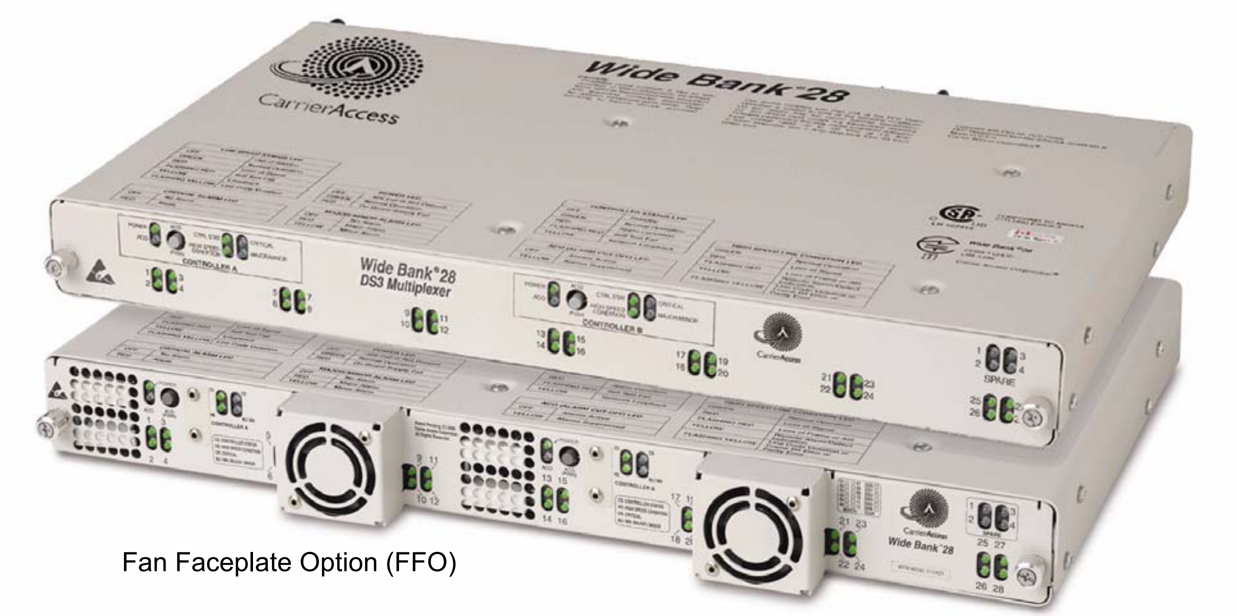
Wide Bank 28 DS3

USER MANUAL



Document: 770-0074-AT

Product Release: 2.4

July 2004

Contact Information:

Carrier Access Corporation
5395 Pearl Parkway
Boulder, CO 80301-2490
Corporate Phone: (800) 495-5455
Fax: (303) 443-5908
www.carrieraccess.com

Customer Support Direct: (800) 786-9929
E-mail: tech-support@carrieraccess.com

PREFACE

In this Preface

Compliance

FCC Requirements, Part 15

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the Federal Communications Rules. These limits are designed to provide reasonable protection against harmful interference when equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

The following cables, when connected to this equipment, must be shielded to maintain FCC Part 15 compliance:

- The Ethernet cable.
- Both Low-Speed (DS1 or E1) cables (LOW-SPEED IN and LOW-SPEED OUT).
- Both RS-232 cables (CLI and TL1).

IMPORTANT NOTE: Unused and unterminated DS1 channels must be turned off to maintain FCC Part 15 compliance. See *Turning Off Unused or Unterminated Low-Speed Channels* on page 6-22.

FCC Requirements, Part 68 Exhibit J1

This equipment complies with Part 68 of the FCC rules. The silkscreen on the top cover of the housing of the Carrier Access Corporation Wide Bank 28 DS3 Multiplexer contains, along with other information, the FCC registration number. You must supply this information to the telephone company, if they request it.

FCC Registration Number: 2Z6USA-32309-XD-N

Service Center in the USA:
Carrier Access Corporation
5395 Pearl Parkway
Boulder, CO 80301-2490

If the Wide Bank 28 DS3 causes harm to the telephone network, the telephone company will notify you in advance. If advance notice proves impractical, the telephone company will notify you as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe such action is necessary.

The telephone company may make changes in its facilities, equipment operations, or procedures that could effect the operation of the Wide Bank 28 DS3. If this occurs, the telephone company will provide advance notice so that you may make necessary modifications to maintain uninterrupted service.

If you need to make repairs or modifications to the Wide Bank 28 DS3, please first contact Carrier Access Corporation for repair and modification information and for warranty information.

If the trouble is causing harm to the telephone network, the telephone company may request that you remove the Wide Bank 28 DS3 from the network until the problem is resolved. User repairs must not be made. Doing so will void your warranty.

To minimize damage caused by local lightning strikes and other electrical surges, it is recommended that the customer install an AC surge arrestor in the AC outlet to which the optional AC to -48VDC Power Converter/Battery Charger is connected.

Safety Requirements for Telecommunications Equipment

The Wide Bank 28 DS3 complies with the following product safety requirements for telecommunications equipment installed in customer premises.

- **National Electrical Code** – overvoltage and power-cross protection on DS1 and E1 lines

For unit cover with CSA logo

- **Canadian Standards Association** – CSA-C22.2 No. 950-95, Standard for Safety for Information Technology Equipment.
- **Underwriters Laboratories** – UL 1950 third edition, Information Technology Equipment

For unit cover with UL logo

- **Underwriters Laboratories** – (Bi-National) Standard for Information Technology Equipment, Including Business Equipment, CAN/CSA 22.2, No. 60950-00 / UL 60950, third edition, dated December 1, 2000.

Industry Canada Requirements

Certification Procedure 01 (CP-01), Issue 8

"**Notice**: This equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). This is confirmed by marking the equipment with the Industry Canada certification number. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Caution: Users should not attempt to make such connections themselves but should contact the appropriate electric inspection authority, or electrician, as appropriate."

Japan Approvals Institute for Telecommunication Equipment (JATE)

In Japan, approvals for connection of telecommunications equipment to the public network are granted by JATE, the Japan Approvals Institute for Telecommunications Equipment. The Wide Bank 28 DS3 JATE file numbers are, CD99-1124JP and L99-1396.

Network Equipment Building System (NEBS) Requirements

The Wide Bank 28 DS3 is certified to meet Network Equipment Building Specifications Level 3 (earthquake Zone 4), Type 2 and 4 requirements for central office/customer-premise products including electrical safety, emissions and immunity requirements for intrabuilding use. This equipment conforms to the Telcordia NEBS standards GR-63 and GR-1089 for intrabuilding only.

Safety Precautions

Refer to the installation chapters of this manual for safe and proper installation procedures.

Notices

This manual contains information and warnings that must be followed to ensure safe conditions for personnel while operating or maintaining the Wide Bank 28 DS3. Safety labels and notes have the following format and definitions:

DANGER! **THE *DANGER!* SIGN DENOTES A HAZARD TO THE USER AND CALLS ATTENTION TO A PROCEDURE, PRACTICE, OR THE LIKE, WHICH, IF IMPROPERLY PERFORMED, COULD RESULT IN INJURY OR LOSS OF LIFE. DO NOT PROCEED BEYOND A *DANGER!* SIGN UNTIL THE NOTED CONDITIONS ARE FULLY UNDERSTOOD AND MET.**

CAUTION! **THE *CAUTION!* SIGN DENOTES THE POSSIBILITY OF NETWORK SERVICE INTERRUPTION AND CALLS ATTENTION TO A PROCEDURE OR PRACTICE, WHICH, IF IMPROPERLY PERFORMED, COULD RESULT IN INTERRUPTION OF NETWORK SERVICE.**

WARNING! **THE *WARNING!* SIGN DENOTES THE POSSIBILITY OF EQUIPMENT DAMAGE AND CALLS ATTENTION TO A PROCEDURE OR PRACTICE, WHICH, IF IMPROPERLY PERFORMED, COULD RESULT IN EQUIPMENT DAMAGE.**

NOTE: The NOTE sign precedes explanatory comments or supplementary instructions.

Electrostatic Discharge Guidelines

ESD can damage processors, circuit cards, and other electronic components. Always observe the following precautions before installing a system component.

1. Do not remove a component from its protective packaging until ready to install it.
2. Wear a wrist grounding strap and attach it to a metal part of the system unit before handling components. If a wrist strap is not available, maintain contact with the system unit throughout any procedure requiring ESD protection.
3. For detailed instructions, see *Static-Sensitive Equipment Handling Procedures* on page 5-3.

WARNING! INTEGRATED CIRCUITS (ICS) ARE EXTREMELY SUSCEPTIBLE TO ELECTROSTATIC DISCHARGE. UNLESS YOU ARE A QUALIFIED SERVICE TECHNICIAN WHO USES TOOLS AND TECHNIQUES THAT CONFORM TO ACCEPTED INDUSTRY PRACTICES, DO NOT HANDLE ICS.

The ESD warning label below appears on packages and storage bags that contain static-sensitive products and components. Static electricity is always present, and using general anti-static procedures will minimize the chances of damage to the Wide Bank.

Warranty

Carrier Access Corporation conditionally warrants to BUYER that PRODUCTS are free from substantial defect in material and workmanship under normal use given proper installation and maintenance for the period of five years from the date of shipment by Carrier Access. An exception is the Battery Unit product, which is warranted for 90 days.

BUYER will promptly notify Carrier Access Corporation of any defect in the PRODUCT. Carrier Access Corporation or its agent will have the right to inspect the PRODUCT or workmanship on BUYER'S or BUYER'S customer premises. Carrier Access Corporation has the option to: (a) repair, replace or service at its factory or on the premises the PRODUCT or workmanship found to be defective; or (b) credit BUYER for the PRODUCT in accordance with Carrier Access Corporation's depreciation policy. Refurbished material may be used to repair or replace the PRODUCT. PRODUCTS returned to Carrier Access for repair, replacement, or credit will be shipped prepaid to BUYER.

Limitations of Warranty and Remedies

Correction of defects by repair, replacement, or service will be at Carrier Access's option and constitute fulfillment of all obligations to Distributor for breach of warranty.

Carrier Access assumes no warranty liability with respect to defects in the Product caused by:

a. modification, repair, installation, operation, or maintenance of the Product by anyone other than Carrier Access or its agent, except as described in Carrier Access's documentation; or
b. the negligent or other improper use of the Product; or
c. handling or transportation after title of the Product passes to Distributor.

Other manufacturer's equipment purchased by Carrier Access and resold to Distributor will be limited to that manufacturer's warranty. Carrier Access assumes no warranty liability for other manufacturer's equipment furnished by Distributor.

Distributor understands and agrees as follows: THE WARRANTIES IN THIS AGREEMENT REPLACE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND ALL OTHER OBLIGATIONS OR LIABILITIES OF CARRIER ACCESS, INCLUDING ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. ALL OTHER WARRANTIES ARE DISCLAIMED AND EXCLUDED BY CARRIER ACCESS.

THE REMEDIES CONTAINED IN THIS AGREEMENT WILL BE THE SOLE AND EXCLUSIVE REMEDIES WHETHER IN CONTRACT, TORT, OR OTHERWISE, AND CARRIER ACCESS WILL NOT BE LIABLE FOR INJURIES OR DAMAGES TO PERSONS OR PROPERTY RESULTING FROM ANY CAUSE WHATSOEVER, WITH THE EXCEPTION OF INJURIES OR DAMAGES CAUSED BY THE GROSS NEGLIGENCE OF CARRIER ACCESS.

THIS LIMITATION APPLIES TO ALL SERVICES, SOFTWARE, AND PRODUCTS DURING AND AFTER THE WARRANTY PERIOD. IN NO EVENT WILL CARRIER ACCESS BE LIABLE FOR ANY SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR COMMERCIAL LOSSES EVEN IF CARRIER ACCESS HAS BEEN ADVISED THEREOF.

No agent, Distributor, or representative is authorized to make any warranties on behalf of Carrier Access or to assume for Carrier Access any other liability in connection with any of Carrier Access's Products, software, or services.

Warranty Product Returns

Before returning any equipment to Carrier Access Corporation, first contact the distributor or dealer from which you purchased the product.

A Return Material Authorization (RMA) number is required for all equipment returned to Carrier Access Corporation. Call Carrier Access Customer Support at (800) 786-9929 or (303) 442-5455 for RMA number, repair/warranty information and shipping instructions. Be prepared to provide the following information:

- Carrier Access Corporation serial number(s) from the system chassis or circuit card(s)
- Name of distributor or dealer from which you purchased the product
- Description of defect

Table of Contents

Preface

1 Introduction

2 Product Description

5 Electrical Installation and Cabling

6 Configuration

7 Diagnostics & Troubleshooting

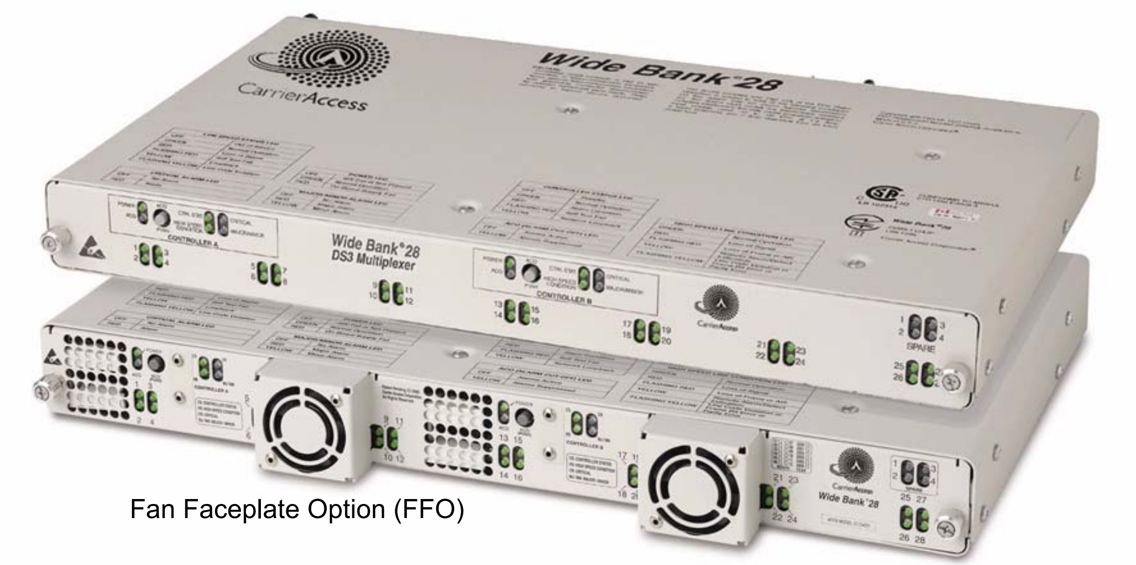
9 TL1 Commands and Messages

CHAPTER 1

Introduction

In this Chapter

System Overview



Carrier Access' Wide Bank 28 DS3 Multiplexer provides a standards-based M1-3 multiplexing function. This product converts a framed Digital Signal Level 3 (DS3) network connection to 28 Digital Signal Level 1 (DS1) connections to T1 facilities, or 21 connections to E1 facilities.

The Wide Bank's modular design provides up to seven active quad DS1 (QDSX) cards or seven active three-channel E1 cards, and one spare circuit card (DS1 or E1), connecting from 4 to 28 DS1 (3 to 21 E1) circuits, as needed. The spare circuit card provides software-controlled redundancy of low-speed interfaces on a 1 to 7 basis. The DS3 Controller Card provides all common electronic functions of power conversion, processing and management, and a single DS3 interface. An optional spare DS3 Controller card in the Wide Bank provides redundancy and protection for both electronic common equipment and a second, redundant, DS3 network connection.

The Wide Bank does not re-frame or re-clock the connected low-speed inputs. It allows T1 or E1 framing to be provided independently by the connected communications equipment at both the near-end and the far-end of the DS3 line. Each T1 or E1 is also independently clocked within the M1-3 formatted DS3 composite. Because of independent clocking and framing capabilities for each of the T1 or E1 connections, the Wide Bank can provide asynchronous T1 or E1 to DS3 multiplexing functions.

The Wide Bank is designed for compact size (one rack unit) and convenient mounting either in standard 19-inch and 23-inch racks or on a wall. It is designed to provide total circuit redundancy and easy maintenance. Integrated self-tests and line tests provide advanced fault isolation. SNMP, command line interfaces, and TL1 connection allow remote management. The Wide Bank is also designed for quick and easy installation. An optional AC to –48VDC power converter and battery backup unit provide protected power. Cabling to the Wide Bank uses connectors to save installation labor.

Features, Functions, and Options

Wide Bank 28 DS3 Features

The Wide Bank 28 DS3 provides:

- Up to 28 DS1 ports with four optional, redundant DS1 circuits
- Up to 21 E1 ports with three optional, redundant E1 circuits
- Up to 2 DS3 ports with network and common electronics redundancy
- Bellcore and ANSI Standards compliance, including Network Equipment Building System (NEBS) standards
- UL 1950 Safety approval and fuseless protection
- There are 3 ports for system management and surveillance: one 9-pin RS-232 port for delivering Command Line Interface (CLI), one 10Base-T Ethernet port for SNMP, Telnet, and TL1, and one 25-pin RS-232 port for TL1 management and Automatic Outbound Alarm Reporting
- Low-speed (DS1 or E1) Network Interface Unit (NIU) loop-up response, loop-down response, and DSX-1 line buildout for DS1 (no line buildout for E1)
- Control Panel LED Test & Status Indicators
- Internal DS3 and low-speed Bit Error Rate Tester (BERT) with industry standard Pseudo-Random Bit Sequence (PRBS) patterns
- Internal self-tests with BERT verification of transmission data paths
- DS3 C-bit application for Far-End terminal alarming, status reporting, and remote loopback initiation
- DS3 C-bit application terminal-to-terminal data link for identification message support and management of the remote terminal using Telnet, SNMP, or TL1 over PPP

DS3 Ports

There are four DS3 connections, two transmit and two receive (75 ohm unbalanced BNC) in the redundant configuration, that make up two DS3 ports. These ports connect to two DS3 interfaces, called Primary and Secondary (the secondary DS3 interface is optional). Each Controller card, also called primary and secondary (the secondary Controller card is optional), has a single DS3 interface.

DS1 and E1 Ports

The Wide Bank's low-speed ports are accessible through two 64-pin connectors. You can use two of Carrier Access' low speed cables to connect 28 DS1s or 21 E1s from standard low-speed patch panels to the Wide Bank 28 DS3.

Any digital equipment may be terminated on both ends at a standard level crossconnect. The crossconnect provides a convenient central facility for circuit rearrangements, patching, and testing.

The Wide Bank's DS1 interfaces provide crossconnects at Digital Signal Crossconnect Level 1 (DSX-1) per ANSI T1.102. The E1 interfaces meet the crossconnect requirements of ITU-T/G.703.

Independent Clocking and Transparent Framing

Because of independent timing and transparent framing, the installation and maintenance of the DS1 or E1 connections are easily managed. Because the Wide Bank 28 DS3 transmits DS1 or E1 streams transparently into a DS3 composite, there are no framing or timing options to set on the 28 DS1 or 21 E1 connections. The Wide Bank transparently passes the framing and clocking as applications change. DS1 line coding, optioned as either AMI or B8ZS, is the only Wide Bank 28 DS3 T1 configuration normally needed to access DS3 carrier services. E1 line coding is fixed as HDB3 and need not be configured to access DS3 carrier services.

By using M1-3 multiplexers, independently clocked DS1 and E1 carrier service connections can be carried in the same DS3 line. Each Wide Bank connection derives clocking from either end of the DS1 or E1 connection, as appropriate for the network requirements.

The Wide Bank 28 DS3 transmits all possible DS1 and E1 framing formats transparently on each of the low-speed connections. Framing transparency allows the customer and end-carriers to frame (or not frame) each of the low-speed connections appropriately for the voice or data application desired. Mixed carrier services can share the same DS3 access line.

DS1 end-to-end transparency for Extended Superframe (ESF) also provides important management capabilities from the end-carriers to the customer. The Wide Bank allows complete ESF communications to each end of the DS1 connection.

Manageability

Carrier Access' Wide Bank 28 DS3 Multiplexer provides configuration management and testing and surveillance using any of the following:

- Command Line Interface (CLI) through a 9-pin RS-232 CLI port
- Command Line Interface using a Telnet session over a 10Base-T connection
- Embedded SNMP agent over a 10Base-T Ethernet connection
- NetworkValet® Enhanced Management System provides network and element management over a 10Base-T Ethernet connection
- TL1 management interface over either a 25-pin RS-232 port or a 10Base-T Ethernet connection
- TL1 Automated Outbound Alarming over either a 25-pin RS-232 port or a 10Base-T Ethernet connection

Security

To control access to user interface functions, the Wide Bank 28 DS3 Multiplexer supports a multiple-level user security system. Basic security, which allows users to be assigned access levels and passwords, is supported by all Wide Banks. Enhanced security, available as the "Security Upgrade" option, provides additional security features, including the ability to disable user interfaces.

Basic Security

Basic security allows CLI users to be assigned access levels based on their requirements. The access level determines which commands are available to the user. The basic security user access levels are:

- ***admin*** – The *admin* user has access to all commands and has the sole authority to grant others access to the system by adding and deleting user names and passwords. There can be only one *admin* user within the system.
- ***rw* (read/write)** – An *rw* user has access to all commands except those for adding users, deleting users, and setting user levels. The *rw* users are typically responsible for the day-to-day operation of the system.
- ***ro* (read only)** – An *ro* user is limited to commands that display status and reports. The *ro* access level permits technicians to monitor system operation and performance, but prevents them from altering settings.

NOTE: In previous releases of the Wide Bank, the security access levels were Level 1, Level 2, and Level 3. These levels correspond to *admin*, *rw*, and *ro*, respectively. If you are upgrading firmware in a Wide Bank that supports the numerical access levels, the Level 1 user is automatically converted to *admin*; Level 2 users are converted to *rw*; and Level 3 users are converted to *ro*.

With basic security, each user can be assigned a password. If security is on and passwords have been assigned, the login process requires both a user name and password. Users can modify their own passwords. If passwords have not been assigned, a user name is required but no password.

When security is off, no password is required, and each user is considered to be at the *admin* level.

Security Upgrade Option

The Wide Bank's Security Upgrade option provides enhanced security features. In addition to the features described for basic security, the Security Upgrade option provides:

- One additional user access level (*secu*, described below)
- Restrictions on the number and types of characters allowed in user names and passwords
- The ability to set a time-out value for CLI sessions
- The ability to individually disable the user interface ports: Ethernet port, 9-pin RS-232 CLI port, and 25-pin RS-232 TL1 port
- The ability to disable SNMP management
- The ability to disable TL1 management

The user access levels available with the Security Upgrade option are:

- ***secu*** – The *secu* user has access to all commands and has the sole authority to grant others access to the system by adding and deleting user names and passwords. The *secu* user also has sole authority to perform such functions as clearing all statistics and logs, configuring IP settings, restoring factory default or previously saved configurations, and configuring the TL1 interface. There can be only one *secu* user within the system.
- ***admin*** – An *admin* user has access to all commands except those assigned exclusively to the *secu* user. Functions available to the *admin* user that are not available to lower-level users include clearing DS1 and DS3 statistics, copying a configuration from the active to standby Controller, setting the system time and date, programming the flash memory, saving a configuration to a TFTP server file, setting various security functions, configuring SNMP, and copying the current configuration to temporary storage.
- ***rw* (read/write)** – An *rw* user has access to all commands except those assigned exclusively to the *secu* and *admin* users. The *rw* users are typically responsible for the day-to-day operation of the system.
- ***ro* (read only)** – An *ro* user is limited to commands that display status and reports. The *ro* access level permits technicians to monitor system operation and performance, but prevents them from altering settings.

NOTE: In previous releases of the Wide Bank, the security access levels were Level 1, Level 2, and Level 3. These levels correspond to *secu*, *rw*, and *ro*, respectively. If you are upgrading firmware in a Wide Bank that supports the numerical access levels, the Level 1 user is automatically converted to *secu*; Level 2 users are converted to *rw*; and Level 3 users are converted to *ro*.

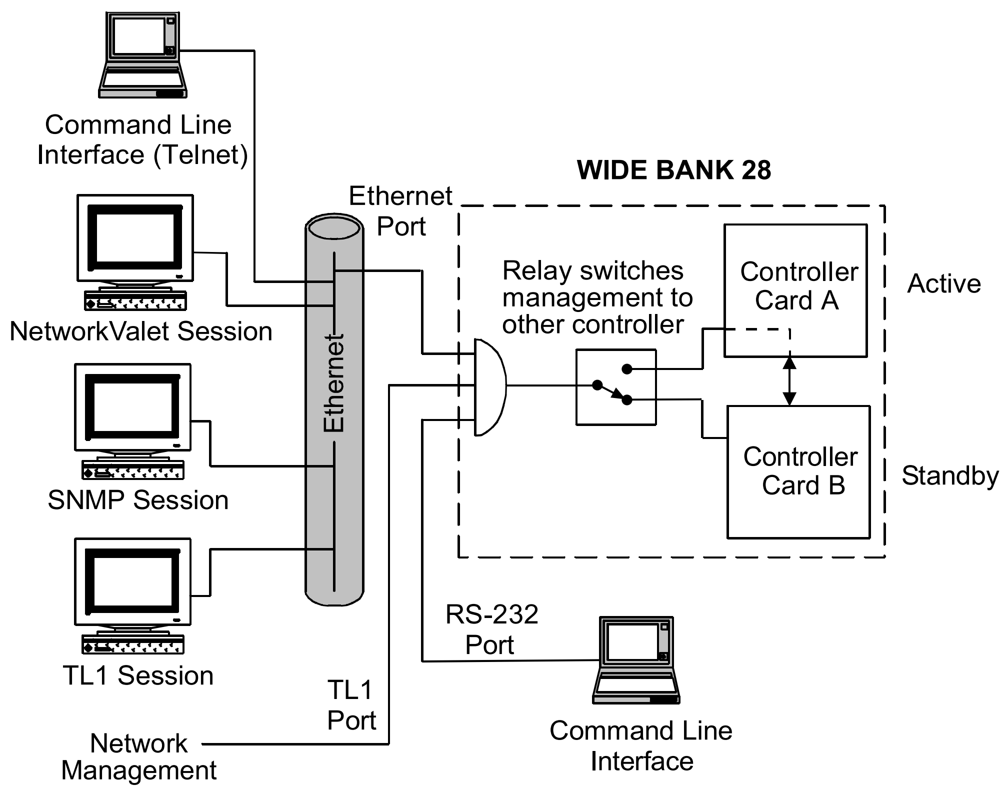
With the Security Upgrade option, passwords are required when security is on. Each user is assigned a password by the *secu* user. Passwords can be modified only by the *secu* user.

When security is off, no password is required, and each user is considered to be at the *secu* level.

Management Capabilities

The Wide Bank 28 DS3 currently provides three management ports for full configuration and monitoring. These ports are:

- One 9-pin RS-232 port for local Command Line Interface (CLI) control
- One 10Base-T Ethernet port for remote SNMP agent, NetworkValet management, Telnet sessions, or TL1 management and Automated Outbound Alarming
- One 25-pin TL1 port for management and Automated Outbound Alarming



Command Line Interface

The command line interface is a simple user interface that controls configuration and maintenance operations. There are two ways to use the command line interface:

- A VT-100 terminal (or a PC running terminal emulation software such as HyperTerminal) connected to the 9-pin (DB9) RS-232 port. The port runs at 9600 baud, 8 data bits, 1 stop bit, no parity, and no flow control.
- A Telnet connection using the 10Base-T Ethernet port. To use Telnet, you must first assign an IP address to the Wide Bank using the RS-232 interface

SNMP

The Wide Bank 28 DS3 contains an embedded SNMP v1 agent that offers the standard MIB II (RFC 1213) in addition to the DS1/E1 MIB (RFC 1406) and the DS3 MIB (RFC 1407).

Also resident are Carrier Access' Wide Bank 28 DS3 enterprise MIBs that provide additional MIB objects.

- DS3 Controller Status
- DS3 identification settings
- DS3 clock settings
- DS3 far-end status
- DS3 line length
- Low-Speed Card Status
- Low-Speed to Low-Speed card association table
- External Power source status
- Traps for CLI Login Failures
- Traps for status changes of DS3 and Low-Speed cards
- Traps for status changes of External Power sources

The network manager can use any SNMP-compatible network management system such as SunConnect's SunNet Manager™, HP OpenView™, or Castle Rock's SNMPc™ to monitor and control the Wide Bank 28 DS3.

You can connect to the SNMP agent through the 10Base-T Ethernet port. Before using the Ethernet port, you must set the IP, mask, gateway, and NMS addresses using the RS-232 command line interface. See Chapter 6 for instructions on how to configure these addresses.

NetworkValet Software

NetworkValet Enhanced Management System provides network and element management with simple graphical user interfaces. The full-featured NetworkValet with alarms and performance monitoring is intended for Network Operations Centers (NOCs).

NetworkValet provides easy management of Carrier Access products including the Wide Bank 28 DS3. It provides the same management functions as CLI, SNMP, and TL1. NetworkValet is a cross-platform Java application that runs on either Microsoft Windows or Solaris based computer systems. Java Runtime Engine (JRE) software for Windows or Solaris is included with the NetworkValet installation program.

NetworkValet sends commands over the carrier's IP network to communicate with the SNMP agent in the Wide Bank 28 DS3. The Wide Bank includes a standard 10Base-T Ethernet port for connection to the hub or network interface, or laptop computer. The Wide Bank 28 DS3 must have FLASH software version 2.00 or higher.

Transaction Language 1 (TL1)

The TL1 Interface provides surveillance and control, provisioning, and testing capabilities between the Wide Bank 28 DS3 and remote operating systems.

- Surveillance includes real-time alarm reports, event reports, threshold crossing alerts, logs, and performance statistics. Control functions include automatic and forced switching of both the low-speed and high-speed circuits.
- Provisioning includes most of the same configuration functions available through the CLI
- Testing includes the ability to initiate, terminate, and get results from all available loop tests

In addition, TL1 provides TL1 Automatic Outbound Alarm Reporting. Automatic outbound alarm messaging is a standards-based ASCII management language defined for TL1-based operations and support systems such as the Telcordia NMA™ network monitoring and analysis system. With this feature, the Wide Bank 28 DS3 will integrate into TL1 alarm-managed networks to provide notification of network and equipment conditions. TL1 is configured using the standard Wide Bank Command Line Interface (CLI). The Wide Bank supports three simultaneous TL1 sessions via the TCP/IP Ethernet port, one session via the RS-232/TL1 port, and one session via Telnet using the CLI “tl1” command.

Chapter 2

Product Description

In this Chapter

Overview

The Wide Bank 28 DS3 Multiplexer is available in increments up to the maximum of seven four-channel DS1 cards supporting 28 DS1 connections, or with seven three-channel E1 cards supporting 21 E1 connections. Built-in options include 1:7 low-speed electronic redundancy, 1:1 Controller electronics redundancy and electronics redundancy with 1+1 network protection. The unit features solid-state fuseless protection, low power consumption, hot card swapping, DS3 and low-speed (DS1 or E1) loopbacks for fault isolation, built-in PRBS Bit Error Rate Testing (BERT), and integrated Network Interface Unit (NIU) functionality. Configuration and maintenance testing is provided by a command-line interface or an SNMP interface.

The Wide Bank 28 DS3 Multiplexer supplies clear-channel DS1/E1 transport, is transparent to DS1/E1 framing, and provides basic DS1/E1 performance monitoring.

Features

- Single Standard Rack Unit (1 RU) size
  WxDxH: 17 x 10 x 1.75 inches (43.2 x 25.4 x 4.45 cm)
- 75 ohm unbalanced BNC DS3 input standard
- Dual independent –48 VDC power feeds with optional AC to DC power converter/battery charger and eight-hour battery backup system
- High-level integration reduces power consumption to less than 36W for a fully-redundant configuration with fan faceplate
- Solid-state, fuseless, overvoltage/overcurrent protection with automatic reset and alarmed overcurrent protectors
- Optional DS3 redundancy for either:
  - Protected electronics (1:1), or
  - Protected electronics and “hitless” network protection (1+1). Requires second independent DS3 input.
- 1:7 by 4 DS1 electronic redundancy, or 1:7 by 3 E1 redundancy
- Built-in automatic self-tests for all internal circuitry and transmission data paths to determine network vs. electronic faults
- Integrated Network Interface Unit (NIU) functionality provides DS3 loopbacks with AIS toward the low-speed CPE
- IP routing with Point-to-Point Protocol over a C-bit data link for management of remote unit
- DS3 C-bit path maintenance data link

- DS3 C-bit far-end alarm, statistics, and control
- Ability to use TFTP to upload and download a configuration file to a file system on an IP host (This function provides the ability to easily load multiple Wide Banks with the same configuration).
- Remote and local low-speed loopbacks with built-in *PRBS* for fault isolation on all active and standby low-speed interfaces
- Remote and local DS3 loopbacks with built-in *PRBS* test pattern generation for fault isolation
- Transparent framing for DS1 or E1 channels
- Individual DS1 support for AMI or B8ZS line coding
- Individual E1 support for HDB3 line coding
- Individual DS1 transmit line buildout (LBO) adjustments to 655 feet
- DS3 line buildout (LBO) adjustments to 450 feet
- DS1 transmit jitter attenuation and receive jitter tolerance
- External critical and major/minor alarm relay contacts
- DS3 clock source from DS3 network, internal Stratum 4E, or external coax input
- Maintenance Service Option (MSO) that maintains T1 or E1 service on the spare low-speed card while swapping failed electronics
- Fan Faceplate Option (FFO), with dual independent fan design, allows direct metal-to-metal stacking of Wide Banks in high-density applications where passive cooling is not sufficient. (Direct stacking of Wide Bank products with other unapproved equipment is not recommended and could lead to excessive heat buildup.)
- Automatic monitoring for fan presence and fan failure, fault-tolerant fan redundancy, and in-service hot swapping of FFO assembly in less than 30 seconds eliminates traditional fan maintenance concerns

Redundant Architecture

The Wide Bank 28 DS3 multiplexer uses two DS3 processors, which handle the DS3 interfaces, and a backplane bus that accesses the low-speed interfaces. It also contains up to seven active low-speed circuit boards and one optional spare circuit board that connect to the low-speed interfaces.

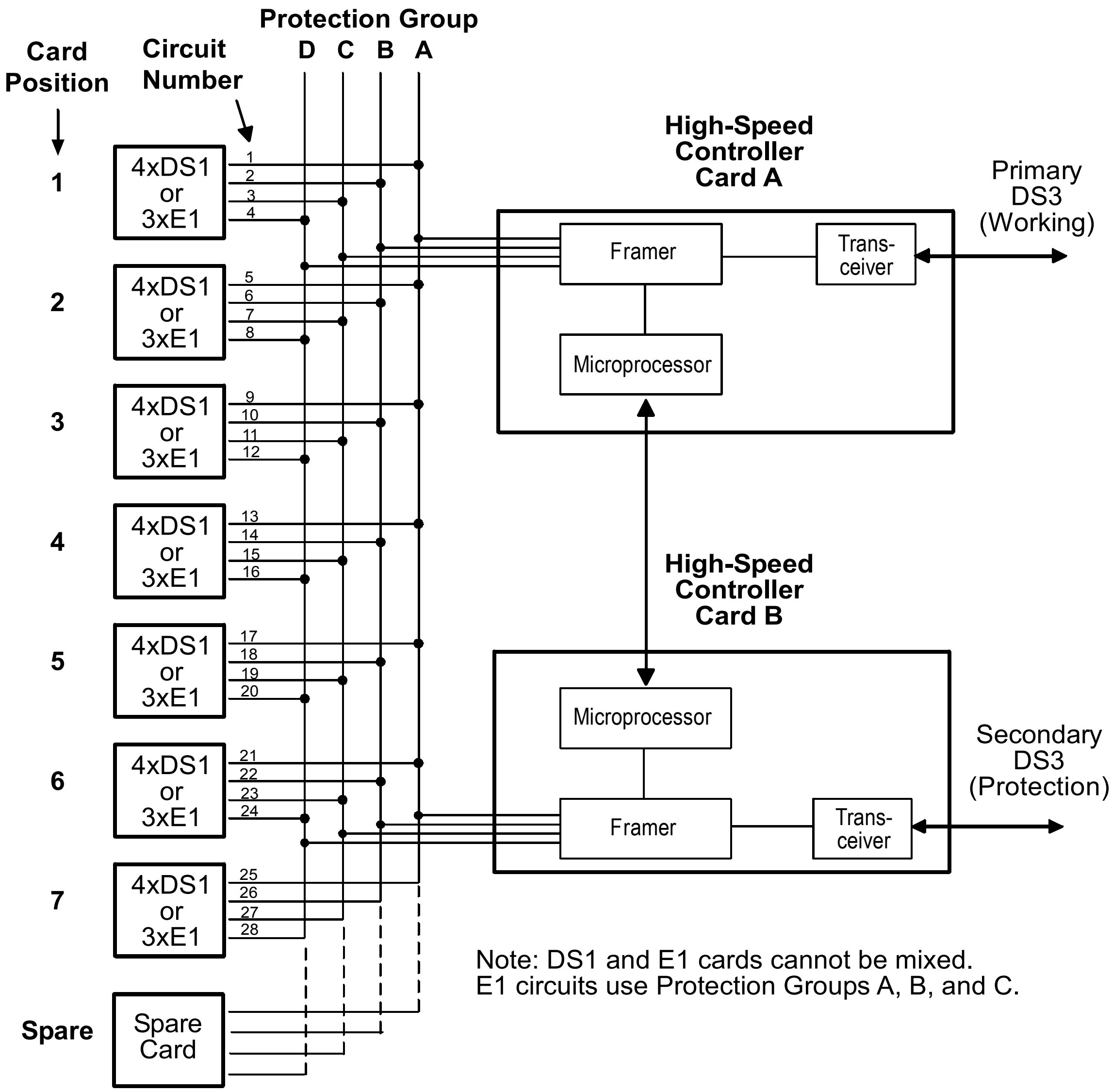
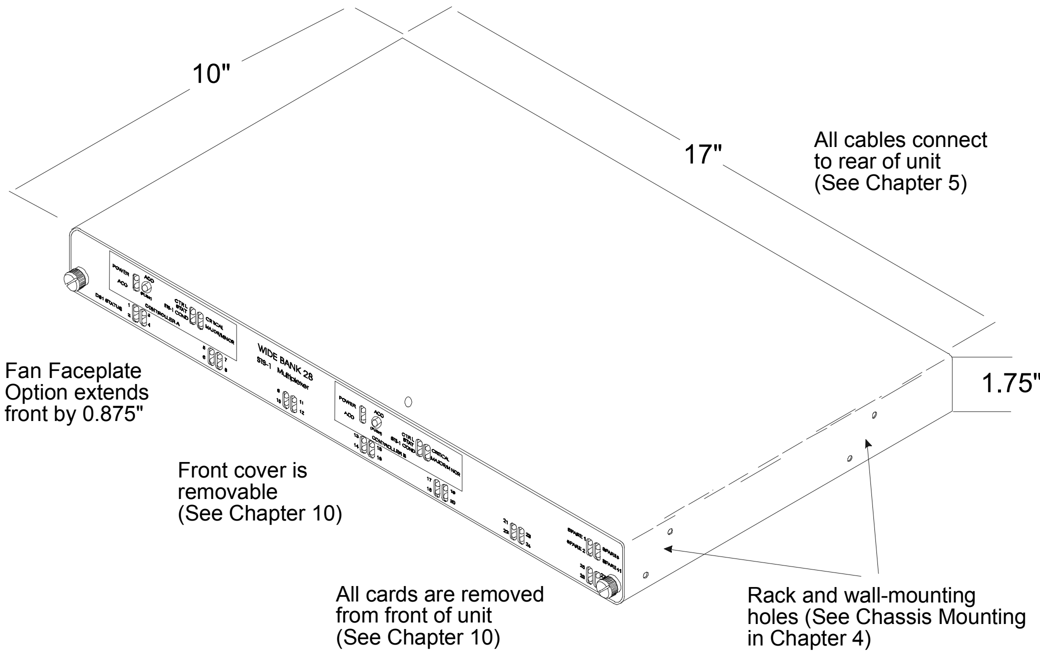


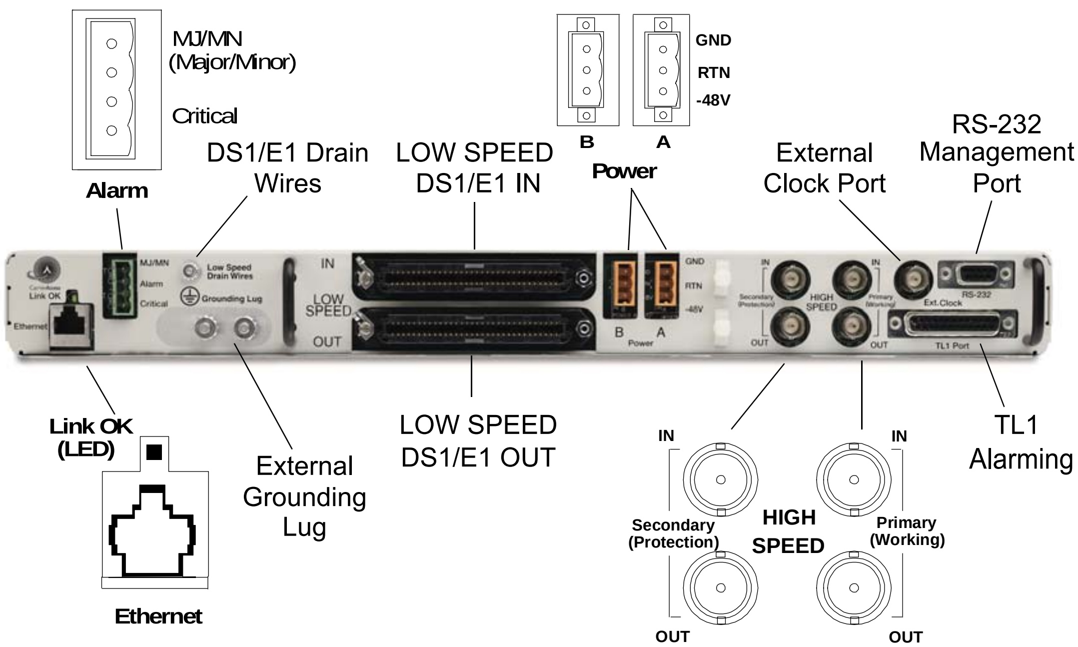
Figure 2-1 Functional Block Diagram

Physical Characteristics



Connector Panel Interfaces

The connector panel on the rear of the chassis housing contains the following connectors and power connection terminals.



- **Low-Speed Connectors.** Together these two 64-pin Champ type connectors support 28 DS3 or 21 E1 ports. One is designated as LOW SPEED IN, and the other is designated as LOW SPEED OUT. The cable connecting to these ports (the same cable is used on both ports) has a male 64-pin Amphenol® connector on both ends for connections between the patch panel or other equipment, and the Wide Bank 28 DS3. (Cables are available in 10-foot and 25-foot lengths.)
- **DS3 Connectors.** There are four DS3 connections: Primary (Active) in and out, and Secondary (Protection) in and out, which make up two DS3 ports. Each Controller card has a single DS3 interface, so the Wide Bank 28 DS3 must have two Controller cards installed to have two DS3 ports available.
- **Ethernet Connector.** The Ethernet interface (RJ-45) provides management access to the Wide Bank 28 DS3. The LED associated with the Ethernet port provides a carrier-detect indicator for the 10Base-T connection when green.
- **RS-232 Monitor Connector.** This is an RS-232 port (DB-9 female) that can connect to a VT-100 terminal or a PC with terminal emulation software to manage the active Controller card via the Command Line Interface (CLI).
- **RS-232 TL1 Connector.** This is an RS-232 port (DB-25 female) for Automated Outbound Alarming and Wide Bank management from a remote operating system.

- **External Clock Connector.** An external DS3 clock connector (75-ohm unbalanced BNC) is provided for clocking the unit from an external 44.736 MHz timing source, when required.
- **Alarm Connector.** The alarm contacts are on a 4-position wiring block connector. There are contacts for a critical alarm and for a combined major/minor alarm. The contacts can be programmed to be normally open or normally closed. One cable connector, which can be wired to externally-powered alarm monitor or indicator, is provided with each Wide Bank 28 DS3. For wiring information, see *External Alarm Wiring on page 5-12*.
- **Power Connectors.** Power connections are made to the –48 VDC power connector input with a three-position removable wiring connector. An 8-foot DC power cord is provided with each Carrier Access Corporation 120 VAC to –48 VDC Power Converter/Battery Charger. There are two independent power receptacles on the rear of the Wide Bank, labeled A and B. Power connector A supplies –48 VDC to the power supply on Controller card A, and power connector B supplies –48 VDC to the power supply on Controller card B. For wiring information, see *Wiring the Power Plugs on page 5-14*.

  The Controller cards are designed to provide power to each other if a power failure occurs. If only power connector A has a power source plugged into it, the power converter for Controller card A will supply power to the entire system including Controller card B. However, if Controller card A is removed, Controller card B will no longer receive power. The same is true (in reverse) if only power connector B has a power source.

WARNING! **FOR REDUNDANT OPERATION BOTH CONTROLLER CARDS MUST RECEIVE POWER AND BOTH POWER CONNECTORS MUST HAVE A POWER SOURCE PLUGGED INTO THEM. IT IS RECOMMENDED, AND IS STANDARD PRACTICE, THAT THE TWO –48V POWER SOURCES BE INDEPENDENT TO MAINTAIN PROPER REDUNDANCY AND PROTECTION.**

Framing Modes

The Wide Bank 28 DS3 can be configured for either M23 or C-bit framing. The major difference between M23 framing and C-bit parity framing is that M23 framing uses the C-bits to indicate stuffing, while C-bit parity framing does not.

With M23 framing, all three C-bits in a subframe are set to one (1) if stuffing occurs, or to zero (0) if stuffing does not occur.

C-bit parity framing does not require stuffing indication (stuffing is always present), so the C-bits are used for other applications. These other applications and how the C-bits are used to accomplish them are described in the following text and figures.

Additional Functions Available in C-Bit Mode

When configured for C-bit framing, the Wide Bank 28 DS3 provides the following functions, which are not available in M23 framing:

- Control of C-bit loopbacks for low-speed and DS3 using the loopup and loopdown commands
- The third C-bit in M-subframe 1 provides a far-end alarm and control signal. This signal is used to send alarm or status information from the far-end to the near-end and to initiate low-speed and DS3 loopbacks at the far-end terminal from the near-end terminal. See _Testing the DS3 Far-End with Loopback Tests on page 7-37_.
- Automatic receipt of far-end alarms
- The alarms are sent automatically and result in a minor alarm indication on the Wide Bank 28 DS3. See _DS3 Far-End Alarms and Control (FEAC) on page 12-4_.
- Controlled receipt of far-end statistics and status
- Separate commands for statistics and status must be issued from the Wide Bank to cause the network to send the information. See _DS3 Far-End Statistics on page 7-7_.
- Point-to-Point Protocol (PPP) IP communication over C-bit link
- This provides an IP connection over the C-bit data link instead of the Ethernet port, and provides management access equal to the Ethernet port. See _Management Interfaces on page 8-2_.
- Controlled receipt of PPP link status
- A command issued from the Wide Bank causes the network to send the information. See _Point-to-Point Protocol Status on page 7-8_.
- A terminal-to-terminal Path Maintenance Data Link

- The Path Maintenance Data Link is a 28.2 Kbps terminal-to-terminal data link embedded in the C-bits. See _DS3 Path Maintenance Data Link on page 7-7_.
- The ability to send a DS3 idle code to the network
- The DS3 idle code means that the DS3 is not carrying traffic

DS3 Multiframe Structure

The DS3 signal is partitioned into multiframes (M-frames) of 4760 bits each. The M-frames are divided into seven M-subframes, each having 680 bits. Each M-subframe is further divided into eight blocks of 85 bits, 84 of which are payload and one bit for frame overhead.

The structure of the DS3 multiframe is the same for both M23 and C-bit framing. As stated above, the C-bits are used for different purposes.

Figure 2-2 shows how the frame is structured with the C-bits highlighted. Figures 2-5 through 2-8 provide details about the individual subframes.

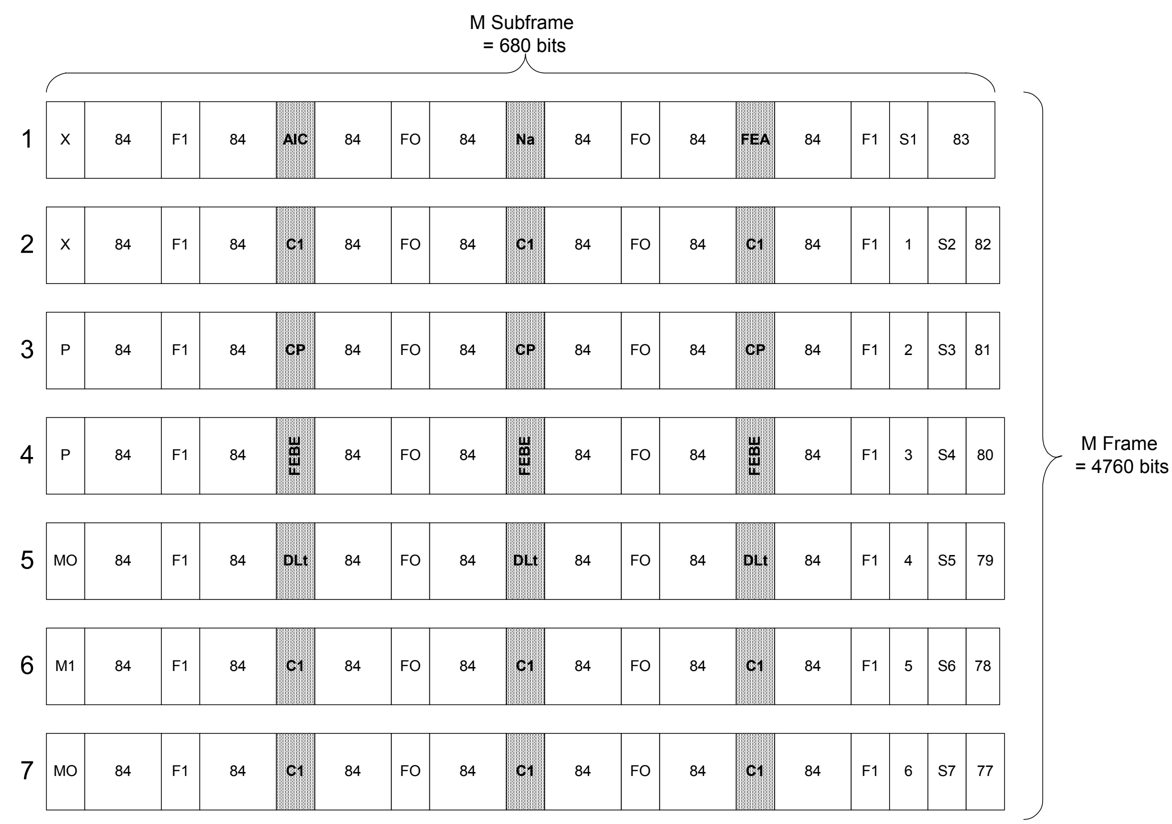


Figure 2-2 Multiframe Structure

X-Bits - Error Message from Far-End to Near-End

The X-bits, located in the first bit position of both M-subframe 1 and M-subframe 2 (see Figure 2-2), are both set to zero (0) if a Loss-of Signal (LOS), Out-of-Frame (OOF), or Alarm Indication Signal (AIS) is detected at the far-end during any one-second interval. This signal is transmitted to the near-end for one second, then the X-bits return to their normal condition (both ones). X-bit states of 01 or 10 are abnormal and are ignored by the near-end.

Application Identification Channel (AIC) Bit

The first C-bit in M-subframe 1, the AIC bit, indicates whether the far-end equipment is set for C-bit parity framing (1), or M23 framing (random 1s and 0s). See Figure 2-3.

Reserved Network Application (Na) bit

This bit is always a one (1). See Figure 2-3.

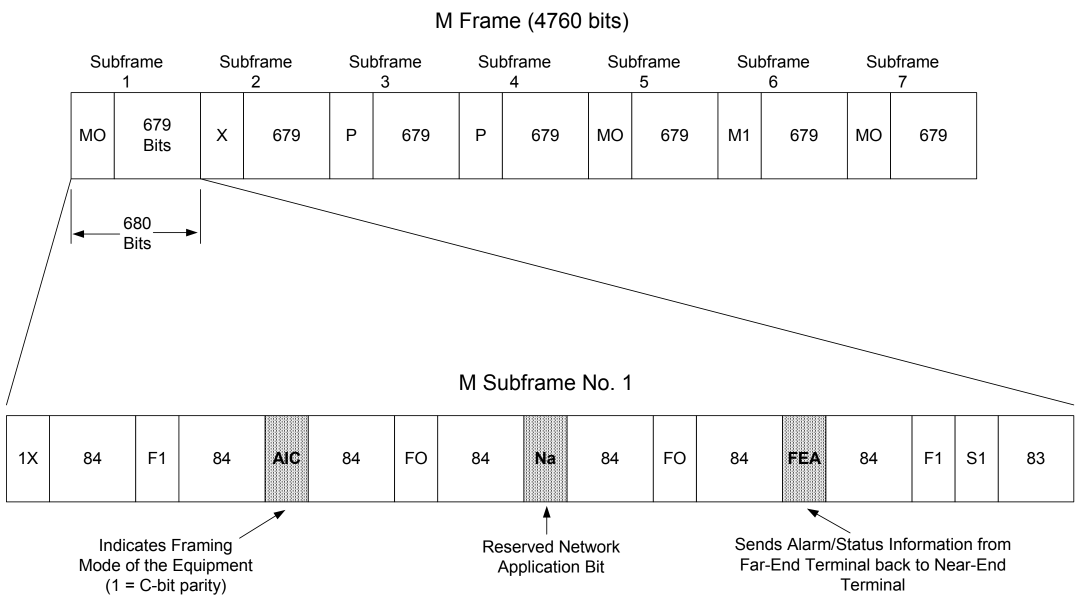


Figure 2-3 Subframe 1 C-bits

Far End Alarm (FEA) Bit

The FEA bit is used for two purposes: (1) as a far-end channel to send alarm and status information from the far-end to the near-end, and (2) to initiate from the near-end, DS3 and low-speed loopbacks at the far end terminal. A 16-bit code is transmitted serially over this one-bit channel, least-significant (right-end) bit first, to indicate one of eleven conditions. The format of the 16-bit code is: 0XXXXXX0 11111111 (where X can be a 1 or a 0).

Table 2-1 FEA Bit Far-End Alarm and Status Channel Codes

	Alarm or Status Condition	16-Bit Code
1	DS3 equipment failure (service-affecting)	00110010 11111111
2	DS3 LOS	00011100 11111111
3	DS3 out-of-frame	00000000 11111111
4	DS3 AIS received	00101100 11111111
5	DS3 IDLE received	00110100 11111111
6	DS3 equipment failure (not service-affecting)	00011110 11111111
7	Common equipment failure (not service-affecting)	00111010 11111111
8	Multiple LS LOS	00101010 11111111
9	LS equipment failure (service-affecting)	00001010 11111111
10	Single LS LOS	00111100 11111111
11	LS equipment failure (not service-affecting)	00000110 11111111

CP Bits

The three C-bits of Subframe 3, called the CP bits, are used to transport DS3 parity information. At the DS3 transmit location, they are set to the same value as the P-bits of Subframes 3 and 4. See Figure 2-4 and Figure 2-5.

P-Bits

The first bit of both Subframes 3 and 4 are called P-bits. They are used as parity indication bits for information bits, and are monitored for indications of DS3 signal errors. See Figure 2-4 and Figure 2-5.

Far-End Block Error (FEBE) Bits

If an incoming path error (framing error or parity error) is detected at the receiving side, the three FEBE bits are set to any combination of 1s and 0s except 111, and sent to the far-end terminal. A setting of 111 means there are no framing or parity errors. See Figure 2-5.

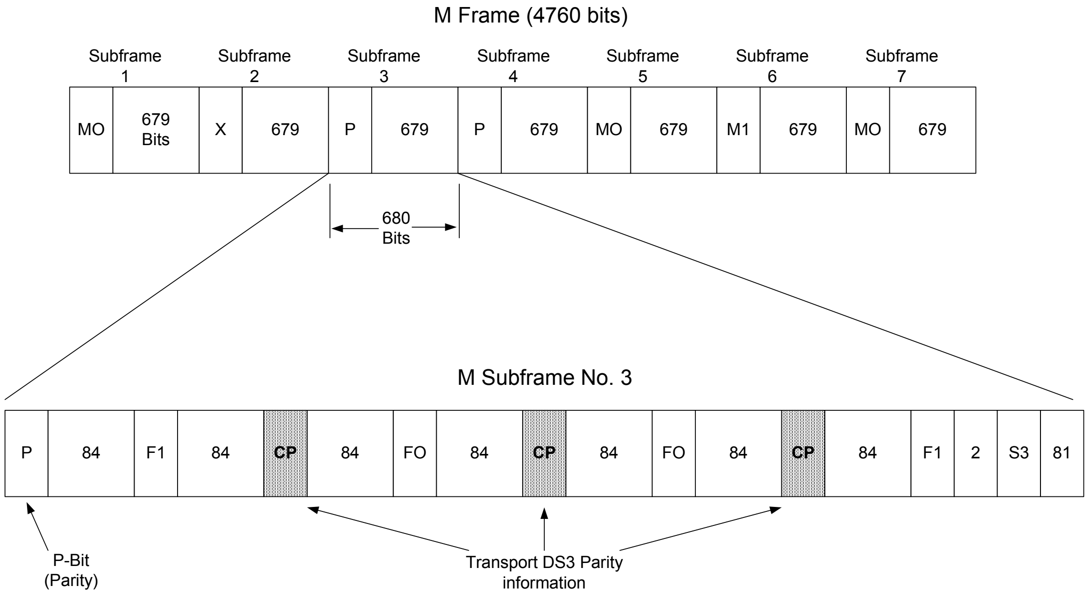


Figure 2-4 Subframe 3 C-bits

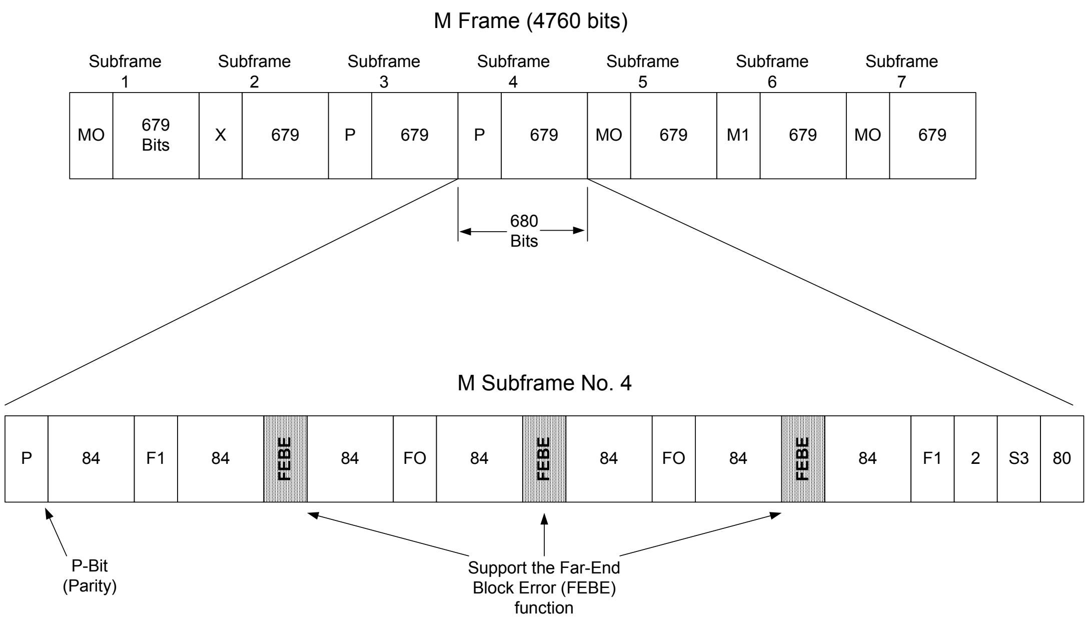


Figure 2-5 Subframe 4 C-bits

DL_t Bits

The three C-bits in Subframe 5, called the DL_t bits, are assigned as a 28.2-Kbit/s terminal-to-terminal path maintenance data link. This link uses a link access procedure on the D-channel (LAPD) to transmit the DS3 path identification number, DS3 idle signal identification, and DS3 test signal identification. See Figure 2-6.

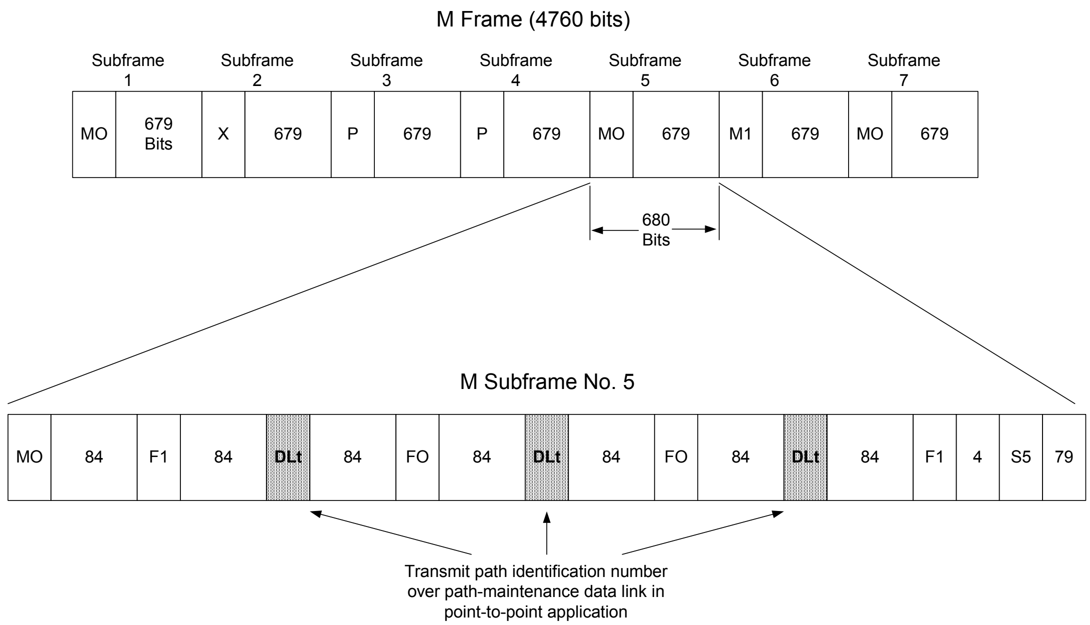
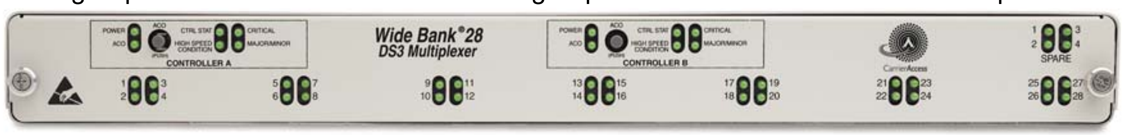


Figure 2-6 Subframe 5 C-bits

LED Test and Status Indicators



CS - CTRL STAT (DS3 CONTROLLER STATUS)	
LED State	Meaning
OFF	Standby
GREEN	Normal (Active) Operation
RED	Alarm Condition
RED Flashing	Self-Test Fail
YELLOW	Network Loopback

CR - CRITICAL ALARM	
LED State	Meaning
OFF	No Alarms
RED	Traffic-Affecting Fault

MJ/MN - MAJOR/MINOR ALARM	
LED State	Meaning
OFF	No Alarms
YELLOW	Minor Alarm
RED	Major Alarm

POWER	
LED State	Meaning
OFF	-48V Input Power Is High, Low or Missing, or -48V Internal Power Failed
GREEN	Normal Operation
RED	5V Onboard Power Supply Failed

ACO - ALARM CUTOFF	
LED State	Meaning
OFF	Alarms Active
YELLOW	Alarms Suppressed

HS - HIGH SPEED LINE CONDITION (DS3 CONDITION)	
LED State	Meaning
GREEN	Normal Operation
RED	Loss of Signal
RED Flashing	LOF or AIS Received
YELLOW	Remote Alarm Detection
YELLOW Flashing	Line Code Violation, Frame Bit Error, or Parity Error

LS - LOW SPEED STATUS (DS1, E1 & SPARE CIRCUITS)	
LED State	Meaning
OFF	Off Line
GREEN	Normal Operation
RED	Loss of Signal or Metallic Loopback
RED Flashing	Self-Test Fail
YELLOW	Line or Equipment Loopback
YELLOW Flashing	Line Code Violation

ETHERNET STATUS (On Rear Panel)	
LED State	Meaning
OFF	No Power or No Link
GREEN	Link OK

Figure 2-7 Wide Bank Test and Status Indicators

Critical and Major/Minor Alarm Definitions

Table 2-2 lists the events that cause critical and major/minor alarms. Any one of the critical alarm events cause the Critical Alarm LED to light red, activate the critical alarm relay contacts, and record appropriate log entries. Any one of the major/minor alarm events cause the Major/Minor Alarm LED to light red (major) or yellow (minor), activate the major/minor alarm relay contacts, and record appropriate log entries. When the alarm event no longer exists, the LED and the relay contacts revert to the non-active state but the log entries remain.

Line Code Violations and Bipolar Violations

Line Code Violations (LCV) are used to determine alarm events that are typically a result of deteriorating transmission line integrity. The calculation of LCVs, and Bit Error Rate (BER) in the Wide Bank 28 DS3 is as follows:

BPV (Bipolar Violations). The occurrence of a pulse of the same polarity that is not part of a zero suppression signature.

EXZ (Excessive Zeros). A string of more than 3 consecutive zeros for E1 and DS3 data, or 7 consecutive zeros for DS1 B8ZS, or 15 consecutive zeros for DS1 AMI

LCV. Total number of BPVs and EXZs.

BER. Number of LCVs in time window divided by number of bits in time window.

LCVs are also used to determine when a DS3 switching event takes place (DS3 threshold). See*DS3 THRESHOLD on page 8-42*.

NOTE: When DS3 protect is turned on and there is a bit error rate (BER) exceeding $1x10^{-3}$, the active Controller executes a protection switch to the standby Controller regardless of the DS3 threshold setting.

Table 2-2 lists all possible alarm events. All alarms are recorded in the event log, which can be accessed through the command line interface.

Table 2-2 Alarm Events

Critical Alarm Conditions	Major/Minor Alarm Conditions	Status Only (Logged event only)
DS3 Receive AIS	–48V Input Missing or Failed	DS3 Controller Switch occurred
DS3 Loss of Signal	Controller Card Removed	DS1 (E1) Switch occurred
DS3 Loss of Frame	DS1 (E1) Card Removed	
DS3 Receive RAI	DS1 (E1) Hardware Failure	
	DS1 (E1) LOS	
	DS1 (E1) Major LCV	
	DS1 (E1) MSO Electronics Card Removed	
	DS1 (E1) Self-Test failure	
	DS1 (E1) Spare Card Conflict	
	DS1 (E1) Transmit Failure	
	DS3 Far-End alarm	
	DS3 Major LCV Errors > 10^{-4} (if threshold not set)	
	Fan Faceplate Not Installed (maj) (FFO only)	
	Fan Failure A or B fan (maj) (FFO only)	
	Far-End multiple DS1 (E1) LOS	
	Far-End single DS1 (E1) LOS	
	On Board Power Supply failure	
	Standby Card Failure	
	Temperature too High	

NOTE: These alarms are defined for the control panel LEDs, connector panel Alarm connections, and for the Command Line Interface. AIS, RAI, DS3 Far-End alarm, Far-End single DS1 (E1) LOS, and Far-End multiple DS1 (E1) LOS are reported as events via TL1. DS3 Major LCV Errors are not reported via TL1.

Controller and DS3 Redundancy

Protection Modes

The Wide Bank can be provisioned with one or two Controller cards and connections to one or two DS3 lines to provide the following levels of protection:

- Electronics Protection – When provisioned with two Controller cards and only one DS3 line, only the Controller cards can be protected.
- Electronics and Network Protection – When provisioned with two Controller cards and two independent DS3 lines, both the Controller cards and the DS3 lines can be protected.

Electronics Protection Mode

In this mode there are two Controllers available to the Wide Bank but only one DS3 line.

The electronics mode of protection provides Controller card redundancy. Because there is only one DS3 connected, there is no DS3 redundancy. The receive path from the DS3 line is simultaneously applied to the receiver of both Controller cards (see Figure 2-8). This enables both Controllers to monitor the condition of the DS3 line so both are continuously framed up to the incoming signal. The controller-select signal disables the outputs of the low-speed receive paths on the standby Controller and enables the low-speed receive paths on the active Controller. The active Controller's transmit signal is connected to the transmit path of the DS3 line through a relay, while the standby is disconnected until a protection switch occurs.

The automatic redundancy mode is used to enable and disable protection switching. If arm is enabled (*arm on*), and the redundancy control process determines the active Controller is malfunctioning, or a maintenance switch is invoked (the switch command), a protection switch will occur. This means that the active Controller relinquishes control to the secondary Controller. This is done by enabling the standby Controller's receive path and disabling the originally active Controller's low-speed receive path (controller-select signal) and switching the output paths so that the transmit path of the DS3 line is connected to the standby Controller. Service interruptions (hits) will be taken on both the DS3 and low-speed connections during this type of switch. However, because the standby Controller is already framed up to the incoming signal, the hits are minimal.

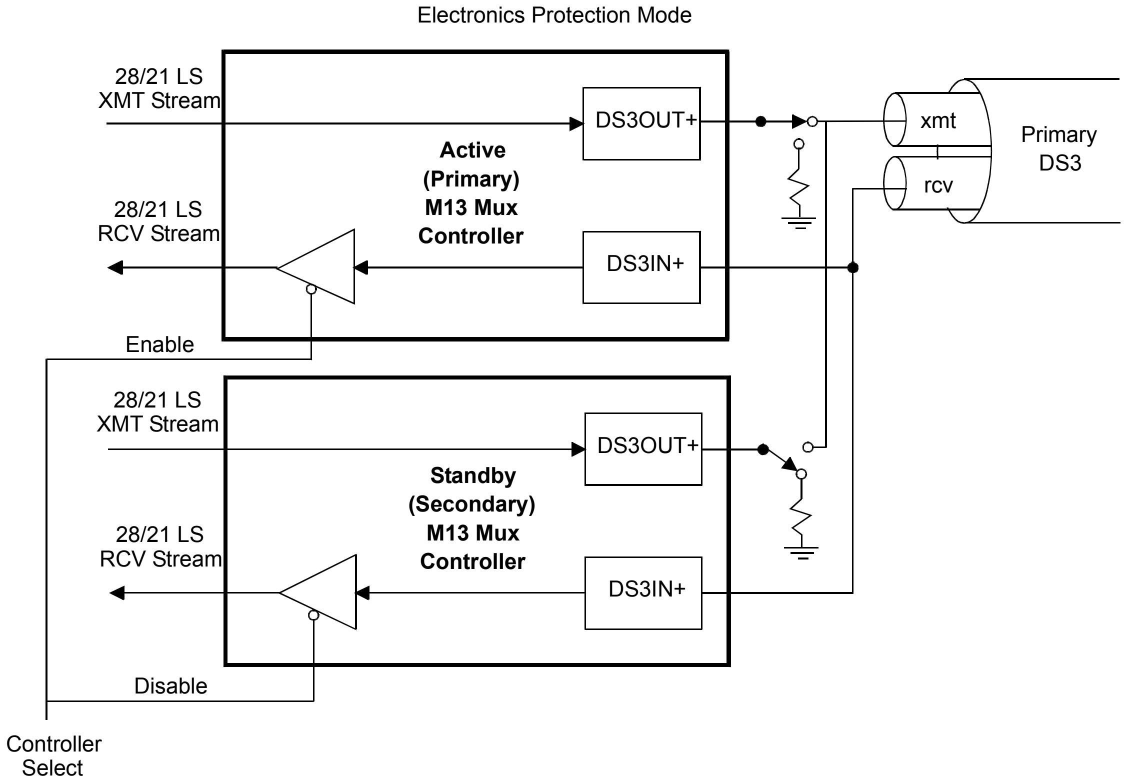


Figure 2-8 Electronics Protection Mode of the Wide Bank 28 DS3

If revertive switching is enabled (*revertive ds3 on*), after a five minute delay the Wide Bank will rearm the automatic protection switching. No automatic switchback will occur (as with Network Protection) but if the currently active Controller malfunctions, another protection switch will occur. If revertive switching is not enabled (*revertive ds3 off*), no protection switch-back will occur.

NOTE: Revertive switching (*revertive ds3 on*) has different effects for Electronic Protection and Electronic and Network Protection. Please read both descriptions to determine the differences.

Setting the Arm and Revertive Software Switches

Arm and **revertive** are interactive. They interact as follows:

- Arm and revertive can both be on (factory default)
- Turning revertive on also turns arm on
- Arm can be on when revertive is off
- If both arm and revertive are on, you cannot turn arm off (*arm off* command) without first turning revertive off (*revertive ds3 off* command)
- If both arm and revertive are off, an *arm on* command only turns on arm
- If both arm and revertive are off, a *revertive ds3 on* command turns on both arm and revertive

Electronics and Network Protection Mode

The highest level of protection, electronics and network protection, allows both the Controller cards and the DS3 lines to be switched. This mode is available with two Controllers and two active DS3 lines. Switching must be enabled (*arm on*) and protection must be enabled (*DS3 protect on*).In this mode, the primary Controller is connected to the primary DS3 line and the secondary Controller is connected to the secondary DS3 line. The low-speed transmit streams are multiplexed, framed and simultaneously broadcast on both the primary and secondary DS3 lines, thus transmitting the identical payload to the far-end service and protection line. Also, each Controller is framed up to its respective DS3 line and the controller-select signal determines which Controller has access to the low-speed cards, and thus carries the service.

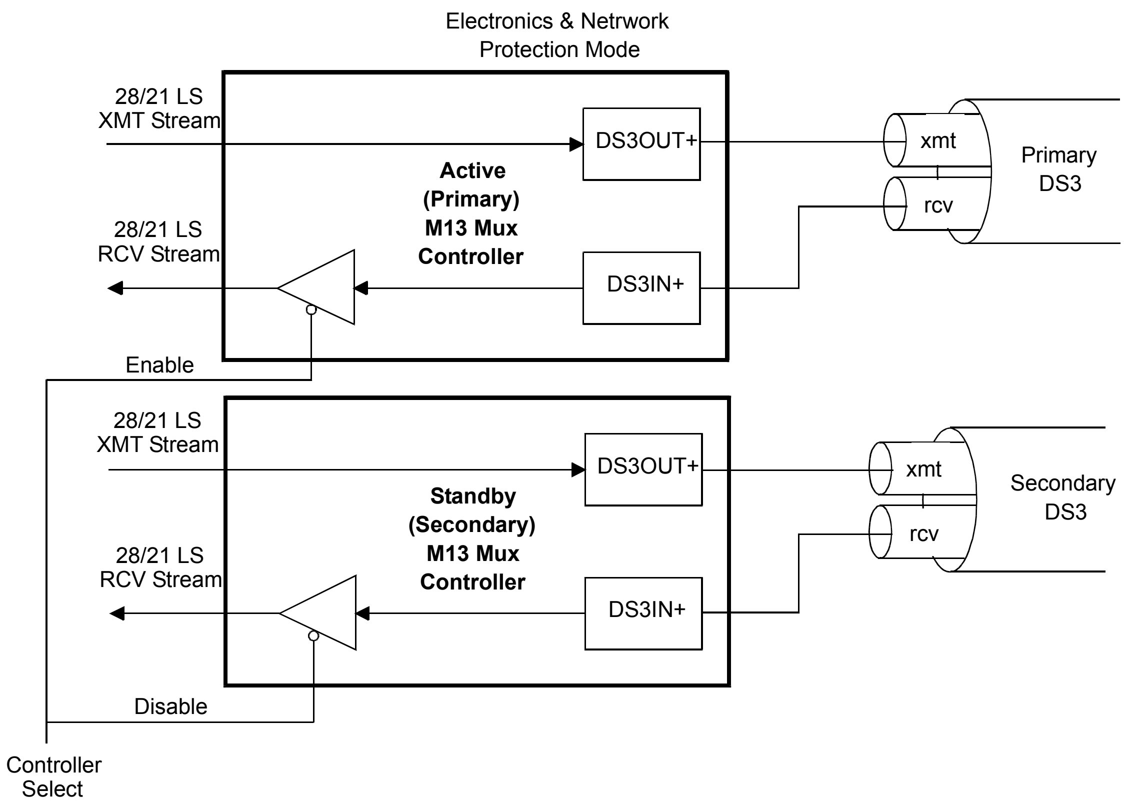


Figure 2-9 Electronics and Network Protection Mode of the Wide Bank 28 DS3

If the active Controller malfunctions, the DS3 line condition deteriorates, or a maintenance switch is invoked (the *switch* command), a protection switch will occur. The Wide Bank will enable the secondary DS3 path through the other Controller card. If revertive switching is enabled (*revertive ds3 on*), there will be a five minute delay (beginning when the previously-active Controller's error rate equals zero). Then the Wide Bank will switch back to the previously-active Controller and DS3 line, provided that there is no longer a malfunction in that path during the five-minute delay. If revertive switching is not enabled (*revertive ds3 off*), no switch-back will occur.

The Wide Bank switching performance complies with Telcordia TR-TSY-752, paragraph 8.4, sub-paragraph 1, which states that no more than 10 bit errors are caused by the switching operation, and also that the switching operation is accomplished within 250 ns.

The threshold at which DS3 switching takes place is determined by an LCV count within a certain length of time. This threshold can be set for different values using the *DS3 threshold* command, which is explained in detail in *DS3* in Chapter 8. For a definition of LCVs, see *Line Code Violations and Bipolar Violations on page 2-15*.

NOTE: After a power cycle or switching event, switching cannot occur again until the original Controller and DS3 line have experienced five minutes of error-free operation. The five-minute delay is built-in, and conforms to standards to prevent oscillation during poor DS3 line conditions.

Operator-Initiated Switch

A switch of Controllers can be initiated manually by using the switch command. At the prompt, enter the switch command:

(A: Active)> switch

If the secondary Controller is fully functional, the switch is initiated immediately.

If the secondary Controller is considered non-functional by the processor, a prompt will ask to continue. If the choice is to continue with the switch, the switch is initiated unless the secondary Controller is experiencing catastrophic failure, in which case the switch is aborted. If revertive switching is enabled in network protection mode, the switch will last only five minutes. The Wide Bank will then switch back to the original state if the originally active path is error-free.

Restoring to Original Status (Revertive Switching)

Once a switch has occurred, another switch back to the original status (revertive switching) can sometimes occur, depending on certain configurations and equipment status, described below.

Revertive Switching with Electronics Protection

When using electronics protection (two Controller cards and one DS3 line), a switch to the standby Controller card cannot revert automatically. After five minutes automatic protection switching is rearmed, allowing another switch if subsequent errors occur. Without errors, a switch back to the originally active Controller card must be initiated using a *switch* command.

Revertive Switching with Electronics and Network Protection

When using network protection (two Controller cards and two DS3 lines), switching can be configured so that it can automatically revert to original state (after five minutes of error-free operation on the original Controller). Then the original Controller and the original DS3 line again carry the traffic. To configure revertive switching, set *revertive ds3 on* and *arm on*.

To configure network protection mode for non-revertive (one-shot) switching, set *revertive ds3 off* and *arm on*. Once a switch occurs with this configuration, switching back requires a manual switch (*switch* command) or a configuration change.

To configure electronics protection or network protection modes for no automatic switching, set *revertive ds3 off* and *arm off*. With this configuration a switch will occur only if there is a catastrophic equipment failure or a manual switch is initiated.

NOTE: To facilitate testing of automatic switching, you can reset the five minute delay (wait-to-restore time) by using the *clear wtr* command.

Low-Speed (LS) Redundancy

Low-Speed Automatic Switchover

The Wide Bank provides low-speed circuit monitoring and automatic switchover to a spare low-speed circuit card when an error is detected. When an error is detected, traffic is automatically switched to a spare low-speed circuit in the same circuit group. The status LED indicator on the spare circuit will change from yellow to green, and the LED on the failed circuit will turn off. When the failed circuit is replaced (see _Hot-Swapping a Failed Standard Low-Speed Card on page 2-27_) the traffic is switched back to the original circuits, leaving the spare card available for subsequent error switching.

Any traffic carried by the spare circuits will be dropped when a failed standard low-speed circuit card is removed. Any traffic carried by the spare circuits will not be dropped when a failed MSO Electronics card is removed, provided that the spare is not already in use before pulling failed MSO card.

Low-Speed Circuit Groups

The Wide Bank 28 DS3 employs a one to seven (1:7) electronics redundancy scheme using four spare DS1 circuits (or three spare E1 circuits) to protect up to 28 active DS1 circuits (or 21 active E1 circuits). Circuit groups are arranged so that each of the circuits on the spare card can replace a corresponding circuit on each of the seven active cards (see Figure 2-1 _Functional Block Diagram on page 2-4_ and Table 2-3 _Low-Speed Circuit Groups for Spare Switching on page 2-23_).

Switchover Lockouts Within Groups

A resource conflict occurs when more than one circuit fails in the same low-speed circuit group. Because redundancy is limited to one spare per circuit group, a second failed circuit within the same group is not covered, so it will be locked out.

- If a second failure occurs in the same circuit group, automatic switchover will not occur and the second failed circuit will not be spared. A minor failure alarm will be activated for the second failed circuit, and its card status LED will turn red.

Pulling or "hot-swapping" a card when circuit failures exist on other cards produces the following lockout behavior, depending on the card type.

- If a Standard card is pulled when the spare is already being used, all four circuits on the Standard card will be dropped. The spare circuits will not be affected.
- If an MSO Electronics card is pulled when the spare is already being used, the low-speed circuits using the spare will be kicked off the spare and will be dropped. All four circuits on the pulled card will be moved to the spare card.

Table 2-3 Low-Speed Circuit Groups for Spare Switching

Group	Active Circuit	Spare Circuit
A	01 (First circuit on Card 1) 05 (First circuit on Card 2) 09 (First circuit on Card 3) 13 (First circuit on Card 4) 17 (First circuit on Card 5) 21 (First circuit on Card 7) 25 (First circuit on Card 7)	1 (first circuit on spare)
B	02 (Second circuit on Card 1) 06 (Second circuit on Card 2) 10 (Second circuit on Card 3) 14 (Second circuit on Card 4) 18 (Second circuit on Card 5) 22 (Second circuit on Card 6) 26 (Second circuit on Card 7)	2 (Second circuit on spare)
C	03 (Third circuit on Card 1) 07 (Third circuit on Card 2) 11 (Third circuit on Card 3) 15 (Third circuit on Card 4) 19 (Third circuit on Card 5) 23 (Third circuit on Card 6) 27 (Third circuit on Card 7)	3 (Third circuit on spare)
D	04 (Fourth circuit on Card 1) 08 (Fourth circuit on Card 2) 12 (Fourth circuit on Card 3) 16 (Fourth circuit on Card 4) 20 (Fourth circuit on Card 5) 24 (Fourth circuit on Card 6) 28 (Fourth circuit on Card 7)	These circuits are not used when low-speed cards are E1 4 (Fourth circuit on spare)

Maintenance Service Option (MSO)

In addition to the circuit failure protection provided by Standard DS1 and E1 cards, MSO DS1 and E1 cards will automatically switch low-speed service to the spare card when the electronics are manually removed from a system. With MSO cards, the service interruption time is less than 50 milliseconds compared to 15 seconds when replacing standard cards.

The Maintenance Service Option (MSO) low-speed circuit card is made up of two separating sections called the MSO Electronics card and the MSO Relay card. By separating these sections, a customer can replace the one-to-four (or one-to-three for E1) failed DS1/E1 electronic circuits of that MSO Electronics card while the MSO Relay card automatically maintains the four DS1 (three E1) circuits by switching them to the spare low-speed circuit card. Once new MSO Electronics are inserted and pass self-test, the four circuits (three E1) currently on the spare card are automatically switched back to the "home" circuits.

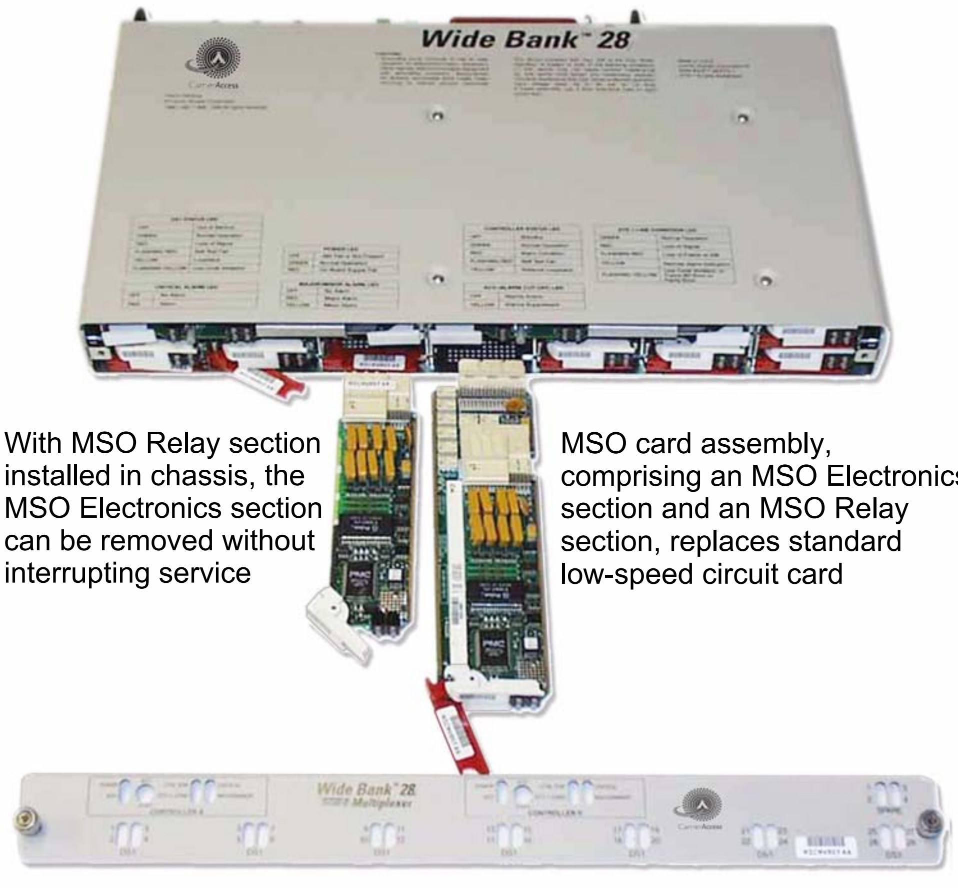


Figure 2-10 MSO Electronics and MSO Relay Cards

When joined together, the MSO Electronics and MSO Relay cards fit the same form-factor of the standard low-speed card. Therefore, the MSO DS1 or E1 card is compatible with all Wide Bank 28 DS3 systems. The MSO Electronics card contains all the necessary electronics for full operation of all four circuits of the MSO Quad DS1 card or all three circuits of the MSO E1 card. This section is replaceable by itself (see Chapter 9 for replacement instructions). The MSO Relay card contains the necessary relays to switch the traffic either to the MSO Electronics card or to the spare low-speed card, as required. The Relay card is only replaceable when combined with the electronics card as a unit to form the MSO DS1 or E1 card.

WARNING! DO NOT INSERT THE RELAY SECTION OF THE CARD BY ITSELF. THE RELAY SECTION AND THE ELECTRONICS SECTION MUST BE LATCHED TOGETHER AS A UNIT FOR ADDED STRENGTH WHEN INSERTING IT INTO THE CARD SLOT CONNECTOR.

You can upgrade a non-MSO Wide Bank to an MSO system. The items necessary to upgrade to MSO functionality are:

1. The desired number of MSO low-speed circuit cards (up to 8) to replace the standard low-speed circuit cards.
2. A code update.
   The release code for MSO support is Rev 1.47 or higher and is available for both FLASH-based systems and EPROM-based systems. The FLASH-based systems will support software code updates via both TFTP and XMODEM. The EPROM-based systems require a new EPROM integrated circuit (IC) from Carrier Access Corporation. Both systems, if redundant, will maintain live traffic and configurations while the off-line Controller is updated.

The low-speed circuit card residing in the spare low-speed circuit card position can be either a Standard low-speed circuit card or an MSO low-speed circuit card.

Failures that Cause a Low-Speed Switchover

The Wide Bank checks for the following events every 200 milliseconds, and if one or more of them occur, initiates a low-speed switchover.

- Transmitter Failure. A transmitter failure is declared when:
    1. There is a lack of activity on the transmit clock.
    2. There is a lack of activity on the transmit tip and ring outputs (either or both). This event is ignored if AMI line coding is selected.
- System Clock Failure. When there are no transitions on the master clock of a low-speed card, a failure is declared for all four DS1 (three E1) circuits on the card.
- Write/Read/Verify Failure. If the Controller cannot correctly read and write certain test registers on a DS1 card, it declares a failure for that card.
- Receiver Failure. This failure can be caused by either a low-speed receiver failure or an external failure of the low-speed line. This failure is declared when there is either no receive activity (Loss of Signal, or LOS) for 2.5 seconds or a Major Line Code Violation (Major LCV). After the switchover, if no signal improvement is seen, the traffic is automatically returned back to the original circuits to retain the availability of the spare.

Enabling and Disabling Low-Speed Switchovers

The low-speed automatic switchovers can be either enabled or disabled for all circuits by using the *ds1 protect* or *ls protect* commands. The factory default setting of low-speed protection is ON. For more information see *LSMODE on page 8-58*.

Example:

To disable automatic switchovers for all low-speed circuits:

```
(A:Active)> ds1 protect off
```

or

```
(A:Active)> ls protect off
```

To enable automatic switchovers for all low-speed circuits:

```
(A:Active)> ds1 protect on
```

or

```
(A:Active)> ls protect on
```

Restoring to Original Status (Revertive Switching)

Because some circuit failures can look like line failures (LOS or Major LCV), the Wide Bank provides a revertive switching feature to keep spares available for use by other circuits.

When a line failure occurs, the Wide Bank will move the channel to the spare circuit. If the failure remains, the problem is a line failure, so the channel is moved back to the home circuit. However, if the failure clears on the spare circuit, the next action depends on the *revertive ds1* setting.

Revertive Off – the channel will remain on the spare circuit until you replace the home card or manually move the channel back to the home circuit.

Revertive On – a self-test will be performed on the home circuit and one of the following actions will occur:

- Self-Test Fails – the channel will remain on the spare circuit until you replace the home card or manually move the channel back to the home circuit.
- Self-Test Passes – the channel will be moved home after 2 minutes. However, if three failures occur within a 24-hour period, the low-speed circuit will be locked out and will remain on the spare card. If fewer than three failures occur on the same circuit within 24 hours, the failure count will decrement by 1 each day until the count is again zero. If desired, you can reset the locked-out circuit (*revertive ds1 reset*), which will move the channel back to the home circuit.

Hot-Swapping a Failed Standard Low-Speed Card

CAUTION! THIS PROCEDURE CAN CAUSE DROPPED CALLS ON THE LOW-SPEED CIRCUITS THAT HAVE BEEN SWITCHED OVER BY AUTOMATIC ELECTRONIC REDUNDANCY.

A standard (non-MSO) low-speed card that causes a switchover can be hot-swapped (swapped with power on) but any calls on the circuits to the failed card, including those that were switched to the spare low-speed card, will be dropped. The circuits will become active again as soon as the new card has completed self-tests, and the previously switched failing channel will be switched back to the new card. The spare card circuit is now unused and available.

Hot-Swapping a Failed MSO Low-Speed Card

The Maintenance Service Option (MSO) low-speed card consists of two separating portions, the MSO Relay card and the MSO Electronics card. The MSO low-speed card allows the failed DS1 or E1 Electronic circuits of that card to be replaced while the MSO Relay portion automatically maintains service on the spare low-speed card. Once a new MSO Electronics card is inserted and passes self-test, the circuits currently on the spare card are automatically switched back to the "home" circuit.

Priority of service on the spare low-speed card is always given to those DS1 or E1 circuits from the first MSO Electronics card removed from the system. Because removing an MSO Electronics card requires four spare DS1 circuits (three E1) to be available, only one MSO card can be removed at a time (see *Low-Speed (LS) Redundancy on page 2-22*). If any of the spares are already in use by other cards, there will be a conflict for resources. The conflict results in any circuits previously switched to the spare low-speed card (and still present there) to be switched back to their home low-speed cards. If the home low-speed cards are not able to maintain the circuits, the circuits will be dropped.

MSO Conflicts with Spare Card

If you remove more than one MSO Electronics card section from a Wide Bank, there will not be enough spares to maintain traffic. This conflict will cause all low-speed circuits handled by the removed electronic sections to be dropped. To resolve the conflict, re-insert all the MSO Electronics card sections, then remove and replace only one card at a time, starting with the card containing the failed low-speed circuits. Removing the relay sections of the MSO cards will also resolve the conflict but will not restore dropped circuits.

Tests and Loopbacks

Transmission Path Verification

Verification of transmission data paths is a unique self-diagnostic capability of the Wide Bank 28 DS3. The low-speed transceivers include a pseudo-random bit sequence (PRBS unframed 2^{15}-1 as defined by ITU -T O.151) generator, detector, and bit error counter. Because these have the flexibility of being placed in either the receive or transmit low-speed stream, several Bit Error Rate test modes are available, in conjunction with the DS3 Framer. Individual DS1 or E1 bit error rate testing may be conducted toward the low-speed equipment (the "drop"), in the DS3 line, or internally to the Wide Bank (part of self-test). Following activation of the PRBS pattern generation, received pattern synchronization is displayed along with bit error rate counts for the low-speed circuits under test.

Low-Speed Loopback Modes

NOTE: For details on how to run low-speed loopback tests, see *Testing Low-Speed Near-End with Loop Tests* on page 7-19.

Low-Speed Line Loopback

The *low-speed line loopback* loops the low-speed signal back to the low-speed interface.

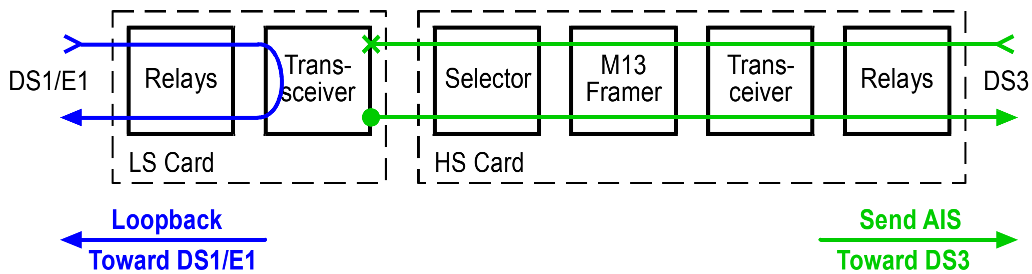


Figure 2-11 Low-Speed Line Loopback Mode

Low-Speed Equipment Loopback

The *low-speed equipment loopback* loops the low-speed signal back to the Wide Bank.

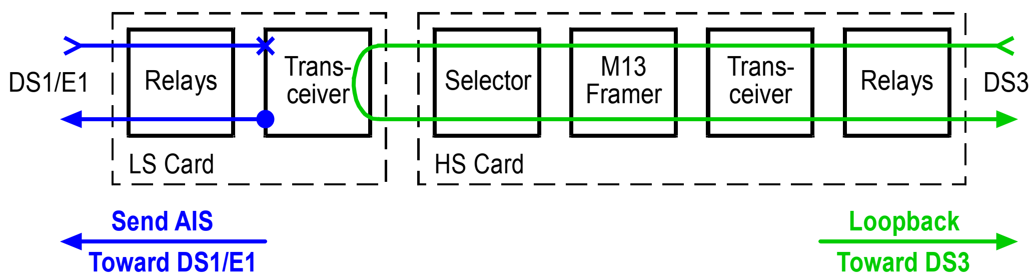


Figure 2-12 Low-Speed Equipment Loopback Mode

Low-Speed Metallic Loopback

The *low-speed metallic loopback* loops the received low-speed signal back to the low-speed transmit using a relay. This Carrier Access Corporation-unique loopback provides "point-of-entry" fault-isolation between the Wide Bank and attached DS1 or E1 equipment to detect DS1 or E1 line problems.

A spare low-speed card is required to provide metallic loopbacks toward the low-speed connections. The metallic loopback function may not be available if the spare low-speed channels are in use. If this is the case, the Wide Bank will not execute a metallic loopback on the low-speed channel requested. Also, only four low-speed channels (in different spare groups) can be selected for metallic loopback at one time.

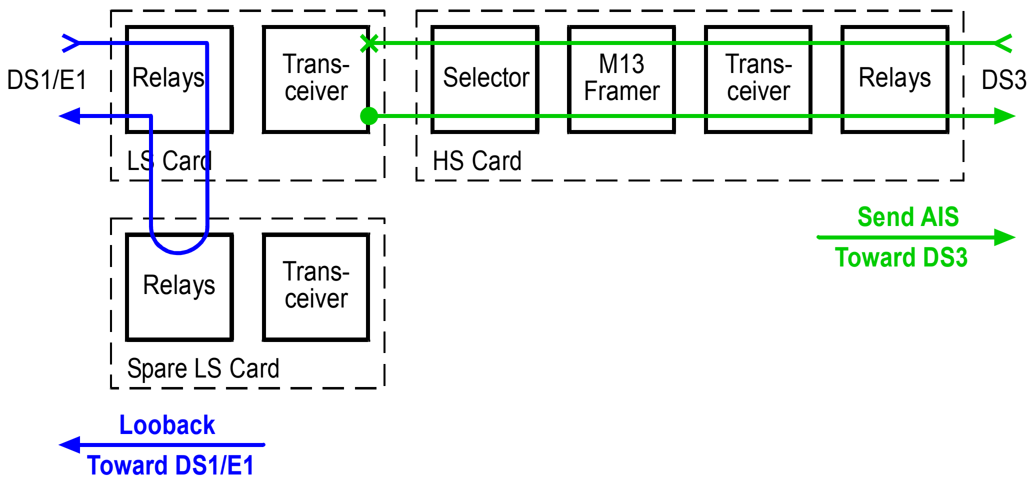


Figure 2-13 Low-Speed Metallic Loopback Mode

C-bit FEAC Loopback Code Word Detection

When the Wide Bank is configured for C-bit framing mode, the DS3 monitors and detects low-speed loopback requests sent over the C-bit far-end alarm and control signal. When a low-speed loopback code word is received an equipment loopback is activated (see *Low-Speed Equipment Loopback Mode on* *page 2-30*).

NIU Loopcode Detection

Each low-speed circuit on the Wide Bank can monitor and detect Network Interface Unit (NIU) loopback codes originating from the DS3 network. A standard 5 second integration time to declare loop-up or loop-down codes is used. Upon detecting an NIU loop-up code on a DS1 or E1 channel of the DS3, a low-speed equipment loopback will be executed by the Wide Bank for that channel. This provides for standard loop testing from the DS3 end, as if a physical DS1 or E1 NIU ("Smart Jack") was connected to each of the 28 DS1s or each of the 21 E1s.

Low-Speed Performance Monitoring

The low-speed transceivers continuously monitor the incoming physical DS1 or E1 line quality for Excess Zeros, Loss of Signal, and Bipolar Violations.

LS Alarm Signals

- Loss Of Signal.
- Hardware Failure.
- Far-End DS1 (or E1) Loss of Signal.
- Line Code Violations

DS3 Loopback Modes

NOTE: For details on how to run DS3 loopback tests, see *Testing the DS3 Near-End with Loopback Tests on page 7-35*.

DS3 Line Loopback

DS3 Line Loopback returns the received DS3 signal from the transceiver back to the transceiver output, without being processed by the M13 framer.

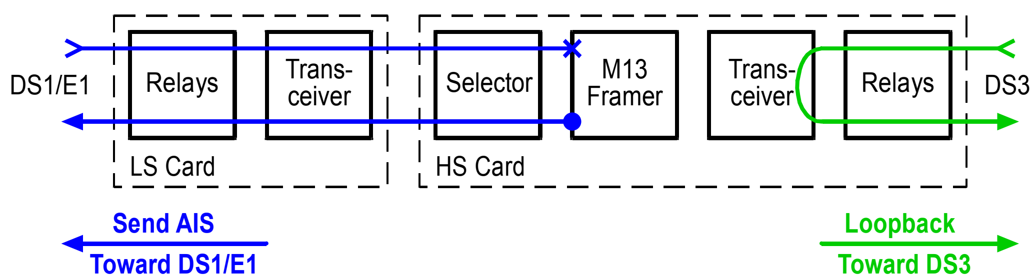


Figure 2-14 DS3 Line Loopback

DS3 Payload Loopback

DS3 Payload Loopback returns the received DS3 signal from the transceiver through the framer and back to the transceiver output, overriding the DS3 signal created internally by multiplexing the low-speed signals.

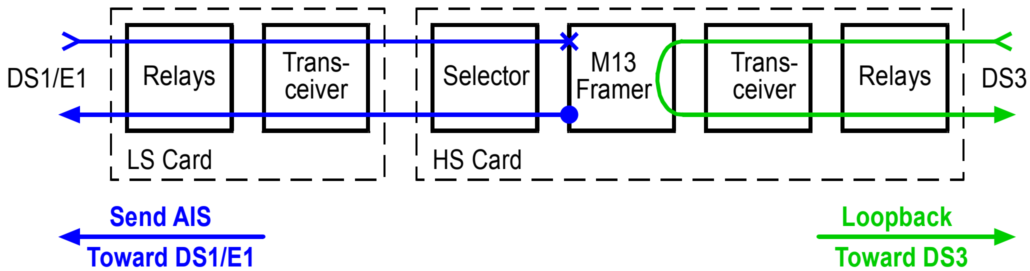


Figure 2-15 DS3 Payload Loopback

DS3 Equipment Loopback

DS3 Equipment Loopback returns the signal received from the M1-3 framer back to the input of the M1-3 framer, replacing the signal received from the DS3 line. This loopback is performed by the DS3 framer and validates a full internal DS3 path through the Wide Bank. This loopback is used to send PRBS test patterns back to the low-speed transceivers during the Wide Bank self-test mode.

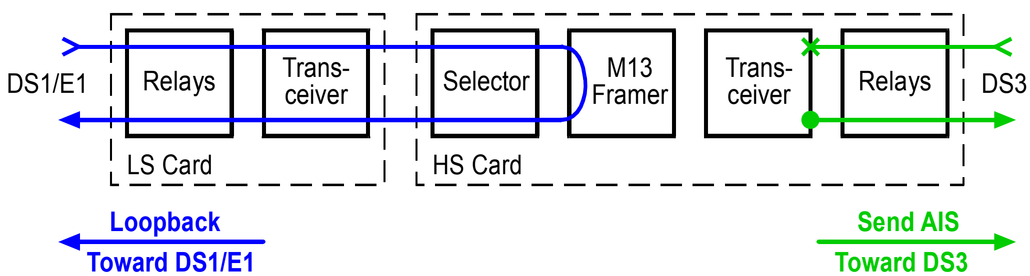


Figure 2-16 DS3 Equipment Loopback

DS3 Loopcode Detection

When the Wide Bank is configured for C-bit framing mode the DS3 monitors and detects DS3 loopback requests sent over the C-bit far-end alarm and control signal. When a DS3 loopback code word is received a line loopback is activated.

Internal Tests

Microprocessor and memory data paths are tested within the Wide Bank by using self-tests. A complete self-test runs when power is turned on. Individual self-tests can be run by using the *test* command (see Chapter 7 and Chapter 8).

DS3 Alarm and Performance Monitoring

The Wide Bank is capable of monitoring the following DS3 alarms and performance parameters:

DS3 Alarm Signals

- Alarm Indication Signal
- Loss Of Signal
- Out Of Frame
- Idle Sequences
- Remote Alarm Indication
- Far-End Alarms

DS3 Errors

- Line Code Violations
- Excessive Zeros
- P-bit Parity Errors
- C-bit Parity Errors
- Far-End Block Errors
- Framing Bit Errors

CHAPTER 3

Technical Specifications

In this Chapter

Specifications

System Parameters

The Wide Bank 28 DS3 has the following system parameters:

- Channel Capacity: Up to 28 DS1 signals or up to 21 E1 signals
- Multiplexed data rate = 44.736 Mbps ±20 ppm, full duplex
- Timing: Line Recovered, internally sourced, or externally supplied by BNC
- Reframe time maximum average:
  - Less than 1.5 ms for DS3 level
  - Less than 7 ms for DS2 level
- Redundancy: Controller 1:1, Power 1:1 with second Controller card, low-speed circuits 1:7 for electronics
- Path protection: 1+1 unidirectional linear APS architecture (requires second High-Speed DS3 electrical connection)
- High-Speed inputs: Two primary (BNC TX/RX); Two secondary BNC TX/RX
- External Clock cable:
  75 ohm coaxial cable with tinned copper shield. Use type 735A or 1735A or equivalent for cables up to 250 feet, and type 734A or 1734A or equivalent for cables longer than 450 feet

- Management:
  - Command Line Interface (CLI) via CLI/RS-232 craft port
  - CLI/Telnet via Ethernet
  - SNMP via Ethernet
  - TL1 via TCP/IP Ethernet and TL1/RS-232 port
  - TL1 automatic outbound messages via TCP/IP Ethernet and TL1/RS-232 port
- Connectors:
  - Four high-speed BNC (728A coax or equivalent)
  - Two locking Low-Speed 64-pin Champ, one for input and one for output
  - Two locking power inputs for independent –48 volt power feeds
  - One locking 9-pin DCE RS-232 for CLI/modem
  - One locking 25-pin RS-232 for TL1 delivery
  - One IEEE 802.3 10Base-T RJ-45 Ethernet
  - One 4-pin alarm, one pair for Critical and one pair for Major/Minor
- Status LEDs:
  - Full primary and secondary Controller critical alarm, major alarm, minor alarm
  - High-Speed and Low-Speed line condition indicators
  - Low-speed Interface

DS3 (44.736 Mbps) Interface

- Meets ANSI T1.102 requirements for DSX-3 digital crossconnect equipment
- Line Rate: 44.736 Mbps ±895bps (20 ppm)
- Line Code: Bipolar with three-zero substitution (B3ZS)
- Line Impedance: 75 ohms ±5% resistive, unbalanced
- Framing: M23 or C-bit framing formats
- Receive Sensitivity: 0.24 Vp to 0.95 Vp input
- Transmit Amplitude: 0.36 to 0.85 Vp
- Transmit Pulse: Meets ANSI T1.102 pulse mask
- Transmit Jitter: Meets ANSI T1.102 requirement of < 2.0 UI RMS
- Cable Length: Meets ANSI T1.102 pulse mask for cable lengths up to 450 feet to the crossconnect, using coaxial cable type 735A or 1735A or equivalent up to 250 feet, and type 734A or 1734A or equivalent for cables longer than 250 feet

DS1 (1.544 Mbps) Interface

- Meets ANSI T1.102 requirements for DSX-1 digital crossconnect equipment
- Line Rate: 1.544 Mbps ±32 ppm
- Line Impedance: 100 ohms ±5% resistive, balanced
- Line Code: AMI or B8ZS selectable for DS1
- Transparent to DS1 framing or lack of framing
- Receive Sensitivity: 0.6 Vp to 3.6 Vp input (–13 dBdsx to 3.3 dBdsx)
- Transmit Amplitude: 2.7 to 3.3 Vp
- Transmit Pulse: Meets ANSI T1.102 and T1.403 pulse mask
- Transmit Jitter: Meets ANSI T1.403, T1.102 and AT&T TR 62411
- Loopback Latency (round trip) 34.5 microseconds
- Cable Length: A maximum of 655 ft. of ABAM cable or equivalent to DSX-1 crossconnect equipment
- Line Build Out (LBO): Individual DS1 transmit adjustments for cable lengths of 0-110 ft., 110-220 ft., 220-330 ft., 330-440 ft., 440-550 ft., and 550-660 ft.

E1 (2.048 Mbps) Interface

- Meets ITU-T/G.703 recommendations
- Line Rate: 2.048 Mbps. ±50 ppm
- Line Impedance: 120 ohms (balanced), meets minimum return loss requirements from ITU-T/G.703
- Line Code: HDB3
- Framing: Transparent to E1 framing or lack of framing
- Receive Sensitivity: 0.6 Vp to 3.3 Vp input (–13 dB to 2.7 dB with respect to 3 Vp)
- Transmit Amplitude: 3.0 V (nominal)
- Transmit Pulse: Meets pulse shape requirements of ITU-T/G.703
- Transmit Jitter: Meets ITU-T/G.823 recommendations
- Lightning surge protection and power induction protection per FCC part 68 and GR-1089

Cable Compensation

- DS3 Power Level: For an all-ones transmitted pattern, the power in a 2 kHz band (about 22.368 MHz) is –1.8 to +5.7 dBm, and the power in a 2 kHz band (about 44.736 MHz) is at least 20 dB below that in the 2 kHz band (about 22.368 MHz).
- DS3 Output Port: ±0.85 volts peak, adjustable for DSX-3 line buildout from 0 to 50 ft. or 50 to 450 ft.
- DS1 Output Port: ±3 volts peak adjustable for DSX-1 line build out from 0 to 660 ft. in increments of 110 ft.

Management

- RS-232 DCE port (DB-9) for command line management
- Ethernet port for SNMP and Telnet sessions, for TL1 transport services over TCP, and for NetworkValet management sessions
- RS-232 port for TL1 transport services

Alarms

External alarm contacts for visible or audible alarms or alarm reporting systems:

- Output Alarm: Relay Contacts
- Output State: Normally Open or Normally Closed
- Two Outputs: Critical Alarm and Major/Minor Alarm
- Maximum Current: 200 mA
- Maximum Voltage: 56 VDC
- Control Input: CPU reset, Alarm Cut Off (ACO) switch on the front control panel, or *aco* CLI command.

DS3 Transmit Clock Source

- Line - recovered from DS3 network receive signal
- Internal - on-board Stratum 4E clock source, 44.736 Mbps ±20 ppm
- External - external BNC input at 44.736 Mbps
  - Input Impedance: 75 Ohms
  - Amplitude: Minimum 250 mV rms sinusoid; Maximum 1.250 V rms sinusoid

Power

- Two three-terminal (–48, Return, Ground) removable wiring connectors provided for A and B power feeds
- Input Voltage: –42 to –58 VDC
- Input current, worst case (–42 VDC):
  Fully-redundant with FFO: 0.9 Amp (A and B inputs combined)
  Single Controller with redundant DS1s and FFO: 0.6 Amp
- Inrush current: 15 Amps for 100 microseconds
- Power dissipation:
  Fully redundant with FFO: 36 Watts (123 BTU/hour)
  Fully redundant, non-FFO: 32 Watts (109 BTU/hour)
  Single Controller with redundant DS1s, non-FFO: 22 Watts (75 BTU/hour)
- Redundant power sharing at the +5V logic level
- Internal solid-state (fuseless) over-voltage and over-current protection
- External inline power fuse recommended: One 3 Amp slow-blow for each power feed
- Optional Power Converter/Battery Charger (Carrier Access P/N 730-0116):
  115 VAC to –48 VDC
- Optional Battery Unit (Carrier Access P/N 730-0114):
  Provides 6 to 8 hours backup power
  Two backup systems provide 8 to 12 hours backup power

Environmental

- Altitude: 0 to 15,000 ft. (0 to 4,572 m)
- Humidity: 0 to 98% (noncondensing)
- External Operational Temperature Range (ambient air):
  Meets NEBS operating temperature criteria of 23°F to 104°F (–5°C to 40°C) for an indefinite period, and up to 131°F (55°C) for 96 hours (4 days) continuous for a maximum of 15 days per year
- Thermal Protection: Automatic power supply shut-down at 176° F (80° C) ambient

Physical Dimensions

- Height: 1.75 inches (4.45 cm) - mounting brackets fit 1.75-inch and 2-inch hole spacing
- Depth: 10 inches (25.4 cm) - 10.9 inches (27.6 cm) with fan faceplate installed
- Width: 17 inches (43.2 cm) - mounting brackets fit 19-inch and 23-inch racks

- Weight: 10 pounds (4.5 kg) fully equipped
  Shipping Weight: 14 pounds (6.4 kg)
- Service Access Aisle: 24 inches (61 cm) front and rear
- Cable Clearance: 3 inches (7.6 cm) behind rear connector panel

Standards Compliance

Safety

- CAN/CSA-C22.2 No. O-M1991
- FCC Regulations, Part 15, Class A (Digital Devices) and Part 68 (Connection of Terminal Equipment to the Telephone Network)
- Industry Canada CS-03 listed
- National Electrical Code 1995 Safety Requirements
- CSA and UL (Bi-National) Standard for Information Technology Equipment, Including Business Equipment, CAN/CSA 22.2, No. 60950-00 / UL 60950, third edition, dated December 1, 2000

Industry

- ANSI T1.403-1996 (T1/El.2194-003 RI). "Network to Customer Installation - DS1 Metallic Interface." Draft revision to ANSI T1.403-I 989. American National Standards Institute, Sept.1994.
- ANSI T1.102-1993, "Digital Hierarchy-Electrical Interfaces"
- ANSI T1.404a-1996, "Mask Modification"
- ANSI T1.107a-1995, "Digital Hierarchy - Formats Specification"
- AT&T Technical Reference 62411. "ACCUNET T1.5 Service: Description and Interface Specifications." AT&T, December 1990.
- AT&T Technical Reference 54017. "Automatic Protection Capability, a service function of ACCUNET T1.5 Service."
- CCITT Recommendation V.11. "Electrical Characteristics for Balanced Double-Current Interchange Circuits for General Use with Integrated Circuit Equipment in the Field of Data Communications."
- Telcordia Technical Reference TR-NWT-000499 Issue 4, Revision 1, April 1992, "Transport Systems Generic Requirements (TSGR): Common Requirements."
- Telcordia GR-253-CORE and GR-499-CORE SONET specification
- NEBS Certification: Meets Network Equipment Building Standards (NEBS) Level 3 (earthquake Zone 4), Type 2 and 4 requirements for central office products including electrical safety, emissions, and immunity requirements for intra-building use. Refer to Telcordia GR-63-CORE and GR-1089-CORE for more details.

- Telcordia GR-63-CORE Network Equipment Building System (NEBS) Requirements: Physical Protection
- Telcordia GR-1089-CORE Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment

Installation

- Standard EIA & WECO 19-inch or 23-inch rack-mount using universal heavy-duty rack-mounting brackets (part number 710-0153) included with each Wide Bank
- Optional EIA & WECO 19-inch crossbars for mounting up to six units vertically in an 11 rack-unit space (P/N 710-0003)
- Optional EIA & WECO 23-inch crossbars for mounting up to eight units vertically in an 11 rack-unit space (P/N 710-0004)
- Fan Faceplate Option, which provides additional cooling and allows up to 40 Wide Banks to be mounted in a rack

CHAPTER 4

Physical Installation

In this Chapter

Installation Preparation and Requirements

This product is shipped as a complete package, including the Wide Bank 28 DS3 case, equipped (per order) with the number of low-speed cards ordered (from none to as many as eight) and the number of DS3 Controller cards ordered (from none to as many as two). When the shipment arrives, check the contents of the shipping carton against the Packing Materials List in Table 4-1.

- Inspect the unit for signs of damage, report any damage to the shipping company
- Retain all packaging materials if you need to ship or relocate the unit in the future

Table 4-1 Wide Bank 28 DS3 Packing List

Description	Part Number
Items Included With Wide Bank 28 DS3 Purchase	
Wide Bank 28 DS3 Multiplexer equipped according to customer order with low-speed cards and DS3 Controller cards.	
Wide Bank 28 DS3 Controller card (1-2)	740-0029 (740-0187)
Wide Bank Quad DS1 (QDSX) card (1-8)	740-0172
Wide Bank MSO Quad DS1 card (electronics and relay card)	740-0023
Wide Bank MSO Quad DS1 electronics card	740-0025
Wide Bank Three-Channel E1 card (1-8)	740-0052
Wide Bank MSO E1 card (electronics and relay card)	740-0057
Wide Bank MSO E1 electronics card	740-0053
Universal 19-inch or 23-inch Heavy Duty Rack Mounting Brackets (4 pieces) with mounting screws	710-0153
Wide Bank 28 DS3 User Manual	770-0074
Wide Bank 28 DS3 Accessory kit (power connectors, alarm connectors)	790-0002
Wide Bank 28 DS3 Ghost Unit (no cards)	930-0097
Optional Items	
Fan Faceplate Option	790-0003
DSX-1 Cable, 10 ft (3.048 m), for DS1/E1 transmit & receive connections.	005-0025
DSX-1 Cable, 25 ft (7.7 m), for DS1/E1 transmit & receive connections	005-0030
Battery Unit	730-0114
115 VAC/60Hz to –48VDC Power Converter/Battery Charger (DO NOT use the Carrier Access Corporation AB115 Power Converter Cube to power the Wide Bank)	730-0116
19-inch Vertical Mounting Cross Bar (2)	710-0003
23-inch Vertical Mounting Cross Bar (2)	710-0004
Power Cube Tray for mounting up to 3 power converter/chargers	710-0005

Mounting the Wide Bank 28 DS3

DANGER! WHEN INSTALLING THE WIDE BANK, BE SURE TO OBSERVE STANDARD SAFETY PROCEDURES FOR WORKING WITH ELECTRICAL EQUIPMENT.

Rack mounting is the only recommended method for mounting the Wide Bank. The different recommended configurations for rack mounting are:

Standard, non-FFO units:

- Horizontal mounting in a 19-inch or 23-inch rack. This method is limited by specific guidelines described in the mounting procedures that follow.
- Vertical mounting in a 19-inch or 23-inch rack. This method allows up to 24 units to be mounted in a single rack, depending on environmental factors.

FFO-equipped units:

- Horizontal mounting is the only recommended configuration for FFO-equipped units. FFO-equipped units do not require a 1 RU space between units, which results in the highest density installation method.

Before mounting the Wide Bank chassis, ensure that the installation site meets the following criteria:

- Adequate clearance for maintenance access, cable routing, and air flow to cool the unit. Allow approximately 30 inches in front of the removable control panel for maintenance and accessing the slide-in cards. Allow approximately 24 inches in the rear for cable access and bending radius.
- Because the cables on the Power Converter/Battery Charger total 12 feet in length, there should be a properly grounded, 120 VAC power outlet within 11 feet of the Wide Bank power connectors, unless power is supplied by other power conversion equipment that has longer cables.
- A stable environment, clean and free from extremes of temperature, shock, vibration, and EMI, with a relative humidity between 0 and 98%.
- An appropriate ambient air temperature for the mounting method used. The Wide Bank 28 DS3 operates throughout the NEBS operating temperature range unless otherwise specified in the installation descriptions below.

NOTE: If the operating temperature rises above 176° F (80° C), an Over-Temperature alarm is generated. When the temperature is reduced below 176° F (80° C), the Over-Temperature alarm will clear.

- An altitude below 15,000 ft. (4,572 m).

Attaching Mounting Brackets to the Units

The included Universal Heavy-Duty Brackets (Carrier Access part number 710-0153) can be used to mount the Wide Bank in either 19-inch or 23-inch racks, with either 1 3/4-inch or 2-inch vertical hole spacing. These brackets are made up of four individual pieces. The following procedures show how to assemble the brackets and attach them to a Wide Bank.

1. There are two bracket parts with right-angle bends (see Figure 4-1). Mount one of these on each side of the Wide Bank to obtain the desired offset, as shown in Figure 4-2, using the #6 x 3/8-inch mounting screws provided. Use the Wide Bank mounting holes nearest the front of the unit to produce a typical flush mounting. Use the Wide Bank mounting holes nearest the rear of the unit for a 5-inch or center offset to the front.
2. If you are mounting the Wide Bank in a 23-inch rack, fasten the other two bracket pieces to the previously-mounted brackets, as shown in Figure 4-1, using the four 10-32 x 3/4″ machine screws provided.
3. Mount the chassis and bracket assembly on the rack, using 10-32 x 3/4″ rack-mounting screws in a manner appropriate for the selected mounting arrangement. See *Rack Mounting - Non-FFO Equipped Units on page 4-6* or *Rack Mounting - FFO-Equipped Units on page 4-9*, as required.

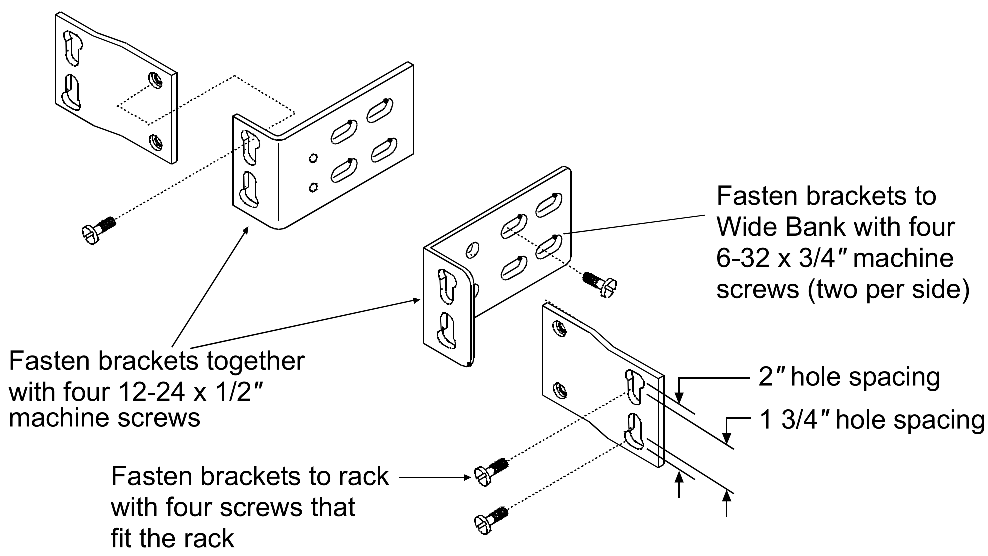


Figure 4-1 Universal Rack-Mounting (19-inch or 23-inch) Brackets (PN 710-0153)

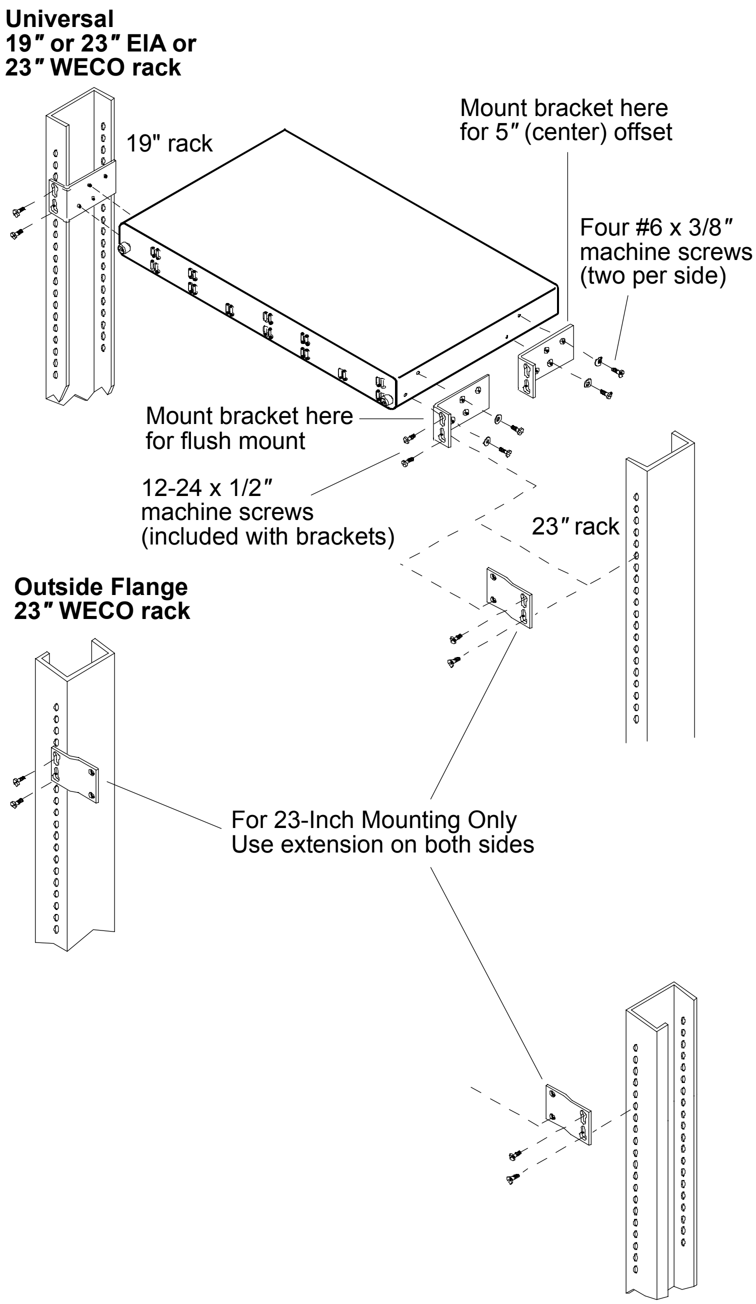


Figure 4-2 Attaching Brackets to 19-inch or 23-inch Racks

Rack Mounting - Non-FFO Equipped Units

NOTE: When mounting Non-FFO Wide Banks horizontally in the same rack, follow the mounting instructions below to meet the NEBS Operating Temperature Criteria and to allow sufficient cooling to prevent thermal shutdown under maximum load conditions.

Horizontal Mounting in a Standard EIA or WECO Rack

Mount Wide Banks, as shown in Figure 4-3, in groups of up to four units, with the units in each group separated by one rack unit (1 3/4 inches). Separate the four-unit groups with four rack units (7 inches of open space. The Wide Banks can be horizontally mounted in either a standard EIA 19-inch rack or a standard EIA/WECO 23-inch rack using the mounting brackets shipped with the unit.

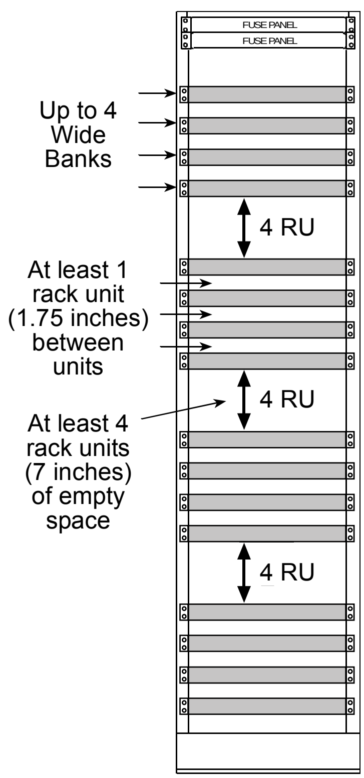


Figure 4-3 Horizontal Mounting in a Standard Rack

Vertical Mounting in a Standard EIA or WECO Rack

This mounting configuration requires an ambient air temperature below 77º F (25º C), without supplemental cooling. In spaces where ambient temperature can rise above 77ºF, install a fan tray (600 CFM or more) below the rows of Wide Banks. The fan tray must direct the air up through the units.

The Wide Banks can be vertically mounted in either a standard EIA/WECO 19-inch rack or a standard EIA/WECO 23-inch rack using the mounting brackets shipped with the unit, and optional Carrier Access Vertical Mount Crossbars (PN 710-0003 for 19-inch racks and PN 710-0004 for 23-inch racks). See Figure 4-4 for an illustration of mounting in both sizes of racks.

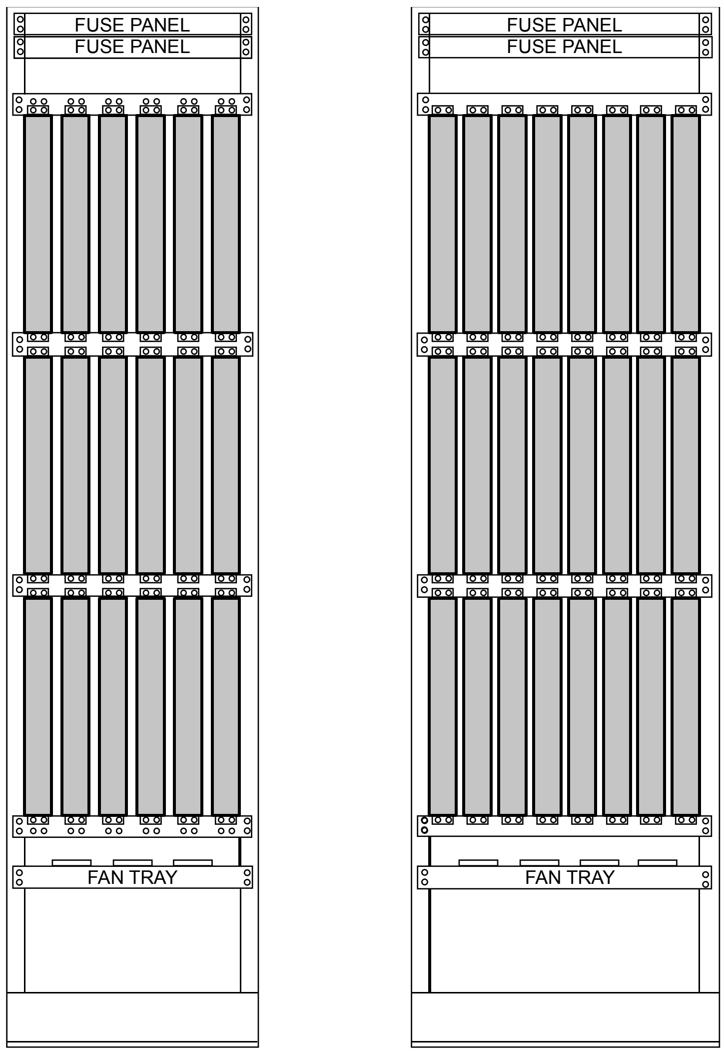


Figure 4-4 Vertical Mounting in 19-inch and 23-inch Racks

If other crossbar structures are used to mount the Wide Banks, align the units vertically, as shown in Figure 4-3, to provide a conduit for convective air flow.

Using a 19-inch rack and crossbars 710-0003, six units can be mounted in each of three horizontal rows, for a total of 18 Wide Banks. Do not mount any other Wide Banks (horizontally) above or below the vertically-mounted units. Fan trays may be mounted below, and fuse panels above but no heat-dissipating equipment or passive structures that impede natural air flow.

Using a 23-inch rack and crossbars 710-0004, eight units can be mounted in each of three horizontal rows, for a total of 24 Wide Banks. Do not mount any other Wide Banks (horizontally) above or below the vertically-mounted units. Fan trays can be mounted below, and fuse panels above but no heat-dissipating equipment or passive structures that impede natural air flow.

Rack Mounting - FFO-Equipped Units

High-density mounting of the Wide Bank requires additional cooling capability provided by the Fan Faceplate Option (FFO). Any Wide Banks mounted with less than one rack unit of space between them must have the FFO option installed.

With FFO the Wide Bank meets NEBS thermal performance criteria for installation of up to 40 units per rack with no space between units (see Figure 4-5 and Figure 4-7).

Fan Faceplate Option

The Fan Faceplate Option provides additional cooling capacity to allow the Wide Banks to be mounted with no space between them. When fan faceplates are installed, the fan power connectors on the faceplates mate with power connectors on the Controller cards (see Figure 4-6). When installing a faceplate, use care to ensure correct alignment of the power connectors before tightening the fastening screws at each end of the faceplate. Also, the fastening screws must be tightened with an adequate tool for compliance with UL 1950. Do not overtighten.

The fans start operating 30 seconds after the FFO is installed.

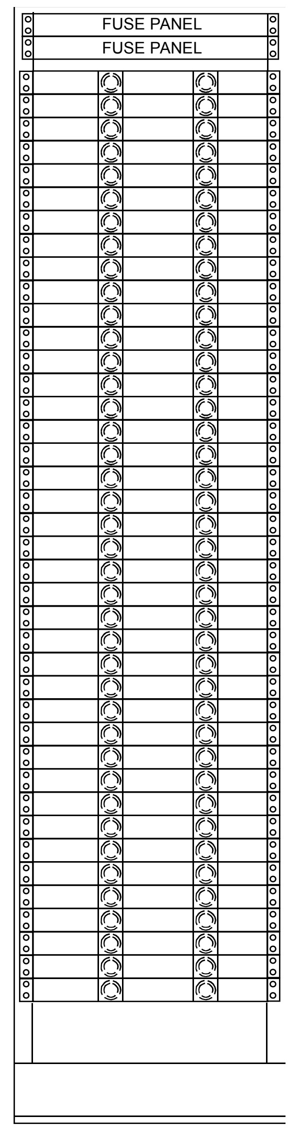


Figure 4-5 Standard Rack Fully Loaded with FFO-Equipped Units

NOTE: Pre-FFO Wide Banks can be converted to FFO units. The conversion requires new Controller cards that can accommodate a Fan Faceplate and loaded with software release 2.0 or higher.

NOTE: When removing a fan faceplate in a high-density rack with power on, re-install the fan faceplate within 30 seconds to prevent the Wide Bank from overheating.

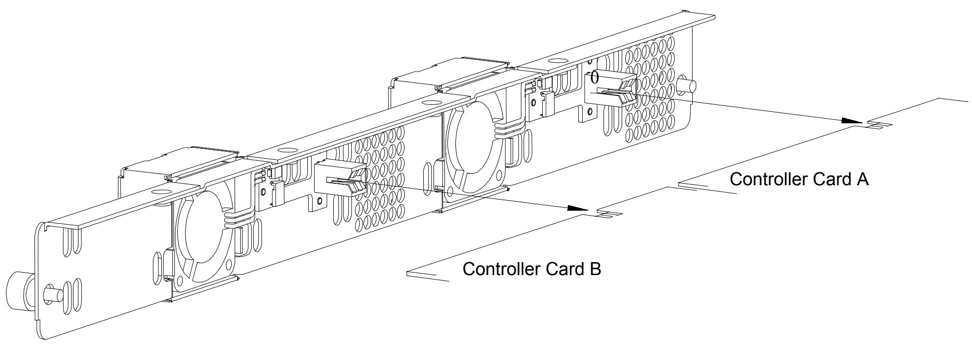


Figure 4-6 Fan Faceplate Option

Rack Mounting (High-Density)

Figure 4-7 illustrates the maximum possible density for rack-mounting the Wide Banks in either a standard EIA or WECO 19-inch or a standard EIA or WECO 23-inch rack using the mounting brackets shipped with the unit. This density requires that each Wide Bank have the Fan Faceplate Option installed. Up to 40 FFO-equipped units can be mounted in a single rack.

Vertical mounting is not an approved option for FFO-equipped units.

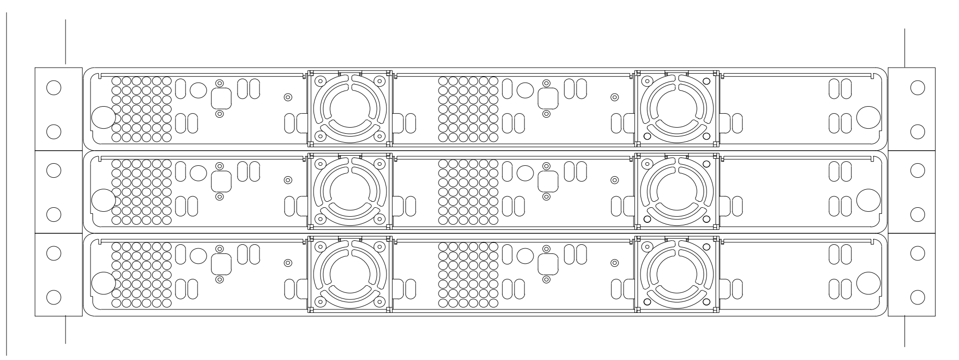


Figure 4-7 High-Density Mounting with the FFO Option

Mounting the Power Converter/Battery Charger

The Wide Bank can be supplied with power for US operation with the optional 115 VAC to –48 VDC Power Converter/Battery Charger. This converter includes both a six-foot grounded AC power cord and a six-foot three-position DC power cable. The Power Converter/Battery Charger has four mounting holes for attaching the unit to a wall or other flat surface. To mount the Power Converter/Battery Charger on a nearby wall, locate the converter within 5.5 feet of the Wide Bank rear connector panel and use screws or anchors appropriate for the mounting surface.

When using a single power converter, the power connectors shipped with the Wide Bank must be "daisy chained" to supply power to both the A and B power input connectors.

Mounting the Battery Unit

The Wide Bank power supply redundancy can be supplemented by using a Carrier Access Corporation –48V Battery unit. The battery unit is kept charged by the Power Converter/Battery Charger. When AC power fails, the battery unit supplies continuous –48 VDC power for six to eight hours, depending on operational status, the condition of the batteries, and the ambient temperature. A single 6-foot DC power cable connects the battery unit to the Power Converter/Battery Charger.

Wall-Mounting the Battery Unit

To mount the battery unit on a nearby wall, locate the battery unit within 5.5 feet of the Power Converter/Battery Charger and use screws or anchors appropriate to the mounting surface. To mount the battery unit on a 3/4-inch piece of plywood, use four #8 x 3/4-inch pan-head wood screws. See Figure 4-8.

1. Using the template included with the battery unit, clearly mark the locations of the four screws on the plywood. If this template is misplaced, a scaled-down copy of the template, with dimensions, is included in Figure 4-8.

DANGER! **DO NOT DRILL THE PILOT HOLES SO LARGE THAT THE SCREW THREADS WILL NOT HOLD. IF THE BATTERY UNIT SHOULD FALL, IT CAN CAUSE SERIOUS INJURY OR DAMAGE. THE CORRECT SIZE DRILL BIT FOR #8 WOOD SCREWS IS 7/64** INCH **(1/8** INCH **MAXIMUM).**

2. Pre-drill pilot holes for all four screws using a drill bit of appropriate size for the screws you are using. This is necessary because the holes are so close to the battery case that it is difficult to drive the screws into the plywood.

3. Drive the lower two #8 x 3/4-inch pan-head wood screws into the lower pilot holes until the heads are within 1/8 inch of the plywood (see enlargement in Figure 4-8). DO NOT drive the screws until the heads seat on the plywood.
4. Carefully lift the battery unit and hang it on the two screws installed in step 3, using the two keyhole screw slots in the lower corners of the battery unit back plate.

DANGER! **DO NOT RELEASE THE BATTERY UNIT UNTIL STEP 5 (BELOW) IS COMPLETED. IF THE BATTERY UNIT SHOULD FALL, IT CAN CAUSE SERIOUS INJURY OR DAMAGE.**

5. Fasten the top of the battery unit to the plywood with two #8 x 3/4” pan-head wood screws in the upper pilot holes.

Also see *Rack Mounting the Power Converter & Battery Unit on* *page 4-14* for a description of how to rack-mount the Battery Unit.

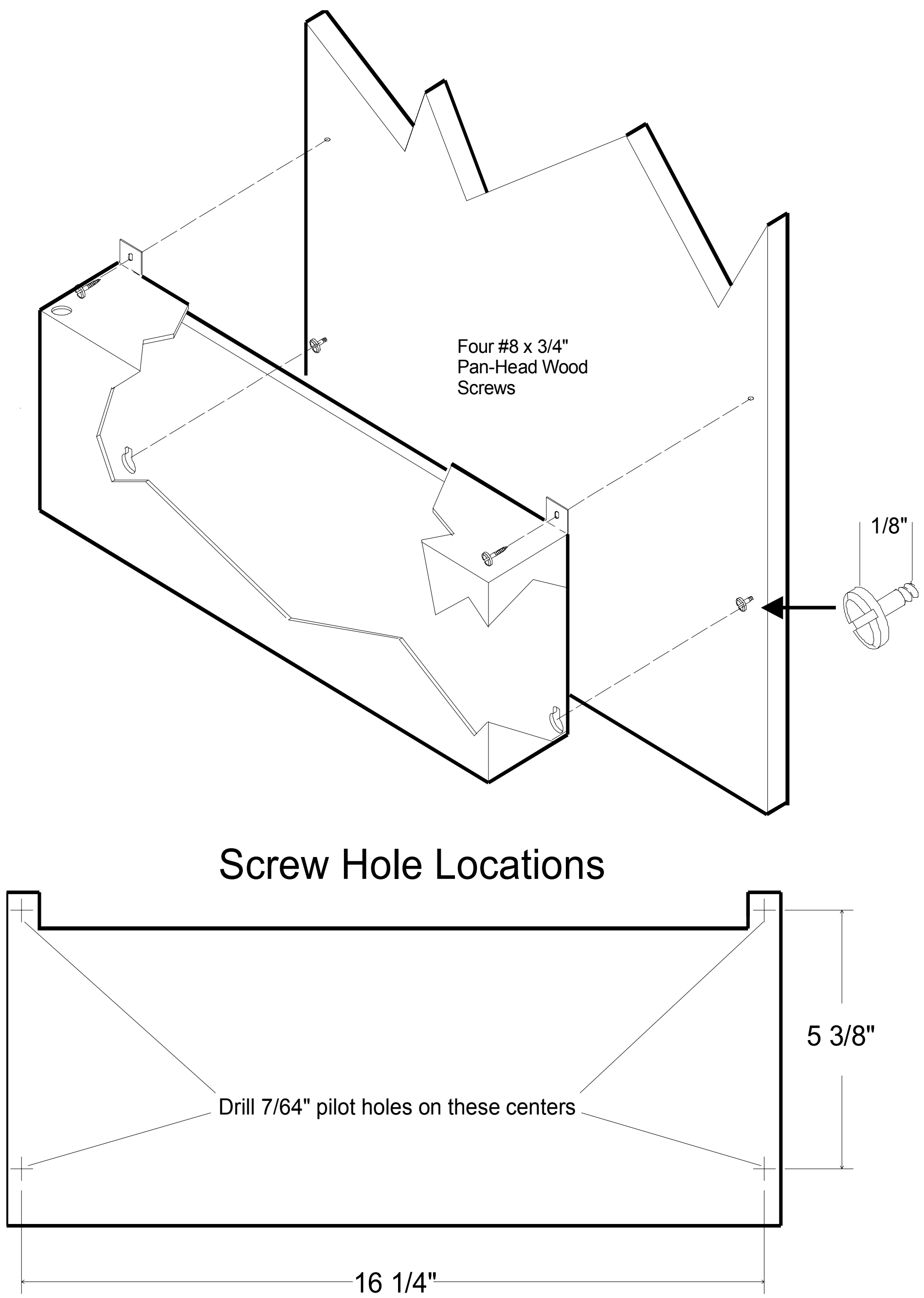


Figure 4-8 Mounting the Battery Unit

Rack Mounting the Power Converter & Battery Unit

The Power Converter and Battery unit can be mounted in EIA or WECO racks using heavy-duty mounting brackets and the power supply shelf, as shown in Figure 4-9.

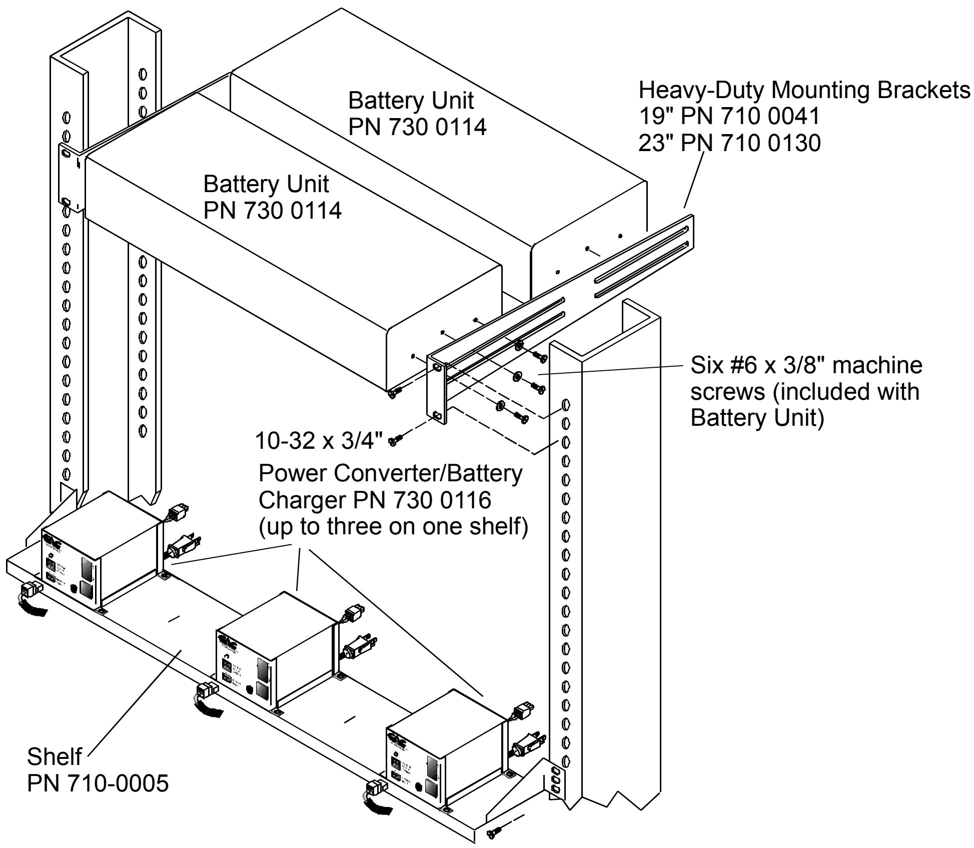


Figure 4-9 Rack-Mounting Battery Units & Power Converters

CHAPTER 5

Electrical Installation and Cabling

In this Chapter

Cabling and Compliance Requirements

The Wide Bank 28 DS3 shipping package contains no cables. Refer to following compliance and cable installation procedures for specific cable requirements.

Maintaining NEBS 1089 and FCC Part 15 Compliance

- **Shielding** – All cables connected to the following connectors on the Wide Bank 28 DS3 must be shielded: the Ethernet connector, both low-speed connectors (**LOW SPEED IN** and **LOW SPEED OUT**), and both RS-232 connectors (**RS-232** and **TL1**).
- **RFI Suppressors –** Both low-speed cables and the RS-232 management cable must have ferrite RFI suppressors installed, as described below.
- **Wiring Exposure** – All cables connected to this product must be intrabuilding or non-exposed wiring per GR-1089-CORE.

Static-Sensitive Equipment Handling Procedures

CAUTION! **THE WIDE BANK CONTAINS CIRCUIT CARDS AND COMPONENTS THAT ARE SUBJECT TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD). ALWAYS USE THE FOLLOWING PROCEDURE WHENEVER HANDLING PLUG-IN CIRCUIT CARDS.**

NOTE: A grounding wrist strap consists of an electrically conductive elastic wrist band with a grounding wire for connection to the equipment chassis or a common ground point.

Static electricity is always present and is easily picked up from shoes and clothing. Using anti-static procedures will minimize the chances of damaging sensitive semiconductor components.

1. Wear a grounding wrist strap whenever handling, touching, inspecting, installing, or removing plug-in circuit cards.
2. Test the grounding wrist strap before using.
   - Use an ohmmeter to check the resistance of a grounding wrist strap.
     - Connect one meter lead to wrist strap.
     - Connect other meter lead to metal clip or banana plug at end of grounding wire.
   - A resistance of one megohm to ten megohms (megohm = one million ohms) is typical and will provide adequate protection to equipment and user.
   - **DO NOT** use the wrist strap if the resistance is more than 35 megohms because it will not protect the equipment from ESD damage.
   - **DO NOT** use the wrist strap if the resistance is less than 0.75 megohms (750,000 ohms) because it will not protect you from high voltage shock hazards.
3. Before touching a circuit card, momentarily touch the grounded equipment rack or chassis to discharge any static buildup.
4. Before inserting or removing a circuit card from a storage bag, momentarily ground or hold the anti-static plastic storage bag to discharge any static buildup.
5. Do not touch any components or printed wiring on the circuit card. Hold the card by its edges or plastic handles.
6. Always store circuit cards in an anti-static storage bag. Whenever possible, use the same storage bag the card or replacement card came in.
7. If a circuit card is to be returned to the factory, always ship the circuit card inside an anti-static storage bag.

Connector Panel Interface and Power Connectors

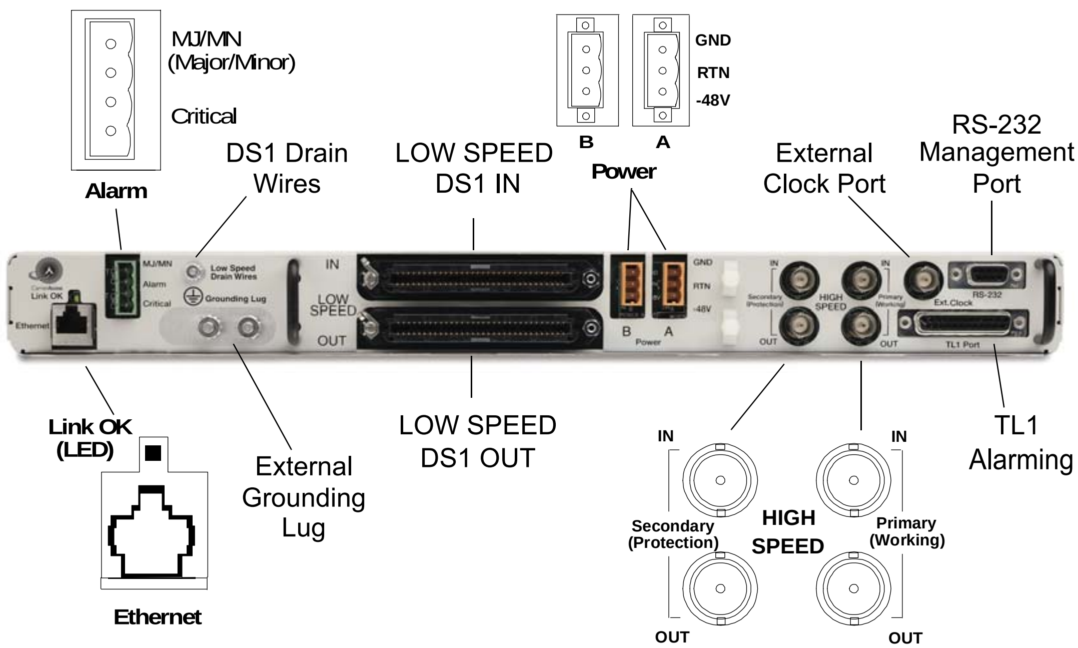


Figure 5-1 Wide Bank 28 DS3 Interface and Power Connectors

Cable and Wiring Layout

The figure below shows a typical cable and wiring layout for the Wide Bank 28 DS3. Tie-down loops are provided on the left and right side of the connector panel for tieing down cables and wires. Because the low-speed connectors are located in the center of the panel, it is easiest to dress the low-speed cables, Ethernet, ground, and alarm wiring toward the left side of the chassis (as viewed from rear), with the remaining cables and power wires dressed toward the right side, as shown.

NOTE: Ferrite Cube RFI Suppressors are Carrier Access part number 010-0051.

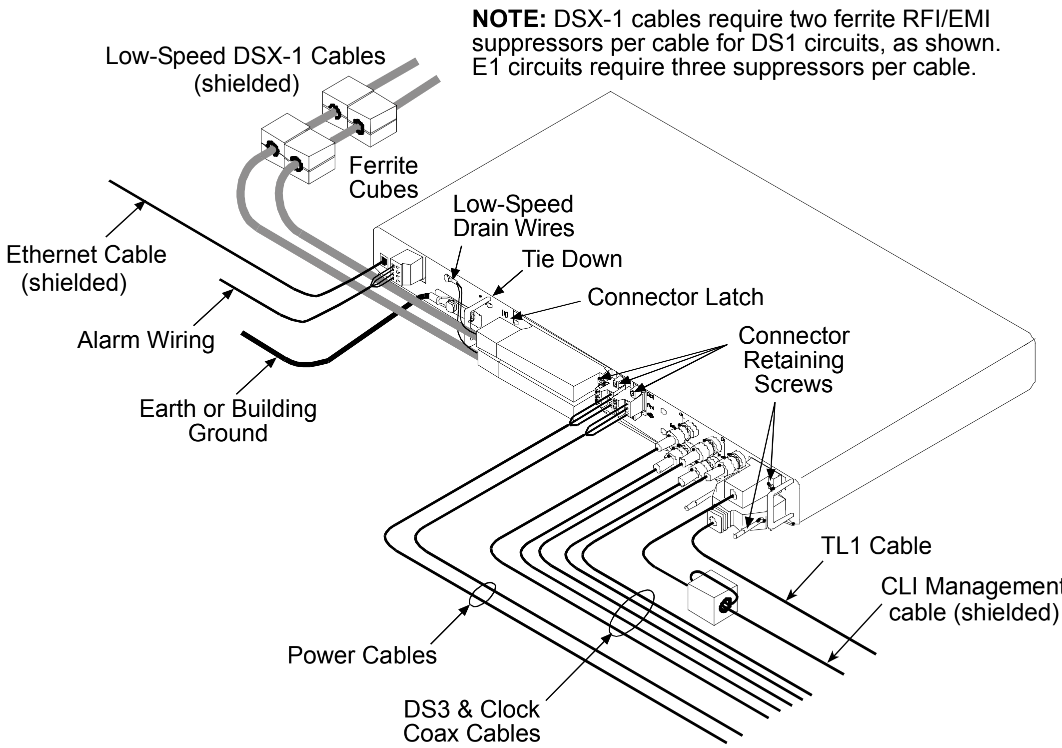


Figure 5-2 Cable and Wiring Layout Example

Ground Connection

When the Wide Bank is connected to a power source other than the Carrier Access Power Converter/ Battery Charger, a separate ground wire must be connected to a Common Bonding Network (CBN). A recommended method to make this connection is shown below.

CAUTION! **CHASSIS MUST BE PROPERLY GROUNDED FOR COMPLIANCE WITH NEBS 1089 EMI/EMC AND FCC REQUIREMENT PART 15, FOR POWER GROUNDING AND TO PREVENT RADIO FREQUENCY INTERFERENCE WITH OTHER EQUIPMENT.**

1. Measure and cut enough wire to connect from building ground to grounding lug on the connector panel of the Wide Bank. Use #14 to #6 AWG insulated copper wire, as required by grounding practice.
2. Route wire from building ground to Wide Bank connector panel. Bend wire to position it near chassis ground studs, as shown in the figure.
3. Obtain a ground lug with crimp or compression clamp for attaching ground wire. Do not use solder, quick-connect or friction-fit connectors.
4. Strip enough insulation off wire end to fit inside the ground lug, flush with front of wire compression clamp.
5. Apply an anti-oxidant compound to the lug's crimp or pressure connector and to the chassis bonding surface.
6. Insert ground wire into ground lug and clamp wire securely using crimp tool or compression tool.
7. Remove lug nuts and lock washers (included) from chassis ground studs.
8. Position ground lug over chassis ground studs and install a star or lock washer.
9. Attach lug nuts and tighten to 0.8 foot-pound (1.086 Nm).

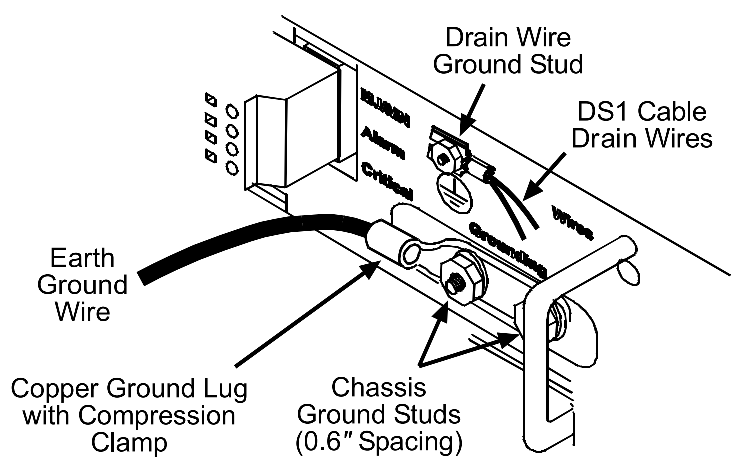


Figure 5-3 Ground Connections

Low-Speed DS1/E1 Cables

The Wide Bank 28 DS3 uses DSX-1 cables for crossconnecting DS1 or E1 signals to other equipment. If the DSX-1 cables will interface with wire-wrap connections, see *Low-Speed DS1/E1 (DSX-1) Connector Pinouts on page A-4* for circuit, pin, and wire group information.

Two DSX-1 cables are required, one for transmit and one for receive. See table for cable part numbers and specifications.

Table 5-1 Wide Bank 28 DS3 Low-Speed Cables

Part No.	Cable Length	Application	Connectors
005-0025	10 ft. (3.048 m)	Low-Speed cable for connecting the Wide Bank 28 DS3 to a DS1 or E1 patch panel for standard low-speed applications	Two 64-pin male Amphenol® "CHAMP" connectors
005-0030	25 ft. (7.7 m)	Low-Speed cable for connecting the Wide Bank 28 DS3 to a DS1 or E1 patch panel for standard low-speed applications.	Two 64-pin male Amphenol® "CHAMP" connectors

CAUTION! **CABLE CONNECTORS MUST BE SECURELY LATCHED IN PLACE TO PREVENT SERVICE INTERRUPTIONS. IF THE CABLE CONNECTOR INTERFERES WITH THE LATCH SPRING OR CAN NOT BE SECURELY LATCHED, A DIFFERENT CABLE SHOULD BE USED.**

1. Carefully connect the 64-pin connectors of DSX-1 cables to **LOW SPEED IN** and **LOW SPEED DS1 OUT** on the Wide Bank connector panel (see Figure 5-4). Ensure that the spring-loaded connector latches snap over the connectors (see Figure 5-5).
2. Insert and tighten the connector screws on the ends of both connectors (see Figure 5-5).
3. Secure both low-speed cables with cable ties as shown in Figure 5-5.
4. Connect both grounding wires from the low-speed cables to the **Low Speed Drain Wires** connection, as shown in Figure 5-3 and in Figure 5-4.
5. If there are grounding leads on the far end of the low-speed cables, cut them off to prevent them from being connected to other equipment, which may cause an unwanted ground loop.
6. Attach ferrite RF Suppressors on the low-speed cables (two per cable for DS1, three per cable for E1) as shown in Figure 5-2.

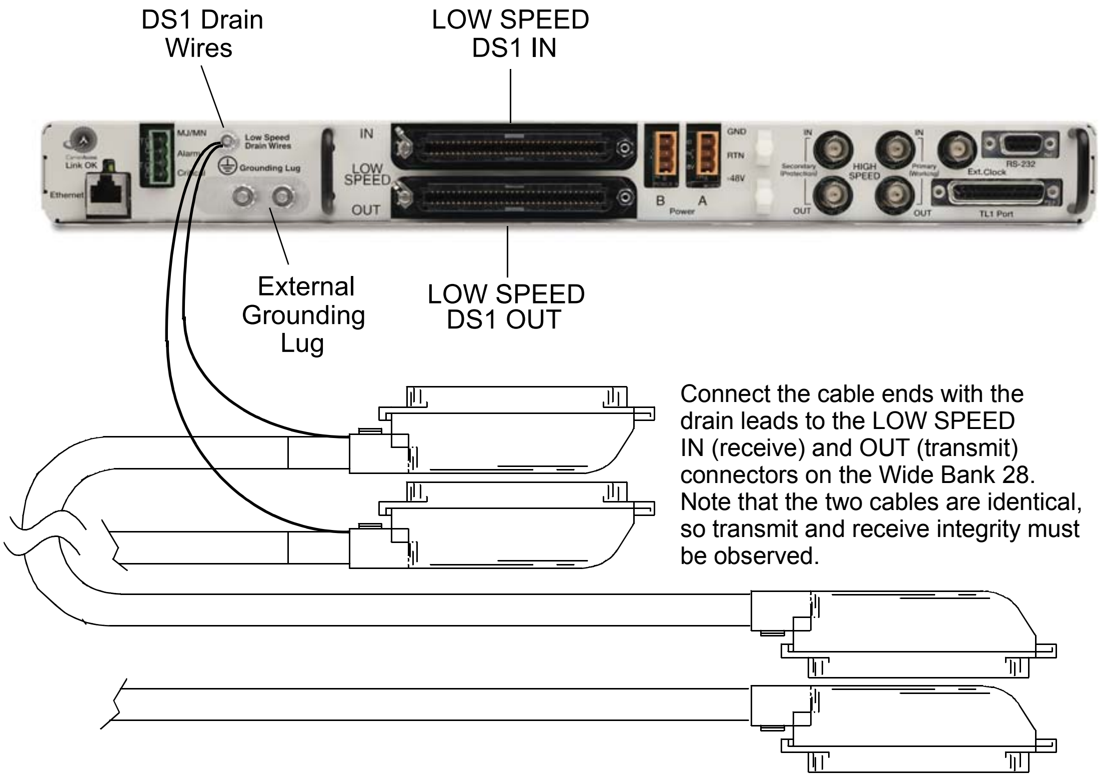


Figure 5-4 Connecting the Low-speed Cables

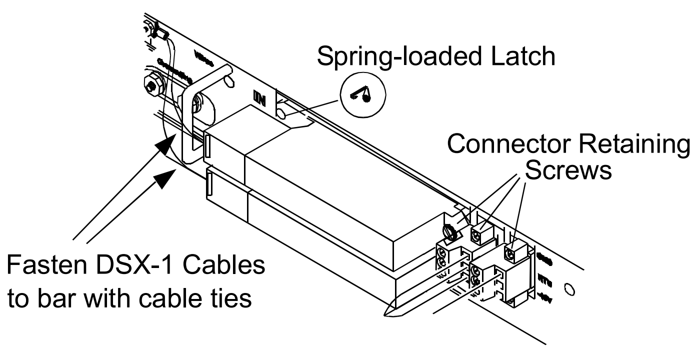


Figure 5-5 Fastening & Tying Down Low-speed Cables

High-Speed DS3 Cables

DS3 connections require 75 ohm coaxial cable with tinned copper shield. Use 735A or 1735A or equivalent cable for lengths up to 250 feet, and 728A or 734A cable for lengths up to 450 feet.

1. Connect the Primary DS3 Input to **Primary IN**.
2. Connect the Primary DS3 Output to **Primary OUT**.
3. Connect the Secondary DS3 Input to **Secondary IN**.
4. Connect the Secondary DS3 Output to **Secondary OUT**.

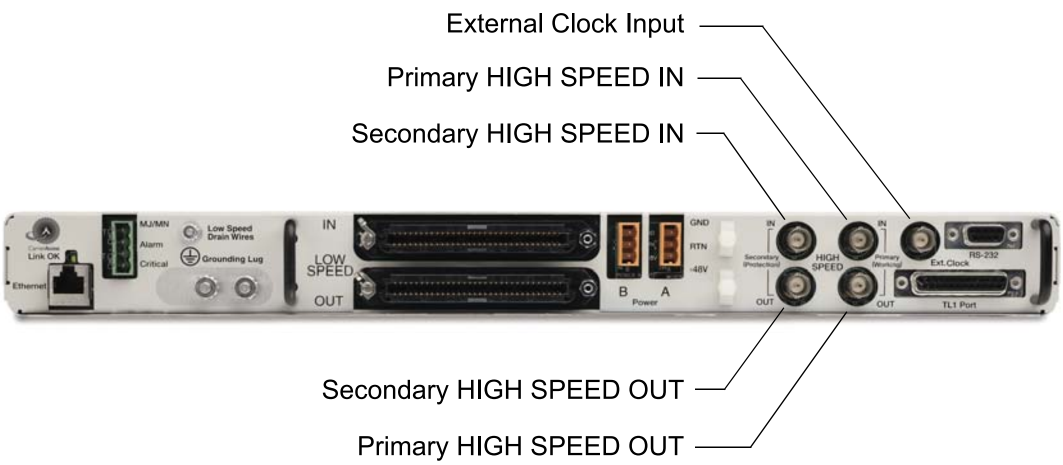


Figure 5-6 Connecting the DS3 and Clock Cables

External Clock Cable

The Wide Bank 28 DS3 is designed to accept a high-speed 44.736 Mbps external clock source for certain applications. The external clock cable must be a shielded coax terminated with a BNC connector. (See DS3 cable requirements above.) Connect it to **Ext. Clock** on the Wide Bank. For technical specifications, see *DS3 Transmit Clock Source on page 3-5*.

Management Cables

CLI RS-232 Management Cable

The RS-232 management port can be connected to an RS-232 terminal or a PC running terminal emulation software such as Hyperterm. Set the port for 9600 baud, 8 data bits, 1 stop bit, no parity, and no flow control.

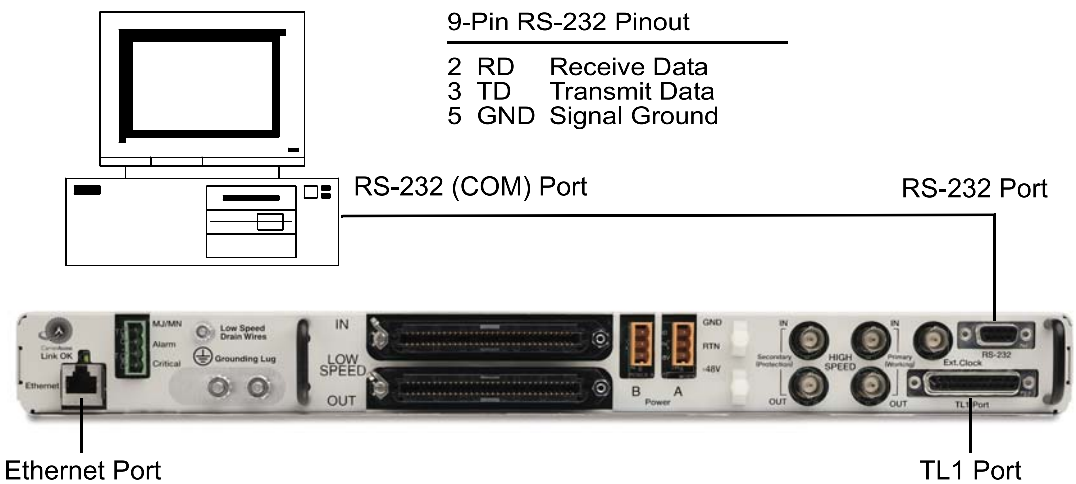


Figure 5-7 Connecting the Management Cables

The RS-232 CLI management cable must be a shielded RS-232 cable with a male DB9 connector. Connect management cable to RS-232 port on the Wide Bank. For compliance with FCC standards, install a ferrite RF suppressor as shown at right. Note that the cable is looped 360º through the suppressor, then the suppressor is closed and latched.

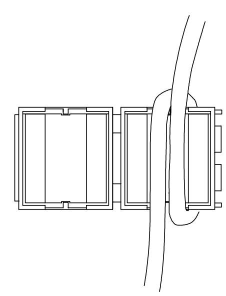


Figure 5-8 Installing the RS-232 Port Cable and Ferrite RF Suppressor

TL1 RS-232 Port Cable

Connect a shielded DB25 cable between the Wide Bank's TL1 RS-232 asynchronous port and either a terminal multiplexer or an external X.25 pad to provide asynchronous RS-232 to X.25 conversion if preferred.See *TL1 RS-232 Management Port Pinout on page A-8*.

Ethernet Management Port

Connect an Ethernet cable between the Wide Bank's Ethernet port and an IP network for remote management using SNMP, Telnet, TL1 alarms, and Carrier Access' NetworkValet EMS software. The Wide Bank's Ethernet port accepts a standard RJ-45 connector. See *Ethernet RJ-45 (10Base-T) Pinout on page A-9*. The Ethernet cable must be shielded for compliance with NEBS and FCC requirements.

NOTE: For remote management over an IP network, you must know the IP address of the Wide Bank (see *Configuring IP and PPP Addresses on page 6-15*). For TL1 the default TCP port number is 9999 but this can be changed (see *TL1 Setup and Configuration on page 9-9*).

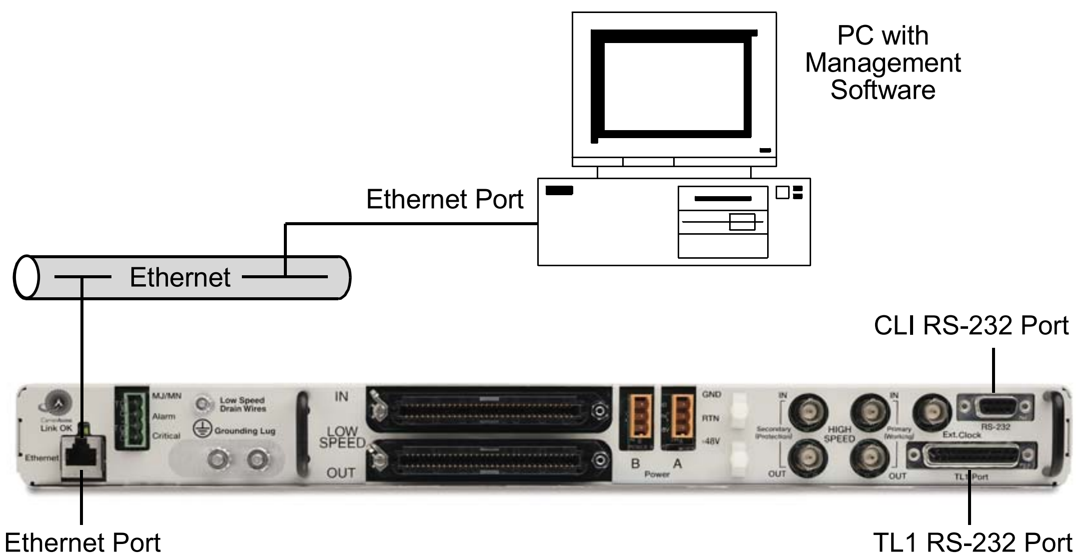


Figure 5-9 Connecting to Ethernet Port for Remote Management

External Alarm Wiring

The external alarm contacts can be wired to a remote alarm panel to indicate alarm conditions on the Wide Bank 28 DS3. The figure shows an example of how to wire the contacts. The external alarm contacts can be programmed for either normally open or normally closed operation, using the CLI command *alarmout* {*no*|*nc*}. In either case, when the Wide Bank is not powered, the alarm contacts will be open. There is no voltage present on these contacts until they are connected to an external voltage source. See figure for maximum contact ratings.

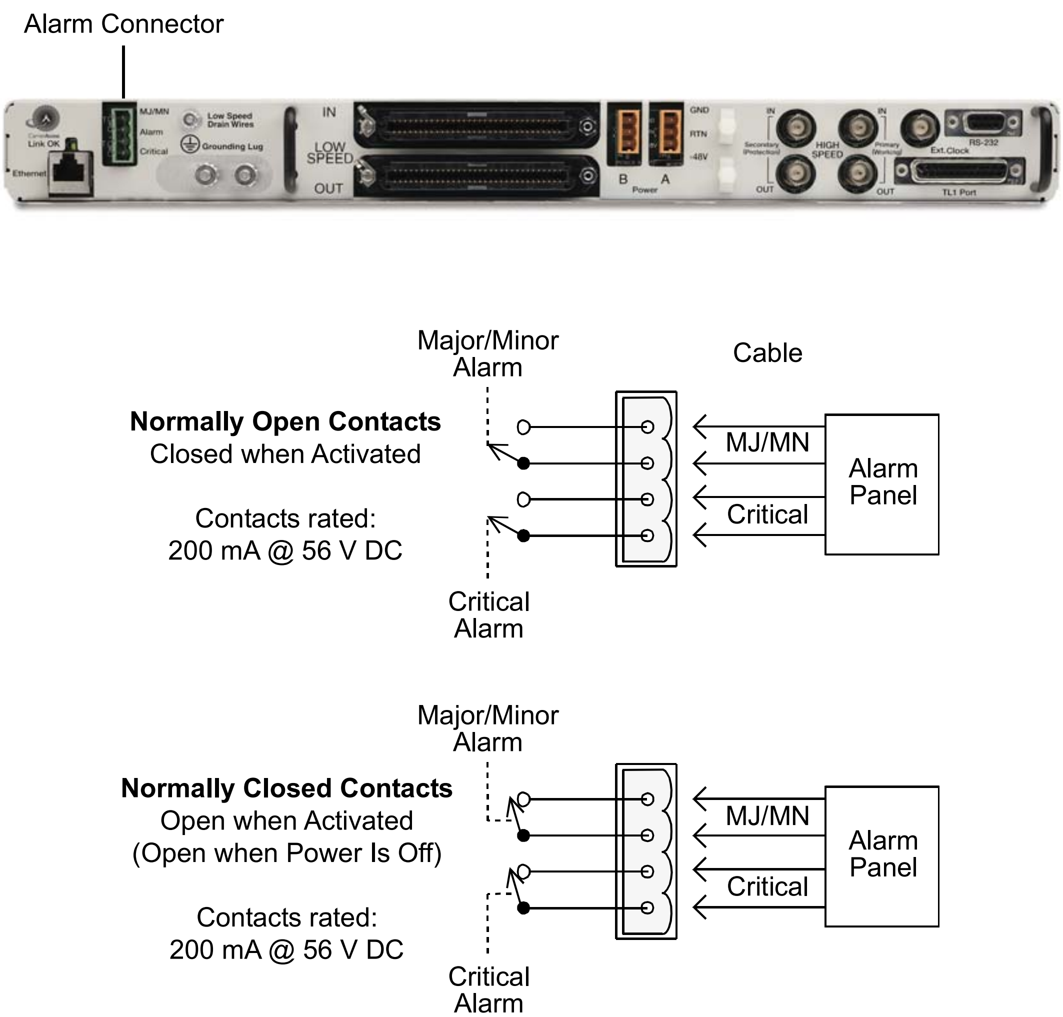


Figure 5-10 External Alarm Wiring

Power Wiring

DC Power Connector Input Requirements

CAUTION! **BOTH POWER INPUTS MUST BE CONNECTED WHEN THE WIDE BANK IS EQUIPPED WITH TWO CONTROLLER CARDS. IF ONLY ONE CONTROLLER IS POWERED, SERVICE WILL BE INTERRUPTED WHEN THE POWERED CONTROLLER IS REMOVED OR ITS INTERNAL POWER CONVERTER FAILS.**

WARNING! **THE POWER CONNECTOR INPUT IS FOR –48 VDC POWER ONLY. THE POWER AND GROUND WIRES IN THE SUPPLY CABLE MUST BE EITHER 16 AWG OR 18 AWG WIRE. THE POWER SUPPLIED TO THE WIDE BANK MUST BE EXTERNALLY PROTECTED BY A THREE-AMP CIRCUIT BREAKER OR SLOW-BLOW FUSE IN THE –48 VDC BRANCH CIRCUIT.**

WARNING! **WARRANTY DOES NOT COVER FAILURES RESULTING FROM LONG-TERM OPERATION WITH POWER APPLIED TO ONLY ONE OF THE REDUNDANT CONTROLLER CARDS.**

NOTE: Carrier Access strongly recommends that power always be applied to both power input connectors even if the unit is equipped with only one Controller card. Powering both connectors allows Controller cards to be inserted into either card slot, enables quick installation of a redundant Controller, and also speeds card replacement and software upgrades without losing the current configuration settings.

The Wide Bank has two three-pin DC power connector inputs located on the rear connector panel (see Figure 5-1). Connector A supplies –48 VDC to Controller card A, and connector B supplies –48 VDC to Controller card B.

If two Controller cards are installed for redundant operation, both power connectors, A and B, must be connected to a –48 VDC power source to prevent service interruptions in the event of a power failure or Controller failure. If redundant power sources are not available, both power connectors can be wired to the same source.

The Wide Bank is designed to provide redundant power input protection and redundant power converter protection. For example, if Controller card A loses –48 VDC input power or if its power converter fails, Controller card B will continue to provide power to all circuits in the Wide Bank. Prolonged operation with only one power input will reduce reliability.

To conform with UL 1950 third edition, and CSA-C22.2 No. 950-95 Standard for Safety for Information Technology Equipment, the Wide Bank is equipped with solid-state, automatic-resetting, current-limiting devices to protect the –48V input and DC return from AC power surges, lightning, or inductive motor spikes. There are no fuses in the Wide Bank**.**

Wiring the Power Plugs

Two power plugs are shipped with each Wide Bank for wiring to a –42 to –58 VDC power supply as described in the following procedure.

DANGER! ENSURE THAT NO POWER IS PRESENT ON THE THREE WIRES FROM THE POWER SOURCE.

1. Use only 16 AWG or 18 AWG copper wire.

2. Strip the three wires from the power source so that 5/16-inch of bare wire is exposed.

WARNING! BE SURE TO WIRE THE CONNECTOR CORRECTLY, AS DESCRIBED IN THIS PROCEDURE. WIRING –48 V TO THE WRONG TERMINAL CAN SEVERELY DAMAGE THE EQUIPMENT OR POWER SUPPLY.

3. Loosen the set screws and insert the wires in the appropriate square holes as shown below, one at a time, tightening the set screws as you go. When inserting wires, ensure that no bare wire is exposed.

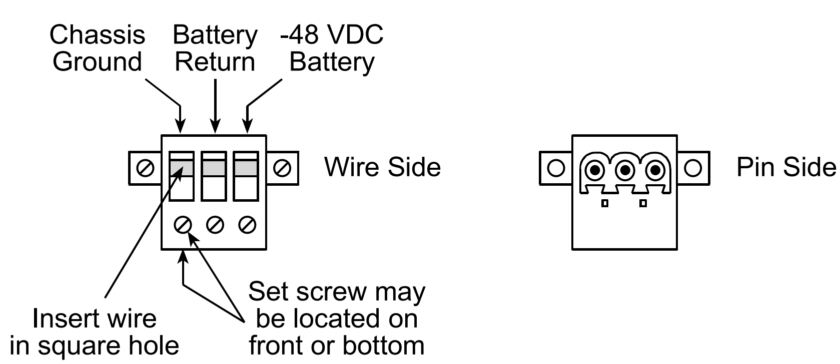


Figure 5-11 Wiring the Power Plugs

Connecting to Power Source

CAUTION! **When a Carrier Access Power Converter/Battery Charger is used, the Wide Bank is grounded through the power plug (pin 1). Therefore, the Power Converter must be plugged into a properly grounded three-pronged outlet with a solid earth ground to prevent circuit problems. The Power Converter also has an external grounding lug that should be connected to earth ground.**

If the Wide Bank is connected to a power source other than the Carrier Access Power Converter/Battery Charger, a separate ground wire must be connected to a Common Bonding Network (CBN). See *Ground Connection* on ***page 5-6*****.**

NOTE: We recommend that each power input cable be protected by an in-line 3-amp slow-blow use in the –48 Volt line.

Pinout assignments for the power connectors are shown below.

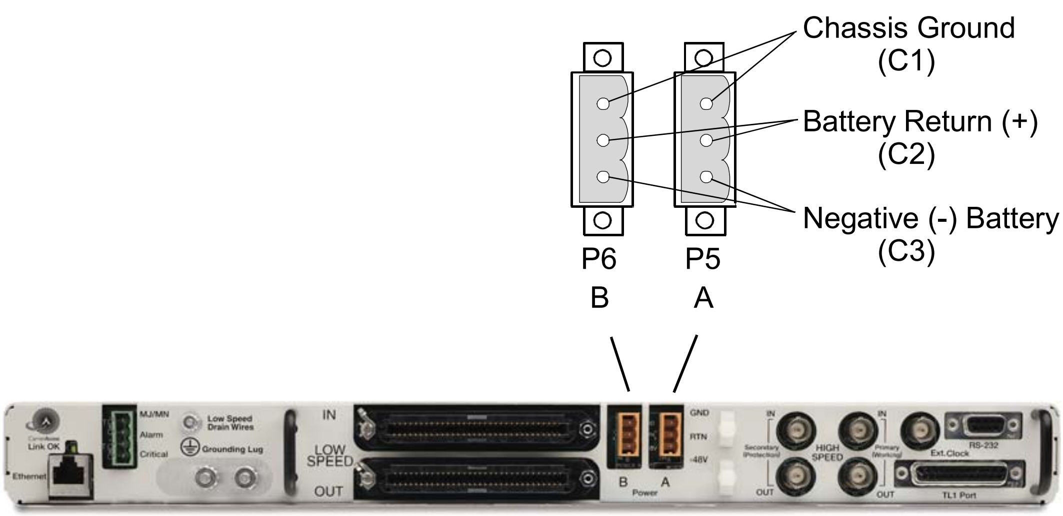


Figure 5-12 Power Connector Pinout

1. Ensure that the power source switch is off (Carrier Access Power Converter/Battery Charger or other power source).
2. Connect the power connectors to the Power A and Power B receptacles on the Wide Bank.

Applying Power

1. Turn on the power switch on the front of the Power Converter, or other local DC power source. There is no power switch on the Wide Bank.
2. Verify that power has been applied to the Wide Bank. The Power LEDs on the front of the Wide Bank should be green for each Controller card installed after initialization.
3. See Chapter 6, *Configuration on page 6-1* for the next step in making the Wide Bank operational.

CHAPTER 6

Configuration

In this Chapter

Configuration Overview

The Wide Bank 28 DS3 Multiplexer is configured at the factory with defaults that are common in the industry. If the default configuration must be changed, or if the setup is lost, perform the following steps to set up a basic configuration.

1. Use the *restore defaults* command to restore the configuration to factory defaults.
2. Change each individual item, as required, to match your specific application.

The basic configuration settings presented in this chapter are examples. It may be necessary to use parameters different from those shown in these procedures to make the Wide Bank work properly in specific installations. See the command descriptions in Chapter 8 for more information about specific commands.

Basic Configuration

Connecting to the Management Port

This procedure assumes that a terminal (or PC with terminal-emulation software) is connected to the RS-232 Management Port on the connector panel of the Wide Bank. The Wide Bank's RS-232 port is a DCE port with DB9 Female connector.

Set terminal program for:

- 9600 baud
- 8 data bits
- No stop bits
- 1 parity bit
- No flow control

Note that when you are using the Command Line Interface for the following procedures, the screen will often stop with a final prompt of "more." This means that all the information has not yet been printed to the screen. You can view the rest of the information by:

- Pressing Enter key to display the next line
- Pressing Space Bar to display the next page of information

You can also change the number of lines that are displayed using the *screen [n]* command where *n* is the desired number of lines to display. A *screen 0* command will cause all information to be printed to the screen without stopping.

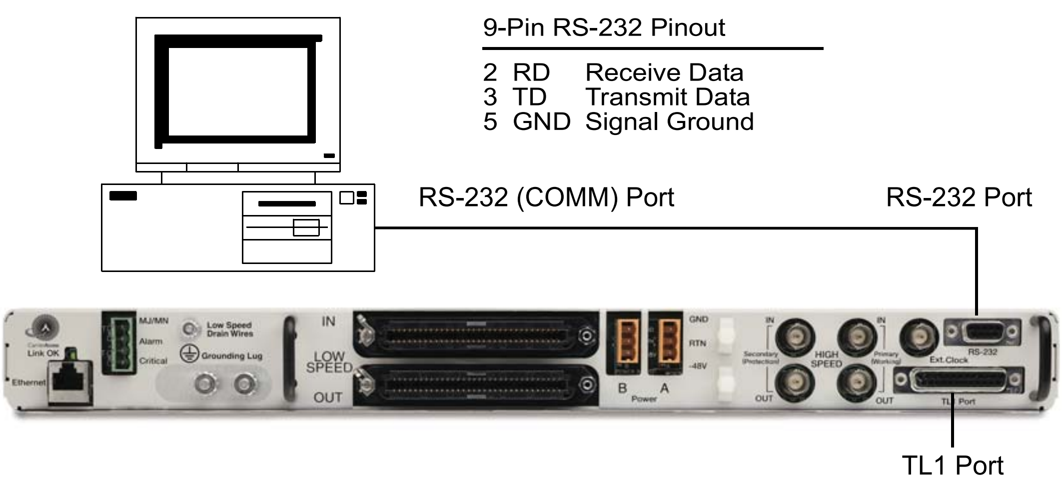


Figure 6-1 RS-232 Management Connection

Logging On

The Wide Bank is shipped with password protection disabled (*security off*). You can enable password protection to prevent unauthorized access. See *Setting System Security, Users, and Login Passwords (Basic Security) on page 6-7* or *Setting System Security, Users, and Login Passwords (Security Upgrade Option) on page 6-10*.

To log in with security off, simply press Enter key. If you are logging in via a Telnet session, login is automatic when the connection is made.

System Response to a successful login request:

Table 6-1 CLI Login Displays for Different LS Modes

CLI in DS1 or DS1LS Mode **Low-Speed Mode is DS1 ("ds1" commands) or** **Low-Speed Mode is DS1 ("ls" commands)**	**CLI in E1LS Mode** **Low-Speed Mode is E1 ("ls" commands)**
14:08:34 05/26/2001 Automatic Login to Controller Card A Equipment Status --------- ------ DS3 Controller A Active DS3 Controller B Standby DS1 Card 1 Active DS1 Card 2 Active DS1 Card 3 Active DS1 Card 4 Active DS1 Card 5 Active DS1 Card 6 Active DS1 Card 7 Active DS1 Spare Card Active	14:08:34 05/26/2001 Automatic Login to Controller Card A Equipment Status --------- ------ DS3 Controller A Active DS3 Controller B Standby E1 Card 1 Active E1 Card 2 Active E1 Card 3 Active E1 Card 4 Active E1 Card 5 Active E1 Card 6 Active E1 Card 7 Active E1 Spare Card Active

Working Configurations

All working configurations are saved in non-volatile memory. Whenever changes are made to the working configuration by issuing any configuration command, the changes are automatically and immediately saved in non-volatile memory. Changes are also copied to the standby Controller's non-volatile memory if Autocopy is on. If Autocopy is off, use the *copy* command to copy the entire configuration to the standby Controller.

There is no command that can undo a configuration change. However, a temporary copy of the current configuration can be saved with the *temp copy* command. This copy of the configuration can be retrieved using the *restore temp copy* command, as long as power has not been cycled.

Another way to preserve the current configuration is to use the *save tftp* command, which saves a snapshot of the configuration in a file system on your network using TFTP. This copy of the configuration will not be destroyed by cycling power. The file can be retrieved using a *restore tftp* command. See the *save* command and the *restore* command in Chapter 9.

Saving a Temporary Copy of Configuration

Use the *temp copy* command to place a temporary copy of the working configuration in volatile storage, to be restored if the working copy becomes corrupted. One use for this command is when you are changing the working configuration and want to easily return to the original configuration if your changes do not work.

To save a copy of the configuration:

```
(A:Active)> temp copy
```

All current settings have been temporarily copied to RAM.

NOTE: This temporary copy, because it is in volatile storage, will be lost whenever power is turned off. This temporary copy, saved by the *temp copy* command, should not be considered a true backup copy. The working configuration and the factory defaults are the only configurations that will survive a power cycle, because they are retained in non-volatile memory.

Restoring a Temporarily Saved Configuration

Use a *restore temp copy* command to replace the current working configuration with the temporary configuration previously saved using a *temp copy* command. If no *temp copy* command was previously issued, or if power was lost, there will be no temporary configuration to load.

Saving the Configuration to a User File System

NOTE: Saving the configuration to a user file system, as well as restoring the configuration requires that a TFTP server be running on the computer identified by the "ipaddr" parameter of the save command.

A more secure copy of the working configuration can be saved to a user file system using TFTP, as mentioned under Working Configuration. The *save tftp ipaddr "filename"* (include quotes) command will save a copy of the working configuration with the specified file name on the computer having the IP address stated in the command.

```
(A:Active)> save tftp ipaddr "filename"
```

Restoring Saved Configuration from User File System

If you have previously saved a copy of the configuration using the *save tftp* command, the file can be retrieved using the *restore tftp ipaddr "filename"* command (see *restore* command in Chapter 9). The IP address and the filename string must match the ones used in the save command. The file you receive is essentially a list of valid CLI commands that will set up the Wide Bank configuration to match the snapshot.

```
(A:Active)> restore tftp ipaddr "filename"
```

Restoring Factory Defaults

The working configuration can be replaced with the original factory defaults by using the *restore defaults* command. Both the working configuration and the factory defaults are stored in non-volatile storage and are retained when power is turned off.

One use for the *restore defaults* command is to re-configure the Wide Bank when the working configuration is lost or corrupted and there is no temporary copy to restore.

To restore the configuration to the factory default settings, enter the following command.

```
(A:Active)> restore defaults
```

Factory default settings are now restored.

Validating Equipment

Validate that all the required interfaces are present. The *equipment* command lists all the low-speed and DS3 cards and shows their status. If the LS mode does not match the card type that is installed, comments in the low-speed status will say “Wrong card for LS mode.”

Table 6-2 CLI Equipment Displays for Different LS Modes

CLI in DS1 or DS1LS Mode **Low-Speed Mode is DS1 ("ds1" commands) or Low-Speed Mode is DS1 ("ls" commands)**	**CLI in E1LS Mode** **Low-Speed Mode is E1 ("ls" commands)**

`(A:Active)> equipment`
 	
`Equipment          Status`
`---------          ------`
`DS3 Controller A   Active`
`DS3 Controller B   Standby`
`DS1 Card 1         Active`
`DS1 Card 2         Active`
`DS1 Card 3         MSO Active`
`DS1 Card 4         Active`
`DS1 Card 5         Active`
`DS1 Card 6         Active`
`DS1 Card 7         Active`
`DS1 Spare Card     Card not present`
	`(A:Active)> equipment`
	
	`Equipment          Status`
	`---------          ------`
	`DS3 Controller A   Active`
	`DS3 Controller B   Standby`
	`E1 Card 1          Active`
	`E1 Card 2          Active`
	`E1 Card 3          MSO Active`
	`E1 Card 4          Active`
	`E1 Card 5          Active`
	`E1 Card 6          Active`
	`E1 Card 7          Active`
	`E1 Spare Card      Card not present`

Setting the Time and Date

Although the working configuration is retained when power is turned off, the system clock time and system date are lost. To set the time and date:

Set System Time

```
(A:Active)> time

The time is 16:01:20 10/01/2001

(A:Active)> time 16:20:00

The time is 16:20:00 10/01/2001
```

Set System Date

```
(A:Active)> date 10/24/2001

The time is 16:21:33 10/24/2001
```

Setting System Security, Users, and Login Passwords (Basic Security)

All configurations of the Wide Bank support a multiple-level user and password security system for the CLI. With this basic security system, each user is assigned an access level and, optionally, a password. The access level limits the user to operate with a specific set of commands. Enhanced security, available as the "Security Upgrade" option, provides additional security features. If your Wide Bank has the Security Upgrade option, see *Setting System Security, Users, and Login Passwords (Security Upgrade Option) on page 6-10*.

See the following sections for information about security tasks:

Access Levels (Basic Security)

With basic security, there are three access levels available for CLI users:

- ***admin*** – The *admin* user has access to all commands and has the sole authority to grant others access to the system by adding and deleting user names and passwords. There can be only one *admin* user (always named "admin") within the system.
- ***rw* (read/write)** – An *rw* user has access to all commands except those for adding users, deleting users, and setting user levels. The *rw* users are typically responsible for the day-to-day operation of the system.
- ***ro* (read only)** – An *ro* user is limited to commands that display status and reports. The *ro* access level permits technicians to monitor system operation and performance, but prevents them from altering settings.

Password Protection (Basic Security)

The Wide Bank is shipped with password protection disabled (*security off*). You may choose to enable password protection (*security on*) and set passwords for users to prevent unauthorized system access.

With security off, login is accomplished simply by pressing the Enter key. No password is required, and the user is considered to be at the *admin* level.

If security is on, and passwords have been assigned, login requires that you type a user name and password when prompted. Users are permitted to modify their own passwords, if desired. If passwords have not been assigned for users, a user name is required but no password is requested.

NOTE: With basic security, user names must include from 1 to 10 alphanumeric characters and must not contain spaces. User names are not case-sensitive when defined; however, users must log in using lower-case characters.

Passwords can be from 1 to 10 alphanumeric characters and are case-sensitive. Spaces and special characters are not allowed. Up to 32 characters may be entered but only the first 10 will be used. Passwords can also be blank (not requested at login).

NOTE: When security is on and the user *admin* is logged in, turning security off logs off the user *admin*. Similarly, turning security on automatically logs in the user *admin*.

Security integrity is provided by denying access if a user name or password is entered incorrectly. After three consecutive unsuccessful login attempts, the login prompt will not appear for 10 seconds, and an SNMP trap (cliLoginFailureTrap) is sent to the Network Management System (NMS). After the 10-second delay, the prompt wll reappear and another login attempt can be made. This three-attempt rule applies to both RS-232 and Telnet sessions but a Telnet session will be disconnected after three unsuccessful attempts, requiring reconnection after a 10-second delay.

Display Current Security Status (Basic Security)

```
(A:Active)> security
  security   off
```

Change the Security Status (Basic Security)

```
(A:Active)> security on
  security    on
```

Add a User (Basic Security)

```
(A:Active)> user "bill" add
  Successfully added new user "bill"
```

See *USER on page 8-82* for user name restrictions.

Assign or Change a User's Password (Basic Security)

```
(A:Active)> user "bill" password
  New password: ****
  Confirm new password: ****
  New password accepted
```

See *USER on page 8-82* for password restrictions.

Set a User's Access Level (Basic Security)

```
(A:Active)> user "bill" level rw
  Successfully set "bill"'s access level to rw
```

Delete a User (Basic Security)

NOTE: The *admin* user cannot be deleted.

```
(A:Active)> user "bill" delete
  Successfully deleted user "bill"
```

Show Current User Settings (Basic Security)

```
(A:Active)> user

  User        Level        Last Login
  ----        -----        ----------
  admin       admin        11:39:36 06/23/2004 (Active)
  bill         rw          11:02:52 06/23/2004
  marie        rw          Never logged in
  morgan       ro          11:39:14 06/23/2004
```

When security is on, the currently logged-on user is indicated as (Active).

Setting System Security, Users, and Login Passwords (Security Upgrade Option)

If the Wide Bank is configured with the Security Upgrade option, enhanced security features are available, including an additional user access level and the ability to disable user interfaces. As with basic security (described in the previous section), each user can be assigned a user level. Passwords are required for each user.

With the Security Upgrade option, the Wide Bank supports the following enhanced security features:

- Four levels of users – *secu*, *admin*, *rw*, and *ro*
- Restrictions on the number and types of characters allowed in user names and passwords
- The ability to set a time-out value for CLI sessions
- The ability to individually disable the user interface ports: Ethernet port, 9-pin RS-232 CLI port, and 25-pin RS-232 TL1 port
- The ability to disable SNMP management
- The ability to disable TL1 management

See the following sections for information about security tasks:

Access Levels (Security Upgrade Option)

With the Security Upgrade option, there are four access levels available for CLI users:

- ***secu*** – The *secu* user has access to all commands and has the sole authority to grant others access to the system by adding and deleting user names and passwords. The *secu* user also has sole authority to perform such functions as clearing all statistics and logs, configuring IP settings, restoring factory default or previously saved configurations, and configuring the TL1 interface. There can be only one *secu* user (always named "security") within the system.
- ***admin*** – An *admin* user has access to all commands except those assigned exclusively to the *secu* user. Functions available to the *admin* user that are not available to lower-level users include clearing DS1 and DS3 statistics, copying a configuration from the active to standby Controller, setting the system time and date, programming the flash memory, saving a configuration to a TFTP server file, setting various security functions, configuring SNMP, and copying the current configuration to temporary storage.
- ***rw* (read/write)** – An *rw* user has access to all commands except those assigned exclusively to the *secu* and *admin* users. The *rw* users are typically responsible for the day-to-day operation of the system.
- ***ro* (read only)** – An *ro* user is limited to commands that display status and reports. The *ro* access level permits technicians to monitor system operation and performance, but prevents them from altering settings.

Password Protection (Security Upgrade Option)

Wide Banks equipped with the Security Upgrade option are shipped with password protection disabled (*security off*). You may choose to enable password protection (*security on*) and set passwords for users to prevent unauthorized system access.

With security off, login is accomplished simply by pressing the Enter key. No password is required, and the user is considered to be *secu*.

If security is on, login requires that you type a user name and password when prompted. Only the *secu* user may modify passwords.

NOTE: With the Security Upgrade option, user names must include from 8 to 10 alphanumeric characters and must not contain spaces. User names are case-sensitive.

Passwords must be from 8 to 10 characters and are case-sensitive. Passwords must contain at least one each of the following types of characters: upper-case alphabetic, lower-case alphabetic, numeric, and special characters. The permitted special characters are listed with the *user* command (see *USER on page 8-82*).

If you are upgrading firmware in an existing Wide Bank, previously defined user names and passwords that contain fewer than 8 characters will be preserved. Blank passwords are also preserved.

NOTE: When security is on and the user *secu* is logged in, turning security off logs off the user *secu*. Similarly, turning security on automatically logs in the user *secu*.

Security integrity is provided by denying access if a user name or password is entered incorrectly. After three consecutive unsuccessful login attempts, the login prompt will not appear for 10 seconds, and an SNMP trap (cliLoginFailureTrap) is sent to the Network Management System (NMS). After the 10-second delay, the prompt wll reappear and another login attempt can be made. This three-attempt rule applies to both RS-232 and Telnet sessions but a Telnet session will be disconnected after three unsuccessful attempts, requiring reconnection after a 10-second delay.

NOTE: Whenever a user logs in or out of the CLI interface or the TL1 interface, an event is recorded in the event log. The log entry indicates the name of the user that logged in or out.

User Interface Access (Security Upgrade Option)

With the Wide Bank's Security Upgrade option, you can selectively disable the following user interfaces to prevent unauthorized access:

- **Ethernet port** – Prevents SNMP, TCP/IP TL1, and Telnet sessions over the Ethernet port.
- **9-pin RS-232 CLI port** – Prevents CLI sessions over the RS-232 CLI port.
- **25-pin RS-232 TL1 port –** Prevents TL1 sessions over the RS-232 TL1 port.
- **SNMP management** – Prevents SNMP sessions over the Ethernet port and over the DS3 C-bit PPP data link.
- **TL1 management** – Prevents TL1 sessions over the 25-pin RS-232 TL1 port, over the Ethernet port, and over the DS3 C-bit PPP data link.

The Ethernet port and RS-232 CLI port cannot both be disabled. One of these ports must remain active to provide CLI management access. If you disable the RS-232 port, you must first assign a valid IP address to the Wide Bank for Ethernet access (cannot be null, 0.0.0.0, or 255.255.255.255). For information about setting the IP address, see *Configuring IP and PPP Addresses on page 6-15*.

If you disable SNMP management, SNMP sessions are disabled over the Ethernet port and the DS3 C-bit PPP data link. If you disable TL1 management, TL1 is disabled over the 25-pin RS-232 TL1 port, the Ethernet port, and the DS3 C-bit PPP data link. In a PPP remote management configuration, a local Wide Bank is connected via DS3 to a remote Wide Bank. The local Wide Bank can route messages originating from the Ethernet channel to the remote Wide Bank over the C-bit link. The remote Wide Bank responds over the C-bit link to the local Wide Bank which then routes the responses back over its Ethernet channel. Disabling SNMP or TL1 in the local Wide Bank does not prevent SNMP or TL1 sessions over the C-bit link to the remote Wide Bank. To prevent SNMP or TL1 sessions to the remote Wide Bank via the C-bit link, these interfaces must be disabled for the remote Wide Bank as well.

Display Current Security Status (Security Upgrade Option)

```
(A:Active)> security
  security   off
```

Change the Security Status (Security Upgrade Option)

```
(A:Active)> security on
  security    on
```

Add a User and Assign a Password (Security Upgrade Option)

```
(A:Active)> user "bill" add
  New password: ********
  Confirm new password: ********
  New password accepted

  Successfully added new user "bill"
```

See *USER on page 8-82* for user name and password restrictions.

Change a User's Password (Security Upgrade Option)

```
(A:Active)> user "bill" password
  New password: ********
  Confirm new password: ********
  New password accepted
```

See *USER on page 8-82* for password restrictions.

Set a User's Access Level (Security Upgrade Option)

```
(A:Active)> user "bill" level rw
  Successfully set "bill"'s access level to rw
```

Delete a User (Security Upgrade Option)

NOTE: The *secu* user cannot be deleted.

```
(A:Active)> user "bill" delete
  Successfully deleted user "bill"
```

Show Current User Settings (Security Upgrade Option)

```
(A:Active)> user

  User        Level       Last Login
  ----        -----       ----------
  security    secu        11:39:36 06/23/2004 (Active)
  john        admin       11:39:36 06/23/2004
  bill         rw         11:02:52 06/23/2004
  marie        rw         Never logged in
  jack         ro         Never logged in
  morgan       ro         11:39:14 06/23/2004
```

When security is on, the currently logged-on user is indicated as (Active).

Set CLI Time-Out (Security Upgrade Option)

```
(A:Active)> security cli 30
  CLI timeout = 30 minutes
```

Disable Ethernet Port (Security Upgrade Option)

```
(A:Active)> security ethernet disable
    Disabling this port will affect the ability to remotely
    manage this unit.  It will not be possible to remotely
    manage this unit on IP Address nnn.nnn.nnn.nnn

    Do you want to disable the Ethernet port now (y/n)?
```

nnn.nnn.nnn.nnn is the Wide Bank's IP address. Remote management will no longer be possible over this address.

Disable 9-Pin RS-232 CLI Port (Security Upgrade Option)

```
(A:Active)> security rs232cli disable
    Disabling this port will disable the ability to locally
    manage this unit.  Remote management will be possible on
    IP Address nnn.nnn.nnn.nnn

    Do you want to disable the CLI port now (y/n)?
```

nnn.nnn.nnn.nnn is the Wide Bank's IP address. Before disabling the CLI port, you must assign a valid IP address. See *Configuring IP and PPP Addresses on* page 6-15.

Disable 25-Pin RS-232 TL1 Port (Security Upgrade Option)

```
(A:Active)> security rs232tl1 disable
   TL1 RS-232 port disabled
```

Disable SNMP Management (Security Upgrade Option)

```
(A:Active)> security snmp disable
   SNMP feature disabled
```

Disable TL1 Management (Security Upgrade Option)

```
(A:Active)> security tl1 disable
   TL1 feature disabled
```

Configuring IP and PPP Addresses

The Wide Bank includes SNMP and Telnet support. Before they can be used, the following network settings must be configured. These settings are not necessary if you do not want to use SNMP or Telnet.

The following example represents a response while in C-bit framing mode. If the Wide Bank is not in C-bit framing mode, the *ip ppp* and *ip route ppp|ethernet* items are not available.

```
(A:Active)> ip

     ip    address 192.168.2.40
     ip       mask 255.255.255.0
     ip    gateway 192.168.2.202
     ip       nms1 192.168.0.4
     ip       nms2 206.168.118.70
     ip       nms3
     ip        ppp 192.168.5.10
     ip      route ethernet

(A:Active)> ip address 192.168.0.5
Modifying IP address will affect ability to remotely manage this unit.
The IP address for remote management will be 192.168.0.5
Do you want to update the IP address now (y/n)?

   (First IP Address of the active controller)

(A:Active)> ip mask  255.255.255.0
 (Subnet mask for LAN)

(A:Active)> ip gateway 192.168.0.1
 (IP Address for the LAN gateway)

(A:Active)> ip nms1 192.168.0.3
 (IP Address for SNMP Trap notification)

(A:Active)> ip nms2 192.168.0.4
 (Second IP Address for SNMP Trap notification)
```

```
(A:Active)> ip nms3 192.168.0.5
  (Third IP Address for SNMP Trap notification)

(A:Active)> ip ppp 192.168.0.6
  (IP Address for far end of the PPP link - DS3 C-bit framing
only)

(A:Active)> ip route ethernet
  (Set route for outbound IP traffic: ppp or ethernet. Ethernet
is the default. DS3 C-bit framing is only for ppp route.)
```

Verify Network Settings

```
(A:Active)> ip

ip    address 192.168.0.5
ip       mask 255.255.255.0
ip    gateway 192.168.0.1
ip       nms1 192.168.0.3
ip       nms2 192.168.0.4
ip       nms3 192.168.0.5
ip        ppp 192.168.0.6
ip      route ethernet
```

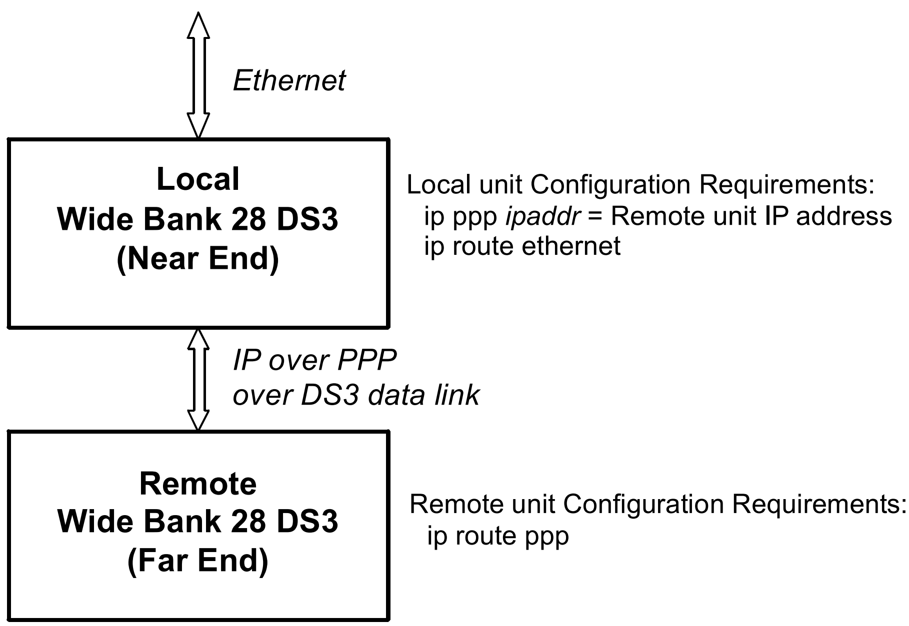


Figure 6-2 IP Routing with Point-to-Point Protocol

IP Routing With Point-to-Point Protocol (PPP)

PPP routing provides an IP connection over the DS3 C-bit data link that can be used for management instead of the Ethernet port. For example, a local (near end) Wide Bank configured with an IP PPP setting will route any IP packets destined for the PPP address along the C-bit PPP data link to the remote (far end) Wide Bank 28 DS3. The near-end Wide Bank will also handle routing of upstream IP traffic from the far-end Wide Bank 28 DS3.

IP over PPP Applications

These IP applications will function over the PPP link:

- TFTP
- SNMP
- TELNET
- PING
- TL1

Configuring DS3

The following command (the ds3 command without parameters) displays the DS3 configuration settings. For details and parameters for the ds3 command, see Chapter 8. The following examples show the difference between M23 framing and C-bit framing.

CAUTION! **IT IS STRONGLY RECOMMENDED THAT THE DS3 CLOCK SOURCE BE SET TO "INTERNAL" TIMING. THE WIDE BANK 28 DS3 IS AN ASYNCHRONOUS MULTIPLEXER. ASYNCHRONOUS COMMUNICATIONS DO NOT REQUIRE A COMMON CLOCK BETWEEN THE COMMUNICATING DEVICES. CHANGING THE CLOCK SOURCE TO "LINE" CAN DISRUPT SERVICE AND CAUSE DS1 TIMING SLIPS.**

The following example shows the response when configured for M23 framing.

```
(A:Active)> ds3

- DS3
    ds3    circuitid "steve"
    ds3        clock int
    ds3  clockrevert on
    ds3    equipment off
    ds3      framing m23
    ds3       length short
    ds3         line off
    ds3   loopdetect off
    ds3      payload off
    ds3         send off
    ds3    threshold off
```

```
ds3 pm lcv thresholds
    min15           0
    hour            0
    day             1
```

The following example shows the response when configured for C-bit framing.

```
(A:Active)> ds3

- DS3
    ds3    circuitid "DS3"
    ds3        clock int
    ds3  clockrevert on
    ds3  equipmentid "DS3 Equip."
    ds3    equipment off
    ds3   facilityid "DS3 Path"
    ds3      frameid "Frame"
    ds3      framing cbit
    ds3    gennumber "DS3 Test Generator"
    ds3       length short
    ds3         line off
    ds3   locationid "DS3 Loc."
    ds3   loopdetect off
    ds3      payload off
    ds3   portnumber "DS3 Idle Port"
    ds3         send off
    ds3    threshold off
    ds3         unit "000000"
    Performance Thresholds:         15 min.      1 hour       1 day
                                   --------     --------     --------
    coding violations - line:             0            0            0
    errored seconds - line:               0            0            0
    coding viols-path p-bit:              0            0            0
    err seconds - path p-bit:             0            0            0
    loss of signal secs - line:           0            0            0
    sev err seconds - line:               0            0            0
    sev err sec - path cp-bit:            0            0            0
```

Configuring Low-Speed Ports

There are two forms of DS1 line coding supported on the Wide Bank: B8ZS and AMI. You can configure to either form, as shown below using AMI as an example.

NOTE: There is only one line-coding for E1: HDB3. When E1 cards are installed in the Wide Bank 28 DS3 and the CLI is set for E1LS mode (see the *lsmode* command), the following DS1 references are changed to E1.

```
(A:Active)> ds1 5
The DS1 channel # is: 5
```

Table 6-3 CLI Low-Speed Displays for Different LS Modes

CLI in DS1 or DS1LS Mode **Low-Speed Mode is DS1 ("ds1" commands) or Low-Speed Mode is DS1 ("ls" commands)**	**CLI in E1LS Mode** **Low-Speed Mode is E1 ("ls" commands)**
`- DS1 5`	`- LS Circuit 5`
`ds1 5 circuitid "DS1 5"`	`e1 13 circuitid "E1 5"`
`ds1 5 enable`	`e1 13 enable`
`ds1 5 equipment off`	`e1 13 equipment off`
`ds1 5 length dsx0`	`e1 13 line off`
`ds1 5 line off`	`e1 13 loopdetect off`
`ds1 5 linecode ami`	`e1 13 metallic off`
`ds3 5 loopdetect off`	`e1 13 send off`
`ds1 5 metallic off`	
`ds1 5 send off`	

For example, to configure DS1 interface 5 to AMI line coding:

```
(A:Active)> ds1 5 linecode ami
The DS1 channel # is: 5
ds1 5    linecode ami
```

Saving the Configuration

There is no need to manually save the configuration. The Wide Bank retains the working configuration settings in non-volatile storage. If power is lost and regained, the working configuration is always retained.

NOTE: An additional backup of the configuration can be sent to a user file using a *save tftp* command.

NOTE: When E1 cards are installed in the Wide Bank and the CLI is set for E1LS mode, the following DS1 references are changed to E1.

Verify All System Parameters

```
(A:Active)> config

 - CONTROLLER

     ds1      protect on
     ds3      protect off
     autocopy        on
     revertive ds3    off
     revertive ds1    off
     arm             on

     ffo      present off

     security        off

     screen 24

     ip    address 192.168.26.44
     ip       mask 255.255.255.0
     ip    gateway 192.168.26.202
     ip       nms1 192.168.41.46
     ip       nms2 192.168.25.212
     ip       nms3
     ip        ppp
     ip      route ethernet

     snmp name       "Name"
     snmp location   "Location"
     snmp contact    "Contact"
     snmp getcomm    "public"
     snmp setcomm    "public"
     snmp trapcomm   "public"

 - DS3
     ds3    circuitid "DS3"
     ds3        clock int
     ds3  clockrevert on
     ds3  equipmentid "DS3 Equip."
     ds3    equipment off
     ds3   facilityid "DS3 Path"
     ds3      frameid "Frame"
     ds3      framing cbit
     ds3    gennumber "DS3 Test Generator"
     ds3       length short
     ds3         line off
     ds3   locationid "DS3 Loc."
     ds3   loopdetect off
     ds3      payload off
     ds3   portnumber "DS3 Idle Port"
```

```
    ds3         send off
    ds3    threshold off
    ds3         unit "000000"
    Performance Thresholds:    15 min.    1 hour     1 day
                              --------  --------  --------
    coding violations - line:      387      1161      3865
    errored seconds - line:         25        75       250
    coding viols-path p-bit:       382      1146      3820
    err seconds - path p-bit:       25        75       250
    loss of signal secs - line:      4        12        40
    sev err seconds - line:          4        12        40
    sev err sec - path cp-bit:       4        12        40

-  1
    ds1 1   circuitid "DS1#1"
    ds1 1      enable
    ds1 1   equipment off
    ds1 1      length dsx0
    ds1 1        line off
    ds1 1    linecode b8zs
    ds1 1  loopdetect off
    ds1 1    metallic off
    ds1 1        send off
    Performance Thresholds:    15 min.    1 hour     1 day
                              --------  --------  --------
    coding violations - line:    13340     40020    133400
    errored seconds - line:         65       195       648

    •
    • (Circuits 2 through 27)
    •

-  28
    ds1 28  circuitid "DS1#28"
    ds1 28     enable
    ds1 28  equipment off
    ds1 28     length dsx0
    ds1 28       line off
    ds1 28   linecode b8zs
    ds1 28 loopdetect off
    ds1 28   metallic off
    ds1 28       send off
    Performance Thresholds:    15 min.    1 hour     1 day
                              --------  --------  --------
    coding violations - line:    13340     40020    133400
    errored seconds - line:         65       195       648
```

Verifying Autocopy to Secondary Controller

With a secondary Controller card installed, and the autocopy feature on (default), the secondary Controller will automatically reflect the same configuration as the primary Controller. The only way to verify that autocopy worked is to switch Controllers and check configurations. If autocopy is off (*autocopy off*), or if you choose to manually copy the configuration, the configuration can be copied to the secondary Controller with a *copy* command. There may be some cases (in protected DS3 installations) when the primary and secondary Controller/DS3 interfaces will not have the same configuration. In these cases, *autocopy* should be turned off (use the command *autocopy off*).

NOTE: The security configuration (user names, access levels, passwords) is always autocopied between Controllers.

Turning Off Unused or Unterminated Low-Speed Channels

For continued FCC Part 15A and NEBS compliance, unused and unterminated low-speed channels must be turned off by issuing the CLI ds1 or ls command:

(A:Active)> **ds1 [*n*|range|all] disable**

or

(A:Active)> **ls [*n*|range|all] disable**

Logging Off

When you have finished configuring the Wide Bank, you can log off with the *exit* command.

(A:Active)> **exit**

```
Logging out
```

Downloading New Software

If your Wide Bank 28 DS3 Controller cards are equipped with FLASH memory, you can download a new level of firmware to your Wide Bank. Usually, units with a serial number of 01898491000 or higher have FLASH capability. The firmware can reside on any TFTP server to which you can connect through the Ethernet, or it can reside on the PC you are using to manage the download. You must know the file name of the new firmware, and if you are downloading through the Ethernet you must know the IP address of the TFTP server on which the firmware resides.

Configurations for Downloading Firmware

A Wide Bank can be physically configured either with one Controller card (non-redundant), or with two Controller cards (redundant). How your Wide Bank is configured will affect the downloading process, as well as the continuous processing of traffic.

Downloading Firmware to a non-redundant Wide Bank will cause a short interruption of service (up to 90 seconds) when the system resets after FLASH is re-programmed. Downloading firmware to a redundant Wide Bank, when successful, will cause no interruption of service.

The effects to the downloading process are explained in the following procedures.

Management Connections for Downloading Firmware

The options for managing the download are:

- Figure 6-3A: A PC, running terminal emulation (HyperTerminal, for example), connected to the RS-232 port on the Wide Bank. The settings are 9600, 8 bits, no parity, 1 stop bit.
- Figure 6-3B: A VT100 terminal connected to the RS-232 port on the Wide Bank to control a download over an Ethernet connection, and the Ethernet port on the Wide Bank connected to the Ethernet. With this connection, the new firmware must reside on a TFTP server connected to the Ethernet.
- Figure 6-3C: A Telnet session, connected to the Ethernet, and the Ethernet port on the Wide Bank connected to an IP network. The TFTP server on which the new level of firmware resides must be reachable through an IP network as well, and you must know the IP addresses for both the Wide Bank and the server.

- Figure 6-3C: A NetworkValet management session connected to the Ethernet, and the Ethernet port on the unit connected to an IP network. The TFTP server on which the new level of firmware resides must be reachable through an IP network as well, and you must know the IP addresses for both the Wide Bank and the server.
- An SNMP session connected to the Ethernet, and the Ethernet port on the Wide Bank connected to an IP network. A TFTP download is initiated via SNMP using the enterprise MIB.
- An SNMP or Telnet session operating via the DS3 PPP link. The PPP link must be active and the device on the other end of the PPP link must be connected to an IP network.

Protocol Options for Downloading Firmware

The protocol options for downloading software are:

- Xmodem protocol: This protocol can be used when the management PC is connected to the RS-232 port of the unit (Figure 6-3A) and the new control code resides on the same (management) PC.
- Trivial File Transfer Protocol (TFTP): This protocol can be used when the management PC is connected to either the RS-232 port in which file transfer occurs over the Ethernet port (Figure 6-3B) or is connected with a Telnet session through the Ethernet port (Figure 6-3C). There must be a TFTP server that can store and transfer the new control code. The TFTP protocol is usually faster than the Xmodem protocol.

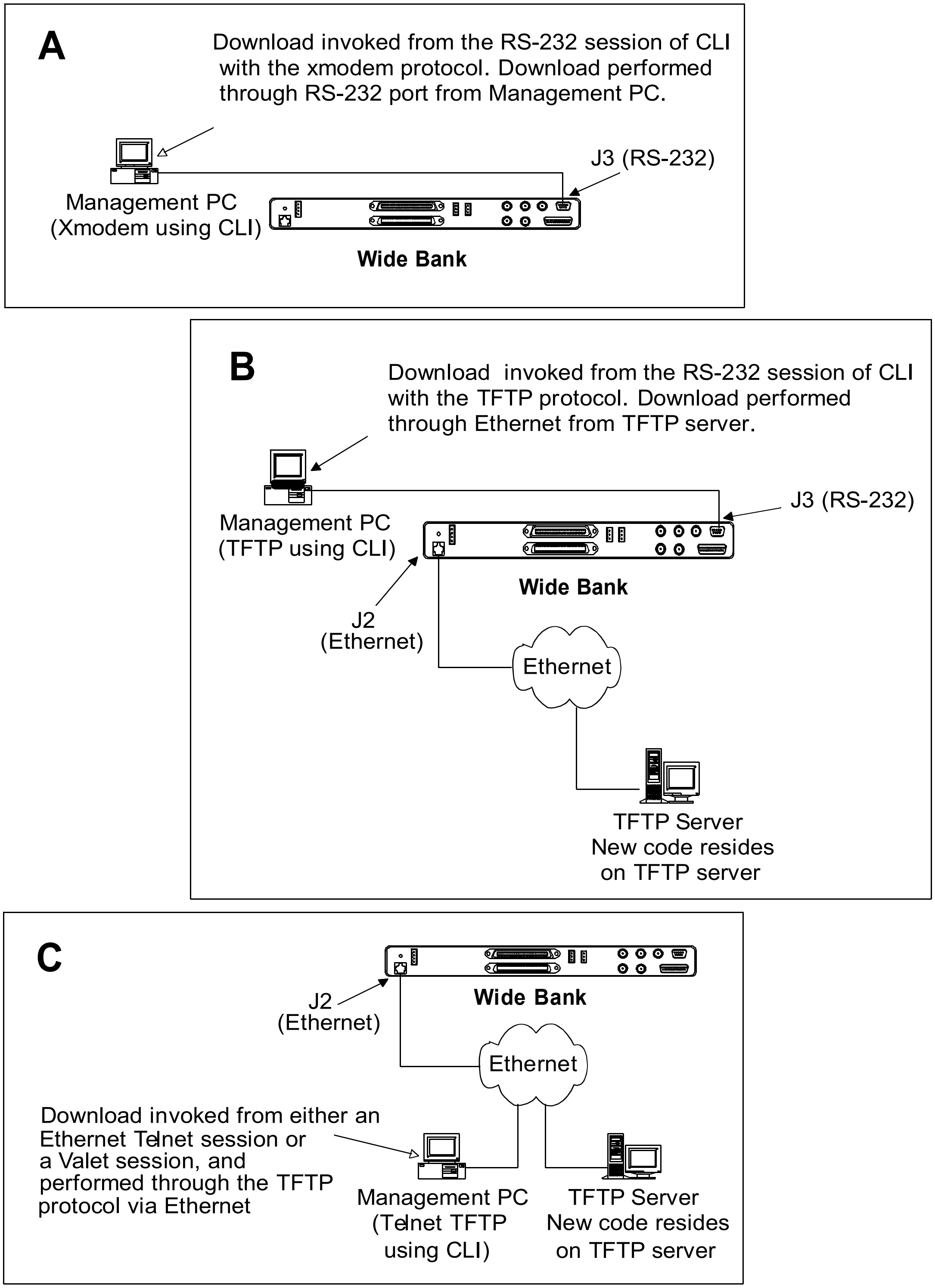


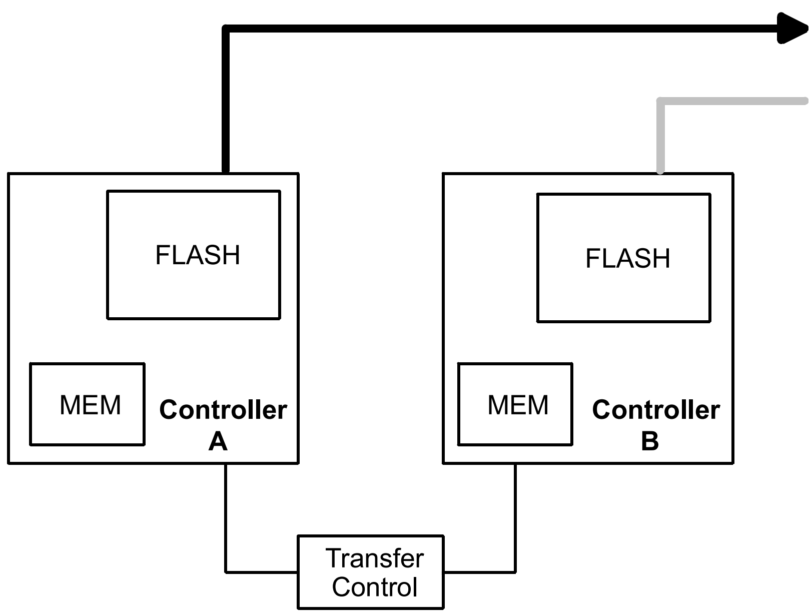
Figure 6-3 Downloading Software to the Wide Bank 28 DS3

Downloading to a Redundant Wide Bank 28 DS3

This procedure applies when you are using TFTP to download, invoked either through the RS-232 port or by Telnet session through the Ethernet port. Connect a PC or terminal as described in *Connecting to the Management Port on* *page 6-3*.

Figure 6-4 shows the state of the Wide Bank before any action is taken to initiate a TFTP download. Controller A is in control and is handling all traffic.

NOTE: Make sure there are no existing error or alarm conditions on the unit before you proceed. Ensure that revertive is turned off (*revertive ds3 off*) before initiating any downloads. A revertive switch while downloading a file will abort a download.



Before the load command is invoked, Controller A has control and is carrying all traffic.

Figure 6-4 Normal Operation of Wide Bank

1. Log in to the Wide Bank.
2. At the prompt, enter the *load* command, as follows (Be sure to include the quotes in the filename, and give the complete path):

```
(A:Active)> load tftp [TFTP server IP address] "[filename]"

Initializing memory buffer...
Downloading Image using TFTP. Please wait...
TFTP Download Finished Verifying. Please wait...
Verification Successful
```

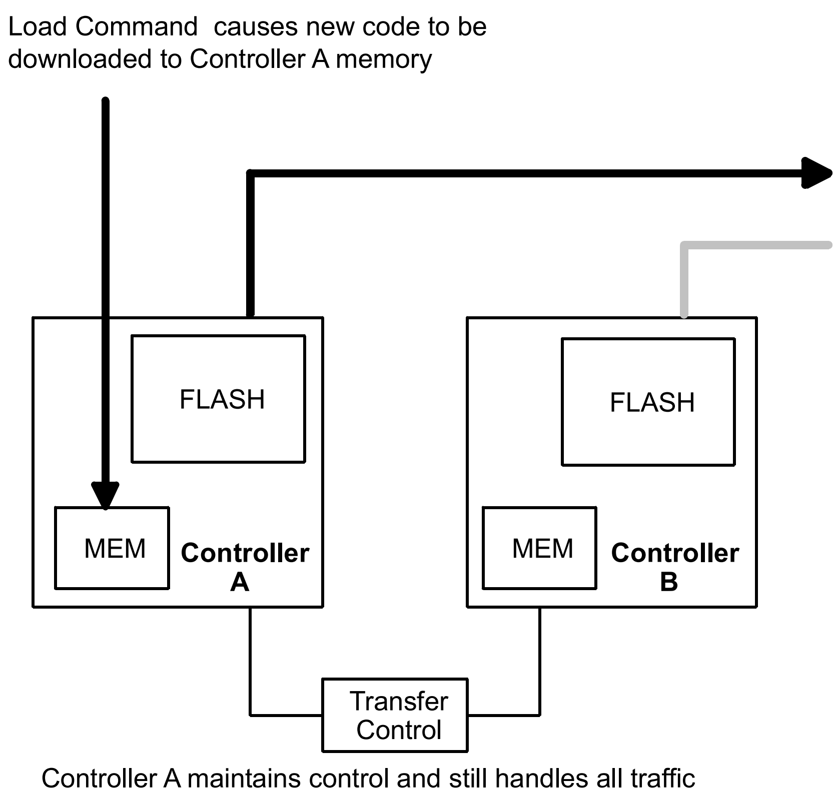


Figure 6-5 Downloading Code to Controller A RAM

```
Do you want to Program the FLASH now (y/n)?
```

3. Enter **Y**.

```
Please wait until this controller comes alive (approximately
1 minute).
Switching control to Standby Controller
```

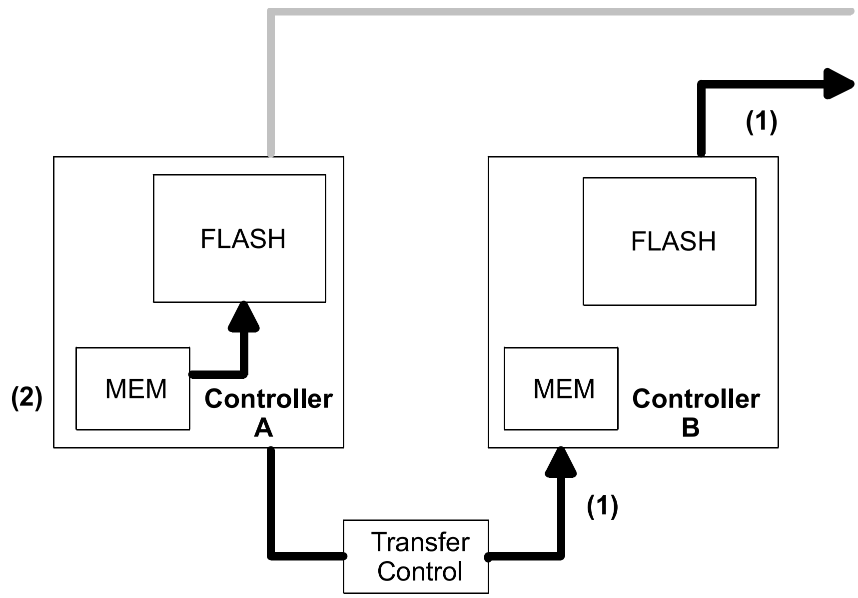


Figure 6-6 Re-Programming the FLASH on Controller A

NOTE: If you are using a Telnet session, it will be closed here. Re-establish the Telnet session on Controller B to continue.

The Wide Bank initiates a switch of Controllers, then executes the commands necessary to cause the firmware just downloaded to RAM to be programmed into the FLASH on the board that used to be active (Controller card A) (see Figure 6-6). During this programming, the traffic is carried by the secondary Controller card (B), which is now active. After the download is complete (approximately one minute), press Enter key to initiate a log-in to Controller card B.

NOTE: When the CLI is in E1LS mode, the following low-speed circuit references are changed to E1 instead of DS1.

4. Press Enter key (now talking to Controller card B).

```
01:00:29   01/01/1997

Automatic Login to Controller Card B

Equipment          Status
  ---------          ------
  DS3 Controller A   Standby
  DS3 Controller B   Active
  DS1 Card 1         Active
  DS1 Card 2         Active
  DS1 Card 3         Active
  DS1 Card 4         Active
  DS1 Card 5         Active
  DS1 Card 6         Active
  DS1 Card 7         Active
  DS1 Spare Card     Card not present

(B:Active)>
```

5. Type the *load* command again and enter the following command (Be sure to include the quotes in the filename, and give the complete path):

```
(B:Active)> load tftp [TFTP server IP address] "[filename]"

Initializing memory buffer.Downloading Image using TFTP.
Please wait...
TFTP Download Finished
Verifying. Please wait...
Verification Successful
```

.

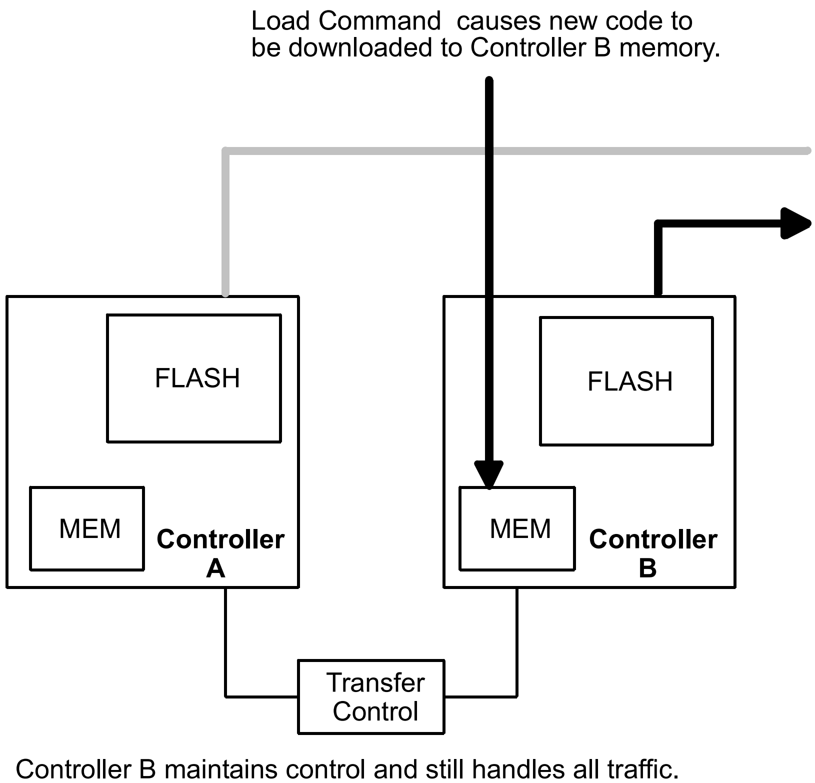


Figure 6-7 Downloading Code to Controller B RAM

```
Do you want to Program the FLASH now (Y/N)?
```

6. Enter ***Y.***

```
Please wait until this card comes alive (approximately 1 minute).
Switching control to Standby Controller and closing Telnet session
Please re-establish Telnet session
```

The Wide Bank again initiates a switch of Controllers, drops the Telnet connection, then executes the commands necessary to cause the firmware just downloaded to RAM to be programmed into the FLASH on the board that used to be active (Controller card B). During this programming, the traffic is carried by the primary Controller card (A), which is now active and running the new code. After the download is completed, log in to Controller card A.

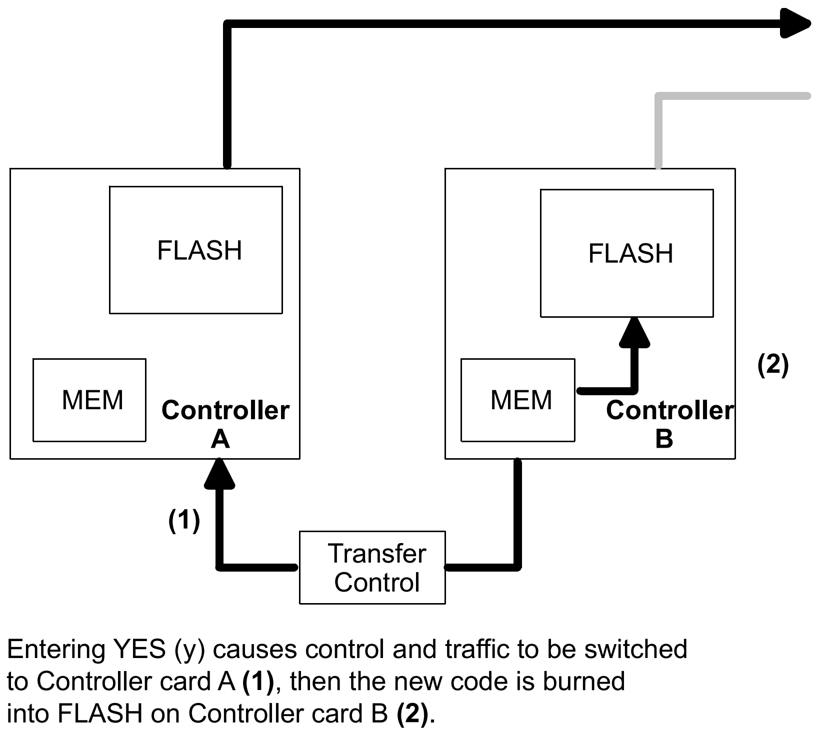


Figure 6-8 Reprogramming FLASH on Controller B

7. Press Enter key to log in to Controller A and continue.

```
01:00:29   01/01/1997

Automatic Login to Controller Card A

Equipment         Status
  ---------         ------
  DS3 Controller A  Active
  DS3 Controller B  Standby
  DS1 Card 1        Active
  DS1 Card 2        Active
  DS1 Card 3        Active
  DS1 Card 4        Active
  DS1 Card 5        Active
  DS1 Card 6        Active
  DS1 Card 7        Active
  DS1 Spare Card    Card not present
```

Downloading to a Non-Redundant Wide Bank 28 DS3

Connect a PC or terminal as described in *Management Connections for Downloading Firmware on page 6-23*

NOTE: Make sure there are no existing error or alarm conditions on the unit before you proceed.

Xmodem Download Initiated Via RS-232

The following procedure assumes you are using MS HyperTerminal to perform the download.

NOTE: When the CLI is in E1LS mode, the following low-speed circuit references are changed to E1 instead of DS1.

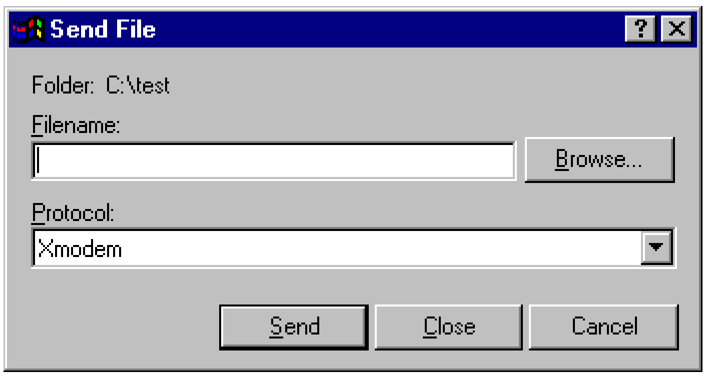
1. Log in as usual:

```
16:51:49 01/01/1997

Automatic Login to Controller Card A

 Equipment          Status
 ---------          ------
 DS3 Controller A   Active
 DS3 Controller B   Card not present
 DS1 Card 1         Active
 DS1 Card 2         Active
 DS1 Card 3         Active
 DS1 Card 4         Active
 DS1 Card 5         Active
 DS1 Card 6         Active
 DS1 Card 7         Active
 DS1 Spare Card     Active

(A:Active)>
```

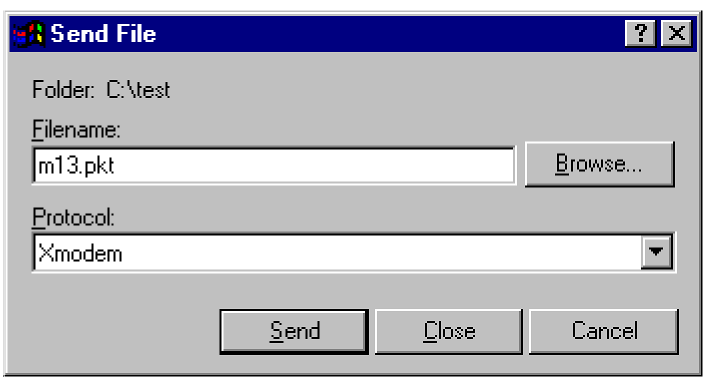
2. Type the command "load xmodem", as follows:

```
(A:Active)> load xmodem

 Initializing memory buffer...
 Please Start Xmodem Download...
```

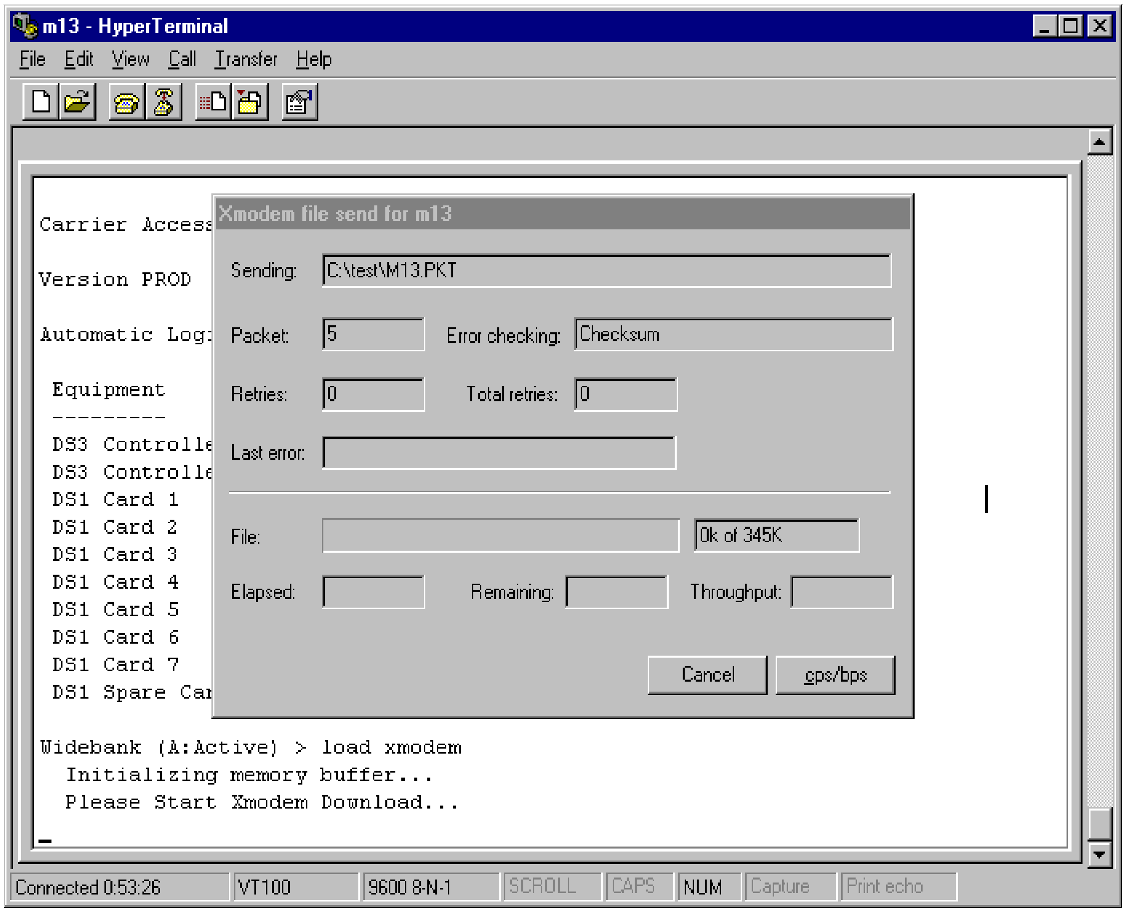
3. From the "Transfer" menu in HyperTerminal, select the option "Send File". The following displays will appear.



4. Type the path and filename you want to download and select Xmodem as the protocol.



5. Click the "Send" button. The Xmodem transfer will start. The following status displays will appear:



6. When the Xmodem download is completed, the system verifies the validity of the downloaded file and a message is displayed indicating whether the download was successful.

7. A prompt asks if you want to program the FLASH now. If you say no, you will have to do it later, using the *program flash* command. Until you program the FLASH, your Wide Bank will continue to run using the old firmware.

8. Do you want to Program the FLASH now (Y/N)?
9. Enter **Y**.

NOTE: Because there is no secondary (backup) Controller, the following message appears. It warns that an interruption of traffic (up to 90 seconds) will occur.

```
WARNING: Secondary Controller is not present
Programming the FLASH will cause interruption of traffic.

Do you want to Program the FLASH now (y/n)?
```

10. Enter **Y**.

```
Please wait until this controller comes alive (Approximately 1
min.)
 Firmware upgrade in process...
 Erasing Flash. Please wait...
 Programming Flash. Please wait...
 Programming Successful.
```

The system will now reset, during which the DS3 traffic is interrupted for up to 90 seconds.

TFTP Download Initiated Via RS-232 or Ethernet

This procedure applies when you are using TFTP to download, invoked either through the RS-232 port or by Telnet session through the Ethernet port. Connect a PC or terminal as described in *Management Connections for Downloading Firmware on* *page 6-23*

NOTE: Make sure there are no existing error or alarm conditions on the unit before you proceed.

1. Log in to the Wide Bank.
2. At the prompt, enter the **load** command, as follows (Be sure to include the quotes in the filename, and give the complete path):

```
(A:Active)> load tftp [TFTP server IP address] "[filename]"

Initializing memory buffer...
Downloading Image using TFTP. Please wait...
TFTP Download Finished
Verifying. Please wait...
Verification Successful
```

NOTE: A prompt asks if you want to program the FLASH now. If you say no, you will have to do it later, using a *program flash* command. Until you program FLASH your Wide Bank is still running the old firmware.

```
Do you want to Program the FLASH now (Y/N)?
```

3. Enter **Y**.

NOTE: Because there is no secondary (backup) Controller, the following message appears. It warns that an interruption of traffic (up to 90 seconds) will occur.

```
WARNING: Secondary Controller is not present
  Programming the FLASH will cause interruption of traffic.

Do you want to Program the FLASH now (Y/N) ?
```

4. Enter **Y**.

```
Please wait until this controller comes alive (Approximately 1
min.)
  Firmware upgrade in process...
  Erasing Flash. Please wait...
  Programming Flash. Please wait...
  Programming Successful.
```

The system now resets, during which the DS3 traffic is interrupted for up to 90 seconds.

NOTE: If you are using a Telnet session for this download, you will have to re-establish the Telnet session after the reset.

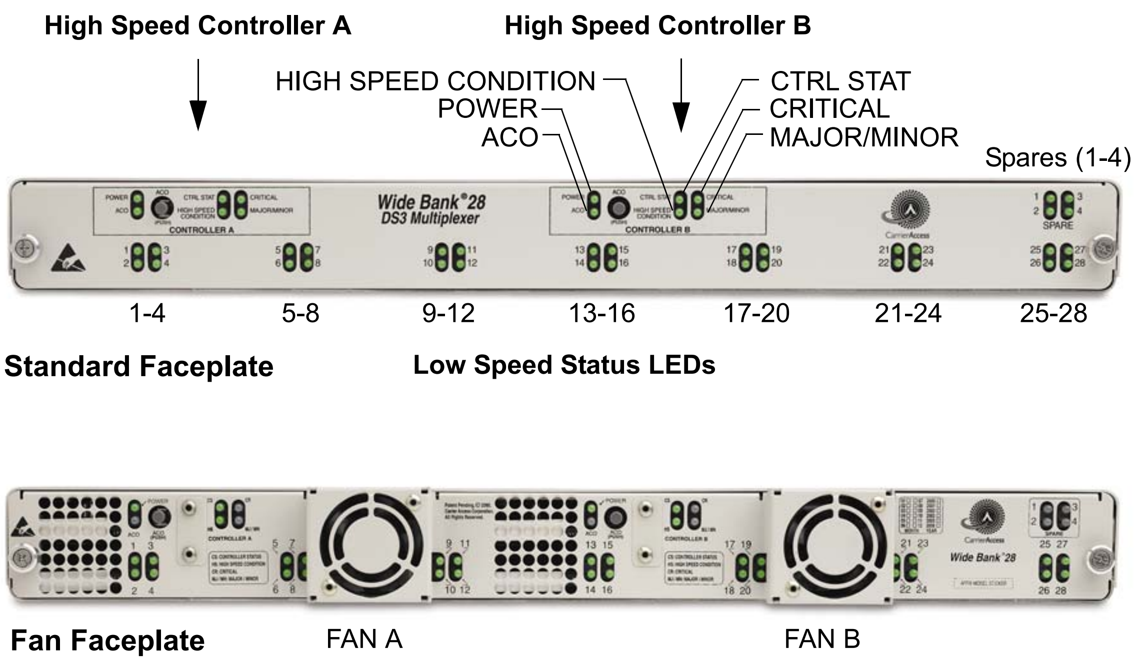
CHAPTER 7

Diagnostics & Troubleshooting

In this Chapter

LED Test and Status Indicators

Status LED indicators on the Wide Bank 28 DS3 control panel provide a visual means of identifying system status, high-speed DS3 line condition, and low-speed DS1/E1 line status.



Power LED

There is one Power LED for each of the two Controller cards. Each indicates the status of the power supply on its respective Controller card.

State	Meaning
OFF	–48V failed
GREEN	Power Supply is functional
RED	On-board power supply (5V) failed

Alarm Cutoff (ACO) LED and Pushbutton

There is one alarm cutoff LED and pushbutton switch for each Controller card. Each alarm severity (critical, major, and minor) has its own ACO function, though major and minor alarms share the same relay contacts. When an alarm condition occurs, the active Controller energizes the alarm relays for that alarm severity, providing open or closed contacts on the alarm output connector on the rear connector panel, depending on the alarmout command setting. The connectors can be wired to the facility alarm system to provide audible and visual alarm indications for each alarm severity. See *Alarm Contacts on page A-3*.

You can silence or suppress the current alarm outputs by pressing the ACO pushbutton on the active Controller (the Controller with lit alarm LEDs). This deactivates the currently active alarm relay contacts and lights the ACO LED. However, if a new alarm condition occurs, the ACO function for that alarm severity will be reset and that alarm output will resume. ACO operation is also reset when the alarm condition is cleared.

Color	Description
OFF	Alarms active
YELLOW	Alarms suppressed

Critical (CR) Alarms

A critical alarm means that a traffic-affecting fault exists. Use the state of the Controller Status LED or DS3 Line Condition LED for more information to identify the fault. The faults can be:

- DS3 Loss of Signal
- DS3 Loss of Frame
- DS3 Receive AIS
- DS3 Receive RAI
- Active Card Failure (only in a single card system)

For a detailed description of critical alarms and how they are reported, see *Alarm Reporting on page 12-1*.

State	Meaning
OFF	No Critical Alarms
RED	Traffic-affecting fault exists

Major/Minor (MJ/MN) Alarms

A major/minor alarm means that a fault exists that has a potential to affect traffic, or a redundancy switch occurred. Use the state of the Controller Status LED, DS3 Line Condition LED, Low-Speed Status LED, or the Power LED for more information to identify the fault. For a detailed description of major and minor alarms and how they are reported, see *Alarm Reporting on page 12-1*.

State	Meaning
OFF	No Alarms
YELLOW	Minor Alarms exist
RED	Major Alarms exist

Controller Status (CS) LED

There is a status LED for each Controller. In a protected redundant system with two Controllers, the active (working) Controller status LED is green and the standby (protection) Controller status LED is off.

State	Meaning
GREEN	Normal Operation
RED	Alarm Condition
RED FLASHING	Self-Test Fail
YELLOW	Network Loopback
OFF	Standby

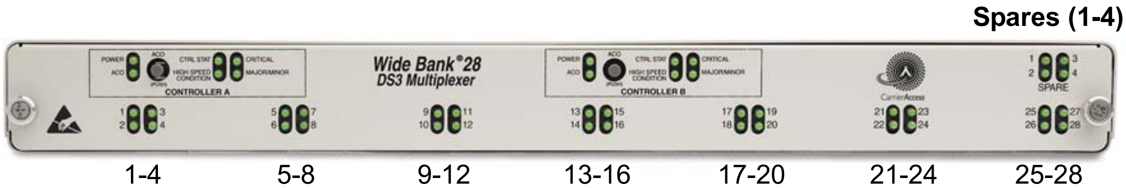
High Speed (HS) Line Condition LED

This LED shows the condition of the high speed DS3 line interface.

State	Meaning
GREEN	Normal Operation
RED	Loss of Signal (LOS)
RED FLASHING	LOF and/or AIS received
YELLOW	RAI Alarm
YELLOW FLASHING	Line Code Violation or Frame Bit Errors

Low-Speed DS1/E1 Line Status LEDs (one per span)

All DS1 and E1 low-speed circuit cards have four LEDs, though E1 cards use only the first three and the fourth remains off. Primary low-speed circuits are numbered 1 through 28, and spares are numbered 1 through 4. When a primary circuit switches to a spare, the primary status LED turns off and the spare LED lights.



Low Speed Status LEDs

State	Meaning
OFF	Off-line
GREEN	Normal Operation
RED	Loss of Signal (LOS) or Metallic Loopback
RED FLASHING	Self Test Fail
YELLOW	Equipment or Line Loopback
YELLOW FLASHING	Line Code Violations

Ethernet Status LED

This LED is located on the rear connector panel.

State	Meaning
OFF	No Link (no power)
GREEN	Link OK (connected)

Determining Performance and Status

DS3 Far-End Statistics

DS3 far-end statistics are available only when the Wide Bank 28 DS3 is configured for C-bit framing.

The commands that display DS3 far-end statistics, in conformance with RFC 1407 DS3 MIB:

- ***hour ds3far*** – Provides hour statistics for the far-end DS3. Statistics are calculated for Unavailable Seconds, Severely Errored Seconds, Errored Seconds, and Parity Error Count.
- ***day ds3far*** – Provides day statistics for the far-end DS3. Statistics are calculated for Unavailable Seconds, Severely Errored Seconds, Errored Seconds, and Parity Error Count.
- ***status ds3far*** – Provides status information for the far-end DS3, including alarm conditions and characteristic DS3 ID strings. The alarm code can be one of the 11 codes specified in ANSI T1.107.

DS3 Path Maintenance Data Link

DS3 Path Maintenance Data Link is available only when the Wide Bank 28 DS3 is configured for C-bit framing.

The Path Maintenance Data Link is a 28.2-kbps terminal-to-terminal data link embedded in the C-bits. The signal format on this data link comprises messages using a link access procedure on the D-channel (LAPD). The LAPD messages carry DS3 Path Identification, DS3 Idle Signal Identification, and DS3 Test Signal Identification. The specific message formats are as defined in ANSI T1.107. The DS3 Path Identification is the most common message and is sent when the DS3 is carrying traffic, the DS3 Idle Signal Identification is sent when an IDLE signal is sent, and the DS3 Test Signal Identification is sent when a PRBS test signal is sent. The appropriate LAPD message is sent at least once per second. Because these messages consume minimal bandwidth, the unused bandwidth is available for proprietary messaging.

Functional Description of DS3 Path Maintenance Data Link

The three identification messages all contain the following information, which can be set using the *ds3* command:

- Equipment Identification Code – Describes a specific piece of equipment
- Location Identification Code – Describes a specific location

- Frame Identification Code – Identifies where the equipment is located within a building at a given location
- Unit Code – Identifies the equipment location within a bay
- DS3 Path Identification Facility Identification Code – Identifies a specific DS3 path
- Idle Signal Identification Port Number – Designates the equipment port that initiates the idle signal
- Test Signal Identification Generator Number – Designates the signal generator that initiates the test signal

Point-to-Point Protocol Status

Use the *status ppp* command to retrieve status information for the PPP link. (See the *status* command in Chapter 8.) The following information is available.

- Operational Status
- Connection Speed
- Transmit Status
- Receive Status

General Troubleshooting

Use the functional block diagram below for general troubleshooting. The following sections provide tests to aid in fault isolation.

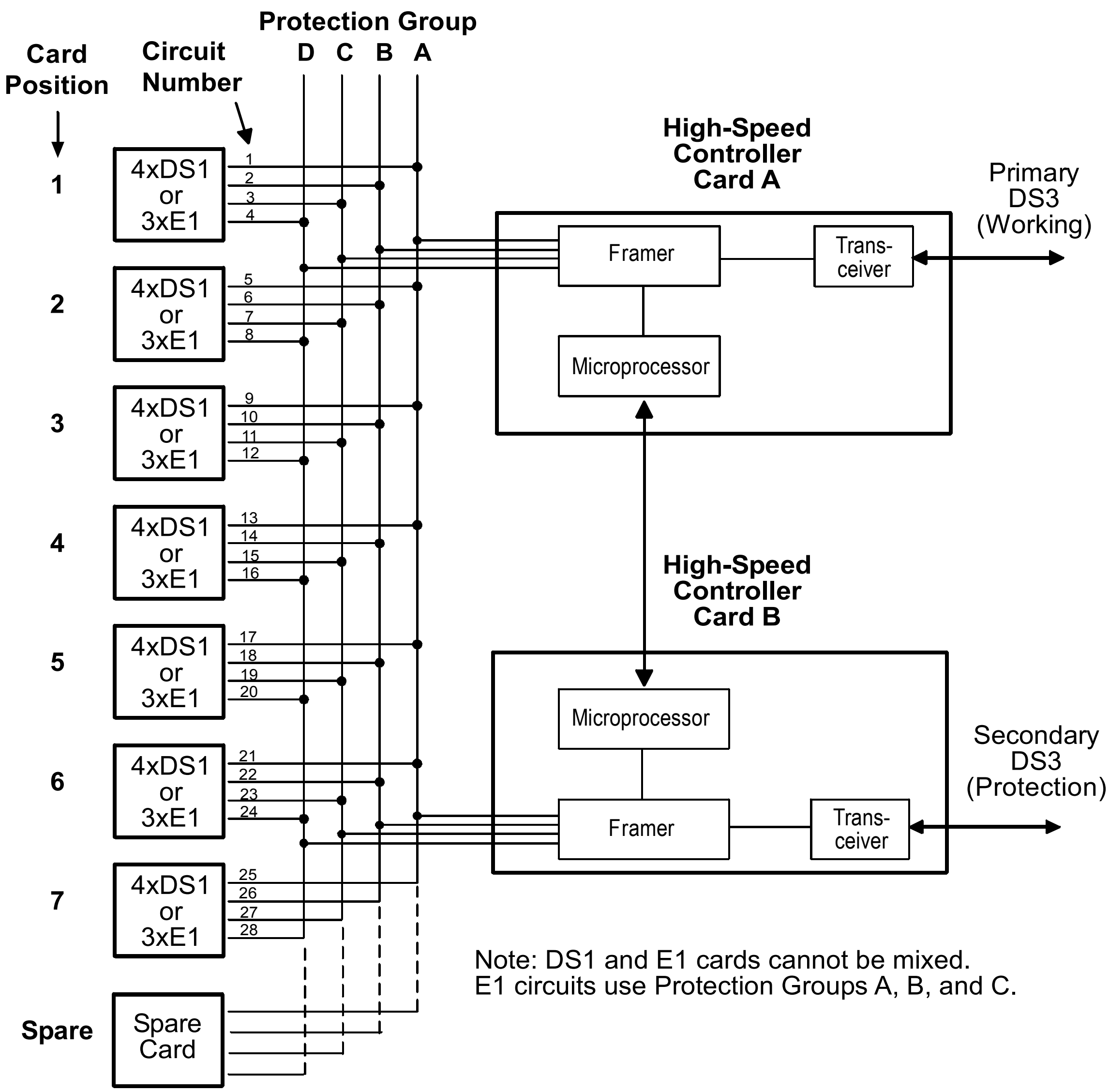


Figure 7-1 General Troubleshooting Diagram

Thermal Shut-Down

The Wide Bank is designed for continuous operation at ambient temperatures up to 104 °F (40 °C) and for short-term operation at ambient temperatures up to 131 °F (55 °C).

At higher ambient temperatures, the Wide Bank uses internal thermal protectors to automatically shut down operation before any damage occurs. Prior to shutdown, the Wide Bank will issue an over temperature alarm to notify the network of an impending thermal shutdown. The Wide Bank will remain shutdown until the temperature inside the unit falls below 158 °F (70 °C), then it will automatically reset and resume normal operation.

If thermal shutdown occurs, do the following:

- Ensure that –48 VDC power is supplied to both the A and B power inputs when redundant Controller cards are installed. (With only one input, the powered Controller must deliver twice as much power, making its power converter operate at a higher temperature.)
- Verify that the Wide Bank is properly ventilated to allow for heat dissipation. (Non-FFO equipped units require free air space between units for ventilation.)
- Reduce the ambient temperature if necessary.

Self-Tests

Low-Speed Circuit Self-Test

NOTE: When the selected CLI mode is either DS1LS or E1LS, the *test ds1* command becomes the *test ls* command. The operation of the *test ls* command is identical to the *test ds1* command, except the references to the circuits are changed to either LS, DS1, or E1.

Use this test for each low-speed circuit, including the four spares. See Figure 7-2.

```
(A:Active)> test ds1 7
This will interrupt traffic. Continue (Y/N)?  Y
Testing DS1 7 ...
ds1 7           Self Test: pass
```

Alternatively, you can test all the circuits on the seven low-speed cards and the spare card:

```
(A:Active)> test ds1 all

WARNING: This command affects service. Continue? [y|n]? y
Testing DS1 1-28 and Spare 1-4...

DS1 1           Self Test: Pass
DS1 2           Self Test: Pass
DS1 3           Self Test: Pass
.
.
.
DS1 28          Self Test: Pass
Spare 1         Self Test: Pass
Spare 2         Self Test: Pass
Spare 3         Self Test: Pass
Spare 4         Self Test: Pass
```

The DS1/E1 Test

1. Sends AIS toward DS1/E1.
2. Performs internal self-test on low-speed DS1/E1 circuits.
3. Loops unframed PRBS test signal through ASIC on high-speed card.

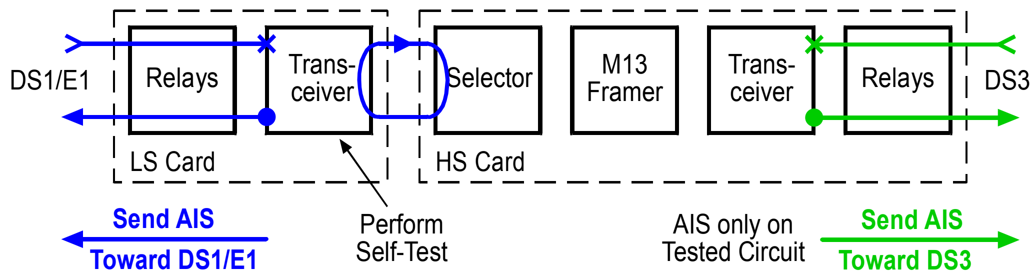


Figure 7-2 Low-Speed Circuit Self-Test

Low-Speed Card Self-Test

This performs the preceding low-speed circuit self-test on all four DS1 (or three E1) circuits on a low-speed card.

```
(A:Active)> test ds1card 5
This will interrupt traffic. Continue (y/n)? Y
Testing DS1 card 5 ...
```

DS3 Card Self-Test

```
(A:Active)> test ds3
This will interrupt traffic. Continue (Y/N)? Y
Testing DS3 ...
DS3             Self Test: pass
```

The DS3 Test

1. Sends AIS toward DS3 and DS1/E1.
2. Performs internal self-test on M13 Framer.

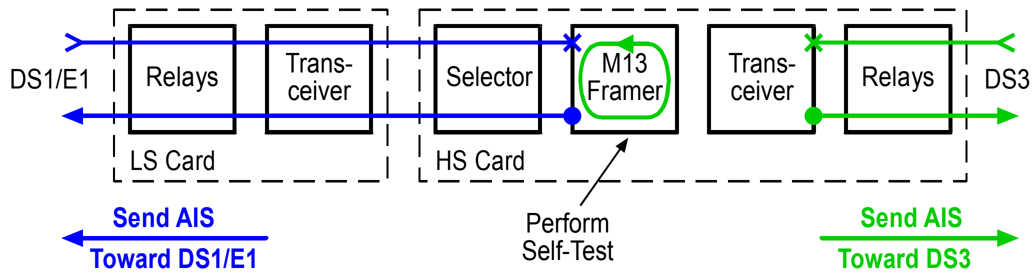


Figure 7-3 DS3 Card Self-Test

FFO Test and Monitoring

Fan Faceplate Option (FFO) operation is automatically tested 30 seconds after installation. Also, the FFO can be manually tested with the *test fan [a|b|all]* command. The FFO test applies power to the fans for 30 seconds (there is a five-second delay after power is applied to the first fan until power is applied to the second fan). During the 30-second test the rotation speed of each fan is monitored. If either fan does not rotate at the correct speed, an error is logged, a Fan A and/or Fan B failure alarm is enabled, and the Controller Status LED blinks red. Once a fan failure is detected, the malfunctioning fan remains disabled until a new faceplate is installed.

If the speed of the fans is sufficient to cool the Wide Bank, they pass the self-test and they remain enabled. Each Controller continually monitors the speed of its fan. If either fan is too slow for 30 consecutive seconds, the malfunctioning fan is disabled and a major alarm (Fan A, Fan B, or all Failure) is generated. The alarm remains active until the malfunctioning FFO faceplate is removed. If the configuration for *ffo present* is *on* when the faceplate is removed, and power is on, another major alarm (Fan Faceplate Not Installed) becomes active. Alarms will clear when the faceplate is re-installed.

To prevent the Fan Faceplate Not Installed alarm, issue the *ffo present off* command in the command line interface before removing the faceplate.

NOTE: The *test all* command includes the fan test for both fans, only if the Controller is a version that supports the Fan Faceplate Option and only if the FFO is installed. If the Controller is an older version, or if the fans are not present, the fan tests are omitted.

Complete Self-Test (Power-Up Test)

Use the complete self-test to test the entire Wide Bank with one command. This test runs automatically when power is turned on.

```
(A:Active)> test all

WARNING: This command affects service. Continue? [y|n]? y
Testing all interfaces...

DS1 Card 1          Self Test: Pass
DS1 Card 2          Self Test: Pass
DS1 Card 3          Self Test: Pass
DS1 Card 4          Self Test: Pass
DS1 Card 5          Self Test: Pass
DS1 Card 6          Self Test: Pass
DS1 Card 7          Self Test: Pass
DS1 Spare Card      Self Test: Pass

DS3                 Self Test: Pass

Fan A               Self Test: Fan not present
Fan B               Self Test: Fan not present
```

The Complete Self-Test

1. Performs DS1/E1 tests.
2. Performs DS3 tests.
3. Performs FFO tests.

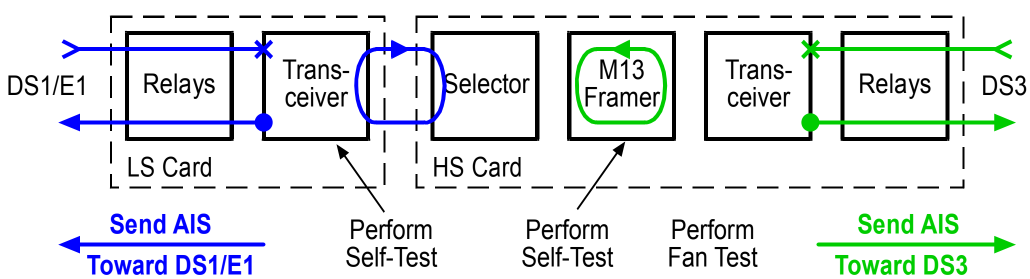


Figure 7-4 Complete Self-Test

Looptests Using Built-in PRBS BERT

Low-Speed CSU Loopup Drop with PRBS BERT

This test sends a CSU loopup code and unframed PRBS test pattern toward a CSU device on the low-speed drop. The returned signal is analyzed by the built-in Bit Error Rate Tester (BERT) and the PRBS error rate is displayed in the hour statistics.

1. Configure for CSU loopback and PRBS test. (This example uses DS1 #1.)

```
(A:Active)> ds1 1 send csu loopup drop
(A:Active)> ds1 1 send prbs drop
```

2. Display PRBS error rate.

```
(A:Active)> hour ds1 1
```

3. When finished, disable loopback and PRBS.

```
(A:Active)> ds1 1 send off
(A:Active)> ds1 1 send csu loopdown drop
```

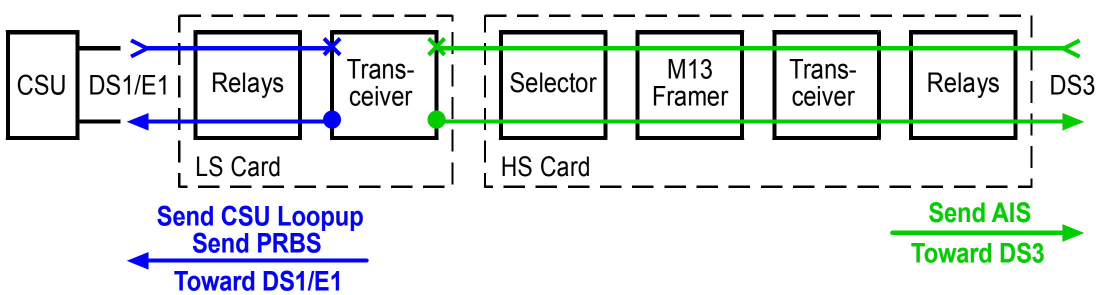


Figure 7-5 Low-Speed CSU Looptest with PRBS BERT

Low-Speed NIU Loopup Network with PRBS BERT

This test sends a low-speed NIU loopup code and unframed PRBS test pattern toward the far-end, which can be another Wide Bank or other NIU device. The far-end device loops back the low-speed signal to the near-end Wide Bank. The returned signal is analyzed by the built-in Bit Error Rate Tester (BERT) and the PRBS error rate is displayed in the *hour* statistics.

1. Configure for NIU network loopback and PRBS test. (This example uses DS1 #1.)

```
(A:Active)> ds1 1 send niu loopup
(A:Active)> ds1 1 send prbs network
```

2. Display PRBS error rate.

```
(A:Active)> hour ds1 1
```

3. When finished, disable loopback and PRBS.

```
(A:Active)> ds1 1 send off
(A:Active)> ds1 1 send niu loopdown
```

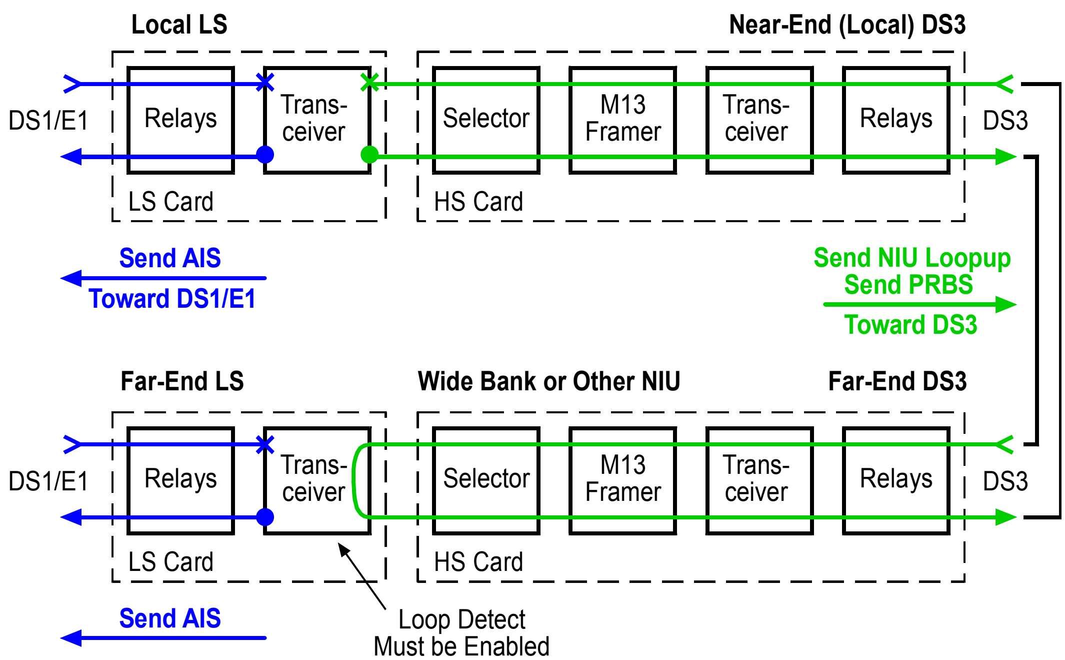


Figure 7-6 Low-Speed Network Looptest with PRBS BERT

DS3 Loopup Network with PRBS BERT

This test sends a high-speed NIU loop code and unframed PRBS test pattern toward the far-end, which can be another Wide Bank or other NIU device. The far-end device loops back the high-speed signal to the near-end Wide Bank. The returned high-speed signal is analyzed by the built-in Bit Error Rate Tester (BERT) and the PRBS error rate is displayed in the *hour* statistics.

NOTE: When *ds3 protect* is turned on, the *ds3 send* command will transmit codes over both primary and secondary DS3s.

1. Configure for DS3 network loopback and PRBS test.

```
(A:Active)> ds3 send loopup
(A:Active)> ds3 send prbs
```

2. Verify that PRBS SYNC SEC is incrementing.

```
(A:Active)> hour ds3
```

3. When finished, disable loopback and PRBS test.

```
(A:Active)> ds3 send off(A:Active)> ds3 send loopdown
```

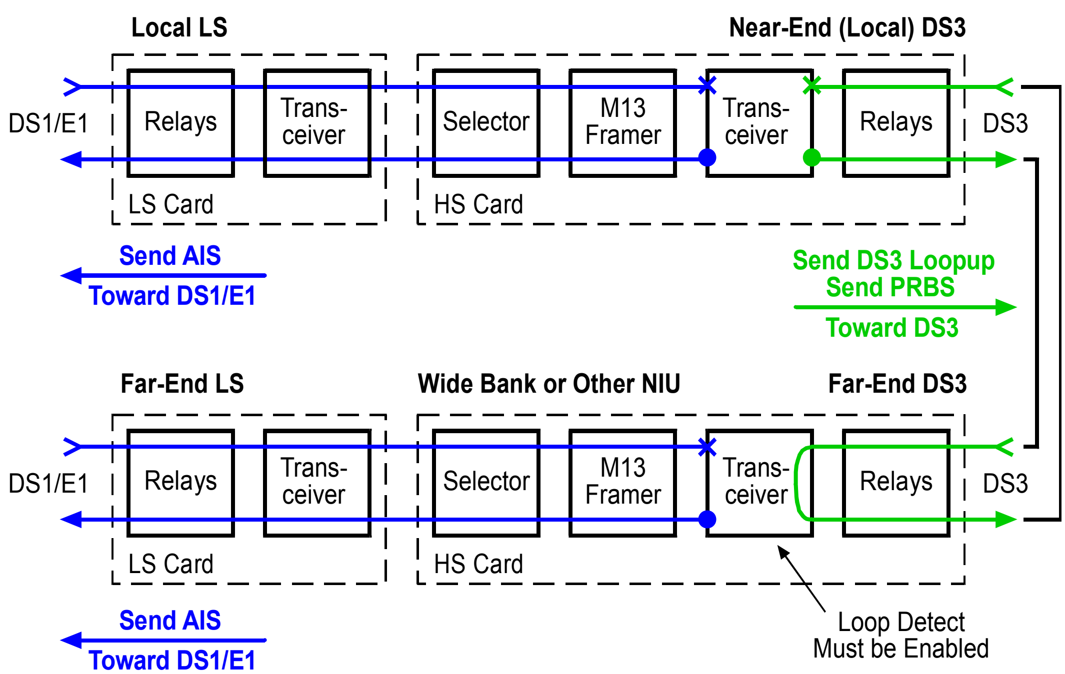


Figure 7-7 DS3 Network Looptest with PRBS BERT

Testing Low-Speed Interface Operation

Use the test configuration below when perform the following tests.

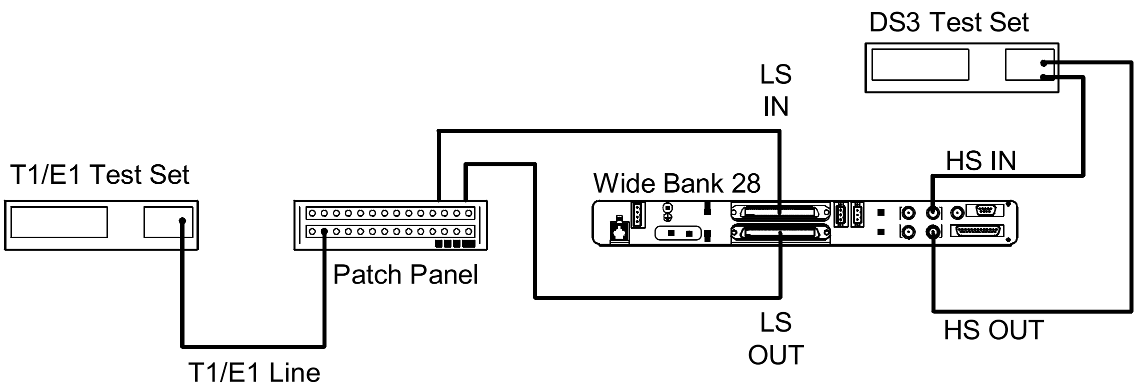


Figure 7-8 Test Setup

Testing Low-Speed Near-End with Loop Tests

NOTE: When the low-speed mode (*lsmode*) is set to either *ds1ls* or *e1ls*, the *ds1* command becomes the *ls* command. The operation of the *ls* command is identical to the *ds1* command, except the references to the circuits are changed to either LS, DS1, or E1. See Chapter 8 for lsmode description.

The command **`ds1 [n|range|all]`** *setting* allows you to select one or more DS1 or E1 circuits for use with most loopback tests. The *n* can be a range (**`ds1 1-6`**), an individual circuit (**`ds1 1`**), a group of individual circuits (**`ds1 1-4,7,12,15`**), or a combination of ranges and individual circuits (**`ds1 1-4,5,7,13-16`**). One exception is the metallic loopback, which is limited to four circuits.

A test set should be used on the low-speed side to send patterns and perform loopback tests on each of the available low-speed circuits, as indicated in the following procedure.

DS1 Line Loopback

1. Configure for line loopback.

```
(A:Active)> ds1 1 line on
```

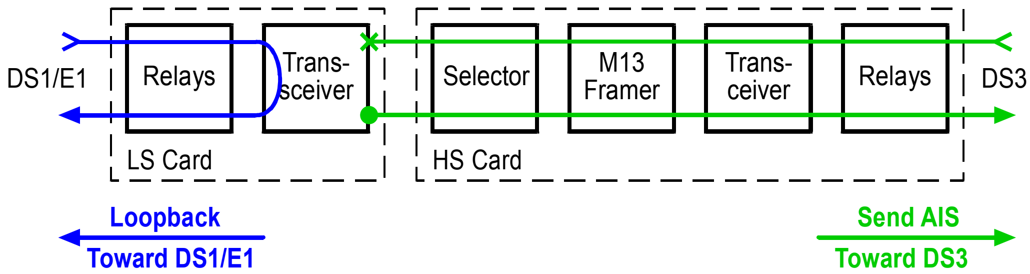


Figure 7-9 Low-Speed Line Loopback

2. Send a pattern from the test set on the low-speed circuit, and verify that the test set synchronizes on the pattern without errors.
3. When finished, disable line loopback.

```
(A:Active)> ds1 1 line off
```

DS1 Equipment Loopback

1. Configure the low-speed circuits for equipment loopback.

```
(A:Active)> ds1 1 equipment on
```

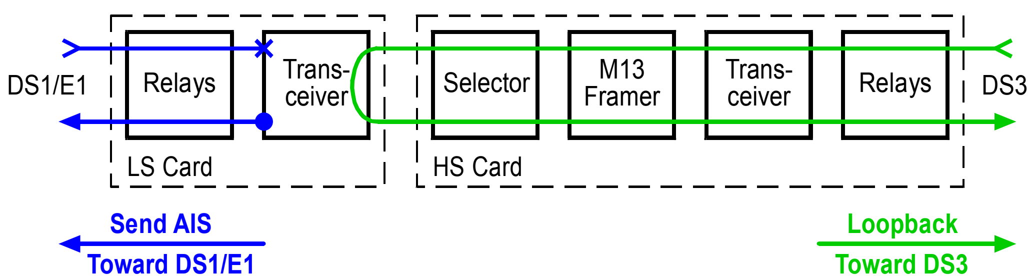


Figure 7-10 Low-Speed Equipment Loopback

2. Test from the DS3 side and verify that there are no errors.
3. When the test is complete, disable equipment loopback.

```
(A:Active)> ds1 1 equipment off
```

DS1 Metallic Loopback

1. Configure the low-speed circuits for metallic loopback. A metallic loopback is shown in Figure 7-11.

```
(A:Active)> ds1 1 metallic on
```

NOTE: Special rules exist for metallic loopback because there is only one spare quad card (four DS1 circuits or three E1 circuits).

- No more than four DS1 or three E1 circuits can be issued a metallic loopback at one time (the commands **`ds1 all metallic`** and **`ls all metallic`** are not valid).
- Circuits selected for metallic loopback must all be from different protection groups. For example, the range 1-5 is not valid because 1 and 5 are in the same group. See Figure 7-1 for information on circuit groups.

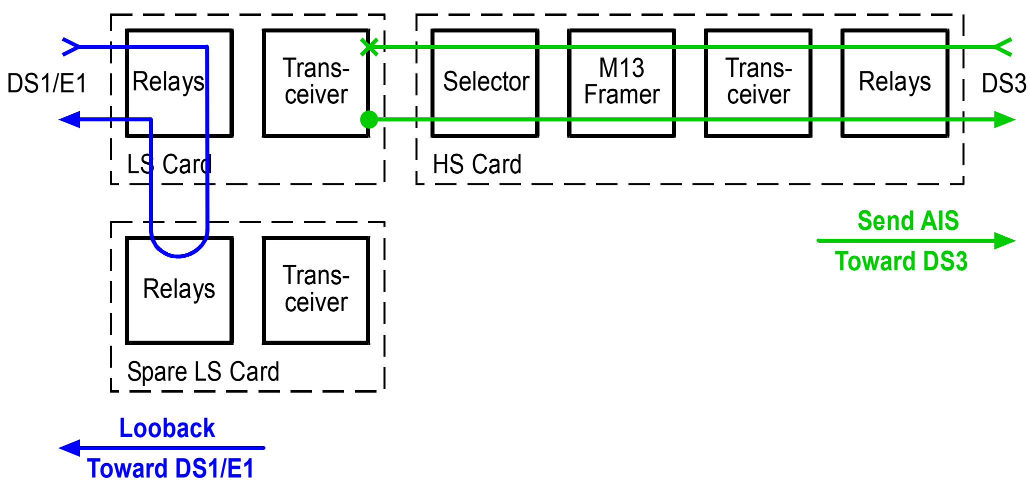


Figure 7-11 Low-Speed Metallic Loopback

2. Send a pattern from the test set on the low-speed circuits, and verify that the test set synchronizes on the pattern without errors.

3. When the test is complete, disable metallic loopback.

```
(A:Active)> ds1 1 metallic off
```

DS1 NIU Loopback

The Wide Bank provides NIU loopback capability toward the DS3 network. To test its functionality, use a test set on the DS3 interface to inject NIU loop codes toward the low-speed interfaces.

NOTE: This test can also be performed with two Wide Banks as shown on the next page.

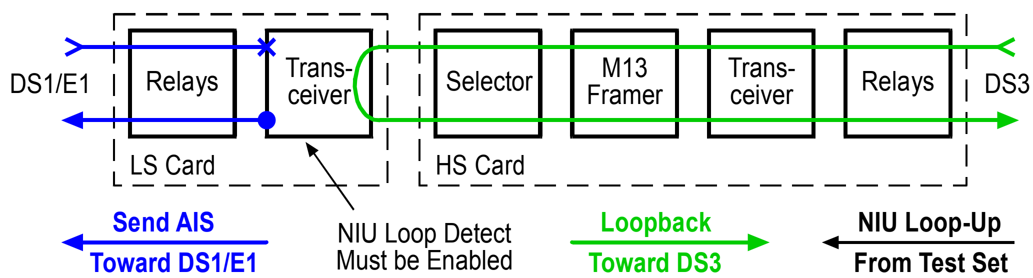


Figure 7-12 Low-Speed NIU Loopback

1. Enable loop code detection.

   ```
   (A:Active)> ds1 1 loopdetect on
   ```

2. Use test set on DS3 side to inject an NIU Loop Up code to low-speed circuit #1. (Loop Up code is 11000).
3. Inject a test pattern of your choice (QRSS, PRBS, and so on).
4. Verify that the loop experiences no bit errors.
5. Verify that the test set connected to the low-speed circuit #1 is receiving AIS.
6. Inject an NIU Loop Down code toward the low-speed circuit #1 from the test set (Loop Down code is 11100).
7. Verify that low-speed circuit #1 returns to normal operation.
8. Disable loop code detection.

   ```
   (A:Active)> ds1 1 loopdetect off
   ```

9. Repeat steps 1 to 8 for the remaining low-speed circuit interfaces.

DS1 NIU Loopback Using Two Wide Banks

This test is similar to the DS1 NIU Loopback on the previous page but uses two Wide Banks connected back-to-back. The local Wide Bank allows the test set on low-speed side to send an NIU loopup across the DS3 connection to test the far end Wide Bank's DS1 NIU loopup response.

1. On local (near-end) Wide Bank, disable loop detection.

   `(A:Active)>` **`ds1 1 loopdetect off`**

2. On far-end Wide Bank, enable loop detection.

   `(A:Active)>` **`ds1 1 loopdetect on`**

3. Using the test set on the low-speed side, send an NIU loop code toward the remote Wide Bank over the DS3.
4. Verify that the test set receives a loopup response.
5. If desired, repeat steps 1 to 4 for the remaining low-speed circuit interfaces.

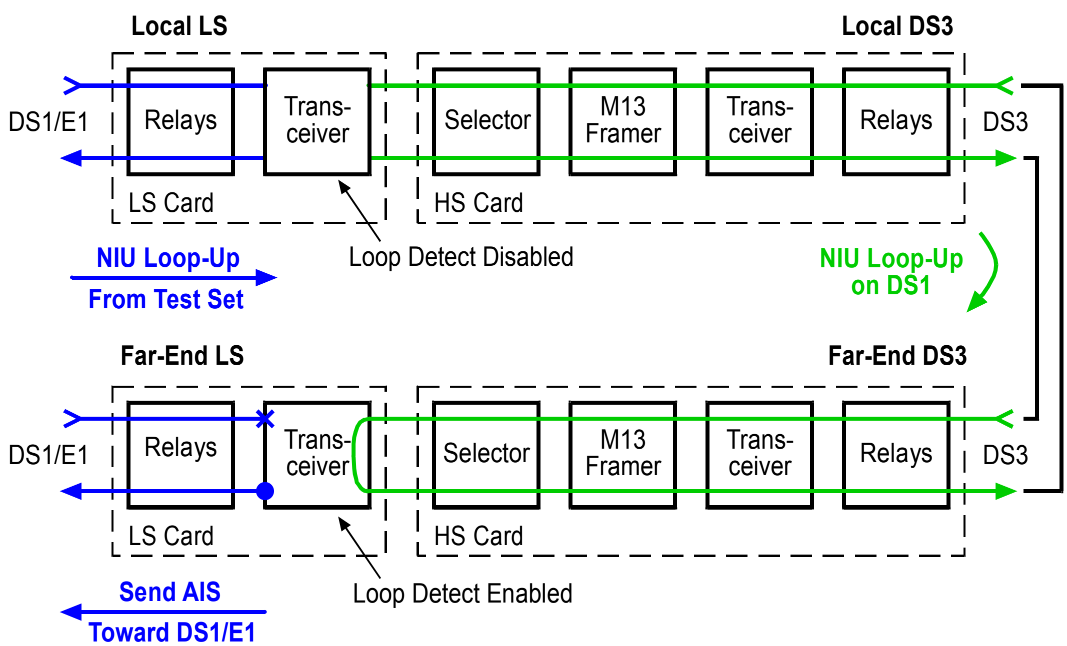


Figure 7-13 Low-Speed NIU Loopback Using Two Wide Banks

DS1 Send CSU Loopback Toward Drop

1. Send CSU loopup toward the test set connected to the low-speed interface.

   `(A:Active)>` **`ds1 1 send csu loopup drop`**

2. Verify that test set responds to loopup code.
3. Send loopdown toward the test set connected to the low-speed interface.

   `(A:Active)>` **`ds1 1 send csu loopdown drop`**

4. Verify that test set responds to the loopdown code.

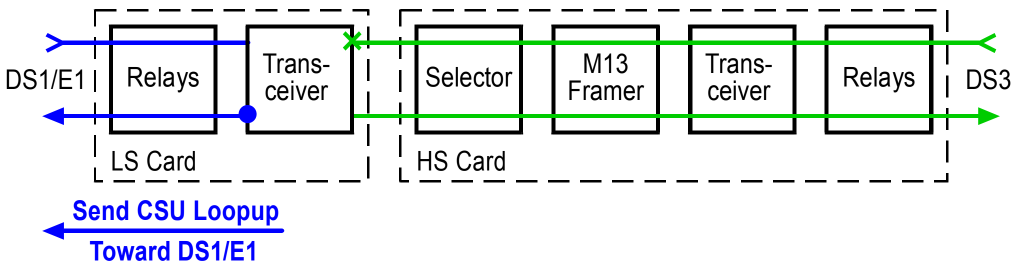


Figure 7-14 Send Low-Speed CSU Loopup Code Toward Drop

5. Repeat tests for interface configured with a line code of AMI.

   `(A:Active)>` **`ds1 1 linecode ami`**

NOTE: The linecode parameter is used only with DS1s. The E1s are always configured for HDB3.

DS1 Send NIU Loopup Code Toward Drop

1. Send NIU loopup toward the test set connected to the low-speed interface.

   ```
   (A:Active)> ds1 1 send niu loopup drop
   ```

2. Verify that test set responds to loopup code.
3. Send loopdown toward the test set connected to the low-speed interface.

   ```
   (A:Active)> ds1 1 send niu loopdown drop
   ```

4. Verify that test set responds to the loopdown code.

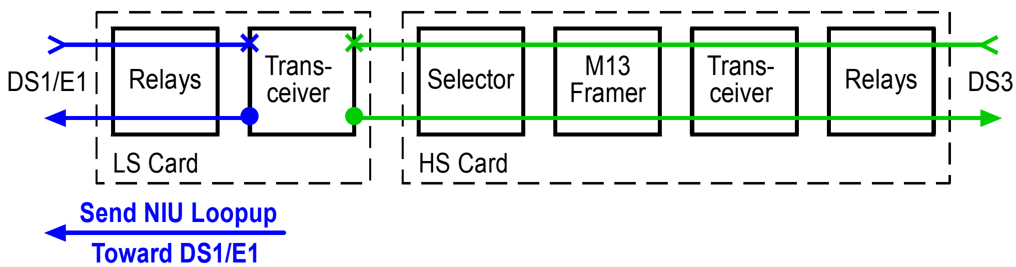


Figure 7-15 Send Low-Speed NIU Loopup Code Toward Drop

DS1 Send NIU Loopup Code Toward Network

1. Send NIU loopup toward the test set connected to the DS3 interface.

   (A:Active)> **ds1 1 send niu loopup network**

2. Verify that test set responds to loopup code.
3. Send loopdown toward the test set connected to the DS3 interface.

   (A:Active)> **ds1 1 send niu loopdown network**

4. Verify that test set responds to the loopdown code.

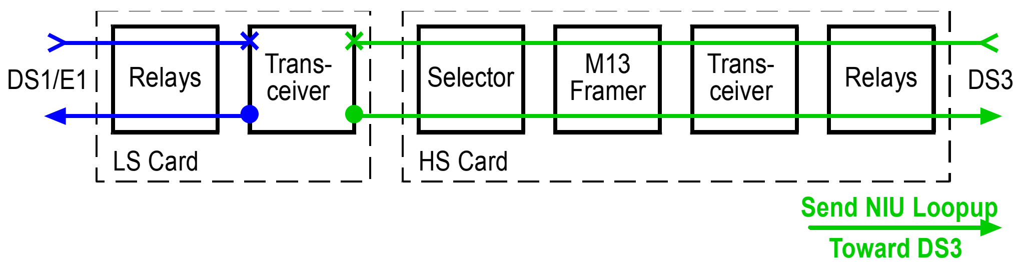


Figure 7-16 Send Low-Speed NIU Loopup Code Toward Network

Testing the Low-Speed Far-End with Loop Tests

When one of the following Activate Loopback commands is received by the far-end, the corresponding low-speed circuit is set to Equipment loopback mode. The loopback status can be observed by the *ds1* and *status ds1* (*ls* and *status ls*) commands. Also, the Low-Speed Status LED is set to YELLOW.

Activating Far-End Loopbacks in M23 Framing Mode

When the Wide Bank is configured for M23 framing, the following low-speed far-end loopup and loopdown commands are available:

ds1 [*n*|*range*|*list*|**all**] **send** [**niu**|**csu**]
[**loopup**|**loopdown**] [**network**|**drop**]

Sends a loop up or loop down code to the specified far-end for loop mode control.

Activating Far-End Loopbacks in C-Bit Framing Mode

When the Wide Bank is configured for C-bit framing, the following low-speed far-end loopup and loopdown control is available.

The commands that control the far-end low-speed loop mode:

ds1 [*n*|*range*|**all**] **send** [**niu**|**csu**|**cbit**]
[**loopup**|**loopdown**] [**network**|**drop**]

Sends a loop up or loop down code to the specified far-end for loop mode control.

Testing the Network to the Far-End Through a Low-Speed Drop

This test uses a Wide Bank at one end of the network to provide an NIU loopup of a low-speed drop at the far end. In the example below, a Wide Bank is used at both ends of the DS3 network, providing a simple illustration of how the far-end loopup works.

NOTE: This test works with *range* and *all* parameters of the *ds1 (ls)* command but usually is just as effective using only the *n* parameter (testing only one ls circuit), which leaves all the other low-speed circuits operational. This test's best purpose is to test the DS3 network, beginning at a near-end low-speed drop and ending at a far-end low-speed drop.

Once an equipment loopback is established to the far-end with the *ds1* [*n*|*range*|*all*] *send loopup* or *ds1* [*n*|*range*|*all*] *send cbit loopup* command, a *ds1* [*n*|*range*|*all*] *send prbs network* command will send a prbs pattern over the selected low-speed tributaries within the DS3 network. This pattern will be looped back from the far-end. Note that the unselected low-speed circuits will maintain normal traffic during this test.

To stop the test, issue a *ds1* [*n*|*range*|*all*] *send off* command, then issue the appropriate loopdown command to disconnect the equipment loopback at the far end.

To read the results of the test, issue an *hour ds1 n* command.

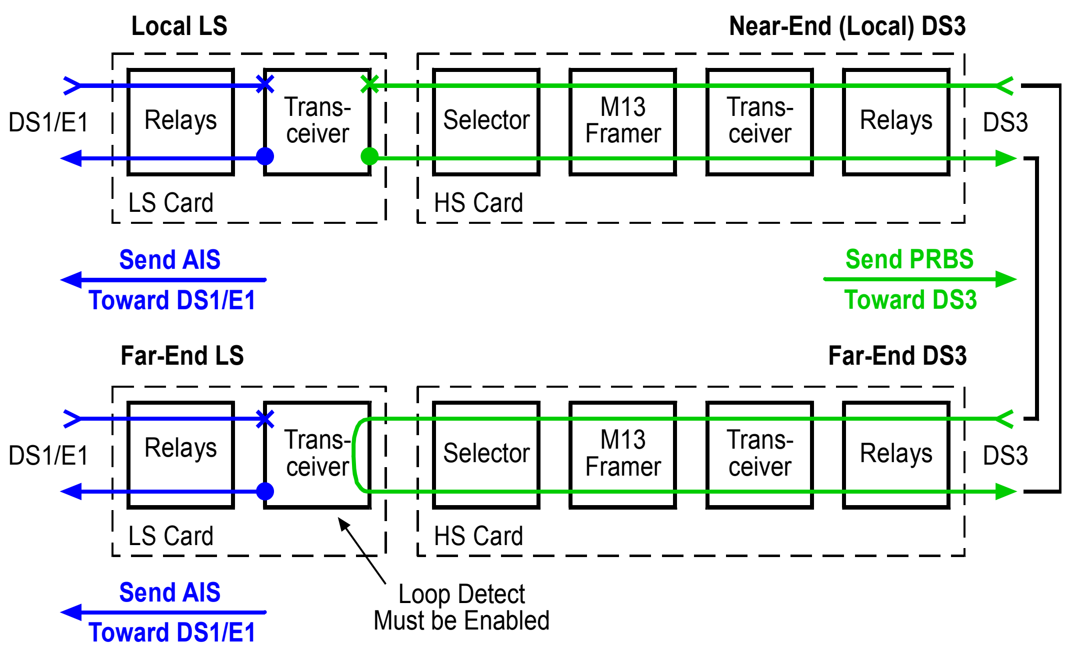


Figure 7-17 Testing the Network with a Send PRBS Network Command

Running Maintenance Tests on a Low-Speed Circuit

NOTE: When the *lsmode* mode is set to either *ds1ls* or *e1ls*, the *ds1* command becomes the *ls* command. The operation of the *ls* command is identical to the *ds1* command, except the references to the circuits are changed to either LS, DS1, or E1. See Chapter 8 for description

This test is used to test the low-speed circuits using the redundant low-speed circuits.

1. Move low-speed circuit #5 to the spare group and display protection

```
(A:Active)> ds1 5 move spare
(A:Active)> status ds1 all
```

```
Interface Receive    Transmit   Loop  Protection
--------- -------    --------   ----  ----------
DS1 1     Traffic    Traffic    None  1 used by DS1 5
DS1 2     Traffic    Traffic    None  by Spare 2
DS1 3     Traffic    Traffic    None  by Spare 3
DS1 4     Traffic    Traffic    None  by Spare 4
DS1 5     Traffic    Traffic    None  1 used by DS1 5
DS1 6     Traffic    Traffic    None  by Spare 2
DS1 7     Traffic    Traffic    None  by Spare 3
DS1 8     Traffic    Traffic    None  by Spare 4
DS1 9     Traffic    Traffic    None  1 used by DS1 5
DS1 10    Traffic    Traffic    None  by Spare 2
DS1 11    Traffic    Traffic    None  by Spare 3
DS1 12    Traffic    Traffic    None  by Spare 4
DS1 13    Traffic    Traffic    None  1 used by DS1 5
DS1 14    Traffic    Traffic    None  by Spare 2
DS1 15    Traffic    Traffic    None  by Spare 3
DS1 16    Traffic    Traffic    None  by Spare 4
DS1 17    Traffic    Traffic    None  1 used by DS1 5
DS1 18    Traffic    Traffic    None  by Spare 2
DS1 19    Traffic    Traffic    None  by Spare 3
DS1 20    Traffic    Traffic    None  by Spare 4
DS1 21    Traffic    Traffic    None  1 used by DS1 5
DS1 22    Traffic    Traffic    None  by Spare 2
DS1 23    Traffic    Traffic    None  by Spare 3
DS1 24    Traffic    Traffic    None  by Spare 4
DS1 25    Traffic    Traffic    None  1 used by DS1 5
DS1 26    Traffic    Traffic    None  by Spare 2
DS1 27    Traffic    Traffic    None  by Spare 3
DS1 28    Traffic    Traffic    None  by Spare 4
Spare 1   Available
Spare 2   Available
Spare 3   Available
Spare 4   Available
```

2. Run test on low-speed circuit #5

```
(A:Active)> test ds1 5

Testing      DS1 5
----         ----
DS1 5        Selftest:  Pass
```

Show low-speed circuit #5 parameters.

```
(A:Active)> ds1 5

-  5
    ds1 5   circuitid "DS1 5"
    ds1 5      enable
    ds1 5   equipment off
    ds1 5      length dsx0
    ds1 5        line off
    ds1 5    linecode b8zs
    ds1 5  loopdetect off
    ds1 5    metallic off
    ds1 5        send off
    Performance Thresholds:        15 min.      1 hour       1 day
                                  --------     --------     --------
    coding violations - line:            0            0            0
    errored seconds - line:              0            0            0
```

3. Restore Spare A group protection

```
(A:Active)> ds1 5 move home

  DS1 5 moved to home

(A:Active)> status ds1 all

  Interface Receive    Transmit   Loop   Protection
  --------- -------    --------   ----   ----------
  DS1 1     Traffic    Traffic    None   by Spare 1
  DS1 2     Traffic    Traffic    None   by Spare 2
  DS1 3     Traffic    Traffic    None   by Spare 3
  DS1 4     Traffic    Traffic    None   by Spare 4
  DS1 5     Traffic    Traffic    None   by Spare 1
  DS1 6     Traffic    Traffic    None   by Spare 2
  DS1 7     Traffic    Traffic    None   by Spare 3
  DS1 8     Traffic    Traffic    None   by Spare 4
  DS1 9     Traffic    Traffic    None   by Spare 1
```

```
DS1 10    Traffic   Traffic   None  by Spare 2
DS1 11    Traffic   Traffic   None  by Spare 3
DS1 12    Traffic   Traffic   None  by Spare 4
DS1 13    Traffic   Traffic   None  by Spare 1
DS1 14    Traffic   Traffic   None  by Spare 2
DS1 15    Traffic   Traffic   None  by Spare 3
DS1 16    Traffic   Traffic   None  by Spare 4
DS1 17    Traffic   Traffic   None  by Spare 1
DS1 18    Traffic   Traffic   None  by Spare 2
DS1 19    Traffic   Traffic   None  by Spare 3
DS1 20    Traffic   Traffic   None  by Spare 4
DS1 21    Traffic   Traffic   None  by Spare 1
DS1 22    Traffic   Traffic   None  by Spare 2
DS1 23    Traffic   Traffic   None  by Spare 3
DS1 24    Traffic   Traffic   None  by Spare 4
DS1 25    Traffic   Traffic   None  by Spare 1
DS1 26    Traffic   Traffic   None  by Spare 2
DS1 27    Traffic   Traffic   None  by Spare 3
DS1 28    Traffic   Traffic   None  by Spare 4
Spare 1   Available
Spare 2   Available
Spare 3   Available
Spare 4   Available
```

4. Send Line loopback toward test equipment

```
(A:Active)> ds1 5 line on
(A:Active)> status ds1 5

Interface   Receive   Transmit  Loop  Protection
---------   -------   --------  ----  ----------
DS1 5       Traffic   Traffic   Line  by Spare 1
```

5. Repeat for a low-speed circuit in each of the protection groups.

Testing DS3 Interfaces

Testing DS3 Framing and Loop Timing

This test is conducted in non-redundant mode. There should be only one Controller card and one DS3 line available.

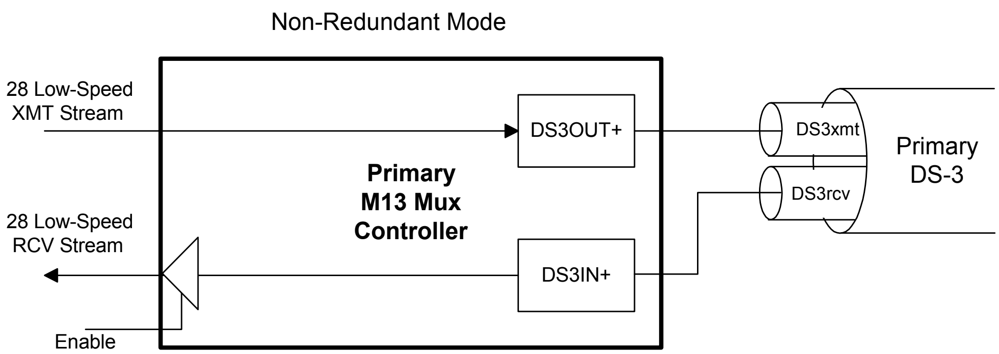


Figure 7-18 Non-Redundant Mode

DS3 Non-Redundant Test Setup

1. Configure as:

```
(A:Active)> arm off
(A:Active)> ds3 protect off
```

2. Configure the DS3 interface parameters

```
(A:Active)> ds3 circuitid "CAC2345"
(A:Active)> ds3 equipmentid "Wide Bank"
(A:Active)> ds3 facilityid "primary"
(A:Active)> ds3 frameid "videodata"
(A:Active)> ds3 gennumber 1
(A:Active)> ds3 locationid "Boulder"
(A:Active)> ds3 portnumber 2
(A:Active)> ds3 unit "aaaa05"
(A:Active)> ds3 clock int
```

DS3 Test with M23 Framing

1. Configure the DS3 for M23 framing.

```
(A:Active)> ds3 framing M23

ds3 framing m23

(A:Active)> ds3

- DS3
    ds3    circuitid "DS3A"
    ds3        clock int
    ds3  clockrevert on
    ds3    equipment off
    ds3      framing m23
    ds3       length short
    ds3         line off
    ds3   loopdetect off
    ds3      payload off
    ds3         send off
    ds3    threshold off
    ds3 pm lcv thresholds
        min15           0
        hour            0
        day             1
```

2. Configure the test set for M23 framing, and verify that the test set frames up.

DS3 Test with C-bit Framing

1. Configure the DS3 for C-bit Parity framing.

```
(A:Active)> ds3 framing cbit

ds3 framing cbit

(A:Active)> ds3

- DS3
    ds3    circuitid "DS3"
    ds3        clock int
    ds3  clockrevert on
    ds3  equipmentid "DS3 Equip."
    ds3    equipment off
```

```
ds3   facilityid "DS3 Path"
ds3      frameid "Frame"
ds3      framing cbit
ds3    gennumber "DS3 Test Generator"
ds3       length short
ds3         line off
ds3   locationid "DS3 Loc."
ds3   loopdetect off
ds3      payload off
ds3   portnumber "DS3 Idle Port"
ds3         send off
ds3    threshold off
ds3         unit "000000"
Performance Thresholds:        15 min.      1 hour       1 day
                              --------     --------     --------
coding violations - line:            0            0            0
errored seconds - line:              0            0            0
coding viols-path p-bit:             0            0            0
err seconds - path p-bit:            0            0            0
loss of signal secs - line:          0            0            0
sev err seconds - line:              0            0            0
sev err sec - path cp-bit:           0            0            0
```

2. Configure the test set for C-bit Parity framing, and verify that the test set frames up.

DS3 Tests with Line Timing

1. Configure the clock source to use line timing (provided by the test set).

   (A:Active)> **ds3 clock line**

2. Repeat preceding *DS3 Test with M23 Framing* and *DS3 Test with C-bit Framing* for line clock source.

3. Configure clock source to internal for the following tests.

   (A:Active)> **ds3 clock int**

Testing the DS3 Near-End with Loopback Tests

DS3 Equipment Loopback

1. Configure the DS3 for equipment loopback.

```
(A:Active)> ds3 equipment on
```

2. Apply PRBS from the test set on the low-speed circuit, and verify that the test set synchronizes on the pattern without errors.
3. When complete, disable equipment loopback.

```
(A:Active)> ds3 equipment off
```

DS3 Line Loopback with M23 Framing

1. With a test set on the DS3, configure for M23 framing and apply a line loopback.

```
(A:Active)> ds3 framing M23
(A:Active)> ds3 clock line
(A:Active)> ds3 line on
```

2. At the test set apply a PRBS pattern, and verify that the test set synchronizes on the pattern without errors.
3. When complete, disable line loopback.

```
(A:Active)> ds3 line off
```

DS3 Line Loopback with C-bit Framing

1. Repeat test using C-bit Parity framing.

```
(A:Active)> ds3 framing cbit
(A:Active)> ds3 line on
```

2. When complete, disable line loopback.

```
(A:Active)> ds3 line off
```

DS3 Payload Loopback with M23 Framing

1. With a test set on the DS3, configure for M23 framing and apply a payload loopback.

```
(A:Active)> ds3 framing M23
(A:Active)> ds3 payload on
```

2. At the test set apply a PRBS pattern to a low-speed line, and verify that the test set synchronizes on the pattern without errors.
3. When complete, disable payload loopback.

```
(A:Active)> ds3 payload off
```

DS3 Payload Loopback with C-bit Framing

1. Repeat test using C-bit Parity framing.

```
(A:Active)> ds3 framing cbit
(A:Active)> ds3 payload on
```

2. When complete, disable payload loopback and set clock to internal.

```
(A:Active)> ds3 payload off
    ds3     payload off

(A:Active)> ds3 clock int
    ds3       clock int
```

Testing the DS3 Far-End with Loopback Tests

When the Wide Bank is configured for C-bit framing, the following DS3 far-end loopup and loopdown control is available.

The command that controls the far-end DS3 loop mode sends either a loop up code or a loop down code:

```
ds3 send [loopup|loopdown]
```

When a DS3 Activate Loopback command is received, the DS3 is set to a LINE loopback mode. The loopback status can be observed by the *ds3* and *status ds3* commands. Also, the Controller Status LED is set to YELLOW.

Far-End Loop Codes

When a far-end loop command is issued at the near-end, the selected Line Loopback Activate or Deactivate code word is transmitted ten times to the far-end, followed immediately by the selected low-speed or DS3 Line code word (also transmitted 10 times). See Table 2-1. The total message to the far-end is 40 octets long (each code word is two octets).

NOTE: The labels for the loopback code words are determined by ANSI T1.107, so the following chart refers to DS1 exclusively. However, the same loopback functions and code words apply to E1 as well, with the exception that every fourth low-speed circuit is not used with E1.

The DS1 code words use bits 3 - 7 to indicate which line is to be looped back.

Table 2-1 Far-End Loopback Code Words

Loopback Function	Loopback Code Word
Activate Line Loopback	00001110 11111111
Deactivate Line Loopback	00111000 11111111
Select DS3 Line	00110110 11111111
Select DS1 Line 1	01000010 11111111
Select DS1 Line 2	01000100 11111111
Select DS1 Line 3	01000110 11111111
Select DS1 Line 4 (not E1)	01001000 11111111
Select DS1 Line 5	01001010 11111111
Select DS1 Line 6	01001100 11111111

Table 2-1 Far-End Loopback Code Words (Continued)

Loopback Function	Loopback Code Word
Select DS1 Line 7	01001110 11111111
Select DS1 Line 8 (not E1)	01010000 11111111
Select DS1 Line 9	01010010 11111111
Select DS1 Line 10	01010100 11111111
Select DS1 Line 11	01010110 11111111
Select DS1 Line 12 (not E1)	01011000 11111111
Select DS1 Line 13	01011010 11111111
Select DS1 Line 14	01111100 11111111
Select DS1 Line 15	01011110 11111111
Select DS1 Line 16 (not E1)	01100000 11111111
Select DS1 Line 17	01100010 11111111
Select DS1 Line 18	01100100 11111111
Select DS1 Line 19	01100110 11111111
Select DS1 Line 20 (not E1)	01101000 11111111
Select DS1 Line 21	01101010 11111111
Select DS1 Line 22	01101100 11111111
Select DS1 Line 23	01101110 11111111
Select DS1 Line 24 (not E1)	01110000 11111111
Select DS1 Line 25	01110010 11111111
Select DS1 Line 26	01110100 11111111
Select DS1 Line 27	01110110 11111111
Select DS1 Line 28 (not E1)	01111000 11111111
Select DS1 Line All	00100110 11111111

Testing DS3 Redundancy

Testing Electronics Protection

This test requires two Controller cards that are capable of operating correctly.

NOTE: If you are testing with a Telnet session, each time you switch Controllers (*switch* command), you will have to reconnect your Telnet session to the Wide Bank IP address.

DS3 Test Setup

1. Configure all of the DS1s for B8ZS line coding (E1 circuits must be configured for HDB3), and both DS3s for M23 framing and DS3 electronic redundancy. Configuring for DS3 electronic redundancy means having two Controller cards that operate correctly, arm turned on (*arm on*), and ds3 network protection turned off (*ds3 protect off*).

   Configure all DS1s for B8ZS line coding (E1 for HDB3):

   ```
   (A:Active)> ds1 all linecode B8ZS
   ```

   Configure both DS3s for M23 framing:

   ```
   (A:Active)> ds3 framing m23
   ```

   Configure for DS3 electronic redundancy only:

   ```
   (A:Active)> ds3 protect off
   ```

2. Loop the DS3 back on itself (transmit to receive with 75 ohm BNC cable).
3. Send PRBS pattern across the low-speed circuit using the test set.
4. Verify that the test set synchronizes on its own pattern on the low-speed link.

DS3 Manual Switch Test

1. Verify that a manual switch-over to the secondary Controller can be achieved.

```
(A:Active)> switch
Switching control to Standby DS3 Controller
(B:Active)>
```

2. Verify that the test set is still synchronized to the PRBS pattern with a low received-error rate. Errors here are the direct result of the manual switch-over.
3. Switch-over to the primary DS3 link.

```
(B:Active)> switch
Switching control to Standby DS3 Controller
(A:Active)>
```

DS3 Automatic Protection Test

1. Ensure that DS3 protection is on.

```
(A:Active)> ds3 protect on

ds3 protect on
```

2. Ensure that revertive switching is off.

```
(A:Active)> revertive off

revertive off
```

3. Physically remove the primary Controller card (Controller card A).
4. Verify that a switch-over has occurred to the standby Controller. Prompt should read:

```
Switching control to Standby DS3 Controller
(B:Active)>
```

DS3 Revertive Switching Test

1. Re-insert the primary Controller card.
2. Verify that no revertive switch-over occurs. There should be no prompt telling you of a switch to the standby Controller, and Controller B should still be shown active.
3. Manually switch back to the primary Controller.

```
(B:Active)> switch

Switching control to Standby DS3 Controller
(A:Active)>
```

4. Remove the secondary Controller card (Controller card B).
5. Verify that the Wide Bank recognizes that the protection Controller card has been removed.
6. Verify that NO errors are encountered by the test set.

Testing Electronics and Network Protection

DS3 Test Setup

The following steps will configures the DS1s for B8ZS line coding (E1 circuits must be configured for HDB3), DS3s for M23 formatting, and DS3 electronic and Network redundancy.

1. Configure all DS1s for B8ZS line coding (DS1 circuits only; E1 is always HDB3):

```
(A:Active)> ds1 all linecode B8ZS
```

2. Configure both DS3s for M23 framing.

```
(A:Active)> ds3 framing m23
```

3. Configure for DS3 electronic redundancy and network redundancy.

```
(A:Active)> ds3 protect on
ds3 protect on
(A:Active)> arm on
arm on
```

4. Ensure that revertive switching is off.

```
(A:Active)> revertive off
revertive off
```

DS3 Network Protection Test

1. Using 75-ohm BNC coaxial cable, loop Primary DS3 receive and transmit signals together, and loop Secondary DS3 receive and transmit signals together.
2. Send PRBS pattern across the low-speed circuit using the test set.
3. Verify that a manual switch-over to the secondary Controller can be achieved.

```
(A:Active)> switch
Switching control to Standby DS3 Controller
(B:Active)>
```

4. Verify that the test set is still synchronized to the PRBS pattern.
5. Switch back to the primary DS3 Controller.

```
(B:Active)> switch
Switching control to Standby DS3 Controller
(A:Active)>
```

6. Repeat test, except this time pull the Primary DS3 Link cable instead of executing a manual switch in step 5.
7. Verify that a switch-over has occurred to the secondary link. Note that although there were errors received during the manual switch over, the error count should be less than those encountered in the Electronics Protection test. For a description of "hitless" switching, see Telcordia TR-TSY-752, chapter 8.
8. Reconnect the primary DS3 network link, and switch operation back to the primary DS3.

```
(A:Active)> switch
Switching control to Standby DS3 Controller
```

DS3 Electronics Protection Test

Verify that the test set encounters no errors when performing the following steps.

1. Pull out the primary Controller card.
2. Verify that a switch-over has occurred to the standby Controller.
3. Re-insert the primary Controller card.
4. Verify that no switch-over occurs.
5. Switch back to the primary Controller.

```
(B:Active)> switch
Switching control to Standby DS3 Controller
```

6. Pull out the secondary Controller card.
7. Re-insert the secondary Controller card.

CHAPTER 8

CLI Commands and Messages

In this Chapter

Management Overview

Management Interfaces

The Wide Bank 28 DS3 has four management interfaces (see Figure 8-1):

- **Command Line Interface (CLI)**. An ASCII language, communicated over an RS-232 data port or via Ethernet through a Telnet session. The Command Line Interface is a scrolling interface. It is operated only from a dumb terminal (VT100) or a terminal emulation program such as ProComm or HyperTerminal.
- **SNMP Agent**. Simple Network Management Protocol (SNMP), an industry standard management interface, communicated through IP over a 10Base-T Ethernet data port. The Wide Bank's embedded SNMP Agent attaches to an Ethernet connection. It is operated by an SNMP Manager application such as SunConnect SunNet Manager, HP OpenView, or Castle Rock SNMPc, and the Carrier Access NetworkValet.
- **Transaction Language One (TL1)**. TL1 compliant automatic outbound alarming through either a 25-pin RS-232 port or over TCP/IP. The Wide Bank also supports TL1 commands over these same interfaces (see Chapter 9).
- **PPP over DS3.** Point-to-Point Protocol (PPP) can be used to support TFTP, SNMP, Telnet, Ping, and TL1 over the DS3 link between two Wide Banks using C-bit framing. Management commands are sent through the Ethernet port of the local Wide Bank for routing over the DS3 C-bit data link to a remote Wide Bank. To use this mode, the local Wide Bank must be configured with the IP PPP Address of the remote Wide Bank and the IP Route is set to Ethernet. The remote Wide Bank's IP Route is set to PPP.

Management interfaces access the same configuration and data structures for low-speed DS1 and E1 and high-speed DS3 interfaces. CLI has more maintenance and monitoring features than the SNMP Agent. In other words, CLI manages a superset of the SNMP Agent. However, SNMP can monitor status (traps), which CLI cannot.

Redundant DS3 Network Interfaces

The Wide Bank can have two Controller cards. To provide electronic and/or network redundancy, each Controller card has a DS3 network interface. The secondary card (B) provides electronics and route protection against faults that occur on the primary Controller card (A) and its interface.

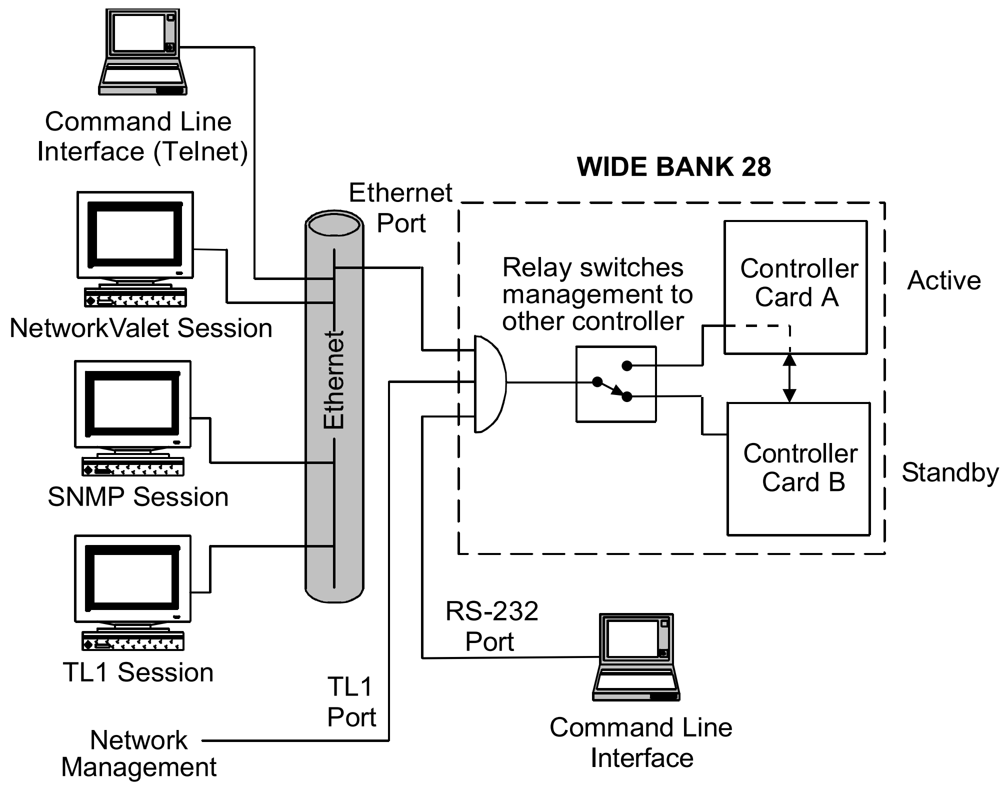


Figure 8-1 Management Port Connections

Telnet Interface

You can use Telnet to remotely access the Wide Bank after setting up the IP address of the Ethernet port (see *IP on page 8-48*). The Telnet interface is identical to the VT100 interface except that it uses the TCP/IP protocol for data transport and is accessed through the 10Base-T Ethernet connection.

You can open a Telnet session using the IP address. After pressing the Enter key to initiate the connection, you can then log in as usual. When finished, log out using the *exit* command before disconnecting the Telnet session.

If you do not exit the session, it will continue for 16 minutes, and any attempt to login through Telnet or the RS-232 port will fail. If this occurs, type Ctrl k on the terminal connected to the Wide Bank RS-232 port to end the one-sided Telnet session. If the Telnet session is idle for five minutes, you will be automatically logged out.

Security Levels

To prevent unauthorized access to the network, users can be assigned security levels. The levels available depend on whether you use the Wide Bank's basic security feature or whether the Wide Bank is equipped with the Security Upgrade option. See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Basic Security

With basic security, there are three security levels:

- ***admin*** – The *admin* user has access to all commands and has the sole authority to grant others access to the system by adding and deleting user names and passwords. There can be only one *admin* user (always named "admin") within the system.
- ***rw* (read/write)** – An *rw* user has access to all commands except those for adding users, deleting users, and setting user levels. The *rw* users are typically responsible for the day-to-day operation of the system.
- ***ro* (read only)** – An *ro* user is limited to commands that display status and reports. The *ro* access level permits technicians to monitor system operation and performance, but prevents them from altering settings.

Security Upgrade Option

With the Security Upgrade option, there are four security levels:

- ***secu*** – The *secu* user has access to all commands and has the sole authority to grant others access to the system by adding and deleting user names and passwords. The *secu* user also has sole authority to perform such functions as clearing all statistics and logs, configuring IP settings, restoring factory default or previously saved configurations, and configuring the TL1 interface. There can be only one *secu* user (always named "security") within the system.
- ***admin*** – An *admin* user has access to all commands except those assigned exclusively to the *secu* user. Functions available to the *admin* user that are not available to lower-level users include clearing DS1 and DS3 statistics, copying a configuration from the active to standby Controller, setting the system time and date, programming the flash memory, saving a configuration to a TFTP server file, setting various security functions, configuring SNMP, and copying the current configuration to temporary storage.
- ***rw* (read/write)** – An *rw* user has access to all commands except those assigned exclusively to the *secu* and *admin* users. The *rw* users are typically responsible for the day-to-day operation of the system.
- ***ro* (read only)** – An *ro* user is limited to commands that display status and reports. The *ro* access level permits technicians to monitor system operation and performance, but prevents them from altering settings.

Security Integrity

The Wide Bank will deny access if a user name or password is entered incorrectly. After three consecutive unsuccessful login attempts, the login prompt does not appear for 10 seconds, and an SNMP trap (cliLoginFailureTrap) is sent. After the 10 second delay, the prompt reappears and another login attempt can be made. The three-attempt rule is effective for both RS-232 and Telnet sessions; however, a Telnet session is disconnected after three unsuccessful attempts, requiring reconnection after a 10 second delay.

SNMP Traps

All supported SNMP MIB traps are turned on by default. The first three traps are supported by the Wide Bank 28 DS3 with RFC 1213 MIB II. The remaining are equipment status traps provided by the Carrier Access enterprise MIB (ds3am.mib). For detailed descriptions, see *SNMP Traps Supported by Wide Bank 28 DS3 on page 11-6*.

- warmStartTrap – occurs when the Wide Bank is powered off and on, or when all Controller cards are removed and replaced
- linkDownTrap – occurs when a communication facility fails or is removed
- linkUpTrap – occurs when a communication facility is removed, then restored
- cliLoginFailureTrap – occurs after three failed CLI login attempts
- ds3ControllerStateTrap – occurs when a DS3 Controller experiences an alarm state change
- ds1CardStateTrap – occurs when a DS1 card experiences an alarm state change
- ext48VPowerStatusTrap – occurs when an external 48V power source fails or when the failure is cleared
- ds1ProtectSwitchTrapTrap – occurs when a DS1 facility is moved to the spare card
- ds1MoveHomeTrap – occurs when a DS1 facility is moved from the spare card to its home card
- ds1InternalHardwareFailureTrap – occurs when a DS1 facility experiences an internal hardware failure
- ds1InternalHdwFailureClearTrap – occurs when a DS1 facility experienced an internal hardware failure and it is now clearing
- ds1InternalHdwFailureSpareTrap – occurs when a DS1 facility experienced an internal hardware failure while on the spare
- ds1InternalHdwFailureSpareClearTrap – occurs when a DS1 facility experienced an internal hardware failure and it is now clearing

Command Line Interface

The command line interface provides a method to fully control and monitor the operation of the Wide Bank using any terminal or PC running terminal emulation software.

Using the Command Line Interface

1. Configure the terminal interface to 9600 baud, 8 data bits, 1 stop bit, no parity, no flow control.
2. Connect the serial port of a terminal or a PC running terminal emulation software to the RS-232 port of the Wide Bank (female DB9 connector).

   This gives you access to the command line interface. After pressing the Enter key, you should see the following display:

```
13:30:14 06/19/1999

Automatic Login to Controller Card A
  Equipment           Status
  ---------           ------
  DS3 Controller A  Active
  DS3 Controller B  Standby
  DS1 Card 1          Active
  DS1 Card 2          Active
  DS1 Card 3          Active
  DS1 Card 4          Active
  DS1 Card 5          Active
  DS1 Card 6          Active
  DS1 Card 7          Active
  DS1 Spare Card      Active
```

NOTE: While using the CLI, remember that an inactive period of 15 minutes causes an automatic termination of the session.

Context Sensitive Help

The Command Line interface has a context-sensitive help feature that tells you what the command options are. If you type a question mark (***?***) at the prompt by itself, the entire list of commands is displayed. If you type a question mark after the name of a command, the first-level options for that specific command are displayed. Some commands have more options under the first level, which can be displayed only by typing **`help`** after the name of the specific command.

For example, note that the first command (ds1 ?) below shows the first level of options, and the second command (ds1 help) below shows **all** option for the ds1 command.

Example: Show First level of options for the *ds1* command.

```
(A:Active)> ds1 ?

 ds1 [n|range|all] .............. Set/Display DS1 n=1..28, range=x-y or all
     circuitid "id" ............. DS1 Circuit ID
     enable/disable ............. Activate/Deactivate DS1 Interface
     equipment .................. Apply DS1 Equipment Loopback
     length ..................... Set DS1 line length
     line ....................... Apply Line Loopback to DS1
     linecode ................... Coding Type
     loopdetect ................. Set Detection of Loop Codes
     metallic ................... Apply DS1 Metallic Loopback
     move ....................... Move Control of DS1 n to Spare DS1
     pm threshold ............... Show/Set DS1 PM Threshold Values
     send ....................... Send a Code on DS1 Toward Drop or Network
```

Example: Show all levels of options for the *ds1* command.

```
(A:Active)> ds1 help

 ds1 [n|range|all] .............. Set/Display DS1 n=1..28, range=x-y or all
     circuitid "id" ............. DS1 Circuit ID
     enable/disable ............. Activate/Deactivate DS1 Interface
     equipment .................. Apply DS1 Equipment Loopback
        off ..................... Disable DS1 equipment loopback towards DS3
        on ...................... Enable  DS1 equipment loopback towards DS3
     length ..................... Set DS1 line length
         dsx0 ................... DSX (0'-110')
         dsx110 ................. DSX (110'-220')
         dsx220 ................. DSX (220'-330')
         dsx330 ................. DSX (330'-440')
         dsx440 ................. DSX (440'-550')
         dsx550 ................. DSX (550'-660')
     line ....................... Apply Line Loopback to DS1
         off .................... Disable DS1 Line Loopback towards DS1
         on ..................... Enable  DS1 Line Loopback towards DS1
```

```
linecode .................. Coding Type
    ami ................... AMI Line Coding
    b8zs .................. B8ZS Line Coding
loopdetect ................ Set Detection of Loop Codes
    off ................... Disable All Loop Code Detections
    on .................... Enable All Loop Code Detections
    niu ................... Enable NIU Loop Code Detections only
    cbit .................. Enable C-bit Loop Code Detections only
metallic .................. Apply DS1 Metallic Loopback
    off ................... Disable Metallic Loopback
    on .................... Enable  Metallic Loopback
move ...................... Move Control of DS1 n to Spare DS1
    home .................. Switches Control from Spare to Home  DS1
    spare ................. Switches Control from Home  to Spare DS1
pm threshold .............. Show/Set DS1 PM Threshold Values
     ...................... Command Syntax:
     ...................... ds1 <n-n> pm threshold <int> <err> <val>
    ...................... Example: ds1 1-4 pm threshold hour cvl 300
     ...................... int = min15, hour, day
     ...................... err = cvl, esl
     ...................... val = value for new threshold
send ...................... Send a Code on DS1 Toward Drop or Network
    off ................... Disable Code Send
    ais ................... Send AIS to the DS1 Drop
    cbit loopup ........... Send C-bit Loop Up Request to DS3
    cbit loopdown ......... Send C-bit Loop Down Request to DS3
    csu loopup drop ....... Send CSU Loop Up Code to DS1 Drop
    csu loopup network .... Send CSU Loop Up Code to DS3 side
    csu loopdown drop ..... Send CSU Loop Down Code to DS1 Drop
    csu loopdown network .. Send CSU Loop Down Code to DS3 side
    niu loopup ............ Send NIU Loop Up Code to DS3 side
    niu loopdown .......... Send NIU Loop Down Code to DS3 side
    prbs drop ............. Send PRBS Code to DS1 Drop
    prbs test drop ........ Perform Automated PRBS Test of DS1 Drop
    prbs network .......... Send PRBS Code to DS1 Network
```

CLI Command List

CLI Command Syntax

The command syntax uses the following conventions:

- `Courier Font` is used for command words
- *`Italic Font`* indicates a variable for which you must substitute a value or word
- Curly Brackets { } enclose required parameters
- Square Brackets [ ] enclose optional items
- Vertical Rules | | | separate items in a list for which you must select only one item

NOTE: The Wide Bank ships with all configuration parameters set to factory default values unless otherwise specified. Default values appear in bold type in the tables following the CLI command syntax. The Wide Bank can be restored to these default values at any time *RESTORE on page 8-63*.

CLI Shortcuts (Recall and Edit)

To simplify entering repetitive commands, CLI allows you to "recall" the previous three commands entered by typing Ctrl+R (hold the Ctrl key down and press the R key). To go "forward," type Ctrl+F.

CLI also allows you to edit commands by using the Backspace key to delete mistakes and retyping characters. This also allows you to easily recall and edit a previous command to change characters, and then press the Enter key to enter the modified command.

ACO

Name: **Alarm Cut Off**

Purpose: Activates the Alarm Cut Off, which deactivates the alarm relay contacts to suppress the alarm.

Security: *rw* and above

Syntax: `aco`

ALARMS

Name: **Alarms**

Purpose: Display the currently active alarms.

Security: *ro* and above

Syntax: `alarms`

Example: `alarms`

```
Sev   Active Alarm
---   ------------
CR    DS3 A Loss Of Signal
```

Syntax: `aco`

ALARMS STANDBY

Name: **Alarms Standby**

Purpose: Set the severity of failure conditions for the standby DS3 Controller when logging and reporting alarms (REPT ALM) and events (REPT EVT). The severity of many other failure conditions can be set by the TL1 command *SET-ATTR-<AIDType> on page 9-75*.

The “standby self-test” is only run when the standby Controller is initialized. Other CLI commands (*test all*, *test ds3)* and TL1 commands (*dgn-t3-all*, *dgn-all*) only run a self-test on the active Controller card.

The “other controller bad” condition occurs if the active Controller loses communications with the standby Controller. Both conditions cause a CONTEQPT, “Control Equipment Failure”, STANDBY.

Note: The Wide Bank restricts standby Controller condition severities to values that are equal to or less than the corresponding active Controller settings. You can still set a standby condition severity to a greater value but the actual reported value will be restricted by the active Controller setting, as shown in the following examples.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: **`alarms standby {ds3_selftest|othercontrollerbad} {critical|major|minor|na|nr}`**

Field	Description
`ds3_selftest`	Standby DS3 Controller failed Self-Test
`othercontrollerbad`	Active DS3 Controller lost communications with the standby Controller
`critical`	Set alarm condition level to Critical
`major`	Set alarm condition level to Major
`minor`	Set alarm condition level to Minor
`na`	Not Alarmed. Condition is logged and reported as an event (REPT EVT) instead of an alarm (REPT ALM).
`nr`	Not Reported. Condition is logged but not reported.

Example: **`alarms standby ds3_selftest`**

```
Set to Not Reported
```

Indicates that standby Controller self-test failure alarm severity is currently set to Not Reported (nr).

Example: **`alarms standby ds3_selftest minor`**

```
Set to Minor
```

Sets standby Controller self-test failure alarm severity to Minor.

Example: **`alarms standby ds3_selftest major`**

```
Notice: Limited to Minor by Active Setting
Set to Major
```

Sets standby Controller self-test failure alarm severity to Major. However, the accompanying “Notice” indicates that this alarm severity will be limited to Minor because the active Controller alarm severity is currently set to Minor. The standby Controller alarm severity can be no higher than the active Controller setting.

ALARMOUT

Name: **Alarm Relay Output Contacts**

Purpose: Sets the alarm output contacts to normally open (NO) or normally closed (NC). This command affects both the Critical and Major/Minor alarm relay contacts.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: **`alarmout {nc|no}`**

Field	Description
`nc`	Normally Closed (NC). Contacts will open when alarm is active. **Note**: The contacts will be open when the Wide Bank is not powered.
`no`	Normally Open (NO). Contacts will close when alarm is active.

Example: **`alarmout`**

```
alarm contacts normally open
```

Example: **`alarmout nc`**

```
alarm contacts normally closed
```

ARM

Name: **Automatic Redundancy Mode**

Purpose: Set or show the current protection switching operation. Arm is turned on automatically when revertive DS3 is turned on (see *REVERTIVE on page 8-67*) because network protection is normally revertive.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: **`arm {on|off}`**

Field	Description
on	The default setting is ON. When a fault occurs in the active Controller, the Wide Bank switches control to the standby Controller. If DS3 network protection is also enabled (see *DS3 PROTECT on page 8-41*), the Wide Bank switches Controllers when a DS3 line defect occurs.
off	Disables protection switching

AUTOCOPY

Name: **Automatic Copy Mode**

Purpose: When turned on, allows the active Controller to automatically copy configuration changes to the standby Controller. This command has no effect when only one Controller is installed. Multi-user information is always copied between Controllers.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: **`autocopy [on|off]`**

Setting	Description
autocopy	Use the command by itself to show the current setting
on	Enables the active Controller to automatically copy configuration changes to the standby Controller card
off	Disables the autocopy mode

Example: **`autocopy on`**

Enables the autocopy mode.

CLEAR

Name: **Clear Data**

Purpose: Clears recorded statistics and logs.

NOTE: If you clear the event log, timestamps for any existing alarms or conditions are also cleared.

Security: *rw* and above with basic security; *admin* and above for CLEAR ds1 and CLEAR ds3 with Security Upgrade; *secu* for CLEAR all, CLEAR log, CLEAR log standby, and CLEAR wtr with Security Upgrade

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: **clear {all|ds1 [***number***|***range***|all]|ds3|**
log [standby]|wtr}

Field	Description
all	All interface statistics and log data
ds1 *number*	Clear a low-speed interface number, 1 to 28
ds1 *range*	Clear a range of low-speed interfaces separated by a hyphen as in 5-8

Field	Description
ds1 all	Clear all low-speed interface statistics and log data
ds3	Clear DS3 statistics
log	Clear event log
log standby	Clear standby Controller event log
wtr	Clear 5-minute wait-to-restore period

Example: **`clear ds1 5`**

Clear counts for DS1 #5 interface.

CONFIG

Name: **Configuration Settings**

Purpose: Display configuration settings of all cards and interfaces.

Security: *ro* and above

Syntax: **`config`**

Message:

```
- CONTROLLER

  ds1      protect on
  ds3      protect off
  autocopy        on
  revertive ds3    off
  revertive ds1    off
  arm             on

  ffo      present off

  security        off

  screen 24

  ip    address 192.168.26.44
  ip       mask 255.255.255.0
  ip    gateway 192.168.26.202
  ip       nms1 192.168.41.46
  ip       nms2 192.168.25.212
  ip       nms3
  ip        ppp
  ip      route ethernet
```

```
    snmp name      "Name"
    snmp location  "Location"
    snmp contact   "Contact"
    snmp getcomm   "public"
    snmp setcomm   "public"
    snmp trapcomm  "public"

- DS3
    ds3    circuitid "DS3"
    ds3        clock int
    ds3  clockrevert on
    ds3  equipmentid "DS3 Equip."
    ds3    equipment off
    ds3   facilityid "DS3 Path"
    ds3      frameid "Frame"
    ds3      framing cbit
    ds3    gennumber "DS3 Test Generator"
    ds3       length short
    ds3         line off
    ds3   locationid "DS3 Loc."
    ds3   loopdetect off
    ds3      payload off
    ds3   portnumber "DS3 Idle Port"
    ds3         send off
    ds3    threshold off
    ds3         unit "000000"
    Performance Thresholds:    15 min.    1 hour     1 day
                              --------  --------  --------
    coding violations - line:      387      1161      3865
    errored seconds - line:         25        75       250
    coding viols-path p-bit:       382      1146      3820
    err seconds - path p-bit:       25        75       250
    loss of signal secs - line:      4        12        40
    sev err seconds - line:          4        12        40
    sev err sec - path cp-bit:       4        12        40

-  1
    ds1 1   circuitid "DS1#1"
    ds1 1      enable
    ds1 1   equipment off
    ds1 1      length dsx0
    ds1 1        line off
    ds1 1    linecode b8zs
    ds1 1  loopdetect off
    ds1 1    metallic off
    ds1 1        send off
    Performance Thresholds:    15 min.    1 hour     1 day
                              --------  --------  --------
    coding violations - line:    13340     40020    133400
    errored seconds - line:         65       195       648
```

```
        •
        • (Circuits 2 through 27)
        •

-   28
    ds1 28  circuitid "DS1#28"
    ds1 28     enable
    ds1 28  equipment off
    ds1 28     length dsx0
    ds1 28       line off
    ds1 28   linecode b8zs
    ds1 28 loopdetect off
    ds1 28   metallic off
    ds1 28       send off
    Performance Thresholds:    15 min.    1 hour     1 day
                              --------   --------   --------
    coding violations - line:    13340      40020     133400
    errored seconds - line:         65        195        648
```

CONTROLLER

Name: **Controller Settings**

Purpose: Display all Controller settings.

Security: *ro* and above

Syntax: **`controller`**

Message:

```
DS3 (A:Active)> controller

- CONTROLLER

    ds1      protect on
    ds3      protect off
    autocopy        on
    revertive ds3    off
    revertive ds1    off
    arm             on

    ffo      present on

    security        off

    screen 24

    ip    address 192.168.26.49
    ip       mask 255.255.255.0
    ip    gateway 192.168.26.202
    ip       nms1
```

```
ip        nms2
ip        nms3
snmp name      "Name"
snmp location  "Location"
snmp contact   "Contact"
snmp getcomm   "public"
snmp setcomm   "public"
snmp trapcomm  "public"
```

COPY

Name: **Copy Configuration**

Purpose: Copy current configuration settings from the active Controller to the standby Controller. This command is not required when autocopy is enabled (see *AUTOCOPY on page 8-14*).

Security: *rw* and above with basic security; *admin* and above with Security Upgrade

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: **copy**

DATE

Name: **Date**

Purpose: Set or show the date of the Wide Bank system clock.

Security: Set - *rw* and above with basic security; *admin* and above with Security Upgrade
Show - *ro* and above

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: **date [***mm***/***dd***/***yyyy***]**

Setting	Description
date	Use the command by itself to show the current setting
mm	Month = 1 to 12
dd	Day = 1 to 31
yyyy	Year = 1997 and up

Example: **date**

```
The time is 14:03:53 09/05/2002
```

Example: `date 9/5/2002`

Sets the date (month, day, and year) to September 5, 2002.

DAY

Name: **Day Performance**

Purpose: Show the 24-hour performance statistics for an interface. Display conforms to RFC 1406 and 1407 requirements for reporting SNMP MIB statistics.

For current hour statistics, see *HOUR on page 8-47*.

Security: *ro* and above

Syntax: **day {ds3|ds3far|ds1** *number***}**

Field	Description
day	Show 24-hour statistics
ds1 *number*	Display 24-hour performance statistics for selected DS1 interface number, 1 to 28
ds3	Display 24-hour performance statistics for the DS3 interface
ds3far	Display 24-hour performance statistics for the far-end DS3 interface. (Valid only with C-bit framing.)

Example: `day ds3`

```
    15-Minute Interval Statistics for Near-end DS3 at 09:58:54 05/09/2001

STATISTIC \ INTERVAL   Current        1        2        3        4       Day
--------------------- --------- -------- -------- -------- -------- ---------
Unavailable Sec              0        0        0        0        0         0
Loss of Signal Sec           0        0        0        0        0         0
P-Bit Sev Err Sec            0        0        0        0        0         0
P-Bit Errored Sec            0        0        0        0        0         0
Sev Err Framing Sec          0        0        0        0        0         0
Line Errored Sec             0        0        0        0        0         0
Line Sev Errored Sec         0        0        0        0        0         0
Protected Sec                0        0        0        0        0         0
Loopback Sec                 0        0        0        0        0         0
PRBS Sync Sec                0        0        0        0        0         0
Protected Cnt                0        0        0        0        0         0
P-Parity Error Cnt           0        0        0        0        0         0
LCV Error Cnt                0        0        0        0        0         0

Elapsed Sec            834         LCV Error Rate                    0
Valid Intervals         96         P-Parity Error Rate               0
FE Elapsed Sec         N/A         C-Parity Error Rate             N/A
FE Valid Intervals     N/A         FE C-Parity Err Rate            N/A

... FOLLOWED BY INTERVALS 5 THROUGH 96.
```

Example: **day ds3far**

```
   15-Minute Interval Statistics for Far-end DS3 at 09:58:58 05/09/2001

STATISTIC \ INTERVAL   Current        1        2        3        4     Day
--------------------- --------- --------- --------- --------- --------- -------
FE Unavailable Sec           0        0        0        0        0       0
FE C-bit Sev Err Sec         0        0        0        0        0       0
FE C-bit Errored Sec         0        0        0        0        0       0
FE C-Parity Err Cnt          0        0        0        0        0       0

Elapsed Sec            N/A         LCV Error Rate           N/A
Valid Intervals        N/A         P-Parity Error Rate      N/A
FE Elapsed Sec         577         C-Parity Error Rate      N/A
FE Valid Intervals      96         FE C-Parity Err Rate       0


... FOLLOWED BY INTERVALS 5 THROUGH 96.
```

Example: **day ds1 5**

```
       15-Minute Interval Statistics for DS1 5  at 09:58:23 05/09/2001

STATISTIC \ INTERVAL   Current        1        2        3        4       Day
--------------------- --------- --------- --------- --------- --------- ---------
Unavailable Sec              0        0        0        0        0         0
Sev Errored Sec              0        0        0        0        0         0
Errored Sec                  0        0        0        0        0         0
Loss of Signal Sec           0        0        0        0        0         0
Line Errored Sec             0        0        0        0        0         0
Controlled Slip Sec          0        0        0        0        0         0
Degraded Min                 0        0        0        0        0         0
Protected Sec                0        0        0        0        0         0
Loopback Sec                 0        0        0        0        0         0
PRBS Sync Sec                0        0        0        0        0         0
Protected Cnt                0        0        0        0        0         0
LCV Error Cnt                0        0        0        0        0         0
PRBS Error Cnt               0        0        0        0        0         0

Elapsed Sec            383         LCV Error Rate                   0
Valid Intervals         96         PRBS Error Rate           No Sync.


... FOLLOWED BY INTERVALS 5 THROUGH 96.
```

DS1

Name: **DS1 Configuration Settings**

Purpose: Show the DS1 or E1 low-speed interface configuration. The command followed by the interface number displays the current configuration. (See following *ds1* commands with settings used to set the interface configuration.)

Note: When the LSMODE is set to DS1, you must use the *DS1* commands. When the LSMODE is set to either DS1LS or E1LS, you must use the *LS* commands. The *LS* command operates just like the *DS1* command, except that the responses are specific to the DS1 or E1 interface type. In the DS1LS mode, the low-speed references in command responses are the same as for the DS1 mode. In E1LS mode, the low-speed references in command responses are for E1 (each E1 card has only three active circuits; the fourth, unused, circuit on an E1 card is called CIR). See *LSMODE on page 8-58* and *LS on page 8-50*.

Security: *ro* and above

Syntax: **`ds1 {`***`number`***`|`***`range`***`|`***`list`***`|all}`**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces

Example: **`ds1 5`**

```
-  5
    ds1 5   circuitid "DS1 5"
    ds1 5      enable
    ds1 5   equipment off
    ds1 5      length dsx0
    ds1 5        line off
    ds1 5    linecode b8zs
    ds1 5  loopdetect off
    ds1 5    metallic off
    ds1 5        send off
    Performance Thresholds:        15 min.      1 hour       1 day
                                  --------     --------     --------
    coding violations - line:            0            0            0
    errored seconds - line:              0            0            0
```

Example: **`ds1 all`**

Display configuration settings for all low-speed interfaces.

DS1 AINS

Name: **DS1 Automatic In-Service Detection**

Purpose: Set low-speed alarm mode for automatic detection of new service connections. This command allows service providers to configure low-speed drops before connections or facilities are available. When automatic in-service detection is enabled, a disabled low-speed channel can be enabled (set in service) while a Loss of Signal (LOS) condition is present, and the Wide Bank will inhibit LOS alarm reporting for that channel until a new service connection has been established for the specified delay time.

Note: Following a DC power interruption, the LOS inhibit will be disabled on all channels, causing an LOS alarm on any DS1 that is enabled but not in service.

Note: A channel's LOS inhibit will also be disabled immediately if any of the following events occur:
- the channel is disabled (set out of service)
- a hardware failure occurs on the channel
- a metallic loopback is run on the channel
- the channel is manually moved to a spare
- the channel's card is removed

However, if a channel is disabled and then re-enabled while an LOS condition is present, the automatic in-service detection will again inhibit the LOS alarm.

Auto in-service detection is applied on a channel-by-channel basis. If service is discontinued on a channel, automatic in-service detection can be reapplied to that channel by simply placing it out of service and then back in service (see *DS1 ENABLE/ DISABLE on page 8-23*).

To quickly provision automatic in-service detection when turning up a new Wide Bank, first turn on automatic in-service detection and then place all DS1s or E1s out of service and then back in service.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: `ds1 ains [on|off|delay time]`

Setting	Description
ds1 ains	Use the command by itself to show the current setting
on	Enables automatic detection of new low-speed service on channels that are subsequently enabled and inhibits LOS alarms until a new service has been connected for the specified delay time.
off	Disables automatic in-service detection and allows LOS alarms on all low-speed channels
delay *time*	Set automatic in-service detection delay in hours, 1 to 168 (1 week). The default time is 2 hours.

Example: **`ds1 ains on`**

Enable automatic in-service detection of all low-speed channels that are subsequently enabled.

Example: **`ds1 ains delay 12`**

Set automatic in-service delay to 12 hours.

DS1 CIRCUITID

Name: **DS1 Circuit Identification**

Purpose: Set the low-speed circuit identification string (transmission vendor's identification), which is used for SNMP display only.

Security: *rw* and above

Syntax: **`ds1 {`***`number`***`|`***`range`***`|`***`list`***`|all} circuitid {"`***`string`***`"}`**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
circuitid	Set low-speed circuit identification string
"string"	Alphanumeric string enclosed in quotes, as per RFC 1406 requirement for SNMP MIBs

Example: **`ds1 1 circuitid "DS1 1"`**

Set DS1 #1 circuit identifier.

DS1 ENABLE/DISABLE

CAUTION! **DISABLING AN INTERFACE WILL DISRUPT SERVICE.**

Name: **DS1/E1 Interface Enable/Disable**

Purpose: Activate or deactivate a low-speed interface (normally used for SNMP managed systems).

Security: *rw* and above

Syntax: **`ds1 {`***`number`***`|`***`range`***`|`***`list`***`|all} {enable|disable}`**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
enable	Activate low-speed interface
disable	Deactivate low-speed interface

Example: **`ds1 8 disable`**

Disable DS1 #8.

DS1 EQUIPMENT

Name: **DS1/E1 Equipment Loopback**

Purpose: Set equipment loopback toward low-speed side (see chapter 7).

Security: *rw* and above

Syntax: **`ds1 {`***`number`***`|`***`range`***`|`***`list`***`|all} equipment {on|off}`**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
equipment	Send equipment loopback toward low-speed side
on	Apply equipment loopback
off	Remove equipment loopback

Example: **`ds1 2 equipment on`**

Apply DS1 #2 equipment loopback.

DS1 LENGTH

Name: **DS1 Length for Line Buildout**

Purpose: Adjust the DS1 line buildout (LBO) based on line length required for making cable connections to DSX-1 crossconnect equipment. Not available for E1 circuits.

Security: *rw* and above

Syntax: **ds1 {***number***|***range***|***list***|all} length {dsx0|dsx110|dsx220|dsx330|dsx440|dsx550}**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
length	Line buildout length (see settings below)
dsx0	Set for 0 to 110 feet
dsx110	Set for 110 to 220 feet
dsx220	Set for 220 to 330 feet
dsx330	Set for 330 to 440 feet
dsx440	Set for 440 to 550 feet
dsx550	Set for 550 to 660 feet

Example: **ds1 5-8 length dsx220**

Set DS1 #5 through #8 for line buildout of 330 to 440 feet.

DS1 LINE

Name: **DS1 Line Loopback**

Purpose: Configure line loopback toward low-speed side (see chapter 7).

Security: *rw* and above

Syntax: **ds1 {***number***|***range***|***list***|all} line {on|off}**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
line	Send line loopback toward low-speed side
on	Apply line loopback
off	Remove line loopback

Example: `ds1 9 line on`

Apply DS1 #9 line loopback.

DS1 LINECODE

Name: **DS1 Line Coding**

Purpose: Configure line coding for low-speed circuits. DS1 circuits use AMI or B8ZS. E1 circuits are fixed at HDB3.

Security: *rw* and above

Syntax: **ds1 {***number***|***range***|***list***|all} linecode {ami|b8zs}**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
linecode	Configure DS1 line coding. E1 circuits are fixed at hdb3 (High Density Bipolar 3).
ami	Alternate Mark Inversion
b8zs	Binary 8-Zero Substitution

Example: `ds1 10 linecode b8zs`

Set DS1 #10 for B8ZS line coding.

DS1 LOOPDETECT

Name: **DS1 Loopcode Detection**

Purpose: Configure low-speed channel for detection of bit pattern loopcodes.

Security: *rw* and above

Syntax: `ds1 {number|range|list|all} loopdetect {on|off|niu|cbit}`

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
loopdetect	Configure loopcode detection
on	Enable loopcode detection
off	Disable loopcode detection
niu	Enable NIU loopcode detection only – turns off C-bit detection
cbit	Enable C-bit loopcode detection only – turns off NIU detection

Example: `ds1 11 loopdetect on`

Set DS1 #11 to detect loopcodes.

DS1 METALLIC

Name: **DS1 Metallic Loopback**

Purpose: Configure metallic loopback toward low-speed side (see chapter 7). Metallic loopbacks can only be applied to a maximum of four DS1 channels, one per protection group.

Security: *rw* and above

Syntax: **`ds1 {`***`number`***`|`***`range`***`|`***`list`***`|all} metallic {on|off}`**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
metallic	Send metallic loopback toward low-speed side
on	Apply metallic loopback
off	Disable metallic loopback

Example: **`ds1 11 metallic on`**

Apply DS1 #11 metallic loopback.

DS1 MOVE

Name: **DS1 Move Channel**

Purpose: Move low-speed channel to home card or spare card. Moving a circuit home does not reset the revertive state (*REVERTIVE on* *page 8-67*).

Security: *rw* and above

Syntax: **`ds1 {`***`number`***`|`***`range`***`|`***`list`***`|all} move {home|spare}`**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
move	Move low-speed channel
home	Move channel to home card
spare	Move channel to spare card

Example: **`ds1 13 move spare`**

Move DS1 #13 from home card to spare card.

DS1 PM THRESHOLD

Name: **DS1 Performance Monitor Threshold**

Purpose: Set or show the threshold value for PM statistics. When the threshold is exceeded, the Wide Bank will log a CLI event and send an automatic TL1 message. The performance threshold function complies with Telcordia GR-820-CORE.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: **ds1 {***number***|***range***|***list***} pm threshold [***interval error value***]**

Field	Description
pm threshold	Use the command by itself to show the current setting
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
interval	Specify measurement time interval (see Interval table below)
error	Specify error type (see Error table below)
value	An integer value specifying the threshold error count for the measurement interval. Set to zero to disable threshold crossing alerts.

Interval	Description
min15	15 minutes
hour	One hour
day	One day

Error	Description
cvl	Code Violations - Line. The total number of line code violations that have been detected during the measurement interval. A CVL is the occurrence of a Bipolar Violation (BPV).
esl	Errored Seconds - Line. The number of one-second intervals containing one or more CVLs or one or more Loss of Signal (LOS) defects.

Example: **ds1 5 pm threshold**

The following message shows the default values defined in GR-820-CORE.

```
- DS1 5
  Performance Thresholds:          15 min.      1 hour       1 day
                                  --------     --------     --------
  coding violations - line:         13340        40020       133400
  errored seconds - line:              65          195          648
```

Example: **`ds1 1-4 pm threshold min15 cvl 32`**

Set DS1 circuits 1 to 4 for PM threshold CVLs to 32 for each 15-minute report interval.

DS1 PROTECT

Name: **DS1 Protection**

Purpose: Configure automatic low-speed electronics protection. The default is on.

Security: *rw* and above

Syntax: **`ds1 protect [on|off]`**

Field	Description
protect	Use the command by itself to show the current setting
on	Enable low-speed electronics protection. This is the default.
off	Disable low-speed electronics protection.

Example: **`ds1 protect on`**

Enable DS1 Electronics Protection.

DS1 SEND

Name: **DS1 Send Code**

Purpose: Configure low-speed circuit to send a code. This command permits a variety of bit pattern codes to be sent toward the low-speed or network side. Each low-speed channel includes a $2^{15}-1$ pseudo-random bit sequence (PRBS) code generator and detector (see chapter 7).

Note: Because the codes are unframed, external test equipment may indicate a loss of framing.

Security: *rw* and above

Syntax: **`ds1 {`***`number`***`|`***`range`***`|`***`list`***`|all} send`** *`setting`*

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
send	Send a code pattern (see settings below)

Setting	Description
off	Send no code or stop sending code
ais	Send alarm indication signal (AIS) toward the low-speed side
cbit loopdown	Send C-bit loopdown request toward the far-end low-speed circuits on the DS3 network side using DS3 C-bit FEAC code words. DS3 C-bit parity framing mode only
cbit loopup	Send C-bit loopup request toward the far-end low-speed circuits on the DS3 network side using DS3 C-bit FEAC code words. DS3 C-bit parity framing mode only.
csu loopdown drop	Send CSU loopdown code (100) toward the low-speed side and wait for acknowledge
csu loopdown network	Send a CSU loopdown code (100) over DS3 toward the far-end low-speed circuit
csu loopup drop	Send CSU loopup code (10000) toward the low-speed side and wait for acknowledge
csu loopup network	Send CSU loopup code (10000) over DS3 toward the far-end low-speed circuit
niu loopdown drop	Send NIU loopdown code request toward DS1 drop side
niu loopdown netowrk	Send NIU loopdown code request over DS3 toward DS1 NIU at remote end
niu loopup drop	Send NIU loopup code request toward DS1 drop side
niu loopup network	Send NIU loopup code request over DS3 toward DS1 NIU at remote end
prbs drop	Send unframed PRBS code toward the low-speed side. The manager monitors the low-speed receive to detect PRBS errors and will display the error count, error rate, and synchronization state (sync/no sync).
prbs network	Send unframed PRBS code toward the network side.
prbs test drop	Perform Automated PRBS Test of DS1 drop side. The Wide Bank will send an unframed PRBS code for 10 seconds and then display the test result.

Example: **`ds1 5 send csu loopup drop`**

Send DS1 #5 CSU loopup code toward low-speed drop side.

DS3

Name: **DS3 Interface**

Purpose: Show the DS3 interface settings.

Security: _ro_ and above

Syntax: **`ds3`**

Example: **`ds3`**

```
- DS3
    ds3    circuitid "DS3"
    ds3        clock int
    ds3  clockrevert on
    ds3  equipmentid "DS3 Equip."
    ds3    equipment off
    ds3   facilityid "DS3 Path"
    ds3      frameid "Frame"
    ds3      framing cbit
    ds3    gennumber "DS3 Test Generator"
    ds3       length short
    ds3         line off
    ds3   locationid "DS3 Loc."
    ds3   loopdetect off
    ds3      payload off
    ds3   portnumber "DS3 Idle Port"
    ds3         send off
    ds3    threshold off
    ds3         unit "000000"
    Performance Thresholds:         15 min.      1 hour       1 day
                                   --------     --------     --------
    coding violations - line:             0            0            0
    errored seconds - line:               0            0            0
    coding viols-path p-bit:              0            0            0
    err seconds - path p-bit:             0            0            0
    loss of signal secs - line:           0            0            0
    sev err seconds - line:               0            0            0
    sev err sec - path cp-bit:            0            0            0
```

DS3 CIRCUITID

Name: **DS3 Circuit Identification**

Purpose: Set the DS3 circuit identification string, which is used for SNMP display only.

Security: *rw* and above

Syntax: `ds3 circuitid {"string"}`

Field	Description
circuitid	DS3 circuit ID
"*string*"	Alphanumeric string providing transmission vendor's identification

Example: `ds3 circuitid "MULTIPLEXER-1"`

DS3 CLOCK

Name: **DS3 Clock Source**

Purpose: Set or show the DS3 transmit primary clock source.

CAUTION! IT IS STRONGLY RECOMMENDED THAT THE DS3 CLOCK SOURCE BE SET TO "INTERNAL" TIMING. THE WIDE BANK 28 DS3 IS AN ASYNCHRONOUS MULTIPLEXER. ASYNCHRONOUS COMMUNICATIONS DO NOT REQUIRE A COMMON CLOCK BETWEEN THE COMMUNICATING DEVICES. CHANGING THE CLOCK SOURCE TO "LINE" CAN DISRUPT SERVICE AND CAUSE DS1 TIMING SLIPS.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: `ds3 clock [clear|ext|int|line]`

Field	Description
ds3 clock	Show DS3 transmit clock source
clock	DS3 transmit clock source
clear	Clear a forced reference switch
ext	Use external BNC input (44.736 Mbps)
int	Use internal Stratum 4E clock oscillator
line	Recover clock from DS3 receive signal

Example: `ds3 clock int`

Set DS3 transmit clock source to use internal oscillator.

DS3 CLOCKREVERT

Name: **DS3 Clock Revertive Switching**

Purpose: Set or show the DS3 clock revertive switch setting. When turned on, the transmit clock will revert to the original clock source when it is considered to be healthy again.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: **`ds3 clockrevert [off|on]`**

Field	Description
ds3 clockrevert	Show DS3 clock revert setting
clockrevert	DS3 clock revert setting
off	Turn off revertive clock switching
on	Turn on revertive clock switching

Example: **`ds3 clockrevert on`**

DS3 EQUIPMENT

Name: **DS3 Equipment Loopback**

Purpose: Set the DS3 equipment loopback (see chapter 7).

Security: *rw* and above

Syntax: **`ds3 equipment {off|on}`**

Field	Description
on	Send DS3 equipment loopback toward the low-speed side
off	Disable DS3 equipment loopback

Example: **`ds3 equipment on`**

DS3 EQUIPMENTID

Name: **DS3 Equipment Identification**

Purpose: Set the DS3 Equipment Identification code to be sent on the C-bit parity link to the far end.

Security: *rw* and above

Syntax: `ds3 equipmentid {"`*`string`*`"}`

Field	Description
equipmentid	DS3 equipment ID
"*string*"	Alphanumeric string providing Equipment ID code

Example: `ds3 equipmentid "MUX3A"`

DS3 FACILITYID

Name: **DS3 Facility Identification**

Purpose: Set the DS3 Facility Identification code to be sent on the C-bit parity link to the far end.

Security: *rw* and above

Syntax: `ds3 facilityid {"`*`string`*`"}`

Field	Description
facilityid	DS3 facility ID
"*string*"	Alphanumeric string providing Facility ID code

Example: `ds3 equipmentid "MUX3A"`

DS3 FRAMEID

Name: **DS3 Frame Identification**

Purpose: Set the DS3 Frame Identification code to be sent on the C-bit parity link to the far end.

Security: *rw* and above

Syntax: `ds3 frameid {"`*`string`*`"}`

Field	Description
frameid	DS3 frame ID
"*string*"	Alphanumeric string providing Frame ID code

Example: `ds3 frameid "MUX3A"`

DS3 FRAMING

Name: **DS3 Framing**

Purpose: Set the DS3 interface framing.

Security: *rw* and above

Syntax: `ds3 framing {m23|cbit}`

Field	Description
framing	DS3 framing
m23	Set to M23 framing
cbit	Set to C-bit parity framing

Example: `ds3 framing cbit`

DS3 GENNUMBER

Name: **DS3 Generator Number**

Purpose: Set the DS3 Test Generator Number or Name to be sent on the C-bit parity link to the far end.

Security: *rw* and above

Syntax: `ds3 gennumber {"string"}`

Field	Description
gennumber	DS3 test generator number or name
"*string*"	Alphanumeric string providing Test Generator Number or Name

Example: `ds3 gennumber "MUX3A"`

DS3 LENGTH

Name: **DS3 Length for Line Buildout**

Purpose: Set the DS3 line buildout (LBO).

Security: *rw* and above

Syntax: `ds3 length {long|short}`

Field	Description
length	DS3 line buildout
long	50 feet or more
short	Less than 50 feet (default)

Example: `ds3 length long`

DS3 LINE

Name: **DS3 Line Loopback**

Purpose: Set the DS3 line loopback toward the DS3 interface (see chapter 7).

Security: *rw* and above

Syntax: `ds3 line {on|off}`

Field	Description
line	DS3 line loopback
on	Apply line loopback toward DS3 interface
off	Disable line loopback

Example: `ds3 line on`

DS3 LOCATIONID

Name: **DS3 Location Identification**

Purpose: Set the DS3 Location Identification code to be sent on the C-bit parity link to the far end.

Security: *rw* and above

Syntax: `ds3 locationid {"string"}`

Field	Description
locationid	DS3 location ID
"*string*"	Alphanumeric string providing DS3 Location ID

Example: `ds3 locationid "Denver"`

DS3 LOOPDETECT

Name: **DS3 Loopcode Detection**

Purpose: Set the DS3 interface setting for detection of loopcodes.

Security: *rw* and above

Syntax: `ds3 loopdetect {on|off}`

Field	Description
loopdetect	DS3 loopcode detection
on	Enable loopcode detection
off	Disable loopcode detection (default)

Example: `ds3 loopdetect on`

DS3 PAYLOAD

Name: **DS3 Payload Loopback**

Purpose: Set the DS3 interface setting for payload loopback toward the DS3 interface.

Security: *rw* and above

Syntax: `ds3 payload {on|off}`

Field	Description
payload	DS3 payload loopback
on	Enable payload loopback toward DS3 interface
off	Disable payload loopback (default)

Example: `ds3 payload on`

DS3 PM THRESHOLD

Name: **DS3 Performance Monitor Threshold**

Purpose: Set or show the threshold value for PM statistics. When the threshold is exceeded, the Wide Bank will log a CLI event and send an automatic TL1 message. The performance threshold function complies with Telcordia GR-820-CORE.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: `ds3 pm threshold [interval error value]`

Field	Description
ds3 pm threshold	Use the command by itself to show the current setting
interval	Specify measurement time interval (see intervals below)
error	Specify error type (see errors below)
value	An integer value specifying the threshold error count for the measurement interval. Set to zero to disable threshold crossing alerts. Maximum values for error-seconds are: 900 per 15-minute interval 3,600 per hour interval 86,400 per day interval Maximum values (register size) for cvl and cvp_p errors are: 2,147,483,647

Interval	Description
min15	15 minutes
hour	One hour
day	One day

Error	Description
cvl	Code Violations - Line. The total number of line code violations that have been detected during the measurement interval. A CVL is the occurrence of a Bipolar Violation (BPV) OR Excessive Zeros (EXZ). BPVs that are part of the zero substitution code are excluded.
esl	Errored Seconds - Line. The number of one-second intervals containing one or more CVLs OR one or more Loss of Signal (LOS) defects detected during the measurement interval. An ESL is the occurrence of one or more Bipolar Violations (BPVs), one or more Excessive Zeros (EXZs), or one or more Loss of Signal (LOS) defects.

Error	Description
cvp_p	Code Violations - Path P-bit. The definition of CVP-P depends on the particular DS3 application: • For M23 applications, CVP-P is the number of P-bit parity check Code Violations (CVs). The receipt of non-identical P-bits corresponding to the same DS3 M-Frame also constitutes a parity check CV. • For C-bit applications, both CP-bit parity Code Violations (CVCP-P) counts and CVP-P counts are defined and may be supported because they can convey different information.
esp_p	Errored Seconds - Path P-bit. The definition of CVP-P depends on the particular DS3 application: • For M23 applications, ESP-P is the number of one-second intervals containing one or more P-bit parity errors, one or more Severely Errored Frames (SEFs), or one or more AIS defects. • For C-bit Parity applications, SSP-P is the number of one-second intervals containing one or more ESP-P errors or ESCP-P errors. ESCP-P is the number of seconds containing one or more CP-bit parity violations, one or more Severely Errored Frames (ESFs), or one or more AIS defects.
loss_l	Loss of Signal Seconds - Line. The number of one-second intervals containing one or more Loss of Signal (LOS) defects.
sesl	Severely Errored Seconds - Line. The number of one-second intervals in which Bipolar Violations (BPVs) plus Excessive Zeros (EXZs), or one or more Loss of Signal (LOS) defects occur.
sescp_p	Severely Errored Seconds - Path CP-bit. The number of one-second intervals containing 44 or more C-bit Coding Violations (CCVs) OR one or more Out of Frame defects OR a detected incoming AIS. This count is only for the SYNTRAN and C-bit Parity DS3 applications.

Example: `ds3 pm threshold`

The following message shows the default values defined in GR-820-CORE.

```
Performance Thresholds:         15 min.      1 hour       1 day
                               --------     --------     --------

coding violations - line:           387         1161         3865
errored seconds - line:              25           75          250
coding viols-path p-bit:            382         1146         3820
err seconds - path p-bit:            25           75          250
loss of signal secs - line:           4           12           40
sev err seconds - line:               4           12           40
sev err sec - path cp-bit:            4           12           40
```

Example: `ds3 pm threshold min15 cvl 32`

Set PM threshold for CVLs to 32 for each 15-minute report interval.

DS3 PORTNUMBER

Name: **DS3 Port Number**

Purpose: Set the DS3 Port Number to be sent on the C-bit parity link to the far end.

Security: *rw* and above

Syntax: `ds3 portnumber {"string"}`

Field	Description
portnumber	DS3 port number
"*string*"	Alphanumeric string providing DS3 port number

Example: `ds3 portnumber "25"`

DS3 PROTECT

Name: **DS3 Network Protection**

Purpose: Configure DS3 network protection when using two DS3 lines. When DS3 protection is enabled, the Wide Bank will switch to the standby Controller if the DS3 interface on the active Controller has an alarm condition. The Wide Bank will not revert back to the active Controller unless revertive switching is enabled (see *REVERTIVE on page 8-67*).

Security: *rw* and above

Syntax: `ds3 protect [off|on]`

Field	Description
protect	DS3 network protection
off	Disable network protection (default). This setting will provide electronics-only protection if there are two Controllers and only one DS3 line.
on	Enable network protection when there are two DS3 lines

Example: `ds3 protect on`

DS3 SEND

Name: **DS3 Send Code**

Purpose: Configure DS3 interface to send a code toward the network. This command permits a variety of bit pattern codes to be sent toward the low-speed or network side. Each low-speed channel includes a pseudo-random bit sequence (PRBS) code generator and detector (see chapter 7).

Note: Because the codes are unframed, external test equipment may indicate a loss of framing.

Note: When *ds3 protect* is turned on, this command will transmit codes over both primary and secondary DS3s.

Security: *rw* and above

Syntax: `ds3 send {off|ais|idle|loopup|loopdown|prbs}`

Field	Description
send	DS3 send code setting
off	Send no code or stop sending code
ais	Send alarm indication signal (AIS) toward the DS3 network
idle	Send IDLE code to far-end DS3
loopup	Send the code to loop up the far end DS3 (C-bit framing only)
loopdown	Send the code to loop down the far end DS3 (C-bit framing only)
prbs	Send unframed PRBS code toward the DS3 network

Example: `ds3 send idle`

DS3 THRESHOLD

Name: **DS3 Threshold**

Purpose: Specify the bit error rate that, when exceeded, triggers a protection switch to the standby DS3 Controller card. The bit error rate (BER) is specified as a power of 10, as in 10^{-n} where n=4, 5, 6, 7, or 8.

Security: *rw* and above

Syntax: `ds3 threshold {4|5|6|7|8}`

Field	Description
threshold	DS3 Bit Error Rate threshold
4	BER > $1x10^{-4}$. Maximum detection time = 100 ms
5	BER > $1x10^{-5}$. Maximum detection time = 1 second
6	BER > $1x10^{-6}$. Maximum detection time = 10 seconds
7	BER > $1x10^{-7}$. Maximum detection time = 100 seconds
8	BER > $1x10^{-8}$. Maximum detection time = 1000 seconds

Example: `ds3 threshold 5`

DS3 UNIT

Name: **DS3 Unit Code**

Purpose: Set the DS3 Unit code to be sent on the C-bit parity link to the far end.

Security: *rw* and above

Syntax: `ds3 unit {"string"}`

Field	Description
unit	DS3 unit code
"*string*"	Alphanumeric string providing DS3 Unit code

Example: `ds3 unit "27"`

EQUIPMENT

Name: **Equipment Configuration**

Purpose: Display list showing what hardware and software is present and what redundant electronics exist.

Security: *ro* and above

Syntax: `equipment`

Message:

```
Equipment           Status
---------           ------
DS3 Controller A    Active
DS3 Controller B    Card not present
DS1 Card 1          Active
DS1 Card 2          Active
DS1 Card 3          Active
DS1 Card 4          Active
DS1 Card 5          Active
DS1 Card 6          Active
DS1 Card 7          Active
DS1 Spare Card      Active
```

Equipment	Status	Description
DS3 Controller A/B	**Active**	Controller card is installed and in active mode (DS3 circuit is active)
	Standby	Controller is installed and in standby mode
	Not Present	Controller is not installed
	Not Ready	Controller is present but is not communicating with the active card for unknown reasons
	Fail	Controller hardware failure
DS1/E1 Card	**Active**	DS1/E1 card is installed and active but individual DS1/E1 circuits may have failed and be on Spare card
	Not Present	DS1/E1 card is not installed
	MSO Active	DS1/E1 MSO card (relay and electronics) is installed and active but individual DS1/E1 circuits may have failed and be on Spare card
	MSO Relay Only Active on Spare	DS1/E1 MSO relay card is installed but electronics card is missing. Circuits have been switched to Spare card.
	MSO Relay Only Not Active	DS1/E1 MSO relay card is installed but electronics card is missing. Circuits have been switched to Spare card.
	MSO Relay Only Conflict On Spare	DS1/E1 MSO relay card is installed but electronics card is missing. Multiple MSO card removals prevent switching circuits to Spare.
	MSO Relay Only Spare Not Present	DS1/E1 MSO relay card is installed but electronics card is missing. Circuits cannot be switched because Spare card is not installed.
	Wrong Card for Mode	System mode is set to DS1 when E1 card is installed, or vice versa. Status applies to both MSO and non-MSO card types.

Equipment	Status	Description
DS1/E1 Card Spare	**Active**	DS1/E1 card is installed and active, bu individual DS1/E1 circuits may have failed
	Not Present	DS1/E1 card is not installed
	MSO Active	DS1/E1 MSO card (relay and electronics) is installed and active but individual DS1/E1 circuits may have failed
	MSO Relay Only Spare Not Present	DS1/E1 MSO relay card is installed but electronics card is missing. Circuits cannot be switched without spare electronics.
	Conflict	Multiple MSO card removals prevent switching circuits to Spare
	Wrong Card for Mode	System mode is set to DS1 when E1 card is installed, or vice versa. Status applies to both MSO and non-MSO card types.

EXIT

Name: **Exit Session**

Purpose: End the current session. The current user is logged out of the CLI. If security is on, a user name (and password, if applicable) is required to log in again.

Security: *ro* and above

Syntax: `exit`

Example: `exit`

End the current session and log off from CLI.

FFO PRESENT

Name: **Fan Faceplate Option Present**

Purpose: Specify whether an alarm will be generated if the fan faceplate is not present or is removed. The default is off.

Note: When an FFO-capable Controller is powered up or a fan faceplate is removed and then reinstalled, the Controller will detect the fan faceplate and set ffo present on.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: `ffo present [on|off]`

Field	Description
ffo present	Use the command by itself to show the current setting
present	Configure FFO alarm response
on	Enable FFO alarm if fan faceplate is not present of is removed
off	Disable FFO alarm (default)

Example: `ffo present on`

HELP, ?

Name: Help

Purpose: Use this command to display a list of available commands. There are two levels of help provided by typing **?** or **help**. The information displayed depends on the user security level.

Security: *ro* and above

Syntax: `[command name] {?|help}`

Field	Description
command name	Type the command name for which you want to obtain help
?	Displays the command and a list of its first level of parameters
help	Displays the command and all its parameters if there is more than one level of options

Example: `help`

```
? .................... For partial command help, type ? after
                       entering any partial command in question
help ................. For full command help, type "help" after
                       entering any partial command in question
```

Example: `ip help`

```
ip ............................. Set/Display IP Addresses xxx.xxx.xxx.xxx
    address ipaddr ............. Set IP Address
    mask    ipaddr ............. Set Subnet Mask
    gateway ipaddr ............. Set IP Address of Gateway
    nms1    ipaddr ............. Set IP Address of NMS1 (trap)
    nms2    ipaddr ............. Set IP Address of NMS2 (trap)
    nms3    ipaddr ............. Set IP Address of NMS3 (trap)
    ppp     ipaddr ............. Set IP Address of Other End of PPP Link
    route ...................... Set Route for Outbound IP Traffic
        ethernet ............... Ethernet
        ppp .................... PPP over DS3 Path Maintenance Data Link
```

HOUR

Name: **Hour Performance Report**

Purpose: Show the one-hour performance report for an interface. The performance statistics displayed conform to SNMP MIBs 1406 and 1407 reporting requirements.

For 24-hour statistics, see *DAY on page 8-19*.

Security: *ro* and above

Syntax: **`hour {ds1`** *`number`***`|ds3|ds3far}`**

Field	Description
ds1 *number*	Display performance for a DS1, where *number* = 1 to 28
ds3	Display performance for the DS3 interface
ds3far	Display performance for far-end DS3 (valid only with C-bit framing)

Example: **`hour ds1 5`**

```
       15-Minute Interval Statistics for DS1 1  at 06:08:23 05/09/2001

STATISTIC \ INTERVAL   Current         1         2         3         4      Hour
--------------------- --------- --------- --------- --------- --------- ---------
Unavailable Sec             0         0         -         -         -         0
Sev Errored Sec             0         0         -         -         -         0
Errored Sec                 0         3         -         -         -         3
Loss of Signal Sec          0         0         -         -         -         0
Line Errored Sec            0         3         -         -         -         3
Controlled Slip Sec         0         0         -         -         -         0
Degraded Min                0         0         -         -         -         0
Protected Sec               0         0         -         -         -         0
Loopback Sec                0         0         -         -         -         0
PRBS Sync Sec               0         2         -         -         -         2
Protected Cnt               0         0         -         -         -         0
LCV Error Cnt               0       371         -         -         -       371
PRBS Error Cnt              0        66         -         -         -        66

Elapsed Sec            175         LCV Error Rate                     0
Valid Intervals          1         PRBS Error Rate             No Sync.
```

Example: **`hour ds3far`**

```
   15-Minute Interval Statistics for Far-end DS3 at 06:09:47 05/09/2001

STATISTIC \ INTERVAL   Current         1         2         3         4      Hour
--------------------- --------- --------- --------- --------- --------- ---------
FE Unavailable Sec          0         0         0         0         0         0
FE C-bit Sev Err Sec        0         0         0         0         0         0
FE C-bit Errored Sec        0         0         0         0         0         0
FE C-Parity Err Cnt         0         0         0         0         0         0
```

```
Elapsed Sec              N/A         LCV Error Rate                  N/A
Valid Intervals          N/A         P-Parity Error Rate             N/A
FE Elapsed Sec           587         C-Parity Error Rate             N/A
FE Valid Intervals        96         FE C-Parity Err Rate              0
```

IP

Name: **IP Configuration**

Purpose: Configure the IP address, gateway, mask, and trap receiver addresses.

Security: Set - *rw* and above with basic security; *secu* with Security Upgrade
Show - *ro* and above

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: **ip [address|mask|gateway|nms1|nms2|nms3|**
ppp *ipaddr***|route {ethernet|ppp** *addr***}]**

Field	Description
ip	Use the command by itself to see current settings
address	Set Wide Bank primary Controller address
mask	Set subnet mask for LAN
gateway	Set IP address for the LAN gateway
nms1	Set Network Management System (NMS) #1 to receive SNMP Trap notifications
nms2	Set NMS #2 to receive SNMP Trap notifications
nms3	Set NMS #3 to receive SNMP Trap notifications
ppp	Set IP address or route to other end of PPP link
ipaddr	IP address in the form xxx.xxx.xxx.xxx, where xxx is a number from 0 to 255
route	Configure route for outbound IP traffic via Ethernet or PPP
ethernet	Send outbound packets to the Ethernet port, except those destined for the PPP link (based on value of “ip ppp ipadress”
ppp	Send outbound packets to the C-bit PPP link using DS3 Path Maintenance Data Link
addr	PPP address in the form xxx.xxx.xxx.xxx, where xxx is a number from 0 to 255

Example: **`ip`**

```
ip    address 192.168.3.161
ip       mask 255.255.255.0
ip    gateway 192.168.3.202
ip       nms1 192.168.3.233
ip       nms2
ip       nms3
```

Example: **`ip address 192.168.90.2`**

```
Modifying IP address will affect ability to remotely manage this unit.
The IP address for remote management will be 192.168.90.2
Do you want to update the IP address now (y/n)?
```

Set IP address of Wide Bank primary Controller.

Example: **`ip mask 255.255.255.0`**

Set subnet mask.

Example: **`ip nms1 192.168.95.17`**

Set NMS2 IP address for reporting traps.

Example: **`ip route ppp 192.168.90.40`**

Set route for outbound packets over C-bit PPP link.

LOAD

Name: **Load Software**

Purpose: Initiate a download of Wide Bank software from a management PC or a network TFTP server to the Wide Bank. See *Downloading New Software on* *page 6-23* for the downloading procedure.

Security: *rw* and above

Syntax: **`load {xmodem|tftp`** *`ipaddress`* `"`*`filename`*`"`**`}`**

Field	Description
xmodem	Download software via XModem
tftp	Download software via TFTP
ipaddress	Host IP address of TFTP server, in the form xxx.xxx.xxx.xxx, where xxx is a number from 0 to 255.
"*filename*"	Set Network Management System (NMS) #1 to receive SNMP Trap notifications

Example: `load xmodem`

Initiates a download from a terminal emulation program using Xmodem protocol. The file name is entered in the terminal emulation program.

Example: `load tftp 192.168.2.90 "c:\directory\filename"`

Initiates a download from a TFTP server on the LAN. The path and file name must be enclosed in quotes.

LOG

Name: **Log**

Purpose: Show event history.

Security: *ro* and above

Syntax: `log`

```
Index  Time     Date          Alarm
-----  ----     ----          ---------------------------------
    9  01:00:30 01/01/97      Self Test Pass
    8  01:00:02 01/01/97      DS3 Test Pass
    7  01:00:00 01/01/97      Power on
    6  01:01:45 01/01/97      Log out
    5  01:00:35 01/01/97      Log in
    4  01:00:29 01/01/97      Self Test Pass
    3  01:00:03 01/01/97      DS3 Test Pass
    2  01:00:00 01/01/97      Default Configuration Installed
    1  01:00:00 01/01/97      Power on
```

LS

Name: **LS Configuration Settings**

Purpose: Show the DS1 or E1 low-speed interface settings. The command followed by the interface number displays the current configuration. The command, with a move option, gives control of a low-speed interface to a spare circuit for maintenance or when a low-speed card is to be removed.

Note: When the LSMODE is set to DS1, you must use the *DS1* commands. When the LSMODE is set to either DS1LS or E1LS, you must use the *LS* commands. The *LS* command operates just like the *DS1* command, except that the responses are specific to the DS1 or E1 interface type. In the DS1LS mode, the low-speed references in command responses are the same as for the DS1 mode. In E1LS mode, the low-speed references in command responses are for E1 (each E1 card has only three active circuits; the fourth, unused, circuit on an E1 card is called CIR). See *LSMODE on page 8-58* and *DS1 on page 8-21*.

Security: *ro* and above

Syntax: **ls {***number***|***range***|***list***|all}**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces

Example: **ls 5**

```
- LS Circuit 5
    ds1 5   circuitid "DS1 5"
    ds1 5      enable
    ds1 5   equipment off
    ds1 5      length dsx0
    ds1 5        line off
    ds1 5    linecode b8zs
    ds1 5  loopdetect off
    ds1 5    metallic off
    ds1 5        send off
    Performance Thresholds:         15 min.      1 hour       1 day
                                   --------     --------     --------
    coding violations - line:             0            0            0
    errored seconds - line:               0            0            0
```

Example: **ls all**

Display configuration settings for all low-speed interfaces.

LS AINS

Name: **LS Automatic In-Service Detection**

Purpose: Set low-speed alarm mode for automatic detection of new service connections. This command allows service providers to configure low-speed drops before connections or facilities are available. When automatic in-service detection is enabled, a disabled low-speed channel can be enabled (set in service) while a Loss of Signal (LOS) condition is present, and the Wide Bank will inhibit LOS alarm reporting for that channel until a new service connection has been established for the specified delay time.

Note: Following a DC power interruption, the LOS inhibit will be disabled on all channels, causing an LOS alarm on any DS1 or E1 that is enabled but not in service.

Note: A channel's LOS inhibit will also be disabled immediately if any of the following events occur:
• the channel is disabled (set out of service)
• a hardware failure occurs on the channel
• a metallic loopback is run on the channel
• the channel is manually moved to a spare
• the channel's card is removed.

However, if a channel is disabled and then re-enabled while an LOS condition is present, the automatic in-service detection will again inhibit the LOS alarm.

Auto in-service detection is applied on a channel-by-channel basis. If service is discontinued on a channel, automatic in-service detection can be reapplied to that channel by placing it out of service and then back in service (see *LS ENABLE/DISABLE on page 8-53*).

To quickly provision automatic in-service detection when turning up a new Wide Bank, first turn on automatic in-service detection and then place all DS1s or E1s out of service and then back in service.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: `ls ains [on|off|delay time]`

Setting	Description
ls auto/in service	Use the command by itself to show the current setting
on	Enables automatic detection of new low-speed service on channels that are subsequently enabled, and inhibits LOS alarms until a new service has been connected for at least 2 minutes
off	Disables automatic in-service detection and allows LOS alarms on all low-speed channels

Example: `ls ains on`

Enable automatic in-service detection of all low-speed channels that are subsequently enabled.

Example: `ls ains delay 12`

Set automatic in-service delay to 12 hours.

LS CIRCUITID

Name: **LS Circuit Identifier**

Purpose: Set the low-speed circuit identification string (transmission vendor's identification), which is used for SNMP display only.

Security: *rw* and above

Syntax: `ls {number|range|list|all} circuitid {"string"}`

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
circuitid	Set low-speed circuit identification string
"string"	Alphanumeric string enclosed in quotes, as per RFC 1406 requirement for SNMP MIBs

Example: `ls 1 circuitid "MUX2-1"`

Set LS #1 circuit identifier.

LS ENABLE/DISABLE

CAUTION! **DISABLING AN INTERFACE WILL DISRUPT SERVICE.**

Name: **LS Interface Enable/Disable**

Purpose: Activate or deactivate a low-speed interface (normally used for SNMP managed systems.

Security: *rw* and above

Syntax: `ls {number|range|list|all} {enable|disable}`

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
enable	Activate low-speed interface
disable	Deactivate low-speed interface

Example: `ls 8 disable`

Disable DS1 #8.

LS EQUIPMENT

Name: **LS Equipment Loopback**

Purpose: Set equipment loopback toward low-speed side (see chapter 7).

Security: *rw* and above

Syntax: `ls {number|range|list|all} equipment {on|off}`

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
equipment	Send equipment loopback toward low-speed side
on	Apply equipment loopback
off	Remove equipment loopback

Example: `ls 2 equipment on`

Apply LS #2 equipment loopback.

LS LENGTH

Name: **LS Length for Line Buildout**

Purpose: Set the DS1 line buildout (LBO) based on line length required for making cable connections to DSX-1 crossconnect equipment. Not available for E1 circuits.

Security: *rw* and above

Syntax: **`ls {`***`number`***`|`***`range`***`|`***`list`***`|all} length {dsx0|dsx110|dsx220|dsx330|dsx440|dsx550}`**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
length	equipment loopback toward low-speed side
dsx0	Set for 0 to 110 feet
dsx110	Set for 110 to 220 feet
dsx220	Set for 220 to 330 feet
dsx330	Set for 330 to 440 feet
dsx440	Set for 440 to 550 feet
dsx550	Set for 550 to 660 feet

Example: **`ls 5-8 length dsx220`**

Set LS #5 through #8 for line buildout of 330 to 440 feet.

LS LINE

Name: **LS Line Loopback**

Purpose: Configure line loopback toward low-speed side (see chapter 7).

Security: *rw* and above

Syntax: `ls {number|range|list|all} line {on|off}`

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
line	Send line loopback toward low-speed side
on	Apply line loopback
off	Remove line loopback

Example: `ls 9 line on`

Apply LS #9 line loopback.

LS LINECODE

Name: **LS Line Coding**

Purpose: Set line coding for low-speed circuits. DS1 circuits use AMI or B8ZS. E1 circuits are fixed at HDB3.

Security: *rw* and above

Syntax: `ls {number|range|list|all} linecode {ami|b8zs}`

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
linecode	Configure DS1 line coding. E1 circuits are fixed at hdb3 (High Density Bipolar 3).
ami	Alternate Mark Inversion
b8zs	Binary 8-Zero Substitution

Example: `ls 10 linecode b8zs`

Set LS #10 for B8ZS line coding.

LS LOOPDETECT

Name: **LS Loopcode Detection**

Purpose: Configure low-speed channel for detection of bit pattern loopcodes.

Security: *rw* and above

Syntax: **ls {***number***|***range***|***list***|all} loopdetect {on|off|niu|cbit}**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
loopdetect	Configure loopcode detection
on	Enable loopcode detection
off	Disable loopcode detection
niu	Enable NIU loopcode detection only – turns off C-bit detection
cbit	Enable C-bit loopcode detection only – turns off NIU detection

Example: `ls 11 loopdetect on`

Set LS #11 to detect loopcodes.

LS METALLIC

Name: **LS Metallic Loopback**

Purpose: Configure metallic loopback toward low-speed side (see chapter 7). Metallic loopbacks can only be applied to a maximum of four LS channels, one per protection group.

Security: *rw* and above

Syntax: **ls {***number***|***range***|***list***|all} metallic {on|off}**

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
metallic	Send metallic loopback toward low-speed side
on	Apply metallic loopback
off	Disable metallic loopback

Example: `ls 11 metallic on`

Apply LS #11 metallic loopback.

LSMODE

Name: Low-Speed Mode

Purpose: Set the low-speed mode on the Wide Bank 28 DS3. The CLI will behave accordingly, regardless of the type of low-speed circuits present in your Wide Bank. This command allows you to configure CLI operation to respond to legacy DS1 commands or to new low-speed (LS) commands for DS1 or E1 circuit configurations. When the LSMODE is set to DS1, you must use the *DS1* commands.

Note: When the LSMODE is set to DS1, you must use the *DS1* commands. When the LSMODE is set to either DS1LS or E1LS, you must use the *LS* commands. The *LS* command operates just like the *DS1* command, except that the responses are specific to the DS1 or E1 interface type. In the DS1LS mode, the low-speed references in command responses are the same as for the DS1 mode. In E1LS mode, the low-speed references in command responses are for E1 (each E1 card has only three active circuits; the fourth, unused, circuit on an E1 card is called CIR). See *DS1 on page 8-21* and *LS on page 8-50*.

Security: *rw* and above

Syntax: `lsmode {ds1|ds1ls|e1ls}`

Field	Description
ds1	Set to DS1 mode using DS1 commands to configure the DS1 interfaces. This is the default mode and is compatible with legacy Wide Banks having only DS1 low-speed cards.
ds1ls	Set to DS1LS mode using LS commands to configure the DS1 interfaces
e1ls	Set to E1LS mode using LS commands to configure the E1 interfaces

Example: `lsmode ds1ls`

Set CLI to use LS commands to configure DS1 circuits.

Example: `lsmode ds1`

Set CLI to use legacy DS1 commands to configure DS1 circuits.

LS MOVE

Name: **LS Move Channel**

Purpose: Move low-speed channel to home card or spare card. Moving a circuit home does not reset the revertive state (*REVERTIVE on page 8-67*).

Security: *rw* and above

Syntax: `ls {number|range|list|all} move {home|spare}`

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
move	Move low-speed channel
home	Move channel to home card
spare	Move channel to spare card

Example: `ls 13 move spare`

Move LS #13 from home card to spare card.

LS PM THRESHOLD

Name: **LS Performance Monitor Threshold**

Purpose: Set or show the threshold value for PM statistics. When the threshold is exceeded, the Wide Bank will log a CLI event and send an automatic TL1 message. The performance threshold function complies with Telcordia GR-820-CORE.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: **`ls {`***`number|range|list`***`} pm threshold [`***`interval error value`***`]`**

Field	Description
ls pm threshold	Use the command by itself to show the current setting
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
interval	Specify measurement time interval (see Interval table below)
error	Specify error type (see Error table below)
value	An integer value specifying the threshold error count for the measurement interval. Set to zero to disable threshold crossing alerts.

Interval	Description
`min15`	15 minutes
`hour`	One hour
`day`	One day

Error	Description
cvl	Code Violations - Line. The total number of line code violations that have been detected during the measurement interval. A CVL is the occurrence of a Bipolar Violation (BPV).
`esl`	Errored Seconds - Line. The number of one-second intervals containing one or more CVLs or one or more Loss of Signal (LOS) defects.

Example: **`ls 5 pm threshold`**

The following message shows the default values defined in GR-820-CORE.

```
- LS Circuit 5
  Performance Thresholds:          15 min.      1 hour       1 day
                                  --------     --------     --------
  coding violations - line:         13340        40020       133400
  errored seconds - line:              65          195          648
```

Example: **`ds1 1-4 pm threshold min15 cvl 32`**

Set DS1 circuits 1 to 4 for PM threshold CVLs to 32 for each 15-minute report interval.

LS PROTECT

Name: **LS Protection**

Purpose: Configure automatic low-speed electronics protection.

Security: Set - *rw* and above
Show - *ro* and above

Syntax: `ls protect [on|off]`

Field	Description
ls protect	Use the command by itself to show the current setting.
protect	Set the electronics protection mode
on	Enable low-speed electronics protection. This is the default.
off	Disable low-speed electronics protection.

Example: `ls protect on`

Enables the DS1 Electronics Protection. This is the default.

LS SEND

Name: **LS Send Code**

Purpose: Configure low-speed circuit to send a code. This command permits a variety of bit pattern codes to be sent toward the low-speed or network side. Each low-speed channel includes a pseudo-random bit sequence (PRBS) code generator and detector. (see chapter 7).

Security: *rw* and above

Syntax: `ls {number|range|list|all} send {setting}`

Field	Description
number	Low-speed interface number, 1 to 28
range	A range of low-speed channels separated by a hyphen as in 5-8
list	A list of low-speed channels separated by commas as in 1,3,5,9
all	All low-speed interfaces
send	Send a code pattern (see settings in following table)

Setting	Description
off	Send no code or stop sending code
ais	Send alarm indication signal (AIS) toward the low-speed side
cbit loopup	Send C-bit loopup request toward the far-end low-speed circuits on the DS3 network side using DS3 C-bit FEAC code words. DS3 C-bit parity framing mode only.
cbit loopdown	Send C-bit loopdown request toward the far-end low-speed circuits on the DS3 network side using DS3 C-bit FEAC code words. DS3 C-bit parity framing mode only
cbit loopup drop	Send CSU loopup code (10000) toward the low-speed side and wait for acknowledge
csu loopup drop	Send CSU loopup code (10000) toward the low-speed side and wait for acknowledge
csu loopup network	Send a C-bit loopup code toward the far-end low-speed circuit on the DS3 csu network side. DS3 M23 framing mode only
csu loopdown drop	Send CSU loopdown code (100) toward the low-speed side and wait for acknowledge
csu loopdown network	Send a C-bit loopdown code toward the far-end low-speed circuit on the DS3 csu network side. DS3 M23 framing mode only
niu loopup	Send NIU loopup code request over DS3 toward DS1 NIU at remote end
niu loopdown	Send NIU loopdown code request over DS3 toward DS1 NIU at remote end
prbs drop	Send PRBS code toward the low-speed side. The manager monitors the low-speed receive to detect PRBS errors and will display the error count, error rate, and synchronization state (sync/no sync).
prbs network	Send PRBS code toward the network side
prbs test drop	Perform Automated PRBS Test of DS1 drop side. The Wide Bank will send PRBS for 10 seconds and then display the test result.

Example: `ls 5 send csu loopup drop`

Send ls #5 csu loopup code toward low-speed drop side.

PING

Name: **Ping**

Purpose: Use the Ping command (ICMP echo) to test whether or not the management node (or other host) on the network is responding.

Security: *ro* and above

Syntax: **`ping {`***`ipaddress`***`} [`***`number`***`] [`***`delay`***`]`**

Field	Description
ipaddress	IP address of the device to query.
number	The number of pings to send. If a number is not specified, the system will send one ping request.
delay	The delay between pings, 500 to 5000 ms. (optional)

Example: **`ping 172.26.100.25 3`**

Send three ping queries to a networked device with IP address of 172.26.100.25.

PROGRAM FLASH

Name: **Program Flash Memory**

Purpose: Program the flash memory with the software previously loaded into RAM by the LOAD command, if you did not choose to program the flash during the download process. See *LOAD on page 8-49*.

There are no options for this command. See *Downloading New Software on page 6-23* for more detail.

Security: *rw* and above with basic security; *admin* and above with Security Upgrade

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: **`program flash`**

RESTORE

Name: **Restore Configuration**

Purpose: Use this command to restore the factory default configuration, download a previously saved TFTP configuration, or retrieve the temp copy from RAM. See *SAVE on page 8-68* and *TEMP COPY on page 8-79*.

This command will not change the Wide Banks's IP address, user names, or passwords.

Security: *rw* and above with basic security; *secu* with Security Upgrade

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: `restore {defaults|temp copy|tftp ipaddr "filename"}`

Field	Description
defaults	Restore the factory defaults. See table below.
temp copy	Retrieve a temp copy from RAM (see *TEMP COPY on page 8-79*)
tftp	Retrieve a previously saved configuration file from a TFTP server (see *SAVE on page 8-68*)
ipaddr	IP address of TFTP server where file is located, in the format xxx.xxx.xxx.xxx where xxx is a number from 0 to 255
"filename"	File name including path. Must be enclosed in quotes.

Example: `restore tftp 192.128.17.10  "configuration"`

Restore the configuration file from TFTP server.

Example: `restore defaults`

Restore the factory default settings (see table below).

Parameter	Default	Comments
alarmout	no	normally open contacts
alarms protected ds3_selftest	minor	standby Controller fail
arm	on	
autocopy	on	
ds1 *n*	enable	*n* = 1 to 28
ds1 *n* circuitid	"DS1 *n*"	*n* = 1 to 28
ds1 *n* equipment	off	
ds1 *n* length	dsx0	
ds1 *n* line	off	
ds1 *n* linecode	b8zs	
ds1 *n* loopdetect	off	
ds1 *n* metallic	off	
ds1 *n* send	off	
ds1 ains	off	auto in-service detection
ds1 ains delay	2	hours
ds1 protection	on	
ds3 circuitid	"DS3"	

Parameter	Default	Comments
ds3 clock	int	
ds3 clockrevert	on	
ds3 equipment	off	
ds3 framing	m23	
ds3 length	short	
ds3 line	off	
ds3 loopdetect	off	
ds3 payload	off	
ds3 protection	off	
ds3 send	off	
ds3 threshold	off	
ffo present	off	When an FFO-capable Controller is powered up or a fan faceplate is removed and reinstalled, the Controller will detect the fan faceplate and set ffo present on.
ip address		none
ip gateway		none
ip mask		none
ip nms1		none
ip nms2		none
ip nms3		none
revertive ds1	off	
revertive ds3	on	
screen	24	
security		This setting is not changed by the *restore defaults* command.
snmp contact	"Contact"	
snmp getcomm	"public"	
snmp location	"Location"	
snmp name	"Name"	
snmp setcomm	"public"	
snmp trapcomm	"public"	

Parameter	Default	Comments
tl1 networkid	""	
tl1 password	""	
tl1 portnumber	9999	

RESULTS

Name: **Results of Test**

Purpose: Show the results from the last test performed on an interface. Tests are activated by the *test* command (see *TEST on page 8-79*).

This command is performed automatically when the test command executes. You can also use this command at any time to display the most recent results of a test. For example, if the unit was just powered up, the *test all* option will show the results of the power-on self-test.

Security: *ro* and above

Syntax: **results {all|ds1 [***number***|***range***|all]|**
ds1card [*n***|spare]|ds3|fan [***n***|all]}**

Field	Description
all	Show results for all tests
ds1 *number*	Show results for low-speed DS1/E1 interface number, 1 to 28
ds1 *range*	Show results for a range of low-speed channels. Range is separated by a hyphen as in 5-8
ds1 all	Show results for all low-speed interfaces
ds1card *n*	Show results for DS1 card number, 1 to 7
ds1card spare	Show results for spare card
ds3	Show results for high-speed DS3 interface
fan *n*	Show results for fan number, A or B
fan all	Show results for both fans

Example: **results all**

```
DS1 Card 1      Self Test: Pass
DS1 Card 2      Self Test: Pass
DS1 Card 3      Self Test: Pass
DS1 Card 4      Self Test: Pass
DS1 Card 5      Self Test: Pass
DS1 Card 6      Self Test: Pass
DS1 Card 7      Self Test: Pass
DS1 Spare Card  Self Test: Pass
```

```
DS3             Self Test: Pass

Fan A           Self Test: Fan not present
Fan B           Self Test: Fan not present
```

REVERTIVE

Name: **Revertive Mode**

Purpose: Set or show the revertive switching mode. The high-speed and low-speed can be controlled independently. When *revertive ds3* is on, *arm* is automatically turned on (see *ARM on page 8-13*).

Security: Set - *rw* and above
Show - *ro* and above

NOTE: The **`revertive [on|off]`** command is obsolete but will continue to work in release 2.41. Please use the new **`revertive ds3 [on|off]`** command to ensure future compatibility.

Syntax: **`revertive ds3 [on|off]`**

Syntax: **`revertive ds1 [on|off|reset]`**

`revertive ls [on|off|reset]`

Field	Description
revertive	Set high-speed or low-speed revertive switching mode. Use the command with DS3, DS1, or LS to show current setting.
ds3	High-speed revertive mode
ds1	Low-speed revertive mode used when LSMODE is set to DS1 (see *LSMODE on page 8-58*). Note: If three protection switches occur within a 24-hour period, the low-speed circuit on the spare will be locked out and will not revert back to home. Use reset option (see below) to remove the lockout.
ls	Low-speed revertive mode used when LSMODE is set to DS1LS or E1LS (see *LSMODE on page 8-58*). Note: If three protection switches occur within a 24-hour period, the low-speed circuit on the spare will be locked out and will not revert back to home. Use reset option (see below) to remove the lockout.
on	Enable revertive switching
off	Disable revertive switching
reset	Reset low-speed revertive lockout. When revertive switching is on, this command will also move the low-speed circuit back to the home card.

Example: **`revertive ds1 on`**

Turn on low-speed revertive switching.

Example: **`revertive ds1`**

```
    revertive ds1    on
```

SAVE

Name: **Save Configuration**

Purpose: Save the current Wide Bank configuration to a TFTP server file. To restore a configuration file, see *RESTORE on page 8-63*.

This command generates a configuration file organized into sections, with an appropriate comment preceding each section. Configuration items that regard security are NOT included (for example, security and user commands). However, configuration files can be manually edited using a text editor, and items such as security and users can be added to the file.

The configuration file contains a list of valid Wide Bank commands and settings. Comments within this file use the # character. Any text between a # and end-of-line is not processed as a configuration item. If errors are encountered while parsing the configuration file, the line numbers on which the errors occurred will be displayed. Also, if privilege restrictions are encountered (a command exists in the configuration that the current user does not have privilege to execute), those errors will be displayed as well.

Security: *rw* and above with basic security; *admin* and above with Security Upgrade

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: **`save tftp`** *`ipaddr`* **`{"`***`filename`***`"}`**

Field	Description
tftp	Save the configuration as a file on a TFTP server.
ipaddr	IP address of TFTP server where the file is to be saved.
"filename"	File name including path. Must be enclosed in quotes.

Example: **`save tftp 192.128.17.10  "configuration"`**

Save the configuration file to TFTP server.

SCREEN

Name: **Screen Size**

Purpose: Set or show the size of the CRT screen in lines. (The screen always has 80 columns.) This command allows the display to show a fixed number of lines before halting and waiting for a user prompt. A value of zero produces continuous scrolling text without stopping.

Security: *ro* and above

Syntax: `screen [lines]`

Field	Description
screen	Use the command by itself to show the current setting
lines	Set number of lines to display on each screen. A value of zero will enable continuous scrolling without stopping. Setting value to 0 will produce a continuous display (scroll) of lines. When setting is not 0, for example 24, the display stops after the specified number of lines and displays a "more" prompt. Pressing Enter key displays one more line. Pressing the Space Bar displays the next 24 lines. Pressing Escape key clears any remaining text.

Example: `screen 24`

Set the screen display to 24 lines.

Example: `screen 0`

Enable screen to scroll without stopping. (This setting is useful when capturing configuration settings and reports to a text file.)

NOTE: With continuous scrolling, it may be necessary to adjust the terminal program buffer size to capture any lines that scroll off the viewing area.

SECURITY

Name: **Security Password Protection**

Purpose: Enable or disable password protection.

NOTE: The factory default is usually OFF so that installers can quickly configure the unit. However, this setting can be changed or preset to ON, so that the user must enter a password if one has been defined. For added security, this setting is not affected by the *restore defaults* command.

Security: Set - *admin* and above
Show - *ro* and above

Syntax: **`security [on|off]`**

Field	Description
security	Use the command by itself to show the current setting
on	Enable password protection
off	Disable password protection

Example: **`security on`**

Turn on security password protection.

Example: **`security`**

```
security        on
```

SECURITY CLI

Name: **Security CLI Time-Out**

Purpose: Set the time-out period for a CLI session. The time-out period applies to RS-232 and Telnet CLI sessions.

Security: Set - *admin* with basic security; *secu* with Security Upgrade
Show - *ro* and above

Syntax: **`security cli [`*`time`*`]`**

Field	Description
security cli	Use the command by itself to show the current setting.
time	The number of minutes of inactivity before a CLI session times out. Valid values are from 0 to 255 minutes. A value of 0 means there is no time-out period. The default is 15 minutes.

Example: **`security cli 30`**

```
CLI timeout = 30 minutes
```

SECURITY ETHERNET

Name: **Security Ethernet Port Enable/Disable**

Purpose: Disable the Ethernet port to prevent unauthorized SNMP, TCP/IP TL1, and Telnet sessions. This command is available only with the Security Upgrade option (see *Security on page 1-5*).

NOTE: If you disable the Ethernet port, you cannot also disable the RS-232 CLI port. The RS-232 CLI port must remain active to provide CLI management access.

Security: *secu*

Syntax: **`security ethernet [enable|disable]`**

Field	Description
security ethernet	Use the command by itself to show the current setting
enable	Enable the Ethernet port (default)
disable	Disable the Ethernet port

Example: **`security ethernet disable`**

```
Disabling this port will affect the ability to remotely
manage this unit.  It will not be possible to remotely
manage this unit on IP Address nnn.nnn.nnn.nnn

Do you want to disable the Ethernet port now (y/n)?
```

SECURITY RS232CLI

Name: **Security RS-232 CLI Port Enable/Disable**

Purpose: Disable the 9-pin RS-232 CLI port to prevent unauthorized CLI sessions. This command is available only with the Security Upgrade option (see *Security on page 1-5*).

NOTE: If you disable the RS-232 CLI port, you cannot also disable the Ethernet port. The Ethernet port must remain active to provide CLI management access. Before disabling the CLI port, you must assign a valid IP address to the Wide Bank (cannot be null, 0.0.0.0, or 255.255.255.255). See *Configuring IP and PPP Addresses on page 6-15* for information about setting the IP address.

Security: *secu*

Syntax: **`security rs232cli [enable|disable]`**

Field	Description
security rs232cli	Use the command by itself to show the current setting
enable	Enable the RS-232 CLI port (default)
disable	Disable the RS-232 CLI port

Example: **`security rs232cli disable`**

```
Disabling this port will disable the ability to locally
manage this unit.  Remote management will be possible on
IP Address nnn.nnn.nnn.nnn

Do you want to disable the CLI port now (y/n)?
```

SECURITY RS232TL1

Name: **Security RS-232 TL1 Port Enable/Disable**

Purpose: Disable the 25-pin RS-232 TL1 port to prevent unauthorized TL1 sessions. This command is available only with the Security Upgrade option (see *Security on page 1-5*).

Security: *secu*

Syntax: **`security rs232tl1 [enable|disable]`**

Field	Description
security rs232tl1	Use the command by itself to show the current setting
enable	Enable the RS-232 TL1 port (default)
disable	Disable the RS-232 TL1 port

Example: **`security rs232tl1 disable`**

```
   TL1 RS-232 port disabled
```

SECURITY SNMP

Name: **Security SNMP Enable/Disable**

Purpose: Prevents SNMP sessions over the Ethernet port and over the DS3 C-bit PPP data link. This command is available only with the Security Upgrade option (see *Security on page 1-5*).

NOTE: In a PPP remote management configuration, a local Wide Bank is connected via DS3 to a remote Wide Bank. The local Wide Bank can route messages originating from the Ethernet channel to the remote Wide Bank over the C-bit link. The remote Wide Bank responds over the C-bit link to the local Wide Bank which then routes the responses back over its Ethernet channel. Disabling SNMP in the local Wide Bank does not prevent SNMP sessions over the C-bit link to the remote Wide Bank. To prevent SNMP sessions to the remote Wide Bank via the C-bit link, SNMP must be disabled for the remote Wide Bank.

Security: *secu*

Syntax: **`security snmp [enable|disable]`**

Field	Description
security snmp	Use the command by itself to show the current setting
enable	Enable SNMP (default)
disable	Disable SNMP

Example: **`security snmp disable`**

```
SNMP feature disabled
```

SECURITY TL1

Name: **Security TL1 Enable/Disable**

Purpose: Prevents TL1 sessions over the 25-pin RS-232 TL1 port, over the Ethernet port, and over the DS3 C-bit PPP data link. This command is available only with the Security Upgrade option (see *Security on page 1-5*).

NOTE: In a PPP remote management configuration, a local Wide Bank is connected via DS3 to a remote Wide Bank. The local Wide Bank can route messages originating from the Ethernet channel to the remote Wide Bank over the C-bit link. The remote Wide Bank responds over the C-bit link to the local Wide Bank which then routes the responses back over its Ethernet channel. Disabling TL1 in the local Wide Bank does not prevent TL1 sessions over the C-bit link to the remote Wide Bank. To prevent TL1 sessions to the remote Wide Bank via the C-bit link, TL1 must be disabled for the remote Wide Bank.

Security: *secu*

Syntax: `security tl1 [enable|disable]`

Field	Description
security tl1	Use the command by itself to show the current setting
enable	Enable TL1 (default)
disable	Disable TL1

Example: `security tl1 disable`

```
TL1 feature disabled
```

SNMP

Name: **SNMP Configuration**

Purpose: Configure SNMP for trap reporting and management using the embedded SNMP agent. The *trapcom* setting is used to report traps to network management alarm systems (see *SNMP Traps on page 8-5*).

Security: *rw* and above with basic security; *admin* and above with Security Upgrade

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: `snmp {contact|location|name|getcom|setcom|trapcom} {"string"}`

Field	Description
snmp	Use the command by itself to show the current settings
contact	Set the contact name
location	Set the location name
name	Set the system name
getcom	Set the Get Community name (used for read permission)
setcom	Set the Set Community name (used for write permission)
trapcom	Set the Trap Community name (used for trap authentication)
"*string*"	An alphanumeric character string

Example: `snmp name "DS3 28 M13 Multiplexer"`

Example: **snmp**

```
snmp name       "DS3 28 M13 Multiplexer"
snmp location   "DS3 28 Location"
snmp contact    "DS3 28 Contact"
snmp getcomm    "public"
snmp setcomm    "public"
snmp trapcomm   "public"
```

STATUS

Name: **Status Report**

Purpose: Show the status of one or more interfaces.

Security: *ro* and above

Syntax: **status {ds1 {***number***|***range***|all}}**

Syntax: **status {ds3|ds3far}**

Syntax: **status {ethernet|icmp|ip|ppp|tcp|udp}**

Syntax: **status {fan [***n***|all]}**

Field	Description
ds1 *number*	A low-speed DS1/E1 interface number, 1 to 28
ds1 *range*	A range of low-speed channels separated by a hyphen as in 5-8
ds1 all	All low-speed channels
ds3	DS3 interface
ds3far	Far-end DS3 interface. See example below. The alarm condition code can be one of the 11 possible codes specified in ANSI T1.107.
ethernet	Ethernet port statistics. See example below. These statistics are also available via SNMP by referencing the interface group defined in RFC-1213 or RFG1573. Includes: MTU - maximum transmission unit: largest packet size, in bytes Speed - physical line speed of connection, in bits per second. Physical Address - Media Access Control (MAC) address
fan *n*	Fan number, A or B. Displays status of cooling fan, including Fan Active, Fain Fail, or Fan Not Present.
fan all	All fans. Displays status of both cooling fans.
icmp	ICMP layer statistics. See example below.
ip	IP interface statistics. See example below.
ppp	PPP interface statistics. See example below.

Field	Description
tcp	TCP layer statistics See example below.
udp	UDP layer statistics

Example: status ds3

```
Interface Receive            Transmit        Loop     Protection
--------- ------------       ----------      ----     ----------
DS3       C-bit Traffic      Traffic         None     Electronics
```

Note: If there is a fault condition while using M23 framing, the message will also show the status for each DS2, as in the following example.

```
Interface Receive            Transmit        Loop     Protection
--------- ------------       ----------      ----     ----------
DS3       Loss of Signal     RAI             None     Electronics
DS2  1    Loss of Framing
DS2  2    Loss of Framing
DS2  3    Loss of Framing
DS2  4    Loss of Framing
DS2  5    Loss of Framing
DS2  6    Loss of Framing
DS2  7    Loss of Framing
```

Example: status ds3far

```
Far End DS3:
  Condition          No Alarm
  Equipment ID      "WideBank28"
  Facility ID       "DS3 Path"
  Frame ID          "Frame"
  Generator Number  "N/A"
  Location ID       "DS3 Loc."
  Port Number       "N/A"
  Unit              "000000"
```

Example: status ethernet

```
Ethernet Interface:
  MTU                               1500
  Speed                             10000000
  Physical Address                  00-E0-97-00-29-9C
  Bytes Received                    0
  Unicast Packets (in)              0
  Non-Unicast Packets (in)          0
  Discarded Packets (in)            0
  Errors (in)                       0
  Unknown Protocols (in)            0
  Bytes Transmitted                 0
```

```
        Unicast Packets (out)           0
        Non-Unicast Packets (out)       0
        Discarded Packets (out)         0
        Errors (out)                    0
```

Example: `status icmp`

```
    ICMP Interface:
        Messages Received               25
        Errors (in)                     0
        Dest. Unreachable (in)          8
        Time Exceeded (in)              0
        Parameter Problems (in)         0
        Source Quenches (in)            0
        Redirects (in)                  0
        Echo Requests (in)              8
        Echo Replies (in)               9
        TimeStamp Requests (in)         0
        Addr. Mask Requests (in)        0
        Messages Sent                   18
        Errors (out)                    0
        Dest. Unreachable (out)         0
        Time Exceeded (out)             0
        Parameter Problems (out)        0
        Echo Requests (out)             10
        Echo Replies (out)              8
        TimeStamp Replies (out)         0
        Addr. Mask Replies (out)        0
```

Example: `status ip`

```
     IP Interface:
        Default Time-To-Live            255
        Packets Received                97831
        Incoming Header Errors          0
        Incoming Address Errors         85464
        Forwarded Datagrams             0
        Incoming Protocol Errors        0
        Incoming Packets Discarded      0
        Incoming Packets Delivered      12367
        Outgoing Packet Requests        4568
        Outgoing Packets Discarded      0
        Unroutable Outgoing Packets     0
        Reassembly Timeout              5
        Reassemblies Requested          0
        Successful Reassemblies         0
        Failed Reassemblies             0
        Successful Fragments            0
        Failed Fragments                0
        Fragments Generated             0
```

Example: **`status ppp`**

```
PPP Interface:
  Operational Status                up
  MTU                               1500
  Speed                             28200
  Bytes Received                    56
  Unicast Packets (in)              0
  Non-Unicast Packets (in)          0
  Discarded Packets (in)            0
  Errors (in)                       0
  Unknown Protocols (in)            0
  Bytes Transmitted                 66
  Unicast Packets (out)             0
  Non-Unicast Packets (out)         0
  Discarded Packets (out)           0
  Errors (out)                      0
```

Example: **`status tcp`**

```
TCP Interface:
    Round Trip Algorithm Type         Van Jacobson's
    Minimum Round Trip (ms)           0
    Maximum Round Trip (ms)           240000
    Actively Opened Connections       0
    Passively Opened Connections      29
    Failed Connection Attempts        0
    Established Connections Reset     14
    Currently Established             1
    Segments Received                 5179
    Segments Sent                     4436
    Errors (in)                       0
    Retransmitted Segments            16
```

SWITCH

Name: **Switch Controllers**

Purpose: Toggle control between the currently active and standby Controllers. The standby Controller becomes active and takes control of the DS3 line, control logic, and power conversion. This command has no options.

Security: *rw* and above

Syntax: **`switch`**

TEMP COPY

Name: **Temporary Copy**

Purpose: Save copy of current configuration in temporary storage (volatile RAM), which is not retained if power is turned off. This command allows you to preserve a copy of the current configuration that can be restored after making temporary changes to the current configuration (see *RESTORE on page 8-63*).

Security: *rw* and above with basic security; *admin* and above with Security Upgrade

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: `temp copy`

TEST

CAUTION! **THIS COMMAND WILL DISRUPT SERVICE ON THE TEST INTERFACE.**

Name: **Test Interface**

Purpose: Perform a diagnostic self-test on an interface and display the results. Test results are saved and can be viewed at a later time with the *results* command (see *RESULTS on page 8-66*).

Security: *rw* and above

Syntax: `test {all|ds3|ds1 [number|range|all]| ds1card [n|spare]|fan[n|all]}`

Field	Description
all	Perform all self-tests
ds1 *number*	A low-speed DS1/E1 interface number, 1 to 28
ds1 *range*	A range of low-speed channels separated by a hyphen as in 5-8
ds1 all	All low-speed channels
ds1card *n*	A low-speed card, 1 to 7
ds1card spare	The low-speed spare card
ds3	DS3 interface (active Controller only)
fan *n*	Fan number, A or B. Fan power is turned on for 20 seconds. After five seconds, allowing for the fan to spin up, the rotation speed of the fans is monitored. If the fan is not rotating at the correct speed, an error is logged and a fan failure alarm (Fan A, Fan B, or all) is asserted, and the Controller Status LED blinks red.
fan all	All fans

Example: **test ds1 5**

```
Testing DS1 5...
DS1 5          Self Test: Pass
```

Example: **test all**

Example: **test ds1card spare**

TIME

Name: **Time**

Purpose: Set or show the time of the Wide Bank system clock.

Security: Set - *rw* and above with basic security; *admin* and above with Security Upgrade
Show - *ro* and above

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: **time [***hh:mm:ss***]**

Field	Description
time	Use the command by itself to show the current setting
hh	Hour, 1 to 24. (24-hour clock)
mm	Minutes, 0 to 59
ss	Seconds, 0 to 59

Example: **time**

```
The time is 15:54:14 03/05/2002
```

Example: **time 5:55:00**

Set time to 5:55 a.m.

TL1

Name: **TL1 Configuration**

Purpose: Set or show TL1 setup configuration, including the TL1 network identification, administrator password, and TCP port number. It can also be used to send a simulated alarm to test the TL1 interface.

This command can be used to embed TL1 commands in quotes and pass them over the CLI channel to the Wide Bank, rather than initiating a separate TL1 session. (See Chapter 9.) This feature permits easy verification and testing of the TL1 configuration.

The networkid serves as the unit identifier in multi-unit networks. It is also the string that appears at the beginning of the command prompt and as the source identifier in TL1 messages.

Note: The TL1 password can be set but is never displayed to any user.

Security: Set - *rw* and above with basic security; *secu* with Security Upgrade
Show - *ro* and above

See *Security on page 1-5* for an overview of basic security and the Security Upgrade option.

Syntax: **tl1 [networkid {"***string***"}|password {"***string***"}| portnumber** *number***|send alarm|"***TL1command;***"]**

Field	Description
tl1	Use the command by itself to see current settings
networkid *"string"*	Sets network identification string. This is the string that appears at the beginning of the command prompt and as the source identifier in TL1 messages. The string must be enclosed in double quotes.
password *"string"*	Sets initial password for default TL1 user named “admin”. The string must be enclosed in double quotes.
portnumber *number*	Sets the TCP port number, 1024 to 65535. The default value is 9999. The TCP port number is required for TL1 operation using the TCP interface port.
send alarm	Sends simulatedTL1 alarm to test the interface
"*TL1command;*"	An embedded Transaction Language One (TL1) command must end in a semicolon and be enclosed in quotes. See example below.

Example: **`tl1 networkid "MULTIPLEXER-1"`**

In addition to changing the Network ID for TL1 messages, this command also changes the command line prompt. After using the command in this example, the prompt would display as follows:

```
MULTIPLEXER-1 (A:Active)>
```

Example: **`tl1 "act-user::admin:::`***`password`***`;"`**

Sends an embedded TL1 command to activate the admin user. The CLI displays the TL1 response as in the completed (COMPLD) message below. See Chapter 9 for detailed TL1 information.

```
    2001-05-09 13:58:28
M   0 COMPLD
;
```

USER

Name: **User Configuration**

Purpose: Add and delete users, assign security levels, and set passwords.

Basic Security – With basic security (see *Security on page 1-5*), only the *admin* user can add and delete users and assign security levels. Users can change their own passwords with the *user "username" password* command.

For convenience in new installations, the *security on* command (see *SECURITY on page 8-69*) automatically logs in the *admin* user (always named "admin"). While security is on, subsequent logins require a username and an associated password (if the password is not blank). The *security off* command disables multiple-user security protection and logs off the *admin* user.

The maximum number of CLI user names is 10, including the *admin* user. The *admin* user cannot be deleted and no other user can have *admin* access.

Security Upgrade – With the Security Upgrade (see *Security on page 1-5*), only the *secu* user can use this command. Users are not permitted to change their own passwords.

For convenience in new installations, the *security on* command (see *SECURITY on page 8-69*) automatically logs in the *secu* user (always named "security"). While security is on, subsequent logins require a username and an associated password. The *security off* command disables multiple-user security protection, and logs off the *secu* user.

The maximum number of CLI user names is 10, including the *secu* user. The *secu* user cannot be deleted and no other user can have *secu* access.

Security: Set - *admin* with basic security (except that users can change their own passwords); *secu* with Security Upgrade
Show - *ro* and above with basic security; *secu* with Security Upgrade

Syntax: `user ["username" {add|delete|level <admin|rw|ro>|password}]`

Field	Description
user	Use the command by itself to show the list of users.
"username"	A user defined name. The string must be enclosed in double quotes. **Basic security** – With basic security, user names must include from 1 to 10 alphanumeric characters and must not contain spaces. User names are not case-sensitive when defined; however, users must log in using lower-case characters. With basic security, users do not require a password. If you want to assign a password, use the *user "username" password* command (described below). **Security Upgrade** – With the Security Upgrade, user names must include from 8 to 10 alphanumeric characters and must not contain spaces. User names are case-sensitive. With the Security Upgrade, a password is required for each user. A prompt for entering the password appears immediately after a new user name is accepted. See the following table for password requirements. Note: If you are upgrading firmware in an existing Wide Bank, previously defined user names and passwords that contain fewer than 8 characters will be preserved. Blank passwords are also preserved.
add	Add a user name. The number of users is limited to 10.
delete	Delete a user name.
level <admin|rw|ro>	Set a user's security level (see *Security Levels on page 8-4* for a description of the security levels). By default, a new user is assigned the level *ro*. **Basic security** – With basic security, only the levels *rw* and *ro* are assignable. The *admin* level is automatically assigned to the *admin* user, and no other user can have *admin* access. **Security Upgrade** – With the Security Upgrade, users can be assigned the levels *admin*, *rw*, or *ro*. The *secu* level is automatically assigned to the *secu* user, and no other user can have *secu* access.

Field	Description
password	Set or change a user's password. After entering this command, the user is prompted to enter a new password and to confirm it (see example). **Basic security** – With basic security, passwords can be from 1 to 10 alphanumeric characters and are case-sensitive. Spaces and special characters are not allowed. Up to 32 characters may be entered but only the first 10 will be used. If the password is left blank, no password is required. After successfully logging in, any user can use this command to change their own password. **Security Upgrade** – With the Security Upgrade, only the *secu* user can set or change passwords. Passwords must be from 8 to 10 characters and are case-sensitive. Passwords must contain at least one each of the following types of characters: upper-case alphabetic, lower-case alphabetic, numeric, and special characters. The acceptable characters are listed in the following table.

Characters	Acceptable Values for Security Upgrade Password (Must Contain at Least One Character From Each Group)
Alphabetic Uppercase	A - Z
Alphabetic Lowercase	a - z
Numeric	0 - 9
Special Characters	! $ % & ‘ ( ) * + - . / < = > ? @ [\ ] ^ _ ‘ { | } ~

Example: **`user`**

```
User          Level         Last Login
----          -----         ----------
security      secu          11:39:36 06/23/2004 (Active)
john          admin         11:39:36 06/23/2004
bill           rw           11:02:52 06/23/2004
marie          rw           Never logged in
jack           ro           Never logged in
morgan         ro           11:39:14 06/23/2004
```

Example is from a Wide Bank with the Security Upgrade option.

Example: **user "henry" add**

```
New password: ********
Confirm new password: ********
New password accepted

Successfully added new user "henry"
```

Example is from a Wide Bank with the Security Upgrade option.

Example: **user "henry" add**

```
Successfully added new user "henry".
```

Example is from a Wide Bank without the Security Upgrade option.

Example: **user "henry" level rw**

```
Successfully set "henry"'s access level to rw.
```

Example: **user "henry" password**

```
New password: ********
Confirm new password: ********
New password accepted
```

VERSION

Name: **Version of Software**

Purpose: Show the current boot and software versions. If the Wide Bank has the Security Upgrade option (see *Security on page 1-5*), the software version is preceded by the word "Security."

Security: *ro* and above

Syntax: **version [standby]**

Field	Description
standby	Standby Controller. If included, shows version of software installed on standby Controller card.

Example: **version**

```
Boot Version 1.02

Security Software Version 2.43.0
```

This response indicates that the Wide Bank has the Security Upgrade option.

Example: **`version`**

```
Boot Version 1.02

Software Version 2.43.0
```

This response indicates that the Wide Bank does not have the Security Upgrade option.

Example: **`version standby`**

```
Standby Controller Software Version 2.43.0
```

CHAPTER 9

TL1 Commands and Messages

In this Chapter

TL1 Overview

The Wide Bank 28 DS3 supports remote management using Transaction Language One (TL1) commands and responses described in Telcordia GR-833-CORE, Issue 2, November 1996, and in GR-199-CORE, Issue 2, November 1996, and TR-NWT-000835, Issue 3, January 1993.

The Wide Bank 28 DS3 also supports TL1 automatic messages that are used to automatically report alarms and other events detected by the Wide Bank. The Wide Bank supports the reporting of alarmed and non-alarmed events using the message formats defined by Telcordia GR-833-CORE, 1996. OSS's such as Telcordia's NMA system are able to use these messages to provide trouble reports to the network operations center.

General Syntax

Command Syntax

All TL1 commands have the following general format:

```
verb-modifier[-modifier]:[<tid>]:[<aid>]:[<ctag>]
[:[general block][:first parameter block]
...[:last parameter block]];
```

Field	Description
verb	A command action. See *Command Categories on page 9-7*.
modifier	A modifier to limit or focus the action. See *Command Modifiers on page 9-7*
aid	Access ID (optional). See *Access Identifier <aid> on page 9-84*
ctag	Correlation Tag (optional). See *Correlation Tag <ctag> on page 9-89*
tid	Target ID of network element (optional). The default value is MULTIPLEXER-1 See *Target Identifier <tid> and Source Identifier <sid> on page 9-98*

NOTE: The Wide Bank ships with all configuration parameters set to factory default values unless otherwise specified. Default values appear in **bold type** in the tables following the TL1 command syntax. The Wide Bank can be restored to these default values at any time (see *STA-LOCL-RST on page 9-80*).

The parts of the command shown between square brackets are optional but some of these options may be required to successfully complete specific commands.

In the Wide Bank system, the access identifier <aid>, correlation tag <ctag>, and target identifier <tid> are optional.

If desired, you can insert the <ctag> in the command so that commands and their associated responses can be correlated.

For example, consider the Retrieve-Header command syntax:

```
RTRV-HDR:tid::ctag;
```

In the Wide Bank system, the default target identifier <tid> is `MULTIPLEXER-1`. Using a <ctag> value of 35 as an example, the resulting command would be:

```
RTRV-HDR:MULTIPLEXER-1::35;
```

In this example, the command parts are:

```
verb        RTRV
modifier    HDR
tid         MULTIPLEXER-1
ctag        35
```

NOTE: For simplicity, examples and responses in this document will represent the tid and ctag values by the lower-case letters tid and ctag.

Grouping Values as Lists and Ranges

Most Access IDs (aids) can be grouped together when sending commands:

- Lists – use & to enter lists, as in DS1-1&DS1-3&DS1-5
- Ranges – use && to specify a range of values, as in DS1-1&&DS1-5

Response Syntax

The general format of a command response is shown below:

```
<cr><lf><lf>
^^^<sid>^<YYYY-MM-DD>^<HH:MM:SS><cr><lf>
M^^<ctag>^<Completion_Code><cr><lf>
[Text_Block<cr><lf>]*;
```

The symbol <cr> represents a carriage return, and <lf> a line feed. A space is represented by the "^" symbol. The correlation tag will be the same as the one provided in the command. If the correlation tag was omitted from the command, then the correlation tag in the response will be zero (0). Completion codes are described in *Completion Codes on* *page 9-87*.

Finally, there may be zero or more Text_Blocks with each block containing a <cr><lf> at the end of the response. The example below is the normal response without a text block. It is used to signify that the command was received and executed.

```
   tid 2001-08-04 10:42:22
M  ctag COMPLD
;
```

NOTE: Normal responses are not shown in the command description unless they provide more information than the basic completed (COMPLD) message.

Multiple Output Responses

In the case where the total size of a response exceeds 4096 bytes, the response is divided into multiple responses. These responses have a separate header with the same <ctag> but all except the last one use the “>” instead of the “;” terminator.

```
   tid 2001-08-04 10:42:22
M  ctag COMPLD
   <first response body line>
    .
    .
    .
   <response body line>
>

   tid 2001-08-04 10:42:22
M  ctag COMPLD
   <response body line>
    .
    .
    .
   <response body line>
>

   tid 2001-08-04 10:42:22
M  ctag COMPLD
   <response body line>
    .
    .
    .
   <last response body line>
;
```

Error Responses

Error responses have the following format:

```
<cr><lf><lf>
^^^ <sid> ^ <YYYY-MM-DD> ^ <HH:MM:SS><cr><lf>
M ^^ <ctag> ^ <DENY><cr><lf>
^^^ <ERROR CODE>
(^^^/* <Optional free format error text> */<cr><lf>)
;
```

Code	Description
ERROR CODE	Valid error codes are described in Telcordia GR-833-CORE, Issue 2, November 1996, Appendix D.
Optional free format error text	Additional or more specific information

The contents of the parentheses can occur zero or more times. If more than one error is detected by the Wide Bank, it can transmit the description for each error in the same response. If the error codes for the errors are different, the error code "MERR" (multiple errors) is used.

For example, when an invalid or unsupported command is received by the Wide Bank, the following error response is transmitted:

```
   tid 2001-08-04 10:42:22
M  ctag DENY
   IICM
   /* Input, Invalid Command  */
;
```

Command Categories

Security Commands

These commands are discussed in Telcordia TR-NWT-835, Issue 3, January 1993.

Transport Surveillance Commands

The syntax for these messages is defined in Telcordia GR-833-CORE, Issue 2, November 1996.

Apart from the specific error responses listed for each command, general error messages can be transmitted.

Memory Administration Commands

The syntax for these messages is defined in Telcordia GR-199-CORE, Issue 2, November 1996.

Apart from the specific error responses listed for each command, general error messages can be transmitted. See *Error Responses* and *Appendix D* in Telcordia GR-833-CORE, Issue 2, November 1996.

Network Maintenance Commands

Apart from the specific error responses listed for each command, general error messages can be transmitted. See *Error Responses* and *Appendix F* in Telcordia GR-833-CORE, Issue 2, November 1996.

Command Modifiers

In the following TL1 command list, many of the commands include command modifiers, as in the command ALW-LPBK-<FacilityType>. The Wide Bank uses three modifiers, which are described below with their permissible values.

FacilityType

Facility Types:

- E1 – for E1 circuits operating at 2.048 Mbps
- T1 – for DS1 circuits operating at 1.544 Mbps
- T3 – for DS3 circuits operating at 44.736 Mbps

LSType

Low-Speed Types:

- E1 – for E1 circuits operating at 2.048 Mbps
- T1 – for DS1 circuits operating at 1.544 Mbps

AIDType

Access Identifier Types:

- E1 – for E1 parameters
- EQPT – for Equipment parameters
- ENV – for Environmental parameters
- T1 – for DS1 parameters
- T3 – for DS3 parameters
- ALL – for ALL parameters

Security Levels

To prevent unauthorized access to the network, the administrator assigns security levels to each user account. TL1 commands have the following three security levels.

- RWA (Read-Write-Administration) for administrators (admins) with full privileges
- RW (Read-Write) for operators that need to monitor and edit data
- R (Read Only) for users that need only to monitor data

TL1 Shortcuts (Recall and Edit)

To simplify entering repetitive commands, the Wide Bank allows you to “recall” the previous ten commands entered by pressing the up and down arrow keys. Press the up arrow to recall the previous command (go backwards), and the down arrow key to go forward.

The Wide Bank also allows you to edit TL1 commands by using the backspace key to delete mistakes and retyping characters. This also allows you to easily recall and edit a previous command to change characters, and then press the semicolon key to enter the modified command.

TL1 Setup and Configuration

Connecting and Configuring for TL1

The Wide Bank 28 DS3 supports TL1 remote management and TL1 automatic messages. You can establish a TL1 session through a TCP connection to the Ethernet TCP port, the Asynchronous RS-232 TL1 port, or a terminal-to-terminal session when running in C-bit framing mode.

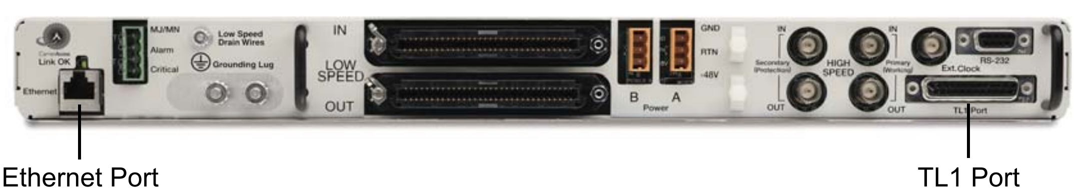


Figure 9-1 Connector Panel Showing Ethernet and TL1 Ports

Establishing a TL1 Session Via a TCP/IP Socket

Establish the TL1 session through TCP/IP socket xxx.xxx.xxx.xxx:yyyy, where xxx.xxx.xxx.xxx is the assigned IP address of the Wide Bank, and yyyy is the number of the TCP port used for TL1. The TCP port number default is 9999 but can be set by the CLI *tl1 portnumber* command to any value between 1024 and 65536.

Establishing a TL1 Session Via the RS-232 TL1 Port

Connect the Wide Bank's asynchronous RS-232 TL1 port to a terminal multiplexer. If an X.25 interface is desired, use an external X.25 pad to provide asynchronous RS-232 to X.25 conversion.

Establishing a TL1 Session Using Terminal-to-Terminal Link

In a point-to-point application with another Wide Bank 28 DS3 running in C-bit framing mode, the DS3 terminal-to-terminal data link can be used to remotely manage the far-end terminal. See *Configuring IP and PPP Addresses on page 6-15*.

Setting the Network/Prompt/Source/Target Identifier

It is recommended that each Wide Bank 28 DS3 be assigned a network identifier for management and identification purposes. This is particularly important when many units are being managed over TCP/IP from a single server. In large networks a unique network identifier can be used to identify each unit for domain name IP address lookup.

Depending on the managment interface, the network identifier is referred to as the:

- Command Line Prompt in CLI sessions
- Network Identifier in CLI commands and responses
- Target Identifier (TID) in TL1 commands and responses
- Source Identifier (SID) in TL1 autonomous event messages

NOTE: Restoring factory defaults will not change the network identifier, IP address, or security settings because that would disrupt management communications with the unit.

Using CLI to Set the Network Identifier

The network identifier is normally set during initial installation and basic configuration. After logging on through a craft terminal or Telnet session, use the following CLI command to enter or change the network ID.

tl1 networkid "*string*"

There can be no spaces in the string, only alphanumeric characters or hyphens.

Example: (A:Active)> **tl1 networkid "MULTIPLEXER-1"**

```
tl1 networkid "MULTIPLEXER-1"
MULTIPLEXER-1 (A:Active)>
```

Using TL1 to Set the Identifier

The identifier can also be set through the TL1 interface. After logging on, use the TL1 command *SET-SID on page 9-78*.

Setting the Initial TL1 Admin Password

A new Wide Bank has no TL1 users in the TL1 user database. So before you can log into the TL1 interface the first time, you must set an initial TL1 administrator Password ID (pid) through the CLI interface.

Enter the initial password with the following CLI command:

TL1 password "*password*"

This password is valid only with the user name "admin," which is automatically assigned to the first user to log in after installation. Logging into the TL1 interface with the user name "admin" and the initial TL1 password will start a TL1 session with administrator privileges to add other users.

Activating a TL1 User Session

The Wide Bank 28 DS3 can accommodate up to five TL1 user sessions simultaneously:

1. One session through the 25-pin RS-232 (TL1) port.
   (9600 baud, 8 data bits, 1 stop bit, no flow control)
   This interface has no session timeout.
2. Three TCP/IP sessions through the Ethernet port using a port address.
   (Example: telnet 192.168.2.247 9999)
   The default session timeout for this interface port is 31 minutes, which is configurable using the command *SET-ATTR-SECUDFLT on page 9-77*.

NOTE: Address 9999 is the default TL1 port address. The TL1 port address can be set to any number between 1024 and 65535, inclusive. This value must be set using the CLI *tl1 portnumber* command (see *TL1 on page 8-81*). When using the Windows Telnet program, the TCP/IP port address must be entered through a separate dialog box.

NOTE: "Local Echo" must be turned on for TL1 sessions using the TL1 port number.

3. One CLI session issuing TL1 commands.
   TL1 commands are entered using double-quotes following the TL1 field.
   Example:

   (A:Active)> **tl1 "ACT-USER:tid:***UserName***:ctag::***password***;"**

TL1 Commands and Response Messages

NOTE: For simplicity, examples and responses in this document use the lower-case letters *tid* and *ctag* to represent the optional Target Identifier and Correlation Tag. The target identifier is optional but if it is included in a command, must be correct or the command will be denied. The correlation tag is optional and is an alphanumeric string, which if entered in a command, will be echoed in the corresponding response message.

Activating Users

Use the *act-user* command is the login command. Use it to start a TL1 session.

```
ACT-USER:tid:UserName:ctag::password;
```

For the first login to a newly installed Wide Bank, the *UserName* field must be “admin” and the *password* must be the initial TL1 password entered through the CLI. Other users, added by the admin session, must use the correct *UserName* and *password* assigned by the admin.

As soon as at least one administrator-level user is added to the TL1 user database, the initial TL1 "admin" user name will no longer be valid and the TL1 password entered through the CLI will also no longer be valid. Subsequently, all users must log in using the correct user name and password as entered in the TL1 user database.

NOTE: If you add one or more administrator level users to the TL1 user database, the “admin” user name will be deleted at the end of the current session and the TL1 password entered through the CLI will no longer be valid. All users must then log in using the user names and passwords in the TL1 user database.

Normal Response to Activate User Command

When the first activate user command is accepted, the Wide Bank will respond with a normal completion response followed by an automatic retrieve equipment response showing the current equipment configuration:

```
   tid 01-12-07 01:41:20
M  ctag COMPLD
;

   tid 01-12-07 01:41:20
A  atag REPT EQPT
   "DS3-A:ACTIVE,2.41.0"
   "DS3-B:STANDBY,2.41.0"
   "DS1-CARD-1:ACTIVE,"
   "DS1-CARD-2:ACTIVE,"
   "DS1-CARD-3:ACTIVE,"
   "DS1-CARD-4:ACTIVE,"
   "DS1-CARD-5:ACTIVE,"
   "DS1-CARD-6:ACTIVE,"
   "DS1-CARD-7:ACTIVE,"
   "DS1-CARD-SPARE:ACTIVE,"
;
```

Error Response for Incorrect Password

```
    tid 01-12-07 01:42:17
M   ctag DENY
    PICC
    /* Can’t login */
;
```

NOTE: Whenever a user logs in or out of the TL1 interface, an event is recorded in the TL1 security log and in the event log. The event log entry indicates the name of the user that logged in or out.

Adding Users

Users can be added only from an administrator session. The maximum number of TL1 user names is 10, including the administrator. Use the *ent-user-secu* command:

ENT-USER-SECU:MULTIPLEXER-1:NewUser:ctag::password,,uap;

- MULTIPLEXER-1 is the default Target ID (tid) of the network element. This field is optional.
- NEWUSER is the new users UserName, a string of up to 10 characters.
- The password is a string of up to 10 characters with at least two non-alpha characters, of which one must be non-alphanumeric. An example is PW-1.
- TL1 formatting characters (such as a colon or comma) can not be used in the user name or password.
- UAP is the user access privilege field. Valid options are: R-Read Only; RW-Read and Write; RWA-Read, Write, and Administration.

NOTE: The default "admin" user name will be deleted after entering another user with RWA privilege. It is advisable to have at least two RWA users.

Deleting Users

Users can be deleted only from an administrator session. Use the *dlt-user-secu* command:

DLT-USER-SECU:MULTIPLEXER-1:UserName**:1;**

NOTE: If there is only one administrator in the user database, that user cannot be deleted.

Normal Response to Delete User Command

```
   MULTIPLEXER-1 01-12-07 01:41:20
M  50 COMPLD
;
```

Changing User Properties

To change a user's UserName, user password, or user privileges from an admin session, use the *ed-user-secu* command:

```
ED-USER-SECU:tid:AdminName:ctag::UserName,UserPassword,,privilege;
```

NOTE: If there is only one administrator-level user in the database, that user cannot be demoted to RW or R privileges.

Changing User Password

A user can change their own password using an ED-PID command. The password is ASCII string up to 10 characters long with at least two non-alphabetic characters with at least one special character (such as FRED-1). Entering a null removes the password requirement.

```
ED-PID:MULTIPLEXER-1:username:1::old_password,new_password;
```

Retrieving Users

Use the *rtrv-user-secu* command to retrieve a list of all users in the user data base, and their privilege levels:

```
RTRV-USER-SECU:MULTIPLEXER-1:ALL:1;
```

Below is an example response to this command:

```
   MULTIPLEXER-1 2001-06-20 14-30-00
M  1 COMPLD
   "ADMIN:RWA"
   "OPERATOR:RW"
   "MONITOR:R"
;
```

Retrieving Alarms

The *retrieve alarm all* command retrieves all outstanding alarms from the Wide Bank's alarm log without filtering for alarm specifics.

RTRV-ALM-ALL:MULTIPLEXER-1::23;

NOTE: Notification codes (alarm severities) for many conditions can be altered through the TL1 interface. See *SET-ATTR-<AIDType> on* *page 9-75*.

Response if No Alarms are Present

```
    MULTIPLEXER-1 01-12-07 01:41:20
M   23 COMPLD
;
```

Response if Alarms are Present

The following example represents the case where one alarm of each type is present (for brevity, not all alarms are shown):

```
   MULTIPLEXER-1 01-12-07 01:41:20
M  23 COMPLD
   "DS3-A,T3:CR,LOS,SA,01-01,01-41-19,NEND,RCV:\"Loss of Signal\",ACTIVE"
   "DS3-B,T3:CR,LOS,SA,01-01,15-39-53,NEND,RCV:\"Loss of Signal\",ACTIVE"
   "DS3-A,T3:CR,LOF,SA,01-01,19-31-32,NEND,RCV:\"Loss of Frame\",ACTIVE"
   "DS3-B,T3:CR,LOF,SA,01-01,19-32-35,NEND,RCV:\"Loss of Frame\",ACTIVE"
   "DS1-17,T1:MJ,INT,SA,01-01,17-29-48,,:\"Internal Hardware Fault or Failure\","
   "DS1-2,T1:MJ,LOS,SA,01-01,01-05-57,NEND,RCV:\"Loss of Signal\","
;
```

Retrieve Header Command

Use the *retrieve-header* command to test if the Wide Bank is operating. A normal response indicates that the Wide Bank is alive.

RTRV-HDR:MULTIPLEXER-1::34;

The following message represents a normal response:

```
    MULTIPLEXER-1 01-12-07 01:41:20
M   34 COMPLD
;
```

Testing TL1 Alarming

The Wide Bank 28 DS3 provides the ability to test TL1 alarming from the command line interface without requiring you to actually initiate a network alarm. The *tl1 send alarm* CLI command sends a simulated alarm out the TL1 interface.

Canceling the TL1 User Session

The *cancel user* command terminates the TL1 command/response session, and the Wide Bank will no longer respond to the *retrieve alarm all* and *retrieve header* commands. However, the automatic messages will continue to be delivered through the same port. The TL1 session will also be closed if the power to the unit is interrupted or the active Controller is switched.

`CANC-USER:MULTIPLEXER-1:USERID:34;`

Error Message in Response to Commands Not Recognized or Supported

```
   MULTIPLEXER-1 01-12-07 01:41:20
M  12 DENY
   ICNV
   "Input, Command Not Valid or Not Supported"
;
```

Error Response to Valid Commands Received When a User Is Not Logged In

```
   MULTIPLEXER-1 01-12-07 01:41:20
M  12 DENY
   PLNA
   "Login Not Active"
;
```

TL1 Command List

ACT-USER

Name: **Activate User**

Purpose: Logs user into a TL1 session.

Category: Security Commands

Security: R

Syntax: `ACT-USER:[<tid>]:uid:[<ctag>]::<pid>;`

Field	Description
ctag	Correlation Tag (optional)
pid	Private ID (password). An ASCII string up to 10 characters long with at least two non-alphabetic characters with at least one special character, such as FRED-22. Omit if password is not required.
tid	Target ID of network element (optional)
uid	User ID (user name). Up to 10 alphanumeric characters.

Example: `ACT-USER::ADMIN;`

Login first time after installation if no password has been assigned. If a password is required the first time, the default password is TEST.

Example: `ACT-USER:tid:FRED:ctag::FRED-22;`

ALW-AUTORST

Name: **Allow Automatic Restoration**

Purpose: Enables revertive switching modes.
To disable revertive switching modes, see *INH-AUTORST on page 9-35*.

Category: Transport Surveillance Commands

Security: RW

Syntax: `ALW-AUTORST:[<tid>]::[<ctag>]::{E1EQPT|DS1EQPT|DS3EQPT|SYNC};`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
E1EQPT	E1 revertive switching. The E1 circuit will revert to its home card after the fault clears. However, if three protection switches occur within 24 hours, the circuit will remain on the spare card until automatic E1 restoration is reasserted.
DS1EQPT	DS1 revertive switching. The DS1 circuit will revert to its home card after the fault clears. However, if three protection switches occur within 24 hours, the circuit will remain on the spare card until automatic DS1 restoration is reasserted.
DS3EQPT	DS3 revertive switching. The DS3 circuit will revert to the primary DS3-A Controller after the fault clears.
SYNC	Clock revert. The transmit clock will revert to the original clock source when it is considered to be healthy again.

Example: `ALW-AUTORST:tid::ctag::DS1EQPT;`

ALW-LOG-SECU

Name: **Allow Log Security**

Purpose: Used by the administrator to enable the recording of security events.
To inhibit recording, see *INH-LOG-SECU on page 9-35*.

Category: Security Commands

Security: RWA

Syntax: `ALW-LOG-SECU:[<tid>]:SECURITY:[<ctag>]::ALL;`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `ALW-LOG-SECU:MUTLIPLEXER-1:SECURITY:67::ALL;`

ALW-LPBK-<FacilityType>

Name: **Allow Loopback**

Purpose: Enables the detection of loop codes.
To inhibit loopbacks, see *INH-LPBK-<FacilityType> on page 9-36*.

Category: Transport Surveillance Commands

Security: RW

Syntax: `ALW-LPBK-{T1|E1|T3|ALL}:[<tid>]:[<facilityID>]: [<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
facilityID	Facility ID depends on selected FacilityType: • For T1, use DS1-1 to DS1-28 • For E1, use E1-1 to E1-27 • For T3 or ALL, use ALL or omit facilityID
tid	Target ID of network element (optional).

Example: `ALW-LPBK-T1:tid:DS1-1:ctag;`

Allow loopback on DS1 #1.

Example: `ALW-LPBK-ALL:tid::ctag;`

Allow the detection of all loop codes.

ALW-MSG-<AIDType>

Name: **Allow Message**

Purpose: Used by the administrator to enable the transmission of automatic messages and alarms. To inhibit messages, see *INH-MSG-<AIDType> on page 9-37*. Notification codes (alarm severities) for many conditions can be altered through the TL1 interface, see *SET-ATTR-<AIDType> on page 9-75*.

Category: Transport Surveillance Commands

Security: RWA

NOTE: Only one parameter can be present in an inhibit/allow command: either the Access Identifier <aid> or the Notification Code <ntfcncde> or the Condition Type <condtype>.

Syntax:
```
ALW-MSG-{T1|E1|EQPT|T3|ALL}:[<tid>]:
[<aid>]:[<ctag>];
```

Syntax: `ALW-MSG-{T1|E1|EQPT|T3|ALL}:[<tid>]::[<ctag>]::[<ntfcncde>];`

Syntax: `ALW-MSG-{T1|E1|EQPT|T3|ALL}:[<tid>]::[<ctag>]::[<condtype>];`

Field	Description
aid	Access ID: T1, E1, EQPT, T3, or ALL See *Access Identifier <aid> on page 9-84*
condtype	Type of alarm or condition. See *Condition Type <condtype> on page 9-87*
ctag	Correlation Tag (optional)
ntfcncde	Severity or class of alarm, event or condition. See *Notification Code <ntfncde> on page 9-96*

Example: `ALW-MSG-ALL:tid::ctag::MJ;`

Enable Transmission of all Major Alarms.

Example: `ALW-MSG-T1:tid::ctag::IMPROPRMVL;`

Enable Transmission of a Specific Message.

Example: `ALW-MSG-ALL:tid::ctag;`

Enable Transmission of ALL Messages.

ALW-PMREPT-<FacilityType>

Name: **Allow Performance Monitoring Report**

Purpose: Allows performance reports to be sent. To inhibit reports, see *INH-PMREPT-<FacilityType> on page 9-38*.

Category: Transport Surveillance Commands

Security: RW

Syntax: `ALW-PMREPT-{T3|T1|E1|ALL}:[<tid>]:[<aid>]:[<ctag>];`

Field	Description
aid	Access ID. Value must be ALL. If aid is omitted, it will default to ALL. See *Access Identifier <aid> on page 9-84*
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `ALW-PMREPT-ALL:tid:ALL:ctag;`

Allow Performance Reports for All Facility Type.

Example: `ALW-PMREPT-T1:tid:ALL:ctag;`

Allow Performance Reports for T1.

ALW-SWTOPROTN-<FacilityType>

Name: **Allow Switching To Protection**

Purpose: Enables the automatic electronics protection of the DS1/E1 or DS3 channels. To inhibit protection, see *INH-SWTOPROTN-<FacilityType> on page 9-38*.

Category: Transport Surveillance Commands

Security: RW

Syntax: `ALW-SWTOPROTN-{T3|T1|E1|ALL}:[<tid>]:ALL:[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `ALW-SWTOPROTN-T1:tid:ALL:ctag;`

ALW-SWTOWKG-<FacilityType>

Name: **Allow Switching To Working**

Purpose: For the T3 modifier, this command arms the protection switch circuit. For T1 or E1, this command clears the revertive lockout flag for the DS1s (or E1s) specified in the <aid> Field. To inhibit switching, see *INH-SWTOWKG on page 9-39*.

Category: Transport Surveillance Commands

Security: RW

Syntax: `ALW-SWTOWKG-{T3|T1|E1|ALL}:[<tid>]:[<aid>]:[<ctag>];`

Field	Description
aid	Access ID is optional and if omitted will default to ALL: • ALL specifies all circuits covered by the modifier. • For T3 modifier, the only valid value is ALL. • For T1 and E1 modifiers, values can be ALL, a range, a list, or one circuit. • For T1 modifier, values are DS1-1 to DS1-28. • For E1 modifier, values are E1-1 to E1-27. See *Access Identifier <aid> on page 9-84*
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `ALW-SWTOWKG-ALL:tid:ALL:ctag;`

CANC-USER

Name: **Cancel User**

Purpose: Terminates the user's TL1 session.

Category: Security Commands

Security: R

Syntax: `CANC-USER:[<tid>]:[<uid>]:[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
uid	User ID

Example: `CANC-USER:tid:FRED:ctag;`

CANC-USER-SECU

Name: **Cancel User Security**

Purpose: Used by an administrator to terminate any active user session.

Category: Security Commands

Security: RWA

Syntax: `CANC-USER-SECU:[<tid>]:<uid>:[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
uid	User ID

Example: `CANC-USER-SECU:tid:FRED:ctag;`

CONN-LPBK-<LSType>

Name: **Connect Loopback {T1|E1}**

Purpose: Activates T1 or E1 loopback. To disconnect loopbacks, see *DISC-LPBK-<FacilityType> on page 9-27*.

Category: Network Maintenance Commands

Security: RW

Syntax: `CONN-LPBK-{T1|E1}:[<tid>]:<aid>:[<ctag>]::<lpsig>;`

Field	Description
aid	Access ID: • For T1 modifier, values are DS1-1 to DS1-28. • For E1 modifier, values are E1-1 to E1-27. See *Access Identifier <aid> on page 9-84*
lpsig	Looping Signal: • A-1 – Send CSU loopup request on line side • R-1 – Send CSU loopdown request on line side • A-2 – Send NIU loopup request on network side • R-2 – Send NIU loopdown request on network side • A-3 – Send NIU loopup request on line side • R-3 – Send NIU loopdown request on line side
tid	Target ID of network element (optional)

Example: `CONN-LPBK-T1:tid:DS1-1:ctag::A-1;`

CONN-LPBK-T3

Name: **Connect Loopback T3**

Purpose: Activates T3 loopback. To disconnect loopbacks, see *DISC-LPBK-<FacilityType> on page 9-27*.

Category: Network Maintenance Commands

Security: RW

Syntax: `CONN-LPBK-T3:[<tid>]:ALL:[<ctag>]::<lpsig>;`

Field	Description
ctag	Correlation Tag (optional)
lpsig	Looping Signal: • A-C – Activate a line loopback at the Far NE • R-C – Release a line loopback at the Far NE
tid	Target ID of network element (optional)

Example: `CONN-LPBK-T3:tid::ctag::A-C;`

CPY-MEM

Name: **Copy Memory**

Purpose: Copies memory from one location to another

Category: Transport Surveillance Commands

Security: RW

Syntax: `CPY-MEM:[<tid>]::[<ctag>]::<frommem>,,<tomem>;`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
frommem	The data area from which memory is to be copied: • ACTIVE • CONFIG • STANDBY • TEMP See *Memory <frommem> and <tomem> on page 9-94*.
tomem	The data area where memory is to be copied (see above)

Example: **`CPY-MEM:tid::ctag::ACTIVE,,STANDBY;`**

Copies configuration from active to standby Controller.

Example: **`CPY-MEM:tid::ctag::CONFIG,,TEMP;`**

Creates a temporary copy of the configuration.

Example: **`CPY-MEM:tid::ctag::TEMP,,CONFIG`**

Restores the configuration from the temporary copy.

DGN-<AIDType>

Name: **Diagnose**

Purpose: Test one or more units on the Wide Bank. This command does not test the standby (protected) T3 interface, which is self-tested only when the standby Controller card is initialized on power-up.

Category: Transport Surveillance Commands

Security: R

NOTE: Entities must be removed from service before self-test diagnostics. See *RMV-<AIDType> on page 9-46*. Entities can be restored to service after self-test. See *RST-<AIDType> on page 9-46*.

Syntax: **`DGN-{T3|T1|E1|ENV|ALL}:[<tid>]:<aid>:[<ctag>];`**

Field	Description
AIDType	Access ID Type. Values are T3, T1, E1, ENV, ALL
aid	Access ID depends on selected AIDType. See table below.
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

AIDType	aid
T3	ALL
T1	DS1-1 to DS1-28
E1	E1-1 to E1-27
ENV	FAN-A, FAN-B
ALL	ALL

Example: **`DGN-T1:tid:DS1-1:ctag;`**

Performs diagnostic on DS1 #1.

Response:

```
   tid 2001-08-04 11:51:58
M  ctag COMPLD
(^^^"<aid>:<rslt>,,"<cr><lf>)+
;
```

The contents of the brackets occur one or more times.

Field	Description
rslt	Result: pass, fail, or not present.

Example: **DGN-T1:tid::ctag;**

Diagnose ALL.

Because this command can take more than 2 seconds to execute, an “In Progress” (IP) acknowledgment will be sent upon receiving a valid command:

```
IP 109
<
```

The acknowledgment is followed by the normal response.

DISC-LPBK-<FacilityType>

Name: **Disconnect Loopback {T1|E1|T3}**

Purpose: Disconnects a T1, E1, or T3 loopback. To connect loopbacks, see *CONN-LPBK-<LSType> on page 9-24* and *CONN-LPBK-T3 on page 9-25*.

Category: Network Maintenance Commands

Security: RW

Syntax: **DISC-LPBK-{T3|T1|E1}:[<tid>]:<aid>:[<ctag>];**

Field	Description
FacilityType	T3, T1, E1
aid	Access ID depends on selected FacilityType. See table below.
ctag	Correlation Tag (optional)

FacilityType	aid
T3	ALL
T1	DS1-1 to DS1-28
E1	E1-1 to E1-27

Example: `DISC-LPBK-T3:tid:ALL:ctag;`

DLT-<LSType>

Name: **Delete {T1|E1}**

Purpose: Deletes a T1 or E1.

Category: Memory Administration Commands

Security: RW

Syntax: `DLT-{T1|E1}:[<tid>]:<aid>:[<ctag>];`

Field	Description
aid	Access ID: • For DS1s, values are DS1-1 to DS1-28 • For E1s, values are E01 to E27
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `DLT-T1:tid:DS1-7:ctag;`

DLT-USER-SECU

Name: **Delete User Security**

Purpose: Used by the administrator to close the account of one or more users. If there is only one user with RWA access privilege, that user cannot be deleted.

Category: Security Commands

Security: RWA

Syntax: `DLT-USER-SECU:[<tid>]:<uid>:[<ctag>];`

The <**uid**> Field is the user account that is to be closed.

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
uid	User ID

Example: `DLT-USER-SECU:tid:FRED:ctag;`

ED-<AIDType>

Name: **Edit {T3|T1|E1}**

Purpose: Edits configuration of AIDs. To retrieve the configuration, see *RTRV-<FacilityType>* *on page 9-47*.

Category: Memory Administration Commands

Security: RW

Syntax:
```
ED-T3:[<tid>]:ALL:[<ctag>]:::
[CKTID=<cktid>],[FMT=<fmt>],[LBO=<lbo>],[OMODE=<omode>],
[TMG=<tmg>],TMGLOCK=<tmglock>];
```

Syntax:
```
ED-T1:[<tid>]:<aid>:[<ctag>]:::
[DLCID=<dlcid>],[LBO=<lbo>],[LINECDE=<linecde>],
[OMODE=<omode>];
```

Syntax:
```
ED-E1:[<tid>]:<aid>:[<ctag>]:::
[DLCID=<dlcid>],[OMODE=<omode>];
```

Syntax: ;

Field	Description
aid	Access ID is optional and if omitted will default to ALL: • ALL specifies all circuits covered by the modifier • For T3 modifier, values are DS3-A and DS3-B • For T1 and E1 modifiers, values can be ALL, a range, a list, or one circuit • For T1 modifier, values are DS1-1 to DS1-28 • For E1 modifier, values are E1-1 to E1-27, except E1-4, E1-8, E1-12, and so on, are not allowed
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
cktid	T3 Circuit ID: ASCII string of up to 32 characters
dlcid	T1/E1 Circuit ID: ASCII string of up to 32 characters
fmt	TS/DS3 digital signal format: This parameter is only used with the T3 modifier. • CBIT – C-bit Parity format • **M23** – M23 Framing format

Field	Description
lbo	Line Build Out only applies to T1 or T3 modifiers. (E1 has no LBO.) For T1 modifier, values are 1 to 6 and correspond to the DSX cable lengths listed below: • **1** – DSX (0'-110') • 2 – DSX (110'-220') • 3 – DSX (220'-330') • 4 – DSX (330'-440') • 5 – DSX (440'-550') • 6 – DSX (550'-660') For T3 modifier, values are 1 or 2 and correspond to the cable lengths listed below: • 1 – short (less than 50 feet) • 2 – long (50 feet or more)
linecde	Line Code. Applies only to T1 modifier. Vaues are: • AMI – Alternate Mark Inversion • **B8ZS** – Bipolar with 8-zero Substitution Note: E1 is hard coded to HDB3.
omode	Output Mode. Applies only to T3 or T1 modifier. Values are: • **NORM** – Normal Data • AIS – Alarm Indication Signal • Null value defaults to NORM Note: QRSU is not supported.
tmg	Timing Source. Applies only to T3 modifier. Values are: • **INT** – Internal Stratum 4E clock • EXT – External Clock (44.736 Mbps) • LINE – Slave to DS3 Line
tmglock	Timing Lock. Applies only to T3 modifier. Indicates whether provisioned timing source is to be locked to disable automatic source switching. Values are: • Y – yes • **N** – no

Example: `ED-T3:tid:ALL:ctag:::FMT=M23;`

Set T3 frame format to M23.

Example: `ED-T1:tid:DS1-8:ctag:::LINECDE=AMI;`

Set DS1 channel 8 Line Code to AMI.

Example: `ED-E1:tid:E1-3:ctag:::DLCID=WB9-E1-3;`

Set E1-3 circuit identifier to WB9-E1-3.

ED-DAT

Name: **Edit Date and Time**

Purpose: Sets the Wide Bank clock's date and time.

Category: Memory Administration Commands

Security: RW

Syntax: **ED-DAT:[<tid>]::[<ctag>]::[YY-MM-DD],[HH-MM-SS];**

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
YY-MM-DD	Date: • YY – Last 2 digits of year • MM – Month: 01 to 12 • DD – Day: 01 ato 31
HH-MM-SS	Time: • HH – Hours: 00 to 23 • MM – Minutes: 00 to 59 • SS – Seconds: 0 to 59

Example: **ED-DAT:tid::ctag::00-01-20,12-00-00;**

ED-PID

Name: **Edit PID**

Purpose: Changes user's own private (password) identifier.

Category: Security Commands

Security: R

Syntax: **ED-PID:[<tid>]:<uid>:[<ctag>]::<old-pid>,<new-pid>;**

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
uid	User ID
new-pid	New Private ID (password): ASCII string up to 10 characters long with at least two non-alphabetic characters with at least one special character, such as SECRET-1. Entering a null removes the password requirement.

Field	Description
old-pid	Old Private ID

Example: `ED-PID:tid:JOHNDOE:ctag::JOHN-22,SECRET-1;`

ED-USER-SECU

Name: **Edit User Security**

Purpose: Used by the administrator to edit the security parameters associated with a particular user. (To create a new user, see *ENT-USER-SECU on page 9-34*.)

Category: Security Commands

Security: RWA

Syntax: `ED-USER-SECU:[<tid>]:<uid>:[<ctag>]::<new-uid>,<new-pid>,,<new-uap>;`

Field	Description
ctag	Correlation Tag (optional)
new-pid	New User Private ID (password). An ASCII string up to 10 characters long with at least two non-alphabetic characters with at least one special character, such as FRED-1. Omit to remove password requirement.
new-uap	New User Access Privilege: • R – Read Only • RW – Read-Write • RWA – Read-Write-Administration See *Security Levels on page 9-8*. Note: If there is only one user with RWA, that user cannot be demoted or deleted.
new-uid	New User ID (user name): Up to 10 alphanumeric characters.
tid	Target ID of network element (optional)
uid	User ID. Default is admin.

Example: `ED-USER-SECU:tid:ADMIN:ctag::FRED,FRED-1,,RW;`

ENT-<LSType>

Name: **Enter {T1|E1}**

Purpose: Creates equipment DS1 or E1 parameters and puts the facility in service. To retrieve the configuration, see *RTRV-<FacilityType> on page 9-47*.

Category: Memory Administration Commands

Security: RW

Syntax:

```
ENT-{T1|E1}:[<tid>]:<aid>:[<ctag>]:::
[DLCID=<dlcid>],[LBO=<lbo>],[LINECDE=<linecde>],
[OMODE=<omode>];
```

Field	Description
aid	Access ID: • For T1 modifier, values are DS1-1 to DS1-28 • For E1 modifier, values are E1-1 to E1-27
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
DLCID=	T1/E1 Circuit ID: ASCII string of up to 32 characters
LBO=	Line Build Out (length) applies to T1 only (E1 has no LBO). Values are 1 to 6. • **1** – DSX (0'-110') • 2 – DSX (110'-220') • 3 – DSX (220'-330') • 4 – DSX (330'-440') • 5 – DSX (440'-550') • 6 – DSX (550'-660')
LINECDE=	Line Code: {AMI|B8ZS} • AMI – Alternate Mark Inversion • **B8ZS** – Bipolar with 8-Zero Substitution This parameter is only used with the T1 modifier. (E1 is hard coded to HDB3.)
OMODE=	Output Mode: {NORM|AIS} • **NORM** – Normal Data • AIS – Alarm Indication Signal • Null value defaults to NORM **Note**: QRSU is not supported.

Example:

```
ENT-T1:tid:DS1-8:ctag:::LINECDE=AMI;
```

Create DS1 #8 with Line Code set to AMI.

ENT-USER-SECU

Name: **Enter User Security**

Purpose: Used by the administrator to enter the security parameters associated with a particular user to create an account for that user. (To edit parameters for an existing user, see *ED-USER-SECU on page 9-32*. To view existing users, see *RTRV-USER-SECU on page 9-72*. To delete an existing user, see *DLT-USER-SECU on page 9-28*.)

The maximum number of TL1 user names is 10, including the administrators. The default "admin" user name will be deleted after entering another user with RWA privilege. It is recommended to have at least two RWA users.

Category: Security Commands

Security: RWA

Syntax: `ENT-USER-SECU:[<tid>]:<uid>:[<ctag>]::<pid>,,<uap>;`

Field	Description
ctag	Correlation Tag: a number used to match Responses with Commands
pid	New User Private ID: ASCII string up to 10 characters long with at least two non-alphabetic characters with at least one special character, such as FRED-22. Omit to remove password requirement.
tid	Target ID of network element (optional)
uap	New User Access Privilege: • R – Read Only • RW – Read-Write • RWA – Read-Write-Administrator See *Security Levels on page 9-8*.
uid	User ID (user name): Up to 10 alphanumeric characters.

Example: `ENT-USER-SECU:tid:FRED:ctag::FRED-22,,RW;`

Creates new user named FRED with password FRED-22 and access RW.

INH-AUTORST

Name: **Inhibit Automatic Restoration**

Purpose: Disables revertive switching modes.
To allow revertive switching modes, see *ALW-AUTORST on page 9-18*.

Category: Transport Surveillance Commands

Security: RW

Syntax: `INH-AUTORST:[<tid>]::[<ctag>]::{DS1EQPT|DS3EQPT|SYNC};`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
DS1EQPT	Turns off DS1 revertive switching
DS3EQPT	Turns off DS3 revertive switching
SYNC	Turns off Clockrevert

Example: `INH-AUTORST:tid::ctag::EQPT;`

INH-LOG-SECU

Name: **Inhibit Log Security**

Purpose: Inhibits the recording of security events.
To allow recording, see *ALW-LOG-SECU on page 9-19*.

Category: Security Commands

Security: RWA

Syntax: `INH-LOG-SECU:[<tid>]:SECURITY:[<ctag>]::ALL;`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `INH-LOG-SECU:tid:SECURITY:ctag::ALL;`

INH-LPBK-<FacilityType>

Name: **Inhibit Loopback**

Purpose: Disables the detection of loop codes.
To allow loopbacks, see *ALW-LPBK-<FacilityType> on page 9-20*.

Category: Transport Surveillance Commands

Security: RW

Syntax: `INH-LPBK-{T1|E1|T3|ALL}:[<tid>]:[<FacilityID>]:[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
FacilityID	Facility ID depends on selected FacilityType: • For T1, use DS1-1 to DS1-28 • For E1, use E1-1 to E1-27 • For T3 or ALL, use ALL or omit FacilityID
tid	Target ID of network element (optional).

Example: `INH-LPBK-T1:tid:DS1-1:ctag;`

Inhibit DS1 #1 loopback.

Example: `INH-LPBK-ALL:tid:ALL:ctag;`

Inhibit the detection of all loop codes.

INH-MSG-<AIDType>

Name: **Inhibit Message**

Purpose: Used by the administrator to disable the transmission of automatic messages and alarms. To allow messages, see *ALW-MSG-<AIDType> on page 9-20*. Notification codes (alarm severities) for many conditions can be altered through the TL1 interface, see *SET-ATTR-<AIDType> on page 9-75*.

Category: Transport Surveillance Commands

Security: RWA

Syntax: **INH-MSG-{T3|T1|E1|EQPT|ALL}:[<tid>]:[<aid>]:[<ctag>]::[<ntfcncde>],[<condtype>];**

Field	Description
aid	Access ID. Values depend on facility type: T1, E1, EQPT, T3, or ALL. See *Access Identifier <aid> on page 9-84*
condtype	Type of alarm or condition. • See *Condition Type <condtype> on page 9-87*
ctag	Correlation Tag (optional)
ntfcncde	Severity or class of alarm, event or condition. Values are: • CR – Critical Alarm • MJ – Major Alarm • MN – Minor Alarm • CL – Condition Cleared • NA – Not Alarmed • NR – Not Reported

Example: **INH-MSG-T1:tid:DS1-1:ctag::,;**

Inhibits messages for DS1 #1.

Example: **INH-MSG-T1:tid::ctag::MJ,;**

Inhibits major DS1 messages.

Example: **INH-MSG-T1:tid::ctag::,LOS;**

Inhibits DS1 LOS messages.

INH-PMREPT-<FacilityType>

Name: **Inhibit Performance Monitoring Report**

Purpose: Inhibits any scheduled performance monitoring reports. To allow reports, see *ALW-PMREPT-<FacilityType> on page 9-22*.

Category: Transport Surveillance Commands

Security: RW

Syntax: **`INH-PMREPT-{T3|T1|E1|ALL}:[<tid>]:[<aid>]:[<ctag>];`**

Field	Description
aid	Value must be ALL. If aid is omitted, it will default to ALL. See *Access Identifier <aid> on page 9-84*
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: **`INH-PMREPT-ALL:tid:ALL:ctag;`**

Inhibits Performance Reports for All Facility Types.

Example: **`INH-PMREPT-T1:tid:ALL:ctag;`**

Inhibits Performance Reports for T1.

INH-SWTOPROTN-<FacilityType>

Name: **Inhibit Switching to Protection**

Purpose: Disables the automatic electronics protection of the DS1/E1 or DS3 channels. To allow protection, see *ALW-SWTOPROTN-<FacilityType> on page 9-22*.

Category: Transport Surveillance Commands

Security: RW

Syntax: **`INH-SWTOPROTN-{T3|T1|E1|ALL}:[<tid>]:ALL:[<ctag>];`**

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: **`INH-SWTOPROTN-T1:tid:ALL:ctag;`**

Inhibit DS1 Protection.

Example: **`INH-SWTOPROTN-ALL:tid:ALL:ctag;`**

Inhibit DS1 and DS3 Protection.

INH-SWTOWKG

Name: **Inhibit Switching To Working**

Purpose: Disarms the DS3 protection switch circuit. To allow switching, see *ALW-SWTOWKG-<FacilityType> on page 9-23*.

Category: Transport Surveillance Commands

Security: RW

Syntax: **`INH-SWTOWKG-T3:[<tid>]:ALL:[<ctag>];`**

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: **`INH-SWTOWKG-T3:tid:ALL:ctag;`**

INIT-LOG

Name: **Initialize Log**

Purpose: Clears the contents of the specified log (see *Log Identifier <lognm> on page 9-93*)

NOTE: If you clear the event log, timestamps for any existing alarms or conditions are also cleared.

Category: Transport Surveillance Commands

Security: RW

Syntax: **`INIT-LOG:[<tid>]::[<ctag>]::<lognm>;`**

Field	Description
ctag	Correlation Tag (optional)
lognm	Name of Log. Values are: • ALL – clears all logs • SECURITY – security event log • EVT – event log • EVT-STBY – event log in standby Controller
tid	Target ID of network element (optional)

Example: `INIT-LOG:tid::ctag::EVT;`

Clear event log.

Example: `INIT-LOG:tid::ctag::ALL;`

Clear all logs.

INIT-REG-<FacilityType>

Name: **Initialize Register**

Purpose: Clears the contents of the specified register. This command is used to clear the performance monitoring data for the DS1 and DS3 interfaces.

Category: Transport Surveillance Commands

Security: RW

Syntax: `INIT-REG-{T3|T1|E1|ALL}:[<tid>]:[<aid>]:[<ctag>]::ALL;`

Field	Description
aid	Access ID depends on selected FacilityType. See table below.
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

FacilityType	aid
T3	ALL or null
T1	DS1-1 to DS1-32, or ALL
E1	E1-1 to E1-31, or ALL
ALL	ALL or null

Example: `INIT-REG-T3:tid::ctag::ALL;`

Clear DS3 Performance Monitoring Statistics.

Example: `INIT-REG-T1:tid:DS1-15:ctag::ALL;`

Clear DS1-15 Performance Monitoring Statistics.

INIT-SYS

Name: **Initialize System**

Purpose: Resets the Active Controller.

Category: Transport Surveillance Commands

Security: RWA

Syntax: `INIT-SYS:[<tid>]:ALL:[<ctag>]::[<ph>];`

Field	Description
ctag	Correlation Tag (optional)
ph	Degree of system initialization. Because the Wide Bank 28 DS3 only supports one degree of system initialization, this parameter is ignored and may be omitted.
tid	Target ID of network element (optional)

Example: `INIT-SYS:tid:ALL:ctag::;`

OPR-ACO-ALL

Name: **Operate Alarm Cutoff**

Purpose: Initiates alarm cutoff.

Category: Transport Surveillance Commands

Security: RW

Syntax: `OPR-ACO-ALL:[<tid>]::[<ctag>];`

Example: `OPR-ACO-ALL:tid::ctag;`

OPR-ARC-<LSType>

Name: **Operate Automatic In-Service Detection**

Purpose: Turns on the automatic in-service detection for all low-speed DS1 or E1 channels that are subsequently put in service while there is an LOS condition. This command inhibits the LOS alarm until a good signal has been received for the specified delay time. To release automatic in-service detection on all DS1 or E1 channels, see *RLS-ARC-<LSType> on page 9-44*.

Note: Following a DC power interruption, the LOS inhibit will be disabled on all channels, causing an LOS alarm on any DS1 or E1 that is enabled but not in service.

Note: A channel's LOS inhibit will also be disabled immediately if any of the following events occur:
• the channel is disabled (set out of service)
• a hardware failure occurs on the channel
• a metallic loopback is run on the channel
• the channel is manually moved to a spare
• the channel's card is removed.

However, if a channel is disabled and then re-enabled while an LOS condition is present, the automatic in-service detection will again inhibit the LOS alarm.

Automatic in-service detection is applied on a channel-by-channel basis. If service is discontinued on a channel, automatic in-service detection can be reapplied to that channel by placing it out of service (see *RMV-<AIDType> on page 9-46*) and then back in service (see *ENT-<LSType> on page 9-33*).

To quickly provision automatic in-service detection when turning up a new Wide Bank, first turn on automatic in-service detection and then place all (aid = ALL) T1s or E1s out of service and then back in service.

Category: Transport Surveillance Commands

Security: RW

Syntax: `OPR-ARC-<T1|E1>:<tid>:<aid>:<ctag>::QI,[<delay>];`

Field	Description
aid	Access ID must either be ALL or be omitted. If omitted, the default is ALL.
ctag	Correlation Tag (optional)
delay	Delay time in hours, 1 to 168 (1 week). If omitted, the current value remains unchanged. Factory default is 2 hours.
QI	Qualified Inhibition (optional). If omitted, the default is QI.
tid	Target ID of network element (optional)

Example: `OPR-ARC-T1:tid::ctag;`

Turn on automatic in-service detection.

Example: `OPR-ARC-T1:tid::ctag::QI,12;`

Turn on automatic in-service detection and set delay time to 12 hours.

OPR-LPBK-<FacilityType>

Name: **Operate Loopback**

Purpose: Activates the specified loopback. To release loopbacks, see *RLS-LPBK-<FacilityType> on page 9-45*.

Category: Transport Surveillance Commands

Security: RW

Syntax:
```
OPR-LPBK-{T3|T1|E1}:[<tid>]:[<aid>]:
[<ctag>]::,,,<lpbktype>;
```

Field	Description
aid	Access ID depends on Facility Type. See table below.
ctag	Correlation Tag (optional)
lpbktype	Loopback Type depends on selected Facility Type. See table below.
tid	Target ID of network element (optional)

Facility Type	aid	<lpbktype>
T3	ALL Note: This refers to the Active Controller	EQUIPMENT, LINE, PAYLOAD
T1	DS -01 to DS -28	EQUIPMENT, LINE, METALLIC Note: Metallic loopbacks can only be applied to four DS1s, one DS1 per protection group.
	ALL	EQUIPMENT, LINE
E1	E1-1 to E -27	EQUIPMENT, LINE, METALLIC Note: Metallic loopbacks can only be applied to three E1s, one E1 per protection group.

Example:
```
OPR-LPBK-T1:tid:DS1-1:ctag::,,,EQUIPMENT;
```

Initiate DS1 #1 equipment loopback.

RD-MEM-FILE

Name: **Read Memory File**

Purpose: Downloads the configuration file.

Category: Transport Surveillance Commands

Security: R

Syntax: `RD-MEM-FILE:[<tid>]:CONFIG:[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Because this command can take more than 2 seconds to execute, an "In Progress" (IP) acknowledgment will be sent upon receiving a valid command:

Example: `RD-MEM-FILE:tid:CONFIG:ctag;`

Response:

```
   tid 2001-08-04 11:51:58
M  ctag COMPLD
<up to 64 characters (32 bytes) of data>
;
```

The contents of the brackets can occur one or more times. In the case where the total size of a response exceeds 4096 bytes, the response is divided into multiple responses.

RLS-ARC-<LSType>

Name: **Release Automatic In-Service Detection**

Purpose: Turns off the automatic in-service detection feature for all low-speed DS1 or E1 channels. Normal LOS alarm operation will resume immediately. To enable automatic in-service detection or set the delay time, see *OPR-ARC-<LSType> on page 9-41*.

Category: Transport Surveillance Commands

Security: RW

Syntax: `RLS-ARC-<T1|E1>:<tid>:<aid>:<ctag>::QI;`

Field	Description
aid	Access ID must either be ALL or be omitted. If omitted, the default is ALL.
ctag	Correlation Tag (optional)
QI	Qualified Inhibition (optional). If omitted, the default is QI.
tid	Target ID of network element (optional)

Example: `RLS-ARC-T1:tid::ctag;`

Turn off automatic in-service detection feature.

RLS-LPBK-<FacilityType>

Name: **Release Loopback**

Purpose: Releases the specified loopback(s). To operate loopbacks, see *OPR-LPBK-<FacilityType> on page 9-43*.

Category: Transport Surveillance Commands

Security: RW

Syntax: **`RLS-LPBK-{T3|T1|E1|ALL}:[<tid>]:<aid>:[<ctag>][::,,,<lpbktype>];`**

Field	Description
FacilityType	T1, E1, T3, ALL
aid	Access ID depends on selected Facility Type. See table below.
ctag	Correlation Tag (optional)
lpbktype	Loopback Type depends on selected Facility Type. See table below.
tid	Target ID of network element (optional)

Facility Type	aid	<lpbktype>
ALL	ALL	
T3	ALL **Note**: This refers to the Active Controller	EQUIPMENT, LINE, PAYLOAD
T1	DS -01 to DS -28 ALL	EQUIPMENT, LINE, METALLIC EQUIPMENT, LINE
E1	E1-1 to E -27	EQUIPMENT, LINE, METALLIC

Syntax: **`RLS-LPBK-T1:[<tid>]:DS1-1:123::,,,EQUIPMENT;`**

Release DS1 #1 equipment loopback.

Example: **`RLS-LPBK-ALL:tid:ALL:ctag;`**

Release all loopbacks.

RMV-<AIDType>

Name: **Remove {T3|T1|E1}**

Purpose: Removes a T3, T1, or E1 channel from service. To put facility back in service, see *ENT-<LSType> on page 9-33*.

Note: A T3 can not actually be removed from service. The purpose of the RMV-T3 command is to allow the active T3 to be tested.

Category: Transport Surveillance Commands

Security: RW

Syntax: `RMV-{T1|E1}:[<tid>]:<aid>:[<ctag>];`

Field	Description
aid	Access ID depends on AIDType: • For T3 modifier, use ALL • For T1 modifier, use DS1-1 to DS1-28, or ALL • For E1 modifier, use E1-1 to E1-27, or ALL
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `RMV-T1:tid:DS1-1:ctag;`

RST-<AIDType>

Name: **Restore {T3|T1|E1}**

Purpose: Restores a T3, T1, or E1 channel to service.

Category: Transport Surveillance Commands

Security: RW

Syntax: `RST-{T3|T1|E1}:[<tid>]:<aid>:[<ctag>];`

Field	Description
aid	Access ID depends on AIDType: • For T3 modifier, use ALL • For T1 modifier, use DS1-1 to DS1-28, or ALL • For E1 modifier, use E1-1 to E1-27, or ALL
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `RST-T1:tid:DS1-1:ctag;`

RTRV-<FacilityType>

Name: **Retrieve Configuration**

Purpose: Retrieves current configuration settings for T3, T1, or E1 facilities. To edit the settings, use, see *ED-<AIDType> on page 9-29*.

Category: Memory Administration Commands

Security: R

Syntax: **RTRV-{T3|T1|E1}:[<tid>]:[<aid>]:[<ctag>];**

Field	Description
aid	Access ID depends on LSType: • For T1 modifier, use DS1-1 to DS1-28, or ALL • For E1 modifier, use E1-1 to E1-27, or ALL • For T3 modifier, use ALL
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: **RTRV-T3:tid::ctag;**

This command retrieves the configuration for the DS3.

Response:

```
   tid 2001-08-04 02:15:52
M  ctag COMPLD
   "AISC=LOS&AISNAS&LOF,AIST=ONES,CKTID=DS3,
CMDMDE=FRCD,FMT=M23,IDLE=N,LBO=1,LINECDE=B3ZS,
MCOND=LOS&RAI&AISNAS&LOF&T-ERL&RTCLK&IMPROPRMVL&
IRR&CONTEQPT&BPV,OMODE=NORM,XBIT=PASS,XBITRCV=ALM1,
XPOL=ALM1,TMG=INT,TMGLOCK=N"
;
```

Field	Description
AISC	Specifies conditions on the input (receive) side of a connection under which AIS will be generated on the output (transmit) side of a connection. This is hard-coded in the Wide Bank to **LOS&AISNAS&LOF**.
AIST	Indicates the type of the AIS signal to be generated/transmitted, and the AIS signal mode expected on input should a failure condition exist. This is hard-coded in the Wide Bank to **ONES**.
CKTID	The circuit identification parameter contains the Common Language Circuit ID or other alias of the channel being provisioned. This is an ASCII string limited to 32 characters.

Field	Description
CMDMDE	Indicates command execution mode. This is hard-coded in the Wide Bank to **FRCD** which means commands may override existing parameter settings in order to execute.
FMT	Indicates DS3 digital signal format. Values for the Wide Bank are CBIT and **M23**.
IDLE	Indicates DS3 idle signal is used or not used. The Wide Bank is hard-coded to **N**.
LBO	Indicates line build out setting. Values are 1 and 2: • 1 – short connections (less than 50') • **2** – long connections (50' or longer)
LINECDE	Indicates DS3 line code. This is hard coded to **B3ZS** in the Wide Bank
MCOND	Specifies conditions to be monitored on the input side of the connection. This is hard-coded in the Wide Bank to: **LOS&RAI&AISNAS&LOF&T-BERL&RTCLK &IMPROPRMVL&INT&PWR&INTERR&CONTEQPT&BPV**
OMODE	Specifies what will be transmitted from the DS3 output port. Values for the Wide Bank are: • **NORM** (normal) • AIS (Alarm Indication Signal)
TMG	Timing Source. Values are: • **INT** – Internal Stratum 4E clock • EXT – External Clock (44.736 Mbps) • LINE – Slave to DS3 Line
TMGLOCK	Timing Lock. Indicates whether provisioned timing source is to be locked to disable automatic source switching. Values are: • Y – yes • **N** – no
XBIT	Indicates how the X-bits are handled for this particular channel. This is hard-coded to **PASS** in the Wide Bank, meaning it will pass the X-bits with no modification.
XBITRCV	Indicates the usage of the outgoing X-bits. This is hard-coded to **ALM1** in the Wide Bank, meaning all the X-bits equal to 1 for indicating incoming remove alarm.
XPOL	Indicates the value/polarity to which the outgoing X-bits are forced. This is hard-coded in the Wide Bank to **ALM1**, meaning the Wide Bank will set X-bits to one for indicating alarm.

Example: **`RTRV-T1:tid:DS1-2:ctag;`**

This command retrieves the configuration for DS1 #2.

Response:

```
   tid 2001-08-04 11:51:58
M  ctag COMPLD
   "DS1-02::AISF=Y,CMDMDE=FRCD,DLCID=DS1 2,
FLMDE=BOTH,FMT=UNFR,IDLE=AIS,LBO=1,LINECDE=B8ZS,
OMODE=NORM,RVRTFLAG=UNLCKD:IS-EQ,NALMNR"
;
```

Example: **`RTRV-E1:tid:E1-1:ctag;`**

This command retrieves the configuration for E1 #1.

Response:

```
   tid 2001-08-04 11:47:18
M  ctag COMPLD
   "E1-01::AISF=Y,CMDMDE=FRCD,DLCID=E1 1,
FLMDE=BOTH,FMT=UNFR,IDLE=AIS,LINECDE=HDB3,
OMODE=NORM,RVRTFLAG=UNLCKD:IS-EQ,"
;
```

Field	Description
AISF	Indicates whether failed signal from upstream should be replaced by AIS. This is hard-coded to **Y** in the Wide Bank.
CMDMDE	Indicates command execution mode. This is hard-coded to **FRCD** in the Wide Bank. This means that existing parameter settings may be overridden in order to execute the command.
DLCID	The DS1 or E1 digital loop carrier system identifier. This is a string of ASCII characters and has a maximum length of 32 characters.
FLMDE	Indicates the fault locate mode. This is hard-coded to **BOTH** in the Wide Bank.
FMT	Indicates DS1 digital signal format. This is hard-coded to **UNFR** in the Wide Bank.
IDLE	Indicates the signal inserted for idle DS1. This is hard-coded to **AIS** in the Wide Bank.
LBO	Indicates the line buildout setting. Values are 1-6. Line Build Out (length) applies to T1 only (E1 has no LBO). • **1** – DSX (0-110 ft.) • 2 – DSX (110-220 ft.) • 3 – DSX (220-330 ft.) • 4 – DSX (330-440 ft.) • 5 – DSX (440-550 ft.) • 6 – DSX (550-660 ft.)

Field	Description
LINECDE	Indicates DS1 line code. E1 is always HDB3 (high density bipolar 3). Valid DS1 values are: • AMI (Alternate mark inversion) • **B8ZS** (Bipolar with 8-zero substitution)
OMODE	Specifies what will be transmitted from the DS1 output port. The Wide Bank supports: • **NORM** (Normal) • AIS (Alarm Indication Signal)
RVRTFLAG	Indicates the DS1 is locked onto the spare due to repeated unsuccessful attempts at reverting to the working card. The DS1 will remain on the spare until this flag is cleared, the DS1 card is replaced, or the DS1 is manually moved home.
state block (PST and SST)	The block following the last colon in the RTRV-T1 command response is the state block. This block contains the primary state (PST) parameter that indicates the primary state and qualifier information of the entity as defined in GR-1093-CORE and sometimes contains the optional secondary state (SST) parameter which indicates the secondary state information. Values for the PST and their meanings are: • IS-EQ – in service (enabled) and equipped • IS-RLY – in service with relay card only (XCVR removed) • IS-UEQ – in service and unequipped • OOS-EQ – out of service (disabled) and equipped • OOS-RLY – out of service with relay card only (XCVR is removed) • OOS-UEQ – out of service and unequipped Values for the SST and their meanings are: • NALMNR – The auto in-service feature is on and an LOS alarm is being suppressed on this DS1. • NALMCD – The auto in-service feature is on, a good signal exists, but it has not persisted for 2 minutes yet.

RTRV-ALM-<AIDType>

Name: **Retrieve Alarm**

Purpose: Displays active facility alarms. For environmental alarms, see *RTRV-ALM-ENV on page 9-53*.

Category: Transport Surveillance Commands

Security: R

Syntax: `RTRV-ALM-{T3|T1|E1|EQPT}:[<tid>]:[<aid>]:[<ctag>]::[<ntfcncde>],[<condtype>];`

Field	Description
aid	Access ID depends on AIDType: • For T3, use DS3-A or DS3-B or ALL • For T1, use DS1-1 to DS1-28, or ALL • For E1, use E1-1 to E1-27, or ALL • For EQPT, see *Access Identifier <aid> on page 9-84* Null value defaults to ALL
condtype	Type of alarm or condition. See *Condition Type <condtype> on page 9-87*. Null value defaults to ALL.
ctag	Correlation Tag (optional)
ntfcncde	Severity or class of alarm, event or condition. See *Notification Code <ntfncde> on page 9-96*. Null value defaults to ALL.
tid	Target ID of network element (optional)

Example: `RTRV-ALM-T3:tid:DS3-A:ctag::CR,LOS;`

Retrieves Critical LOS alarm on DS3-A.

Response Format:

```
<cr><lf><lf>
^^^<tid>^<YYYY-MM-DD>^<HH:MM:SS><cr><lf>
M^^<ctag>^COMPLD<cr><lf>
(^^^"[<aid>]:<ntfcncde>,<condtype>,<srveff>,[<ocrdat>],
[<ocrtm>],[<locn>],[<dirn>],[:[<conddescr>],[<aiddet>]"
<cr><lf>)*
;
```

* - the contents of the parentheses can occur zero or more times.

Example: `RTRV-ALM-T3:tid::ctag;`

Retrieve all Active DS3 Alarms.

Example: **`RTRV-ALM-ALL:tid::ctag;`**

Retrieve all Active Alarms. The following response is typical. (This may take a few seconds.)

Response:

```
   tid 2001-08-04 11:51:58
M  ctag COMPLD
   "DS3-A:CR,LOS,SA,01-01,01-41-19,NEND,RCV:\"DS3 RX LOS\",ACTIVE"
   "DS3-B:CR,LOS,SA,01-01,15-39-53,NEND,RCV:\"DS3 RX LOS\",ACTIVE"
   "DS3-A:CR,LOF,SA,01-01,19-31-32,NEND,RCV:\"DS3 RX LOF\",ACTIVE"
   "DS3-B:CR,LOF,SA,01-01,19-32-35,NEND,RCV:\"DS3 RX LOF\",ACTIVE"
   "DS1-17,T1:MJ,INT,SA,01-01,17-29-48,,:\"Internal Hardware Fault or Failure\","
   "DS1-02,T1:MJ,LOS,SA,01-01,01-05-57,NEND,RCV:\"Loss of Signal\","
   "DS1-CARD-3:MJ,IMPROPRMVL,NSA,01-01,17-33-25,,:\"Improper Removal\","
   "DS1-CARD-MSO-6:MJ,IMPROPRMVL,NSA,06-16,12-41-58,,:\"Improper Removal\","
   "DS1-CARD-MSO-2:MJ,IMPROPRMVL,NSA,06-16,12-43-43,,:\"Improper Removal\","
   "DS1-CARD-2:MJ,FAILTOSW,SA,06-16,12-43-44,,:\"Conflict on Spare Card\","
   "DS1-CARD-MSO-2:MN,IMPROPRMVL,NSA,06-16,12-43-31,,:\"Improper Removal\","
   "DS1-CARD-SPARE:MN,IMPROPRMVL,NSA,06-16,12-42-42,,:\"Improper Removal\","
   "DS1-CARD-MSO-SPARE:MN,IMPROPRMVL,NSA,06-16,12-44-35,,:\"Improper Removal\","
   "DS3-A:MN,LOS,SA,01-01,15-39-44,,RCV:\"DS3 RX LOS\",STANDBY"
   "DS3-B:MN,LOS,SA,01-01,15-47-23,,RCV:\"DS3 RX LOS\",STANDBY"
   "DS3-A:MN,LOF,SA,01-01,19-32-48,NEND,RCV:\"DS3 RX LOF\",STANDBY"
   "DS3-B:MN,LOF,SA,01-01,19-34-49,NEND,RCV:\"DS3 RX LOF\",STANDBY"
   "DS3-A:MN,IMPROPRMVL,NSA,01-01,01-02-25,,:\"DS3 Card Removed\","
   "DS3-B:MN,IMPROPRMVL,NSA,01-01,01-44-56,,:\"DS3 Card Removed\","
   "DS3-A:MN,CONTEQPT,NSA,01-01,22-30-39,,:\"DS3 Card Fail\",STANDBY"
   "DS3-B:MN,CONTEQPT,NSA,01-01,01-01-00,,:\"DS3 Card Fail\",STANDBY"
   "POWER-5V-A:MN,PWR,NSA,01-01,01-07-51,,:\"Internal Power Failure\","
   "POWER-5V-B:MN,PWR,NSA,01-01,01-03-28,,:\"Internal Power Failure\","
   "DS3-A:MN,INTERR,NSA,01-01,01-03-31,,:\"DS3 Over Temp\",STANDBY"
   "DS3-B:MN,INTERR,NSA,01-01,01-04-50,,:\"DS3 Over Temp\",STANDBY"
   "DS3-A:MN,INTERR,NSA,01-01,01-07-55,,:\"DS3 Over Temp\",ACTIVE"
   "DS3-B:MN,INTERR,NSA,01-01,01-09-51,,:\"DS3 Over Temp\",ACTIVE"
   "DS1-17:MN,INT,SA,01-01,01-39-13,,:\"DS1 HW Failure\","
   "DS3-A:MN,LOS,SA,01-01,01-39-59,NEND,RCV:\"DS3 RX LOS\",STANDBY"
   "EXT48V-A:MN,PWR,NSA,01-01,01-11-34,,:\"External Power Supply Fail or Low\","
   "EXT48V-B:MN,PWR,NSA,01-01,01-45-58,,:\"External Power Supply Fail or Low\","
;
```

RTRV-ALM-ENV

Name: **Retrieve Alarm Environment**

Purpose: Retrieves active environment alarms. For facility alarms, see *RTRV-ALM-<AIDType> on page 9-51*.

Purpose:

Category: Transport Surveillance Commands

Security: R

Syntax: **RTRV-ALM-ENV:[<tid>]:[<envAid >]:[<ctag>]::[<ntfcncde>],[<almtype >];**

Field	Description
almtype	Type of alarm. See *Condition Type <condtype> on page 9-87*. Null value defaults to ALL
ctag	Correlation Tag (optional)
envAid	Environmental Access ID. See *Environment Access Identifier (EnvAID) on page 9-91*. Null value defaults to ALL
ntfcncde	Severity or class of alarm, event or condition. See *Notification Code <ntfncde> on page 9-96*. Null value defaults to ALL
tid	Target ID of network element (optional)

Example: **RTRV-ALM-ENV:tid::ctag::;**

Retrieve All Environment Alarms.

Example: **RTRV-ALM-ENV:tid:EXT48V-A:ctag::;**

Retrieve Alarms for a Specific AID.

Example: **RTRV-ALM-ENV:tid:FAN-A:ctag::,MJ,CLFAN;**

Retrieve a Specific Alarm.

Response Format:

```
<cr> <lf> <lf>
^^^<tid>^YYYY-MM-DD^HH:MM:SS <cr> <lf>
M^^<ctag>^COMPLD <cr> <lf>
(^^^"<aid>:<ntfcncde>,<almtype>,[<ocrdat>],[<ocrtm>]
[,<almmsg>]" <cr> <lf>)*
;
```

* - the contents of the parentheses can occur zero or more times.

Response:

```
   tid 2001-08-04 11:51:58
M  ctag CMPLD
  "FAN-A & FAN-B:MJ,CLFAN,01-01,01-00-44,\"Fan Faceplate Not Present\""
   "EXT48V-A:MN,PWR-48,01-01,01-00-49,\"Power -48V Fail or Low\""
   "EXT48V-B:MN,PWR-48,01-01,01-00-49,\"Power -48V Fail or Low\""
   "TEMP-A:MN,HITEMP,01-01,01-00-51,\"High Temp\""
   "TEMP-B:MN,HITEMP,01-01,01-00-51,\"High Temp\""
;
```

RTRV-AO

Name: **Retrieve Automatic Output**

Purpose: Retrieves queued automatic messages or specific automatic messages when an out-of-sequence automatc tag <**atag**> is received.

Category: Memory Administration Commands

Security: R

Syntax:

```
RTRV-AO:[<tid>]::[<ctag>]:::
[ATAGSEQ=<atagseq>],[MSGTYPE=<msgtype>];
```

Field	Description
ATAGSEQ=	Retrieve messages with a specific <atag> (see _Automatic Message Tag <atag> on page 9-86_). The value can be replaced by an integer or integers. Multiple or a range of values can be specified by using the & or && respectively. For example, ATAGSEQ=301&&320 will cause the messages with an <atag> from 301 to 320 to be retrieved.
ctag	Correlation Tag (optional)
MSGTYPE=	Retrieve messages of a specific type: ALM, EVT, ALL. (see _Message Type <msgtype> on page 9-94_). For example, MSGTYPE=ALM will retrieve all the messages reported by the "REPT ALM" message. See _TL1 Automatic Messages on page 9-101_.
tid	Target ID of network element (optional)

Example:

```
RTRV-AO:tid::ctag:::
ATAGSEQ=100&&110,MSGTYPE=ALM;
```

Retrieve Alarm Messages with an <atag> from 100 to 110.

RTRV-ARC-<LSType>

Name: **Retrieve Automatic In-Service**

Purpose: Retrieves the automatic in-service status (on/off) and delay time (1 to 168 hours) for all low-speed T1 or E1 channels.

Category: Transport Surveillance Commands

Security: RW

Syntax: **`RTRV-ARC-{T1|E1}:<tid>:<aid>:<ctag>::QI;`**

Field	Description
aid	Access ID must either be ALL or be omitted. If omitted, the default is ALL.
ctag	Correlation Tag (optional)
delay	Delay time in hours, 1 to 168 (1 week). The factory default is 2 hours. This parameter appears in the response message (see below) and can be changed by the command *OPR-ARC-<LSType> on page 9-41*.
QI	Qualified Inhibition (optional). If omitted, the default is QI.
tid	Target ID of network element (optional)

Example: **`RTRV-ARC-T1:tid::ctag;`**

Retrieve auto in-service status.

The following response appears when automatic in-service detection is turned on. If it is turned off, the response will be a simple COMPLD with no data.

Response Format:

```
<cr><lf><lf>
^^^<tid>^<YYYY-MM-DD>^<HH:MM:SS><cr><lf>
M^^<ctag>^COMPLD<cr><lf>
^^^"ALL,T1:QI,<delay>"
;
```

Response:

```
   tid 2002-06-12 11:21:32
M  ctag CMPLD
   "ALL,T1:QI,2"
;
```

RTRV-ATTR-<AIDType>

Name: **Retrieve Attribute**

Purpose: Instructs the Wide Bank to return the notification code associated with the specified alarm or event. The notification code determines whether an event is alarmed and the severity assigned to the alarm or event. All alarm and event conditions (condtype) have default severities for notification conditions (ntfcnde) but most severities can be changed by the user. The assigned severities apply to alarms and events reported in the CLI and TL1 alarm messages and by the alarm LED indicators and alarm output contacts on the unit.

- This command does not retrieve environment (ENV) conditions.
- Severities can be assigned by the command *SET-ATTR-<AIDType> on page 9-75*.
- Critical (CR), Major (MJ), and Minor (MN) alarms are reported by REPT ALM messages (see *TL1 Automatic Messages on page 9-101*).
- Not Alarmed (NA) events are reported by REPT EVT messages (see *TL1 Automatic Messages on page 9-101*).
- Not Reported (NR) events can be retrieved by the RTRV-COND command (see *RTRV-COND-<AIDType> on page 9-59*).

Category: Transport Surveillance Commands

Security: R

Syntax:
```
RTRV-ATTR-{T3|T1|E1|EQPT}:[<tid>]:[<aid>]:[<ctag>]::
<ntfcncde>,<condtype>,<locn>,<dirn>,<tmpr>;
```

Field	Description
aid	Access ID must be ALL or omitted
condtype	Type of alarm or event condition. Only the following conditions are valid: • ACTLPBK – Loopback send code is Active • AISNAS – Alarm Indication Signal, North American Standard • BER-SF – Bit error rate signal failure • BER-SD – Bit error rate signal degrade • CONTEQPT – Control equipment failure • FAILTOSW – Failure to switch • IMPROPRMVL – Improper removal • INHAUTORSTEQPT – Revertive Off • INHAUTORSTSYNC – DS3 clockrevert Off • INHLPBK – Loopdetect Off • INHSWPR – Facility protection not enabled • INHSWWKG – Equipment protection not enabled • INT – Internal hardware failure • INTERR – Internal error detected • LOF – Loss of frame • LOS – Loss of signal • LPBKEQPT – Equipment loopback • LPBKLINE – Line loopback • LPBKMETALLIC – Metallic loopback • LPBKPAYLOAD – Payload loopback • NORMAL – Normal is used only for REPT EVT "clear" condition, with clarification in the description field to indicate which condition has cleared. • PROTNA – Protection unit is not available • PWR – Power +5V failure • RAI – Remote Alarm Indication • SYNCPRI – Loss of designated clock • TRMT – Transmitter failure • T-CVL – Threshold Violation - CV Line • T-CVP-P – Threshold Violation - CV Path p-parity • T-ESL – Threshold Violation - Errored seconds line • T-ESP-P – Threshold Violation - Errored seconds path p-parity • T-LOSS-L – Threshold Violation - Loss of signal seconds line • T-SESL – Threshold Violation - Severely errored seconds line • T-SESCP-P – Threshold Violation - Severely errored seconds path • WKSWPR – Working Unit Switched to Protect Unit • WKSWBK – Working Unit Switched Back to Working
ctag	Correlation Tag (optional)
dirn	Direction • RCV – receive • TX – transmit

Field	Description
locn	Location • FEND – far end • NEND – near end
ntfcncde	Alarm severity notification code • CR – Critical, *C • MJ – Major, ** • MN – Minor, * • NA – Not Alarmed, A • NR – Not Reported
tid	Target ID of network element (optional)
tmper	Time period that these statistics were gathered – not supported in this release

Response Format:

```
   <tid> <date> <time>
M  <ctag> COMPLD
(^^^"<aid>,<aidType>:<ntfcncde>,<condtype>,<locn>,<dirn>"
<cr><lf>)*
;
```

* - The contents of the parentheses can occur zero or more times.

Example: **`RTRV-ATTR-T3:tid:DS3-A:ctag:::CR;`**

Retrieve notification codes for T3 critical alarms, as in the following response.

Response:

```
   tid 2001-08-04 11:51:58
M  ctag COMPLD
   "DS3-A,T3:CR,LOF,NEND,RCV"
   "DS3-A,T3:CR,LOS,NEND,RCV"
   "DS3-A,T3:CR,SYNCPRI,,"
;
```

Example: **`RTRV-ATTR-T1:tid:DS1-1:ctag::MN;`**

Retrieve notification codes for T1 minor alarms for DS1 #1.

Response:

```
   tid 2001-08-04 11:51:59
M  ctag COMPLD
   "DS1-01,T1:MN,BER-SD,NEND,RCV"
;
```

RTRV-COND-<AIDType>

Name: **Retrieve Condition**

Purpose: Retrieves the current status of entities in the Wide Bank.

Category: Transport Surveillance Commands

Security: R

Syntax: **RTRV-COND-{T3|T1|E1|ENV|ALL}:[<tid>]:[<aid>]:[<ctag>]::[<typereq>];**

Field	Description
aid	Access ID depends on AIDType (optional). See *Access Identifier <aid> on page 9-84*. Null value defaults to ALL.
typereq	Type of condition or state to be retrieved. See *Condition Type <condtype> on page 9-87*. Null value defaults to ALL
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: **RTRV-COND-T1:tid:DS1-1:ctag::,,;**

Retrieve current condition of DS1 #1.

Response:

```
   tid 2001-08-04 05:05:51
M  ctag COMPLD
;
```

Response Format:

```
   <tid> <date> <time>
M  <ctag> COMPLD
^^^"<aid>:[<ntfcncde>],<condtype>,[<srveff>],[<ocrdat>],
[<ocrtm>],[<locn>],[<dirn>],[<tmper>],[<conddescr>]"
;
```

Field	Description
aid	Access ID. See *Access Identifier <aid> on page 9-84*
ntfcncde	Severity or class of alarm, event or condition. See *Notification Code <ntfncde> on page 9-96*.
condtype	Type of alarm or condition. See *Condition Type <condtype> on page 9-87*
srveff	Service Effect. See *Service Effect of Alarm or Condition <srveff> on page 9-98*
ocrdat	Date when the event was detected (format: mm-dd)
ocrtm	Time when the event was detected (format: hh-mm-ss)
locn	Location. See *Location of Alarm or Condition <locn> on page 9-92*
dirn	Direction. See *Direction of Alarm or Condition <dirn> on page 9-89*
tmper	Time period: • 15-MIN – 15 minutes • 1-HR – 1 hour • 1-DAY – 1 day
conddescr	Detailed Description of Alarm condition. A maximum of 64 characters enclosed in escaped quotes (\") .

Example: **`RTRV-COND-T3:tid::ctag;`**

Receive severities for all T3 alarms, as in the following response:

Response:

```
   tid 2001-08-04 05:05:51
M  ctag COMPLD
   "DS3-A,T3:LOS,SA,01-01,04-42-21,NEND,RCV,,\"Loss of Signal\""
   "DS3-A,T3:INHLPBK,NSA,,,,,,\"Loopdetect Inhibited\""
  "DS3-A,T3:INHSWPR,NSA,,,,,,\"DS3 Facility Protection Not Enabled\""
   "DS3-A,T3:PROTNA,NSA,,,,,,\"Protection Unit not Available\""
;
```

RTRV-EQPT

Name: **Retrieve Equipment**

Purpose: Retrieve equipment configuration settings.

Category: Transport Surveillance Messages

Security: R

Syntax: `RTRV-EQPT:[<tid>]:ALL:[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `RTRV-EQPT:tid:ALL:ctag;`

Response:

```
   tid 2001-08-04 05:08:45
M  ctag COMPLD
   "DS3-A:ACTIVE,2.41.0"
   "DS3-B:STANDBY,2.41.0"
   "DS1-CARD-1:ACTIVE,"
   "DS1-CARD-2:ACTIVE,"
   "DS1-CARD-3:ACTIVE,"
   "DS1-CARD-4:ACTIVE,"
   "DS1-CARD-5:ACTIVE,"
   "DS1-CARD-6:ACTIVE,"
   "DS1-CARD-7:ACTIVE,"
   "DS1-CARD-SPARE:ACTIVE,"
;
```

RTRV-HDR

Name: **Retrieve Header**

Purpose: Polls the Wide Bank. If it is alive, a normal response will be sent.

Category: Transport Surveillance Commands

Security: R

Syntax: `RTRV-HDR:[<tid>]::[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `RTRV-HDR:tid::ctag;`

RTRV-LOG

Name: **Retrieve Log**

Purpose: Displays the contents of the specified log.

Category: Transport Surveillance Commands

Security: R for Event log; RWA for Security log.

Syntax: `RTRV-LOG:[<tid>]:ALL:[<ctag>]::<lognm>;`

Field	Description
ctag	Correlation Tag (optional)
lognm	Name of Log. Values are: • SECURITY – Log where Security Events are Logged • EVT – Event Log
tid	Target ID of network element (optional)

Example: `RTRV-LOG:tid:ALL:ctag::EVT;`

RTRV-NETYPE

Name: **Retrieve Network Element Type**

Purpose: Retrieves the type of network element. These values are fixed in the equipment.

Category: Transport Surveillance Commands

Security: R

Syntax: `RTRV-NETYPE:[<tid>]::[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `RTRV-NETYPE:tid::ctag;`

Response Format:

```
   tid 2002-12-04 11:51:58
M  ctag COMPLD
^^^"<vendor name>,<model name>,MUX,<software release>"
;
```

Field	Description
vendor name	"Carrier Access Corporation"
model name	"Wide Bank 28 DS3 Multiplexer"
software release	"2.41.0" – value is updated for each release

RTRV-PM-<FacilityType>

Name: **Retrieve Performance Monitoring Data**

Purpose: Retrieves performance monitoring statistics.

Category: Transport Surveillance Commands

Security: R

Syntax: **`RTRV-PM-{T3|T1|E1}:[<tid>]:[<FacilityID>]:[<ctag>]::[<montype>],[<monlev>],[<locn>],,[<tmper>],[<mondat>],[<montm>];`**

Field	Description
FacilityID	Facility ID depends on selected Facility Type: • For T3, use DS3-A, DS3-B, or ALL • For T1, use DS1-1 to DS1-28, or ALL • For E1, use E1-1 to E1-27, or ALL
ctag	Correlation Tag (optional)
locn	Location of the statistics: NEND or null
mondat	Date during which the time period started
monlev	Level that must be monitored to be reported: 1-UP or null
montm	Time during which the time period started
montype	Monitored parameter type: ALL or null
tid	Target ID of network element (optional)
tmper	Time period that these statistics were gathered

Example: **`RTRV-PM-T1:tid:ALL:ctag::,,,,15-MIN,,;`**

Retrieve PM for all DS1s at 15-minute intervals, as shown below:

Response:

```
   tid 2001-08-04 05:42:38
M  ctag COMPLD
"DS1-01,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-02,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-03,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-04,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-05,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-06,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-07,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-08,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-09,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-10,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-11,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-12,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-13,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-14,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-15,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-16,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-17,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-18,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-19,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-20,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-21,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-22,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-23,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-24,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-25,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-26,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-27,:CSS,660,PRTL,NEND,NA,15-MIN,,"
"DS1-28,:CSS,660,PRTL,NEND,NA,15-MIN,,"
;
```

Response Format:

```
<cr><lf><lf>
^^^<sid>^<YY-MM-DD>^<HH:MM:SS><cr><lf>
A^^<atag>^REPT^PM^<FacilityType>
^^^"[<FacilityId>]:<montype>,<monval>,[<vldty>],
   [<locn>],[<dirn>],[<tmper>],[<mondat>],[<montm>]"
;
```

Field	Description
FacilityType	T1, E1, T3
FacilityID	Facility ID depends on Facility Type: • For T1, values are DS1-1 to DS1-28 • For E1, values are E1-1 to E1-27 • For T3, values are DS3-A, DS3-B
atag	Automatic message tag. A sequential value is assigned to each message by the Wide Bank. Receiving a non-sequential value indicates that some messages have been lost.
dirn	Direction of traffic: • TRMT – transmit • RCV – receive
locn	Location: • NEND – near end • FEND – far end
mondat	Date during which the time period started
montm	Time during which the time period started
montype	Monitored parameter type
monval	Monitor Value
sid	Source Identifier
tmper	Time period that these statistics were gathered • 15-MIN – 15 minutes • 1-HR – 1 hour • 1-DAY – 1 day
vldty	Validity • COMPL – complete • PRTL – partial period

RTRV-PMSCHED-<FacilityType>

Name: **Retrieve Performance Monitoring Schedule**

Purpose: Retrieves the schedule for automatic performance monitoring reports.

Category: Transport Surveillance Commands

Security: R

Syntax: `RTRV-PMSCHED-{T3|T1|E1|ALL}:[<tid>]:[<aid>]:[<ctag>];`

Field	Description
aid	Access ID depends on selected Facility Type: • For T3, use DS3-A, DS3-B, or ALL • For T1, use DS1-1 to DS1-28, or ALL • For E1, use E1-1 to E1-27, or ALL • Null value defaults to ALL
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `RTRV-PMSCHED-T1:tid:DS1-1:ctag;`

Response:

```
   tid 2001-08-04 05:58:05
M  ctag COMPLD
   "ds1-01:,,,0,ALL,,NEND&FEND,RCV,15-MIN,,ALW"
   "ds1-01:,,,0,ALL,,NEND&FEND,RCV,1-HR,,ALW"
   "ds1-01:,,,0,ALL,,NEND&FEND,RCV,1-DAY,,ALW"
```

Response Format:

```
<cr><lf><lf>
^^^<sid>^<YY-MM-DD>^<HH:MM:SS><cr><lf>
A^^<atag>^REPT^PM^<FacilityType>
^^^"[<FacilityId>]:<montype>,<monval>,[<vldty>],
   [<locn>],[<dirn>],[<tmper>],[<mondat>],[<montm>]"
;.
```

Field	Description
ctag	Correlation Tag (optional)
dirn	Direction of traffic: • TRMT – transmit • RCV – receive • NA – not applicable

Field	Description
locn	Location: • NEND – near end • FEND – far end
monlev	Monitor Level specifies the discriminating level for the requested monitored parameter. Currently, the Wide Bank only supports 1-UP, which means we will report and performance statistics that do not have a value of zero.
montype	Monitored Type. Values are: • CSS – Control Slip Seconds count • CVL – Coding Violation count – Line. This montype supports Threshold Cross Alerts on the DS1s and DS3. • CVP-P – Coding Violation count – Path. This montype supports Threshold Cross Alerts on the DS3 only. • DGRML – Degraded Minute count – Line • ESL – Errored Second count – Line • ES-LFE – Errored Second count – Line, Far End • ESP-P – Errored Second count Path – P-bit parity. This montype supports Threshold Cross Alerts on the DS3 only. • LOSS-L – Loss of Signal Seconds count – Line • PSC – Protection Switching Count • PSD – Protection Switching Duration in seconds • SESCP-P – Severely Errored Second count – Path, DS3 CP-bit parity. This montype supports Threshold Cross Alerts on the DS3 only. • SEFS – Severely Errored Framing Second count • SESL – Severe Errored Second count – Line. This montype supports Threshold Cross Alerts on the DS3 only. • SES-LFE – Severe Errored Second Count – Line, Far End • UASL – Unavailability Second count – Line • UAS-LFE – Unavailability Second count – Line, Far End
numrept	The number of reports the user would like scheduled. A value of zero turns reports off. Otherwise, reports are sent every reporting interval and the number of reports is decremented. Even if reporting is inhibited (see *INH-PMREPT-<FacilityType> on page 9-38*), the number will continue to be decremented. If the numrept value is omitted from the command, the Wide Bank will report every reporting interval indefinitely until another schedule command is issued.
reptinvl	Reporting Interval specifies how often reports are to be generated and sent: • 15-MIN • 1-HR • 1-DAY Omitting this field defaults to 15-MIN.

Field	Description
reptstatm	Reporting Start Time specifies the time when the reports should start being generated. Currently, the Wide Bank only supports: • Null • 0-0 • 00-00 A non-null value will start the reports immediately.
tid	Target ID of network element (optional)
tmofst	Time Offset specifies the time offset from the end of the last complete accumulation time period to the beginning of the accumulation period specified with the tmper variable. This parameter will accept only the following values but these values are ignored and the time offset defaults to the current register: • Null • 0-1-0
tmper	Time Period: • 15-MIN • 1-HR • 1-DAY} Note: tmper must be equal to reptinvl or omitted.

RTRV-STATUS

Name: **Retrieve Status**

Purpose: Retrieves the system status showing what users are currently logged on.

Category: Security Commands

Security: R

Syntax: `RTRV-STATUS:[<tid>]::[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `RTRV-STATUS:tid::ctag`

Response:

```
   tid 2001-08-04 11:51:58
M  ctag COMPLD
   ":,UserID-1
    &UserID-2
    &UserID-3"
;
```

The response is a list of users currently logged on. The names of the users are separated by the '&' character, and optionally by a carriage return and line feed.

RTRV-TH-<FacilityType>

Name: **Retrieve Threshold Value**

Purpose: Instructs the Wide Bank to return the threshold value, that when crossed, will issue a threshold crossing alert.

Category: Transport Surveillance Commands

Security: R

Syntax: **`RTRV-TH-{T3|T1|E1}:[<tid>]:[<aid>]:[<ctag>]::[<montype>],,[<tmper>];`**

Field	Description
aid	Access ID. Omitting the field defaults to ALL. • ALL is a valid value for any facility type. • For T3, the aid can be ALL only or omitted. • For T1, the aid can be a single DS1, a list of DS1s, or a range of DS1s. • For E1, the aid can be a single E1, a list of E1s, or a range of E1s.
ctag	Correlation Tag (optional)
montype	The type of performance monitoring statistic the threshold exists for: • For T3s, values are: CVL, ESL, LOSS-L, SESL, CVP-P, ESP-P, SESCP-P. • For T1s and E1's values are CVL and ESL. If omitted, the field defaults to ALL.
tid	Target ID of network element (optional)
tmper	Time period that these statistics were gathered

Response Format:

```
   tid 2001-08-04 11:51:58
M  ctag COMPLD
   "<aid>:<montype>,,,<thlev>,<tmper>"
;
```

Field	Description
aid	Access ID
montype	The type of performance monitoring statistic the threshold exists for
thlev	Threshold Level, an integer value between 0 and (2^31)-1, a range from zero to more than 2 billion.
tmper	Time period that these statistics were gathered

RTRV-TOD

Name: **Retrieve Time of Day**

Purpose: Instructs the Wide Bank to display the date and time.

Category: Transport Surveillance Commands

Security: R

Syntax: `RTRV-TOD:[<tid>]::[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `RTRV-TOD:tid::ctag;`

```
   tid 2001-08-04 11:51:58
M  ctag COMPLD
"2001,08,04,11,51,46"
;
```

RTRV-USER-SECU

Name: **Retrieve User Security**

Purpose: Used by the administrator to retrieve the security parameters associated with a user or a list of users.

Category: Security Commands

Security: RWA

Syntax: `RTRV-USER-SECU:[<tid>]:<uid>:[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
uid	User ID. Multiple user IDs can be grouped, as in uid1&uid2. ALL will retrieve all users.

Example: **`RTRV-USER-SECU:tid:ALL:ctag;`**

Retrieves security parameters for all users.

Response:

```
   tid 2001-12-19 11:51:58
M  ctag COMPLD
"allan:RWA"
"fred:RW"
"tester1:RW"
"tester2:RW"
"william:RW"
"sylvia:R"
;
```

Security	Description
RWA	Read-Write-Administration for administrators (admins) with full privileges
RW	Read-Write for operators that need to monitor and edit data
R	Read Only for users that need only to monitor data

Example: **`RTRV-USER-SECU:tid:ALLAN:ctag;`**

Retrieve security parameters for ALLAN.

Example: **`RTRV-USER-SECU:tid:ALLAN&WILLIAM&SYLVIA:ctag;`**

Retrieve security parameters for ALLAN and WILLIAM and SYLVIA.

SCHED-PMREPT-<FacilityType>

Name: **Schedule Performance Monitoring Report**

Purpose: Schedules a performance report for the selected FacityType. These are automatic reports that provide performance statistics (see *Report Performance Monitoring Message Format on page 9-105*). PM reports can be allowed or inhibited (see *ALW-PMREPT-<FacilityType> on page 9-22* and *INH-PMREPT-<FacilityType> on page 9-38*).

Category: Transport Surveillance Commands

Security: RW

Syntax:
```
SCHED-PMREPT-<{T3|T1|E1}>:[<tid>]:<aid>:[<ctag>]::
[<reptinvl>],[<reptstatm>],[<numrept>],,
[1-UP],[NEND],,[<tmper>],[0-1-0];
```

Example:
```
SCHED-PMREPT-T1:tid:ALL:ctag::15-MIN,,10,,,,,15-MIN;
```

Schedule ten T1 Performance Reports at 15-minute intervals.

Field	Description
0-1-0	Time Offset (optional) specifies the time offset from the end of the last complete accumulation time period to the beginning of the accumulation period specified with the tmper variable. The Wide Bank will accept the following values but the time offset will always be zero: • **0-1-0** – no offset
1-UP	Monitor Level (optional) specifies the discriminating level for the requested monitored parameter. The Wide Bank currently supports the following: • **1-UP** – report all performance statistics that do not have a value of zero
ctag	Correlation Tag (optional)
NEND	Location (optional): • **NEND** – near end and far end
numrept	The number of reports (optional) the user would like scheduled. A value of zero turns reports off. Otherwise, reports are sent every reporting interval and the number of reports is decremented. Even if reporting is inhibited (see *INH-PMREPT-<FacilityType> on page 9-38*), the number will continue to decrement. If the numrept value is omitted from the command, the Wide Bank will report every reporting interval indefinitely until another schedule command is issued. • **null** – (default) report all intervals • 0 – no reports • *integer* – number of reports

Field	Description
reptinvl	Reporting Interval (optional) specifies how often reports are to be generated and sent: • **15-MIN** – (default) • 1-HR • 1-DAY
reptstatm	Reporting Start Time (optional) specifies the time when the reports should start being generated. All selections will start reports at end of current reporting interval • **null** – (default) • 0-0 • 00-00
tid	Target ID of network element (optional)
tmper	Time Period (optional): • **15-MIN** • 1-HR • 1-DAY} **Note**: tmper must be equal to reptinvl or omitted.

SET-ATTR-<AIDType>

Name: **Set Attribute**

Purpose: Assigns a severity to an alarm or event condition. All alarm and event conditions (condtype) have default severities for notification conditions (ntfcnde) but most severities can be changed by the user. The assigned severities apply to alarms and events reported in the CLI and TL1 alarm messages and by the alarm LED indicators and alarm output contacts on the unit.

NOTE: Notification codes can only be changed through the TL1 interface, except for the standby Controller self-test failure and communications failure (see *ALARMS STANDBY on page 8-11*).

- This command does not apply to environment (ENV) conditions.
- Transient Conditions (TC) can be assigned to Not Alarmed (NA) and Not Reported (NR) severities.
- Condition severities are retrieved with the command *RTRV-ATTR-<AIDType> on page 9-56*.
- Critical (CR), Major (MJ), and Minor (MN) alarms are reported by REPT ALM messages (see *TL1 Automatic Messages on page 9-101*).
- Not Alarmed (NA) events are reported by REPT EVT messages (see *TL1 Automatic Messages on page 9-101*).

- Not Reported (NR) events do not produce any REPT messages. However, these events are logged and can be retrieved by the RTRV-COND command (see *RTRV-COND-<AIDType> on page 9-59*).

Category: Transport Surveillance Commands

Security: RW

Syntax: **`SET-ATTR-{T3|T1|E1|EQPT}:[<tid>]:[<aid>]:[<ctag>]::<ntfcncde>,<condtype>,<locn>,<dirn>,<tmpr>;`**

Field	Description
aid	Access ID must be ALL or omitted
condtype	Type of alarm or event condition. Only the following conditions are valid: • AISNAS – Alarm Indication Signal, North American Standard • BER-SF – Bit error rate signal failure • BER-SD – Bit error rate signal degrade • CONTEQPT – Control equipment failure • FAILTOSW – Failure to switch • IMPROPRMVL – Improper removal • INT – Internal hardware failure • INTERR – Internal error detected • LOF – Loss of frame • LOS – Loss of signal • PWR – Power +5V failure • RAI – Remote Alarm Indication • SYNCPRI – Loss of designated clock • TRMT – Transmitter failure
ctag	Correlation Tag (optional)
dirn	Direction – not supported in this release
locn	Location – not supported in this release
ntfcncde	Alarm severity notification code: • CR – Critical, *C • MJ – Major, ** • MN – Minor, * • NA – Not Alarmed, A • NR – Not Reported
tid	Target ID of network element (optional)
tmper	Time period that these statistics were gathered – not supported in this release

Example: **`SET-ATTR-T1:tid::ctag::MN,LOS,,,;`**

Assign Minor alarm severity to T1 Loss of Signal.

SET-ATTR-SECUDFLT

Name: **Set Attribute Security Default Time-out**

Purpose: Set the number of minutes before session inactivity times out the TL1 TCP/IP port. When the command is issued, any active sessions will be updated with the new session time-out period. Setting the tmout parameter to zero will turn off session inactivity time-outs so that sessions will never time out. The system default time-out is 31 minutes.

Note: This command applies only to TL1 sessions using the TCP/IP port on that Wide Bank. It does not affect TL1 sessions using the TL1 RS-232 port or any CLI sessions using TCP/IP or RS-232.

Category: Memory Administration Commands

Security: RWA

Syntax: `SET-ATTR-SECUDFLT:[<tid>]::[<ctag>]::TMOUT=<tmout>;`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)
tmout	Time-out period in minutes: • Any positive integer value • A zero value will disable timeout • Default value is **31**

Example: `SET-ATTR-SECUDFLT:tid::ctag::TMOUT=15;`

Set user TCP/IP sessions to time-out after 15 minutes of inactivity. For description of time-out message, see *Cancel User Session Event Message Format on page 9-106*.

SET-SID

Name: **Set System Identification**

Purpose: Set the TL1 network identification of the Wide Bank.

Category: Memory Administration Commands

Security: RWA

Syntax: **`SET-SID:[<tid>]::[<ctag>]::<newSID>;`**

Field	Description
ctag	Correlation Tag (optional)
newSID	New System Identification: Up to 20 alphanumeric or hyphen characters
tid	Target ID of network element (optional)

Example: **`SET-SID:tid::ctag::WB-1;`**

Set new SID to WB-1.

Response:

```
   tid 2002-01-05 11:23:48
M  ctag COMPLD
;
```

The first response following the SET-SID command will display the original tid so that the response can be matched to the command. Subsequent commands and responses will use the new tid.

SET-TH-<FacilityType>

Name: **Set Threshold Value**

Purpose: Sets the threshold for supported performance monitored facility types. If threshold is exceeded, a threshold crossing alert will be sent.

Category: Transport Surveillance Commands

Security: RW

Syntax:
```
SET-TH-{T3|T1|E1}:[<tid>]:[<aid>]:[<ctag>]::
[<montype>],<thlev>,,,<tmper>;
```

Field	Description
aid	Access ID depends on selected Facility Type: • For T3, use DS3-A, DS3-B, or ALL • For T1, use DS1-1 to DS1-28, or ALL • For E1, use E1-1 to E1-27, or ALL • Null defaults to ALL
ctag	Correlation Tag (optional)
montype	The type of performance monitoring statistic the threshold exists for: • For T3s, values are: CVL, ESL, LOSS-L, SESL, CVP-P, ESP-P, SESCP-P. • For T1s and E1s, values are CVL and ESL.
tid	Target ID of network element (optional)
thlev	Threshold Level, an integer value between 0 and (2^31)-1, a range from zero to more than 2 billion. If the number monitored for the performance type exceeds the threshold value for the given time period, a threshold crossing alert will be generated. If the value is zero, no threshold crossing alerts will be generated.
tmper	Time period that these statistics were gathered

Example:
```
SET-TH-T3:tid:ALL:ctag::CVL,100,,,15-MIN;
```

STA-LOCL-RST

CAUTION! THE RESTORATION COMMAND WILL DISRUPT SERVICE.

Name: **Start Local Restoration**

Purpose: Instructs the Wide Bank to restore the configuration parameters to their default values.

Category: Transport Surveillance Commands

Security: RW

Syntax: `STA-LOCL-RST:[<tid>]::[<ctag>];`

Field	Description
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `STA-LOCL-RST:tid::ctag;`

SW-TOPROTN-<FacilityType>

Name: **Switch To Protection**

Purpose: Instructs the Wide Bank to switch to the standby T3 Controller in slot B, or to move a DS1 channel to the spare card.

NOTE: If you switch T3 Controllers, your TL1 session will be terminated.

Category: Transport Surveillance Commands

Security: RW

Syntax: `SW-TOPROTN-{T3|T1|E1}:[<tid>]:[<aid>]:[<ctag>];`

Field	Description
aid	Access ID depends on FacilityType: • For T3, use ALL • For T1, use DS1-1 to DS1-28 • For E1, use E1-1 to E1-27
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `SW-TOPROTN-T3:tid:ALL:ctag;`

Switch to Protection Controller.

Example: `SW-TOPROTN-T1:tid:DS1-5:ctag;`

Move DS1 #5 to Spare Card.

SW-TOWKG-<FacilityType>

Name: **Switch To Working**

Purpose: Instructs the Wide Bank to switch to the T3 Controller in slot A, or to move a DS1 channel to its home card.

NOTE: If you switch T3 Controllers, your TL1 session will be terminated.

Category: Transport Surveillance Commands

Security: RW

Syntax: `SW-TOWKG-{T3|T1|E1}:[<tid>]:[<aid>]:[<ctag>];`

Field	Description
aid	Access ID depends on FacilityType: • For T3, use ALL • For T1, use DS1-1 to DS1-28 • For E1, use E1-1 to E1-27
ctag	Correlation Tag (optional)
tid	Target ID of network element (optional)

Example: `SW-TOWKG-T3:tid:ALL:ctag;`

Switch to Working Controller.

Example: `SW-TOWKG-T1:tid:DS1-5:ctag;`

Move DS1 #5 Home.

WRT-MEM-FILE

Name: **Write Memory File**

Purpose: Uploads the configuration file.

Category: Transport Surveillance Commands

Security: RW

Syntax: **`WRT-MEM-FILE:[<tid>]:CONFIG:[<ctag>]::`**
`[<byteOffset(integer)>]:<data>;`

Because this command can take more than two seconds to execute, an “In Progress” (IP) acknowledgment will be sent upon receiving a valid command.

Example:

```
WRT-MEM-FILE:tid:CONFIG:ctag::
160:000000000000000000000000000010001000000000000001000
40000000000;
```

TL1 Parameter Descriptions

Access Identifier <aid>

The Access Identifier determines which entity in the Wide Bank is addressed. The Access ID is represented by <aid>.

NOTE: For commands specifying DS1 and E1 circuits, you can often use the single-ampersand notation (&) to enter lists and the double-ampersand notation (&&) to specify a range of DS1s or E1s. For example, to enter DS1 #1, #3, and #5, enter DS1-1&DS1-3&DS1-5. To specify a range from DS1 #1 through #6, enter DS1-1**&&**DS1-6. The & and && notation can normally be used whenever the equivalent CLI command allows you to enter a list or range.

Facility Type	AID	Description and Possible Values
E1	E1 Low Speed Cards	E1-CARD-MSO-SPARE E1-CARD-MSO-{1-7} E1-CARD-SPARE E1-CARD-{1-7}
E1	E1 Low Speed Circuits	E1-SPARE-{1-4} E1-{01-27}.
ENV	Environment	EXT48V-{A,B} FAN-{A,B} TEMP-{A,B}
EQPT	Equipment	POWER-5V-A POWER-5V-B DS1-SPARE-{1-4} DS1-{01-28} E1-SPARE-{1-4} E1-{01-27} DS1-CARD-MSO-SPARE DS1-CARD-MSO-{1-7} DS1-CARD-SPARE DS1-CARD-{1-7} E1-CARD-MSO-SPARE E1-CARD-MSO-{1-7} E1-CARD-SPARE E1-CARD-{1-7} DS3-A DS3-B
T1	DS1 Low Speed Cards	DS1-CARD-MSO-SPARE DS1-CARD-MSO-{1-7} DS1-CARD-SPARE DS1-CARD-{1-7}
T1	DS1 Low Speed Circuits	DS1-SPARE-{1-4} DS1-{01-28}

Facility Type	AID	Description and Possible Values
T3	DS3 High Speed Cards	DS3-A DS3-B

Error Response: Invalid Access Identifier

```
   tid 2001-08-04 10:42:22
M  ctag DENY
   IIAC
   /* Invalid Access Identifier */
;
```

Access Identifier Types <AIDType>

This parameter specifies the type of entity that the operating system wants to address. Fields of this type are represented by {AIDType}.

Type	Description
ALL	All Access IDs
E1	E1 Circuit
ENV	ENV Circuit
EQPT	Equipment Unit
T1	T1 (or DS1) Circuit
T3	T3 (or DS3) Circuit

Error Response: Invalid Access Identifier Type

```
   tid 2001-08-04 10:42:22
M  ctag DENY
   IICM
   /* Invalid Command */
;
```

Additional Access Identifier Information <aiddet>

Because there can be two Controller cards, it may be necessary to specify whether the active or standby Controller is being addressed.

Identifier	Description
ACTIVE	Active DS3 Controller
STANDBY	Standby DS3 Controller

Alarm Code <almcde>

This parameter identifies the severity of the autonomous message. Identifiers are:.

Identifier	Description
*C	Critical
**	Major
*	Minor
^A	Automatic Message

Alarm Message <almmsg>

The message is a detailed text description of the alarm. It is up to 40 characters long and enclosed with a pair of escaped quotes.

ATAG Segment <atagseg>

This parameter specifies the list of alarm tag <atag> messages to be retrieved.

Automatic Message Tag <atag>

NOTE: For simplicity, examples and responses in this document will represent the <atag> by the lower-case letters atag.

This field is represented by <atag>. This tag is used in sequence by the Wide Bank in automatic messages. If an out-of-sequence value for this tag is received by the management application, it means that some automatic messages may have been missed.

Command Mode <cmdmde>

This parameter indicates the command execution mode: NORM or FRCD. This is hard-coded to FRCD in the Wide Bank, which means that existing parameter settings may be overridden in order to execute the command.

Completion Codes

Code	Description
COMPLD	Command received, executed, and completed.
DENY	Execution denied.
PRTL	Command received but only partially executed.
RTRV	Completion code of multiple responses to RTRV commands. The final response should have the COMPLD completion code.

Condition Description <conddescr>

This is detailed text description of the condition. It is up to 64 characters long and enclosed with a pair of escaped quotes.

Condition Effect <condeff>

This is the effect of the condition on the system.

Condition Code	Description
CL	Clear – the condition effect used to clear standing conditions.
SC	Standing Condition – an event that must be cleared.
TC	Transient Condition – does not need clearing. It happens and then it is over.

Condition Type <condtype>

This parameter describes the type of alarm, event or condition. This field is represented by `<condtype>`.

Alarmed Condition Types

Condition	Description
ACTLPBK	Loopback send code is Active
AISNAS	Alarm Indication Signal – North American Standard
BER-SD	Bit Error Rate – Signal Degrade
BER-SF	Bit Error Rate – Signal Failure
CLFAN	Cooling Fan failure
CONTEQPT	Control Equipment failure
FAILTOSW	Failure to Switch to protection

Condition	Description
HITEMP	High Temperature
IMPROPRMVL	Improper card Removal
INHAUTORSTEQPT	Revertive Off
INHAUTORSTSYNC	DS3 clockrevert Off
INHLPBK	Loopdetect Off
INHSWPR	Facility protection not enabled
INHSWWKG	Equipment protection not enabled
INT	Internal hardware failure
INTERR	Internal error detected
LOF	Loss of frame
LOS	Loss of signal
LPBKEQPT	Equipment loopback
LPBKLINE	Line loopback
LPBKMETALLIC	Metallic loopback
LPBKPAYLOAD	Payload loopback
NORMAL	Normal condition is used only for REPT EVT "clear" condition, with clarification in the description field to indicate which condition has cleared.
PROTNA	Protection Unit not Available
PWR	Power +5V failure
PWR	Power –48V failure or low
RAI	Remote Alarm Indication
SYNCPRI	Loss of designated clock
TRMT	Transmitter Failure
T-x	Threshold Crossing Alert, where "x" represents a montype. For x values, see *Monitored Parameter Type <montype> on page 9-95*.
WKSWBK	Working unit switched back to working
WKSWPR	Working unit switched to protect unit

Error Response: Invalid Condition Type

```
   tid 2001-11-02 01:41:20
M  ctag DENY
   INUP
   /* Invalid Payload block. Invalid positional field. */
;
```

Correlation Tag <ctag>

NOTE: For simplicity, examples and responses in this document will represent the <ctag> by the lower-case letters ctag.

This field is represented by <ctag>. The correlation tag is used to match commands and responses. It is sent out as part of the command, and the Wide Bank returns it as part of the response. The correlation tag is assigned by the user issuing the command and can be arbitrarily chosen. Each command issued should be assigned a different correlation tag to prevent confusing commands and responses.

Correlation tags are optional in TL1 commands. The correlation tag can contain between zero and six alphanumeric characters. If the correlation tag is not issued with the command, the responses to that command will have a correlation tag with a value of zero.

An invalid ctag will produce the following error response.

```
   tid 2001-08-05 00:40:54
M  ctag DENY
   IICT
   /* Invalid Correlation Tag */
;
```

Data Segment <data_seg>

This parameter specifies the data to be written. The value is a hexadecimal string.

Date <date>

This parameter specifies the time. The date format is YY-MM-DD, where YY is the last two digits of the year, MM is the month, and DD is the day.

Direction of Alarm or Condition <dirn>

This parameter indicates the direction of the alarm or condition with respect to the Wide Bank.

Identifier	Description
NA	Not Applicable
RCV	Receive
TRMT	Transmit

Error Response: Invalid Direction

This parameter is used in automatic messages and is not supported in TL1 commands. If issued as part of a command, the following error response is returned.

```
   tid 2001-08-04 12:06:48
M  ctag DENY
   ENEQ
   /* Direction (dirn) not supported */
;
```

DS1/E1 Properties

Field	Description and Possible Vales
DLCID	Circuit ID: ASCII string – up to 32 characters.
LBO	Line Build Out (length): (Applies to T1 only. E1 has no LBO.) • 1 – DSX (0'-110') • 2 – DSX (110'-220') • 3 – DSX (220'-330') • 4 – DSX (330'-440') • 5 – DSX (440'-550') • 6 – DSX (550'-660')
LINECDE	Line Code. (Applies to T1 only. E1 is hard coded to HDB3.) • AMI – Alternate Mark Inversion, • B8ZS – Bipolar with 8-zero Substitution
OMODE	Output Mode: • NORM – Normal Data • AIS – Alarm Indication Signal • QRSS – Quasi-random Signal, unframed • Null value defaults to NORM. • QRSU is not supported.
RVRTFLAG	Revertive Lockout Flag: • LCKD – Locked, DS1 will remain on spare until flag is cleared, new card is inserted, or DS1 is sent home manually. • UNLCKD – Unlocked, DS1 will stay on spare if card self-test fails, otherwise it will return to the home channel after two minutes.

Error Message: Invalid T1/E1 Parameter or Value

```
   tid 2001-08-04 13:18:00
M  ctag DENY
   INUP
   /* Invalid Payload block. Invalid name value field.  */
;
```

DS3 Properties

Field	Description and Possible Vales
CKTID	Circuit Identification Parameter: ASCII string – up to 32 characters.
FMT	DS3 digital signal format: • CBIT – C-bit Parity format, M23 Framing format • M23 – M23 Framing format
LBO	Line Build Out (length): • 1 – Short Line Length (< 50 feet) • 2 – Long Line Length (>= 50 feet)
OMODE	Output Mode: • NORM – Normal Data • AIS – Alarm Indication Signal • QRSS – Quasi-random Signal, unframed • Null value defaults to NORM. • QRSU is not supported.

Error Message: Invalid T3 Parameter or Value

```
   tid 2001-08-04 13:18:00
M  ctag DENY
   INUP
   /* Invalid Payload block. Invalid name value field. */
;
```

Environment Access Identifier (EnvAID)

Field	Description and Possible Values
ALL	All of following. Null value defaults to ALL.
EXT48V-A	External -48V Power Input to DS3 Controller A
EXT48V-A	External -48V Power Input to DS3 Controller B
FAN-A	Faceplate Fan A
FAN-B	Faceplate Fan B
TEMP-A	DS3 Controller A over temperature
TEMP-B	DS3 Controller B over temperature

Equipment Parameters

Field	Description and Possible Values
ID	Equipment ID: Up to 20 ASCII characters.
TMG	Timing Source: • INT – Internal clocke • EXT – External Clock, Slave to DS3 Line • LINE – Slave to DS3 Line

Error Message: Invalid Equipment Parameter Value

```
   tid 2001-08-04 13:18:00
M  ctag DENY
   INUP
   /* Invalid Payload block. Invalid name value field. */
;
```

Error Message: Invalid Test Session Number

Test session numbers are not supported.

Location of Alarm or Condition <locn>

This parameter indicates the location of the alarm condition.

Identifier	Description
FEND	Far End: At a Distant Entity connected to the Identified Entity
NEND	Near End: At the Identified Entity

Error Response: Invalid Location

```
   tid 2001-08-04 11:51:58
M  ctag DENY
   INUP
   /* Invalid Payload block. Invalid positional field. */
;
```

Log Identifier <lognm>

This indicates the name of the log.

Identifier	Description
EVT	Event Log
EVT-SBY	Event log in Standby Controller. This identifier can only be used to clear the log in the Standby Controller.
SECURITY	Log where Security Events are Logged

Error Response: Invalid Log Identifier

```
   tid 2001-08-04 11:51:58
M  ctag DENY
   INUP
   /* Invalid Payload block. Invalid positional field. */
;
```

Loopback Type <lpbktype>

This indicates the type of loopback.

Identifier	Description
EQUIPMENT	Equipment Loopback. Valid for T1/E1 and T3.
LINE	Line Loopback. Valid for T1/E1 and T3.
METALLIC	Metallic Line Loopback. Valid for T1/E1 only.
PAYLOAD	Payload Loopback. Valid for T3 only.

Error Response: Invalid Loopback Type

```
   tid 2001-08-04 11:51:58
M  ctag DENY
   INUP
   /* Invalid Payload block. Invalid positional field. */
;
```

Memory <frommem> and <tomem>

From Memory <frommem> specifies the data area from which memory is to be copied, while To Memory <tomem> specifies data area where memory is to be copied to.

Code	Description
ACTIVE	Specifies memory area in active Controller
CONFIG	Specifies configuration memory area
STANDBY	Specifies memory area in standby Controller
TEMP	Specifies temporary memory area

Message Type <msgtype>

This parameter specifies the type of autonomous message to be retrieved.

Type	Description
ALM	Alarm
DBCHG	Database Change
EVT	Event
LOG	Log
PM	Performance Monitory

Monitor Date <mondat>

This parameter specifies the starting date of the performance monitoring (PM) or storage register period defined with the <tmper> variable.

Monitor Level <monlev>

This parameter specifies the discriminating level for the requested monitored parameter. The Wide Bank currently supports only 1-UP, which means it will report any performance statistics that do not have a value of zero.

Monitor Time <montm>

This parameter specifies the starting time of the performance monitoring (PM) or storage register period defined with the <tmper> variable.

Monitored Parameter Type <montype>

This identifies the type of parameter being monitored.

Identifier	Description
CSS	Control Slip Seconds count
CVL	Coding Violation count – Line. This montype supports Threshold Cross Alerts on the DS1s and DS3.
CVP-P	Coding Violation count – Path. This montype supports Threshold Cross Alerts on the DS3 only.
DGRML	Degraded Minute count – Line
ESL	Errored Second count – Line
ES-LFE	Errored Second count – Line, Far End
ESP-P	Errored Second count Path – P-bit parity. This montype supports Threshold Cross Alerts on the DS3 only.
LOSS-L	Loss of Signal Seconds count – Line
PSC	Protection Switching Count
PSD	Protection Switching Duration in seconds
SEFS	Severely Errored Framing Second count
SESCP-P	Severely Errored Second count – Path, DS3 CP-bit parity. This montype supports Threshold Cross Alerts on the DS3 only.
SESL	Severely Errored Second count – Line. This montype supports Threshold Cross Alerts on the DS3 only.
SES-LFE	Severe Errored Second Count – Line, Far End
UASL	Unavailability Second count – Line
UAS-LFE	Unavailability Second count – Line, Far End

Error Response: Invalid Monitored Parameter Type

```
   tid 2001-08-04 12:12:07
M  ctag DENY
   INUP
   /* montype must be "ALL" or NULL */
;
```

The following error occurs for invalid montype in set threshold or retrieve threshold commands.

```
   2001-08-05 22:39:34
M  0 DENY
   INUP
   /* Invalid Payload block. Invalid positional field. */
;
```

Notification Code <ntfncde>

The notification code specifies the severity or class of alarm, event or condition. This field is represented by `<ntfncde>`.

Identifier	Description
CL	Condition Cleared
CR	Critical Alarm
MJ	Major Alarm
MN	Minor Alarm
NA	Not Alarmed
NR	Not Reported

Error Response: Invalid Notification Code

```
   tid 2001-08-04 01:41:20
M  ctag DENY
   INUP
   /* Invalid Payload block. Invalid positional field. */
;
```

Number of Reports <numrept>

This parameter specifies the number of reports to be generated and sent.

Occurrence Date <ocrdat>

This parameter specifies the date when the event occurred. The format is MM-DD, where MM is the month and DD is the day.

Occurrence Time <ocrtm>

This parameter specifies the time when event occurred. The format is HH-MM-SS, where HH is the hours (24-hour clock), MM is the minutes, and SS is the seconds.

Phase <ph>

This parameter specifies the degree to which the system should be initialized. This parameter is currently accepted but ignored.

Private Identifier <pid>

This parameter specifies the private password identifier. This is a string of up to ten ASCII characters and must contain at least two non-alphabetic characters, with at least one non-alphanumeric character. Example: FRED-1

Reporting Interval <reptinvl>

This parameter specifies how often reports are to be generated and sent: 15-MIN, 1-HR, or 1-DAY.

Reporting Start Time <reptstatm>

This parameter specifies the time when the reports should start being generated. The Wide Bank currently supports only NULL, 0-0, or 00-00. All of these start the reports immediately.

Restoration Function Codes

These function codes identify the area within the NE that restoration is allowed or inhibited.

Code	Description
DS1EQPT	Allow or inhibit autorestoration of a DS1 card
DS3EQPT	Allow or inhibit autorestoration of the DS3 card
SYNC	Allow or inhibit autorestoration of the clock

Security Alarm Type <secualmtype>

This parameter explains type of security alarm.

Type	Description
INTRUSION	There were 3 consecutive failed login attempts
LOGBUFR90-SECULOG	The security log is 90% full
LOGBUFROVFL-SECULOG	The security log buffer is overflowing
T-UIDAGE	A user ID has not been used over a long period of time and should be disabled. The Wide Bank does not currently support T-UIDAGE.

Service Effect of Alarm or Condition <srveff>

This field is represented by <**srveff**>.

Error Response: Invalid Service

Identifier	Description
NSA	Non-Service affecting Condition
SA	Service affecting Condition

Service Effect Codes are used in automatic messages and are not supported in TL1 commands. When a service effect is specified in a command, the following error response is returned:

```
   tid 2001-08-04 01:41:20
M  ctag DENY
   ENEQ
   /* Service effect (srveff) not supported */
;
```

Target Identifier <tid> and Source Identifier <sid>

NOTE: For simplicity, examples and responses in this document will represent the target id and source identifiers by the lower-case letters tid and sid.

The target identifier <tid> specifies the network element to which the command is sent. The source identifier <sid> is part of the response, and specifies which network element transmitted the response. Both tid and sid are alphanumeric or hyphen characters.

The target identifier is optional in TL1 commands. However, if a value is entered that does not match the target identifier stored on the network element, the following error response is returned.

```
   tid 2001-08-05 00:43:22
M  ctag DENY
   IITA
   /* Input, Invalid Target Indentifier */
;
```

The target identifier or source identifier is set by the command *tl1 networkid "networkid"* issued from the CLI of the network element to which the target identifier belongs. Any commands issued to that network element must contain its target identifier. That same target identifier will become the source identifier in any response that specific network element sends back.

Threshold Level <thlev>

This parameter specifies the threshold level. If this level is exceeded, the Wide Bank will send an event report for the associated parameter.

Time <time>

This parameter specifies the date. The date format is HH:MM:SS, where HH is the hour (24-hour clock), MM is the minutes, and SS is the seconds.

Time Offset <tmofst>

This parameter specifies the time offset from the end of the last complete accumulation time period to the beginning of the accumulation period specified with the <tmper> variable. The Wide Bank will accept NULL and 0-1-0 values but these values are ignored and the time offset defaults to the current register.

Time Period <tmper>

This identifies the time period for performance monitoring.

Identifier	Description
1-DAY	One Day
1-HR	One Hour
15-MIN	15 Minutes

Error Response: Invalid Time Period

```
   tid 2001-08-04 11:51:58
M  ctag DENY
   INUP
   /* Invalid Payload block. Invalid positional field. */
;
```

Type or Request <typereq>

This parameter describes the type of condition or state to be retrieved. This field is represented by `<typereq>`. Values can be any specific `<condtype>` (see *Condition Type <condtype> on page 9-87*).

User Access Privilege <uap>

This parameter determines which commands the user can issue.

Identifier	Description
R	Monitor: Cannot change any parameters or configuration items.
RW	Operator: Can issue any command, except security commands.
RWA	Administrator: Can issue any command.

Error Response: Illegal User Access Privilege

```
   tid 2001-08-04 01:41:20
M  ctag DENY
   INUP
   /*  Invalid Payload block. Invalid positional field. */
;
```

Error Response: Insufficient Privilege to Execute Command

```
   tid 2001-08-04 10:42:22
M  ctag DENY
   PICC
   /* Illegal Command Code */
;
```

User Identifier <uid>

This parameter specifies the user identifier. This is a string of up to 10 alphanumeric characters.

TL1 Automatic Messages

The Wide Bank 28 DS3 automatically reports alarms and events to the network management system. The Wide Bank provides default values for the severities assigned to these alarms and events. However, you can change the notification code (ntfcncde) of many alarm and events in order to alter their severity or to prevent them from being automatically reported (see *SET-ATTR-<AIDType> on page 9-75*).

NOTE: Notification codes can only be changed through the TL1 interface.

Report Alarm Message Format

Syntax:

```
<cr><lf><lf>
^^^<tid>^<YY-MM-DD>^<HH:MM:SS><cr><lf>
<almcde>^<atag>^REPT^ALM^<modifier2><cr><lf>
^^^"<aid>:<ntfcncde>,<condtype>,<srveff>,
   <ocrdat>,<ocrtm>,<locn>,<dirn>,:
   \"<description>\"<aiddet>,"
;
```

Example:

```
   tid 2001-08-04 11:51:58\
*  atag REPT ALM EQPT
   "DS1-07:MN,INT,NSA,11-14,01-01-40,,:
   \"Internal hardware fault or failure\","
;
```

Field	Description
^	Space character
cr	Carriage Return character
lf	Line Feed character
aid	Access ID used to identify trouble interface

Field	Description
aiddet	Supplementary Access ID information used to identify location of reported trouble: • MASTER – master Controller • SLAVE – slave Controller
almcde	Alarm code identifies priority of action: *C – Critical alarm ** – Major alarm *^ – Minor alarm A^ – Automatic message If multiple alarms occur, the alarm code will be the highest severity.
atag	Automatic message tag. A sequential value is assigned to each message by the Wide Bank. Receiving a non-sequential value indicates that some messages have been lost.
conddescr	Condition Description provides a detailed description of the trouble.
condtype	Condition Type. See Table 2-1 *Alarm and Event Message Parameters on page 9-107* for values and descriptions.
dirn	Direction of traffic: • TRMT – transmit • RCV – receive • NA – not applicable
HH:MM:SS	Time (24 hour) in format Hours:Minutes:Seconds
locn	Location: • NEND – near end • FEND – far end
modifier2	Identifies interface type: • EQPT – equipment • ENV – environment • T1 – DS1 • T3 – DS3 • SECU – security
ntfcncde	Notification Code: • CR – Critical alarm • MJ – Major alarm • MN – Minor alarm • CL – condition cleared
ocrdat	Occurrence Date: MM-DD • MM – month • DD – day
ocrtm	Occurrence Time: HH-MM-SS • HH – hour • MM – minutes • SS – seconds

Field	Description
sid	Source ID
srveff	Service Effect code for REPT ALM messages: • SA – service affecting • NSA – not service affecting
YY-MM-DD	Date in format Year-Month-Day

Report Alarm Clear Message Format

For every automatic alarm report message generated, there is a corresponding message that is generated when the alarm clears. The TL1 alarm clear message is the same as the original alarm report message except for the alarm code and notification code fields.

Example: **ALARM MESSAGE**

```
   tid 2001-08-04 11:51:58
*C atag REPT ALM EQPT
   "DS3-A:CR,LOS,SA,08-04,11-51-58,NEND,RCV:
   \"Loss of Signal\",ACTIVE"
;
```

When the above alarm is cleared, the following TL1 message is sent again with the alarm code changed from critical (*C) to alert (A) and the notification code changed from critical (CR) to cleared (CL).

Example: **CLEAR MESSAGE**

```
   tid 2001-08-04 11:52:19
A  atag REPT ALM EQPT
   "DS3-A:CL,LOS,SA,08-04,11-52-19,NEND,RCV:
   \"Loss of Signal\",ACTIVE"
;
```

Report Event Message Format

The event message syntax is almost identical to alarm messages except that an event condition effect code <condeff> replaces the alarm service effect code <serveff>.

Syntax:

```
<cr><lf><lf>
^^^<sid>^<YY-MM-DD>^<HH:MM:SS><cr><lf>
<almcde>^<atag>^REPT^EVT^<modifier2><cr><lf>
^^^"<aid>:<condtype>,<condeff>,<ocrdat>,
   <ocrtm>,<locn>,<dirn>,:
   \"<description>\"<aiddet>,"<cr><lf>
;
```

Field	Description
condeff	Condition Effect code for REPT EVT messages: • CL – standing condition cleared • SC – standing condition raised • TC – Transient condition • Null value defaults to TC
other fields	Same as *Report Alarm Message Format on page 9-101*.

Example:

```
   tid 2001-10-19 16:26:20
A  atag REPT EVT T3
   "DS3-A:RAI,SC,10-19,16-26-19,NEND,RCV,,,:
   \"Remote Alarm Indication\""
;
```

Report Performance Monitoring Message Format

Performance monitoring messages are generated according to the report schedule (see *SCHED-PMREPT-<FacilityType> on page 9-74*). These reports provide performance statistics and can be allowed or inhibited (see *ALW-PMREPT-<FacilityType> on page 9-22* and *INH-PMREPT-<FacilityType> on page 9-38*).

Syntax:

```
<cr><lf><lf>
^^^<sid>^<YY-MM-DD>^<HH:MM:SS><cr><lf>
A^^<atag>^REPT^PM^<FacilityType>
^^^"[<FacilityId>]:<montype>,<monval>,[<vldty>],
    [<locn>],[<dirn>],[<tmper>],[<mondat>],[<montm>]"
;
```

Field	Description
FacilityType	T1, E1, T3
FacilityID	Facility ID depends on Facility Type: • For T1, values are DS1-1 to DS1-28 • For E1, values are E1-1 to E1-27 • For T3, values are DS3-A, DS3-B
atag	Automatic message tag. A sequential value is assigned to each message by the Wide Bank. Receiving a non-sequential value indicates that some messages have been lost.
dirn	Direction of traffic: • TRMT – transmit • RCV – receive
locn	Location: • NEND – near end • FEND – far end
mondat	Date during which the time period started
montm	Time during which the time period started
montype	Monitored parameter type
monval	Monitor Value
sid	Source Identifier
tmper	Time period that these statistics were gathered • 15-MIN – 15 minutes • 1-HR – 1 hour • 1-DAY – 1 day
vldty	Validity • COMPL – complete • PRTL – partial period

Example:

```
    tid 2001-08-04 11:51:58
A   atag REPT PM T1
    "DS1-01:UASL,20,COMPL,,,15-MIN,,"
    "DS1-01:SESL,50,COMPL,,,15-MIN,,"
    "DS1-01:LOSS,0,COMPL,,,15-MIN,,"
    "DS1-01:ESL,100,COMPL,,,15-MIN,,"
    "DS1-01:CSS,0,COMPL,,,15-MIN,,"
    "DS1-01:DGRML,0,COMPL,,,15-MIN,,"
    "DS1-01:PSD,0,COMPL,,,15-MIN,,"
    "DS1-01:PSL,900,COMPL,,,15-MIN,,"
    "DS1-01:CVL,0,COMPL,,,15-MIN,,"
;
```

Cancel User Session Event Message Format

If two or more users have active sessions and one user session times out because of user inactivity, the other users will receive a CANC message. In the following example, STEVE is the user that timed out:

Example:

```
    tid 2001-08-04 04:40:32
A   atag CANC
    STEVE
    /* Session Timeout: STEVE */
;
```

The session time-out period can be set by the administrator. The default is 31 minutes. See *SET-ATTR-SECUDFLT on page 9-77*.

DS3 Far-End Alarms

Far-end alarms are events that occur at a remote location and are reported to the Wide Bank over the DS3 link. This feature and the associated commands require the DS3 to be set for C-bit framing.

Message Summary Table

Table 2-1 summarizes the alarm and event messages provided by the Wide Bank 28 DS3.

NOTE: Table 2-1 lists the *default* values for the Notification Code alarm severities. You can assign a different alarm severity to many of the Condition Types by using the TL1 command *SET-ATTR-<AIDType> on page 9-75*. Alarm severities for the standby Controller can be set using the CLI command *ALARMS STANDBY on page 8-11*.

Table 2-1 Alarm and Event Message Parameters

Access Identifier	Report Message Type	Interface Type	Default Notifi-cation Code	Service or Con-dition Effect Code	Condition Type	Condition Description
DS3-{A,B} <aiddet>= ACTIVE	REPT ALM	EQPT	CR	SA	CONTEQPT	Control Equipment Failure
			MN	SA	INT	Internal Hardware Fault or Failure
			MJ	NSA	IMPROPRMVL	Improper Removal
			MN	NSA	PROGFLT	Software Version Mismatch Between Controllers
			CR	SA	TRMT	Transmitter Failure
	REPT ALM	T3	CR	SA	LOS	Loss of Signal
			CR	SA	LOF	Loss of Frame
			CR	NSA	SYNCPRI	DS3 Loss of Designated Clock
DS3-{A,B} <aiddet>= STANDBY	REPT ALM	EQPT	MN	NSA	CONTEQPT	Control Equipment Failure
			MN	NSA	INT	Internal Hardware Fault or Failure
			MN	NSA	IMPROPRMVL	Improper Removal
			MN	NSA	TRMT	Transmitter Failure
	REPT ALM	T3	MN	SA	LOS	Loss of Signal
			MN	SA	LOF	Loss of Frame
			MN	NSA	SYNCPRI	DS3 Loss of Designated Clock

Table 2-1 Alarm and Event Message Parameters (Continued)

Access Identifier	Report Message Type	Interface Type	Default Notifi-cation Code	Service or Con-dition Effect Code	Condition Type	Condition Description
DS3-{A,B} FAR END (C-bit framing only)	REPT EVT	T3		SC	RAI	Far-end DS3 Equipment Failure (NSA)
						Far-end DS3 Equipment Failure (SA)
						Far-end DS3 Loss of Signal
						Far-end DS3 Out of Frame
						Far-end DS3 Receive AIS
						Far-end DS3 Receive IDLE
						Far-end DS1 Equipment Failure (NSA)
						Far-end DS1 Equipment Failure (SA)
						Far-end Multiple DS1 LOS
						Far-end Single DS1 LOS

Table 2-1 Alarm and Event Message Parameters (Continued)

Access Identifier	Report Message Type	Interface Type	Default Notifi-cation Code	Service or Con-dition Effect Code	Condition Type	Condition Description
DS3-{A,B}	REPT ALM	T3	MJ	SA	BER-SF	Signal Fail
			MN	NSA	BER-SD	Signal Degrade
	REPT EVT	T3			WKSWPR	Working Unit Switched to Protect Unit
					WKSWBK	Working Unit Switched Back to Working
	REPT EVT	T3		SC	AISNAS	Alarm Indication Signal - North American Standard
					RAI	Remote Alarm Indication
	REPT EVT	T3		TC	T-CVL	Threshold Violation - CV Line
					T-CVP-P	Threshold Violation - CV Path p-parity
					T-ESL	Threshold Violation - Errored seconds line
					T-ESP-P	Threshold Violation - Errored seconds path p-parity
					T-LOSS-L	Threshold Violation - Loss of signal seconds line
					T-SESL	Threshold Violation - Severely errored seconds line
					T-SESCP-P	Threshold Violation - Severely errored seconds path
	Not Reported				ACTLPBK	Loopback send code is Active
					PROTNA	Protection unit is not available
					LPBKEQPT	Equipment loopback
					LPBKLINE	Line loopback
					LPBKPAYLOAD	Payload loopback
					INHAUTORSTEQPT	Revertive Off
					INHAUTORSTSYNC	DS3 clockrevert Off
					INHLPBK	Loopdetect Off
					INHSWPR	Facility protection not enabled
					INHSWWKG	Equipment protection not enabled

Table 2-1 Alarm and Event Message Parameters (Continued)

Access Identifier	Report Message Type	Interface Type	Default Notifi-cation Code	Service or Con-dition Effect Code	Condition Type	Condition Description
DS1-{01-28}	REPT ALM	EQPT	MN	NSA	INT	Internal Hardware Fault or Failure
	REPT ALM	T1	MN	NSA	BER-SD	Signal Degrade
			MJ	SA	BER-SF	Signal Fail
			MJ	SA	FAILTOSW	Failed to Switch
			MJ	SA	LOS	Loss of Signal
	REPT EVT	T1			T-CVL	Threshold Violation - CV Line
					T-ESL	Threshold Violation - Errored seconds line
					WKSWPR	Working Unit Switched to Protect Unit
					WKSWBK	Working Unit Switched Back to Working
	Not Reported				ACTLPBK	Loopback send code is Active
					INHLPBK	Loopdetect Off
					INHSWPR	Facility protection not enabled
					INHSWWKG	Equipment protection not enabled
					LPBKEQPT	Equipment loopback
					LPBKLINE	Line loopback
					LPBKMETALLIC	Metallic loopback
					PROTNA	Protection unit is not available
DS1-CARD-{1-7}	REPT ALM	EQPT	MJ	SA	FAILTOSW	Multiple MSO Card Removal
			MJ	SA	IMPROPRMVL	Improper Removal
DS1-CARD-SPARE	REPT ALM	EQPT	MN	NSA	IMPROPRMVL	Improper Removal
DS1-CARD-MSO-{1-7}	REPT ALM	EQPT	MN	NSA	IMPROPRMVL	Improper Removal
DS1-CARD-MSO-SPARE	REPT ALM	EQPT	MN	NSA	IMPROPRMVL	Improper Removal

Table 2-1 Alarm and Event Message Parameters (Continued)

Access Identifier	Report Message Type	Interface Type	Default Notifi-cation Code	Service or Con-dition Effect Code	Condition Type	Condition Description
E1-{01-27}	REPT ALM	EQPT	MN	NSA	INT	Internal Hardware Fault or Failure
	REPT ALM	E1	MN	NSA	BER-SD	Signal Degrade
			MJ	SA	BER-SF	Signal Fail
			MJ	SA	FAILTOSW	Failed to Switch
			MJ	SA	LOS	Loss of Signal
	REPT EVT	E1			T-CVL	Threshold Violation - CV Line
					T-ESL	Threshold Violation - Errored seconds line
					WKSWPR	Working Unit Switched to Protect Unit
					WKSWBK	Working Unit Switched Back to Working
	Not Reported				ACTLPBK	Loopback send code is Active
					INHLPBK	Loopdetect Off
					INHSWPR	Facility protection not enabled
					INHSWWKG	Equipment protection not enabled
					LPBKEQPT	Equipment loopback
					LPBKLINE	Line loopback
					LPBKMETALLIC	Metallic loopback
					PROTNA	Protection unit is not available
E1-CARD-{1-7}	REPT ALM	EQPT	MJ	SA	FAILTOSW	Multiple MSO Card Removal
			MJ	SA	IMPROPRMVL	Improper Removal
E1-CARD-SPARE	REPT ALM	EQPT	MN	NSA	IMPROPRMVL	Improper Removal
E1-CARD-MSO-{1-7}	REPT ALM	EQPT	MN	NSA	IMPROPRMVL	Improper Removal
E1-CARD-MSO-SPARE	REPT ALM	EQPT	MN	NSA	IMPROPRMVL	Improper Removal

Table 2-1 Alarm and Event Message Parameters (Continued)

Access Identifier	Report Message Type	Interface Type	Default Notifi-cation Code	Service or Con-dition Effect Code	Condition Type	Condition Description
EXT48V-{A,B}	REPT ALM	ENV	MN		PWR-48	Power -48V Fail or Low
FAN-{A,B}	REPT ALM	ENV	MJ		CLFAN	Cooling Fan Fail
FAN-A&FAN-B	REPT ALM	ENV	MJ		CLFAN	Fan Faceplate Not Present
POWER-5V-{A,B}	REPT ALM	EQPT	MN	NSA	PWR	Power +5V Fail
SECURITY	REPT ALM	SECU	MJ	NSA	LOGBUFR90-SECULOG	TL1 Security Log 90% Full
			MJ	NSA	LOGBUFROVFL-SECULOG	TL1 Security Log Full
TEMP-{A,B}	REPT ALM	ENV	MN		HITEMP	High Temp
Unit Identifier <uid>		SECU	MN	NSA	INTRUSION	

CHAPTER 10

Maintenance

In this Chapter

Card Maintenance

The Wide Bank is equipped with one or two Controller cards for processing and high-speed connections. For Low-Speed (LS) connections the Wide Bank can have from one to seven active low-speed cards and one spare low-speed card. These cards contain all the Wide Bank circuits, and can be removed and replaced with power on (hot-swapped).

WARNING! SEE PROPER ELECTROSTATIC DISCHARGE (ESD) PROCEDURES WHEN REMOVING AND HANDLING THE LOW-SPEED AND CONTROLLER CARDS. WE RECOMMEND THAT YOU WEAR A RESISTANCE-STYLE WRIST STRAP TO GROUND YOURSELF THROUGH THE EQUIPMENT CHASSIS. SEE *STATIC-SENSITIVE EQUIPMENT HANDLING PROCEDURES* ON *page 5-3* FOR INSTRUCTIONS ON HOW TO USE A WRIST STRAP.

Card Locations

The following figure shows card slot and circuit locations. The Controller cards occupy the two wide slots at the top left of the chassis. Any low-speed card slot, including the spare slot, can contain either a standard LS card or an MSO card. The figure below shows both low-speed card types for purposes of identification but it is recommended that all cards be the same type.

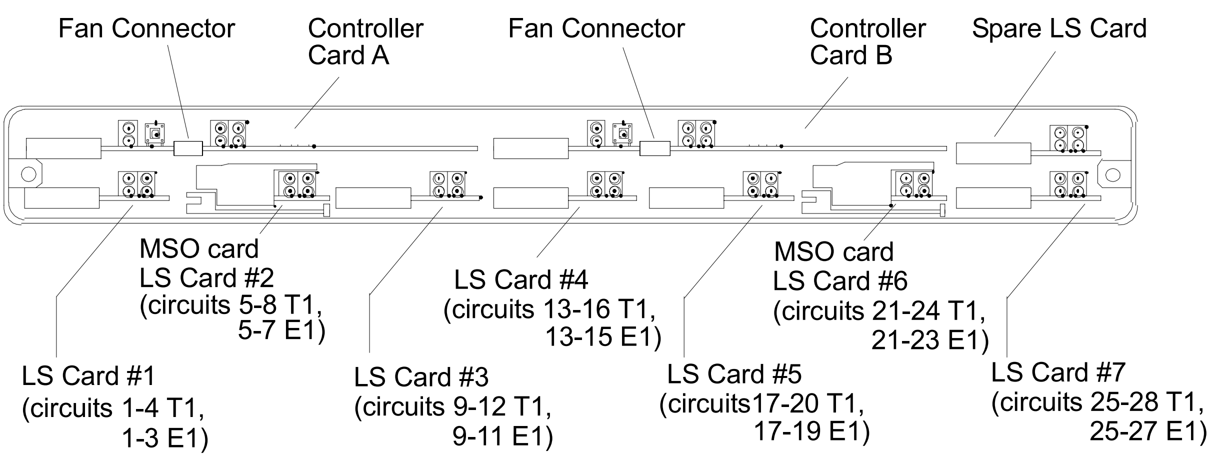


Figure 10-1 Card Locations (front view)

Removing and Installing Faceplates

DANGER! **FIRE HAZARD. STANDARD UL 1950 REQUIRES THAT ALL ACCESS COVERS BE REPLACED TO PREVENT FIRES FROM SPREADING TO NEARBY EQUIPMENT.**

Wide Banks come either with a standard (no-fan) faceplate or with the fan faceplate option (FFO). The faceplate must be removed and re-installed when replacing a circuit card. If a fan fails on a fan faceplate, the entire fan faceplate must be replaced because individual fans are not replaceable.

Standard Faceplates

1. Remove the faceplate with a Phillips-head screw driver. Loosen the two captive screws on each end of the faceplate that secure the faceplate to the Wide Bank chassis.
2. When installiing the faceplate, do not overtighten the captive screws. Carrier Access recommends a maximum torque of 8 to 10 inch-pounds.

Fan Faceplates

CAUTION! **IN HIGH-DENSITY RACKS WITH THE POWER TURNED ON, A FAN FACEPLATE MUST BE RE-INSTALLED WITHIN 5 MINUTES TO PREVENT THE WIDE BANK FROM OVERHEATING AND INTERRUPTING SERVICE.**

NOTE: Fan faceplates can only be installed on FFO-capable Controller cards equipped with fan power connectors.

Fan faceplates have two fans that provide extra cooling for high-density installations. Power for the fans is derived from connections between the faceplate and the two Controller cards. These connections also include a tachometer lead that allows the fans to be monitored and tested. Therefore, proper alignment of the power connectors is essential when installing a fan faceplate.

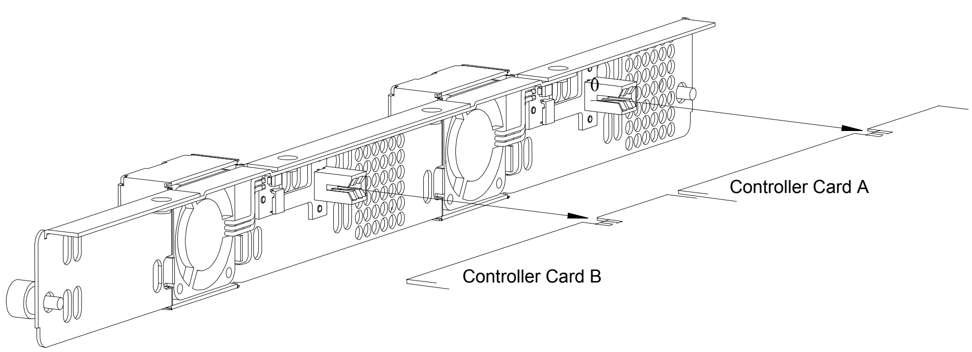


Figure 10-2 Fan Faceplate Installation

1. Remove the fan faceplate with a Phillips-head screw driver. Loosen the two captive screws on each end of the faceplate that secure the faceplate to the Wide Bank chassis. A little force may be required to disconnect the two fan power connectors.
2. When installiing the fan faceplate, use care to ensure correct alignment of the two power connectors before tightening the fastening screws at each end of the faceplate. Do not overtighten the captive screws. Carrier Access recommends a maximum torque of 8 to 10 inch-pounds.

NOTE: When a fan faceplate is installed with the Wide Bank power turned on, there is a 30-second delay before the fans are turned on.

Replacing Low-Speed Cards

WARNING! **See proper electrostatic discharge (ESD) procedures when removing and handling the low-speed and Controller cards. We recommend that you wear a resistance-style wrist strap to ground yourself through the equipment chassis. See _Static-Sensitive Equipment Handling Procedures_ on _page 5-3_ for instructions on how to use a wrist strap.**

Low-speed cards come in two styles: the standard card and the Maintenance Service Option (MSO) card. The procedures for swapping these cards are different, as described below. The Maintenance Service Option includes not only a different style of card but also a specific minimum level of firmware (1.47 or higher).

Maintenance Practices for Low-Speed Cards

There are two maintenance practices that you should follow when replacing low-speed cards to minimize the effects on traffic. One practice is used for standard low-speed cards and the other is used for MSO low-speed cards.

Standard Low-Speed Card Maintenance Practice

1. Plan to replace a failed low-speed card during a low-traffic period or when the circuits on the card will not be carrying traffic. Removing a low-speed card disrupts service on all four circuits on the card because there are no relays to maintain service through the spare card. So, replacing cards during off-peak traffic times will minimize service disruptions.
2. Replace a failed low-speed card at the first opportunity. This will reduce the risk that other failed circuits will be dropped because there are no spare circuits available.
3. Do not remove more than one low-speed card at the same time. Each card that is removed will disrupt traffic on four circuits.

MSO Low-Speed Maintenance Practice

1. Replace a failed low-speed MSO Electronics card at the first opportunity. This will reduce the risk that other failed circuits will be dropped because there are no spare circuits available.
2. Do not remove or replace more than one MSO Electronics card at a time. If one low-speed card is removed, all four circuits on that card will move to the spare card. But when a second low-speed card is removed, the resulting resource conflict will cause all circuits on all removed cards to be dropped.

Replacing a Standard Low-Speed Card

CAUTION! **STANDARD LOW-SPEED CARDS CAN BE REMOVED AND REPLACED WITH POWER ON. HOWEVER, THE FOUR CIRCUITS ON THE CARD BEING SWAPPED WILL BE DROPPED UNTIL A CARD IS INSERTED INTO THE SLOT.**

1. Use a Phillips head screwdriver to loosen the two fastening screws on the front faceplate of the Wide Bank and remove the faceplate. See Figure 10-3.
2. Locate the low-speed card you want to remove. See Figure 10-1 for low-speed card and circuit locations.
3. Pull the card ejector latch to release the card from its internal connector.
4. Carefully slide the card out of the Wide Bank.
5. Ensure that the replacement card is positioned correctly in the guide rails, then carefully slide the card into the slot.
6. Press the card ejector latch in toward the card until the connector on the card mates with the matching connector on the backplane.

NOTE: When replacing a fan faceplate, ensure that the fan power connectors are aligned and seated on the Controller board power connectors.

7. Replace the faceplate and tighten the fastening screws. Do not overtighten. Carrier Access recommends a maximum torque of 8 to 10 inch-pounds.

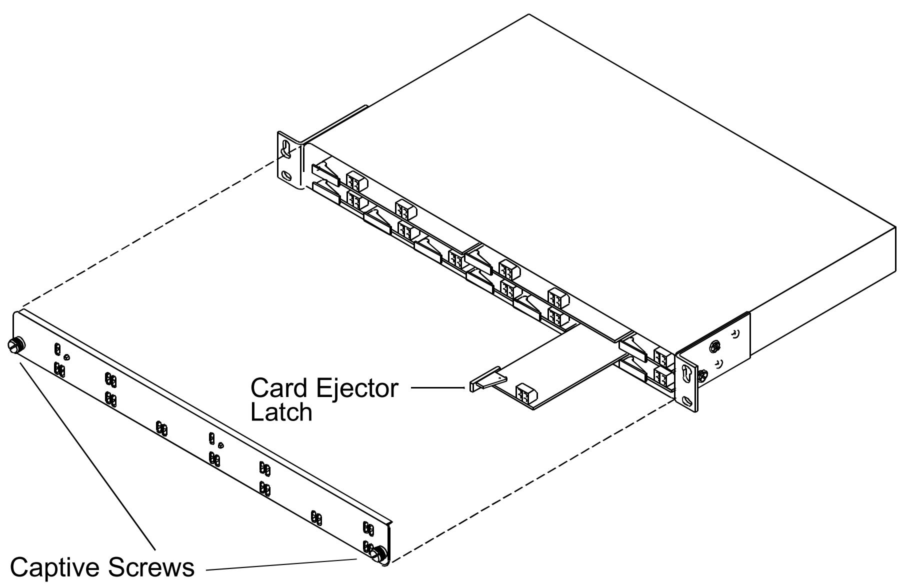


Figure 10-3 Replacing a Standard Low-Speed Card

Replacing an MSO Low-Speed Card

The Maintenance Service Option allows hot-swapping a low-speed card without dropping the circuits carried by that card. This is accomplished by removing only the electronics section of the two-section MSO card, leaving the relay section of the MSO card fully seated and latched in the card slot, as shown in Figure 10-4. Removing the relay section of the MSO card will drop the circuits carried by the card, just like removing a standard low-speed card.

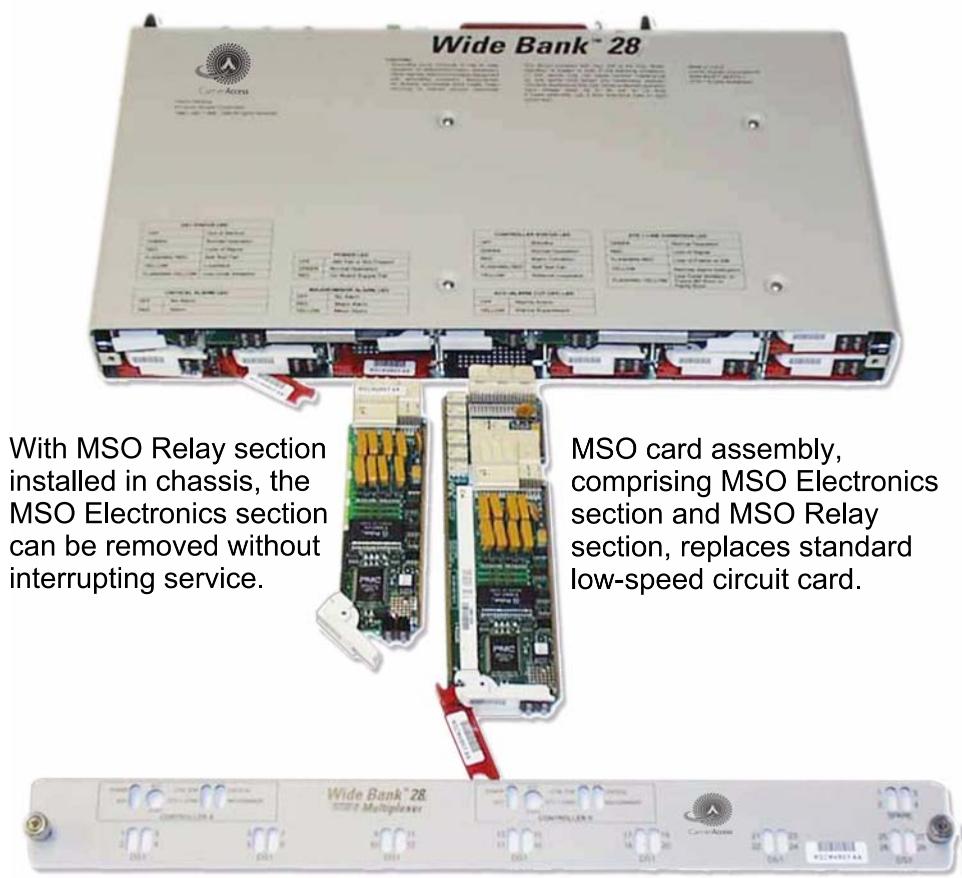


Figure 10-4 MSO Electronics and MSO Relay Sections

The MSO card has two card ejector latch levers, a white one (the upper one) and a red one (the lower one). See Figure 10-6 and Figure 10-5 on the following pages. The white ejector latches the electronics section of the card to the relay section. The red ejector latch holds both the relay section and the electronics section of the card in the slot position.

CAUTION! **WHEN HOT-SWAPPING AN MSO CARD, ALWAYS PULL THE WHITE EJECTOR LATCH LEVER TO EJECT THE MSO ELECTRONICS SECTION.**
DO NOT PULL THE RED EJECTOR LATCH LEVER BECAUSE IT WILL EJECT THE MSO RELAY SECTION AND INTERRUPT SERVICE ON ALL CIRCUITS OF THE CARD.

WARNING! **NEVER INSERT THE RELAY SECTION OF AN MSO CARD INTO A WIDE BANK UNLESS THE ELECTRONICS SECTION OF THE CARD IS CORRECTLY LATCHED TO IT. FAILURE TO DO SO MAY DAMAGE THE RELAY SECTION.**

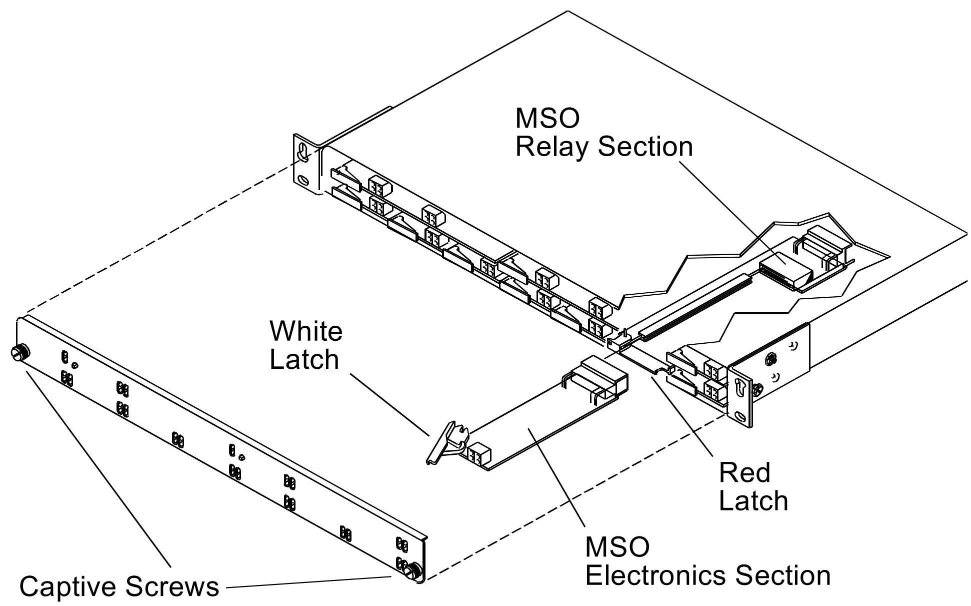


Figure 10-5 Removing an MSO Electronics Section

Removing the Electronics Section of an MSO Card

1. Use a Phillips head screwdriver to loosen the two fastening screws on the faceplate of the Wide Bank and remove the plate. See Figure 10-5.
2. Locate the low-speed card you want to remove. See Figure 10-1 for low-speed card and circuit locations.
3. Pull out the white card ejector latch to release the electronics section of the MSO card from the relay section. Do not disturb the red ejector latch. See Figure 10-6 and Figure 10-5 for the location of the white latch (upper latch) of each MSO Quad card.
4. Slide the electronics section of the card out of the Wide Bank.

Inserting the Electronics Section of an MSO Card

1. Ensure that the replacement section is positioned correctly in the guide rails, and the white ejector latch lever is positioned to engage the roll pin on the relay section. Then carefully slide the section into the slot.
2. Press the white ejector latch inward until the connector on the electronics section mates with a matching connector on the relay section.

NOTE: If the faceplate is a fan faceplate, in the following step ensure that the fan power connectors are aligned and seated on the Controller board power connectors.

3. Replace the faceplate and tighten the fastening screws. Do not overtighten. Carrier Access recommends a maximum torque of 8 to 10 inch-pounds.

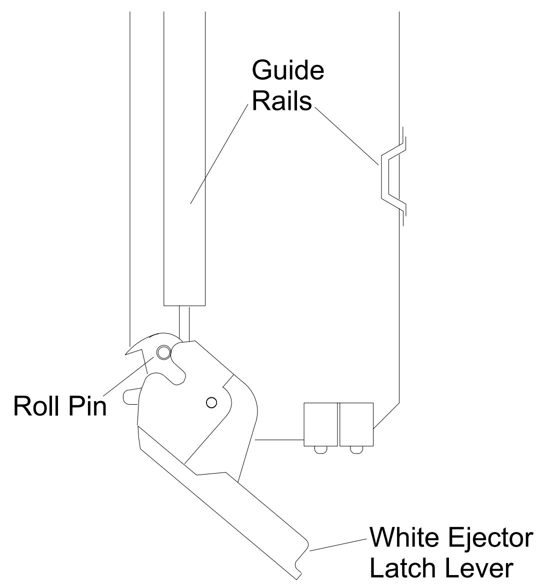


Figure 10-6 Inserting an MSO Electronic Card

Replacing DS3 Controller Cards

WARNING! THE WIDE BANK CONTAINS CIRCUIT CARDS AND COMPONENTS THAT ARE SUBJECT TO DAMAGE BY ELECTROSTATIC DISCHARGE (ESD). ALWAYS FOLLOW THE *STATIC-SENSITIVE EQUIPMENT HANDLING PROCEDURES* ON *page 5-3* WHEN OPENING EQUIPMENT COVERS AND HANDLING PLUG-IN CARDS.

ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

There can be one DS3 Controller Cards installed in the Wide Bank, or there can be two. When two DS3 cards are installed, one of them can be hot-swapped without losing the DS3 connection if both power connectors A and B are supplied with –48 VDC. When only one DS3 card is installed, or when only one power connector is supplied with –48 VDC, hot-swapping will interrupt service on the DS3 interface. With two Controller cards, and both power connectors supplied with –48 VDC, use the *switch* command to switch control away from the card to be replaced (if it has not already switched). If possible, always replace the standby Controller.

NOTE: If a fan faceplate is installed, the replacement Controller card must be a version that supports the fan faceplate option. FFO-capable Controller cards have a fan power connector.

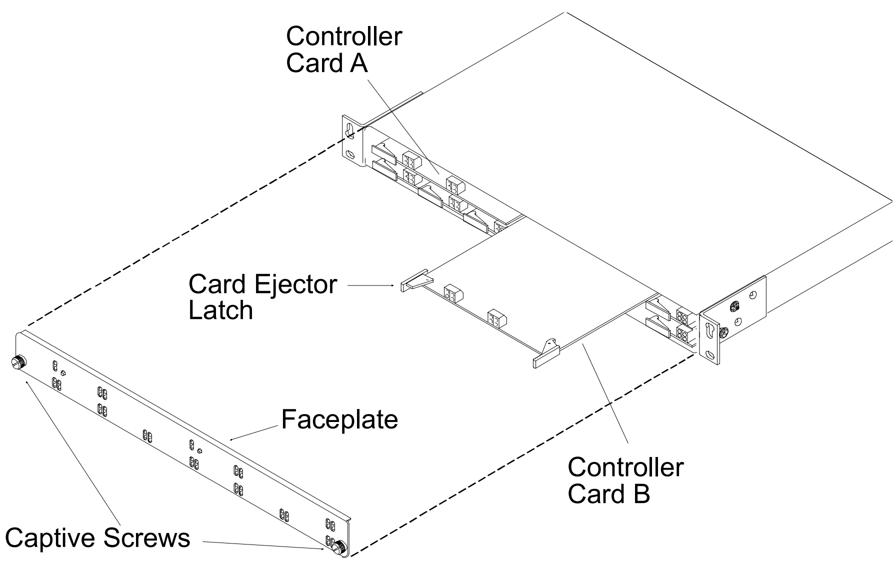


Figure 10-7 Replacing a DS3 Controller Card

1. Use a Phillips head screwdriver to loosen the two fastening screws on the faceplate of the Wide Bank and remove the faceplate. See Figure 10-7.

2. Remove the Controller card (A or B) by lifting the card ejector latches and sliding the card out of the chassis housing.
3. Ensure that the replacement card is positioned correctly in the guide rails, then carefully slide the card into the slot.
4. Press the card ejector latches in toward the card until the connector on the card mates with a matching connector on the backplane.

NOTE: If the faceplate is a fan faceplate, in the following step ensure that the fan power connectors are aligned and seated on the Controller board power connectors.

5. Replace the faceplate and tighten the two fastening screws. Do not overtighten. Carrier Access recommends a maximum torque of 8 to 10 inch-pounds.

Turning Off Unused or Unterminated Low-Speed Channels

For continued FCC Part 15A and NEBS compliance, unused and unterminated low-speed channels must be turned off by issuing the CLI *ds1* or *ls* command:

`(A:Working) >` **`ds1`** `[`*`n`*`|`*`range`*`|`**`all`**`]` **`disable`**

or

`(A:Working) >` **`ls`** `[`*`n`*`|`*`range`*`|`**`all`**`]` **`disable`**

NOTE: For details on *ds1* and *ls* commands, see *CLI Commands and Messages on page 8-1*.

CHAPTER 11

SNMP

In this Chapter

Configuration for SNMP

Several basic settings are required before you can use the SNMP facilities provided by the Wide Bank 28 DS3. Basic settings must be initially configured through the Command Line Interface (CLI). These settings are the Wide Bank IP address, Subnet mask, Default gateway, NMS IP Address, system name, location, and contact. The default get, set, and trap community strings are "public" and can be changed by the SNMP manager after completing the basic configuration.

The Wide Bank 28 DS3 contains an SNMP MIB agent that supports RFC 1213 (general), RFC 1406 (DS1 and E1), and RFC 1407 (DS3).

The Wide Bank also contains Enterprise MIBs that enhances the SNMP operation of the Wide Bank (see *Carrier Access DS3 Multiplexer Enterprise MIBs on page 11-5*).

In a point-to-point application with another Wide Bank 28 DS3 running in C-bit framing mode, the DS3 terminal-to-terminal data link can be used to remotely manage the far-end terminal. See *Configuring IP and PPP Addresses on page 6-15* for information on how to use PPP over the DS3 data link to establish an SNMP session with a remote Wide Bank 28 DS3.

Basic Configuration Parameters

Wide Bank IP Address

The Internet address identifies the Wide Bank on a TCP/IP based network. This field is required. Each Wide Bank on the network must have a unique IP address.

Subnet Mask

Networks that require further partitioning use subnet masks to perform subnet routing. These values indicate which part of your IP address is a network address and which part is a node address.

Default Gateway

This is the IP address of a default gateway on your logical network. A TCP/IP gateway (router) allows you to communicate outside your local network (subnet) by forwarding information to another network. The gateway must be on your logical network, and the network portion of the address should be the same as the network portion of your IP address.

Network Management Station (NMS) IP Address

This is the address of the Network Management Station (NMS) that is used to manage the SNMP sessions. This address is required by Wide Bank for reporting of trap events. There can be as many as 3 NMS addresses configured.

System Name

The system Name is a string of up to 255 characters that is the assigned administrative name for this managed node.

Location

This is a string of up to 255 characters that describes the physical location of this node.

Contact

This is a string of up to 255 characters that identifies the contact person for this managed node, together with information on how to contact this person.

Basic Configuration from the CLI

1. Configure the Wide Bank network IP interface values. For example:

```
(A:Active)> ip address 192.168.20.10
(A:Active)> ip mask 255.255.255.0
(A:Active)> ip gateway 192.168.20.1
```

2. Configure the IP Addresses of up to three NMS systems that the Wide Bank will report traps to. For example:

```
(A:Active)> ip nms1 192.168.20.3
(A:Active)> ip nms2 192.168.20.4
(A:Active)> ip nms3 192.168.20.5
```

3. Configure SNMP system group information contained in RFC-1213. Enter values for the name, location, and contact. For example:

```
(A:Active)> SNMP name "Wide Bank 28 DS3"
(A:Active)> SNMP location "Acme Corp: telephone closet"
(A:Active)> SNMP contact "John Doe, Acme Corp (303)555-5678"
```

Validate Link

Before proceeding with an SNMP management session, use the following steps to validate the Ethernet connection through your Local Area Network (LAN) to the Wide Bank.

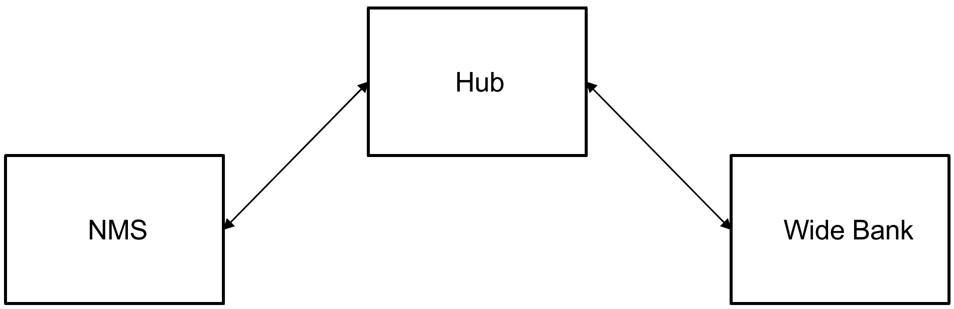


Figure 11-1 SNMP Link

1. Verify that the IP cable is connected to the LAN.
2. From your computer or Network Management Station (NMS), send a Ping request toward the Wide Bank. For example:

   `ping 192.168.20.10`

   ```
   Pinging 192.168.20.10 with 32 bytes of data:
   Reply from 192.168.20.10: bytes=32 time<10ms TTL=128
   ```

3. Verify that the Wide Bank replies to the Ping request, as in the example above.
4. Now validate that your management station can be seen by the Wide Bank. Use the Wide Bank CLI *ping* command to send a Ping request toward the NMS. For example:

   `(A:Active)>` **`ping 192.168.20.30`**

   ```
   Pinging 192.168.20.30 with 32 bytes of data:
   Reply from 192.168.20.30: bytes=32 time<10ms TTL=128
   ```

Carrier Access DS3 Multiplexer Enterprise MIBs

The Carrier Access DS3 Multiplexer Enterprise MIB supports:

- DS3 Controller card status
- DS3 identification settings
- DS3 clock settings
- DS3 far-end status
- DS1/E1 low-speed card status
- DS1/E1 low-speed spare card allocation
- DS3 Controller status change traps
- DS1/E1 low-speed card status change traps
- External power low or missing trap
- Failed login attempt trap

NOTE: The Wide Bank 28 DS3 documentation CD-ROM includes the Carrier Access Corporation Multiplexer Enterprise MIB definition file (DS3AM.MIB) in ASN.1 Standard syntax for use by network management software.

SNMP Traps Supported by Wide Bank 28 DS3

Interface Index (ifIndex) Numbers

SNMP trap reports use the following index numbers to identify the interfaces in the Wide Bank.

Table 11-1 ifIndex Values for Interfaces

ifIndex	Interface
1	DS3 Controller "A"
2	DS3 Controller "B"
3-30	Low-Speed DS1/E1 1-28
31	Ethernet port
32	PPP link

NOTE: The linkup and linkdown traps are reported for each interface separately. The report shows the ifIndex number and interface for each trap, as in "#1 - DS3 CONTROLLER A, #2 DS3 CONTROLLER B, #3 DS1 1, #4 DS1 2" and so on.

Standard Traps

Authentication Failure Trap

An *authenticationFailure* trap indicates that the sending protocol entity is the addressee of a protocol message that is not properly authenticated. While implementations of the SNMP must be capable of generating this trap, they must also be capable of suppressing the emission of such traps via an implementation-specific mechanism.

Events that cause an authenticationFailure Trap:

- Change node object definition that is not supported by SNMP.

For example, at the SNMP Manager Edit object's community parameters for "get" function from "public" to "private" (if WB is set to getcomm = "public"). This will generate an authenticationFailure trap message.

Warm Start Trap

A *warmStartTrap* indicates that the sending protocol entity is re-initializing itself in a way that neither the agent configuration nor the protocol entity implementation is altered.

Events that cause a warmStartTrap:

- Turning the power off, then on again (cycle power). Also called cold start.
- Removing, then replacing all Controllers.

Link Down Trap

A *linkDownTrap* indicates that the sending protocol entity recognizes a failure in one of the communication links represented in the agent's configuration.

The Trap-PDU of type linkDownTrap contains as the first element of its variable-bindings, the name and value of the ifIndex instance for the affected interface.

Events that cause a linkDownTrap:

- Removing a DS3 link
- Removing a low-speed link
- Removing a DS3 Controller
- Removing a low-speed card
- Removing and replacing all Controllers will also trigger linkDown and linkUp traps from DS3 and all low-speed circuits

Link Up Trap

A *linkUpTrap* indicates that the sending protocol entity recognizes that one of the communication links represented in the agent's configuration has come up.

The Trap-PDU of type linkUpTrap contains as the first element of its variable-bindings, the name and value of the ifIndex instance for the affected interface.

Events that cause a linkUpTrap:

- Removing, then replacing a DS3 link
- Removing, then replacing a low-speed link
- Removing, then replacing a DS3 Controller
- Removing, then replacing a low-speed card
- Removing and replacing all Controllers will also trigger linkDown and linkUp traps from DS3 and all low-speed circuits

Enterprise Traps

DS3 Controller State Trap

The *ds3ControllerStateTrap* is an enterprise-specific trap that indicates a change in the DS3 Controller's alarm state.

The Trap-PDU contains two variable bindings: *ds3amControllerStatus*, *ds3ControllerIndex*. The first variable indicates the value of the Controller Status leaf for the affected Controller. The second variable indicates the primary or secondary DS3 Controller.

DS1 Card State Trap

A *ds1CardStateTrap* indicates a change in the DS1/E1 card's alarm state.

The Trap-PDU contains two variable bindings: *ds3amDS1CardStatus*, *ds3amDS1CardIndex*. The first variable indicates the value of the DS1/E1 Card Status leaf for the affected DS1/E1 Card. The second variable indicates the DS1/E1 card number.

Failed CLI Login Trap

The *cliLoginFailureTrap* is an enterprise-specific trap that is issued when there are three consecutive unsuccessful attempts to login to the CLI.

There are no variables bound to this trap, so the only information provided by the trap is the IP of the Wide Bank that experienced the login failures and the time the last failure occurred.

Power Status Trap

The *ext48VPowerStatusTrap* is an enterprise-specific trap that is issued whenever an "external 48V power source low or missing" event occurs or is cleared.

The Trap-PDU contains two variable bindings: *ds3amEnvExternalPowerStatus*, *ds3amEnvPowerSupplyIndex*. The first variable indicates either normal(1) or lowOrMissing(2). When the low or missing event occurs, the trap is sent and the value bound to the trap is lowOrMissing. When the event is cleared, the value bound to the trap is normal. The second variable indicates the power supply number.

DS1 Protect Switch Trap

The *ds1ProtectSwitchTrap* is an enterprise-specific trap that indicates when a DS1/E1 facility is switched to the spare card. This trap is sent with the DS1/E1 line index number bound to it.

DS1 Move Home Trap

The *ds1MoveHomeTrap* is an enterprise-specific trap that indicates when a DS1/E1 facility is switched to its home card from the spare card. This trap is sent with the DS1/E1 line index number bound to it.

DS1 Internal Harware Failure Trap

The *ds1InternalHdwFailureSpareClearTrap* is an enterprise-specific trap that indicates when a DS1/E1 facility experiences an internal hardware failure. This trap is sent with the DS1/E1 line index number bound to it.

DS1 Internal Hardware Failure Clear Trap

The *ds1InternalHdwFailureClearTrap* is an enterprise-specific trap that indicates when a DS1/E1 facility experienced a hardware failure and is now clearing. This trap is sent with the DS1/E1 line index number bound to it.

DS1 Internal Hardware Failure Spare Trap

The *ds1InternalHdwFailureSpareTrap* is an enterprise-specific trap that indicates when a DS1/E1 spare facility experiences an internal hardware failure. This trap is sent with the DS1/E1 line index number bound to it.

DS1 Internal Hardware Failure Spare Clear Trap

The *ds1InternalHdwFailureSpareClearTrap* is an enterprise-specific trap that indicates when a DS1/E1 spare facility experienced a hardware failure and is now clearing. This trap is sent with the DS1/E1 line index number bound to it.

CHAPTER 12

Alarm Reporting

In this Chapter

Overview

The Wide Bank reports alarms in several ways. First, there are LEDs that indicate that alarm events have occurred. Second, the alarm events that occur are entered into an event log. Third, certain SNMP traps are generated when alarms occur. Finally, the Wide Bank reports alarms via the Transaction Language One (TL1) messaging system, in compliance with:

- Telcordia GR-474, Network Maintenance: Alarm and Control for Network Elements
- Telcordia GR-820, Generic Digital Transmission Surveillance

The Wide Bank alarms are categorized as either Critical, Major, or Minor. Critical alarms are those that will adversely affect traffic at the DS3 level. Major alarms are those that adversely affect traffic at the low-speed (DS1 or E1) level. Minor alarms do not affect traffic but do affect standby circuits.

Critical, Major and Minor Alarms

NOTE: The following information and charts are based on the *default* values assigned to the alarm severities. Many of the alarm conditions can be assigned a different alarm severity by using the TL1 command *SET-ATTR-<AIDType> on* *page 9-75*.

The chart on the following page shows the alarm conditions that generate critical and major/minor alarms.

- **Critical Alarms.** Critical alarm events cause the Critical Alarm LED to light red, the critical alarm relay contacts to activate, and the appropriate log entries to be recorded.
- **Major and Minor Alarms.** Major/ minor alarm events cause the Major/Minor Alarm LED to light red (major) or yellow (minor), the major/minor alarm relay contacts to activate, and appropriate log entries to be recorded.
- **Alarm Cleared.** When the alarm condition no longer exists, the LED and the relay contacts will deactivate.
- **Alarm Cutoff (ACO).** You can override the alarm condition, turn off the LED, and deactivate the relay contacts by pressing the ACO switch on the front control panel, or by issuing the *aco* command from the Command Line Interface. ACO is a momentary action, and does not affect subsequent alarm reporting.

LEDs That Report Alarms

The information in Table 12-1 assumes that your Wide Bank 28 DS3 is fully redundant and is using the default alarm severities for Critical, Major, and Minor alarms. Some physical configurations other than fully redundant affect the way some alarms are reported.

Table 12-1 LED Alarm Summary

CRITICAL MAJOR MINOR

CR - CRITICAL ALARM	
LED State	Meaning
OFF	No Alarms
RED	Traffic-Affecting Fault

MJ/MN - MAJOR/MINOR ALARM	
LED State	Meaning
OFF	No Alarms
YELLOW	Minor Alarm
RED	Major Alarm

ACTIVE CS - CTRL STAT (DS3 CONTROLLER STATUS)	
LED State	Meaning
OFF	Standby
GREEN	Normal (Active) Operation
RED	Alarm Condition
RED Flashing	Self-Test Fail
YELLOW	Network Loopback

STANDBY CS - CTRL STAT (DS3 CONTROLLER STATUS)	
LED State	Meaning
OFF	Standby
GREEN	Normal (Active) Operation
RED	Alarm Condition
RED Flashing	Self-Test Fail
YELLOW	Network Loopback

POWER	
LED State	Meaning
OFF	-48V Input Power Is High, Low or Missing, or -48V Internal Power Failed
GREEN	Normal Operation
RED	5V Onboard Power Supply Failed

ACTIVE HS - HIGH SPEED LINE CONDITION (DS3 CONDITION)	
LED State	Meaning
GREEN	Normal Operation
RED	Loss of Signal
RED Flashing	Loss of Frame
RED Flashing	AIS Received
YELLOW	Remote Alarm Detection
YELLOW Flashing	Line Code Violation, Frame Bit Error, or Parity Error

STANDBY HS - HIGH SPEED LINE CONDITION (DS3 CONDITION)	
LED State	Meaning
GREEN	Normal Operation
RED	Loss of Signal
RED Flashing	Loss of Frame
RED Flashing	AIS Received
YELLOW	Remote Alarm Detection
YELLOW Flashing	Line Code Violation, Frame Bit Error, or Parity Error

LS - LOW SPEED STATUS (DS1/E1 & SPARE CIRCUITS)	
LED State	Meaning
OFF	Off Line
GREEN	Normal Operation
RED	Loss of Signal or Metallic Loopback
RED Flashing	Self-Test Fail
YELLOW	Equipment or Line Loopback
YELLOW Flashing	Line Code Violation

OTHER ALARM CONDITIONS
Low Speed (DS1/E1) Card Removed
High Speed (DS3) Card Removed
High Speed (DS3) Card Over Temperature
High Speed Controller Switch Occurred
Low Speed Switch Occurred
Far End High Speed (DS3) Alarm
System Operating Over Temperature
Fan A or B Failure (active is major, stdby is minor)
Fan Faceplate Not Present
Software Version Mismatch Between Controllers

DS3 Far-End Alarms and Control (FEAC)

Far-end alarms are events that occur at a remote location and are reported to the Wide Bank 28 DS3 over the DS3 link. This feature and the associated commands require the DS3 to be set for C-bit framing.

Far-End Alarm Transmission

When there is a far-end alarm condition, code words are transmitted continuously for the duration of the alarm, or for a minimum of 10 code words, whichever is longer. Only the highest priority alarm is transmitted. If a high priority alarm occurs while a low priority alarm is active, only the higher priority alarm will be sent. When no alarm is being transmitted, the far-end alarm signal contains all ones. Absence of a far-end alarm signal implies no far-end alarm exists.

Far-End Alarm Reporting

The 11 far-end alarms are treated as MINOR alarms but are reported as events in TL1 (see *Alarm and Event Message Parameters on page 9-107*). Thus, when an alarm occurs the non-critical alarm LED goes to YELLOW, the non-critical alarm contact is activated, an automatic TL1 message is generated, and the alarm is entered in the Event Log. The current far-end alarm will also be displayed by the *alarms* and *status ds3far* commands for DS3 far-end alarms.

TL1 Alarm Reporting

Transaction Language One (TL1) automatic outbound alarm messaging is a standards-based ASCII management language defined for TL1-based operations and support systems such as the Telcordia NMA™ network monitoring and fault management system.With this feature, the Wide Bank will integrate into TL1 alarm-managed networks to provide notification of network and equipment conditions. See *TL1 Automatic Messages on page 9-101*.

TL1 Automatic Messages

TL1 automatic messages are used to automatically report alarms and other events detected by the Wide Bank 28 DS3. The Wide Bank supports the reporting of alarmed and non-alarmed events using the message formats defined by Telcordia GR-833-CORE, 1996. OSS's such as Telcordia's NMA system are able to use these messages to provide trouble reports to the network operations center. For a detailed description of the Wide Bank messages, see *TL1 Automatic Messages on page 9-101*.

You can establish a TL1 session through a TCP connection through TCP port, the Asynchronous RS-232 TL1 port, or a terminal-to-terminal session when running in C-bit framing mode. See *Connecting and Configuring for TL1 on page 9-9*.

APPENDIX A

Connector Pinouts

In this Appendix

.

DC Power Connectors

The A and B power connectors are identical, and both must be supplied with –48 VDC if the Wide Bank is operating as a redundant system.

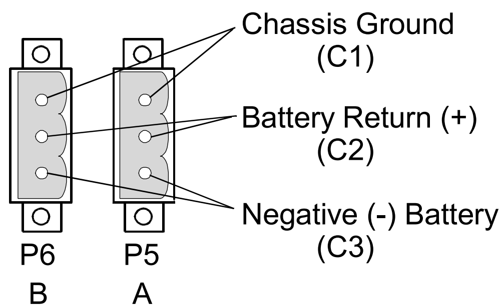


Figure A-1 Power Connector Pinout

Table A-1 Power Connector Pinout

Pin Position	Signal
Top (C1)	Telco or safety ground
Middle (C2)	DC return, to power supply + terminal
Bottom (C3)	Power Converter/Battery Charger, or other –42 to –58 VDC power source

Alarm Contacts

Alarm Contacts on 4-Position Wiring Block Connector. Contacts are programmable as normally open or normally closed. See *ALARMOUT on page 8-13*.

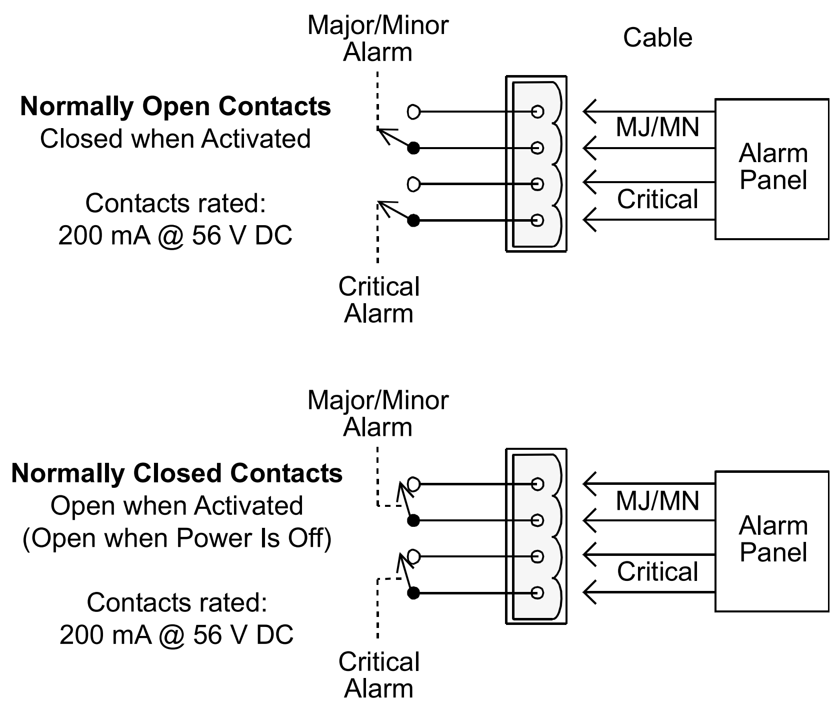


Figure A-2 Alarm Contacts Pinout

Low-Speed DS1/E1 (DSX-1) Connector Pinouts

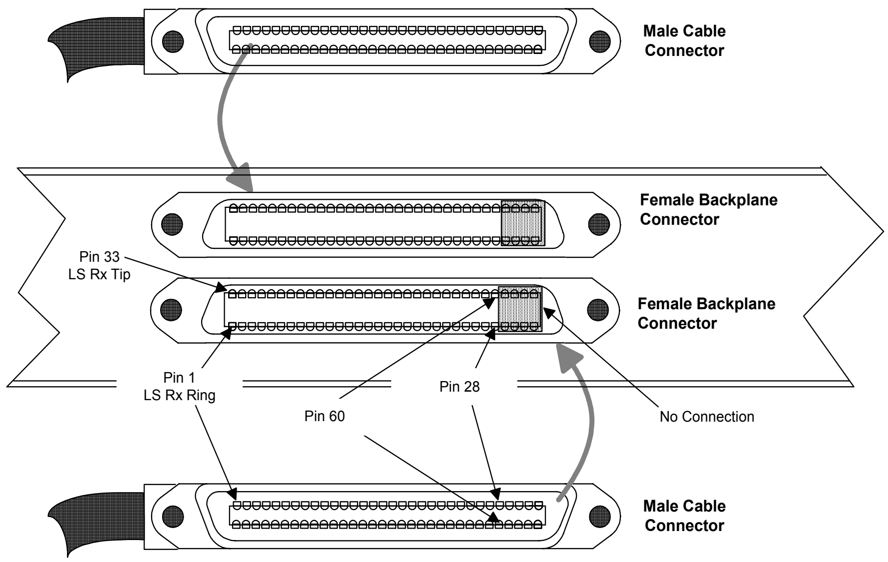


Figure A-3 Low-Speed Connector Pinouts

Low-Speed Connector Pinout Chart

Table A-2 shows wiring details for the DSX-1 low-speed cables for the LOW SPEED IN and LOW SPEED OUT connectors. The low-speed transmit and receive cables for DS1/E1 circuits are physically identical and the signal assignments are as shown. For flying lead connections, the following points apply:

- The wires are packaged within the cable in three groups:
  - Group 1 – twelve pairs, connecting low-speed circuits 1 through 12
  - Group 2 – thirteen pairs, connecting low-speed circuits 13 through 25
  - Group 3 – seven pairs, connecting low-speed circuits 26 through 28
- Four of the wire pairs in group 3 repeat the same colors as the first seven pairs in group 1.
- The wire pairs in group 3 repeat the same colors as the first seven pairs in group 1.

Table A-2 DSX-1 Connector Pinouts and Circuits

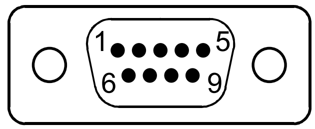
DS1/E1 Circuit	LOW SPEED IN Pins		LOW SPEED OUT Pins		DS1/E1 Card	Wire Group
	Rx Tip	Rx Ring	Tx Tip	Tx Ring		
1	33 white/blue	1 blue/white	33 white/blue	1 blue/white	1	1
2	34 white/orange	2 orange/white	34 white/orange	2 orange/white		
3	35 white/green	3 green/white	35 white/green	3 green/white		
4	36 white/brown	4 brown/white	36 white/brown	4 brown/white		
5	37 white/slate	5 slate/white	37 white/slate	5 slate/white	2	
6	38 red/blue	6 blue/red	38 red/blue	6 blue/red		
7	39 red/orange	7 orange/red	39 red/orange	7 orange/red		
8	40 red/green	8 green/red	40 red/green	8 green/red		
9	41 red/brown	9 brown/red	41 red/brown	9 brown/red	3	
10	42 red/slate	10 slate/red	42 red/slate	10 slate/red		
11	43 black/blue	11 blue/black	43 black/blue	11 blue/black		
12	44 black/orange	12 orange/black	44 black/orange	12 orange/black		

Table A-2 DSX-1 Connector Pinouts and Circuits (Continued)

DS1/E1 Circuit	LOW SPEED IN Pins		LOW SPEED OUT Pins		DS1/E1 Card	Wire Group
	Rx Tip	Rx Ring	Tx Tip	Tx Ring		
13	45 black/green	13 green/black	45 black/green	13 green/black	4	2
14	46 black/brown	14 brown/black	46 black/brown	14 brown/black		
15	47 black/slate	15 slate/black	47 black/slate	15 slate/black		
16	48 yellow/blue	16 blue/yellow	48 yellow/blue	16 blue/yellow		
17	49 yellow/orange	17 orange/yellow	49 yellow/orange	17 orange/yellow	5	
18	50 yellow/green	18 green/yellow	50 yellow/green	18 green/yellow		
19	51 yellow/brown	19 brown/yellow	51 yellow/brown	19 brown/yellow		
20	52 yellow/slate	20 slate/yellow	52 yellow/slate	20 slate/yellow		
21	53 violet/blue	21 blue/violet	53 violet/blue	21 blue/violet	6	
22	54 violet/orange	22 orange/violet	54 violet/orange	22 orange/violet		
23	55 violet/green	23 green/violet	55 violet/green	23 green/violet		
24	56 violet/brown	24 brown/violet	56 violet/brown	24 brown/violet		
25	57 violet/slate	25 slate/violet	57 violet/slate	25 slate/violet	7	
26	58 white/blue	26 blue/white	58 white/blue	26 blue/white		3
27	59 white/orange	27 orange/white	59 white/orange	27 orange/white		
28	60 white/green	28 green/white	60 white/green	28 green/white		
Not used	white/brown	brown/white	white/brown	brown/white	Not used	
Not used	white/slate	slate/white	white/slate	slate/white	Not used	
Not used	red/blue	blue/red	red/blue	blue/red	Not used	
Not used	red/orange	orange/red	red/orange	orange/red	Not used	

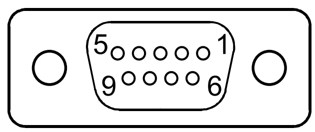
CLI RS-232 Management Port Pinout

Male DB9 Connector



Female DB9 Connector

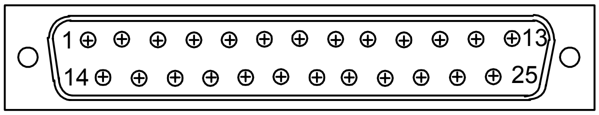
This connector is the one on the Wide Bank.



Pin	Signal	Name
1	CD	(not used)
2	RD	Receive Data
3	TD	Transmit Data
4	DTR	(not used)
5	GND	Ground
6	DSR	(not used)
7	RTS	Request To Send
8	CTS	(not used)
9	RI	(not used)

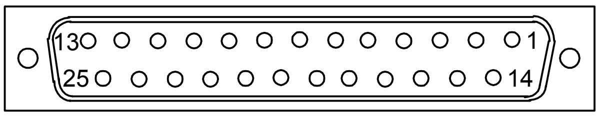
TL1 RS-232 Management Port Pinout

Male DB25 Connector



Female DB25 Connector

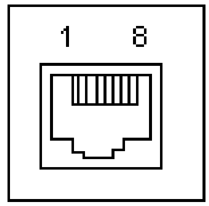
This connector is the one on the Wide Bank.



Pin	Signal	Name
1		(not used)
2	TD	Transmitted Data
3	RD	Receive Data
4	RTS	Request To Send
5	CTS	Clear To Send
6		(not used)
7	GND	Signal Ground
8	DCD or CD	Data Carrier Detect
9-14		(not used)
15	TC	Transmit Clock
16		(not used)
17	RC	Receive Clock
18-19		(not used)
20	DTR	Data Transmit Ready
21-23		(not used)
24	xTC	(external) Transmit Clock
25		(not used)

Ethernet RJ-45 (10Base-T) Pinout

RJ-45 Connector



Pin	Signal	Color
1	TX+	White w/Orange
2	TX–	Orange
3	RX+	White w/Green
4		Blue
5		White w/Blue
6	RX–	Green
7		White w/Brown
8		Brown

Glossary

Abbreviations/Acronyms

ADM	Add/Drop Multiplexer
AIS	Alarm Indication Signal
AMI	Alternate Mark Inversion
APS	Automatic Protection Switching
ARP	Address Resolution Protocol
ATM	Asynchronous Transfer Mode
B3ZS	Bipolar with 3-Zero Substitution
B8ZS	Bipolar with 8-Zero Substitution
bit	Binary digit; a pulse of data
bps	Bits Per Second
BER	Bit Error Rate
BITS	Building Integrated Timing Supply
BPV	Biplar Violation
CCV	C-bit Coding Violation
CES	C-bit Errored Seconds
CSES	C-bit Severely Errored Seconds
CCITT	Comite Consultatif Internationale de Telegraphique et Telephonique
CEPT	Conference of Postal and Telecommunications Administrations

CPE	Customer Premises Equipment
CRC	Cyclic Redundancy Check
CRC-6	Cyclical Redundancy Check code, 6 bits
CSU	Channel Service Unit
CV	Coding Violation
CVL	Coding Violation, Line
DCS	Digital Crossconnect System
DLC	Digital Loop Carrier
DS0	Digital Signal level 0
DS1	Digital Signal level 1
DS3	Digital Signal level 3
DSU	Data Service Unit
DSX-1	Digital Signal Crossconnect - level 1
DSX-3	Digital Signal Crossconnect - level 3
DTE	Data Terminal Equipment
E1	European CEPT digital signal 1.
ECSA	Exchange Carrier Standards Association
ESF	Extended Superframe
EXZ	Excessive Zeros
FEBE	Far End Block Error
FERF	Far End Receive Failure
IP	Internet Protocol. A network protocol providing connectionless service
LES	Line Errored Seconds
LOS	Loss of Signal

LTE	Line Terminating Equipment
Kbps	Kilobits per second; one thousand bits per second
M13	Multiplexer, DS1 to DS3
M23	Multiplexer, DS2 to DS3
Mbps	Megabits per second; one million bits per second
MUX	Multiplex or Multiplexer
NE	Network Element
NMS	Network Management System
OA&M	Operations, Administration, and Maintenance. Also called OAM&P.
OAM&P	Operations, Administration, Maintenance and Provisioning
OC-1	Optical Carrier Level 1
OC-N	Optical Carrier Level N
OOF	Out of Frame
OS	Operations System
OSI	Open Systems Interconnection
PCV	P-bit Coding Violation
PES	P-bit Errored Seconds
PING	Packet Internet Groper
POP	Point of Presence
PSES	P-bit Severely Errored Seconds
QRSS	Quasi-Random Signal Sequence
RAI	Remote Alarm Indication
RDI	Remote Defect Indication
REI	Remote Error Indication

RFI	Remote Failure Indication
SDH	Synchronous Digital Hierarchy
SEFS	Severely Errored Framing Seconds
SF	Superframe
SNMP	Simple Network Management Protocol
SONET	Synchronous Optical Network
SPE	Synchronous Payload Envelope
STE	Section Terminating Equipment
STM	Synchronous Transfer Mode
STS-1	Synchronous Transport Signal level 1
Syntran	Synchronous Transmission
Telnet	Telecommunications Network protocol
UAS	Unavailable Seconds
UDP	User Datagram Protocol
VT	Virtual Tributary

Definitions

10Base-T

An IEEE standard for operating Ethernet local area networks (LANs) on twisted-pair cabling using the home run method of wiring (the same as the phone company uses) and a wiring hub that contains electronics performing similar functions to a central telephone switch. The full name for the standard is IEEE 802.3 10Base-T.

Add/Drop

The process where a part of the information carried in a transmission system is demultiplexed (dropped) at an intermediate point and different information is multiplexed (added) for subsequent transmission. The remaining traffic passes straight through the multiplexer without additional processing.

Add/Drop Multiplexer

ADM. A multiplexer, like a terminal multiplexer, capable of extracting and inserting lower-rate signals from a higher-rate multiplexed signal without completely demultiplexing the signal.

Address Resolution Protocol

ARP. A protocol used to map IP addresses to Ethernet addresses.

Alarm Indication Signal

AIS. The DS3 AIS is framed with “stuck stuffing.” This implies that it has a valid Msubframe alignments bits, M-frame alignment bits, and P bits. The information bits are set to a 1010 sequence, starting with a one (1) after each M-subframe alignment bit, M-frame alignment bit, X bit, P bit, and C bit. The C bits are all set to zero giving what is called “stuck stuffing.” The X bits are set to one. The DS3 AIS defect is declared after DS3 AIS is present in contiguous M-frames for a time equal to or greater than T, where $0.2 \text{ ms} \leq T \leq 100 \text{ ms}$. The DS3 AIS defect is terminated after AIS is absent in contiguous M-frames for a time equal to or greater than T.

Alternate Mark Inversion

AMI. An AMI encoded signal is a bipolar pseudo-ternary signal conveying binary digits (bits) in which successive “marks” are normally of alternating, positive and negative, polarity. This is the traditional method of line encoding used with bipolar DS1 (T1) signals. However, use of AMI does not preclude long strings of zeros being sent in the signal entering the public network from the DTE in violation of the pulse density requirements mandated in FCC Rules Part 68 and AT&T Publication 62411.

Asynchronous

A network where transmission system payloads are not synchronized and each network terminal runs on its own clock.

Asynchronous Transfer Mode

ATM. A multiplexing/switching technique in which information is organized into fixed-length cells with each cell consisting of an identification header field and an information field. The transfer mode is asynchronous in the sense that the use of the cells depends on the required or instantaneous bit rate.

Attenuation

Reduction of signal magnitude or increased signal loss, usually expressed in decibels (dB).

Authentication

Process whereby a received message is associated with a specific originating entity.

Authorization	Process whereby an access policy determines if an entity is permitted to perform an operation.
Automatic Protection Switching	**APS**. The ability of a network element to detect a failed working line and switch the service to a spare (protection) line. 1+1 APS pairs a protection line with each working line. 1:n APS provides one protection line for every n working lines.
Bandwidth	Information-carrying capacity of a communication channel expressed in bits or bytes per second. Analog bandwidth is the range of signal frequencies that can be transmitted by a communication channel or network.
Bidirectional	Operating in both directions. Bidirectional APS allows protection switching to be initiated by either end of the line.
Bipolar Violation	**BPV**. A violation of the T1 bipolar AMI transmission pattern in which succeeding "ones" (pluses) are sent at opposite polarities. A BPV normally indicates a transmission error. However, B8ZS patterns contain bipolar violations, which are not counted as errors. For B3ZS (or HDB3) coded signals, a bipolar violation error event is the occurrence of a pulse of the same polarity as the previous pulse without being part of the zero substitution code. For B3ZS (or HDB3) coded signals, a bipolar violation error event may also include other error patterns such as three (four) or more consecutive zeros and incorrect polarity.
Bipolar with 3-Zero Substitution	**B3ZS**. An AMI line code with the substitution of a unique code to replace occurrences of three consecutive zero signal elements. Each block of three successive zeros is replaced by 00V or B0V, where B represents an inserted non-zero signal element conforming to the AMI rule, and V represents a non-zero signal element that is a bipolar violation. The choice of 00V or B0V is made so that the polarity of successive V elements alternatives to avoid introducing a DC component to the signal. An equivalent specification is that the number of B pulses between consecutive V pulses is odd.
Bipolar with 8-Zero Substitution	**B8ZS**. A line coding scheme used to avoid long strings of zeros in a bipolar DS1 signal entering the network from the DTE. Every string of eight zeros is replaced by a special code (token) for transmission over networks that are sensitive to long strings of zeros. The code contains a pattern of bipolar violations that is identified by the recipient and then removed in the decoding process to recreate the original string of zeros.
Bit Error Rate	**BER**. The number of coding violations detected in a unit of time, usually one second. BER is the ratio of errored bits received to the total bits transmitted. Bits Per Second The transmission rate for digital information.
Building Integrated Timing Supply	**BITS.** A master timing supply for a network in a building or office. The BITS receives timing from a source outside the building and provides DS1 and DS0 synchronization throughout the building's network.
C-bit Coding Violation	**CCV**. For C-bit Parity and Syntran DS3 applications, this is the count of coding violations reported via the C-bits. For C-bit Parity, it is a count of CP-bit parity errors occurring in the accumulation interval. For SYNTRAN, it is a count of CRC-9 errors occurring in the accumulation interval.

C-bit Errored Seconds

CES. A second with one or more CCVs OR one or more Out of Frame defects OR a detected incoming AIS. This count is only for the SYNTRAN and C-bit Parity DS3 applications. This gauge is not incremented when UASs are counted.

C-bit Parity Framing

A DS3 frame format with overhead communications bits. Unlike M23 framing, C-bit parity framing does not require a stuffing indicator (stuffing is always present), so the C-bits are used to carry alarms, data, and status information. See Stuffing.

C-bit Severely Errored Seconds

CSES. A second with 44 or more CCVs OR one or more Out of Frame defects OR a detected incoming AIS. This count is only for the SYNTRAN and C-bit Parity DS3 applications. This gauge is not incremented when UAS are counted.

Channel

The smallest subdivision of a circuit that provides a type of communication service; usually a path with only one direction.

Circuit

A communications path or network; usually a pair of channels providing bi-directional communication.

Circuit Identifier

A character string assigned by the circuit vendor, which is useful when communicating with the vendor during the troubleshooting process.

Circuit Switching

Basic switching process whereby a circuit between two users is opened on demand and maintained for their exclusive use for the duration of the transmission.

Coding Violation

CV. A transmission error detected by the difference between the transmitted and the locally calculated bit-interleaved parity.

Comite Consultatif Internationale de Telegraphique et Telephonique

CCITT. The technical organs of the United Nations specialized agency for telecommunications, now the International Telecommunications Union - Telecom. They function through international committees of telephone administrations and private operating agencies.

Community Name

String that defines an administrative relationship between SNMP entities.

Conference of Postal and Telecommunications Administrations

CEPT. The European CEPT format defines the 2.048 Mbps European E1 signal made up of 30 voice-frequency channels.

CRC-6

A six-bit Cyclical Redundancy Check code embedded in the ESF frame and used to verify data transmission. If the transmitted and received CRC-6 codes match, it is highly probable that the ESF field arrived without error; however, if the CRC-6s do not match, one or more errors have occurred during the transmission of that particular ESF field. CRC-6 error events are logged into internal pairs of registers within the CSU and may be recalled through the 4 Kbps Facility Data Link (FDL) by the customer and the carrier.

Customer Premises Equipment	**CPE**. Items of telecommunications equipment, such as key systems, PBXs, answering machines, and CSU/DSUs, which reside on the customer's premises past the network interface.
Cyclic Redundancy Check	**CRC**. A technique for using overhead bits to detect transmission errors.
Data Terminal Equipment	**DTE**. In the EIA/TIA 232E standard specification, the RS-232 interface is connected between the DCE (Data Circuit-Terminating Equipment) and the DTE. The main difference between the DCE and the DTE is the pins two and three are reversed. The ABII uses an RS-232 port for management and asynchronous and synchronous data transmission.
Defect	A limited interruption in the ability of an item to perform a required function.
Demultiplexing	A process applied to a multiplex signal for recovering signals combined within it and for restoring the distinct individual channels of the signals.
Digital Crossconnect System	**DCS**. An electronic crossconnection that has access to lower-rate channels in higher-rate multiplexed signals and can electronically rearrange (crossconnect) those channels.
Digital Loop Carrier	**DLC**. Digital Loop Carriers are specialized SONET back-to-back mux systems providing circuit concentration in the local loop market. The elements used are similar to the Terminal Mux but transmission speed is normally limited to 155 Mbit/s (OC-3).
Digital Signal	An electrical or optical signal that varies in discrete steps. Electrical signals are coded as voltages, optical signals are coded as pulses of light.
DS0	Digital Signal level 0. The basic digital signal at 64,000 bits per second (bps) used to transport 8,000 data bytes or voice samples per second over telecommunications networks.
DS1	Digital Signal level 1. A digital signal at 1.544 million bits per second (Mbps) in North America and at 2.048 Mbps elsewhere.
DS3	Digital Signal level 3. A digital signal at 44.736 million bits per second (Mbps), the equivalent of 28 DS1 signals.
DSX-1	Digital Signal Crossconnect level 1. Refers to equipment that crossconnects DS1 rate signals, typically over short distances from zero to 660 feet.
DSX-3	Digital Signal Crossconnect level 3. Refers to equipment that crossconnects DS3 rate signals, typically over short distances from zero to 660 feet.
E1	The European CEPT digital signal similar to the North American DS1 except that the E1 information rate is 2.048 Mbps and transports 30 DS0 signals, compared to the 24 DS0 signals in the North American DS1. E1 uses separate 64 Kbps channels for synchronization and signaling, so all 8 bits of the DS0 are used to code the wave shape of the digitized voice sample.

Exchange Carrier Standards Association	**ECSA**. An organization that specifies telecommunications standards for ANSI.
Extended Superframe	**ESF**. A North American format for DS1 rate signals at 1.544 Mbps that extends the capability of the Superframe format to include a 4 Kbps facility data link channel by using less of the 8 Kbps overhead for synchronization.
Failure	A termination of the ability of an item to perform a required function. A failure is caused by the persistence of a defect.
Far End Block Error	**FEBE**. A message sent back upstream that receiving network element is detecting errors, usually a coding violation.
Far End Receive Failure	**FERF**. A signal to indicate to the transmit site that a failure has occurred at the receive site.
Far End SEF/AIS	A Far End SEF/AIS defect (Yellow Alarm) is the occurrence of the two X-bits in a M-frame set to zero. The Far End SEF/AIS defect is terminated when the two X-bits in a M-frame are set to one.
Fixed Stuff	A bit or byte whose function is reserved. Fixed stuff locations, sometimes called reserved locations, do not carry overhead or payload.
Framing	Method of distinguishing digital channels that have been multiplexed together.
Frequency	The number of cycles of periodic activity that occur in a discrete amount of time.
Grooming	Consolidating or segregating traffic for efficiency.
Interleave	The ability of SONET to mix together and transport different types of input signals in an efficient manner, thus allowing higher-transmission rates.
Internet Protocol	**IP**. A network protocol providing connectionless service.
IP Address	The IPv4 standard specifies a 32-bit internet address. This quantity is displayed as four decimal digits, each with a decimal range of 0 to 255, separated by decimal periods.
Jitter	Short waveform variations caused by vibration, voltage fluctuations, control system instability, and so on.
Line	An electrical path (two wires) connecting between a central office and a subscriber.
Line Errored Seconds	**LES**. A Line Errored Second is a second in which one or more CVs occurred OR one or more LOS defects.

Line Terminating Equipment
: **LTE**. Network elements such as add/drop multiplexers or digital cross-connect systems which can access, generate, and process Line Overhead.

Loss of Signal
: **LOS**. The DS3 LOS defect is declared upon observing 175 ± 75 contiguous pulse positions with no pulses of either positive or negative polarity. The DS3 LOS defect is terminated upon observing an average pulse density of at least 33% over a period of 175 ± 75 contiguous pulse positions starting with the receipt of pulse.

M23 Framing
: A DS3 frame format that uses the overhead C-bits to indicate stuffing. All three Cbits in a subframe are set to one (1) if stuffing occurs, or to zero (0) if stuffing does not occur. See Stuffing.

Megabits per second
: **Mbps**. one million of bits per second.

Multiplex
: **MUX**. To transmit two or more signals over a single channel.

Multiplexer
: A device for combining several channels to be carried by one line or fiber.

Narrowband
: Services requiring up to 1.5 Mbps transport capacity.

Operations System
: Sophisticated applications software that overlooks the entire network.

Orderwire
: A channel used by installers to expedite the provisioning of lines.

OSI Seven-Layer Model
: An Open System Interconnection (OSI) standard architecture for data communications. Layers define hardware and software required for multi-vendor information processing equipment to be mutually compatible. The seven layers from lowest to highest are: physical, link, network, transport, session, presentation, and application.

Out of Frame
: **OOF**. A DS3 defect that is detected when any three or more errors in sixteen or fewer consecutive F-bits occur within a DS3 M-frame. An OOF defect may also be called a Severely Errored Frame (SEF) defect. An OOF defect is cleared when reframe occurs. A DS3 Loss of Frame (LOF) failure is declared when the DS3 OOF defect is consistent for 2 to 10 seconds. The DS3 OOF defect ends when reframe occurs. The DS3 LOF failure is cleared when the DS3 OOF defect is absent for 10 to 20 seconds.

Overhead
: Extra bits in a digital stream used to carry information besides traffic signals. Orderwire, for example, would be considered overhead information.

P-bit Coding Violation
: **PCV**. For all DS3 applications, a coding violation error event is a P-bit Parity Error event. A P-bit Parity Error event is the occurrence of a received P-bit code on the DS3 M-frame that is not identical to the corresponding locally-calculated code.

P-bit Errored Seconds
: A second with one or more PCVs OR one or more Out of Frame defects OR a detected incoming AIS. This gauge is not incremented when UASs are counted.

P-bit Severely Errored Seconds
: **PSES**. A PSES is a second with 44 or more PCVs OR one or more Out of Frame defects OR a detected incoming AIS. This gauge is not incremented when UASs are counted.

Packet Switching

An efficient method for breaking down and handling high-volume traffic in a network. A transmission technique that segments and routes information into discrete units. Packet switching allows for efficient sharing of network resources as packets from different sources can all be sent over the same channel in the same bit stream.

Parity Check

An error-checking scheme which examines the number of transmitted bits in a block which hold the value one. For even parity, an overhead parity bit is set to either one or zero to make the total number of transmitted ONES an even number. For odd parity, the parity bit is set to make the total number of ONES transmitted an odd number.

Path

A logical connection between two points in a network, which may follow many physical paths.

Payload

The portion of the digital signal, excluding overhead, that is available to carry voice and data services to the subscriber.

Ping

An Internet application used to test IP-level connectivity. Ping sends packets toward an Internet device address and then measures the round-trip delay time required for the device to reply.

Point of Presence

POP. A point in the network where inter-exchange carrier facilities like DS3 or OC-N meet with access facilities managed by telephone companies or other service providers.

Poll

An individual control message from a central controller to an individual station on a multipoint network inviting that station to send.

Remote Alarm Indication

RAI. A code sent upstream in a DSn network as a notification that a failure condition has been declared downstream. (RAI signals were previously referred to as Yellow signals.)

Remote Defect Indication

RDI. A signal returned to the transmitting Terminating Equipment upon detecting a Loss of Signal, Loss of Frame, or AIS defect. RDI was previously known as FERF.

Remote Error Indication

REI. An indication returned to a transmitting node (source) that an errored block has been detected at the receiving node (sink). This indication was formerly known as Far End Block Error (FEBE).

Remote Failure Indication

RFI. A failure is a defect that persists beyond the maximum time allocated to the transmission system protection mechanisms. When this situation occurs, an RFI is sent to the far end and will initiate a protection switch if this function has been enabled.

Severely Errored Framing Seconds

A second with one or more Out of Frame defects OR a detected incoming AIS.

Simple Network Management Protocol

SNMP. An application layer providing connection-less protocol and running over UDP (User Datagram Protocol), that functions as TCP's stack network management protocol between a management station and a SNMP agent resident in a managed device. For managing TCP/IP-based networks, SNMP is the de facto standard. SNMP is designed to implement an automated network-management system for controlling and performance

Slip

An overflow (deletion) or underflow (repetition) of one frame of a signal in a receiving buffer.

Stratum

Stratum or Stratum Level refers to the accuracy of the clock source used to synchronize SONET communications systems. Accuracy is important in maintaining communications across a network. During local network failures, a backup clock source is used to maintain network timing. But when the backup clock becomes temporarily isolated because of an equipment or line failure, the clock phase will drift slowly until the communications link eventually falls out of synchronization. Stratum 1 is the primary SONET clock source obtained from a Cesium beam time standard located in Paris, France. Stratum 2 is less accurate but can keep a network synchronized for 3 to 5 days. Stratum 3 and Stratum 4 are each less accurate (and less expensive) and can provide backups for shorter time periods.

STS-1

Synchronous Transport Signal level 1. The basic SONET building block signal transmitted at 51.84 Mb/s data rate.

STS-N

Synchronous Transport Signal level N. The signal obtained by multiplexing integer multiples (N) of STS-1 signals together.

Stuffing

M13 multiplexing uses bit stuffing to bring each asynchronous DS1/DS2 up to a common data rate for transmission. M13 multiplexing forces the seven DS2s to be synchronous to each other at a rate that causes 100-percent pulse stuffing in the M23 frame. This allows the “stuff” indicator bits in the M23 frame to be used as a maintenance link between the end points. The C-bit frame does not have a “stuff” indicator because stuffing is always present.

Subnet Mask

A bit-mapped number, in xxx.xxx.xxx.xxx format, indicating which bits in an IP address identify the physical network and which bits should be ignored.

Superframe

SF. Any structure made of multiple lower-rate frames. A DS1 frame format (also called D4) comprising 193 bit positions used to multiplex 24 DS0 channels.

Synchronous

A network where transmission system payloads are synchronized to a master (network) clock and traced to a reference clock.

Synchronous Digital Hierarchy

SDH. The ITU-T defined world standard of transmission whose base transmission rate is 52 Mb/s (STM-0) and is equivalent to SONET's STS-1 or OC-1 transmission rate. SDH standards were published in 1989 to address interworking between the ITU-T and ANSI transmission hierarchies.

Synchronous Optical Network

SONET. A standard for optical transport that defines optical carrier levels and their electrically equivalent synchronous transport signals. SONET allows for a multi-vendor environment and positions the network for transport of new services, synchronous networking, and enhanced OAM&P.

Syntran

Synchronous Transmission of restructured DS3 signals in North American format at 44.736 Mbps.

Telnet

A telecommunications network application protocol providing virtual terminal service within the Internet protocol suite.

Terminal Multiplexer

Terminal Multiplexers provide simple add/drop multiplexing of SONET and standard DS1/DS3 channels onto a single SONET bearer.

Trap

A system event that results in a message being sent to a Network Management System.

Unavailable Seconds

UAS. The number of seconds that an interface is unavailable. The DS3 interface is said to be unavailable from the onset of 10 contiguous PSESs, or the onset of the condition leading to a failure. If the condition leading to the failure was immediately preceded by one or more contiguous PSESs, then the DS3 interface unavailability starts from the onset of these PSESs. Once unavailable, and if no failure is present, the DS3 interface becomes available at the onset of 10 contiguous seconds with no PSESs. Once unavailable, and if a failure is present, the DS3 interface becomes available at the onset of 10 contiguous seconds with no PSESs, if the failure clearing time is less than or equal to 10 seconds. If the failure clearing time is more than 10 seconds, the DS3 interface becomes available at the onset of 10 contiguous seconds with no Press, on the onset period leading to the successful clearing condition, whichever occurs later. With respect to the DS3 error counts, all counters are incremented while the DS3 interface is deemed available. While the interface is deemed unavailable, the only count that is incremented is UASs.

User Datagram Protocol

UDP. A transport protocol offering connectionless-mode service within the Internet protocol suite.

Wideband

Services requiring 1.5 to 50 Mb/s transport capacity.

INDEX

Symbols

Numerics

A

D

E

M

N

O

P

Q

R

S

T

U

V

W

X

Z