MCN: 0080264-01

Rev. A

CopperEdge®

Installer Guide

CopperEdge 200 DSL Concentrator

Copper Mountain Networks, Inc.

Corporate Headquarters:
1850 Embarcadero Road
Palo Alto, California 94303

San Diego Facility:
10145 Pacific Heights Boulevard
San Diego, California 92121

Limited Warranty

Copper Mountain Networks, Inc. (“Copper Mountain”) warrants this CopperEdge™ DSL Concentrator to be free from defects in materials or workmanship for a period of one (1) year from the date of shipment from Copper Mountain's factory. Should this CopperEdge product fail during the warranty period, Copper Mountain will, at its option and as its sole and exclusive obligation under this warranty, repair or replace it with a like product, which may include new or refurbished parts or components. This warranty is extended only to the original purchaser and only covers failures due to defects in materials and workmanship which occur during normal use during the period of the warranty. It does not cover damage which occurs in shipment or failures resulting from misuse, negligence, accident, improper storage, installation or testing, unusual electrical stress, fire, lightning, other environmental hazards, unauthorized attempts at repair, operation inconsistent with published electrical and environmental specifications, or if the Product was maintained in a manner other than described in this document, or if the serial number or other identifications markings have been altered, removed or rendered illegible. Expendable components such as batteries or cabling external to the unit are not covered by this warranty.

For specific terms and conditions of the product warranty and Copper Mountain's obligations thereto, please refer to the warranty section of your purchase agreement.

In order to exercise your rights to repairs under this warranty, you must first contact Copper Mountain at 888-611-4266 (for calls made from U.S. locations only) or 858-410-7278 (for all calls made from outside the U.S.) to obtain authorization (including tracking number) and instructions for return of the product(s).

EXCEPT FOR THE EXPRESS WARRANTIES SET FORTH HEREIN AND IN THE APPLICABLE PURCHASE AGREEMENT, COPPER MOUNTAIN MAKES NO WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY AND HEREBY EXPRESSLY DISCLAIMS ANY AND ALL SUCH WARRANTIES, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF TITLE, NON-INFRINGEMENT, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE PRODUCTS PURCHASED. NO REPRESENTATION OR OTHER AFFIRMATION OF FACT, WHETHER MADE BY COPPER MOUNTAIN OR OTHERWISE, SHALL BE DEEMED TO BE A WARRANTY FOR ANY PURPOSE OR GIVE RISE TO ANY LIABILITY OF COPPER MOUNTAIN.

The laws in some localities do not allow limitations on the warranty period so the above exclusions or limitations may not be applicable. This warranty provides specific legal rights. You may have other rights with respect to this product, depending on local laws.

Software License Agreement

Use of this Product is subject to the Software License Grant contained in the purchase agreement used to originally purchase this Product from Copper Mountain.

Except as expressly permitted by applicable law, Customer or any third party to which the software may be licensed as permitted under the original purchase agreement, may not alter, modify, adapt or translate, create any derivative works based on the software, reverse engineer, decompile, disassemble or otherwise attempt to derive the human-readable source code for the software licensed with this Product.

* * * * *

Should you have questions regarding the above Product warranty or Software License Grant, please contact the Contracts Department, Copper Mountain Networks, at 858-410-7277.

About this Document

The *CopperEdge 200 Installer Guide* is intended to aid those persons who are responsible for any or all of the processes involved in receiving, unpacking, and physically installing the CopperEdge 200 DSL Concentrator, or who may perform the initial, baseline provisioning necessary to achieve communication over the network sufficient to enable remote configuration and management. Certain information in this document has been condensed from other Copper Mountain publications in order to provide selective information and procedures pertinent to installation and maintenance of the CopperEdge 200. The Installer's Guide is divided into the following chapters.

Introduction and Overview

Describes the overall functionality of the CE200 and its operating software, and provides a listing of selected specifications.

Installing the CE200

Provides receiving and unpacking information, listings of required equipment and software, mounting instructions, and information on cabling and connections to the various CE200 interfaces. Includes information on initial powering.

Basic Configuration

Fundamentals of the CopperCraft command-line interface and its query language and syntax. Provides basic information needed for establishing minimum the configuration required to effect connectivity with the network and the system managers.

If you will be operating the CE200 or monitoring its performance beyond the basic functions described here, then you should consult the *CE200 Installation and Operating Guide* for further details.

System Applicability

This document reflects hardware and software configurations and capabilities of the CopperEdge 200 which were current as of the publication date of this document. If you require access to the full capabilities of the system and all of its operating system commands (beyond those required for installation and initial setup), check with Copper Mountain Customer Service to determine the applicable Product Release for your system.

Revision History		
Rev.	**Doc. Rev. Date**	**Summary of Changes**
A	15 February 2001	Initial release.
	8 April 2002	Added installation information for OC-3c/STM-1 WAN Modules, T1/E1 IMA Module, and G.Shdsl module.

US Federal Communications Commission Information

This device complies with Part 15 of the US FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this device not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

This equipment has been tested and found to comply with the limits for a Class "A" digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the 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 interference to radio communications. Unprotected operation of this type of commercial equipment in a residential area is likely to cause harmful interference which the user would be required to correct

NOTE: *The CopperEdge™ 200 was FCC verified under test conditions that included the use of shielded I/O cables and connectors on certain system components. To be in compliance with FCC regulations, the user must use properly installed shielded cables and connectors on all connections to the System Control Module, and the V.35, DS3 Frame and HSSI WAN Modules. Shielding is not required on cables to DSL port connectors (LJ1 through LJ8 on the rear of the equipment chassis), the alarm status connector (JA2 on the rear of the chassis), or on the DC power input connections.*

10145 Pacific Heights Blvd.
Suite 100
San Diego, CA 92121 USA

Declaration of Conformity

We, Copper Mountain Networks, Inc., declare under our sole responsibility that the following product to which this declaration relates is in conformity with the Essential Requirements and Harmonised Standards identified below.

1999/5/EC of the European Parliament and of the Council relating to Radio & Telecommunications Terminal Equipment. *The mutual recognition of conformity with this directive is based on compliance with the following Essential Requirements*:

89/336/EEC, EMC Directive

EN 55022:1998, Limits and methods of measurement of radio interference characteristics of Information Technology Equipment (ITE)

EN 55024:1998, Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement

73/23/EEC, Low Voltage Directive

EN60950:1992, Safety of Information Technology Equipment, Including Electrical Business Equipment, Including amendments A1:1993, A2:1993, A3:1995, A4:1997, A11:1997

PRODUCT

Manufacturer	Copper Mountain Networks, Inc.
Trade Name/Model Number	CopperEdge 200 DSL concentrator, CE200

Alternate Trade Names/Model Numbers-Identical to that shown above except for Trade Name/Model Number.

- CopperEdge 200 made for Lucent Technologies by Copper Mountain Networks, Inc.

Year of First Issue 2000

Tom Lavka, Member of Technical Staff
Typed Name and Title of Representative

+01.858.410.7110, tlavka@coppermountain.com
Telephone Number & E Mail address

Signature of Manufacturer's Representative

May 15, 2000
Date

Form Copper Mountain: EU D of C

Issue: 05/15/00, Rev B

Canadian, Industry Canada CS-03 Telecommunications Notice

The following notice relates to the CE200 System Control Module Modem interface, operation of which may require connection to the public telephone network:

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective operational and safety requirements in the appropriate Terminal Equipment Technical Requirements documents. 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.

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

The Ringer Equivalence Number (REN) of this device is 0.6.

The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination of an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

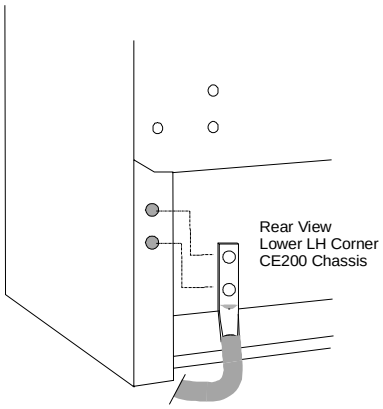
This equipment uses Canadian CA11A Jacks.

Safety Information
for Central Office Equipment

Installation of Ground Conductor (protective earthing)

The installer must ensure that the central office (CO) battery connections to the CE200 are as follows:

- The -48 VDC Return must be at the same potential as CO ground (earth ground). This is normally accomplished in the CO Battery power system by connecting the positive terminal of the CO Battery to CO ground. It is the installer's responsibility to verify this arrangement prior to installing the CE200.
- The installer must ensure that the conductor connected to the CE200 CO GND tab is equal to, or of a larger diameter wire gauge than the conductors used to supply primary power to the CE200.
- Where the local jurisdiction requires use of a two-hole grounding lug, install a ground strap fitted with a UL Listed two-hole lug (Panduit LCC6-10A-L or equivalent) sized for compression connection to #6 copper wire. Attach the lug to the two holes in the metal flange at the lower left corner of the CE200 chassis using standard hardware (two each 10/32 screws and lock nuts). Torque the connection to 34-42 inch pounds.



ESD Protection Required

*All CE200 modules contain static-sensitive devices. If you must remove or handle modules for **any** reason, observe standard ESD precautions (ground straps for personnel and equipment, etc.). If you are unsure of the necessary precautions, contact Copper Mountain Technical Support for assistance.*

Fuses

The telephone line interface modules (DSL module) and Power modules in the CE200 are equipped with over-voltage protection devices.

For continued protection against the risk of fire and electric shock, replace all fuses only with fuses of the same type and rating as the originals.

All CE200 DSL Modules are equipped with resettable polyswitch fuse devices (PTCs), Raychem part no. TR600-150, designated PT1 through PT48. Replace these devices with the same type **only.**

If it becomes necessary to replace the Power module fuse, use only a UL Listed Slo-Blo device with ratings (current and voltage) identical to the original, factory installed part.

Table of Contents

List of Illustrations

Document Conventions

Throughout this document, output from the *CopperCraft* command line interface or other data output is shown in fixed-space "Courier" type. Information that you type (user input) is shown in "**boldface Courier**" type, and is preceded by the system prompt, shown as "Craft>" or "System>".

At various places in this document, we have provided examples of configuration commands in which link- or user-specific information such as IP addresses, subnet masks, or MAC addresses are shown. Unless otherwise specified, all such specific data is fictitious and is provided for illustrative purposes only.

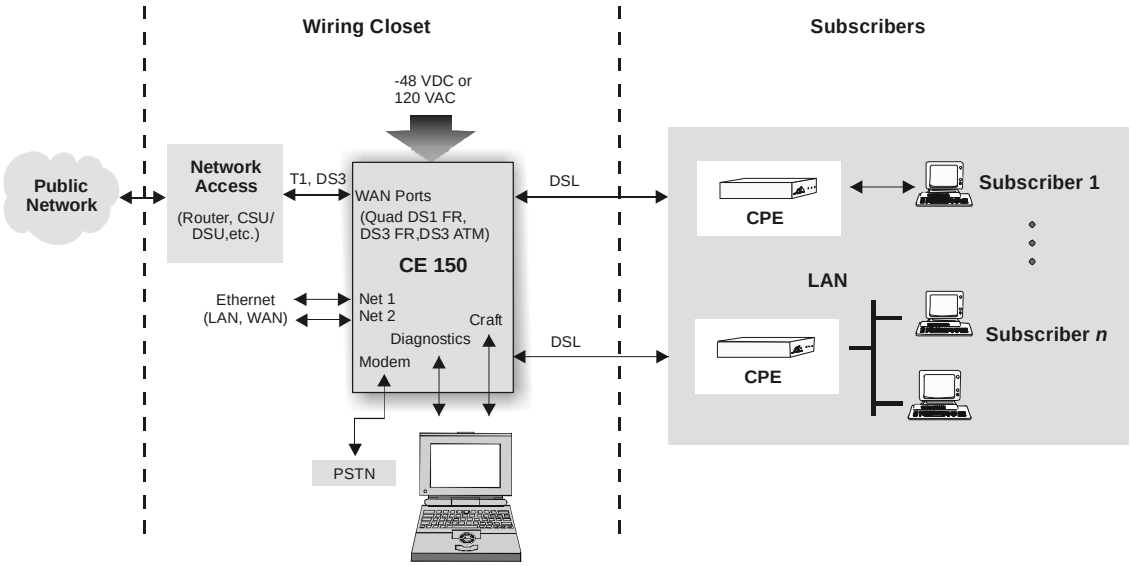
CopperEdge 200 DSL Concentrator

Chapter 1
Introducing the CopperEdge™ 200

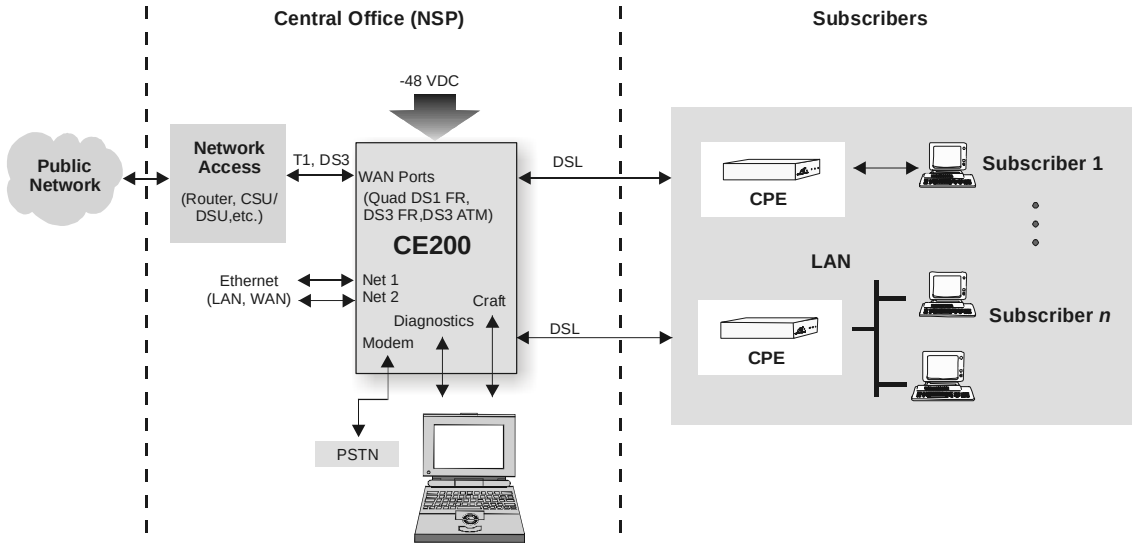
The *CopperEdge*® 200 (CE200) DSL Concentrator comprises the central-office portion of Copper Mountain's end-to-end high speed DSL connectivity solution for Network Service Providers (NSPs) and their subscribers.

Each CE200 can distribute data packets at DSL speeds to as many as 192 subscriber lines (supporting up to 2,048 virtual circuits) over two-conductor twisted-pair copper wire. At the subscriber premises, an appropriate DSL access device such as one of Copper Mountain's *CopperRocket*® products seamlessly connects the subscriber's host PC or LAN, through the DSL physical link, to the CE200 at the Central Office, and from there to the digital facilities of the wide-area network.

The diagram below illustrates a typical deployment of elements of the Copper Mountain DSL system.



Concept of Operation



Concept of Operation

The CE200 chassis can be equipped with a variety of plug-in modules, providing the system operator with the ability to connect easily to different types of facilities on both the upstream (network) side and downstream (subscriber) side of the concentrator. Upstream (WAN-side) modules may connect to the network via Frame Relay, ATM, DS1 or an Ethernet. On the subscriber side, the full range of DSL Module options (SDSL, IDSL, ADSL G.dmt, G.Lite ADSL) is available, enabling the CE200 to operate with a variety of DSL formats and data rates.

This document contains instructions for physical installation of the CE200 in a central-office environment, and provides brief procedures for initial startup and configuration sufficient to establish a connection to the network. Complete instructions for operating the CE200, configuring its links and monitoring its performance are contained in a set of comprehensive reference documents, available in electronic form from Copper Mountain's Support web site. Printed copies of any of Copper Mountain's technical publications are also available from Copper Mountain Networks; contact your customer service representative for details.

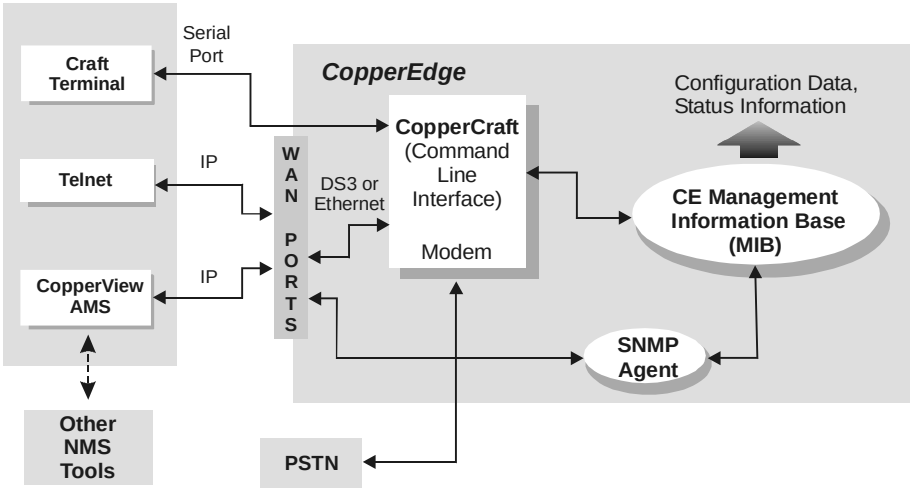
At the subscriber location, the Customer Premise Equipment (a DSL modem or Integrated Access Device) connects to the subscriber's LAN, PC, or other Ethernet device.

Data from each DSL link (subscriber lines) is received by the *CopperEdge*, which adds packet header information to identify each of its connected subscribers, and aggregates the various subscriber lines for transmission over the network.

Configuration and Management

Software to configure and manage the system consists of the *CopperCraft*™ command line/craft user interface. Remote monitoring and control via Telnet is also supported. A graphic user interface is provided through the Element Manager software component of the available *CopperView*™ DSL Access Management System (AMS). The *CopperView* AMS facilitates remote control and management of multiple *CopperEdge* concentrators simultaneously via SNMP. These software tools may be used individually or in concert to configure the CE200 and each of its links, and to monitor configuration, status, and performance.

As shown in the diagram below, the *CopperCraft* interface provides an intelligible, text-based mechanism by which an operator can directly monitor and control the CE200. When controlled by the *CopperView* Element Manager or other network management system, the *CopperEdge's* SNMP agent responds to commands originated by another computer (SNMP Manager).



Status/Configuration Data Flow

Third-Party CPE

As a leader in the xDSL standardization initiative, Copper Mountain conceived and operated a comprehensive program to facilitate interoperability of the CE200 with the DSL CPE of other manufacturers, in addition to its own CopperRocket product line.

A large number of manufacturers have submitted their CPE (operating with various DSL formats, protocols and digital rates) for test and certification of their interoperability with the CopperEdge family of concentrators. Check with your Copper Mountain sales representative for a current list of *CopperCompatible* CPE products.

The full collection of CPE Application Notes, with instructions for configuring your system to operate with CopperCompatible CPE, can be found on the Copper Mountain Support website.

CE200 Specifications[1]

DSL Platform

- Modular design supports current and future DSL interfaces, transmission and backbone network technologies
- 18-slot chassis; up to eight DSL Modules (192 physical ports) per CE200 shelf

DSL Modules

1. All specifications are subject to change without notice.

- **SDSL 30X Module (24 Ports):** multi-speed 1.568 Mbps, 1.040 Mbps and 784, 416, 320, 208, and 160 kbps 2B1Q
- **IDSL Module (24 Ports):** multi-speed 144, 128, and 64 kbps 2B1Q for use in systems offering IDSL service
- **ADSL G.lite Module (24 Ports):** multi-speed 64 Kbps to 2.336 Mbps
- **ADSL G.dmt Module (24 Ports):** multi-speed 64 Kbps to 6.144 Mbps
- **G.SHDSL Module (24 Ports):** multi-speed n x 64, 19.2 kbps to 2.304 Mbps
- **DS1 Module (12 Ports):** via UNE T1 4-wire loops
- Input/Output Impedance at all DSL ports: Balanced, 135 Ω

Network WAN Modules

- 2-port Universal Serial I/O – EIA-449 (CCITT V.36), X.21, and V.35
- 1-port DS3 (45 Mbps) Frame Relay, dual (Tx/Rx) 75-Ohm Coaxial
- 1-port DS3 ATM, dual (Tx/Rx) 75-Ohm Coaxial
- 4-port DS1 (T1 PMC), 100-Ohm unshielded twisted pair, using RJ-48C connectors
- Up to 2048 WAN VCs supported in each CopperEdge chassis

DSL Link Protocols

- Internet RFC 1483 Multiprotocol Encapsulation over Frame-Based User-to-Network Interface (FUNI)
- DSL ports also support RFC 1490, Q.922, Q.922-1490, HDLC, and HDLC PPP as implemented in various third-party CPE

Packet Multiplexing Protocols

- TCP/IP
  - ⇒ RFC 791 Internet Protocol
  - ⇒ RFC 792 Internet Control Message Protocol
  - ⇒ RFC 768 User Datagram Protocol
  - ⇒ RFC 826 Ethernet Address Resolution Protocol (ARP)
  - ⇒ RFC 1058 Gateway and Hosting Protocol
- Virtual Wide Area Net (VWAN) multiplexing and *CopperVPN* IP multiplexing for Copper Mountain's *CopperRocket* customer-premise equipment
- Cross-connect for efficient exchange of data between various third-party CPE and Frame/ATM based network interfaces.
- Policy-based packet multiplexing
- Security filtering using source or destination address or port

Network Standard Protocols

- ANSI T1.606 Frame Relay Architectural Framework

- ANSI T1.606 Addendum 1 for Congestion Management – CIR/BIR/BECN/FECN support
- ANSI T1.618 Core Aspects of Frame Protocol for Frame Relay Service
- Supports multiple standards of LMI management protocols including T1.617 Annex D, Q.933 Annex A, and LMI Rev 1.0a
- Frame Relay Forum UNI FRF.1
- Frame Relay NNI (per FRF.2) supported on WAN links
- Frame Relay/ATM service internetworking (per FRF.8)
- RFC 1157 SNMP Protocol
- RFC 1483 Multiprotocol Encapsulation over ATM
- RFC 1490 Multiprotocol Encapsulation over Frame Relay
- RFC 1973 PPP over Frame Relay
- Inverse ARP over Frame Relay (per RFC2390)
- Inverse ARP over ATM (per RFC2225)

Network Management

- Full SNMP functionality
- Internet RFC 1213 MIB-II, RFC 1315 Frame Relay MIB, RFC 1573 DS3/ES MIB, and Copper Mountain Proprietary MIB
- Proxy management for Copper Mountain CPE
- EIA-2332D Console port/craft interface
- Telnet (password protected) to *CopperCraft* CLI
- *CopperCraft*™ interface accepts up to four simultaneous management sessions via IP (Telnet or FTP), and one via the CRAFT serial port
- PING utility (both originate and respond)
- *CopperView*™ DSL Access Management System with graphics-based element manager, a self-contained SNMP Manager
- Includes support for RADIUS authentication and accounting of CopperEdge user base

Reliability/Serviceability

- Hot-swap supported for all DSL modules; front-panel status indicators to aid fault isolation
- Control and WAN redundancy supported when equipped with optional redundant modules (System Control, Buffer Control and WAN Modules)
- Optional power redundancy via dual load-sharing power supplies with automatic failover and fault monitoring
- Redundant inputs (A&B) for -48 VDC primary power
- Software and configuration downloads from flash memory or from external server via FTP
- Extensive performance monitoring via system-, trunk-, and port-level statistics
- Event and alarm log, and extensive event trapping capability provide status info to NMS/SNMP Managers; front panel mod-

ule shows alarm status, and network of contact closures enable audible and visible CO alarm devices

Certifications

US and Canada

- Network Equipment Building Systems (NEBS) meets or exceeds NEBS levels 1, 2, and 3 and the following Bellcore Specifications:
  - ⇒ Network Equipment Building Systems (NEBS): GR-63-CORE
  - ⇒ Electromagnetic Compatibility and Electrical Safety Generic Criteria for Telecom Equipment: GR-1089-CORE
  - ⇒ Generic Physical Design Requirements for Telecom Products: TR-NWT-000078, Issue 3
- Product Safety:
  - ⇒ UL 1950 3rd Edition, Safety of Information Technology Equipment, Including Electrical Business Equipment
  - ⇒ CAN/CSA C22.2 No. 950-95 3rd Edition.
  - ⇒ UL/CUL Recognized Component
- Product Emissions:
  - ⇒ U.S. Federal Communications Commission (FCC), CFR 47, Part 15, Subpart B, Class A

European Union

- Product Emissions:
  - ⇒ EN 55022:1998, Limits and methods of measurement of radio interference characteristics of Information Technology Equipment (ITE), Class A.
- Product Immunity:
  - ⇒ EN 55024:1998, Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement
  - ⇒ IEC 61000-4-1:1992, Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 1: Overview of immunity tests. Basic EMC Publication
  - ⇒ IEC 61000-4-2:1995, Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test. Basic EMC Publication
  - ⇒ IEC 61000-4-3:1998, Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
  - ⇒ IEC 61000-4-4:1995, Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transient/burst immunity test. Basic EMC Publication
  - ⇒ IEC 61000-4-5:1995, Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5: Surge immunity test
  - ⇒ IEC 61000-4-6:1996, Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields
  - ⇒ IEC 61000-4-8:1993, Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 8: Power frequency magnetic field immunity test. Basic EMC Publication

- Product Safety:
  - ⇒ EN60950:1992, Safety of Information Technology Equipment, Including Electrical Business Equipment, Including amendments A1:1993, A2:1993, A3:1995, A4:1997, A11:1997
- Product Telecommunications:
  - ⇒ G.lite Line Card, ITU G.992.2, ATU-C Characteristics
  - ⇒ G.dmt Line Card, ITU G.992.1, ATU-C Characteristics
  - ⇒ SDSL Line Card, ETS TS 101 135 V1.5.1 (1998-11) for Pulse-shape, PSD output power and Electrical Characteristics of a single 2B1Q Transceiver
  - ⇒ IDSL Line Card, ETSI ETR 080, Nov. 1996, Transmitter Output Characteristics and Transmitter/Receiver Termination

Physical Dimensions

- Overall Dimensions:
  21" (53.3 cm) H x 18" (45.7 cm) W. x 10" (25.54 cm) D
- Rack mounting options: EIA 19-inch (48.3 cm) or 23-inch (58.4 cm) mid-mount central office style
- Weight (approximate) with full circuit-module complement: 89 lbs (40.4 kg)

Input Power

- -40 to -60 Volts DC
- 15 AMPS @ -48 VDC max.

Operating Environment

- Temperature: 32° to 122° F. (0° to 50° C.)
- Humidity: 10-80%, non-condensing
- Altitude: to 10,000 feet (3,048 m)

Release Notes

For complete information about new features, hardware/software compatibility, and late-breaking operational or other issues that the operator or installer should know about, consult the Release Notes document corresponding to the version of hardware and installed software in this CE200. Electronic copies of current release notes are available at the Copper Mountain support ftp site. From your web browser, enter:

`ftp://userid@support.coppermountain.com`

Enter your password when prompted to complete your login.

Technical Support

Expert help with your Copper Mountain equipment and software is available through our Customer Service Center (CSC). Toll-free telephone support is available Monday through Friday from 6 a.m. to 6 p.m., Pacific time, at 888-611-4CMN (888-611-4266), or from outside the U.S., call 858-410-7278. Optional service agreements are also available for those requiring extended (24-hour, seven-day) support and other premium services; contact your Copper Mountain sales representative for details.

For assistance or information via e-mail, contact *support@coppermountain.com*. Technical information about DSL and Copper Mountain products and technology is also available at our web site at *http://www.coppermountain.com*.

Chapter 2
Installing the CE200

This chapter describes physical installation of the CE200 and provides instructions on completing its various physical connections.

Receiving/Unpacking the CE200

The CE200 is shipped fully assembled, packed in a heavy cardboard container designed to protect it against normal shipping hazards. Accessory items such as cables and documentation are packed in a separate carton and enclosed in the main container with the *CopperEdge* chassis. Immediately upon receipt, inspect the exterior of the shipping container and note any visible damage. Keep all forms and invoices pertaining to the shipment, whether packed inside or attached to the outside of the package.

Carefully remove the top from the CE200 container, lift out the accessory carton and set it aside. Then, remove the packing materials, and lift off the cardboard sleeve. Once the chassis is accessible, carefully lift it out of the shipping container base.[1]

Inspect the entire contents thoroughly for signs of damage. If any damage is apparent, immediately notify the claims agent of the carrier and send a copy of the claim to Copper Mountain. Be sure to include the name, part or model number, and serial number on all correspondence. Copper Mountain will advise you of the appropriate course of action.

Return Shipment Procedure

If the unit is damaged and is to be returned for repair or replacement, Copper Mountain will provide you with shipping instructions and one or more Return Authorization (RA) numbers. Forward the damaged item via prepaid freight to the destination address supplied by Copper Mountain. If feasible, ship the unit in its original packaging. Otherwise use a suitable container, surround the chassis with at least three inches of shock absorbing material, and insure the package is secured for shipment. Make sure that the RA number is clearly marked on the outside of the shipping container.

1. At least two persons are required to safely handle the CE200 during unpacking, and to move it into position for installation into its assigned equipment rack.

Hardware and Software Required

CE200 System Hardware

CE200 chassis are assembled as ordered, and are shipped with all of their modules in place. Should it be necessary to modify the physical configuration of a chassis as delivered from the factory by adding, removing, or substituting any of its modules or assemblies, please contact your Copper Mountain sales representative or the Copper Mountain Customer Service Center (page 9) to verify that the components of your modified chassis configuration are compatible with each other and with this version of the product release. For example, there are some combinations of WAN modules which will prevent or interfere with correct operation of the CopperEdge.

The following CE200 hardware items are the *minimum* required for an operational DSL access link. This minimum configuration will support either 12 or 24 DSL ports, depending on the DSL Module installed.

- (1) CE200 chassis
- (1) System Control Module
- (1) DSL Module (any compatible module type)
- (1) Buffer Control Module
- (1) DC Power Module (if this is a NEBS-compliant installation, two DC Power modules are required)
- (1) Fan Assembly

A Control Console (a notebook or other portable PC) is normally used at installation and could be used by an on-site operator at any time to provide direct, serial-port access to the *CopperCraft* command line interface (CLI), to act as an external file server, or to monitor information at the CE200's Diagnostic port.

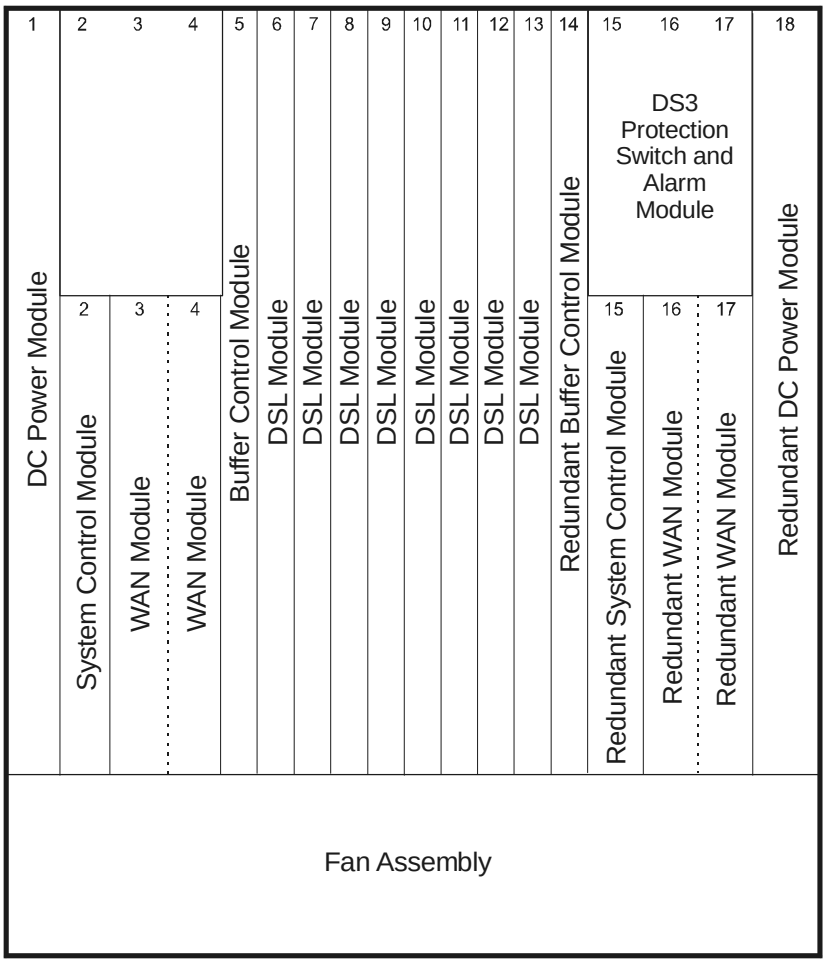
A -48 VDC (nominal) power source is also required. For DC supplies, you can use either Central Office Battery or a suitable external supply.

The CE200 chassis can accommodate up to eight DSL modules. For access to wide-area networks at digital-service rates, Copper Mountain offers the following options:

- a dual-port V.35 WAN Module
- a Quad-DS1 (four port) module
- single port unchannelized DS3 WAN Modules (either Frame Relay or ATM)
- Single-port OC-3c/STM-1 Optical fiber modules (models available for single- or multimode fiber)
- Eight-port T1/E1 IMA Module
- Network access may also be provided through the 10/100BASE-T Ethernet (either single- or dual-port).

*All CopperEdge modules contain static-sensitive devices. If you must remove or handle modules for **any** reason, observe standard ESD precautions (ground straps for personnel and equipment, etc.). If you are unsure of the necessary precautions, contact Copper Mountain Technical Support for assistance.*

The diagram below shows the arrangement of the various circuit modules in the CE200 chassis. Module slots labeled “DSL Module” can accommodate DSL modules of any of various types (e.g., SDSL, IDSL, G.SHDSL, DS1/DSL and ADSL (either G.Lite or full-rate). Note that your installation may not include all of the modules shown.



CE200 Chassis, Circuit Module Arrangement

System Software

In addition to the core data processing software, CE200 software includes the *CopperCraft* command-line interface, and an SNMP agent. A remote management suite, the *CopperView™ AMS* DSL Access Management System, is also available and allows control and management of large numbers of *CopperEdge* products from a central host at a remote site.

The System Control Module code and all configuration data is stored in on-board flash memory, configurable locally through a terminal at the front-panel *Craft* port, or remotely over the network via Telnet or the *CopperView AMS*.

The embedded *CopperEdge* software, and the software for *CopperRocket* CPEs, is upgradable via FTP download from a remote host for easy upgrade of existing equipment.

Other Equipment:

Required Equipment

- Serial cable (DB9) female/female, Null Modem to connect the serial port of a local terminal to the CRAFT or DIAG connector on the System Control Module front panel.
- Network connection cables:
    - Ethernet: Category 5 STP cable; RJ45 at both ends.
    - DS3 (Frame Relay or ATM) WAN: Two coaxial cables (RG-59/U), BNC connector at both ends of each.
    - V.35 WAN: Use shielded cable (DTE, DB25-F to Winchester V.35 block) See page 18 for description and pinouts. Two supplied with V.35 WAN Module.
    - A regulated source of -48 VDC (10 A max. per CE200) is also required at the installation site.
    - Cabling (24/25 pair) between the DSL demarc and rear-panel connectors on the *CopperEdge* chassis.

Tools and Materials

- Flat blade screwdriver
- No. 2 Phillips screwdriver (prefer magnetized tip)
- Modular Telephone Crimp Tool (4- and 8-pin connectors)
- Cable ties
- If connecting to a 66 block, a punch-down tool will also be required

Optional Equipment

For connection to DIAG or CRAFT ports, you may also need:

- (2) serial cables (DB9), male-to-female
- (1) serial A/B switch
- (1) Gender changer, male-to-male, DB9

For access to DS3 *Transmit* and *Receive* monitor jacks:

- (2) 75-Ohm double braid shielded cable (RG316/U); SMB connector at both ends of each.

The following are required for dial-in access to *CopperCraft*:

- Modem, 9600 bps or better (not required if CE200 has a Type 3 SCM)
- Serial cable (DB9/DB25) for use with above modem
- Telephone line cord for connecting modem to dial-up line

CE200 Installation

The remainder of this chapter describes physical installation of the CE200 in a Central Office environment, and connection of the chassis and its various modules.

Important Safety Information

Copper Mountain intends that all *CopperEdge* equipment and software be installed and configured by qualified technical personnel only. Although a full recitation of all of the safety measures required for working on equipment in a Telco CO and/or connected to the network is beyond the scope of this document, the following paragraphs list some of the precautions that you, the installer or maintenance technician, must carefully observe in order to safeguard both personnel and equipment.

CE200 Central Office Equipment Room

The CE 200 may only be installed in restricted access equipment spaces, to prevent accidental injury to non-qualified personnel.

Only Qualified Personnel May Connect or Operate

When installed and connected, hazardous voltages are present at various locations in and around the CE200. Electrical and other hazards may also be encountered throughout the CO equipment spaces. Because of this, and because physical and electrical installation of the CE200 requires completion of various tasks which, if performed incorrectly, could result in damage to the equipment and/or disruption to the network, only personnel who are qualified to work on telephone equipment should be permitted to connect, power, or operate the CopperEdge 200.

Lithium Batteries

The *CopperEdge* is equipped with a lithium battery to maintain certain system parameters whether or not it is powered.

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by manufacturer. Dispose of used batteries according to manufacturer's instructions.

Fuses

The telephone line interface modules (DSL modules) and DC Power modules in the CE200 are equipped with over-voltage protection devices. For continued protection against the risk of fire and electric shock, replace all fuses only with fuses of the same type and rating as the originals.

All CE200 DSL Modules are equipped with resettable polyswitch fuse devices (PTCs), Raychem part no. TR600-150, designated PT1 through PT48. Replace these devices with the same type **only.**

If it becomes necessary to replace the DC Power module fuse, use only a UL Listed Slo-Blo device with ratings (current and voltage) identical to the original, factory installed part.

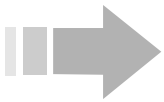
CE200 Rack Installation

The CE200 can be ordered with attachment hardware for either 19-inch EIA or 23-inch Telco CO style racks. Mount the chassis as shown in the typical rack-mount illustration (page 17).

For installations in the European Union — The CE 200 must be installed in an equipment rack which complies with the criteria of a fire enclosure as defined EN60950:1992, A1:1993, A2:1993, A3:1995, A4:1997, A11:1997 Section 4.4.6, Fire Enclosure Construction.

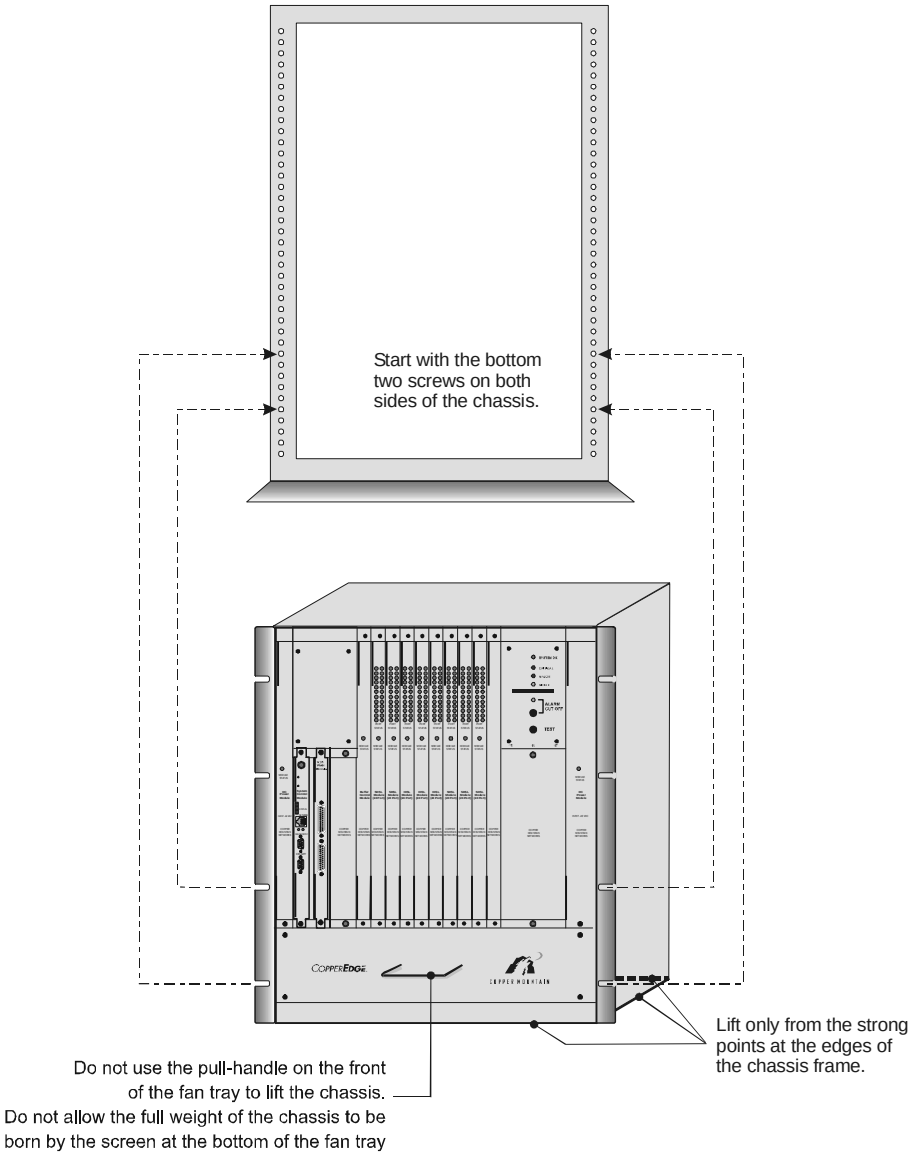
For the United States and Canada — The CE 200 must be installed in a suitable equipment rack or equipment rack frame as defined in UL 1950 3rd Edition and CSA C22.2 No. 950-95, Section 4.4.6, Fire Enclosure Construction.

It is the installer's responsibility to verify that the Equipment Rack is connected to a professionally installed Earth Ground System, prior to installing the CE200.



N O T E S

1. *To ensure an adequate flow of cooling air to all circuit modules and throughout the chassis, any slots not filled with an appropriate module should be covered with Copper Mountain-supplied blank panels of the correct size and type.*
2. *The CE200 is heavy. To prevent injury to personnel or damage to equipment, at least two persons should assist in its handling during installation.*



CE200 Rack Installation

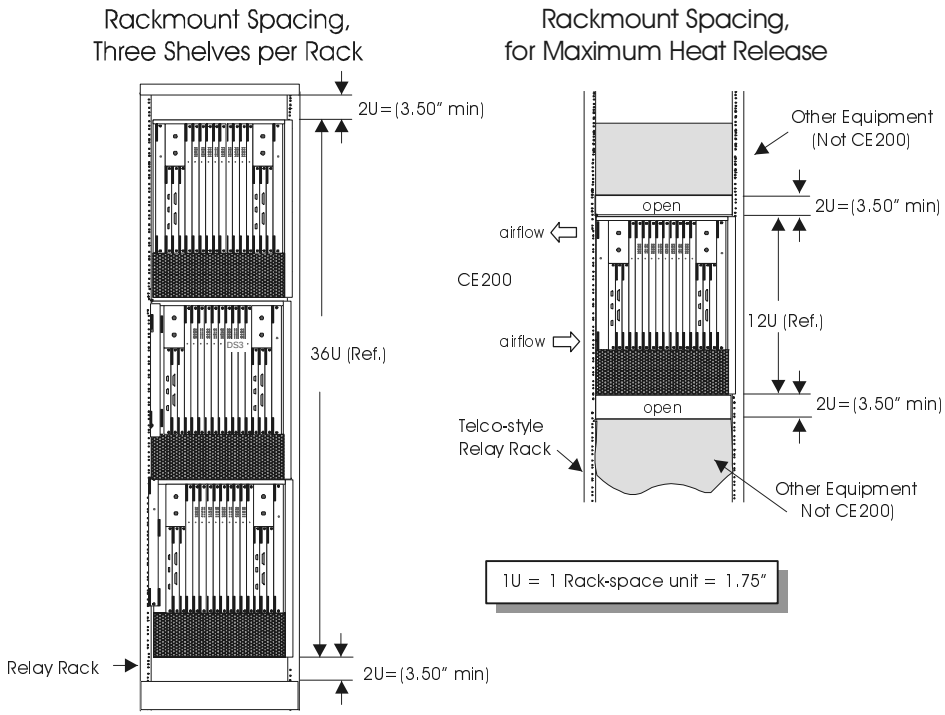
Rackmount Constraints

Although this document presents suggested installation guidelines, it is the responsibility of the installing party to ensure that the actual installation complies with any local requirements that may apply. For example, the ownership or management of the Central Office may specify or restrict the type or size of equipment racks that can be used, or the number of CopperEdge shelves allowed in any single rack. Your Copper Mountain sales representative can provide information on the restrictions known to Copper Mountain for certain locations, but you should also check with the cognizant local authority for this installation site for complete details on any local restrictions or requirements.

In the illustration below two mounting configurations are shown. The sketch on the left shows the maximum CE200 physical load in a standard Telco-style equipment rack. This is the maximum rack-mount density recommended by

Copper Mountain, and shown at right, may or may not be permitted in a particular CO, depending on local regulations. Even if permitted, however, this installation density is only acceptable if the ambient air temperature can be maintained at or below 50 Deg. C. (120 Deg. F.).

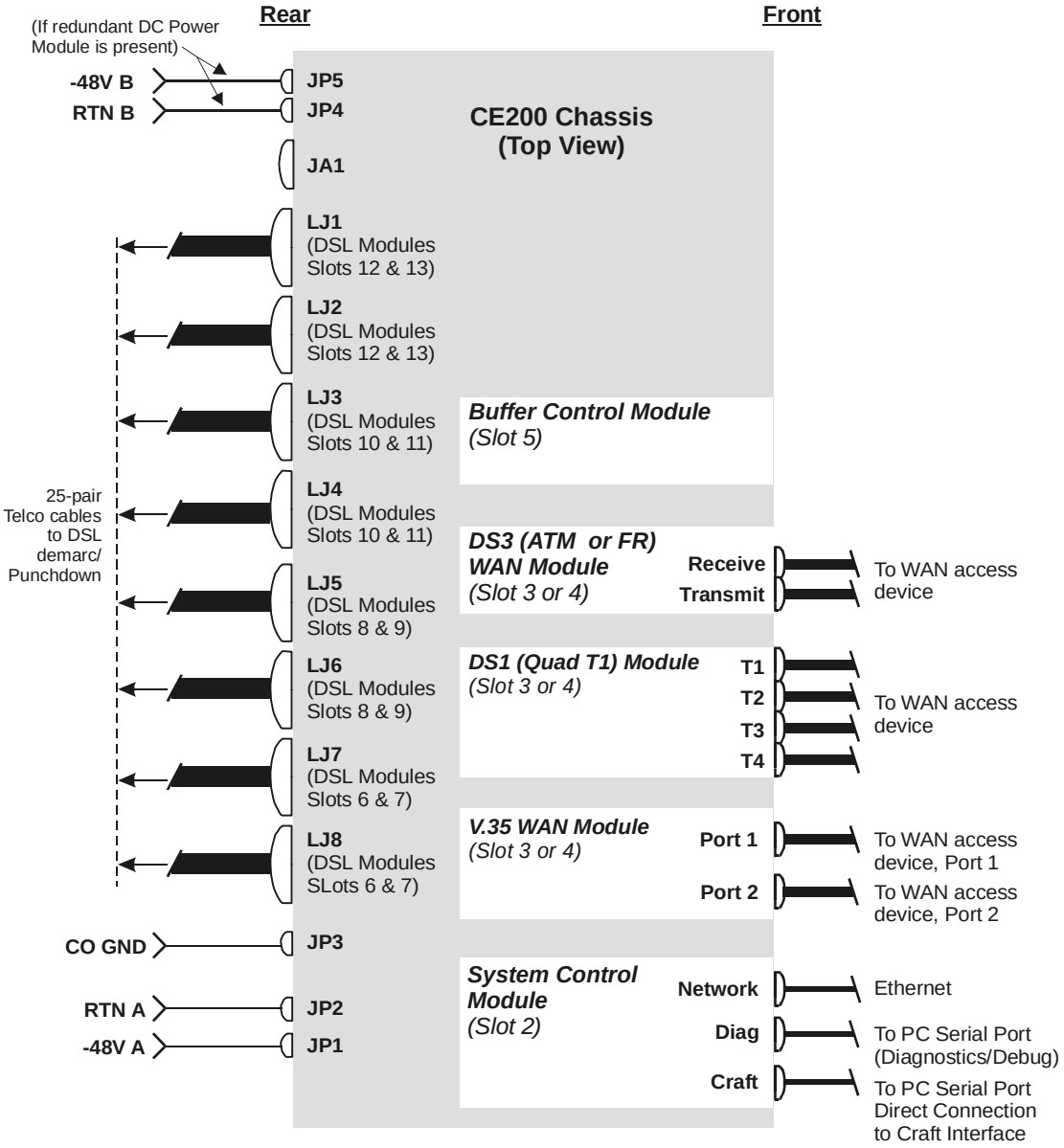
A lower-density installation, mandated in some CO's to meet NEBS heat-release objectives, is shown in the sketch at right.



High- and Low-Density Rackmount Configurations

External Connections, Rear of Chassis

The Connection Map below is a simplified diagram showing external connections for a typical single-shelf CE200 (Control and WAN Redundancy not shown).



CE200 Installation/Hook-up Diagram

Installation of Ground Conductor (Protective Earthing)

The installer must ensure that the Central Office (CO) battery connections to the CE200 are as follows:

- The -48 VDC Return (JP2 & JP4) must be at the same potential as the Central Office ground (earth ground).

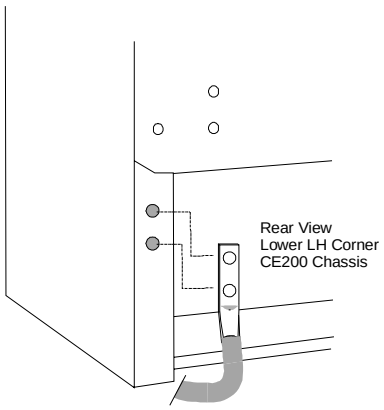
  This is typically accomplished in the Central Office Battery power system by connecting the positive terminal of the Central Office Battery to Central Office ground. It is the installer's responsibility to verify that this connection exists before installing the CE200.

- The wire conductor connected to the CE200 CO GND (JP3) must be equal to, or of a larger diameter wire gauge, than the conductors used to supply primary power to the CE200. (JP1, JP2, JP4, JP5).

Equipment Grounding

In some applications, you may be required to take additional measures to ground the CE200 chassis as illustrated in the diagram at right and described below.

If this installation requires use of a two-hole grounding lug, prepare a ground strap fitted with a UL Listed two-hole lug (Panduit LCC6-10A-L or equivalent) sized for compression connection to a #6 copper wire. Fasten the lug, to the two holes in the metal flange at the lower left corner of the CE200 chassis, using standard hardware (two each 10/32 screws and lock nuts). Torque to 34-42 inch pounds.



CO Ground Connection

Power Conductor Installation

The circuit backplane of the CE200 chassis is protected by a transparent sheet of structural acrylic, separated from the backplane by standoff insulators. The wire conductors that connect the -48 VDC sources and the CO Ground to the CE200 connect to terminals located beneath the acrylic sheet. The following sections describe how to establish those connections.

W A R N I N G

*Reversing the polarity of the -48 VDC input connections **will** cause damage to the DC Power Module, requiring its return to the factory for repair. Never rely on wire color or "logic" in connecting the supply lines (the "hot" wire is on the right for the "A" supply, and on the left for the "B" supply). Use an appropriate meter or testing device to verify the polarity before connecting the DC Power Sources.*

Over-current protection devices (circuit breakers) in circuits supplying the -48V DC to the CE200 should be rated at no more than 20 Amps.

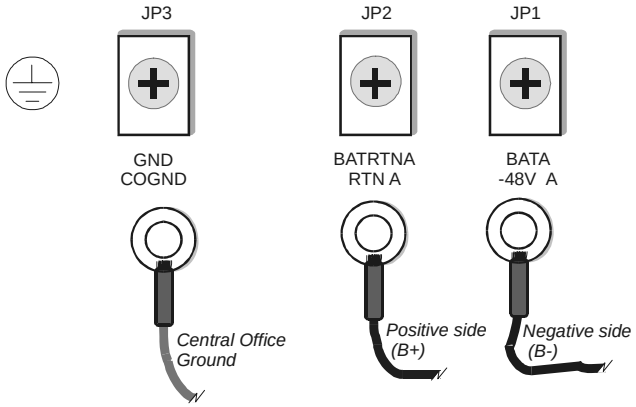
Connect DC Power Source "A"

The DC Power Module in Slot 1 is supplied via the right (A) side input terminals; the connections are:

- Ground wire from Central Office ground to JP3 (CO GND).
- Positive (B+) wire to JP2 (RTN A).
- Negative (B-) wire to JP1 (-48V A).

To connect the power:

1. Locate the three screw-driver access holes at the bottom right (A) side of the rear panel.
2. Remove the hold-down screws on JP1, JP2, and JP3.
3. Connect one end of a suitable ground-wire to the Central Office ground and using one of the screws removed in step 1, fasten the other end of the CO ground wire to JP3 (CO GND).



Rear Panel DC Power Source "A" Connection

4. With the power turned off, route the -48V and Return DC Power wires up from the bottom of the CE200 and between the back-plane and the acrylic panel.
5. Connect the positive (B+) wire to JP2 (RTN A).
6. Connect the negative (B-) wire to JP1 (-48V A).
7. Tighten the screws on all three terminals to secure the leads in place.
8. Tie Wrap and secure the power and ground wires to the equipment rack.

Connect DC Power Source “B”

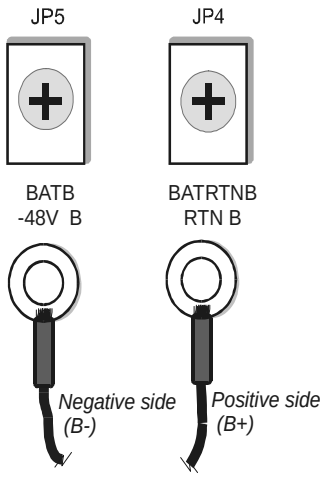
When a second DC Power Module is installed in slot 18, the left (B) side supply must also be connected:

- Positive (B+) lead to JP4 (RTN B)
- Negative (B-) lead to JP5 (-48V B)

To ensure maximum failsafe protection, the B-side connectors (JP4 and JP5) should be supplied by a separate DC power source with separate Over-current Circuit Breakers (protection devices).

To connect the power:

1. Locate the two screwdriver access holes at the bottom left (B) side of the rear panel.
2. Remove the two screws at JP4 and JP5.
3. With the power turned off, route the -48V and Return DC wires up from the bottom of the CE200 and between the backplane and the acrylic panel.
4. Connect the positive (B+) lead to JP4 (RTN B).
5. Connect the negative (B-) lead to JP5 (-48V B).
6. Tighten the screws on both terminals to secure the leads in place.
7. Tie Wrap and secure the power wires to the equipment rack.



Rear Panel DC “B” Power Connection

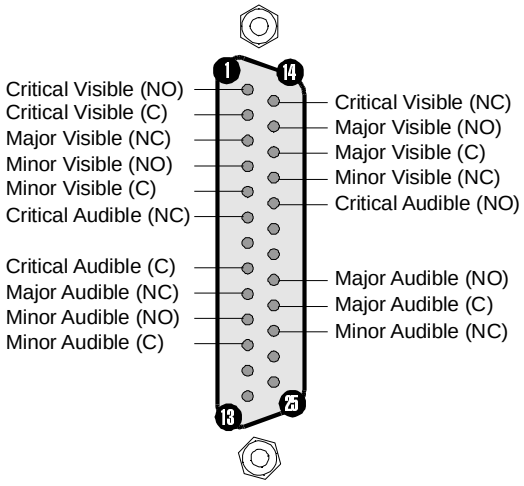
Connect External Alarm Cable (if present)

Rear-panel JA2 is a DB25-F connector. This receptacle provides access to dry contact closure to actuate external alarm devices in case of a failure on the CE200 or one of its components or links.

Separate sets of contacts are provided to activate visible and audible devices for each of three types of alarm: minor, major, and critical. The diagram shows the pinout:

NO = normally open
NC = normally closed
C = common.

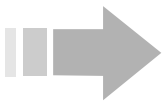
Audible alarms are reset (silenced) by the front panel Alarm Cutoff switch. Alarms remain active for as long as the alarm condition persists.



Alarm Connector Pinouts

Connect DSL Cables

Illustrations in this section show the rear-chassis connector arrangement and pinout diagrams for wiring the DSL ports. Each connector (RJ21X) services two DSL Modules as indicated in the drawing by the slot number labels at the top and bottom of each connector pair. Use standard 25-pair cables of a length to connect the CE200 to your 66 blocks or other terminal point. This wiring plan accommodates both 24-port DSL modules and 12-port DS1 DSL Modules as shown in the illustration on page 25.



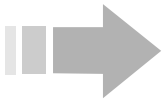
I M P O R T A N T

- *The rear-panel DSL connectors use a unique wiring plan in order to mate compatibly with the CE200 backplane.*
  - — *DSL modules in even-numbered slots use the top 12 pairs of two adjacent rear panel connectors, beginning at the top*
  - — *Modules in odd-numbered slots use the bottom 12 pairs, beginning at the bottom of the connector.*

  If you will be installing or modifying these connections, it is imperative that you first carefully read and understand the diagram on the following page.

- *When connecting DSL links, use caution in selecting and using cable-attachment hardware. Take particular care that any screws or other fasteners do not contact the backplane circuitry, and that cables so attached, are held securely in place. Damage resulting from use of non-standard hardware may not be covered by warranty.*

CE200 DSL Module slots are filled at the factory in ascending slot-number order. The first DSL Module is installed in Slot 6 (**served by J7 and J8**), the second in Slot 7 (**also served by J7 and J8**), the third in Slot 8 (**served by J5 and J6**), etc.



N O T E

The CopperEdge is designed for installation in facilities that provide over-voltage protection on the subscriber loops. This protection should be greater than or equivalent to that provided by 3 mil gap carbon blocks

DSL Connections to Telecommunications Network Voltage (TNV) Circuits

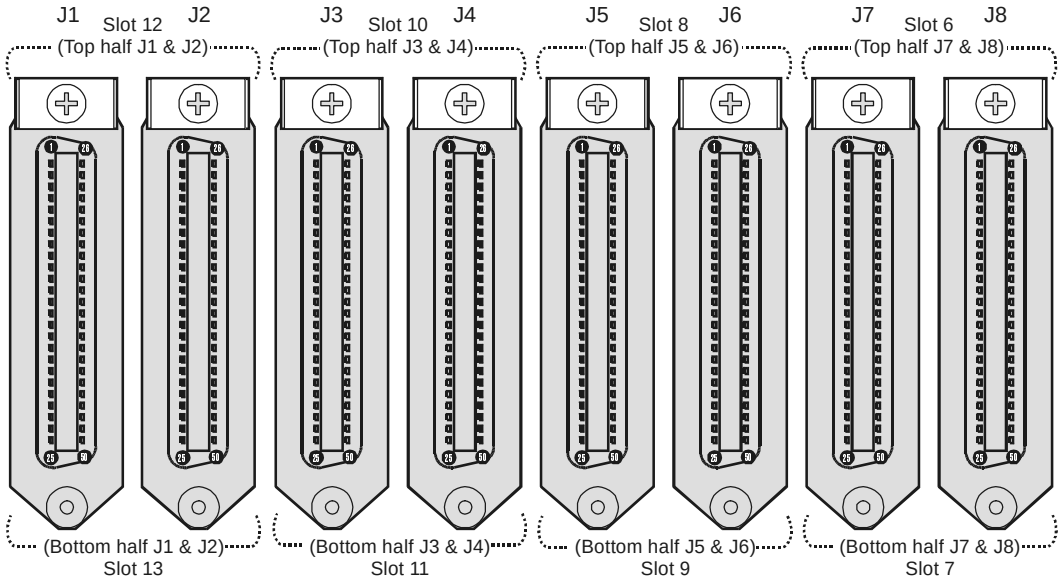
All CE200 Telecommunications Line Cards are compliant for connection to TNV-1 circuits, as defined in Section 6.2.1 & Annex V of the following standards:

- EN60950:1992, A1:1993, A2:1993, A3:1995, A4:1997, A11:1997 *for the European Union*
- UL 1950 3rd Edition and CSA C22.2 No. 950-95 *for the United States and Canada.*

If CE200 Telecommunication Line Cards are used to communicate over TNV-2 or TNV-3 circuits, a protective device (such as a POTS Splitter), which provides isolation from TNV-2/TNV-3 voltages, is required.

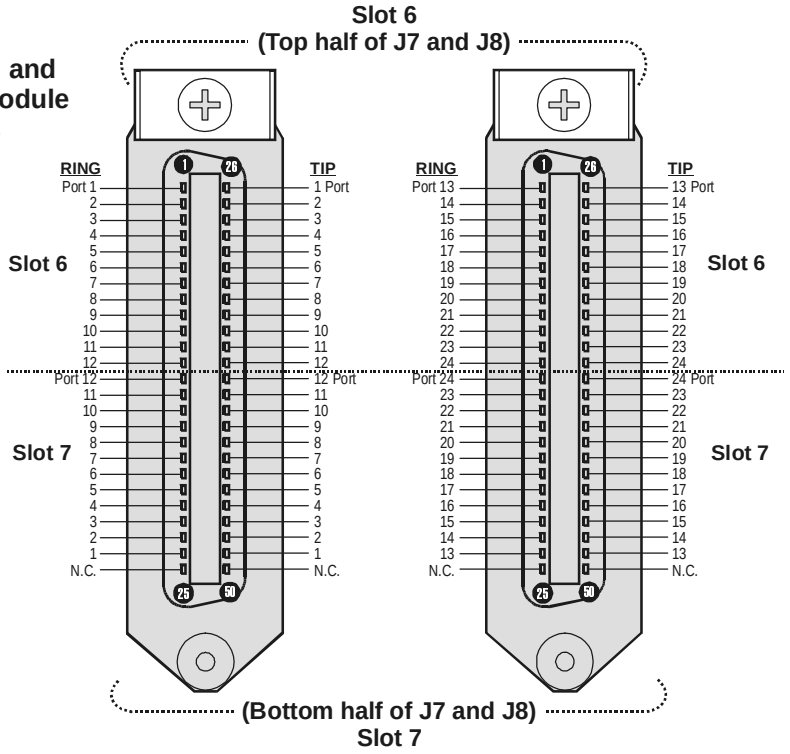
For the European Union, the Protective Device must be approved to EN60950:1992, A1:1993, A2:1993, A3:1995, A4:1997, A11:1997, CE Marked, and provide a Declaration that this protection is provided.

For the United States and Canada, the Protective Device must be approved to UL 1950 3rd Edition and CSA C22.2 No. 950-95, NRTL Marked, and provide a Declaration that this protection is provided.

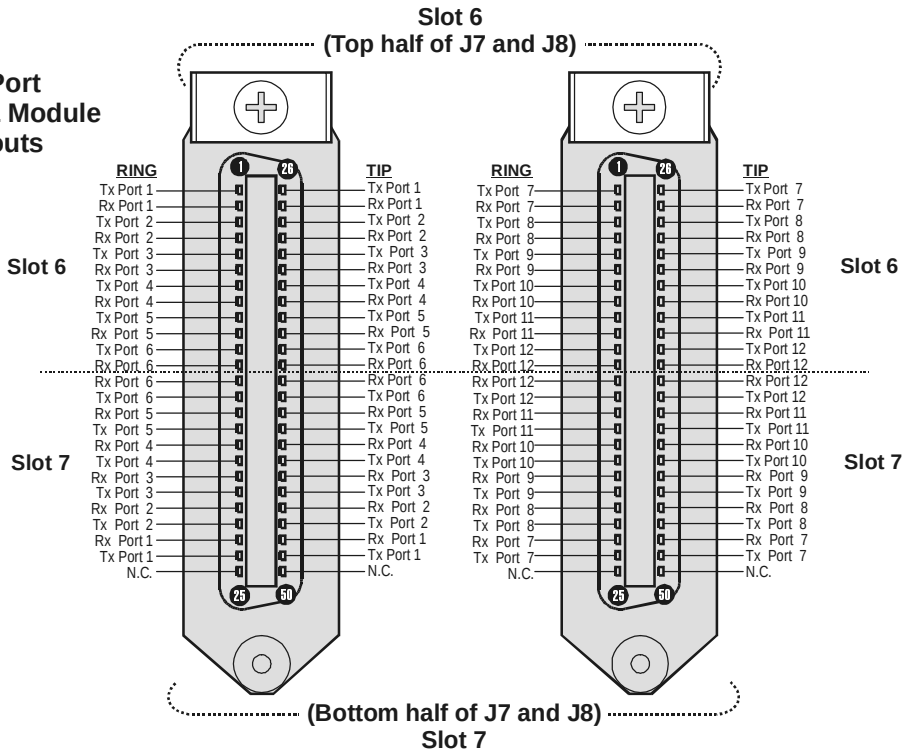


CE200 DSL Connector Arrangement (Rear of Chassis)

SDSL, IDSL, and ADSL Line Module Pinouts



12-Port DS1 DSL Module Pinouts



For all connectors:

1. Pinouts as shown for J7 and J8 are typical for corresponding connector pairs, J1 through J8.
2. Pins 25 and 50 are not used.

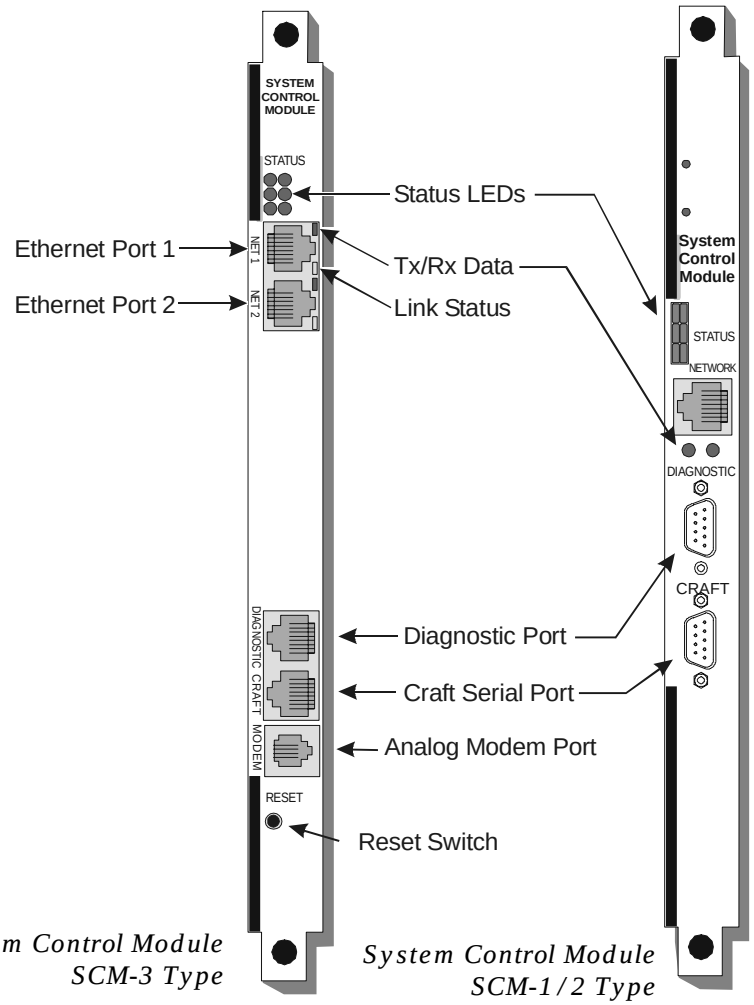
CE 200 Rear-Chassis DSL Cable Pinouts (Typical)

Front-Panel Connections

This section describes electrical connections made at the front panel of the CE200. At a minimum, you will have to connect the System Control Module. If the chassis contains other WAN Modules, make the appropriate connections to those modules as described in the corresponding paragraphs.

System Control Module

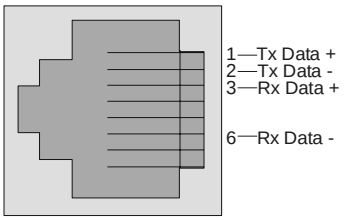
Two types of System Control Module are currently in production for the CE200. Although the connector configurations are different, the functions of the two boards are basically identical. The SCM-3 type board features a second Ethernet Port and an analog modem port not found on the SCM-2. The processor speed, memory capacity, and throughput of the SCM-3 have also been considerably enhanced to support high-performance applications (voice, video, etc.).



System Control Module SCM-3 Type

System Control Module SCM-1/2 Type

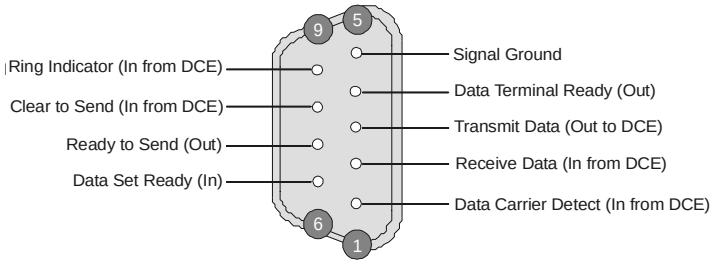
Ethernet



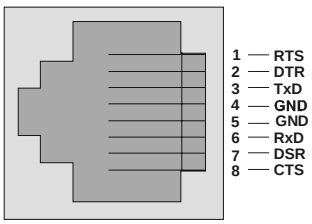
Ethernet Port Pinouts

Connect a Cat 5 STP cable (with RJ45 connectors at both ends) between the System Control Module Ethernet Port connector, and an available port (10BASE-T or 100BASE-T) of a network facility, such as a hub. If indicated on the install order, and if ports are available, you may need to connect both Ethernet ports of a Type 3 SCM.

Craft Serial Port



EIA/TIA-232, DB9



EIA/TIA-232, RJ45

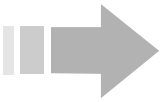
Pinouts for Craft and Diagnostic Ports)

Connect a null modem cable between the COM port on the local terminal or computer and the System Control Module CRAFT port. Note that the CRAFT port is a DTE interface. If you are connecting a terminal or computer which are also DTEs, you will need to use a null modem cable.

Depending upon the type of System Control Module installed, both the CRAFT and DIAGNOSTIC connectors may be either DB9 male, or RJ45. Both are EIA/TIA-232 Serial Interface with pinouts as shown at right. If the module uses RJ45 connectors, you may need to use an adapter (DB9 or DB25 to RJ45) to connect to your or computer or the local terminal you will use as a system console.

Diagnostic Port

The DIAGNOSTIC port on the System Control Module is intended to facilitate factory processes. If there is a problem with your system, however, your Copper Mountain Technical Support engineer may ask you to connect the DIAGNOSTIC port to the serial port of a local computer to aid in troubleshooting.



N O T E

We recommend that you not connect the DIAGNOSTIC port except as directed by Technical Support. Restarting a computer with one of its serial ports connected to the DIAGNOSTIC port may cause the CE200 to reset.

Analog Modem Port (Type 3 SCM Only)

Using a standard telephone cord (RJ11 connectors) connect the modem port on the System Control Module to a dial-up phone line (SCM-3 only; CE200s with SCM-2 or SCM-1 must connect an external dial-up modem directly to the Craft port).

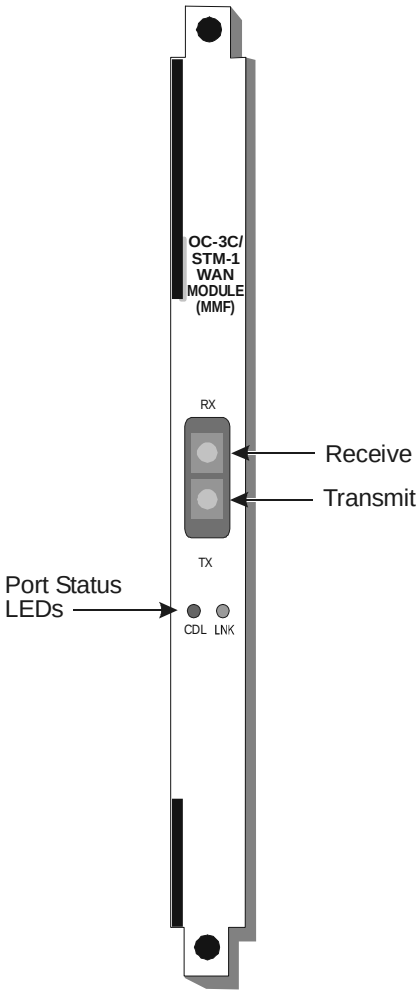
The modem is set to automatically answer on the second ring. However, it will take longer to answer when it is trying to reconnect after a disconnection—it cannot answer on the second ring because it is still busy disconnecting from the previous session. In setting up the remote terminal to operate with the SCM, use 8-1-0 (eight data bits, 1 stop bit, no parity bit). The internal modem will support rates up to 33.6 kbps, but will auto negotiate a lower rate if the remote modem is slower.

If the modem connection is dropped and the operator did not log out of the Craft session, the Craft session is terminated within 15 minutes. The session is immediately available, without requiring a password, to the next person who dials in during the 15 minute period. *This is a security risk*; make sure all operators are aware that they need to properly log out of the Craft session.

Unlike the SCM-1 and SCM-2 boards, the SCM-3 supports concurrent sessions on both the Craft and MODEM ports.

OC-3c/STM-1 WAN Module

The OC-3c WAN Modules support optical carrier standard 3, with a frame structure that operates at 155.52 Mbps. Two types of OC-3c module are available: a Single Mode version for intermediate reach (up to 15 km), and a Multi-Mode version for short-haul (up to 2 km) fiber applications.

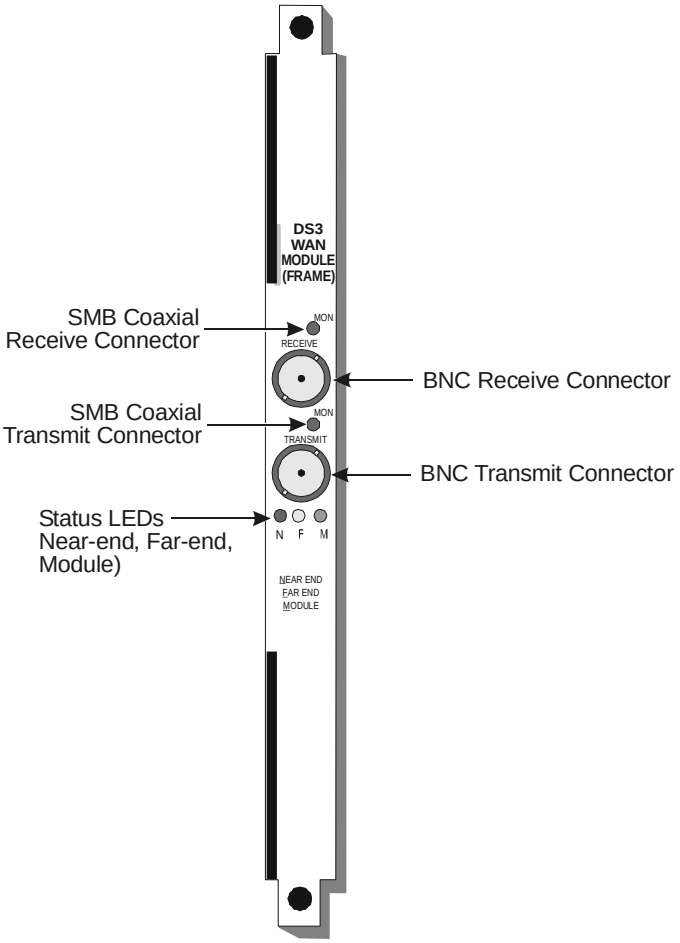


OC-3c/STM-1 WAN Module

Two fiber interfaces, receive and transmit, are provided to complete the connection between the module and the fiber network access device. Connect the appropriate cables from the front-panel fiber ports to the corresponding ports on the associated router or CSU/DSU.

DS3 WAN Module (ATM or Frame Relay)

The DS3 WAN Module (either Frame or ATM) has separate BNC connectors for the Transmit and Receive signals. Two RG59/U coaxial cables are provided to complete the connection between the module and the DS3 access device.



DS3 WAN Module

If your CE200 is equipped with a DS3 Protection Switch/Alarm Panel, you will connect the DS3 WAN modules (ATM or Frame Relay) to the DS3 switch, and the DS3 switch to the DS3 access device (WAN concentrator). For instructions, see "DS3 Protection Switch/Alarm Panel" on page 35.

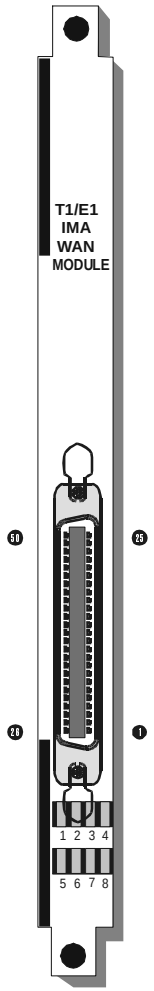
Two subminiature coaxial connectors (SMB) allow test equipment to be connected to the Transmit and Receive Monitor ports.

Three LED indicators are located below the BNC connectors on. At power-up, they all illuminate briefly as a functional test. Each LED has a specific color to indicate its state as shown in the following table.:

Indicator	Color	Description
N	Red	A near-end failure condition, including either loss of signal or loss of frames. The LED stays red until the condition is cleared.
F	Yellow	A far-end failure condition. The LED stays yellow until the condition is cleared.
M	Green	Normal module operation. The line has been synchronized with the network and shows no local or far-end alarms.

T1/E1 IMA WAN Module

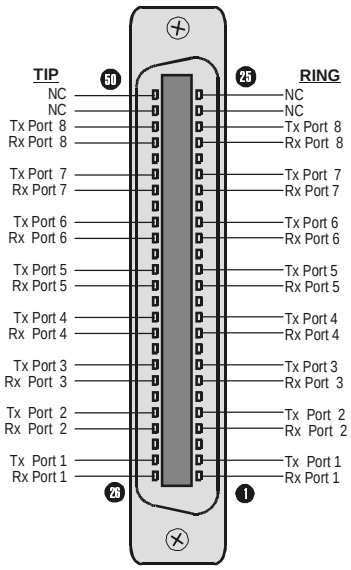
The T1/E1 IMA WAN Module is capable of inverse multiplexing up to 8 T1 (or E1) physical ports into an IMA (Inverse Multiplexed over ATM) bundle for transmission over the network as a virtual *n* x T1/E1 connection.



T1/E1 IMA WAN Module

Network connection to the T1/E1 IMA WAN Module is made via an RJ-21X connector on the front of the module. The connector pinout is shown in the diagram below.

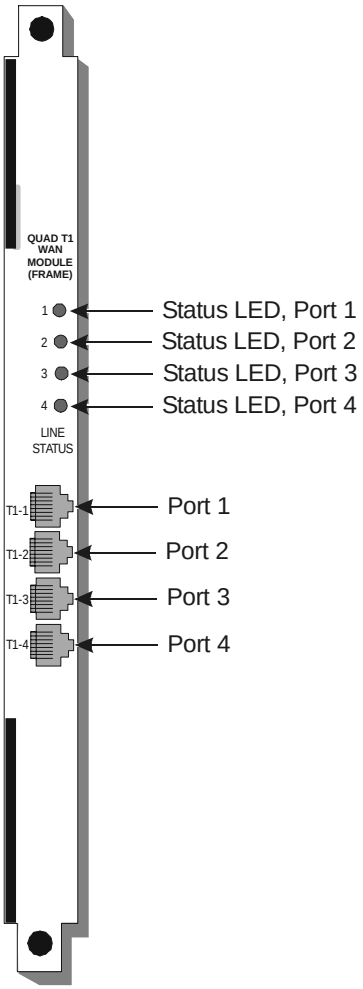
Eight Port-Status LED indicators, labeled 1 through 8, are located on the front of the module, directly below the connector.



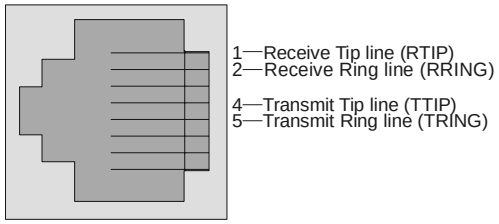
T1/E1 IMA Pinout

DS1 WAN Module (Quad T1)

The DS1 WAN module, shown here, has four DS1 ports. Four unshielded twisted pair cables (rated at 100 ohms) with RJ48C modular jacks are provided to complete the connection between the module and the DS3 access device. Each DS1 line has an LED that indicates the condition of the line or the type of traffic on the line, including alarm signals and normal operating signals. The LEDs have three colors indicating different states as shown in the table below



DS1 Quad T1 WAN Module



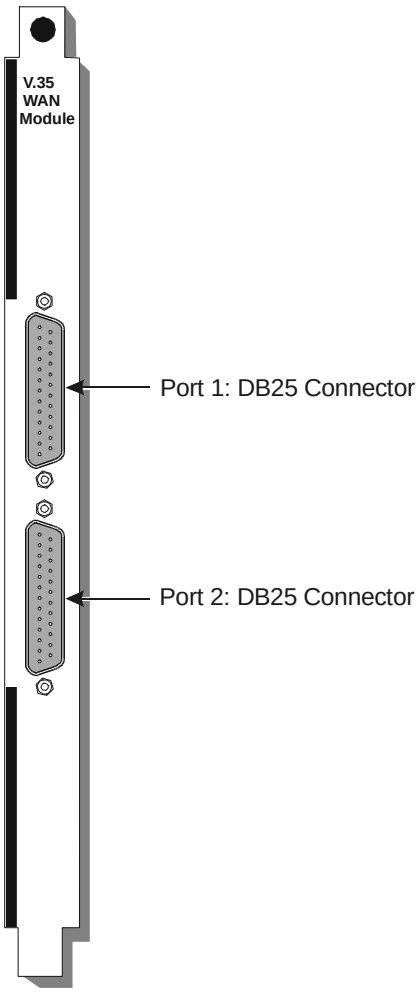
Quad DS1 Pinouts

Color	Description
Green	Normal operation. The line has been synchronized with the network and shows no local or far-end alarms.
Yellow	A far-end failure condition. The LED stays yellow until the condition is cleared.
Red	A near-end failure condition, including either loss of signal or loss of frames. The LED stays red until the condition is cleared.

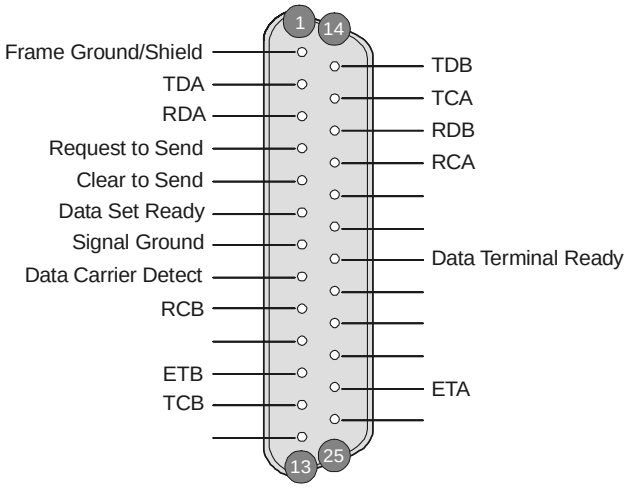
V.35 WAN Module

The V.35 WAN Module has two WAN ports that are accessed through DB25 connectors. The top connector is designated as Port 1 and the bottom connector is Port 2.

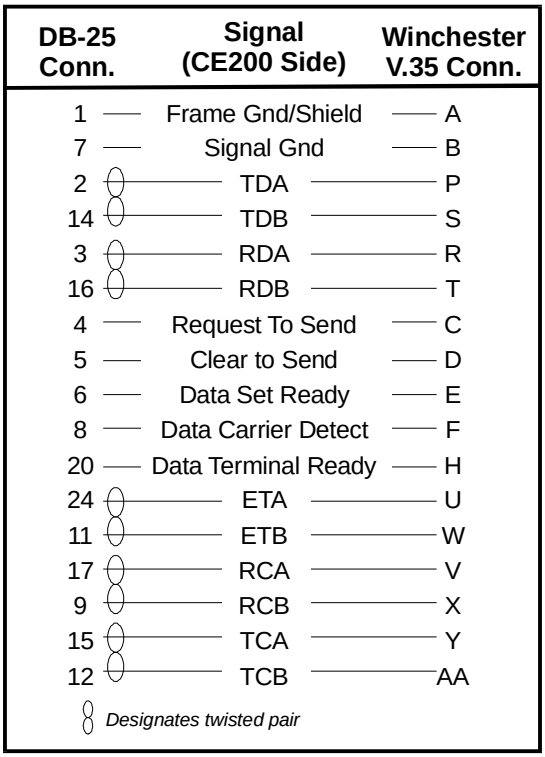
Two shielded cables (DB25-F to Winchester V.35 block) are provided to complete the connection between the V.35 module and the DS3 access device.



V.35 Wan Module



V.35 WAN Port Pinouts



V.35 WAN Cable Pinouts

Connect the appropriate cables from the front-panel V.35 ports to the corresponding ports on the associated router, frame relay switch, or CSU/DSU. The ports on the V.35 WAN module are completely independent of each other and are configured separately, including destination addresses, virtual circuit numbers (DLCIs), etc.

DS3 Protection Switch/Alarm Panel

If your CE200 has been equipped with a DS3 Protection Switch/Alarm Panel (DS3 switch), you will connect the DS3 WAN modules (ATM or Frame Relay) to the DS3 switch, and the DS3 switch to the DS3 access device (WAN concentrator).

The DS3 switch allows the WAN cards to be connected to a single WAN facility (such as a T3 line), or one of two facilities to be connected to a single WAN card. In the current release, there are two possible configurations:

- Control and WAN redundancy using only two WAN modules—This provides complete complex redundancy using only one facility.
- Control and WAN redundancy using all four WAN modules—The switch connects one WAN modules from each side to Facility A and the other WAN modules from each side to Facility B. The switch also connects both Facilities to the WAN modules on each side of the complex. That is, Facility A's transmit can connect to Primary module A's and Secondary module A's receive connectors.

> *The terms Primary and Secondary are different from the terms Preferred and Backup. Primary refers to currently active circuits, and Secondary refers to circuits that will be active in case of a failover. Preferred refers to modules located in the left side of the chassis, and Backup refers to modules located in the right side of the chassis.*

To connect the DS3 WAN and DS3 switch modules:

1. Using the table below, select the type of configuration you want to set up.

	Preferred			Backup			
Configuration Type	**SCM** (Slot 2)	**A** (Slot 3**)**	**B** (Slot 4)	**SCM** (Slot 15)	**A** (Slot 16)	**B** (Slot 17)	**Facilities Connected**
Control and WAN	SCM	ATM	–	SCM	ATM	–	A only
(Single WAN) (or)	SCM	F-R	–	SCM	F-R	–	A only
Control, WAN, and Facility	SCM	ATM	F-R	SCM	ATM	F-R	A & B
(Dual WAN) (or)	SCM	F-R	ATM	SCM	F-R	ATM	A & B

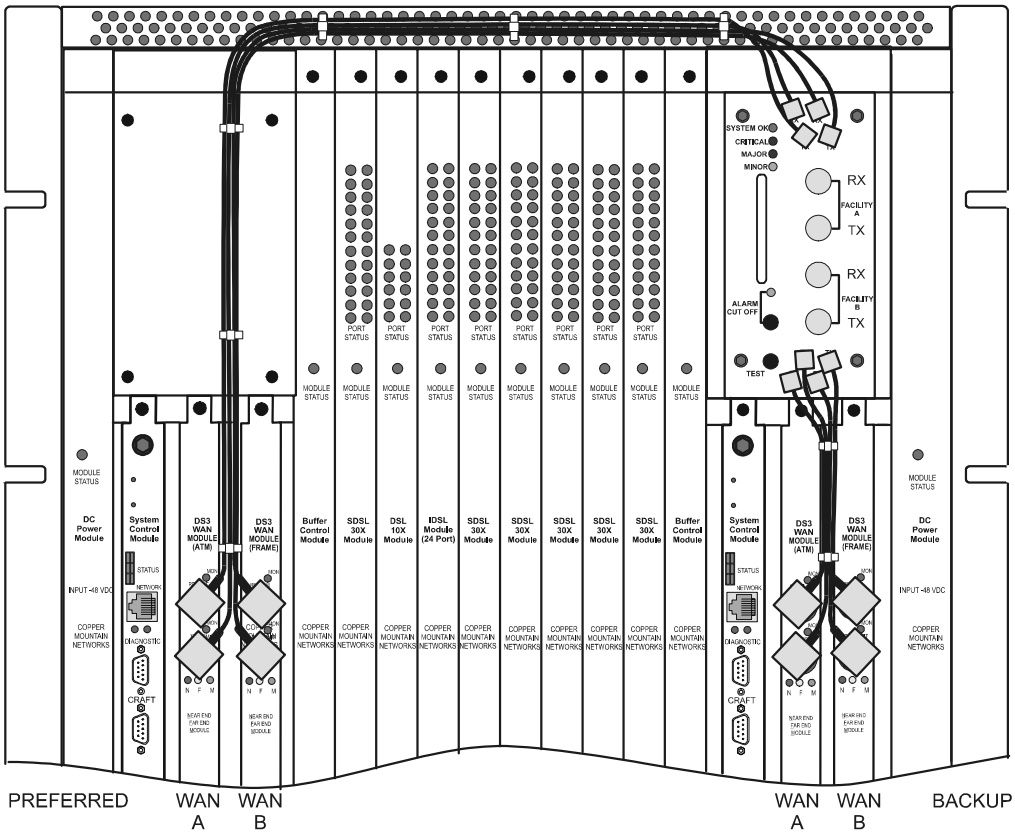
Legend:
SCM = SCM module installed.
ATM = DS3 ATM WAN module installed.
F-R = DS3 Frame Relay module installed.
– = No module installed.

2. Using Table and Figure to guide you, connect the thin coaxial cables according to the configuration you selected.

Cable Connection Guide

From WAN Module	To DS3 Protection Switch/ Alarm Panel	Cable Part No.
Slot 3, Preferred WAN A (Transmit)	RX1	005993-4-XX[a]
Slot 3, Preferred WAN A (Receive)	TX1	005993-3-XX
Slot 4, Preferred WAN B (Transmit)	RX2	005993-4-XX
Slot 4, Preferred WAN B (Receive)	TX2	005993-3-XX
Slot 16, Backup WAN A (Transmit)	RX3	005993-2-XX
Slot 16, Backup WAN A (Receive)	TX3	005993-1-XX
Slot 17, Backup WAN B (Transmit)	RX4	005993-2-XX
Slot 17, Backup WAN B (Receive)	TX4	005993-1-XX

a. "XX" is a two-digit revision number (01, 02, etc.).



DS3 Protection Switch Connections

3. Dress the cables using the supplied cable ties, as shown in Figure .
4. For a single WAN, connect two shielded 75-Ohm coax cables (RG-59/U) to the Facility A BNC connectors on the Alarm Panel

5. For a dual WAN, also connect two cables to the Facility B BNC connectors.
6. Connect the other ends of the shielded 75-Ohm coax cables (RG-59/U) to the DS3 access device (WAN concentrator).

Pre-Power Check

Before you apply power to the CE200 for the first time, please take a few minutes to check the physical integrity of the installed unit:

- Check to be sure that power wires match the right leads. If uncertain, use a multimeter to perform another test of the circuitry.
- Check to be sure that all plug-in modules are properly aligned and seated snugly in their connectors.
- Check all modules to ensure that their extraction levers are lying flat, parallel to the plane of the front panel (module inserted position).
- Check the retainer screws on all plug-in modules and assemblies, including the fan tray and the alarm module. Use your fingers to tighten any loose screws until they are snug
- Recheck all connectors to be sure they are correctly installed and fastened securely.

This completes the physical installation.

Initial Power-Up

Apply -48 VDC power to the CE200, and observe the start-up sequence displayed by the front-panel LEDs on the various modules.

Check LED Displays at Startup

1. DC Power Modules (slots 1 and/or 18) *Module Status* LED green.
2. *Module Status* LEDs on the DSL Modules cycle as follows:

   Red / **Amber** / **Green**

   (approximately ½ second each)
3. *Module status* on the Buffer Control Module cycles as:

   Red / **Amber** / Off / **Green**

   and then turns steady **Amber** to await its software download.

> *Initially, the CE200 may start with one or more of its front panel Alarm-Module LEDs lit, indicating an alarm. If that occurs, connect the Control Console to the Craft serial port, log in to the CopperCraft interface, and enter:* **`set cmsystem command=save`** *and then press* **`<Enter>`**`.` *When the "*`Set Successful`*" message appears, enter:* **`get cmsystem`** *and* **`<Enter>`**`.` *In the resulting list, Command Status should indicate "*`Successful`*"; if not, wait a minute, then repeat the* **`get cmsystem`** *command. The alarm condition should clear; if not, contact Copper Mountain Technical Support.*

4. *a. Normal Start-up:*

   After the cycle described in Step 2, the Buffer Control *Module Status* LED repeats the same sequence while the System Control Module finishes loading and prepares to send code to the Buffer. As the initialization process completes (usually less than one minute), the Buffer Control LED changes to flickering green.

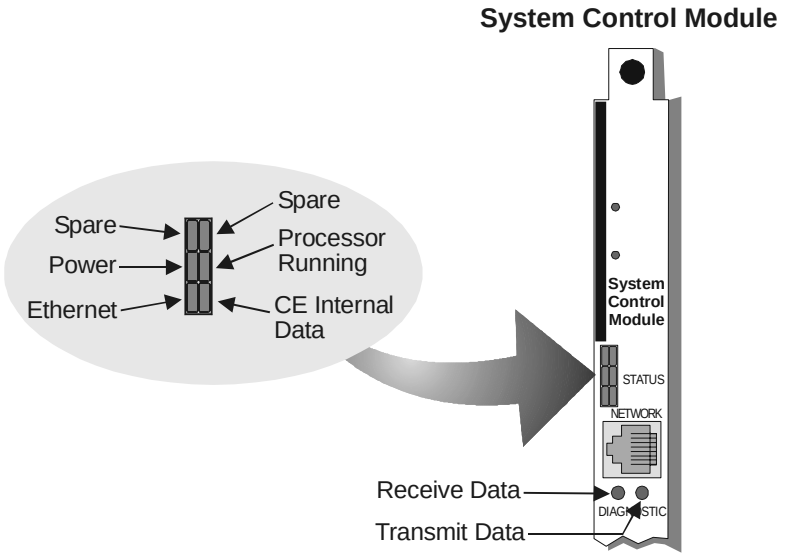
   On the DSL Modules, the *Module Status* LEDs turn amber while software is being downloaded from the System Control Module. Then they switch to steady green.

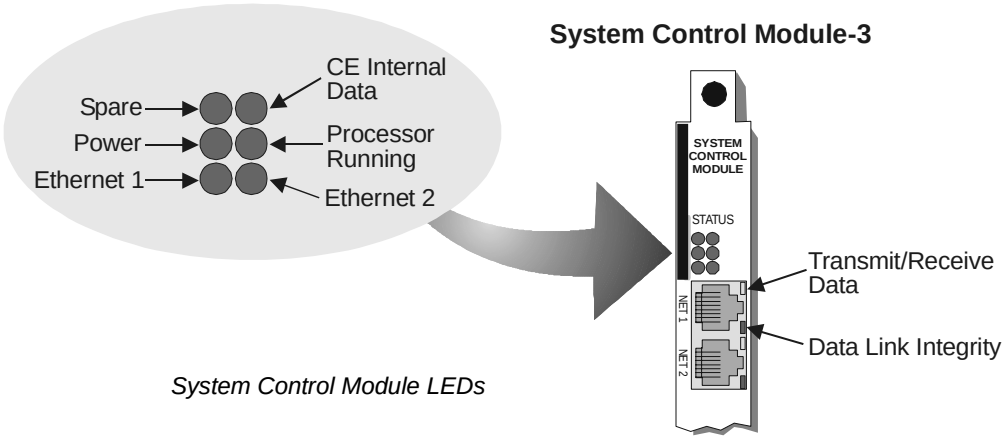
   b. If software is being installed (system has newly installed circuit modules or software is being upgraded):

   After the cycle described in Step 2, the status LEDs display steady amber until software download begins. While the software download is in progress, the Buffer Control and DSL *Module Status* LEDs display blinking amber.

   When download is complete, the DSL *Module Status* LEDs turn green, and the Buffer Control *Module Status* LED changes from amber to rapidly flickering green.
5. Both types of System Control Module have six LEDs adjacent to the *Network* (or *Net 1*) connector. When power is applied, the *Power* LED immediately turns green, and the *Processor Running* indicator turns green within a second or two.

6.





System Control Module LEDs

If the System Control Module is connected to an Ethernet network, the module will negotiate its speed with the network. The *Ethernet* LED turns green if the network is a 10BASE-T (10 Mbps) system, and red if it is a 100BASE-T (100 Mbps) system.

> *A green Ethernet LED is not a signal that the unit is connected to or communicating with a live Ethernet network; the LED turns green by default, whether or not the port is actually connected.*

The *CE Internal Data* LED indicates data activity internal to the CE200 itself. The state of this LED does not correspond to the status of the system; it may be off, blinking, or solid green.

On the System Control Module panel, the *Receive Data* and *Transmit Data* LEDs indicate data traffic. The *Receive Data* indicator turns or flickers green when Ethernet data packets are received by theCE200. The *Transmit Data* indicator

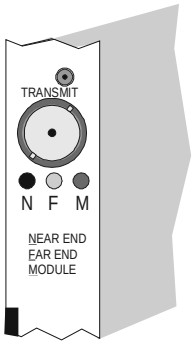
turns or flickers green when Ethernet data packets are transmitted by the CE200.

On the System Control Module-3 panel, each of its two Ethernet ports has two LEDs: a single *Transmit/Receive Data* LED and a *Data Link Integrity* LED. The *Transmit/Receive Data* LED indicates data traffic. It turns or flickers yellow when data is received or transmitted on the Ethernet line. The *Data Link Integrity* LED turns green when the integrity of the Ethernet link for 10BASE-T or 100BASE-T is acceptable.

7. The DS3 WAN Module (if present) has three LED indicators on its front panel, just below the *Transmit* BNC connector. At power-up-, all three LEDs will light briefly as a functional test.

8. If the DS3 (ATM or Frame) WAN module is connected to a compatible DS3 facility, then the green (*Module*) LED will light and the Red (*NEAR END*) and Yellow (*FAR END*) LEDs will be off.

   In the event of a local failure such as loss of signal or frame errors at the CE200 or in the DS3 Module itself, the *NEAR END* LED will turn red to indicate the fault. If a failure occurs but is not due to the CopperEdge unit or the DS3 Module, but rather as a result of trouble with the link or with upstream equipment, then the *FAR END* LED will turn yellow.



DS3 WAN Module LEDs

9. If there is a saved configuration file, it will be read in automatically. If there are CPE units connected to the DSL ports, they will attempt to train (handshake and connect) on the CE200, *regardless of whether the ports have been configured*. As a CPE unit attempts to train on a port, the Port Status LED on the corresponding DSL Module will first blink rapidly, then light steady green if the CPE trains successfully. If the CPE attempts to train but fails, the Port Status LED will go off until the CPE again tries to train. *[It may take several minutes for all of the connected ports to come up.]* The Port Status LEDs of unconnected DSL ports will periodically blink green as the system checks their status.

If you have trouble starting the system from data stored in the *CopperEdge* flash memory, contact Copper Mountain Tech Support.

Check the Fan Tray

After the unit has been successfully powered up, check the fan tray to be sure it is operating properly. The fans pull air in from the front of the tray assembly, and exhaust it out the bottom.

Check at the bottom of the fan tray to ensure that air is blowing out.

If no air is being exhausted:

1. Disconnect power from the CE200 unit.
2. Use the voltmeter to recheck the wiring.
3. Reapply power.

If the power checks okay, but the fans are still not running properly, remove power from the unit and contact Copper Mountain Technical Support.

Composite Chapter 3

Chapter 3
Basic Provisioning

This chapter describes procedures used to perform initial provisioning of the *CopperEdge*, and carry out basic control and management tasks using the *CopperCraft* interface.

Full configuration of subscriber interfaces, setup of WAN links and monitoring and evaluating system performance are beyond the scope of the step-by-step procedures in this chapter. If you will be performing those kinds of activities, then please consult the current revision of the comprehensive *CopperEdge 200 Installation and Operating Guide* and its companion volume, *CopperCraft Reference and MIB Definitions*.

Unless otherwise specified, the term DSL Module used throughout this document applies to all types of DSL modules. Note, however, that different types of CPE may only work if connected to a DSL Module of a type that will support it.

System Configuration

To configure the CE200, you will enter a series of commands to modify settings of the system's Management Information Base (MIB). This section contains essential instructions on how to query and configure the CE200 as part of the installation process, and provides instructions for basic provisioning, that is, configuration sufficient to establish communication between the CE200 and its connected subscriber terminals (CPE), and between the *CopperEdge* unit and the network.

CopperCraft Command-Line Interface

In order to safely perform even limited configuration of the CE200 MIB, it's important that you understand a few essential concepts about the *CopperCraft* command-line interface that controls it. If you've never used *CopperCraft*, please take a few minutes to become familiar with the information on the next two or three pages.

The command language used for the *CopperCraft* interface is a text version of the *Simple Network Management Protocol* (SNMP) that computers use to communicate with each other over the network. While individual commands or queries can be quite long, all of them begin with one of two command words: *get*, and *set*. Two shortcut commands, *getnext* and *getall*, are variants of the get command. *Get is* used to request information, such as current status of a specific interface, port, etc. *Set* is the configuration command used to establish or modify the specified parameter.

In general, commands and other data can be entered without regard to case; capital letters or lowercase letters are acceptable, with one exception: Should you be required to specify a directory path on a file server, you *must* use lowercase letters, as many servers are case-sensitive and will not download their software if commands are not lowercase.

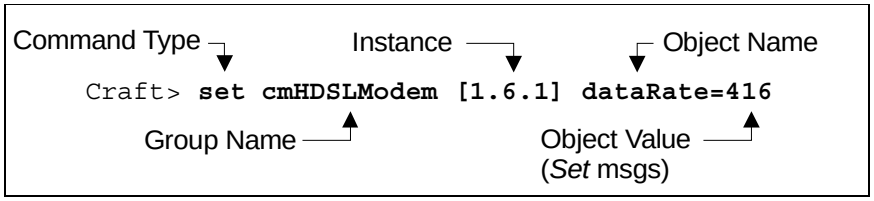
For a command to be accepted, it must be presented in the correct order. SNMP commands take the following order:

- **Command type** (*get, set, getn, getall*)
- **Group name** (*cmOperator, ipRoute, cmSystem,* etc.)
- **Instance** required for this group, e.g. IP address, Permanent Interface Identifier, etc. The *instance* consists of all of the *index* items that uniquely identify a row of a table in the MIB database. If a group has more than one index, then all of them are required to form the instance.

  The **instance**, when required, is enclosed in brackets [like these]. If the entry takes more than one index, enter them in the same order as displayed in the help objects listing or in this guide. Multiple indexes are separated with a comma, but enclosed in a common set of brackets: [index1, index2].

  Some groups don't need an instance if there is only one member of the group; *cmSystem,* for example, is one of these.
- **Object name**, i.e., the specific parameter to be acted or reported upon. In a set command, the object name is followed by an equal sign and the value to be set.

  Example:



The CE200 acknowledges but does not echo the *Set* command, so it's a good idea to promptly follow a configuration command with a *Get* command to verify the setting.[2]

[2] Parameters and values displayed by your system in response to commands you issue may deviate from those shown in the corresponding examples, depending on the software version installed and the configuration settings in effect.

Example:

```
craft(1.2)> set cmiface [1.10.6]
                                ipaddr=206.71.190.5
                                9 netmodel=ip
                                encap=rfc1483
set successful
craft(1.2)> get cmiface [1.10.6]
group: cmiface
instance: [1.10.6.0]
pii                 = 1.10.6.0
ifindex             = 1.10.6.0
name                = stanley
groupname           = ....
additionalinfo      = ....
netmodel            = ip
ipaddr              = 206.71.190.59
netmask             = 255.255.255.0
macaddr             = 0.80.50.14.86.df
burnedinmacaddr     = 0.80.50.14.86.df
farendaddr          = 0.0.0.0
destpii             = 0.0.0.0
cmcpcompatible      = yes
encpasulationtype   = rfc1483
fwdmode             = full-ip
pix                 = 166
service class       = a
```

The response from the *CopperEdge* shows the full contents of the table for the specified interface location (1.10.6).

Permanent Interface Identifier (PII): Who's Who – and Where

On a fully populated CE200, there may be over 200 connection points at which various types of data communications can enter or leave the CE200. To organize and keep track of these individual points of interface, the CE200 uses a system of physical addresses, called *Permanent Interface Identifiers* (PII).

The PII defines the chassis, module slot number and port number where an interface is physically located. For most MIB objects (as seen in the preceding examples), the required *instance* is the PII.

If the interface is associated with a frame-relay virtual circuit, the PII may also include a Data Link Circuit Identifier (DLCI).

Thus, the full PII format consists of four elements, entered as "c.s.p.v" where:

c =chassis number [always enter the chassis number as 1]

s =*CopperEdge* module (slot number) where the target interface is located as follows:

p = port number. On DSL Modules the port number is a number between 1 and 12 or 1 and 24 (see diagram in Chapter 2); on other modules, the port number refers to front-panel ports which are numbered from top to bottom, 1 to n.

Slot No.	Module
1	DC Power Module
2	System Control Module

3-4	WAN Modules (DS3, HSSI, V.35)
5	Buffer Control Module
6-13	DSL Modules, 24 or 12 (T1) Ports
14	Redundant Buffer Control Module (when available)
15	Redundant System Control Module (when available)
16-17	Redundant WAN Modules (when available)
18	Redundant DC Power Module

v =a number identifying an associated virtual circuit.

Examples:

A PII entered as **1.3.1.24** refers to the interface at Chassis 1, Module Slot 3 (a WAN module), Port 1, which is part of a frame relay PVC with a DLCI of 24.

A PII of **1.2.1** refers to the interface at Chassis 1, Slot 2, Port 1 (Ethernet port on the System Control Module). Note that for PIIs *not* associated with a frame relay data link, no virtual circuit number is entered or displayed.

Some third-party SNMP managers may display the PII without using periods to separate the segments. With those systems, the entire field must be filled using leading zeros where necessary.

Example:

In the previous example, a PII was entered via the command line as **1.3.1.24**; in the pure SNMP form the same PII becomes: **103010024**.

Help

Typing ***Help*** displays the list of valid *help* modifiers at the command level:

```
helpget
helpgetall
helpgetnext
helpset
helpGROUPS
helpOBJECTS group_name
help Scmrestart
```

Enter **help groups** to display a listing of all active MIB groups for the software version installed in this CopperEdge unit and a thumbnail explanation of the function of each.

For a listing of all of the valid objects within a group (and a short explanation of each object), type **help objects**, followed by the group name. For example, here's a listing for the *if* group, which has only one object, *Number*:

```
craft 1.2> help objects if
Number          No. of interfaces in IF
                 Table ()

                NOTE: Parenthesis con-
                tain Alias Name
```

Using the Line Editor

Command strings for SNMP can become long and complex. A built-in line editor lets you review typed commands, and correct any errors without having to retype the entire entry.

Here's a summary of the Line Editor commands. Control characters are shown with a caret (example: ^D = Control-D); escape sequences are indicated by ESC (example: ESC-F). If you are using a terminal emulator, be sure to set it to VT100 mode.

^D	Delete current character
DEL	Delete current character
^H	Backspace
^E	End of line
^A	Beginning of line
ESC-F	Forward one word
ESC-B	Backward one word
^K	Delete to end of line
^U	Delete to beginning of line
^U^K	Delete entire line
^L	Redisplay current line
^P	Previous entry from history buffer
^N	Next entry from history buffer
ESC-?	Line Editor Help (types this list)
←	Cursor left
→	Cursor right
↑	Previous entry from history buffer
↓	Next entry from history buffer

If a command line won't fit on a single line, an arrow character (< or >) appears at either end of the line on the screen indicating Scroll mode. Use the arrow keys to move to the end of the line, and the display will scroll to reveal the next 10 characters.

The command history buffer stores the last 20 entries. Logging out of *CopperCraft* or closing your Telnet connection clears the history buffer.

Connecting the Control Console

At installation and initial setup, the CE200 will normally be operated via a control console (a terminal device or a PC) directly connected to CE200 System Control Module front panel.

- Using the Null Modem serial cable provided, connect the COM port of your PC or terminal to the *Craft* serial port on the front panel of the System Control Module.
- Using Hyperterminal or an equivalent terminal emulation application, set the serial port rate to 9600 bps, 8-N-1 (8 data bits, no parity, 1 stop bit). If you wish to use flow control, choose the hardware (RTS/CTS) settings.

Installation and on-site verification of the *CopperEdge* are normally done using this direct connection method, so procedures in this document assume that is the method being used. Unless otherwise noted, however, the same general procedures should be considered as applying to other access methods (e.g., Telnet) as well.

Initial Configuration

Overview

With the CE200 physically in place and successfully started, the next step is to configure the CE200 itself, and any links that need to be immediately established. Initial configuration consists of setting up those attributes that are essential to two-way communication over the network, and for which there is no practical factory default.

The required steps, described in detail in the following paragraphs, consist of:

- Logging into the *CopperCraft* interface
- Setting up records (user names and passwords) for authorized system operators
- Storing the CE200 system name, location and contact information (optional)
- Setting the system clock
- Specifying an SNMP manager to which traps will be sent (a trap destination)
- Configuring the CE200 network interfaces to enable remote access for system management
- Saving the configuration data.

Once the initial configuration steps are completed, your System Management may then configure individual subscriber (DSL) links, the upstream (WAN side) links, and set up any additional parameters as needed for your specific operation. These operations (subscriber and WAN link setup) are normally done remotely; if further configuration is required at installation, your System Management will provide you with specific information.

CopperCraft Log-in

To access the *CopperCraft* command line interface via your PC COM port, connect the Control Console to the CRAFT serial port. Using *Hyperterminal* or an equivalent terminal emulator, set the serial port rate to 9600 bps, 8-N-1 (8 data bits, no parity, 1 stop bit). Use the hardware (RTS/CTS) settings for flow control.

As the CE200 boots, the Copper Mountain Networks banner page will appear, followed by the *User Name* prompt. To log in, enter the default "**ce200**" for both user name and password. Once you are logged in, the factory-default command-line prompt will appear:

SYSTEM(1.2)>

Configure Operator Names

This section describes the method of configuring and managing operator names and passwords through a local database internal to the CE200 (cmOperator MIB group). If access to this CE200 will be managed through an external server, then consult your system management for alternate instructions.

Your system management may instruct you to establish one or more unique operator names and passwords, and/or to change the password for the factory

default (ce200) operator name. For operation with an SNMP manager, you may also need to configure operator records with the SNMP Community names (Public and Private).

1. To view the available parameters in the cmOperator group, see the on-line Help command:

   help objects cmOperator

   Operators can be configured either directly through the Craft port or via Telnet. They are not configurable through SNMP.

2. From the control console, use *set cmOperator* to create a new operator. Enter the name, password, state, context, and the operator privilege level as shown.

   The following characters should not be used in UserName or Password entries as they could be misinterpreted by the CE200 as other commands: Backslant (\), Double Quotes (“), or close bracket (]). The # character is not allowed.

   Spaces are not allowed in UserName strings. If first and last names are needed, use casing or an underscore to separate them: `JohnDoe` *or* `john_doe`. *Note, however, that due to a trait of the underlying software, passwords are not completely case sensitive; the first character of a password may be accepted regardless of case. The system is case-sensitive to all successive password characters.*

In addition to name and password, each operator has a context (whether the operator may access the system via SNMP, nonSNMP, or ALL), and a Privilege level (View, Monitor, Provision, Security). Only one operator is allowed the highest privilege level, Security Administrator (Security). The default operator (ce200) is always the Security Administrator for the system.

Example:

```
SYSTEM(1.2)>set cmoper [Mick] password=stones
        state=create context=SNMP privilege=provision
Set Successful

SYSTEM(1.2)> get cmop [Mick]
Group: cmOperator
Instance: [Mick]
Name                    = Mick
Password                = *******
State                   = active
Context                 = SNMP
Privilege               = Provision
```

3. Follow the above example to set up additional operators.

Once you have verified the new operator configuration as shown in the example, use *set cmOperator* to change the password of the factory default operator as instructed by your system management:

Example:

```
SYSTEM(1.2)> set cmoper [CE200] password=b5c312r
Set Successful
SYSTEM(1.2)> get cmop [CE200]
Group: cmOperator
Instance: [CE200]
Name                  = CE200
Password              = *******
State                 = active
Context               = All
Privilege             = Security
```

The password is not displayed. If a user forgets a password, the Security Administrator can change it to another one, or else delete the operator and start again.

System Information

Though not essential for operation, you should identify this *CopperEdge* unit by configuring the MIB-II *System* group.

System Name = A unique identifier for this unit
Location = Site information (e.g., CO, city, state)
Contact = Point of contact for this CE200 (name, title, phone)

Example:

```
SYSTEM(1.2)> set system name=Craft loc="E St. COLLO"
       Contact="Network Administrator 800-555-4141"
Set Successful
Craft(1.2)>
```

1. Surround character strings that include spaces with quotes.
2. Character strings may not contain backslash (\), angle brackets (< and >), or apostrophe (‘) characters. The “pound sign” (#) should never be used in the database as it will be interpreted as a comment, and the balance of the command will be ignored.
3. The System Prompt automatically changes to display the System Name entered.

System Clock

Check the system clock and observe the date and time displayed in the format shown (time in 24-hour format) in the example:

```
Craft(1.2)> get cmSystem CalendarTime
CalendarTime = 2001/06/15-12:04:17
```

If necessary, set the clock to the correct date and time:

```
Craft(1.2)> set cmSystem Calend=2001/06/15-15:05:00
Set Successful
```

Verify that the clock displays the correct date and time:

```
Craft(1.2)> get cmSystem CalendarTime
```

```
CalendarTime = 2001/06/15-15:05:09
```

Trap Destination

Configure at least one trap destination (a managing device to which SNMP traps should be sent).

```
Craft(1.2)set cmTrapDest [n.n.n.n, 162]
          Community=TrapComm rowstatus=active
```

where n.n.n.n is the IP address of the SNMP manager.

Depending on the SNMP manager you are using, it may also be necessary to configure an IP port number or a community string for the receiver. If so, your System Manager will provide you with that information.

Connecting the CE200 to the Network

In order for the CE200 to communicate with the network, and to enable a remote host or server to connect to the CE200 via Telnet or FTP, you must first enable one of the system's network interfaces. Depending on the facilities available, this may be either the Ethernet interface (1.2.1) or a wider-bandwidth WAN interface (slots 3 or 4). Your System Manager will advise you on the specific details.

1. **Assign the IP address and subnet mask to the network interface** (address and netmask shown below are examples to show format):

   ```
   Craft(1.2)> set cmiface [1.2.1] ipaddr=172.16.191.254
               netmask=255.255.255.0 netmodel=ip encap=none
   ```

   Normally, the interface will be configured for the IP internetworking model, Full-IP forwarding mode, and no encapsulation. After this initial configuration is complete, System Management may elect to specify a different internetworking model (netModel), a far-end IP address (for Policy routing), or other parameters. If the interface will connect to a frame-relay or ATM virtual circuit, it will also be necessary to configure the frame or ATM link and assign a permanent virtual circuit (pvc) number.

2. **Configure the CE200's default IP route.** In most cases, the routes to connected networks that are followed by outgoing message packets are automatically defined by the IP addresses and subnet masks of the interfaces. For any messages that do not have an assigned routing, the default IP route (specified as 0.0.0.0) establishes the "next hop" address. This default route is mapped to its next hop through the port on the CE200 used for "upstream" packet-based communication. Typically this would be a WAN port, but it also could be the Ethernet port, if that interface is used for network access.

3. *Example:*

   ```
   Craft(1.2)> set iproute[0.0.0.0]
               NextHop=192.176.1.88
   ```

   where: 192.176.1.88 is the IP address of the router interface to which packets for unknown destinations are routed. If there is *not* a valid IP address in the NextHop field of the Default route, packets addressed to unknown destinations are discarded.

4. **Configure other entries in the Route Table as necessary**. For distant destinations, you may need to insert additional routing-table entries. In fact, any other IP Route information, beyond the default, must be configured as static routes, as there is no provision for dynamic route assignment. If additional

routes are needed, add them to the *iproutetable* as described in the previous section.

Using the *CopperCraft* interface, first view the existing route table, beginning with the default (0.0.0.0) route.

Example:

```
Craft(1.2)> get iproute [0.0.0.0]
Group: ipRoute
Instance: [0.0.0.0]
Dest          = 0.0.0.0
IfIndex       = 2
Metric1       = 0
Metric2       = -1
Metric3       = -1
Metric4       = -1
NextHop       = 192.176.1.88
Type          = Direct
Protot        = netmgmt
Age           = 64
Mask          = 0.0.0.0
Metric5       = -1
Info          = 0.0
```

The *iproute* table is indexed by the destination IP address. A route entry requires at least a destination address and a Next Hop address. The Next Hop address specifies where to send a packet with the specified destination address.

5. **Save the interface configuration to the CE200's flash memory:**

```
Craft(1.2)> set cmsystem command=save
```

6. **Verify that the configuration information has been saved:**

```
Craft(1.2)> get cmsystem
```

The CE200 responds with the *cmSystem* configuration. The *CommandStatus* object should display S*ucceeded*. If Command Status shows *InProgress*, repeat the *get cmSystem* command; if Command Status shows *"Failed,"* contact Tech Support.

If this CE200 is equipped for Control and WAN Redundancy (duplicate control and WAN modules installed in slots 2 -5 and 14-17 of the CE200), you will need to repeat the previous initialization steps for the Redundancy Complex.

7. **Configure any additional items required by System Management.**
After the initial configuration is complete, you may be asked to modify other attributes that require a setting other than the default, or to configure other interfaces. If this is necessary, your system management will supply you with the specific configurations to be changed and the parameters to be instated. For a complete list of the CE200 MIB groups and their configurable objects, refer to the *CopperEdge Installation and Operating Guide* for the CE200.

8. **When finished, log out of the CopperCraft Command Line Interface.**

At the prompt, type **`exit`**, **`quit`**, or **`logout`** to end your *CopperCraft* session.

If you fail to log out, the system will perform an auto logout after approximately 15 minutes.

Successful completion of the procedures in this chapter should be sufficient to enable remote control and management of the CE200 via Telnet or through an SNMP manager such as Copper Mountain's CopperView Access Management System. If possible, the installer should contact the appropriate system management and remain in place until two-way communication can be verified.