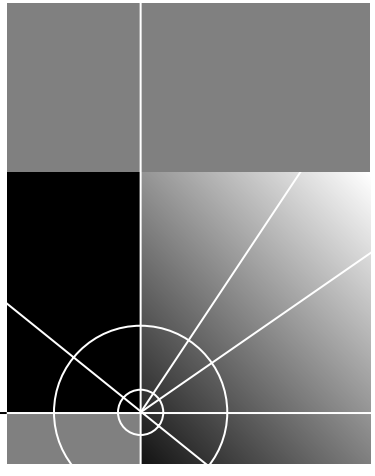
CoreBuilder® 9000 Enterprise Management Engine User Guide



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2 INSTALLING AND SETTING UP YOUR MANAGEMENT SYSTEM

3 DOWNLOADING SOFTWARE

4 CONFIGURING THE EME USING MANAGEMENT COMMANDS

About This Guide

The *CoreBuilder 9000 Enterprise Management Engine User Guide* provides instructions for installing and managing the 3Com CoreBuilder® 9000 Enterprise Management Engine (EME), and provides troubleshooting guidelines.

This guide is intended for the following people at your site:

- Network manager or administrator
- Hardware installer

If the information in the release notes that are shipped with your product differs from the information in this guide, follow the instructions in the release notes.

Conventions

Table 1 and Table 2 list conventions that are used throughout this guide.

Table 1 Notice Icons

Icon	Notice Type	Description
	Information note	Information that describes important features or instructions
	Caution	Information that alerts you to potential loss of data or potential damage to an application, system, or device
	Warning	Information that alerts you to potential personal injury

Table 2 Text Conventions

Convention	Description
`Screen displays`	This typeface represents information as it appears on the screen.
`Syntax`	The word "syntax" means that you must evaluate the syntax provided and then supply the appropriate values for the placeholders that appear in angle brackets. Example: To enable RIPIP, use the following syntax: `SETDefault !<port> -RIPIP CONTrol = Listen` In this example, you must supply a port number for <port>.
`Commands`	The word "command" means that you must enter the command exactly as shown and then press Return or Enter. Commands appear in bold. Example: To remove the IP address, enter the following command: **`SETDefault !0 -IP NETaddr = 0.0.0.0`**
The words "enter" and "type"	When you see the word "enter" in this guide, you must type something, and then press Return or Enter. Do not press Return or Enter when an instruction simply says "type."
Keyboard key names	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press Ctrl+Alt+Del
Words in *italics*	Italics are used to: ■ Emphasize a point. ■ Denote a new term at the place where it is defined in the text. ■ Identify document titles

Related Documents

This section provides information about supporting documentation, including:

- CoreBuilder 9000 Documents
- World Wide Web Site Documents
- 3Com Facts Automated Fax
- Reference Documents

CoreBuilder 9000 Documents

The following documents compose the CoreBuilder 9000 documentation set. Documents are available in three forms:

- Paper documents

  The paper documents that are shipped with your system are listed on the next page.

- CD-ROM

  Additional documents are included on the CoreBuilder 9000 Documentation CD. This CD contains online versions of the paper documents as well as additional documents that are not shipped with the system.

- World Wide Web and Fax Services

  Various types of documentation and information are available from the 3Com Web site and fax services.

To order a paper copy of a document that you see on the CD, or to order additional CDs, contact your 3Com representative, or call the 3Com Customer Call Center at (800) 724-2447 and choose option 3.

For a complete list of all CoreBuilder 9000 documents, see the *CoreBuilder 9000 Documentation Overview*.

Paper Documents

These documents are shipped with the CoreBuilder 9000 chassis:

- *Chassis Quick Installation* Guides

  Instructions for installing the 7-slot chassis, 8-slot chassis, and 16-slot chassis in a rack, on a table, or on a shelf, including prerequisites

- *CoreBuilder 9000 Enterprise Switch Getting Started Guide*

  An overview of the Switch and its components; a description of the power management subsystem; information about what occurs when you start up your Switch; how to use the documentation CD-ROM; and important safety, location, and preinstallation information

- *Chassis Power Supply Installation* Guides

  Instructions for installing and removing a power supply for the 7-slot chassis, 8-slot chassis, and 16-slot chassis

- *Web Management User Guide for the CoreBuilder 9000 Enterprise Switch*

  Overview, installation, and troubleshooting information for the Web Management suite of applications that help you manage your system with a Web browser

- *CoreBuilder 9000 Documentation Overview*

  A list of all CoreBuilder 9000 documents

These documents are shipped with their individual modules or field-replaceable units:

- Module *Quick Start* Guides or *Getting Started* Guides

  An overview, LED status information, and installation instructions for each interface module, switch fabric module, and management module

- Module *Command Quick Reference* cards or booklets

  A list of commands that are used on each module

- *Fan Tray Removal and Replacement* Guides

  Instructions for removing a faulty fan tray and installing a new one in the 7-slot chassis, 8-slot chassis, and 16-slot chassis

- *Chassis ID Printed Circuit Board for the CoreBuilder 9000 Enterprise Switch*

  Information about a chassis ID printed circuit board (PCB)

- *16 MB Expansion Memory Card Installation Guide for the CoreBuilder 9000 Enterprise Switch*

  Instructions for installing a 16 MB expansion memory card in the EME, and removing an existing 4 MB expansion memory card

- Module *Release Notes*

  An explanation of software issues and documentation issues in the current release

Documents on CD-ROM

The Documentation CD-ROM contains online versions of the paper guides that are shipped with your chassis and other CoreBuilder 9000 documents in online format only, such as:

- *CoreBuilder 9000 Enterprise Management Engine User Guide* (this guide)
- *CoreBuilder 9000 Implementation Guide*

  Information about using features of the CoreBuilder 9000 Enterprise Switch after you install it and attach it to your network

- *Command Reference Guide*

  Information about the Administration Console commands that you use to configure the CoreBuilder 9000 Enterprise Switch. This multiplatform guide also describes commands for the CoreBuilder 3500, CoreBuilder 9400, SuperStack® II Switch 3900, and SuperStack II Switch 9300.

World Wide Web Site Documents

Most user guides and release notes are available in Adobe Acrobat Reader Portable Document Format (PDF) or Hypertext markup Language (HTML) from the 3Com World Wide Web support site at:

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- Document title
- Document part number (found on front or back page of document)
- Page number (if appropriate)

Example:

CoreBuilder 9000 Enterprise Switch Getting Started Guide

Part Number 10012166

Page 30

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http//www.3com.com/products/yr2000.html

1 INTRODUCTION

This chapter introduces the 3Com CoreBuilder® 9000 Enterprise Switch, which is made up of the CoreBuilder 9000 chassis (including fans and power supplies), the Enterprise Management Engine (EME) module, the Enterprise Management Controller (EMC) module, switch fabric modules, and interface modules.

Before you proceed, make sure that you have properly installed your chassis in a rack, on a shelf, or on a table and that you have read the following documents:

- *7-Slot Chassis Quick Installation Guide for the CoreBuilder 9000 Enterprise Switch, or Chassis Quick Installation Guide for the CoreBuilder 9000 Enterprise Switch 8-slot chassis and 16-slot chassis, depending on which chassis you are using*
- *CoreBuilder 9000 Enterprise Switch Getting Started Guide*
- *Enterprise Management Engine Quick Start Guide for the CoreBuilder 9000 Enterprise Switch*
- *CoreBuilder 9000 Release Notes for Management Modules*
- *Enterprise Management Controller Quick Start Guide for the CoreBuilder 9000 Enterprise Switch*

System Management Overview

You install switch fabric modules, interface modules, and management modules into the CoreBuilder 9000 chassis. Before you begin to manage your CoreBuilder 9000 system, review the management–related information in this section.

The CoreBuilder 9000 system supports the following management interfaces:

- EME Management Console

  Use the EME Management Console to manage EME and EMC functions, such as login table management, IP connectivity, event and trap logs, and software downloads to all modules. The EME Management Console also manages chassis functions such as system inventory and power management features. This guide describes how to perform these tasks.

- Administration Console

  Use the Administration Console, which is a menu-driven, command line interface, to manage switch fabric modules, interface modules, and Layer 2 and Layer 3 switching modules. The Administration Console is embedded in the software for each module and provides module-specific menus and parameters.

  To learn about managing switch fabric modules, interface modules, and Layer 2 and Layer 3 switching modules using the Administration Console, see the *CoreBuilder 9000 Implementation Guide* and the multiplatform *Command Reference Guide*.

- ATM Local Management Application (LMA)

  Use the ATM LMA to manage the ATM Enterprise Switch, ATM Switch Fabric Module, and ATM interface modules. These modules contain an on-board network management agent to allow this direct management.

  ATM LMA management of ATM switch fabric modules and ATM interface modules is outside of the scope of this guide. To learn about managing the ATM Enterprise Switch and ATM modules using the ATM LMA, see the *CoreBuilder 9000 ATM Enterprise Switch Management Guide.*

  You cannot manage the EME using the ATM LMA, and you cannot manage ATM Switch Fabric Modules or ATM interface modules using the EME Management Console.

- Web Management Suite of Applications

  You can manage the EME over the Web using the CoreBuilder 9000 Web Management suite of applications.

- SNMP Protocols

  You can manage the EME using SNMP Protocols applications such as 3Com's Transcend® Network Control Services application suite.

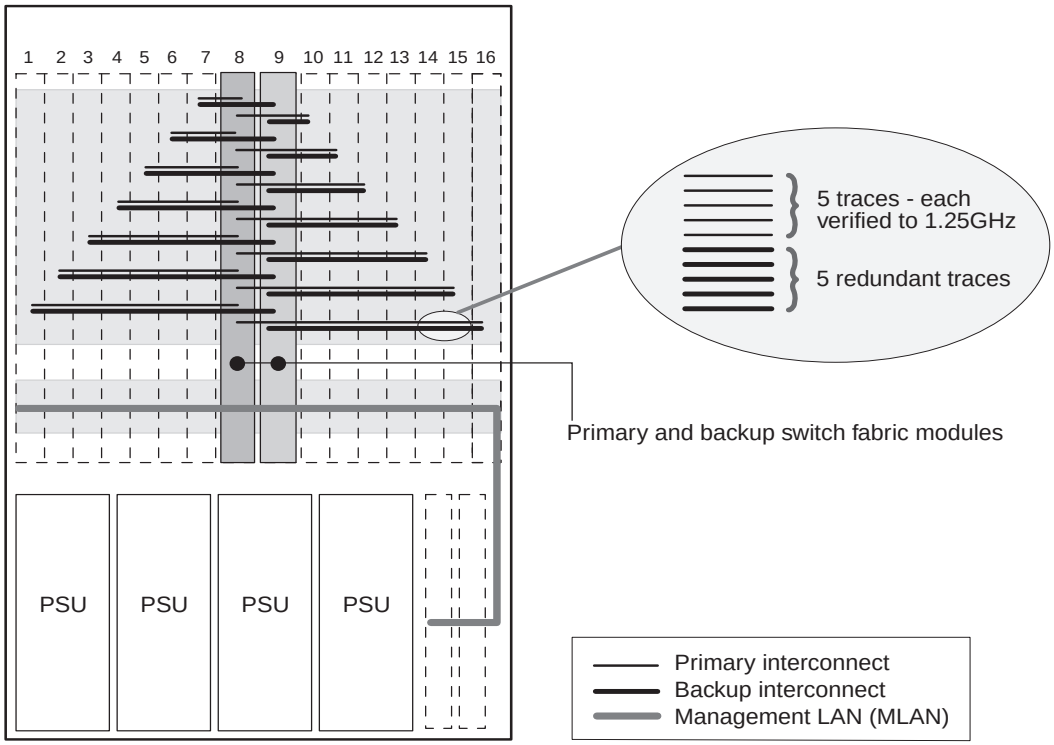
Management and Data Channels

The CoreBuilder 9000 system uses separate channels for network traffic and management traffic:

- The private management LAN (MLAN) handles management traffic. Management traffic travels to and from the EME, which acts as the single point of contact for all management traffic in the chassis.
- Switch fabric backplane channels handle network traffic. Each interface module has one or two backplane ports that connect to the switch fabric backplane, allowing network traffic to pass through the CoreBuilder 9000 system.

Figure 1 illustrates the MLAN channel and the switch fabric backplane channels in a 16-slot chassis.

Figure 1 System Data Channels



EME File System

The EME file system is a storage area on the EME that stores:

- The event log
- Software configuration files

The file system also acts as a temporary storage area for software images that are being downloaded through the EME to Gigabit Ethernet switch fabric modules and interface modules in the chassis.

CoreBuilder 9000 7-Slot Chassis Features

The CoreBuilder 9000 7-slot chassis provides the following features:

- Bays for two power supplies to provide from 820 watts to 1860 watts, depending on the type and quantity of installed modules.
- Power fault-tolerant mode so that you can reserve the power of a single power supply to act as backup if one of the power supplies fails.
- Four exhaust fans (in one fan tray) to make sure that the chassis maintains the optimal temperature for operation.
- Two management module slots that do not take up space for switch fabric modules or interface modules.
- One switch fabric module slot above all the interface module slots to provide optimal network performance.

CoreBuilder 9000 8-Slot Chassis Features

The CoreBuilder 9000 8-slot chassis provides the following features:

- Bays for three power supplies to provide from 820 watts to 2460 watts, depending on the type and quantity of installed modules.
- Power fault-tolerant mode so that you can reserve the power of a single power supply to act as backup if one of the power supplies fails.
- Six exhaust fans (in two fan trays) to make sure that the chassis maintains the optimal temperature for operation.
- Two management module slots that do not take up space for switch fabric modules or interface modules.
- Two switch fabric module slots to provide optimal network performance.

CoreBuilder 9000 16-Slot Chassis Features

The CoreBuilder 9000 16-slot chassis provides the following features:

- Bays for four power supplies to provide from 820 watts to 3280 watts, depending on the type and quantity of installed modules.
- Power fault-tolerant mode so that you can reserve the power of a single power supply to act as backup if one of the other power supplies fail.
- Nine exhaust fans (three fan trays with three fans per tray) to make sure that the chassis maintains the optimal temperature for operation.
- Two management module slots that do not take up space for switch fabric modules or interface modules.

  You can fill the slots with an EME and an EMC or two EMEs, with one acting as hot standby support for the master EME.
- A single passive backplane that is capable of 70 redundant serial links and that enables the use of multiple networking technologies, defined by the type of switch fabric module that is installed.
- Two switch fabric module slots centered in the chassis to provide complete redundancy and optimal network performance.

CoreBuilder 9000 Management Features

You can manage the CoreBuilder 9000 system through a terminal interface (both in-band and out-of-band), through the Simple Network Management Protocol (SNMP), Web Management suite of applications, and through the 3Com Transcend® Network Control Services. The EME is the primary communication mechanism into the chassis and modules. You can manage other intelligent modules within the chassis through the EME. The remainder of this section describes:

- EME Overview
- EME Components
- Management Functions
- EMC Overview

EME Overview

The EME is an SNMP-based network management module that manages and controls the 3Com CoreBuilder 9000 chassis and its modules. The EME has the following features:

- **Chassis Management Architecture** — Provides a cost-efficient management architecture that:
  - Provides a central point of contact for chassis management
  - Provides Enterprise Management Controller (EMC) functions, as well as EME functions
- **Intelligent Power Management** — Manages power use in the chassis by:
  - Preventing newly installed modules from receiving power when there is not enough power available
  - Allowing you to prioritize the order in which modules power off (if there is insufficient power available)
  - Allowing you to implement fault-tolerant power, which allows the chassis to reserve some of its power capacity to protect against a power supply failure

In the chassis:

- The EME exchanges information with all modules through the MLAN.
- Interface modules pass data through the switch fabric module. The data may get sent back out to other modules or sent out through a switch fabric module front panel port to another device.
- On some modules that include their own agent, the EME is used to "connect" to that module and then allow you to use the management system provided for that module. For example, you gain access to the Administration Console command interface of the switching modules through the EME.

EME Components

The EME module consists of the following two components:

- System Management Component (SMC)
- System Controller Component (SCC)

Both components share the same in-rush current, clocks, and backplane interfaces. The remaining circuits in both components are separated and are controlled by two dedicated CPUs.

The four-character LED display on the EME front panel shows the status of the SMC component. The Active and Stndby (Standby) LEDs indicate the SCC status on the front panel also.

Management Functions

The EME provides the following management and control capabilities:

- **Configurations** — When you are logged in with administrator access, you can configure the EME and monitor the chassis environment.
- **EME standby support** — EMEs share configuration information, so that a standby EME has the same configuration as the active EME. This capability enables a standby EME to become functional if the active EME fails.
- **Inventory** — The EME provides an inventory of chassis contents, including fans and power supplies. The inventory lists current software revisions for all installed modules. The inventory system also supports a scratchpad feature so that you can add custom information to the EME display.
- **Power management** — With EME commands, you can manage how the chassis reacts to low power situations. The chassis can also provide fault-tolerant power, which protects the system against power supply failures.
- **In-band and out-of-band software download** — The EME provides both in-band and out-of-band software download capability. An in-band download uses TFTP (Trivial File Transfer Protocol) through a network connection. An out-of-band download uses XMODEM software and the RS-232 serial port on the front panel of the EME. The EME allows you to download software to multiple modules using a single command.

- **SNMP support** — Simple Network Management Protocol (SNMP) is a protocol that the Internet Engineering Task Force defined. The EME acts as an agent in an SNMP-managed environment. The agent responds to SNMP requests and generates SNMP traps.
- **Telnet support** — With the EME `telnet` command, you can connect an EME to any other Telnet device. The EME also supports incoming Telnet sessions so that you can manage an EME or another module from a workstation with Telnet support or from another EME.
- **Web Management support** — You can monitor and manage the EME through the CoreBuilder 9000 Web Management suite of applications.
- **Transcend Network Control Services support** — You can also monitor and manage the system through the 3Com Transcend Network Control Services applications.

EMC Overview

The EMC module provides standby controller functions for an EME that is installed in a 7-slot chassis, 8-slot chassis, and 16-slot chassis. The EMC is installed in a slot adjacent to the EME in each chassis.

2 Installing and Setting Up Your Management System

This chapter describes installation and setup procedures for the 3Com CoreBuilder® 9000 Enterprise Management Engine (EME). The sections are:

- Prerequisites for Installing Modules
- Installing Modules
- Verifying EME Operation
- Configuring a Management Connection
- The EME File System

Prerequisites for Installing Modules

Before you install modules in a CoreBuilder 9000 chassis, make sure that you have completed these tasks:

1. Complete the chassis unpacking and installation procedure, as described in the *Chassis Quick Installation Guide for the CoreBuilder 9000 Enterprise Switch 8-Slot Chassis and 16-slot Chassis,* or the *7-slot Chassis Quick Installation Guide for the CoreBuilder 9000 Enterprise Switch*. You can install the chassis in a rack, on a shelf, or on a table.
2. Read the *CoreBuilder 9000 Enterprise Switch Getting Started Guide* to make sure that you have all the required components to get your system up and running and that you have completed any prerequisite work.
3. Complete the EME unpacking and installation procedure, as described in the *Enterprise Management Engine Quick Start Guide for the CoreBuilder 9000 Enterprise Switch*.
4. Plug power cords from all installed power supplies into electrical outlets.

Installing Modules

3Com recommends that you install one EME prior to adding switch fabric modules, interface modules, and switching modules.

Installing EME and EMC Modules

One EME is required in each chassis. Install an EME (Model Number 3CB9EME) in one of the two management module slots:

- In the 7-slot chassis, use slot 8 (lower) and slot 9 (upper), which are located in the upper right front corner
- In the 8-slot chassis, use slot 9 (left) and slot 10 (right), which are located in the upper right front corner
- In the 16-slot chassis, use slot 17 (left) and slot 18 (right), which are located at the lower right front corner

Installing Two EME Modules

If you are installing two EME modules for redundancy purposes, you must install the EME modules in the following order:

- Install the first EME in the lower-numbered slot.
- Install the second EME in the other, higher-numbered slot.

The lower-numbered EME slot in the chassis is designated as the slot for the *primary* EME. The other slot is designated as the slot for the *secondary* EME.

See the *Enterprise Management Engine Quick Start Guide for the CoreBuilder 9000 Enterprise Switch* for details about installing EME modules.

Installing an EMC Module

If you are installing one EME module and one EMC module, you must install the modules in the following order:

- Install the first EME in the lower-numbered slot.
- Install the EMC in the other, higher-numbered slot.

See the *Enterprise Management Engine Quick Start Guide for the CoreBuilder 9000 Enterprise Switch* for details about installing the EME module. See the *Enterprise Management Controller Quick Start Guide for the CoreBuilder 9000 Enterprise Switch* for details about installing the EMC module.

Installing Other Modules

To install a CoreBuilder 9000 switch fabric module, interface module, or switching module, see the module-specific installation instructions in the *Quick Start Guide* that accompanies the module.

Hot Insert and Hot Swap

You do not need to turn off power supplies to install modules in the CoreBuilder 9000 chassis. You can install CoreBuilder 9000 modules while the chassis is operating. This is called a *hot insert.* You can also remove a module and install a replacement in that slot while the chassis is operating. This is called a *hot swap*.

Before you remove the primary (active) EME, ensure that a secondary (standby) EME resides in the chassis.

Before you remove the primary (active) switch fabric module, ensure that a secondary (standby) switch fabric module resides in the 8-slot chassis or 16-slot chassis.

When you remove the primary modules, the secondary modules activate and provide uninterrupted service to other modules in the chassis.

CAUTION: *Do not install or remove modules during system power-on or while software is downloading to modules in the chassis.*

Verifying EME Operation

After you install an EME in the chassis, and before you configure the chassis and install other modules, verify that the EME is running correctly. This section explains how to verify EME operation before you enter commands.

To verify that your EME is operating correctly, watch the four-character LED display located on the EME front panel during system power-on. Table 3 shows the sequence of characters that appear in the LED display during a successful system power-on.

Table 3 The EME LED Display Readouts During Power-on

Characters in Display	Indication
random characters	Power-on has begun
none (blank display)	Power-on continues
`Diag`	EME is running self-diagnostic tests
`Cksm`	EME is calculating the checksum value
`Sec`	EME is in standby mode, if it is a Secondary
`Pri`	EME is active and ready, if it is a Primary

The system displays the following message on the management console when the EME is installed properly and you have made the RS-232 connection:

```
CoreBuilder 9000 Enterprise Management Engine (vx.xx)
Copyright (c) 1999 3Com Corporation.
Login:
```

To ensure that a broken module LED is not providing a false indication of current conditions, enter the `show chassis` *command to verify that chassis operating conditions are normal.*

EMC module LEDs operate differently than EME LEDs during a software download. For a description of LED status during an EMC module download, see the *Enterprise Management Controller Quick Start Guide for the CoreBuilder 9000 Enterprise Switch.*

When two EMEs are installed in a chassis thus creating Redundancy, and the Primary EME fails over, the Standby LED on that EME continues to display `Active`*. This is because only the SMC component fails over while the SCC component remains active.*

The Display Button

The EME front panel includes a display button that is located next to the LED display, and labeled `DSPLY`. The LED display shows status information when you power on the EME, and shows `Pri` when the EME is running normally.

When the EME is running normally, the following information appears in the LED display when you press the display button:

- The first time that you press the display button, the LED display shows `FPEI` (Front Panel Ethernet Interface).
- The second time that you press the display button, the LED display shows `Vers` (Version) and then, after a few seconds, the release of software that is running the EME. Example: `0300`.

Configuring a Management Connection

This section describes the connections that you can make to communicate with the EME. Choose the connection that is most appropriate to your installation. After you have connected the EME, you can configure EME characteristics. This section includes:

- Connecting to a 10BASE-T Ethernet Port
- Connecting to an RS-232 Console Port
- Using a Modem
- Verifying Network Connectivity

Connecting to a 10BASE-T Ethernet Port

Connect the EME to a 10 Mbps (Megabits-per-second) Ethernet network or device using the front panel 10BASE-T Media Dependent Interface (MDI) port. The EME uses an RJ-45 connector for the 10BASE-T port.

Table 4 lists the 10BASE-T MDI port pinouts.

Table 4 10BASE-T (MDI) Port Pinouts

Pin	Signal Name
1	Transmit Data plus (TD+)
2	Transmit Data minus (TD-)
3	Receive Data plus (RD+)
4	no connection
5	no connection
6	Receive Data minus (RD-)
7	no connection
8	no connection

Using an MDI-to-MDI Crossover Cable

The EME 10BASE-T port is configured as an MDI or *host* port. To connect the EME to an MDI crossover (MDI-X) or *switch* port, use a standard RJ-45 jumper cable. To connect the EME directly to a host or another MDI port, use a crossover cable.

Table 5 lists the MDI-to-MDI crossover cable pinouts.

Table 5 MDI-to-MDI Crossover Cable Pinouts

EME Signal	EME Pin	Switch Pin	Switch Signal
TD+	1	3	RD+
TD-	2	6	RD-
RD+	3	1	TD+
RD-	6	2	TD-

Connecting to an RS-232 Console Port

Connect the EME to a terminal or modem using the front panel RS-232 Console Port or RS-232 Auxiliary Port connectors. The EME uses 9-pin connectors for the RS-232 ports.

Table 6 and Table 7 list the console port and auxiliary port pinouts.

Table 6 Console Port Pinouts

Pin	Signal Name
1	Carrier Detect (CD)
2	Receive Data (RD)
3	Transmit Data (TD)
4	Data Terminal Ready (DTR)
5	Signal Ground (GND)
6	Data Set Ready (DSR)
7	Request to Send (RTS)
8	Clear to Send (CTS)
9	reserved

Table 7 Auxiliary Port Pinouts

Pin	Signal Name
1	Carrier Detect (CD)
2	Receive Data (RD)
3	Transmit Data (TD)
4	Data Terminal Ready (DTR)
5	Signal Ground (GND)
6	Data Set Ready (DSR)
7	Request to Send (RTS)
8	Clear to Send (CTS)
9	reserved

Table 8 lists 9-pin-to-9-pin assignments for connecting your PC to the front panel of the EME.

Table 8 RS-232 9-Pin-to-9-Pin Cable Connection Pin Assignments

Signal	EME Pin	DTE Pin	Signal
CD	1	N/A	Not Used
RX	2	3	TX
TX	3	2	RX
DTR	4	6	DSR
GND	5	5	GND
DSR	6	4	DTR
RTS	7	8	CTS
CTS	8	7	RTS
Reserved	9	N/A	Not Used

Table 9 lists 9-pin-to-25-pin assignments for connecting your PC to the front panel of the EME.

Table 9 RS-232 9-Pin-to-25-Pin Cable Connection Pin Assignments

Signal	EME Pin	DTE Pin	Signal
CD	1	N/A	Not Used
RD	2	2	TD
TD	3	3	RD
DTR	4	6	DSR
GND	5	7	GND
DSR	6	20	DTR
RTS	7	5	CTS
CTS	8	4	RTS
Reserved	9	N/A	Not Used

Using a Modem

The EME Console Port permits dial-in modem use. To use a dial-in modem:

1. Ensure that the modem supports the AT command set.
2. Select one of the following baud rates: 300, 1200, 2400, 4800, 9600, 19200, or 38400.

Default baud rate The factory default is `9600`.

3. Place the modem in Dumb/Auto Answer mode. To do this, enter the commands that are listed in Table 10 from a terminal that is directly connected to the modem. Press Enter after each command.

Table 10 Modem Commands Required for Console Ports

a	at&F	Restore factory defaults
b*	at&d0	Ignore changes in DTR status
c	ats0=1	Auto-answer on first ring
d	ats0?	Verify auto-answer (should return 001)
e	atq1	Does not return result codes
f	ate0	Does not echo characters in command state
g	at&W	Save this configuration
h	at&Y	Define this configuration as default

* If you enter the `set terminal console hangup enable` command for modem use, you must change the DTR parameter as follows to ensure proper modem operation:

b	at&d2	Indicates hangup and assumes command state when an On to Off transition of DTR occurs

Verifying Network Connectivity

To verify that the CoreBuilder 9000 chassis and all modules have been installed correctly:

1. Confirm that communication can be established on all network segments that you have enabled.
2. Confirm that the Network Activity LED on each installed module correctly indicates network traffic status. Table 11 lists the Network Activity LED status indicators.

Not all modules have Network Activity LEDs.

Table 11 Network Activity LED Status

10BASE-T Port Status	Network Activity LED Status
Link Down	Off
Receiving Traffic	Flashing Green
No Traffic (Port Enabled and Link Up)	Steady Green
Error	Steady Yellow

If an installed module's Network Activity LEDs do not appear as shown in Table 11 when the chassis is powered on, see Chapter 8, "Troubleshooting the EME" for more information.

The EME File System

The EME file system is an area on the EME that stores:

- Software configuration files
- The event log

The file system also acts as a temporary storage area for software images that are downloading through the EME to other modules in the chassis.

Under most conditions, you do not need to access or manage the file system. The file system supports commands that allow you to view the files in the file system or to delete certain files.

Software Configuration Files

The following commands are available to display and manage the EME file systems, which store software configuration files:

- `show file`
- `clear file`
- `clear file_system`

The `show file` Command

The `show file` command displays files in the file system storage.

Example:

```
CB9000> show file

Eme flash disk directory contents list:
Current number of files is: 13
Maximum number of files was: 15

FileSize      Date         Time       FileName
-------   -----------     -----      --------
170551     Jul 25 1999     10:27:26   EventLog
71288      Jul 24 1999     10:39:01   BladeConfig.08.01
71288      Jul 24 1999     10:39:10   BladeConfig.09.01
82904      Jul 25 1999      9:49:15   BladeConfig.10.01
82904      Jul 25 1999      9:49:19   BladeConfig.11.01
82904      Jul 25 1999      9:49:23   BladeConfig.16.01
82904      Jul 25 1999      9:49:27   BladeConfig.07.01
82904      Jul 25 1999      9:50:00   BladeConfig.14.01
82904      Jul 25 1999      9:50:04   BladeConfig.13.01
82904      Jul 25 1999      9:50:08   BladeConfig.12.01
82904      Jul 25 1999      9:50:12   BladeConfig.15.01
82904      Jul 25 1999      9:52:15   BladeConfig.06.01
82904      Jul 25 1998      9:52:19   BladeConfig.05.01

Number of files:                         13
Number of bytes in file system:          11945984
Number of bytes used:                    1157120
Number of bytes available:               10788864
Number of bytes cleaned:                 10788864
```

The `clear file` Command

The `clear file <filename>` and `clear file all` commands delete the files that you specify from the file system. If you enter `all` to delete all files, the system prompts you to confirm that you want to delete each file before you delete it. If you enter `n` (no), the system does not delete the file.

Example:

```
CB9000> clear file all

Are you sure you want to delete file EventLog?(y/n): n
Are you sure you want to delete file a.1 (y/n): y
File a.1 deleted.
Are you sure you want to delete file a.11? (y/n): y
File a.11 deleted.
```

The system continues to prompt you about files until all files are either deleted or saved.

The `clear file_system` Command

The `clear file_system` command deletes all files that are stored in the file system, reinitializes the file system, and resets the EME. This command clears the file system even if files are currently open or being updated.

Use this command only if the combined number of bytes that individual files use is inconsistent with the figure in the Number of bytes used: field in the `show file` display. The number of bytes that each file uses appears in the FileSize column of this display.

CAUTION: *This command deletes all files from the file system and reinitializes the file system storage area. Do not use this command unless the file system has been corrupted in some way.*

Before you clear the file system, you can store a copy of the event log on the file server with the `upload eme event_log <ip address> <filename>` *command, if you want to save the content of this file.*

Example:

```
CB9000> clear file_system
        !!WARNING!!
This command will clear all files and reset the EME.
Consult the user guide for information on operational
considerations before continuing with this command.

Do you wish to continue with clear file_system
command?(y/n):y
Preparing to clear file_system.
Ready to clear file_system.
Do you wish to continue with clear file_system
command?(y/n):y
Clearing file system please wait for EME to reset.
```

After the EME reset is complete, you can log in to the EME.

The Event Log

The EME Event Log captures various events. You can specify characteristics of the Event Log, and view the status and contents of the Event Log through EME commands.

To display the status of Event Log characteristics, use the `show event log status` command.

Example:

```
CB9000> show event log status

Events logged:           2
Event log size:          512k
Event log full:          WRAP
Event log utilization:   0%
Event log notify:        ALL
File server ip:          151.104.20.75
File server time:        0 hours
Max file number:         100
Last file transfer:
File name prefix:        EVENT
Last upload file name:
Auto upload mode:        DISABLED
Last upload status:      no error
```

The event log full default is `WRAP`.

To display the contents of the Event Log, use the `show event log verbose`, `show event log nonverbose` or `show event log <number>` commands.

Example:

```
CB9000> show event log unfiltered nonverbose

 Entry Slot  Time     Date        Id    Severity  Description
 ----- ----  -------- ----------- ----- --------  -------------
 00002 18.02 14:22:23 16 Aug 1999 00290 Inform    SNMP Trap
 00001 18.02 14:22:23 16 Aug 1999 00290 Inform    SNMP Trap
```

3 DOWNLOADING SOFTWARE

This chapter explains how to download software to the EME and EMC modules. The procedures for downloading software depend on how many of each module are loaded in the chassis and whether you are using an in-band or out-of-band process.

The chapter covers these topics:

- Downloading Software In-Band
- Using the EME Out-of-Band Port

Downloading Software In-Band

This section describes how to download software in-band (over the network) onto EME and EMC modules in various chassis configurations.

To download software in-band, you must first load all software images onto a file server. This section assumes that you have already done this. Your source for software images can be the software CD-ROM or the 3Com Web site:

http://support.3com.com/infodeli/swlib/index.htm

You can download software to a chassis that contains:

- One EME.

  In this configuration, there is no redundancy. See "Single EME Chassis Configuration" next for procedures.

- Two EMEs, where one operates as the Primary and the other as Secondary.

  In this configuration, both the controller and management functions have redundancy. See "Dual EME Chassis Configuration" later in this chapter for procedures.

- One EME and one EMC.

  In this configuration, only the controller function has redundancy. See "EMC Configuration" later in this chapter for procedures.

CAUTION: *Always download the boot software first and then download the operational software. If you do not follow this specified order, the modules may not function properly.*

Downloading boot or operational software on the active EMC causes the EME and the EMC to automatically reset. (The active EMC and all of the EMEs automatically reset.) If you are using the console interface to the EME, the login prompt appears after the reset is complete. If you are using a Telnet connection to the EME, you need to reestablish the Telnet connection after the reset.

Single EME Chassis Configuration

These instructions assume that you have only one EME (3CB9EME) module in the chassis and that it is installed in the lower-numbered slot.

CAUTION: *Always download the boot software first and then download the operational software. If you do not follow this specified order, the modules may not function properly.*

Downloading software to the EME or the EMC causes the modules to reset. If you are using the console interface to the EME, the following message and prompt appear:

```
This will cause the eme to reset.
Are you sure you want to continue download? (y, n):
```

If you enter **y***, the login prompt appears after the download is complete. If you are using a Telnet link to the EME, then you have to reestablish the link after you determine that the EME has completed its reset process.*

Downloading Boot Code

To download the boot code to a single EME, enter the following commands at the prompts. You must enter the server IP address where the new code resides in the `set tftp` command along with the proper filename.

To download boot code to an EME located in slot 17, subslot 1, enter:

```
CB9000> download eme 17.1 boot_image <server address>
<filename>.bt
```

Where `<server address>` is the IP address of the server where the software image resides and `<filename>` is the boot code filename.

The following messages appear after you enter this command:

```
Please stand by for download:
(Target will reset upon successful download completion)
(Target reset will cause this device to reset)
(All remote sessions will be terminated when this device
resets)
(You will need to log back in):
```

Wait until the EME fully reboots. Then you can log in and enter the next set of commands.

Downloading Operational Code

To download operational code to the EME in slot 17, subslot 1, enter:

```
CB9000> download module 17.1 oper_image <server address>
<filename>.op
```

Where `<server address>` is the IP address of the server where the software image resides and `<filename>` is the operational code file name.

At the reset prompt, enter **y** (yes) to continue with the download procedure. The following messages appear:

```
File transfer request pending.
Downloading file from external file server to eme - 000149992
Downloading file from eme to emc - 000149992
File transfer completed successfully.
The active emc and all of the emes will automatically reset.
```

Dual EME Chassis Configuration

These instructions assume that you have two EME (3CB9EME) modules in your chassis. The EMEs are labeled `Primary` and `Secondary` when you enter the `show module all` command.

In a two-EME configuration, you load all software on the Secondary EME first, then you load all software on the Primary EME. This approach minimizes disruption to your network and provides the most efficient way to ensure that the EME in the lower-numbered slot remains Primary.

Figure 2 shows a sample display for a 16-slot chassis, where the Primary EME is installed in slot 17.02 and the Secondary EME is installed in slot 18.02.

Figure 2 Sample Display from a 16-slot Chassis with Two EMEs Installed

```
CB9000> show module all

Slot  Module      Status            Description
----- ----------- ----------------- ------------------
04.01 3CB9LF36T   Up                36 Port 10/100TX Telco Layer 2 Switching Module
05.01 3CB9LF36R   Up                36 Port 10/100TX RJ45 Layer 2 Switching Module
06.01 3CB9RF12R   Up                12 Port 10/100TX Layer 3 Switching Module
07.01 3CB9LG2MC   Managed by fabric 2 port Gen I/O Module
08.01 3CB9FG24T   Primary           24 Port Gigabit Switching Fabric, 12 Trunks
17.01 3CB9EMC     Active            Enterprise Management Controller
17.02 3CB9EME     Primary           Enterprise Management Engine
18.01 3CB9EMC     Standby           Enterprise Management Controller
18.02 3CB9EME     Secondary         Enterprise Management Engine
```

Downloading Boot Software to the Secondary EME

To download boot software on the secondary EME, enter:

```
CB9000> download module 18.2 boot_image <server address>
<filename>.bt
```

Where <server address> is the IP address of the server where the software image resides and <filename> is the name of the bootcode file.

The following messages and prompt appear:

```
This will cause the backup eme to reset.
Are you sure you want to continue the download? (y/n): y
File transfer request pending.
Downloading file from external file server to eme - 000105972
Downloading file from eme to backup eme - 000105972
File transfer completed successfully.
Module 18.2 will automatically reset.
```

Downloading Operational Software to the Secondary EME

To download operational software to the Secondary EME, enter:

```
CB9000> download module 18.2 oper_image <server address>
<filename>.op
```

Where <server address> is the IP address of the server where the software image resides and <filename> is the name of the operational code file.

The following messages and prompt appear:

```
This will cause the backup eme to reset.
Are you sure you want to continue the download? (y/n): y
File transfer request pending.
Downloading file from external file server to eme - 000105972
Downloading file from eme to backup eme - 000105972
File transfer completed successfully.
Module 18.2 will automatically reset.
```

To verify that the correct versions of EME code were downloaded, enter the `show module <slot.subslot> verbose` command.

Example:

```
CB9000> show module 18.2 verbose

  Slot  Module      Status             Description
  ----- ----------- ------------------ ------------------
  18.02 3CB9EME     Secondary          Enterprise Management Engine

  Front Panel Ports:      1
  Backplane Panel Ports:  0

  Cpu Ram Size (MB):      20
  Flash Memory (MB):      16


  Supported Files         Version
  ---------------         ---------------
  oper_image              v3.0
  boot_image              v3.0
```

Downloading Boot Software to the Primary EME

To download boot software to the Primary EME, enter:

```
CB9000> download eme boot_image <server address>
<filename>.bt
```

Where `<server address>` is the IP address of the server where the software image resides and `<filename>` is the boot code file name.

The following messages and prompt appear:

```
This will cause the EME to reset.
Are you sure you want to continue the download? (y/n): y
File transfer request pending.
```

Additional text appears on the screen to indicate that download procedure has successfully completed.

Downloading Operational Software to the Primary EME

To download operational software to the Primary EME, enter:

```
CB9000> download eme oper_image <server address>
<filename>.op
```

Where <server address> is the IP address of the server where the software image resides and <filename> is the operational code file name.

The system displays the following messages and prompt:

```
This will cause the EME to reset.
Are you sure you want to continue download? (y/n): y
File transfer request pending.
```

Additional text appears on the screen to indicate that the download procedure has successfully completed.

EMC Configuration

These instructions assume that you have one EME (3CB9EME) module and one EMC (3CB9EMC) module in your chassis and you have already downloaded the boot and operational software to the EME module.

Downloading Boot Software to the EMC

To download boot software to the EMC, enter:

```
CB9000> download module 17.1 boot_image <server address>
<filename>.bt
```

Where <server address> is the IP address of the server where the software image resides and <filename> is the name of the bootcode file.

The following message and prompt appear:

```
This will cause the active emc and all of the emes to reset.
Are you sure you want to continue the download? (y/n): y
```

Enter **y** (yes) to continue with the download procedure. The following messages appear:

```
File transfer request pending.
Downloading file from external file server to eme - 000105972
Downloading file from eme to emc - 000105972
File transfer completed successfully.
The active emc and all of the emes will automatically reset.
```

Downloading Operational Software to the EMC

To download operational software to the EMC, enter:

```
CB9000> download module 17.1 oper_image <server address>
<filename>.op
```

Where <server address> is the IP address of the server where the software image resides and <filename> is the name of the operational code file.

The following message and prompt appear:

```
This will cause the active emc and all of the emes to reset.
Are you sure you want to continue the download? (y/n): y
```

Enter **y** (yes) to continue with the download procedure. The following messages appear:

```
File transfer request pending.
Downloading file from external file server to eme - 000105972
Downloading file from eme to emc - 000105972
File transfer completed successfully.
The active emc and all of the emes will automatically reset.
```

To verify that the correct versions of EMC code was downloaded, enter the show module <slot.subslot> verbose command.

Additional text appears on the screen to indicate that the download procedure has successfully completed.

Using the EME Out-of-Band Port

The EME module includes an out-of-band port, which provides an alternative download mechanism if the EME's operational code becomes corrupted and you cannot connect to the EME in-band.

EME software can become corrupted if a power cycle on the chassis occurs during the software download process. If the download does not complete or if the software becomes corrupted, the EME displays the following messages while it is resetting after you have performed a download:

```
Welcome to Boot Services version v3.0
8192 kBytes flash memory installed.

ERROR:Checksum failed for operational code.

Enter download out_of_band command to initiate download.

Boot>
```

Performing an Out-of-Band Download

To perform an out-of-band download, have the following items available:

- An RS-232 cable that is connected to the console interface of the EME module (3CB9EME)
- A PC with a terminal emulation program (such as ProComm) installed that supports the XMODEM file transfer protocol

Next, follow these steps:

1. From the EME console interface, set the terminal baud rate:

   ```
   Boot> set terminal console baud 38400
   ```

   3Com recommends that you use a high rate when you set the terminal baud rate.

2. After you have reestablished your console connection at this baud rate, enter:

   ```
   Boot> download out_of_band eme operational
   Confirm with carriage return.

   Erasing flash...done
   Please initiate file transfer sequence.
   Enter ~C to get>Local command? prompt.
   ```

3 Enter the following command using the correct pathname to your image file:

```
>Local command? xmodem -sbp emev20001.op
```

The system displays the following message. (This is an example of an image file from the directory tftpboot.)

```
XMODEM Version 3.0 (July 1999) -- Unix-Microcomputer File
Transfer Facility
File /tftpboot/emev20001.op Ready to send in Binary mode
Estimated File Size 1038K, 8300 Sectors, 1062376 Bytes
Can't change TTY mode
----
XMODEM Send Function
File Name: /tftpboot/emev20001.op
File Size 1038K, 8300 Records, 1062376 Bytes
Estimated transmission time 2 hours 43 minutes 56 seconds
```

The system reboots and then you can log in and continue.

The number of bytes in the previous example are not accurate. This is only a sample of what appears.

4 Configuring the EME Using Management Commands

This chapter describes how to configure an installed Enterprise Management Engine (EME). This chapter contains the following sections:

- Entering Commands
- Quick Reference for Configuring the EME
- Configuring the Terminal
- Configuring the EME
- Configuring User Logins
- Setting SNMP Values
- Making Network Connections
- Logging Out
- Resetting the EME to Default Values
- Adding a Second EME for Standby Management Support
- Accessing the Administration Console

See Table 2 in About This Guide in this guide for information about text conventions that are used in command syntax.

Entering Commands

Before you can enter commands, you must log in to the EME. To log in to the system, enter your user name at the `Login:` prompt (default is `admin`) and your password at the `Password:` prompt (default is no password). Usernames and passwords are case sensitive.

Enter commands at the management prompt on the terminal console. By default, the management prompt is `CB9000>`. Commands are not case-sensitive: you can mix uppercase and lowercase characters.

Using the Command Completion Feature

Command completion allows the EME interface to accept abbreviated command input. With command completion, you need only to enter a minimum number of characters to distinguish the command from other acceptable choices and then press the spacebar to complete the command.

Example:

1. Enter a command (for example, the `show` command).
2. Enter the first several letters of the selected command parameter.
3. Press the spacebar to complete the command.
4. Press Enter to process the completed command.

Example:

```
CB9000> sh [spacebar]
CB9000> show
CB9000> show cha
CB9000> show cha [spacebar]
CB9000> show chassis
CB9000> show chassis [Enter]
```

If the characters that you enter are not sufficient to determine a unique command, the EME waits for you to enter more characters. For example, entering the letter "s" and pressing the spacebar is not sufficient for the EME to determine which command to issue because other commands also start with the letter "s" (that is, `set` and `show`).

Using Command Help

Help is available for each EME command. To display Help information for an EME command, enter **`?`** at the `CB9000>` prompt.

For example, after you enter **`?`** at the `CB9000>` prompt, a list of high level commands appear (`show, set, download`, and so forth).

You can continue using **?** in this manner. For example, if you want to see the list of options available for the `show` command, enter **`show ?`** at the `CB9000>` prompt. The list of first-level options appears as follows:

```
chassis
clock
community
eme
event_log
file
host
interface
inventory
ip
login
module
power
security
servdiag
snapshot
snmp
sntp
terminal

trap_destination
web
```

Each command as a list of options associated with it. The specific options that are available to complete the command depend on the type of module that is in the chassis slot. For example, if you want to associate a module with a network, the completion list displays only the networks that are available for the module.

If you enter an option from the list followed by a **?**, any additional options that can be used appear or, if none are available, the following message appears: `Confirm with Carriage Return.`

Using Keystroke Functions

Certain keyboard functions and control sequences allow you to alter your keyboard input. For example, you can correct typing mistakes by pressing the Delete key or the Backspace key. If you press Enter in the middle of a command entry when a parameter is expected, the EME prompts you for additional information. Table 12 lists terminal keystrokes and their functions.

Table 12 Terminal Keystroke Functions

Keystroke	Function
Backspace	Moves the cursor back one character and deletes that character
Ctrl+C	Terminates the current command and returns to a blank command line at any time
Ctrl+D	Closes a Telnet session
Ctrl+R	Retypes the previous command string on the command line
Delete	Moves the cursor back one character and deletes that character
Enter	Implements the command
spacebar	Completes an abbreviated command
?	Displays the available command options

Quick Reference for Configuring the EME

Table 13 outlines the steps for configuring your EME.

Table 13 EME Configuration Steps

Procedure*	Command
1 Configure your terminal to default EME communication settings.	See your terminal vendor's documentation

2 Configure EME terminal settings.	`set terminal console hangup`
	`set terminal console prompt`
	`set terminal timeout system`
	`set terminal timeout session`

3 Configure the EME.	`set eme contact`
	`set eme diagnostics`
	`set eme location`
	`set eme name`

4 Set the time and date.	`set clock`

5 Set user login functions.	`set login password`
	`set login administer`
	`show login`
	`clear login`

6 Set SNMP parameters to enable network access.	`set ip ip_address`
	`set ip subnet_mask`
	`set ip default_gateway`
	`set community`
	`set authentication`
	`set eme trap_receive`

* The order of configuration is important in some networks. Read the appropriate sections for more information.

Saving Configuration Values

When you make configuration changes to the EME using the `set` command, they take effect immediately and they are saved permanently. Thus, do not attempt to make any configuration changes until you are fully aware of the consequences these changes have on the system.

Configuring the Terminal

This section describes:

- Configuring the Terminal to Default Settings
- Changing the Terminal Configuration
- Customizing Terminal Settings

Configuring the Terminal to Default Settings

Configure the terminal that is attached to the serial port on the EME to the same parameter settings as the EME. In doing this, you allow the terminal and EME to communicate. Initially, the terminal settings must match the factory-default settings of the EME, as specified in Table 14. To display the current terminal settings, use the `show terminal` command. To access the Administration Console, use the `connect <slot>.1` command.

Table 14 Terminal Defaults and EME Options

Parameter (SET TERMINAL +)	EME Options (when connected)	Factory Default
Baud	300, 1200, 2400, 4800, 9600, 19200, 38400	9600
Data_bits	7 or 8	8
Parity	odd, even, or none	none
Stop_bits	1 or 2	1
Hang_up	enable or disable	disable
Mode	command line or slip	command line
Terminal_type		VT100

To configure the terminal:

1. Consult the user guide that was shipped with your terminal for instructions about setting the terminal values.
2. After you configure your terminal to match the factory defaults of the EME, press Enter.

   The following message appears:

```
CoreBuilder 9000 Enterprise Management Engine (vx.xx)
Copyright (c) 1999 3Com Corporation
```

3 At the `Login` prompt, enter a login name.

The default login name is `admin`

The EME prompts you for a password. By default, there is no password.

4 Press Enter. The EME displays the following message and prompt:

```
Welcome to Administer service on CB9000.
CB9000>
```

You are now logged in as the `admin` with full access to all commands.To show the current terminal settings, use the `show terminal` command.

After terminal settings are complete, you can configure the newly installed EME, and all other CoreBuilder 9000 modules in the chassis.

Changing the Terminal Configuration

To change the terminal configuration, use the `set terminal` command using the EME options listed in Table 14. The syntax for the command is:

```
set terminal <port> <option>
```

Where `<port>` is either `console` or `auxiliary` and the options are as listed in Table 14.

After you enter each new `set terminal` command (changing the baud rate, for example), you must change the settings for the terminal to match the new setting before you can reestablish communication.

Customizing Terminal Settings

The EME allows you to change the following optional terminal management settings to customize your terminal connection:

- Terminal hangup
- Terminal prompt
- Terminal timeout value
- Terminal type

These terminal settings are optional, and apply to both terminal ports. Any changes that you make to the terminal parameters are automatically saved when you press Enter.

Setting Terminal Hangup

If you use a modem connection to log in to the EME, use the `set terminal console hangup` command. This command causes the EME to de-assert the RS-232 DTR signal when you log out of the EME. This forces the modem to hang up the connection and may help prevent unauthorized access.

The default for the `set terminal console hangup` command is `disable`. When the command is set to `disable`, the DTR signal remains asserted when you log out.

Example:

```
CB9000> set terminal console hangup enable
```

Setting Terminal Prompt

Use the `set terminal prompt` command to customize the terminal prompt for each EME. Use this prompt to identify the EME that you are connected to when logged in to a remote EME. The default is `CB9000>.`

To customize your terminal prompt, use the `set terminal prompt` command. Example:

```
CB9000> set terminal prompt EME3>
```

To avoid confusion, use the same identification for both the terminal prompt and for the name of your EME.

Setting Terminal Timeout Value

Use the `set terminal timeout session` or `set terminal timeout system` commands to specify the amount of time that you want your terminal to remain active during the absence of any keyboard activity. The `session` keyword applies the timeout value to the current terminal session, and the `system` keyword applies the timeout value to all sessions on the system.

Use this feature to keep unauthorized users off of the system if you leave your terminal without logging out. The default for the command is `0`, which means that no timeout has been set and the terminal cannot be logged out automatically.

To set the timeout period (value expressed in minutes), use the `set terminal timeout` command. You can specify up to 30 minutes.

Example:

```
CB9000> set terminal timeout system 10
```

After you set the timeout, the terminal automatically logs you out of the system if there is no terminal (keyboard) activity for the period of time that you have specified. In this example, logout occurs after 10 minutes of keyboard inactivity.

Setting Terminal Type

Use the `set terminal console terminal_type` command to define a terminal type for use with outbound Telnet sessions. The system sends the terminal type to the device that is connected to the EME when initiating the Telnet session. The terminal type setting enables the device to send the proper control sequences to the EME, which appear on the EME terminal.

The following command defines the terminal type as a VT100 terminal on the console port:

```
CB9000> set terminal console terminal_type vt100
Terminal type changed.
```

Configuring the EME

This section describes the commands to start up and manage your EME:

- Changing the EME Factory Defaults
- Configuring the Internal Clock

Changing the EME Factory Defaults

This section describes the configuration settings to set for your EME. The EME is factory-set to default values that you may need to change before you use it. You can set the following configuration values for your EME:

- EME Name
- Diagnostics
- Service Contact Name and Location

Assigning the EME a Name

When you assign a unique name to an EME, you can use this name instead of the IP address or MAC address to reference the EME (for example, when using Telnet).

To assign a unique name (up to 31 characters) to your EME, use the `set eme name` command. For example, to set the EME name to chassis3, enter:

```
CB9000> set eme name chassis3
```

Use the same identification to specify the terminal prompt and the name for your EME.

To display the current system name, use the `show eme` command.

Setting EME Diagnostics

You can set the EME to bypass diagnostics. When you reset the EME (or reboot it) with diagnostics enabled, the EME performs diagnostics before it returns to full functionality. The EME boots faster with these diagnostics disabled. Diagnostics are enabled by default.

To bypass the diagnostics, enter:

```
CB9000> set eme diagnostics disable
```

Assigning a Contact Name and Location

The EME can store the name of a service contact and chassis location for reference, in case you have a network problem. Use the `show eme` command to display the current contact name and location of the EME.

To identify the location of the EME and the name of the person responsible for the EME, use the following commands:

```
CB9000> set eme location
CB9000> set eme contact
```

After you enter each command, the EME prompts you to enter a line of text, which can be up to 78 characters:

```
CB9000> enter one line of text:
```

The EME commands time out if you do not enter text within 15 seconds.

Configuring the Internal Clock

Use the `set clock date_time` command when you install the EME into your chassis to establish a starting time, date, and day. Define this setting only once, because changing the clock setting may affect real-time statistics gathering. To display the current time, use the `show clock date_time` command.

To set the 24-hour internal clock to 5:58 PM, Saturday, August 7th, 1999, enter:

```
CB9000> set clock date_time 17:58T99/08/07 saturday
```

The internal clock is powered by its own battery and continues to work even if the chassis loses power. Even when the EME is powered off, this battery is designed to operate for 10 years.

You can change the timezone using the `set clock time_zone` command. You can also enable your chassis for daylight savings time using the `set clock daylight_saving_time` command.

Configuring User Logins

This section describes:

- User Access Levels
- User Login Functions
- Setting the Password
- Adding New Users
- Showing Current Users
- Clearing Login Names

User Access Levels

The EME provides three levels of user access:

- **Administer** — The user can perform all tasks, reset and configure CoreBuilder 9000 modules, and add and change passwords, as well as:
  - Configure EME IP address information
  - Configure community tables
  - Download new operational and boot code
- **Write** — The user can perform most commands except those that configure IP information, community tables, and download software.
- **Read** — The user can display information about network configuration and operation (except community table information). Read users can change their own passwords with a `set` command.

To add login names, you must be logged in with a user name that has been assigned Administer access.

User Login Functions

You can configure up to 10 user logins in any combination of access levels using the EME. More than one user at a time can log in to the command interface.

Login Limitations

Only one user at a time can log in with Administer privileges. If a second user with Administer access privileges tries to log in, that user has access to Write-level functions only. Up to four remote (Telnet) sessions can be established at one time.

Administer Access

Because the EME allows only one user with Administer privileges to log in at a time, the software includes a special `set login administer` command. If an Administer user logs in and is granted only Write privileges, that user can use the `set login administer` command with the following implications:

- The current Administer user is logged out of the EME.
- The user who enters the command immediately assumes Administer privileges.

Setting the Password

By default, the EME has no password. The first time that you log in, you press Enter at the `Password:` prompt. To set a password for the default log in username, use the `set login password` command.

Setting a password for the default login name makes the system more secure. Without a password, other users can log in with Administer access and change system configuration settings.

Choose a password that you can remember. If you forget or lose the Administer password, you cannot log in and perform Administer-level functions. See "Resetting the EME to Default Values" on page 72 for information about how to recover system defaults if you forget or lose the Administer password.

Example:

1. Enter the `set login password` command.

   ```
   CB9000> set login password
   ```

2. Enter the password at the prompt.

   ```
   Enter Login password:
   ```

3. At the next prompt, reenter the password.

   ```
   Verify - re-enter password:
   Login successfully entered.
   ```

Adding New Users

You can configure up to 10 user logins, with access rights as described previously in this chapter.

To add a new user, you must have Administer access.

To add a new user:

1. Log in using an Administer name and password.
2. At the prompt, enter:

   `set login administer` `<login type>`

   Where `<login type>` is the type of user that you are adding: `administer, write`, or `read`

   The system prompts you for your password (to confirm your right to set new passwords) as follows:

   ```
   Enter current session password for user “admin”:{enter password}
   ```

3. Enter your password.
4. At the `Enter Login Name:` prompt, enter the login name for the user that you want to add.
5. At the `Enter Login Password:` prompt, enter the user's login password.
6. At the `Verify - re-enter password:` prompt, enter the new password again.

   The system acknowledges the new password by displaying:

   ```
   Login successfully entered.
   ```

Showing Current Users

To show the existing login names for the EME, enter:

```
CB9000> show login
```

The following information appears:

```
Login Table:

      Index   Login Name       Access          Active Sessions
      -----   --------------   -------------   ---------------
          1   admin            Administer           1
          2   Pete             Write                0
          3   Larry            Write                0
          4   Marie            Administer           0
          5   Richard          Read                 0
          6   [not used]
          7   [not used]
          8   [not used]
          9   [not used]
         10   [not used]

Active Login Sessions:

     Login Name       Session Type              Session Time
     ----------       ------------              ------------
     admin            Local Administer          0 days 00:28:43
```

Table 15 describes the fields in the `show login` display.

Table 15 Fields in the `show login` Display

Column	Description
Index	Index number of each of the 10 available logins
Login Name	Name assigned to each login
Access	Privilege level assigned to this login name (Administer, Write, or Read)
Active Sessions	Number of active sessions under this login name
Active Login Sessions	Session Type — User privileges and whether session is local or remote Session Time — Length of the session

Clearing Login Names

You may want to clear login names from the EME periodically to help ensure system security. Only a user with Administer access can clear other users.

You can enter either the index number of the user or users that you want to clear or `all` to clear all users except yourself (as the Administer user). Use the `show login` command to display all login names and their corresponding index numbers. If you clear all users, you can log in to the EME with the default username (`admin`) and no password.

To clear the username with index number 3, enter:

```
CB9000> clear login 3
```

To clear all users, enter:

```
CB9000> clear login all
```

Setting SNMP Values

The Simple Network Management Protocol (SNMP) is a standard that is defined by the Internet Engineering Task Force (IETF). SNMP information is encapsulated in a UDP and IP packet, which in turn, is encapsulated in an appropriate protocol-specific frame.

This section describes the following topics:

- Interaction Between EME and SNMP
- Obtaining More Information About SNMP
- Setting Up IP Connectivity
- Creating a Community Table
- Configuring the Authentication Alert Setting
- Configuring the Event Log
- Configuring the Trap Log

Interaction Between the EME and SNMP

The EME interacts with SNMP to:

- Respond to SNMP requests.
- Generate SNMP traps.
- Act as an agent in an SNMP-managed environment, enabling you to configure your EME.

If you plan to manage your chassis using an SNMP workstation, you must enable the 10BASE-T front panel Ethernet port and set the following attributes for the EME:

- IP connectivity
  - Subnet mask
  - IP address
  - Default gateway
- Community table
- Alerts (optional)
- Trap receive

CAUTION: *The default subnet mask is ff.00.00.00. In networks in which the IP addresses begin with 151, the default subnet mask may conflict with internally reserved addresses. To avoid this situation, always set a subnet mask before you set the corresponding IP address.*

Obtaining More Information About SNMP

More information about protocols is available from the references in Table 16.

Table 16 Protocols and References

Protocol	Reference
UDP	RFC-768
SNMP	RFC-1157
IP	RFC-791
Telnet	RFC-854
ARP	RFC-826
802.2	ISO/DIS 802/2

Setting Up IP Connectivity

Assigning an IP Address to the EME

Use the `set ip ip_address` command to assign a unique IP address to the EME.

Example:

```
CB9000> set ip ip_address 195.36.58.27 ethernet_port
```

Setting a Subnet Mask

Use the `set ip subnet_mask` command to assign a subnet mask to the EME.

For example, to set the subnet mask for a class B device, without subnetworks, enter a command similar to the following:

```
CB9000> set ip subnet_mask 255.255.0.0 ethernet_port
```

CAUTION: *Do not change the IP address of an EME that is already up and running from a network connection. Doing so terminates the session.*

Defining a Default Gateway

Use the `set ip default_gateway` command to assign default gateways to networks. The default gateway is the IP address of the gateway (for example, a router) that receives and forwards packets whose addresses are unknown to the local network. The EME uses the default gateway when sending alert packets to a management workstation on a network other than the local network.

For example, to specify that the gateway with address 195.36.58.1 is the default gateway, use the following command:

```
CB9000> set ip default_gateway 195.36.58.1 ethernet_port
```

You must connect the front panel Ethernet port to the locally attached network.

Showing and Clearing IP Settings

Use the `show ip` or `show interface` commands to view IP parameter settings. Use the `clear ip <index #>` command to clear parameter settings. Before you clear an IP interface, use the `set interface <index#> disable` command to ensure that the interface is not in use.

Creating a Community Table

Use the Community Table to define:

- SNMP stations on the network that access information from the EME
- SNMP stations that receive traps from the EME

To enable the EME to receive SNMP alarms, you must add the following items to the community table of the SNMP device that generates the alarms:

- The EME IP address
- Accompanying attributes

The EME Community Table can contain up to 10 IP community entries. You may assign one of the following attributes to the IP addresses:

- **Read-only** — Allows the specified IP address community to read SNMP objects using the SNMP `get` and `get next` commands.
- **Read-write** — Allows the specified IP address community to read and write SNMP objects using the SNMP `get, get next,` and `set` commands, respectively.
- **Trap** — Sends a trap to the specified IP address when an event occurs.
- **Read-trap** — Allows the specified IP address to read SNMP objects and receive traps.
- **All (read-write and trap)** — Allows the specified IP address to read SNMP objects, change the objects using the SNMP `set` command, and receive traps.

Use the `set community` command to create a Community Table entry. For example, to add a community name of NCS with the IP address 195.36.58.217 that has read_write access, enter the following command:

```
CB9000> set community NCS read_write 195.36.58.217
```

Community entry names are case-sensitive. For example, NCS and ncs are different community names. You can use the `show community` *command to view existing community entries.*

The wildcard value of All appears as `***.***.***.***` *for IP addresses. The value for All access privileges is only* `all`.

Configuring the Authentication Alert Setting

The `set snmp authentication_trap` command enables or disables the feature that sends an alert to the management workstation when someone tries to gain access to the EME, and the IP address or community name is not valid for the attempted read or write operation.

To enable authentication alerts, use following command:

```
CB9000> set snmp authentication_trap enable
```

Configuring the Event Log

The EME maintains a log of informational events, nonfatal errors, and fatal errors that occur on all CoreBuilder 9000 modules in the chassis. Event log entries are stored in the chronological order in which they are received.

When two EMEs are installed in the chassis, only the Primary EME collects information. Each EME only stores events that occur while that EME is the Primary.

You can configure the following event log characteristics:

- Amount of memory allocated to storing events

  Event log memory is allocated in 64k blocks. The default allocation (also the minimum setting) is eight 64k blocks (0.5 MB). The maximum setting depends upon available memory.

- Action for the EME to take when the event log buffer is full

  You can set the system to stop logging events, or to begin overwriting old events.

- Mechanism that triggers the EME to copy the event log to a file server

  The EME can upload the event log when the event log reaches a certain percent usage (default is 80 percent), when a user-defined time interval has passed, or when you initiate the event log upload.

  Before the event log can be copied to a file server, you must create a public-access file on the file server to which the event log is written.

  Uploaded event logs are larger than the size that appears on the EME because they are stored in a compressed format.

To open the event log, use the `show event_log status` command:

```
CB9000> show event_log status
```

The following information appears:

```
Events logged:          0
Event log size:         2048k
Event log full:         WRAP
Event log utilization:  0%
Event log notify:       NO TRAPS
File server ip:         10.11.101.20
File server time:       4 hours
Max file number:        101
Last file transfer:     12:01:16 Wed 18 Nov 1998
File name prefix:       TEST
Last upload file name:  TEST043.LOG
Auto upload mode:       ENABLED
Last upload status:     no error
```

To display the contents of the Event Log, use the `show event_log unfiltered` command with the `nonverbose`, `verbose`, or `<number>` options.

Example:

```
CB9000> show event_log unfiltered

Entry Slot  Time     Date         Id    Severity  Description
----- ----  -------- ----------- ----- --------  -------------
00002 18.02 14:22:23 16 Aug 1999 00290 Inform    SNMP Trap
00001 18.02 14:22:23 16 Aug 1999 00290 Inform    SNMP Trap
```

Configuring the Trap Log

As a trap receiver, the EME receives traps from other SNMP devices, including other CoreBuilder 9000 modules, that have the EME IP address in their Community Table. For example, to allow an EME to function as the trap receiver for other SNMP devices on the network, use the following command:

```
CB9000> set eme trap_receive enable
```

To enable that device to send traps to the EME, add the EME IP address to that device's Community Table.

You can also configure the following EME trap characteristics:

- Alert transmission
- Trap receivers

Alert Transmission

You can configure the EME to transmit an SNMP trap to trap receivers that you define, and you can specify the system events that trigger these alerts.

Trap Receivers

You can specify the network management stations that receive alerts from the EME. To do so, you must create a new community table entry for each network management station.

SNMP traps are transmitted only through an in-band IP routing interface.

Making Network Connections

To make network connections, you must connect the EME front panel Ethernet port to a network. This allows:

- In-band management using Telnet or SNMP.
- In-band download of operational boot code.

To connect to the EME in-band:

1. Make sure that you have set up IP connectivity for the single network that you plan to use for IP connectivity. See "Configuring User Logins"for more information.
2. Use Telnet or SNMP to reach the EME using the IP address that you assigned. In routed networks, you can connect to the EME using only the default gateway.

Logging Out

When you have finished using the EME, you may log out. To log out of the system, use the `logout` command:

```
CB9000> logout
Good-Bye
```

Resetting the EME to Default Values

You can reset the EME to its user-configurable values and options to their default values using the `FORCE` command. The `FORCE` command resets all EME. If you have forgotten or lost the Administer password, this command is the only way to reset this password to the default value, which is no password. You cannot use this command remotely because you must press the EME Reset button after you enter the command.

CAUTION: *Do not use this command unless absolutely necessary. This command resets all user-configurable values and options to defaults, and terminates all network communications. You will need to reenter all values and options that you changed with* `set` *commands.*

Choose an Administer password that you can remember, so that you do not have to use the `FORCE` *command.*

The `FORCE` command is case-sensitive. Use all uppercase letters.

To reset the EME to factory defaults, follow these steps:

1. Log out of the EME using the `logout` command.
2. Press Enter for the `Login:` prompt.
3. Enter **`FORCE`** as the username.

   The system prompts you for a password.
4. Enter **`FORCE`** as the password.
5. Press the EME Reset button *within 5 seconds* after you have pressed Enter. A series of reports appear ending with the following message:

   ```
   NVRAM not initialized or corrupt. Loading factory defaults.
   ```

   You can now log in to the EME using default values. (At the `Login:` prompt, enter **`admin`**, and at the `Password:` prompt, press Enter.)

After you perform the `FORCE` *operation, the EME that was previously configured as the Secondary EME becomes the Primary EME.*

Adding a Second EME for Standby Management Support

When you add a second EME to the second management module slot in a 7-slot chassis, 8-slot chassis, or 16-slot chassis, the second EME automatically goes into standby mode (Secondary), providing standby management support for the Primary EME. If the Primary EME fails for any reason, the Secondary EME becomes the Primary without any loss of service.

The EME that you insert into slot 8 in the 7-slot chassis, slot 9 in the 8-slot chassis, and slot 17 in the 16-slot chassis is the primary after that EME module becomes operational. Use the `show module all` command to view the current status of EMEs in the chassis. The EME that is installed in the previously indicated slot is displayed as the Primary, and the second EME is displayed as the Secondary.

Accessing the Administration Console

The software in CoreBuilder 9000 switch fabric modules and switching modules includes a menu-driven command line management interface, called the *Administration Console*. To access a module's Administration Console, use the `connect` command from the EME and specify the modules's slot number and subslot number (which is always 1 for non-management modules). For example, to access a module in slot 4, enter:

```
CB9000> connect 4.1
```

If the module in slot 4 is a 20-port Fast Ethernet Layer 2 Switching Module, the resulting menu and prompt appear as follows:

```
Menu options (CoreBuilder 9000-FF0B00): -----------------------------------
  module                  - Administer module-level functions
  ethernet                - Administer Ethernet ports
  bridge                  - Administer bridging/VLANs
  snmp                    - Administer SNMP
  analyzer                - Administer Roving Analysis
  disconnect              - Disconnect and return to Management Console
Type ? for help.
------------------------------------------------------------------------
CB9000@slot 4.1 [20-E/FEN-TX-L2] ():
```

When the Administration Console appears, you can enter options from the top-level menu at the module prompt. These options lead to other menu options.

To exit the module and return to the EME management console, enter the `disconnect` command at the module prompt.

See the *Command Reference Guide* for more information about the commands that are available through the Administration Console.

Managing the Chassis Power and Temperature Using Management Commands

This chapter describes how to configure and manage the CoreBuilder® 9000 chassis power and temperature parameters using EME commands. This chapter contains the following topics:

- Managing Power in the Chassis
- Load-Sharing Power Supplies
- Budgeting Power
- Overheat Conditions
- Saved Power Management Configurations
- Resetting the Entire Chassis
- Displaying Operating Conditions

Managing Power in the Chassis

The CoreBuilder 9000 chassis provides a fault-tolerant, managed, intelligent power supply subsystem. This subsystem supports:

- Load-sharing power supplies
- High power availability
- EME-based power verification features that are designed to ensure optimal performance

Intelligent Power Subsystem Features

The intelligent power subsystem includes the following features:

- **Load-sharing power supplies** — Provides evenly distributed power consumption among all installed power supplies. Chassis activity disruption is minimized if a power supply fails because there is no changeover (and hence, no changeover interval).
- **Front-loading and rear-loading accessibility** — Provides easy access for upgrades. As your power needs increase over time, it is easy to upgrade by adding a power supply into the front of the 8-slot and 16-slot chassis, and into the rear of the 7-slot chassis. Because power supplies are modular and plug into the backplane, replacing a faulty power supply is a quick procedure.
- **Dedicated power supply bay cooling (16-slot chassis)** — Cools the power supply bay. Vent holes and fan trays reduce the possibility that an overheat condition in the power supply bay may cause or contribute to a failure of the chassis or its modules. This feature works with other chassis features to maintain normal chassis internal operating temperature.
- **High power capacity** — The power mode and the amount of power available determine the current power limit. The actual power that is delivered depends on whether you are running in non-fault-tolerant mode or in fault-tolerant mode.

  (For detailed information about power supply capacity, see "Power Non-Fault-Tolerant Mode" and "Power Fault-Tolerant Mode" later in this chapter.)

  If a power supply fails while the chassis is running in fault-tolerant mode, still-functioning power supplies provide all of the power necessary to keep installed modules and the chassis running.

- **Software driven, power management** — The EME polls each switch fabric module and interface module that is installed in the chassis to confirm that enough power is available for new module to power on. If available power is:
  - **Adequate** — The new module powers on.
  - **Inadequate** — The new module does not power on. System overload is avoided.

  Software-driven power management also provides protection against the possibility of a catastrophic power failure. If the chassis is operating in power non-fault-tolerant mode and a power supply fails, installed EMEs power off selected (low power class) CoreBuilder® 9000 modules until the power deficit is corrected. Intelligent Power Management ensures that key components and resources continue to operate, even under extreme failure conditions.

  (Alerts and traps about changes are sent to the network management applications.)

Load-Sharing Power Supplies

When you determine the total power budget in your system, consider the *system overhead*. System overhead includes power that the chassis itself and its components (fans, backplane signalling, and the EME) consume. Calculate the total power requirements for all installed modules before you install any new module in the chassis. To determine each new module's power requirements, see the documentation that is supplied with each module.

Table 17 lists the system overhead for the 7-slot chassis, 8-slot chassis, and the 16-slot chassis.

Table 17 System Overhead in the 7-slot Chassis, 8-slot Chassis, and the 16-Slot Chassis

	+5 V	+3.5 V	+12 V	-12 V	-5 V	+2 V
7-slot chassis	29 W	0 W	49 W	0 W	0 W	4 W
8-slot chassis	29 W	0 W	109 W	1 W	0.5 W	4 W
16-slot chassis	29 W	0 W	109 W	1 W	0.5 W	4 W

V = volts; W= watts

This section describes available power modes and power supply capacity in each power mode. The CoreBuilder 9000 chassis runs in either of two power supply output modes:

- Power Non-Fault-Tolerant Mode
- Power Fault-Tolerant Mode

Power Non-Fault-Tolerant Mode

Power non-fault-tolerant mode is:

- A user-selectable mode in which 100 percent of the power that can be allocated to modules is available to them (no power is held in reserve).
- The default mode for power supplies as shipped.

While the chassis is running in power non-fault-tolerant mode, the amount of power that is available to modules is determined only by the number of power supplies that are installed. If a power supply fails while the chassis is running in non-fault-tolerant mode:

- Installed modules continue to operate without interruption if the output of the remaining power supplies is sufficient to provide adequate power to all installed modules.
- The EME may shut down selected switch fabric modules and interface modules to bring installed module power consumption under the now-reduced power budget. See "Budgeting Power" on page 83 for more information about how the EME manages power.

Power Fault-Tolerant Mode

Power fault-tolerant mode is a user-selectable mode in which power that is equivalent to one power supply is held in reserve. This reserve power is not available to installed modules unless a power supply fails, or if you switch the power mode from power fault-tolerant mode to power non-fault-tolerant mode.

While the chassis is running in power fault-tolerant mode:

- All installed power supplies are functioning and contributing power to the chassis and modules. No single power supply is a dedicated standby power supply. Rather, a factory-defined power limit ensures that power that is equivalent to at least one power supply is available to replace power lost if a power supply fails.
- The amount of power that installed modules require must not be greater than the number of installed power supplies, minus one (n-1). When you reserve power that is equivalent to one power supply in power fault-tolerant mode, the failure of a single power supply has no impact on installed modules that are already powered on.

If a power supply fails while the chassis is running in fault-tolerant mode:

- The EME automatically disables fault-tolerant mode.
- Power formerly reserved is made available by power class and slot location to power-enabled modules to prevent them from powering off (as an attempt to bring power consumption under the now-reduced power budget).
- All modules that had power before the power supply failure continue to receive power without interruption.
- Upon power supply recovery (or replacement), the EME automatically reenables fault-tolerant mode.

Setting Power Fault-Tolerance

By default, the chassis is set to non-fault-tolerant mode. To set the chassis to power fault-tolerant mode or to power non-fault-tolerant mode, enter `set power mode` at the EME prompt.

Use the following syntax:

```
set power mode fault_tolerant
set power mode non_fault_tolerant
```

The following example sets the power mode to fault-tolerant:

```
CB9000> set power mode fault_tolerant
Power will switch to FAULT_TOLERANT mode when sufficient
power is available
```

When you attempt to set the chassis to power fault-tolerant mode, the EME determines if sufficient unallocated power exists to place one power supply's worth of power in reserve:

- If the unallocated power budget is sufficient, the chassis sets to power fault-tolerant mode.
- If the unallocated power budget is not sufficient, the chassis remains in power non-fault-tolerant mode.

Enabling and Disabling Power to Slots

You can enable or disable power to any slot in your CoreBuilder 9000 chassis, and the EME does not turn on power to the module in the disabled slot. Modules in disabled slots are not allocated power. All slots are enabled by default.

You enable or disable power to slots by entering the `set power mode` command at the EME prompt using the following syntax:

```
set power slot <slot #> mode enable
set power slot <slot #> mode disable
```

In the following example, power is enabled to slot 2:

```
CB9000> set power slot 2 mode enable
Slot 2 enabled
CB9000>
```

If there is:

- *Sufficient power* available to meet the requirements of the new module, the EME enables power to the specified slot and reduces the power budget by the amount of power that module consumes.
- *Insufficient power* to meet the requirements of the new module, the module remains in power-pending state until sufficient power becomes available.

A CoreBuilder 9000 module that was powered off due to a lack of sufficient available power is in *power pending state*. The EME automatically powers on the module again when sufficient power becomes available.

CoreBuilder 9000 Module Power Class Settings

A *power class setting* is a value in the range of 1 through 10 that is assigned to each module. The highest setting is 10. Each module has a default power class setting, which you can change with an EME command. The EME uses the power class settings to manage power among the modules in the chassis, and to determine the order in which it powers on and powers off installed modules.

Even though the EME has a power class setting, you cannot manage the power of an EME module. An EME always draws power when it is inserted in the chassis, and you cannot power off an EME module using an EME command.

This section describes:

- Using the Default Power Class Setting
- Setting Power Class
- Power Class 10 Warnings

Using the Default Power Class Setting

Each CoreBuilder 9000 module is shipped with a default power class setting:

Module	Default Power Class Setting
EME	10
EMC	10
Interface Module	3
Switch Fabric Module	9

Setting Power Class

To set the power class for a CoreBuilder 9000 module that is in a specified slot, enter the `set power class` command at the EME prompt using the following syntax:

```
set power slot <slot #> class <class #>
```

In the following example, the module in slot 2 is set to power class 5:

```
CB9000> set power slot 2 class
Enter class: 5

slot 02 power class is set to 05.
CB9000>
```

Power Class 10 Warnings

The EME cannot automatically power off a module that is assigned a power class setting of 10.

For example, if a power supply failure causes a power deficit (or if a chassis overheat condition develops), a module that is assigned a power class setting of 10 continues to run until you order it to power off. Under some conditions (such as an extended overheat condition), chassis or module hardware damage may result.

CAUTION: *To ensure that the EME can make all power management decisions automatically, do not assign a power class setting of 10 to any switch fabric module or interface module unless it is absolutely necessary.*

Budgeting Power

This section describes:

- Allocating Power for Installed Modules
- Increasing the Unallocated Power Budget
- Determining Chassis Power Budget
- Power Supply Output in Non-Fault-Tolerant Mode (7-slot Chassis)
- Power Supply Output in Non-Fault-Tolerant Mode (8-slot Chassis)
- Power Supply Output in Non-Fault-Tolerant Mode (16-slot Chassis)
- Power Supply Output in Fault-Tolerant Mode (7-slot Chassis)
- Power Supply Output in Fault-Tolerant Mode (8-slot Chassis)
- Power Supply Output in Fault-Tolerant Mode (16-slot Chassis)

Allocating Power for Installed Modules

Before you install a new CoreBuilder 9000 module in the chassis, use the `show power budget` command to confirm that there is sufficient power for installed modules. The `show power budget` command displays current chassis power conditions that help you decide if there is sufficient power available to power on and operate the new module.

Table 18 shows selected EME power management commands and their functions.

Table 18 Selected EME Power Management Commands

Command Name	Displays
`show power budget`	Power budget information on a per-voltage basis. Displays actual voltages measured on the CoreBuilder® 9000 backplane.
`show power slot <slot #>` or `<all>`	Power class, power state, and power status for the module in a specified slot, or in all slots.
`show power mode`	Whether power fault-tolerant or power non-fault-tolerant mode is currently in effect for the chassis. Also indicates whether `overheat_auto_power_down` is enabled or disabled.
`show power all`	All information that the preceding commands display.

The EME provides initial module power consumption values from the power consumption table that it maintains:

- When an EME powers on a CoreBuilder 9000 module, it adjusts the available power budget to reflect the power consumption of the newly powered-on module.
- The EME then powers on remaining CoreBuilder 9000 modules (by power class and slot location) to the limit of the unallocated power budget.

By maintaining an accurate power budget, an EME can determine which installed CoreBuilder 9000 modules to:

- Power on.
- Power off to bring module power consumption under budget (if any).
- Place in power pending state due to a lack of sufficient unallocated power budget to power them on.

Increasing the Unallocated Power Budget

This section describes actions that you can take to increase the unallocated power budget whenever you need more power for installed switch fabric modules and interface modules, or to power on newly installed modules.

To increase the unallocated power budget:

1. Add one or more power supplies.

   For instructions and information, see the *7-Slot Chassis Power Supply Installation Guide for the CoreBuilder 9000 Enterprise Switch*, or the *Power Supply Installation Guide for the CoreBuilder 9000 Enterprise Switch 8-slot Chassis and 16-slot Chassis*.

2. If the chassis is running in power fault-tolerant mode, change the power mode to power non-fault-tolerant to make reserve power available to all installed modules.
3. Manually power off selected modules until you have enough power.

Determining Chassis Power Budget

To ensure optimal power fault-tolerance, determine the current power budget for the chassis as follows:

1. At the terminal prompt, enter: **`show power budget`**

   The `show power budget` command shows the amount of power currently available for modules:

   - Total power installed
   - Amount of power consumed
   - Amount of power available

2. Examine the output of the `show power budget` command. If necessary, add another power supply to your chassis to provide sufficient additional power to enable power fault-tolerant mode.

   Example:

```
CB9000> show power budget

Power Management Information
----------------------------

Chassis Power Budget :

Voltage Type  Voltage Level  Watts Capacity   Watts Available   Watts Consumed
------------  -------------  --------------   ---------------   --------------
    +3V          3.556         1154.00          517.00          637.00

    +5V          5.281         1184.00          565.00          619.00

 +3V+5V Shared     N/A         1310.00          568.00          742.00

    -5V         -5.001           30.00           14.50           15.50

   +12V         12.066          240.00           30.50          209.50

   -12V        -12.010           36.00           17.00           19.00

    +2V          2.154           16.00            4.00           12.00
```

Power Supply Output in Non-Fault-Tolerant Mode (7-slot Chassis)

In Table 19, values are rounded values that do not include system overhead (fans, backplane, signalling, and EMEs). Table 19 shows the power available in power non-fault-tolerant mode (by voltage type) when the power supply is 930 watts.

Table 19 Power Output in Non-Fault-Tolerant Mode (7-slot Chassis)

Output Voltage (Volts)	1 Power Supply (Watts)	2 Power Supplies (Watts)
+3	682	1364
+5	210	449
+3 and +5	821	1671
+12	22	94
+2	4	12
TOTAL WATTS	1739	3590

Power Supply Output in Non-Fault-Tolerant Mode (8-slot Chassis)

In Table 20, values are rounded values that do not include system overhead (fans, backplane, signalling, and EMEs). Table 20 shows the power available in power non-fault-tolerant mode (by voltage type) when the power supply is 820 watts.

Table 20 Power Output in Non-Fault-Tolerant Mode (8-slot Chassis)

Output Voltage (Volts)	1 Power Supply (Watts)	2 Power Supplies (Watts)	3 Power Supplies (Watts)
+3	612	1224	2448
+5	598	1196	1794
+3 and +5 shared	660	1320	2640
+12	120	240	360
+2	8	16	24
TOTAL WATTS	1998	3996	5994

Power Supply Output in Non-Fault-Tolerant Mode (16-slot Chassis)

In Table 21, values are rounded values that do *not* include system overhead (fans, backplane signalling, and EMEs). Table 21 shows the power available in power non-fault-tolerant mode (by voltage type) when the power supplies are 820 watts.

Table 21 Power Output in Non-Fault-Tolerant Mode (16-slot Chassis)

Output Voltage (Volts)	1 Power Supply (Watts)[1]	2 Power Supplies (Watts)	3 Power Supplies (Watts)	4 Power Supplies (Watts)
+3	577	1154	1731	2308
+5	567	1165	1763	2361
+3, +5	630	1290	1950	2610
-5	14.5	29.5	44.5	59.5
+12	46	166	286	406
-12	17	35	53	71
+2	4	12	20	28
TOTAL WATTS	1855.5	3851.5	5847.5	7843.5

[1] Power fault-tolerance can only be established if at least one power supply's worth of unallocated power budget is available to be held in reserve.

Power Supply Output in Fault-Tolerant Mode (7-slot Chassis)

In Table 22, values are rounded values that do *not* include system overhead (fans, backplane signalling, and EMEs). Table 22 shows the power available in power fault-tolerant mode (by voltage type) when the power supplies are 820 watts.

Table 22 Power Output in Fault-Tolerant Mode (7-slot Chassis)

Output Voltage (Volts)	1 Power Supply (Watts)[1]	2 Power Supplies (Watts)
+3	N/A	577
+5	N/A	567
+3, +5	N/A	630
-5	N/A	14.5
+12	N/A	46
-12	N/A	17
+2	N/A	4
TOTAL WATTS	N/A	1855.5

[1] Power fault-tolerance can only be established if at least one power supply's worth of unallocated power budget is available to be held in reserve.

Power Supply Output in Fault-Tolerant Mode (8-slot Chassis)

In Table 23, values are rounded values that do not include system overhead (fans, backplane, signalling, and EMEs). Table 23 shows the power available in power fault-tolerant mode (by voltage type) when the power supply is 820 watts.

Table 23 Power Output in Fault-Tolerant Mode (8-slot Chassis)

Output Voltage (Volts)	1 Power Supply (Watts)[1]	2 Power Supplies (Watts)	3 Power Supplies (Watts)
+3	N/A	682	1364
+5	N/A	239	578
+3 and +5 shared	N/A	850	1700
+12	N/A	72	144
+2	N/A	8	16
TOTAL WATTS	N/A	1851	3702

[1] Power fault-tolerance can only be established if at least one power supply's worth of unallocated power budget is available to be held in reserve.

Power Supply Output in Fault-Tolerant Mode (16-slot Chassis)

In Table 24, values are rounded values that do *not* include system overhead (fans, backplane signalling, and EMEs). Table 24 shows the power available in power fault-tolerant mode (by voltage type) when the power supplies are 820 watts.

Table 24 Power Output for Modules in Fault-Tolerant Mode (16-slot Chassis)

Output Voltage (Volts)	1 Power Supply (Watts)[1]	2 Power Supplies (Watts)	3 Power Supplies (Watts)	4 Power Supplies (Watts)
+3	N/A	577	1154	1731
+5	N/A	567	1165	1763
+3, +5	N/A	630	1290	1950
-5	N/A	14.5	29.5	44.5
+12	N/A	46	166	286
-12	N/A	17	35	53
+2	N/A	4	12	20
TOTAL WATTS	N/A	1855.5	3851.5	5847.5

[1] Power fault-tolerance can only be established if at least one power supply's worth of unallocated power budget is available to be held in reserve.

Overheat Conditions

An overheat condition exists when one of the chassis temperature sensors detects a chassis internal operating temperature that exceeds a predefined threshold. The allowable ambient temperature operating range is 0 °C through 50 °C (32 °F through 122 °F). The default threshold setting is fixed at an upper limit of 60 °C (140 °F) or higher to prevent module damage.

Cooling loss or excessively high ambient (room) air temperature can cause an overheat condition.

The following events occur during an overheat condition:

1. The Primary EME character display shows the word TEMP
2. If an SNMP agent is present in the chassis, power management informs the SNMP agent of the overheat condition.
3. A 1-minute delay is provided, during which the Primary EME and external management entities are notified of the overheat condition.
4. Approximately 1 minute later, the EME initiates a power-off strategy to all CoreBuilder 9000 modules installed in the overheat management areas where the overheat condition was detected.
5. The overheat indication TEMP stops when the chassis internal operating temperature falls below the temperature threshold and stays there for 15 minutes.

The EME does *not* power off modules that occupy slots outside of affected overheat management areas. This overheat power-off strategy is based on the power class setting and slot location of each installed switch fabric module and interface module.

Enabling and Disabling Automatic Module Power-off

To enable automatic CoreBuilder 9000 module power-off in response to an overheat condition, use the `set power overheat_auto_power_down` command as follows:

```
set power overheat_auto_power_down mode enable
set power overheat_auto_power_down mode disable
```

The two overheat auto-power-down modes are:

- **Enable** — Causes slots to power off automatically when the chassis overheats.
- **Disable** — (default) Causes the EME to send notification to network management applications, but the chassis keeps operating.

CAUTION: *If* `set power overheat_auto_power_down mode disable` *is in effect when an overheat condition occurs, the chassis and all installed, powered-on, modules continue to run. Under these circumstances, an extended overheat condition may cause heat-related hardware damage. 3Com recommends that you run the chassis with* `overheat_auto_power_down enable` *in effect.*

In the following example, overheat power-down mode is enabled:

```
CB9000> set power overheat_auto_power_down mode enable

overheat-power-down mode set to ENABLE
CB9000>
```

The Overheat Management Area in the 7-Slot Chassis

The overheat power-off process in a 7-slot chassis is based on one temperature sensor that treats the module payload area of the chassis as one overheat management area. Modules power off in this overheat management area according to their power class settings.

Overheat Management Areas in the 8-Slot Chassis

The overheat power-off process in an 8-slot chassis is based on one temperature sensor that treats the module payload area of the chassis as one overheat management area. Modules power off in this overheat management area according to their power class settings.

Overheat Management Areas in the 16-Slot Chassis

The overheat power-off process in a 16-slot chassis is based on three temperature sensors that effectively divide the module payload area of the chassis into three overlapping *overheat management areas*.

Each overheat management area comprises eight module slots. The overlap reflects the overlapping cooling effects of adjacent fan units. Each fan unit contains three fans to cool each management area. The chassis can run with a minimum of two installed and functioning fan units, but three are recommended.

The overheat management areas in the 16-slot chassis divide the network module slots as follows:

- Slots 1 through 8: Overheat management area 3
- Slots 6 through 13: Overheat management area 2
- Slots 10 through 16: Overheat management area 1

Overheat Power-off Process

The CoreBuilder 9000 module overheat power-off process is as follows:

1. When any chassis temperature sensor detects an internal chassis operating temperature of 45 °C (113 °F) or higher, power management issues warning traps that inform the user that an overheat condition may soon exist. The system generates warning traps every 30 seconds (approximately) at this point.
2. When internal chassis operating temperature reaches 60 °C (140 °F), power management power-disables *selected* CoreBuilder 9000 modules installed within each affected overheat management area to reduce the 5-volt power consumption by at least 50 watts.

   Selected modules in affected overheat management areas power off, in order, starting with modules that have the lowest power class setting.

   This reduction of power consumption should provide a 2 °C drop in temperature per slot at the temperature sensor for that overheat management area. The system generates overheat traps every 10 seconds (approximately).
3. If two or more modules in an affected overheat management area have the *same* power class, they power off from highest slot number to lowest slot number.

4 Switch fabric modules and interface modules continue to power off until all modules in the affected overheat management area have powered off or until you resolve the overheating condition. Modules with a power class setting of 10 continue to run.

5 Chassis temperature is allowed to stabilize for 15 minutes before further action is taken.

6 If chassis temperature is not at or below the established overheat threshold after 15 minutes have elapsed, *all* CoreBuilder 9000 modules that are in the affected overheat management areas are powered off. Modules in affected overheat management areas do not power on again until you correct the overheat condition.

Overheat Recovery Process

Overheat recovery occurs when the temperature sensor that detected an overheat condition reports that internal chassis temperature is at or below the overheat threshold.

When overheat recovery is initiated, modules that were powered off to alleviate the overheat condition power on to the limit of the current power budget.

The overheat recovery process proceeds as follows:

- The EME powers on CoreBuilder 9000 modules, in order, from the lowest slot number in the affected overheat management area to the highest slot number in the affected overheat management area.
- The EME powers on CoreBuilder 9000 modules with the highest power class setting first. If two or more CoreBuilder 9000 modules have the *same* power class setting, they power on from the lowest slot number in the affected overheat management area to the highest slot number in the affected overheat management area.

Saved Power Management Configurations

The EME stores:

- Saved power management configuration data for all installed network modules in on-board EME NVRAM (non-volatile RAM).
- Unmanaged power allocation data that describes the type (per voltage) and the amount of power (watts) that are available to installed CoreBuilder 9000 modules.

When the chassis powers on or after a chassis reset:

- The EME uses saved power management configuration data to verify that power configurations for installed CoreBuilder 9000 modules precisely match those in effect prior to the chassis reset.
- If necessary, the EME uses the saved data to restore lost CoreBuilder 9000 module power configurations.

The EME saves the power management configuration data listed in Table 25.

Table 25 Saved Power Management Configuration Data

Data Type	Descriptions
Slot profile	Identifies the module installed in a given slot. In addition, empty slots are identified.
Slot power state	Power state for each installed module (enabled, disabled, or pending).
Slot power class	Power class setting for each installed module.
Power mode	Power mode for the chassis prior to a chassis reset (power fault-tolerant mode or power non-fault-tolerant mode).
Overheat auto-power-down mode	Auto-power-down mode of the chassis prior to a chassis reset (enabled or disabled).

When the chassis powers on or after a chassis reset, the EME compares saved slot profile data for the modules that are installed in each successive slot with current slot profile data for those same modules. Module power is based on power class setting and relative slot location.

CAUTION: *If you power off the chassis, then move or install modules while the chassis is powered off, the system reevaluates chassis power management based on available power in the chassis.*

Resetting the Entire Chassis

Use the `reset chassis` command to reboot all of the installed modules and the chassis itself, including the EME. The `reset chassis` command performs a hardware reset of the chassis and all installed modules. Diagnostic routines execute (if enabled) and traffic forwarding may be briefly interrupted. After the chassis reset is complete, you must log back in to the primary EME before you can enter any other commands.

In the following example, `reset chassis` reboots the chassis and all installed modules:

```
CB9000> reset chassis
Resetting chassis
```

Displaying Operating Conditions

Use the `show` command to display chassis, module, and port operating conditions and to identify installed chassis components.

This section describes the following `show` commands:

- `show chassis`
- `show module`
- `show power`
- `show inventory`
- `show eme`

To view the other `show` *commands that the EME supports, enter* **`show ?`**

The `show chassis` Command

Use the `show chassis` command to display basic information about chassis operating conditions, including temperature and power supply conditions.

The following chassis information is provided by the `show chassis` command:

- **Type** — The specific model of a chassis
- **Backplane** — The type and revision level of the backplane
- **Power supply** — If a power supply is present in a slot, its normal or faulty status, and its model number
- **Fan** — The status of each chassis fan tray
- **Temperature** — Chassis temperature at three locations

The following example identifies the CoreBuilder 9000 configuration for a 16-slot chassis:

```
CB9000> show chassis

Chassis Type: 3CB9E16

Backplane Information:

     Backplane Type                                          Revision
     --------------                                          --------
     16 Slot CoreBuilder 9000 Backplane                       0

Power Supply Information:

     Power Supply   Status              Model Number
     ------------   ------              ------------
      1             REMOVED
      2             REMOVED
      3             OKAY                3CB9EP8
      4             OKAY                3CB9EP8


Temperature Information:

     Probe          Location            Temperature
     -----          --------            -----------
      1             ZONE 1               23 Degrees Celsius
      2             ZONE 2               23 Degrees Celsius
      3             ZONE 3               25 Degrees Celsius

Fan Information:

     Fan            Status
     ---            ------
      1             OKAY
      2             OKAY
      3             OKAY
```

The `show module` Commands

Use the `show module` commands to display status information for a module and submodule that is installed in a specific slot or to display information for *all* modules and submodules that are installed in the chassis.

The following `show module` commands are available:

- `show module <slot.subslot>`
- `show module all`
- `show module all verbose`

The `show module` Command

To display basic information for a module installed in a specific slot, use the following command syntax:

```
show module <slot.subslot>
```

Where `<slot.subslot>` is the location of the module in the chassis. The following example displays basic information for the EME installed in slot 17, subslot 1 in a 16-slot chassis:

```
CB9000> show module 17.1

Slot    Module     Status  Description
-----   ------     ------  --------------------------------
17.01   3CB9EME    Active  Enterprise Management Controller
```

The `show module all` Command

To display basic information for all installed modules, use the `show module all` command. The following example displays basic information about all modules in a 16-slot chassis:

```
CB9000> show module all
```

```
CB9000> show module all

Slot  Module      Status            Description
----- ----------- ----------------- ------------------
04.01 3CB9LF36T   Up                36 Port 10/100TX Telco Layer 2 Switching Module
05.01 3CB9LF36R   Up                36 Port 10/100TX RJ45 Layer 2 Switching Module
06.01 3CB9RF12R   Up                12 Port 10/100TX Layer 3 Switching Module
07.01 3CB9LG2MC   Managed by fabric 2 port Gen I/O Module
08.01 3CB9FG24T   Primary           24 Port Gigabit Switching Fabric, 12 Trunks
17.01 3CB9EMC     Active            Enterprise Management Controller
17.02 3CB9EME     Primary           Enterprise Management Engine
18.01 3CB9EMC     Standby           Enterprise Management Controller
18.02 3CB9EME     Secondary         Enterprise Management Engine
```

The `show module all verbose` Command

To display detailed information about all of the modules that are installed in your chassis, including information about module software and DIP switch settings, use the `show module all verbose` command. The following example displays `show module all verbose` information for an EMC installed in an 8-slot chassis:

```
09.02 3CB9EME     Primary      Enterprise Management Engine

Front Panel Ports:      1
Backplane Panel Ports:  0

Cpu Ram Size (MB):      20
Flash Memory (MB):      16

Supported Files         Version
---------------         ---------------
oper_image              3.0.0
boot_image              3.0.0
config                   n/a
event_log                n/a
file                     n/a
```

The `show power` Commands

Use the `show power` commands to display the power budget, power modes, and power information on a per-slot basis.

Table 26 lists the commands that display current power conditions in the chassis.

Table 26 Commands Used to Display Current Power Conditions

Command	Description
`show power budget`	Indicates how power output is distributed among all installed load-sharing power supplies. This information helps you to determine if chassis power is sufficient to permit the addition of modules, and to avoid an unintentional loss of power fault-tolerance (if currently in effect).
`show power mode`	Indicates which of two power modes is currently in effect (fault-tolerant or non-fault-tolerant).
`show power slot`	Displays the slot number, power class setting, administrative status (slot power enabled or disabled), and module operating status of a module that is installed in a specified slot.
`show power all`	Displays power mode, slot power information, and power budget information for all installed CoreBuilder® 9000 modules.

The `show power budget` Command

The `show power budget` command displays power budget information.

Example for a 16-slot chassis:

```
CB9000> show power budget

 Power Management Information
 ----------------------------

Chassis Power Budget :

Voltage Type  Voltage Level  Watts Capacity   Watts Available   Watts Consumed
------------  -------------  --------------   ---------------   --------------
    +3V          3.556         1154.00          517.00          637.00

    +5V          5.281         1184.00          565.00          619.00

 +3V+5V Shared     N/A         1310.00          568.00          742.00

    -5V         -5.001           30.00           14.50           15.50

   +12V         12.066          240.00           30.50          209.50

   -12V        -12.010           36.00           17.00           19.00

    +2V          2.154           16.00            4.00           12.00
```

The `show power mode` Command

Use the `show power mode` command to display the available power modes.

When you enter the `show power mode` command while the chassis is running in non-fault-tolerant mode, the following information appears:

```
Chassis Power Modes:

      Fault-Tolerant Mode:       NON_FAULT_TOLERANT
      Overheat Power Down Mode:  DISABLE
      Fault-Tolerant Status:     NON_FAULT_TOLERANT
```

When you enter the `show power mode` command while the chassis is running in fault-tolerant mode, the following information appears on the screen:

```
Fault-Tolerant Mode:       FAULT_TOLERANT
Fault-Tolerant Status:     FAULT_TOLERANT
Overheat Power Down Mode:  DISABLE
```

The `show power slot` Command

To display the slot number, power class setting, administrative status (slot power enabled or disabled), and module operating status of a CoreBuilder 9000 module that is installed in a specified slot, use the `show power slot <slot>` command.

For example, for a module that is installed in slot 1, the following information appears:

```
CB9000> show power slot 1

               Power Management Information
               ----------------------------
Slot Power Information:

Slot     Class          Admin Status        Operating Status
----     -----          ------------        ----------------
1        3              ENABLE              ENABLED
```

The `show power all` Command

To display detailed power information for the chassis and installed modules, use the `show power all` command. For example, entering this command for a 16-slot chassis reveals the following display:

```
CB9000> show power all

                Power Management Information
                ----------------------------

Chassis Power Modes:

        Fault-Tolerant Mode:       FAULT_TOLERANT
        Fault-Tolerant Status:     FAULT_TOLERANT
        Overheat Power Down Mode:  DISABLE

Slot Power Information:

Slot     Class          Admin Status        Operating Status
----     -----          ------------        ----------------
7        3              ENABLE              ENABLED
8        3              ENABLE              ENABLED

Chassis Power Budget :

Voltage Type  Voltage Level  Watts Capacity   Watts Available   Watts Consumed
------------  -------------  --------------   ---------------   --------------
    +3V          3.556         1154.00          517.00          637.00

    +5V          5.281         1184.00          565.00          619.00

 +3V+5V Shared     N/A         1310.00          568.00          742.00

    -5V         -5.001           30.00           14.50           15.50

   +12V         12.066          240.00           30.50          209.50

   -12V        -12.010           36.00           17.00           19.00

    +2V          2.154           16.00            4.00           12.00
```

The `show inventory` Commands

The `show inventory` command displays contents of a CoreBuilder 9000 chassis, including hardware release numbers and serial numbers. You can display inventory with the following options:

- `chassis`
- `module`
- `power supply`
- `summary`

The following is an example of the `show inventory chassis` command for a 16-slot chassis:

```
CB9000> show inventory chassis

 inventory format version number: (1)
 payload slot capacity: (14)
 fabric slot capacity: (2)
 power supply capacity: (4)
 fan tray capacity: (3)
 +2v power requirements in units of .1 Watt: (40)
 +3v power requirements in units of 1 Watt: (0)
 +5v power requirements in units of 1 Watt: (1)
 +3v, +5v shared power requirements in units of 1 Watt: (1)
 -5v power requirements in units of .25 Watt: (0)
 +12v power requirements in units of .5 Watt: (144)
 -12v power requirements in units of .25 Watt: (0)
 temperature probe capacity: (3)
 model number: (3CB9E16)
 serial number: (E20078)
 date of manufacture YYYYMMDD: (19990729)
 vendor: (3COM)
 hardware revision: (4)
 chassis mac address: (08-00-8f-70-23-a1)
 mac address count: (96)
 management module serial number: (9ABJ001091)
 service notepad: ()
 user notepad: (0)
 run time indicator in units of hours: (144)
 checksum: (0)
 diag_test: (0)
```

The following is an example of the `show inventory module` command for the module installed in slot 5, subslot 1 of a 16-slot chassis:

```
CB9000> show inventory module 5.1

inventory format version number: (1)
payload slot capacity: ()
fabric slot capacity: (0)
power supply capacity: (0)
fan tray capacity: (0)
+2v power requirements in units of .1 Watt: (40)
+3v power requirements in units of 1 Watt: (0)
+5v power requirements in units of 1 Watt: (1)
+3v, +5v shared power requirements in units of 1 Watt: (1)
-5v power requirements in units of .25 Watt: (0)
+12v power requirements in units of .5 Watt: (144)
-12v power requirements in units of .25 Watt: (0)
temperature probe capacity: (3)
model number: (3CB936T)
serial number: ()
date of manufacture YYYYMMDD: (19990823)
vendor: (3COM)
hardware revision: (4)
chassis mac address: (08-00-8f-70-23-a1)
mac address count: (96)
management module serial number: (9ABJ001091)
service notepad: ()
user notepad: (0)
run time indicator in units of hours: (144)
checksum: (0)
diag_test: (0)
```

The following is an example of the `show inventory power supply` command for the power supply installed power supply slot 1 of a 16-slot chassis:

```
CB9000> show inventory power_supply 1

 inventory format version number: (1)
 +2v power delivered in units of .1 Watt: (84)
 +3v power delivered in units of 1 Watt: (577)
 +5v power delivered in units of 1 Watt: (598)
 +3v, +5v shared power delivered in units of 1 Watt: (660)
 -5v power delivered in units of .25 Watt: (60)
 +12v power delivered in units of .5 Watt: (240)
 -12v power delivered in units of .25 Watt: (72)
 serial number: (9AD200259)
 date of manufacture YYYYMMDD: (19980610)
 vendor: (3COM)
 model number: (3CB9EP8)
 hardware revision: (E1)
 power supply vendor model number: (22946100)
 power supply vendor hardware revision: (22)
 management module serial number: (9ABJ000633)
 service notepad: ()
 user notepad: ()
 run time indicator in units of hours: (168)
 checksum: (0)
 diag_test: (0)
```

The following is an example of the `show inventory summary` command for the modules installed in a 16-slot chassis:

```
CB9000> show inventory summary

Chassis/            HW                          Ports
Slot     Module     Rev   Serial      Vendor    F/B      Date
-------  ------     ---   ------      ------    -----    ----------
Chassis  3CB9E16    4     E20073      3Com      -/-      19990528
03.01    3CB9LG9MC  AB    9AWE000928  3Com      9/3      19990723
04.01    3CB9LF36T  AB    9AQJ001833  3Com      36/2     19990607
05.01    3CB9LF36R  AC    9BCJ002161  3Com      36/2     19990624
06.01    3CB9RF12R  AD    9AZE001545  3Com      12/1     19990523
07.01    3CB9LG2MC  AB    9ANE005008  3Com      2/2      19990718
08.01    3CB9fg24T  AA    9BKE001662  3Com      0/24     19990507
12.01    3CB9RD6MC  1     21          3Com      6/1      19981110
17.01    3CB9EME    AF    9ABJ007047  3Com      0/0      19990416
18.01    3CB9EME    AF    9ABJ007647  3Com      0/0      19990415
PS.01    3CB9EP8    E1    9AD200259   3Com      -/-      19980331
```

The `show eme` Command

The `show eme` command displays EME information.

Example:

```
CB9000> show eme

Name:
  CoreBuilder-9000
Location:
  Boston
For assistance contact:John Smith
  System Administrator

Operational Version: v3.0                Boot Version:        v3.0

Serial Number:       9ABJ001292          Service Date:        1999/04/
Mac Address:         08-00-8f-30-c7-27   Restarts:            7
Cpu Ram Size (MB):   20                  Flash Memory (MB):   16

Trap Receive:        DISABLED            Diagnostics:         ENABLED
```

6 USING THE EME FOR NETWORK ADMINISTRATION

This chapter describes how to use remote management features provided by an installed and configured Enterprise Management Engine (EME). The chapter contains the following sections:

- Using Telnet to Manage the EME Remotely
- Using EME Telnet to Connect to Remote Devices
- Using the CoreBuilder 9000 Web Management System to Manage the EME
- Using Transcend to Manage the EME

Using Telnet to Manage the EME Remotely

You can log in to an EME remotely using Telnet, and manage the EME from your local workstation.

To use Telnet to manage the EME remotely:

1. Connect your EME 10BASE-T port to the network. See "Connecting to a 10BASE-T Ethernet Port" for more information.
2. Telnet to the EME IP address from your workstation.
3. Log in to the EME in with Administer access.

The EME supports up to four incoming Telnet sessions.

You cannot use Telnet to connect to an EME if the EME is in standby mode. You can connect an EME in standby mode to the network to provide redundancy only.

CAUTION: *Do not change the IP address of an EME that is already up and running from an in-band network connection. Doing so will terminate the session.*

Logging Out of the Remote EME

When you no longer require a connection to a remote EME, enter the `logout` command. This command terminates the Telnet session:

```
CB9000> logout
Good-Bye
```

CAUTION: *If you set TIMEOUT for the remote EME and if the time runs out, the remote EME terminates the Telnet session.*

Using EME Telnet to Connect to Remote Devices

To use the EME Telnet service to log in to a remote device, follow these steps:

1. Verify that you are logged in to the EME through the RS-232 Console port.
2. Specify the IP address of the remote device using the `telnet` command.

   For example:

   ```
   CB9000> telnet 192.34.67.101
   ```

   You can enter the EME `telnet` *command only if you are logged in through the EME's RS-232 port.*

   You can only log in to devices that support the Telnet protocol.
3. Log in to the remote device and manage the device using commands that are appropriate to that device.

   You are allowed one outgoing Telnet session per console port (2 total).
4. To log out of the remote device, use the appropriate command for that device.

   After you have logged out, the local EME prompt reappears on the screen.

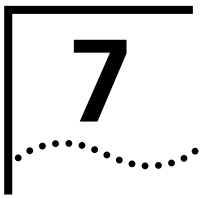
Using the CoreBuilder 9000 Web Management Suite of Applications

You can manage the EME from the CoreBuilder 9000 Web Management suite of applications via the Web.

You can access, configure, and modify previous settings through the Web Management suite of applications. See the *Web Management User Guide for the CoreBuilder 9000 Enterprise Switch* for more detailed information.

Using Transcend to Manage the EME

You can manage the EME from Transcend® Network Control Services. See the documentation that is shipped with Transcend for more detailed information.



MANAGING REDUNDANT EMES

This chapter covers the following topics:

- EME Redundancy
- EME Redundancy Fail-over Mechanism
- Managing Redundant EMEs

EME Redundancy

EME redundancy and its associated fail-over mechanism are entirely software based and are a separate application that resides on the CoreBuilder® 9000 system software. There is no backplane line or other hardware-level control that defines a primary EME or secondary EME, nor is the fail-over activity affected by any hardware-level control.

EME redundancy provides the following:

- Monitoring of status and conditions that are used to initiate the fail-over mechanism
- Activation of the fail-over mechanism and recovery operations
- Maintenance of redundant data between the primary EME and secondary EME

After EME redundancy is established, it provides the functionality whereby two EMEs can function as one management entity. The EMEs are categorized as a primary management entity and a hot standby secondary management entity. The CoreBuilder 9000 system treats both EMEs as a single logical device. However, for some management activities, such as image download and Telnet connections, you must treat the two modules as separate devices.

If a management application is running on the secondary EME, it:

- Initializes based on the parameters of the primary EME
- Operates in *hot-standby* mode, meaning that it is kept informed about the dynamic state of the management application that is running on the primary EME. For example, an application that is located on the secondary EME resumes a transaction with a chassis device that the same application located on the primary EME was performing when the EME fail-over mechanism occurred.
- Works in cooperation with the underlying Service Registration infrastructure that allows the applications that support hot-standby to track changes in status of either the primary EME or secondary EME.

The primary EME is constantly sending the secondary EME any RAM-based, volatile data that is relevant for tracking activity with the management application. Management application redundancy is done through the EME redundancy's two-state hot-standby architecture that consists of:

- Active state
- Standby state

Both the primary EME and the secondary EME are synchronized after redundancy is established. When any configuration or non-volatile data (NVdata) is modified on the primary EME, the data is automatically modified on the secondary EME. New events are also stored on each EME. The log files are also synchronized after redundancy is established.

Events that occurred before EME redundancy was established are not synchronized.

EME redundancy provides a seamless flow of management operation when the fail-over mechanism occurs. There is no reboot of switching modules, no loss of data, and no interruption of service. You can force a fail-over to occur from the Command Line Interface (CLI) or SNMP through the Web Management suite of applications or the Transcend® Network Control Services.

Management Connectivity

The following connectivity rules apply after you establish EME redundancy:

- You can only access the secondary EME through its console port or its auxiliary port.
- You cannot Telnet to the secondary EME from an external source because both the primary EME and the secondary EME share the same IP address for the front panel port. The front panel port is enabled only for the primary EME and disabled on the secondary EME. Therefore, when you attempt to Telnet to the shared IP address, you always access the primary EME.
- You cannot move from the primary EME to the secondary EME during a Telnet session (also known as *telnet-hopping*).

EME Redundancy Functional Overview

To establish EME redundancy, you must have two EMEs installed in the CoreBuilder 9000 chassis. Each chassis has two slots dedicated for EME installation (8 and 9 in the 7-slot chassis, 9 and 10 in the 8-slot chassis, and 17 and 18 in the 16-slot chassis). You can install the first EME in either slot. You can only install one of the following modules in the second slot:

- A second EME module for standby management support
- An EMC for standby controller support

You do not need to power off the CoreBuilder 9000 chassis to install, remove, or replace the EME module. You can insert the module while the chassis is operating. (This is called a *hot swap*.)

Primary EME

The EME module that you insert into slot 8 in a 7-slot chassis, slot 9 in an 8-slot chassis, or slot 17 in a 16-slot chassis is the primary after it becomes operational.

This is not always the case, however. If the EME that is installed in the higher-numbered slot boots up faster that the EME that is installed in the lower-numbered slot, then the EME in the higher slot is the Primary. This also can happen if diagnostics are set to enable on the EME in the lower-numbered slot.

After you install the second EME in slot 9 in a 7-slot chassis, slot 10 in an 8-slot chassis, and slot 17 in a 16-slot chassis, its status is displayed as the secondary EME when you enter a `show module all` command.

For example:

```
CB9000> show module all

Slot  Module      Status            Description
----- ----------- ----------------- ------------------
04.01 3CB9LF36T   Up                36 Port 10/100TX Telco Layer 2 Switching Module
05.01 3CB9LF36R   Up                36 Port 10/100TX RJ45 Layer 2 Switching Module
06.01 3CB9RF12R   Up                12 Port 10/100TX Layer 3 Switching Module
07.01 3CB9LG2MC   Managed by fabric 2 port Gen I/O Module
08.01 3CB9FG24T   Primary           24 Port Gigabit Switching Fabric, 12 Trunks
17.01 3CB9EMC     Active            Enterprise Management Controller
17.02 3CB9EME     Primary           Enterprise Management Engine
18.01 3CB9EMC     Standby           Enterprise Management Controller
18.02 3CB9EME     Secondary         Enterprise Management Engine
```

If the primary EME fails for any reason, the secondary EME immediately takes over all primary functions. All flash file system activity (copying files to, deleting files from) on the primary EME is mirrored on the secondary EME.

There are times when you may not want to automatically copy a file from the primary EME to the secondary EME (for example, temporary files). You can configure the system software to set these parameters during initialization. All files that are designated not to be automatically copied to the secondary EME are lost after a fail-over.

Hot Swapping

If you hot-swap the primary EME, the following process occurs automatically:

1. EME redundancy initiates the fail-over mechanism.
2. The secondary EME becomes the primary EME.
3. The EME that was replaced becomes the secondary EME and automatically powers on in standby mode without modifying its configuration.

Primary EME goes "not active"

If a problem occurs on a primary EME, EME redundancy initiates its automatic fail-over mechanism and makes the secondary EME the new primary EME.

The secondary EME then designates itself as the primary EME and, because it learned all the configuration settings from the primary EME during initialization, it continues to provide all the management functions with no interruption to the operation of the CoreBuilder 9000 system.

The Standby LED, located on front panel of the EME that fails over, continues to display `Active`*. This is because the two components that make up the EME (SMC and SCC) are independent of each other. Therefore, when the SMC fails over, the SCC on the same EME continues to be active. See Chapter 1, "EME Components" for more information about the SMC and the SCC.*

EME Redundancy Fail-over Mechanism

The EME Redundancy fail-over mechanism provides a quick and seamless flow of operation if the Primary EME fails for any reason and the Secondary EME takes over as the Primary EME. The fail-over mechanism causes the management capabilities to be transferred from the Primary EME that went down to the Secondary EME. There is no reboot of switching modules, no loss of data, and no interruption of service during the fail-over process.

After it has transferred the management capabilities to the Secondary EME, the fail-over mechanism provides the associated recovery mechanisms used by the management applications.

The EME fail-over mechanism is entirely controlled by the EME redundancy software application. The fail-over mechanism is non-revertive only, which means after the fail-over has occurred, the EME that had been Primary becomes the Secondary EME and remains in this state even if the original problem that caused the fail-over is fixed.

8 TROUBLESHOOTING THE EME

This chapter provides help in isolating and correcting problems that may occur during the installation process or during normal operation of the CoreBuilder® 9000 Enterprise Management Engine (EME). This chapter contains the following sections:

- Interpreting EME LEDs
- Troubleshooting Power-on Problems
- Troubleshooting Download Problems
- Troubleshooting the Terminal Interface
- Understanding EME Network Impact
- Interpreting EME Trap Messages
- Running Diagnostic Tests
- Obtaining Technical Assistance

Interpreting EME LEDs

If an LED does not illuminate as you expected, and the LED is functional, see the troubleshooting tables within this chapter.

Troubleshooting Power-on Problems

Table 27 lists common problems that can arise when you install your EME and possible solutions. Under normal conditions, when you install the EME, the Status LED lights and the character display shows the EME's operating state.

Table 27 Power-on Troubleshooting

Symptom	Meaning	Corrective Action
Chassis power is on, but ACTIVE LED does not light	EME is in standby or has failed diagnostics	**1** Verify that the EME is installed correctly by following the installation instructions in Chapter 2. **2** Install the EME in the other slot in the chassis. **3** If the LED still does not light, the software on the EME may be corrupted. Try downloading a new copy of the software. (See Chapter 3.) If downloading software does not solve the problem, call your supplier for assistance.
Display reads STBY	EME is in standby mode.	**1** Wait 60 seconds to see if the EME corrects the situation itself. **2** If more than one EME exists in the chassis, verify that only one EME is set to Primary (using `show module all`). Then use the `reset eme` command to alleviate the problem. **3** Follow the corrective actions for the previous symptom.
Display reads NRAM	EME has failed diagnostics	Indicates a faulty non-volatile RAM device. Reinstall the EME or call your supplier for assistance.
Display reads DRAM	Indicates faulty on-board DRAM	Reinstall the EME or call your supplier for assistance.
Display reads CARD	Indicates faulty memory card	Reinstall the card or call your supplier for assistance.
Display shows numeric characters	EMC has failed diagnostics	Connect a terminal to the serial port and examine the diagnostic messages.

Troubleshooting Download Problems

Table 28 lists some common problems that can occur as you perform an out-of-band download.

Table 28 Download Troubleshooting

Symptom	In-Band or Out-of-Band	Corrective Action
When you connect the PC to the EME, garbage characters appear on the screen.	Out-of-Band	Verify that the baud rate for the EME and PC are the same. Perform the download procedure again.
When you download the ProComm software, the following message appears: `ProComm directory already exists, overwrite files?`	Out-of-Band	You have the choice of overwriting the files or quitting the installation. If you enter **Y** to overwrite the files, the existing ProComm tiles are deleted and the new files are copied to the selected drive.

Troubleshooting the Terminal Interface

Table 29 lists some common problems that can occur as you configure the EME to communicate with a terminal. Follow the directions in Chapter 2, "Installing and Setting Up Your Management System" for more information about how to do this.

Table 29 EME Terminal Interface Problems

Symptom	Corrective Action
Nothing appears on the screen (screen is blank).	■ Make sure that the RS-232 cable meets the specifications in Chapter 2. ■ Make sure that the RS-232 cable is securely connected to both devices. ■ Verify that the baud rates match for the terminal and the EME. (See Chapter 4)
Garbled characters appear on the screen.	Verify that the EME and the terminal settings match for baud, data bits, stop bits, and parity. The default baud rate is 9600, 8 data bits, no parity, 2 stop bits.
The `set` command does not work.	Make sure that you are logged in as `admin` and that you are connected to the primary EME (display shows `Rdy`).
You use abbreviated input, but pressing the spacebar does not complete the command.	Enter enough characters for the EME to distinguish between different commands and options. Enter **?** for a list of available options.

Table 29 EME Terminal Interface Problems (continued)

Symptom	Corrective Action
Characters are lost when connected to the EME through a modem.	Make sure the STOP_BITS value on the terminal is set to 2STOP_BITS.
The management prompt on the screen is not as you set it.	You may be connected to a remote device. See the `telnet` and `logout` commands described in Chapter 6.
You do not receive any statistics from the chassis.	Make sure that you have properly configured EME IP information.
	Make sure that the statistics groups are enabled.
The >> prompt appears on the screen.	The EME is running in maintenance mode. Enter **`boot`** to return to management mode and the `CB9000>` prompt.
Module fails to respond after download.	Retry the download. If the module appears not to be operating, contact your service provider.
Module reports that a particular subnetwork is reserved.	Subnet 151.104.252.0 is reserved for chassis use. Use a different subnetwork.
Statistics are inaccurate.	EME statistics are designed to identify problems on the network. They may not be 100% accurate.
Module appears after `show inventory` command, but not after the `show module` command.	Reset the EME and retry the command. Replace the EME.

Understanding EME Network Impact

This section describes the impact of the EME on the network. It is designed to help you identify the source of packets on the network. Specifically, this section helps identify 3Com-generated packets.

The EME generates packets on the network when:

- Establishing and maintaining a Telnet session, either as a client or a server.
- Translating an IP address to a MAC address using the Address Resolution Protocol (ARP).
- Initiating or responding to a `ping` command.
- Responding to a Simple Network Management Protocol (SNMP) request.
- Sending SNMP traps.
- Performing an in-band download using the Trivial File Transfer Protocol (TFTP).
- Sending REM and CRS information.
- Generating MAC frames.

The EME uses a separate path on the CoreBuilder 9000 backplane to manage the other modules in the chassis.

Interpreting EME Trap Messages

The EME console receives a trap message when a change is made or an error occurs in a chassis that has an installed EME. The designated trap receiver (for example, a management workstation) also receives a trap if you have entered this information in the EME community table.

For example, if you remove a module from a chassis, the EME sends messages that describe the change to the console:

```
Message received from this device on 15:58 Fri 09 Jul 99:
Enterprise:   3Com
Enterprise Specific Trap:    Module Down
Message Information:
Slot Number:   6
Subslot Number:   1
Module Type Number:   6
Module Description:
Message received from this device on 15:58 Wed 21 Jul 99:
Enterprise:   3Com
Enterprise Specific Trap:   Slot Down
Message Information:
Slot Number:   6
```

Table 30 describes the first two fields in the trap message. The remainder of the fields are dependent upon the type of trap that is received and are self-explanatory.

Table 30 EME Trap Message Fields

Field	Description
Enterprise	Describes the enterprise (organization) responsible for this type of trap message.

Enterprise-Specific Trap	One of the following trap messages:
	`Module Up` or `Module Down`
	`Slot Up` or `Slot Down`
	`Port Up` or `Port Down`
	`Trunk Up` or `Trunk Down`
	`Fatal Error`
	`Environment Change`

SNMP traps are sent to the EME console when traps occur. An example of an SNMP trap is when a device attempts to gather information (read) from the EME, but the address of the device was not added to the community table with that access level. The message that appears in this instance is similar to the following example:

```
Message received from this device on 15:58 Fri 09 Jul 99:
Enterprise:   3Com
SNMP Generic Trap:    SNMP Authentication Failure
Message Information:
 Authentication Failure Address: 151.104.6.163
```

Running Diagnostic Tests

Use the `servdiag` command to run diagnostic tests on the module that you specify. This command is useful if you suspect a problem on the module or if you notice that the module is behaving inconsistently. The syntax for this command is:

```
servdiag <slot.subslot> <test>
```

Two types of tests are available:

- **Boot** — This test is the same module diagnostic test that runs automatically when you power on a module. This test takes up to 4 minutes to run.
- **Extended** — This is a series of tests that include the Boot test and a series of subtests. This test takes up to 15 minutes to run.

While the module runs these diagnostic tests, it does not pass network traffic. Do not use this command unless you suspect a problem on the module, and you do not need to use the module in your network.

The following example runs the Boot test on an interface module in slot 2. This module passes the test.

```
CB9000> servdiag 2.1 boot
Test may take up to 4 minutes and 0 seconds.
Do you wish to continue (y/n): y

Module 02.01 accepted diagnostic.
Event Received: "Mod Diags: 02.01"  Event generated: 18:50:26
Jul 09 1999 Entry: 00002  Slot: 18.02  Id: 01002  Severity:
Inform  Type: Inform Module Diagnostics: Slot 02, Subslot 01.

CB9000>

Event Received: "Diag: PASSED"  Event generated: 18:51:10 19
Jul 09 1999 Entry: 00003  Slot: 02.01  Id: 00103  Severity:
Inform  Type:   Diag Test: 01.00  Loop: 00001

CB9000>

Event Received: "Mod Up: 02.01"  Event generated: 18:52:15 19
Jul 09 1999 Entry: 00005  Slot: 18.02  Id: 01002  Severity:
Inform  Type: Inform Module Up: Slot 02, Subslot 01.
```

Reporting Diagnostic Errors

If the `servdiag` test encounters an error, and if it is set to stop on the error, the module does not function. If this occurs, call your 3Com reseller or 3Com Technical Support immediately to obtain assistance. See Appendix B for information about obtaining Technical Support. See "The cont_mode Characteristic" later in this chapter for information about how to set the `servdiag` diagnostic tests to stop on different types of errors.

Setting `servdiag` Characteristics

With the `set servdiag` command, you can specify how the EME executes the diagnostics tests on the module that you specify. The characteristics are:

- `cont_mode`
- `loop_count`
- `verbosity`

The `cont_mode` Characteristic

The `cont_mode` (continuation mode) of the diagnostic test determines whether the test continues after it encounters an error. The continuation mode can be one of the following:

- `continue` — The test reports an error then proceeds to the next test after it encounters the error.
- `halt_on_fatal` — The test stops when it encounters a fatal error. The module is no longer functional. This is the default continuation mode.
- `halt_on_nonfatal_and_fatal` — The test stops when it encounters a nonfatal error or a fatal error. The module is not longer functional.

The following example sets the `cont_mode` to `continue`:

```
CB9000> set servdiag cont_mode continue
```

The `loop_count` Characteristic

The `loop_count` characteristic determines how many times the EME runs the diagnostic test on the module that you specify. Because the module does not pass network traffic during the tests, do not set a high loop count when you need to use the module in your network.

Valid values for the `loop_count` characteristic are 0 through 65535. The default `loop_count` value is 1. A value of zero causes the test to run indefinitely. The following example sets the `loop_count` to 5:

```
CB9000> set servdiag loop_count 5
```

The `verbosity` Characteristic

The `verbosity` characteristic determines the amount of output that the diagnostic test sends to the console. Two options are available:

- `normal` — The test reports results at the end of the test or when it encounters an error. This is the default.
- `verbose` — The test reports results at the end of each subtest as well as when it encounters an error and at the end of the test.

The following example sets the `verbosity` to `verbose`:

```
CB9000> set servdiag verbosity verbose
```

Displaying `servdiag` Characteristics

Use the `show servdiag` command to view the characteristics of this option:

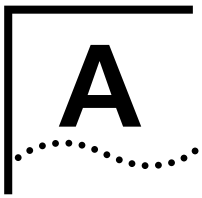
```
CB9000> show servdiag
Verbosity:      nonverbose
Loop count:     1
Continue mode:  continue
```

Obtaining Technical Assistance

To receive assistance for installing and troubleshooting the EME, call your 3Com reseller or the 3Com Technical Support Organization. Be prepared to supply a representative with the following information:

- A description of the problem
- The steps that you have taken to try to correct the problem
- The status of the front panel LEDs (if relevant)
- The screen information (if available)
- The configuration of your chassis (the types of modules that are installed by slot)
- The version number of the EME software

See Appendix B for Technical Support contact information.



SPECIFICATIONS

This appendix lists specifications for the CoreBuilder® 9000 Enterprise Management Engine (Model Number 3CB9EME) and the Enterprise Management Controller (Model Number 3CB9EMC).

This appendix contains the following sections:

- EME Technical Specifications
- EMC Technical Specifications

EME Technical Specifications

Table 31 lists general specifications, Table 32 lists power specifications, Table 33 lists environmental specifications, and Table 34 lists mechanical specifications for the EME.

Table 31 EME General Specifications

Element	Specification
Connectors	One front panel RS-232 shielded DB-9 connector for console port connections
	One front panel RS-232 shielded DB-9 connector for auxiliary port connections
	One RJ-45 10BASE-T Ethernet Port
Processors	One Motorola 68EC040 processor and two Motorola 68302 processors
Memory	16 MB of Flash EPROM 6 MB of RAM
	512 KB of Flash PROM for controller functions 512 KB of SRAM for controller functions
External Modem Support	For 100% Hayes-compatible modems
	Baud rates supported up to 38,400 baud

Table 32 EME Power Specifications

Element	Power Consumption
EME	12 W @ 5 V 1.0 W @ +12 V

Table 33 EME Environmental Specifications

Specification	Range
Operating temperature	0 °C to 50 °C (32 °F to 122 °F)
Humidity	Less than 95%, noncondensing
BTU/hr	46

Table 34 EME Mechanical Specifications

Element	Specification
Maximum slots	One CoreBuilder® 9000 EME per slot
Weight	0.45 kg (1 lb)
Dimensions	2.6 cm H x 20.8 cm W x 34.7 cm D (1.0 in. H x 8.2 in. W x 13.7 in. D)

EMC Technical Specifications

Table 35 lists general specifications, Table 36 lists power specifications, Table 37 lists environmental specifications, and Table 38 lists mechanical specifications for the EMC.

Table 35 EMC General Specifications

Element	Specification
Processors	Motorola 68302 processor
Memory	512 KB of Flash EPROM
	512 KB of RAM

Table 36 EMC Power Specifications

Element	Power Consumption
EMC	4.25 W @ +5 V 1.0 W @ +12 V

Table 37 EMC Environmental Specifications

Element	Specification
Operating Temperature	0 °C to 50 °C (32 °F to 122 °F)
Humidity	Less than 95%, noncondensing
BTU/hr	14.5

Table 38 EMC Mechanical Specifications

Element	Specification
Weight	80.1 g (2.85 oz)
Dimensions	2.6 cm H x 20.8 cm W x 34.7 cm D (1.0 in. H x 8.2 in. W x 13.7 in. D)

B TECHNICAL SUPPORT

3Com provides easy access to technical support information through a variety of services. This appendix describes these services.

Information contained in this appendix is correct at time of publication. For the most recent information, 3Com recommends that you access the 3Com Corporation World Wide Web site.

Online Technical Services

3Com offers worldwide product support 24 hours a day, 7 days a week, through the following online systems:

- World Wide Web site
- 3Com Knowledgebase Web Services
- 3Com FTP site
- 3Com Bulletin Board Service (3Com BBS)
- 3Com Facts℠ Automated Fax Service

World Wide Web Site

To access the latest networking information on the 3Com Corporation World Wide Web site, enter this URL into your Internet browser:

`http://www.3com.com/`

This service provides access to online support information such as technical documentation and software, as well as support options that range from technical education to maintenance and professional services.

3Com Knowledgebase Web Services

This interactive tool contains technical product information compiled by 3Com expert technical engineers around the globe. Located on the World Wide Web at **`http://knowledgebase.3com.com`**, this service gives all 3Com customers and partners complementary, round-the-clock access to technical information on most 3Com products.

3Com FTP Site

Download drivers, patches, software, and MIBs across the Internet from the 3Com public FTP site. This service is available 24 hours a day, 7 days a week.

To connect to the 3Com FTP site, enter the following information into your FTP client:

- Hostname: **`ftp.3com.com`**
- Username: **`anonymous`**
- Password: **`<your Internet e-mail address>`**

You do not need a user name and password with Web browser software such as Netscape Navigator and Internet Explorer.

3Com Bulletin Board Service

The 3Com BBS contains patches, software, and drivers for 3Com products. This service is available through analog modem or digital modem (ISDN) 24 hours a day, 7 days a week.

Access by Analog Modem

To reach the service by modem, set your modem to 8 data bits, no parity, and 1 stop bit. Call the telephone number nearest you:

Country	Data Rate	Telephone Number
Australia	Up to 14,400 bps	61 2 9955 2073
Brazil	Up to 28,800 bps	55 11 5181 9666
France	Up to 14,400 bps	33 1 6986 6954
Germany	Up to 28,800 bps	4989 62732 188
Hong Kong	Up to 14,400 bps	852 2537 5601
Italy	Up to 14,400 bps	39 2 27300680
Japan	Up to 14,400 bps	81 3 5977 7977
Mexico	Up to 28,800 bps	52 5 520 7835
P.R. of China	Up to 14,400 bps	86 10 684 92351
Taiwan, R.O.C.	Up to 14,400 bps	886 2 377 5840
U.K.	Up to 28,800 bps	44 1442 438278
U.S.A.	Up to 53,333 bps	1 847 262 6000

Access by Digital Modem

ISDN users can dial in to the 3Com BBS using a digital modem for fast access up to 64 Kbps. To access the 3Com BBS using ISDN, call the following number:

1 847 262 6000

3Com Facts Automated Fax Service

The 3Com Facts automated fax service provides technical articles, diagrams, and troubleshooting instructions on 3Com products 24 hours a day, 7 days a week.

Call 3Com Facts using your Touch-Tone telephone:

1 408 727 7021

Support from Your Network Supplier

If you require additional assistance, contact your network supplier. Many suppliers are authorized 3Com service partners who are qualified to provide a variety of services, including network planning, installation, hardware maintenance, application training, and support services.

When you contact your network supplier for assistance, have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

If you are unable to contact your network supplier, see the following section on how to contact 3Com.

Support from 3Com

If you are unable to obtain assistance from the 3Com online technical resources or from your network supplier, 3Com offers technical telephone support services. To find out more about your support options, call the 3Com technical telephone support phone number at the location nearest you.

When you contact 3Com for assistance, have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision levels
- Diagnostic error messages
- Details about recent configuration changes, if applicable

Here is a list of worldwide technical telephone support numbers:

Country	Telephone Number	Country	Telephone Number
Asia, Pacific Rim			
Australia	1 800 678 515	P.R. of China	10800 61 00137 or
Hong Kong	800 933 486		021 6350 1590
India	+61 2 9937 5085	Singapore	800 6161 463
Indonesia	001 800 61 009	S. Korea	
Japan	0031 61 6439	From anywhere in S. Korea:	00798 611 2230
Malaysia	1800 801 777	From Seoul:	(0)2 3455 6455
New Zealand	0800 446 398	Taiwan, R.O.C.	0080 611 261
Pakistan	+61 2 9937 5085	Thailand	001 800 611 2000
Philippines	1235 61 266 2602		
Europe			
From anywhere in Europe, call:	+31 (0)30 6029900 phone +31 (0)30 6029999 fax		
Europe, South Africa, and Middle East			
From the following countries, you may use the toll-free numbers:			
Austria	0800 297468	Netherlands	0800 0227788
Belgium	0800 71429	Norway	800 11376
Denmark	800 17309	Poland	00800 3111206
Finland	0800 113153	Portugal	0800 831416
France	0800 917959	South Africa	0800 995014
Germany	0800 1821502	Spain	900 983125
Hungary	00800 12813	Sweden	020 795482
Ireland	1800 553117	Switzerland	0800 55 3072
Israel	1800 9453794	U.K.	0800 966197
Italy	1678 79489		
Latin America			
Argentina	AT&T +800 666 5065	Mexico	01 800 CARE (01 800 2273)
Brazil	0800 13 3266	Peru	AT&T +800 666 5065
Chile	1230 020 0645	Puerto Rico	800 666 5065
Colombia	98012 2127	Venezuela	AT&T +800 666 5065
North America	1 800 NET 3Com (1 800 638 3266) Enterprise Customers: 1 800 876-3266		

Returning Products for Repair

Before you send a product directly to 3Com for repair, you must first obtain an authorization number. Products sent to 3Com without authorization numbers will be returned to the sender unopened, at the sender's expense.

To obtain an authorization number, call or fax:

Country	Telephone Number	Fax Number
Asia, Pacific Rim	+ 65 543 6500	+ 65 543 6348
Europe, South Africa, and Middle East	+ 31 30 6029900	+ 31 30 6029999
Latin America	1 408 326 2927	1 408 326 3355
From the following countries, you may call the toll-free numbers; select option 2 and then option 2:		
Austria	0800 297468	
Belgium	0800 71429	
Denmark	800 17309	
Finland	0800 113153	
France	0800 917959	
Germany	0800 1821502	
Hungary	00800 12813	
Ireland	1800553117	
Israel	1800 9453794	
Italy	1678 79489	
Netherlands	0800 0227788	
Norway	800 11376	
Poland	00800 3111206	
Portugal	0800 831416	
South Africa	0800 995014	
Spain	900 983125	
Sweden	020 795482	
Switzerland	0800 55 3072	
U.K.	0800 966197	
U.S.A. and Canada	1 800 NET 3Com (1 800 638 3266) Enterprise Customers: 1 800 876 3266	1 408 326 7120 (not toll-free)

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