Business Communications Manager 2.5

Installation and Maintenance Guide

NØRTEL
NETWORKS™

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Trademarks

North American Regulatory Information

Safety

Business Communications Manager equipment meets all applicable requirements of both the CSA C22.2 No. 950-95 and UL-1950 Edition 3.

Danger: Risk of shock.
Read and follow installation instructions carefully.
Ensure the Business Communications Manager and Business Communications Manager expansion cabinet are unplugged from the power socket and that any telephone or network cables are unplugged before opening the Business Communications Manager or Business Communications Manager expansion cabinet.
If installation of additional hardware and /or servicing is required, disconnect all telephone cable connections prior to unplugging the Business Communications Manager.
Ensure the switch located on the back of the PC on the power supply is set to the correct input voltage (115 or 230).
Ensure the Business Communications Manager and Business Communications Manager expansion cabinet are plugged into the wall socket using a three-prong power cable before any telephone cables are connected.

Caution: Only qualified persons should service the system.
The installation and service of this hardware is to be performed only by service personnel having appropriate training and experience necessary to be aware of hazards to which they are exposed in performing a task and of measures to minimize the danger to themselves or other persons.

Electrical shock hazards from the telecommunication network and AC mains are possible with this equipment. To minimize risk to service personnel and users, the Business Communications Manager system must be connected to an outlet with a third-wire ground. Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events near network lines. These leakage currents normally safely flow to Protective Earth ground via the power cord. Therefore, it is mandatory that connection to an earthed outlet is performed first and removed last when cabling to the unit. Specifically, operations requiring the unit to be powered down must have the network connections (central office lines) removed first.

Enhanced 911 Configuration

Caution: Warning
Local, state and federal requirements for Emergency 911 services support by Customer Premises Equipment vary. Consult your telecommunication service provider regarding compliance with applicable laws and regulations.

Note: For information about 911 configuration, refer to the **Enhanced 911 (E911) Configuration** section in the *Business Communications Manager 2.5 Programming Operations Guide*.

Radio-frequency Interference

Warning: Equipment generates RF energy.
This equipment generates, uses, and can radiate radio-frequency energy. If not installed and used in accordance with the installation manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of the FCC Rules and with ICES.003, CLASS A Canadian EMI Requirements. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his or her own expense, will be required to take whatever measures may be required to correct the interference.

Telecommunication Registration

Business Communications Manager equipment meets all applicable requirements of both Industry Canada CS-03 and US Federal Commission FCC Part 68 and has been registered under files Industry Canada 332-5980 A and FCC AB6CAN-20705-KF-E (key system), AB6CAN-20706-MF-E (hybrid system), and AB6CAN-23740-PF-E (PBX system). Connection of the Business Communications Manager telephone system to the nationwide telecommunications network is made through a standard network interface jack that you can order from your local telecommunications company. This type of customer-provided equipment cannot be used on party lines or coin lines.

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

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

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

Network Connection

Canada and US

Table 1   Interface harmonized standards

Interface	Harmonized Standard	Description
CTM	Industry Canada CS03 FCC Part 68	Analog terminal device
DTM	Industry Canada CS03 FCC Part 68	T1 and Primary Rate ISDN
BRIM	Industry Canada CS03 FCC Part 68	Basic Rate ISDN
WAN	Industry Canada CS03 FCC Part 68	T1

Hearing Aid Compatibility

Business Communications Manager telephones are hearing-aid compatible, as defined in Section 68.316 of Part 68 FCC Rules.

Electromagnetic Compatibility

Business Communications Manager equipment meets all FCC Part 15, Class A radiated and conducted emissions requirements.

Business Communications Manager does not exceed the Class A limits for radiated and conducted emissions from digital apparatus as set out in the Radio Interference Regulations of Industry Canada.

Telephone Company Registration

It is usually not necessary to call the telecommunications company with information on the equipment before connecting the Business Communications Manager system to the telephone network. If the telecommunications company requires this information, provide the following:

*   telephone number(s) to which the system will be connected
*   FCC registration number (on label affixed to Business Communications Manager)
*   universal service order code (USOC)
*   service order code (SOC)
*   facility interface code (FIC)

Use of a Music Source

In accordance with U.S. Copyright Law, a license may be required from the American Society of Composers, Authors and Publishers, or similar organization if Radio or TV broadcasts are transmitted through the Music On Hold or Background Music features of this telecommunication system.

Nortel Networks hereby disclaims any liability arising out of the failure to obtain such a license.

Rights of the Telecommunications Company

If the Business Communications Manager system is causing harm to the telephone network, the telecommunications company may discontinue service temporarily. If possible, the telecommunications company will notify you in advance. If advance notice is not practical, the user will be notified as soon as possible. The user will be given the opportunity to correct the situation and informed of the right to file a complaint to the FCC.

The telecommunications company may make changes in its facilities, equipment, operations or procedures that could affect the proper functioning of the system. If this happens, the telecommunications company will give you advance notice in order for you to make any necessary modifications to maintain uninterrupted service.

Repairs

In the event of equipment malfunction, all repairs to certified equipment will be performed by an authorized supplier.

Canadian Regulations - please read carefully

Notice

The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). The Department does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations. Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the

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

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

Notice

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

This Class A device complies with Part 68 & Part 15 of the FCC Rules and ICES-003 Class A Canadian EMI requirements. Operation is subject to the following two conditions (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Do not attempt to repair this equipment. If you experience trouble, write for warranty and repair information:

Nortel Networks
30 Norelco Drive, Weston, Ontario
M9L 2X6   Canada

US Regulations - please read carefully

Federal Communications Commission (FCC) Notice

FCC registration number: This telephone equipment complies with Part 68, Rules and Regulations, of the FCC for direct connection to the Public Switched Telephone Network. (The FCC registration number appears on a sticker affixed to the bottom of the telephone.)

Your connection to the telephone line must comply with these FCC rules:

• An FCC compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network premises wiring using a compatible modular jack which is Part 68 compliant. See installation instructions for details.

• Use only an FCC Part 68-compliant Universal Service Order Code (USOC) network interface jack, as specified in the installation instructions, to connect this telephone to the telephone line. (To connect the phone, press the small plastic tab on the plug at the end of the phone's line cord. Insert into a wall or baseboard jack until it clicks. To disconnect, press the tab and pull out.) See installation instructions for details.

- If the terminal equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of the product may be required. But if advance notice isn't practical, the telephone company will notify you as soon as possible. You will also be advised of your right to file a complaint with the FCC, if you believe it is necessary.

- If a network interface jack is not already installed in your location, you can order one from your telephone company. Order the appropriate USOC Network interface jack, as specified in the installation instructions, for wall-mounted telephones or for desk/table use. In some states, customers are permitted to install their own jacks.

- Your telephone may not be connected to a party line or coin telephone line. Connection to Party Line Service is subject to state tariffs. (Contact the state public utility commission, public service commission or corporation commission for information.)

- It is no longer necessary to notify the Telephone Company of your phone's Registration and REN numbers. However, you must provide this information to the telephone company if they request it. The telephone company may make changes in its facilities, equipment, operation or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modification to maintain uninterrupted service.

- Do not attempt to repair this equipment. If you experience trouble, write for warranty and repair information:

Nortel Networks
640 Massman Drive,
Nashville, TN, 37210, USA

Ringer Equivalence Number

The FCC Registration label (on bottom of phone), includes a Ringer Equivalence Number (REN), which is used to determine the number of devices you may connect to your phone line. A high total REN may prevent phones from ringing in response to an incoming call and may make placing calls difficult. In most areas, a total REN of 5 should permit normal phone operation. To determine the total REN allowed on your telephone line, consult your local telephone company.

Hearing Aids

This phone is compatible with hearing aids equipped with an appropriate telecoil option.

Programming Emergency Numbers

When programming emergency numbers and/or making test calls to emergency numbers:

1 Remain on the line and briefly explain to the dispatcher the reason for calling before hanging up.

2 Perform such activities in the off-peak hours, such as early mornings or late evenings.

EMI/EMC (FCC Part 15)

> **Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

Important Safety Instructions

The following safety instructions cover the installation and use of the Product. Read carefully and retain for future reference.

Installation

> **Warning:** To avoid electrical shock hazard to personnel or equipment damage observe the following precautions when installing telephone equipment:

1 Never install telephone wiring during a lightning storm.

2 Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.

3 Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

4 Use caution when installing or modifying telephone lines. The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

This symbol on the product is used to identify the following important information: Use only with a CSA or UL certified CLASS 2 level C power supply, as specified in the user guide.

Use

When using your telephone equipment, basic safety precautions should always be followed to reduce risk of fire, electric shock and injury to persons, including the following:

1 Read and understand all instructions.

2 Follow the instructions marked on the product.

3 Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

4 Do not use this product near water, for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool.

5 Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.

6 This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.

7 Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.

8 Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.

9 Never spill liquid of any kind on the product.

10 To reduce the risk of electric shock do not disassemble this product, but have it sent to a qualified service person when some service or repair work is required.

11 Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

a When the power supply cord or plug is damaged or frayed.

b If the product has been exposed to rain, water or liquid has been spilled on the product, disconnect and allow the product to dry out to see if it still operates; but do not open up the product.

c If the product housing has been damaged.

d If the product exhibits a distinct change in performance.

12 Avoid using a telephone during an electrical storm. There may be a remote risk of electric shock from lightning.

13 Do not use the telephone to report a gas leak in the vicinity of the leak.

14 **Caution:** To eliminate the possibility of accidental damage to cords, plugs, jacks, and the telephone, do not use sharp instruments during the assembly procedures.

15 **Warning:** Do not insert the plug at the free end of the handset cord directly into a wall or baseboard jack. Such misuse can result in unsafe sound levels or possible damage to the handset.

16 Save these instructions.

International Regulatory Information

	The CE Marking on this equipment indicates compliance with the following: This device conforms to Directive 1999/5/EC on Radio Equipment and Telecommunications Terminal Equipment as adopted by the European Parliament And Of The Council.	

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Hereby, Nortel Networks declares that Enterprise Edge/Business Communications Manager Model No. NT7B10xxxx, is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Information is subject to change without notice. Nortel Networks reserves the right to make changes in design or components as progress in engineering and manufacturing may warrant. This equipment has been tested and found to comply with the European Safety requirements EN 60950 and EMC requirements EN 55022 (Class A) and EN 55024. These EMC limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial and light industrial environment.

WARNING

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. The above warning is inserted for regulatory reasons. If any customer believes that they have an interference problem, either because their Nortel Networks product seems to cause interference or suffers from interference, they should contact their distributor immediately. The distributor will assist with a remedy for any problems and, if necessary, will have full support from Nortel Networks.

Safety

WARNING!

Only qualified service personnel may install this equipment. The instructions in this manual are intended for use by qualified service personnel only.

Risk of shock.

Ensure the Business Communications Manager is unplugged from the power socket and that any telephone or network cables are unplugged before opening the Business Communications Manager.

Read and follow installation instructions carefully

Only qualified persons should service the system.

The installation and service of this hardware is to be performed only by service personnel having appropriate training and experience necessary to be aware of hazards to which they are exposed in performing a task and of measures to minimize the danger to themselves or other persons.

Electrical shock hazards from the telecommunication network and AC mains are possible with this equipment. To minimize risk to service personnel and users, the Business Communications Manager system must be connected to an outlet with a third-wire Earth.

Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events near network lines. These leakage currents normally safely flow to Protective Earth via the power cord. Therefore, it is mandatory that connection to an earthed outlet is performed first and removed last when cabling to the unit. Specifically, operations requiring the unit to be powered down must have the network connections (exchange lines) removed first.

Additional Safety Information

The following interfaces are classified as Telecommunication Network Voltage (TNV) circuits, and may be connected to exposed plant:

• DTM interface

• WAN interface

• TCM Isolator

The following interfaces are classified as Safety Extra Low Voltage (SELV) circuits, and shall not be connected to exposed plant:

• BRIM Interface

• TCM extensions

• external music sources (MSCX)

• auxiliary ringer (AUX)

• paging system relay (PAGE)

• serial port

• LAN interface

The following interfaces are classified as Telecommunication Network Voltage (TNV) circuits, and shall NOT be connected to exposed plant:

• ATA II

Limited Warranty

Nortel Networks warrants this product against defects and malfunctions during a one (1) year period from the date of original purchase. If there is a defect or malfunction, Nortel Networks shall, at its option, and as the exclusive remedy, either repair or replace the telephone set at no charge, if returned within the warranty period.

If replacement parts are used in making repairs, these parts may be refurbished, or may contain refurbished materials. If it is necessary to replace the telephone set, it may be replaced with a refurbished telephone of the same design and color. If it should become necessary to repair or replace a defective or malfunctioning telephone set under this warranty, the provisions of this warranty shall apply to the repaired or replaced telephone set until the expiration of ninety (90) days from the date of pick up, or the date of shipment to you, of the repaired or replacement set, or until the end of the original warranty period, whichever is later. Proof of the original purchase date is to be provided with all telephone sets returned for warranty repairs.

Exclusions

Nortel Networks does not warrant its telephone sets to be compatible with the equipment of any particular telephone company. This warranty does not extend to damage to products resulting from improper installation or operation, alteration, accident, neglect, abuse, misuse, fire or natural causes such as storms or floods, after the telephone is in your possession.

Nortel Networks shall not be liable for any incidental or consequential damages, including, but not limited to, loss, damage or expense directly or indirectly arising from the customers use of or inability to use this telephone, either separately or in combination with other equipment. This paragraph, however, shall not apply to consequential damages for injury to the person in the case of telephones used or bought for use primarily for personal, family or household purposes.

This warranty sets forth the entire liability and obligations of Nortel Networks with respect to breach of warranty, and the warranties set forth or limited herein are the sole warranties and are in lieu of all other warranties, expressed or implied, including warranties or fitness for particular purpose and merchantability.

Warranty Repair Services

Should the set fail during the warranty period:
In North America, please call 1-800-574-1611 for further information.
Outside North America, contact your sales representative for return instructions. You will be responsible for shipping charges, if any. When you return this telephone for warranty service, you must present proof of purchase.

After Warranty Service

Nortel Networks offers ongoing repair and support for this product. This service provides repair or replacement of your Nortel Networks product, at Nortel Networks option, for a fixed charge. You are responsible for all shipping charges. For further information and shipping instructions:
In North America, contact our service information number: 1-800-574-1611.
Outside North America, contact your sales representative.

Repairs to this product may be made only by the manufacturer and its authorized agents, or by others who are legally authorized. This restriction applies during and after the warranty period. Unauthorized repair will void the warranty.

Contents

Figures

Tables

Preface

This guide describes how to install, initialize and maintain the hardware for the Business Communications Manager 2.5 system.

Information in these chapters explains:

- how to set up the system hardware
- how to start and initialize the system hardware
- how to troubleshoot and maintain the hardware

All core system operational configuration is described in the *Business Communications Manager 2.5 Programming Operations Guide*.

To use this guide, you must:

- be a Nortel Networks installer with Business Communications Manager certification
- know basic Nortel Networks terminology

Symbols used in this guide

This guide uses symbols to draw your attention to important information. The following symbols appear in this guide:

Caution: Caution Symbol
Alerts you to conditions where you can damage the equipment.

Danger: Electrical Shock Hazard Symbol
Alerts you to conditions where you can get an electrical shock.

Warning: Warning Symbol
Alerts you to conditions where you can cause the system to work improperly or to fail.

Note: Note Symbol
Alerts you to important information.

Tip: Tip Symbol
Alerts you to additional information that can help you perform a task.

> **Warning:** Grounding Symbol.
> Alerts you to ground yourself with an antistatic grounding strap before performing the maintenance procedure.

> **Warning:** Disconnect Symbol
> Alerts you to remove the Business Communications Manager and Business Communications Manager expansion cabinet power cords from the AC outlet before performing any maintenance procedure.

Text conventions

This guide uses the following text conventions:

bold Courier text	Indicates command names and options and text that you need to enter in a command-line interface. Example: Use the **dinfo** command. Example: Enter **show ip** {**alerts**|**routes**}.
italic text	Indicates file and directory names, new terms, book titles, Web addresses, and variables in command syntax descriptions.
bold text	Indicates command names, screen titles, options and text for a graphical user interface (GUI).
angle brackets (< >)	Indicates a keyboard key press or simultaneous key presses, i.e. <ENTER> or <CTRL j>

Acronyms

These are the acronyms used in this document.

ANSI	American National Standards Institute
ASM	Analog station module
AWG	American wire gauge
BIOS	Basic input output system
BPS	Bits per second
BRI	Basic rate interface module
CAP	Central answering position
CIR	Committed information rate
CLID	Calling line identification
CSMA/CD	Carrier sense multiple access/collision detect

CSU	Channel service unit
CTM	Calling line trunk module
DECT	Digital enhanced cordless telecommunications
DIMM	Dual in-line memory module
DLCI	Data link connection indentifier
DN	Directory number
DNS	Domain name server
DPNSS	Digital private network signalling system
DRT	Delayed ring transfer to prime
DSM	Digital station module
DTM	Digital Trunk media bay module
DTMF	Dual tone multifrequency.
FEM	Fiber expansion module
HTTP	Hypertext transfer protocol
Hz	Hertz
I/C	Intercom
IP	Internet protocol
ISDN	Integrated services digital network
Kbyte	Kilobyte
LAN	Local area network
MCDN	Meridian customer-defined network protocol
MHz	Megahertz
MSC	Media services card
NIC	Network interface card
OPX	Off premises extension
PBX	Private branch exchange
PCI	Peripheral component interconnect
PEC III	Processor expansion card, version III
PRI	Primary rate interface
PSTN	Public switched telephone network
QoS	Quality of service
QSIG	Q reference point signalling
RAM	Random access memory
ROM	Read only memory
SAPS	Station auxiliary power supply

TAPI	Telephony application program interface
TCP/IP	Transmission control protocol/internet protocol
UTAM	UTAM Inc.
VoIP	Voice over IP
WAN	Wide area network

Related publications

The following documents provide further information about the Business Communications Manager and related media bay modules, extension equipment, and the applications and software on the system, refer to:

- *Business Communications Manager 2.5 Programming and Operations Guide* describes how to program the Business Communications Manager equipment.

- *Telephone Features Programming Guide* provides feature descriptions and programming for the numerous telephone features available to users through the buttons on digital telephone sets.

- If you are not an experienced telephone installer, the *Business Communications Manager 2.5 BIX Box Wiring Guide* provides illustrations for correctly wiring internal cable connections to telephones.

- All optional Business Communications Manager applications have installation and user guides specific to that application. For an overview of what these guides contain, refer to .
  - *Attendant Console Setup and Operation Guide* and *Attendant Console User Guide*
  - *Call Center Agent User Guide* and *Call Center Supervisor User Guide*
  - *Call Center Reporting Set Up and Operation Guide*
  - *Call Center Set Up and Operation Guide*
  - *Call Detail Recording System Admin. Guide*
  - *CallPilot Desktop Messaging Software Install and Maintenance Guide*
  - *CallPilot Fax Set up & Operation Guide* and *CallPilot Fax User Guide*
  - *CallPilot Manager Set Up and Operation Guide* and *CallPilot Programming Record*
  - *CallPilot Message Networking Setup and Operation Guide* and *CallPilot Message Networking User Guide*
  - *CallPilot Reference Guide*
  - *IP Telephony Configuration Guide*
  - *LAN CTE Configuration Guide*
  - *Multimedia Call Center Setup and Operation Guide* and *Multimedia Call Center Web Developers Guide*
  - *Personal Call Manager User Guide*

How to Get Help

Your local distributor should provide the technical support for your Business Communications Manager system or have access to that information through a Technical Service Center (TSC).

If you require non-technical support, contact 1-800-4NORTEL (1-800-466-7835), choose option 3, Sales or Pre-Sales Support)

Chapter 1
Introducing the Business Communications Manager

This chapter describes the Business Communications Manager system and the hardware required to create the system.

The Business Communications Manager system provides private network and telephony management to small to medium-sized businesses.

With this system, you can create a telephony system that suits your special business requirements. This compact system allows you to set up access to the public network, as well as to create your own internal network between remote sites over dedicated central office (CO) lines or through a LAN or WAN connection, where you can use voice over IP (VoIP) trunks to route both data and voice traffic. You control your own setup from your desktop using the Unified Manager and CallPilot applications.

The system supports a variety of Nortel Networks telephones with many user features that can be programmed either by the system manager or by the users at their sets.

CallPilot voice mail and call attendant applications are part of the basic Business Communications Manager system. However, if you require more extensive coverage, such as more mail boxes, additional applications are easily activated using software keycodes.

Business Communications Manager System Components

The Business Communications Manager system includes software and hardware components that provide data networking, telephony service, and voice messaging and service applications.

Figure 1 provides an overview of the core Business Communications Manager system. The page locations, where the information about each part is discussed, are also indicated.

Figure 1   Business Communications Manager core system components overview
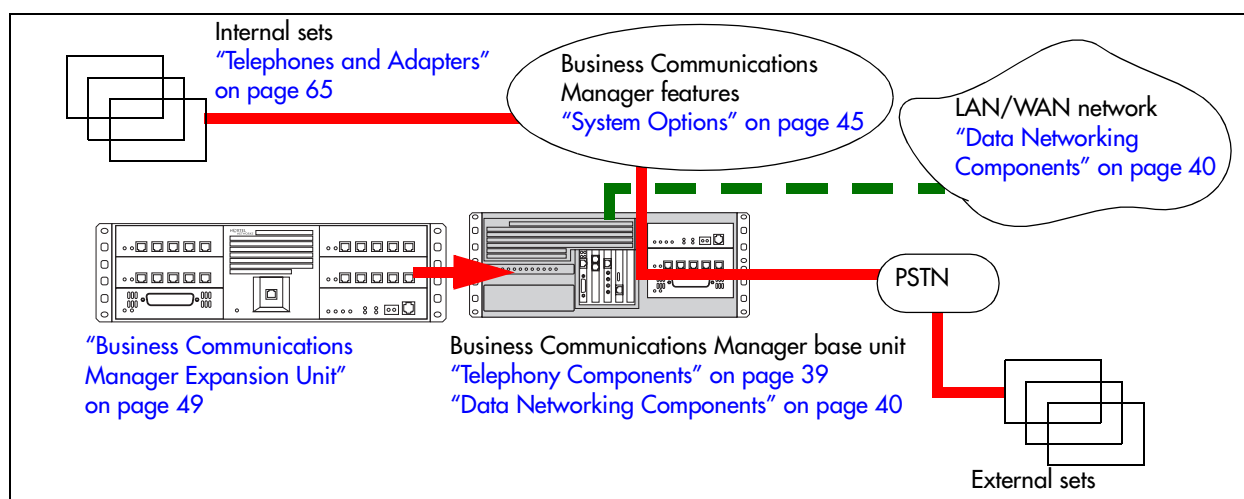
> → **Note:** Some of the components described in this document are not available in all areas. Ask your Business Communications Manager sales agent for information about availability.

Computer Components

The Business Communications Manager base unit computing functions are supported by the following hardware:

- Intel® microprocessor[1]
- memory: 256 MB SDRAM; 128 MB SDRAM added for 2.0 upgrades.
- **hard disk:** 20 GB hard disk(2.5 hardware); 8.4 GB hard disk (2.0 hardware)
- four PCI slots containing one MSC and four possible combinations ofWAN, LAN, and/or modem cards
- four PEC slots on the MSC, each of which can contain one Processor expansion card (PEC) I or PEC III card (2.5)
- three media bays

Hardware Components

The main component of the Business Communications Manager system is the Business Communications Manager base unit. This hardware controls all data and telephony tasks, such as call processing, voice messaging, and data routing.

Figure 2 shows the functional hardware as seen from the front of the Business Communications Manager base unit.

Figure 2   External functional hardware, base unit

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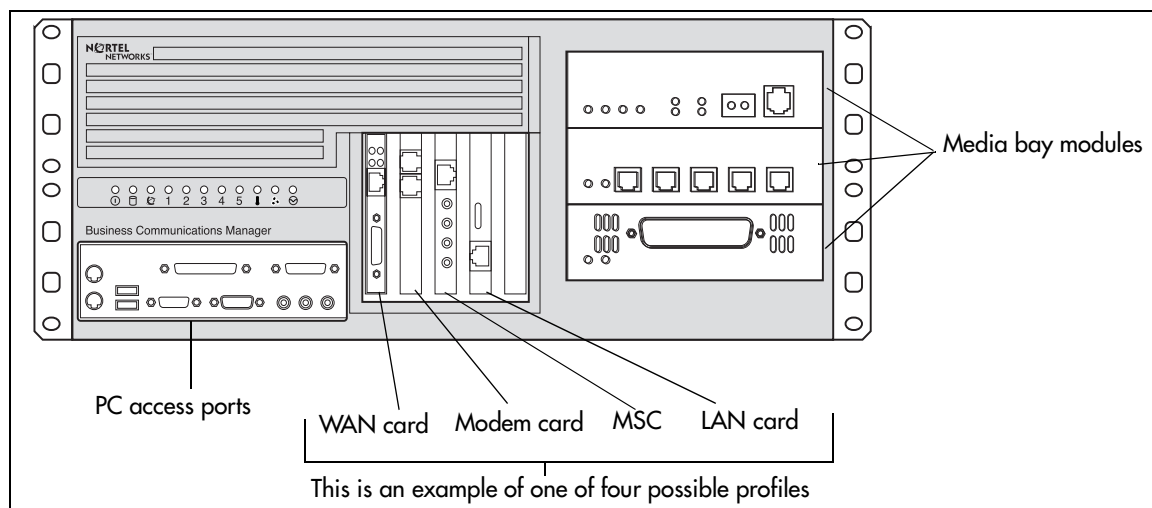
1   Intel is a registered trademark of Intel Corporation.

Table 2 provides a table of weights and measurements of the base unit.

Table 2   Basic Business Communications Manager base unit specifications

Size	• depth: 18.28 inches (with bezel in place) • width: 17.51 inches • height: 7.05 inches
Weight	• no PCI cards or modules: approx 23 lbs. • loaded system: approx. 31 lbs. (varies, depending on power supply)

Figure 3 shows the location of the hardware components in the Business Communications Manager base unit pre-2.5 versions. Nortel Networks recommends that you know the location of the different components before working with the system.

Figure 4 on page 38 and Figure 5 on page 38 show the two configurations of the Business Communications Manager 2.5 hardware.

Figure 3   Base unit interior components for standard system (pre-2.5)
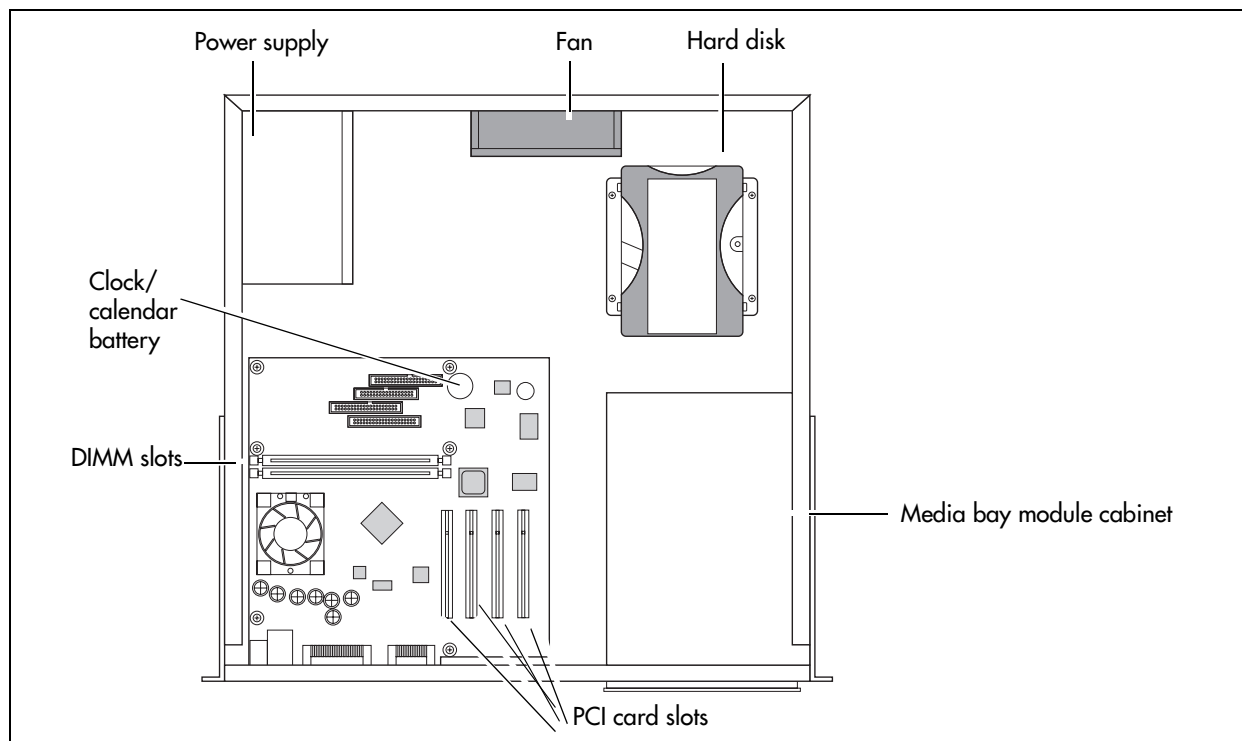
Figure 4 Base Unit interior components with a standard power supply system (2.5)
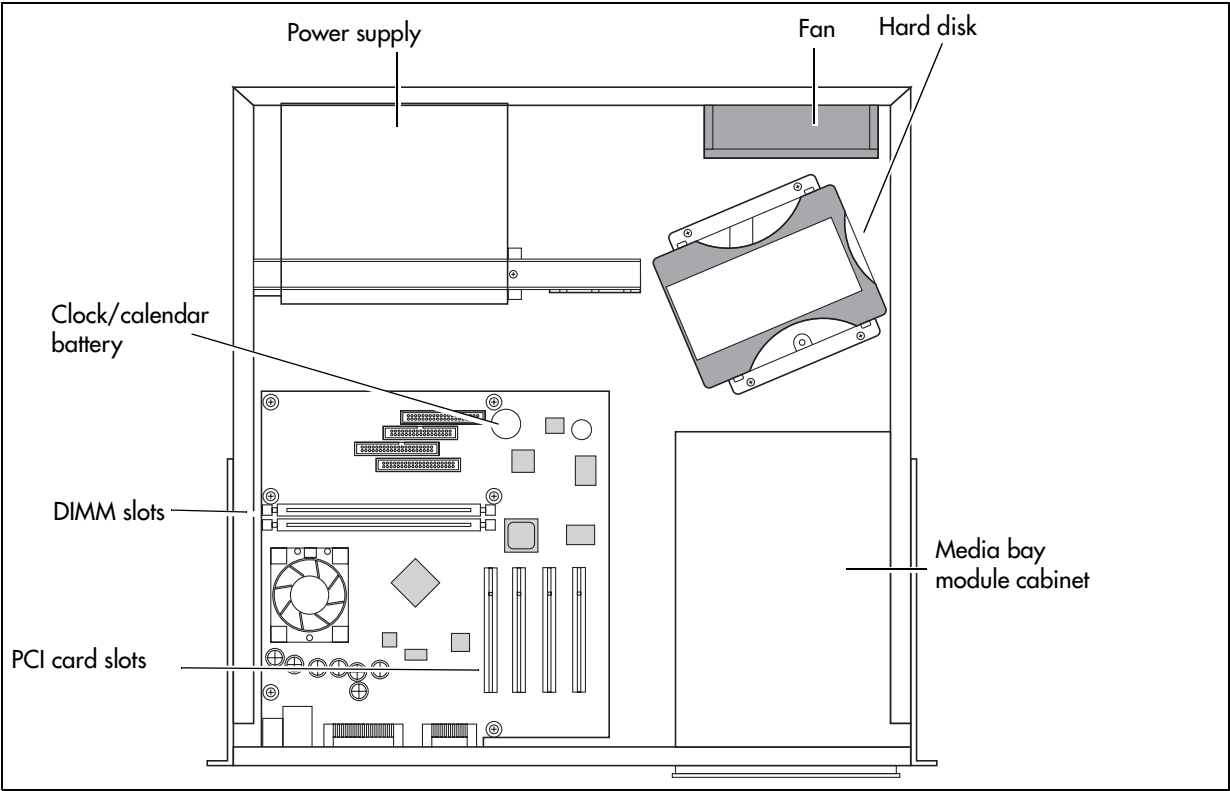
Figure 5 Base unit interior components for a redundant system (2.5)
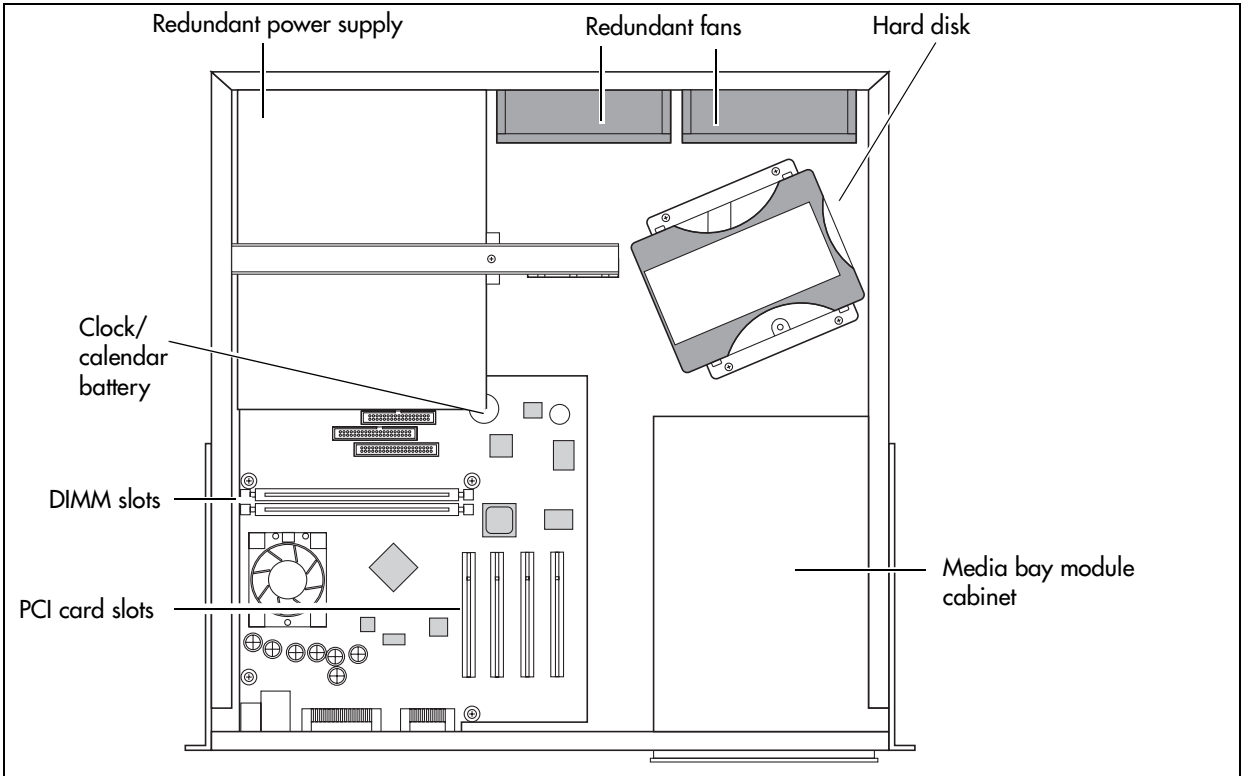
Power supply — The Business Communications Manager base unit can have a single power supply module or a redundant power supply module. Single power supply units can also be upgraded to redundant power supplies.

> **Note:** Power supplies for the Business Communications Manager 2.5 system are auto-switching power supplies.
>
> The power supply on an original 2.0 system has a voltage switch that must be set to the correct voltage.

Cooling fan — The Business Communications Manager base unit can have a single cooling fan or a redundant set of fans.

- Systems prior to Business Communications Manager 2.0 upgraded to redundant power supply systems use a piggy-back fan configuration.
- The new 2.5-version systems have the fan ports side-by-side.

Hard disk — The Business Communications Manager base unit has a single hard disk.

Telephony Components

The telephony components perform call processing by connecting the telephones or peripheral telephony equipment, such as fax machines, to the Public Switched Telephone Network (PSTN) lines. They also process telephony information that has been received through an IP link.

- MSC — The Media Services Card (MSC) is a PCI card which performs call processing and media processing of the voice channels. The Business Communications Manager 2.5 MSC contains two PEC IIIs that provide additional voice channel processing for the MSC. Refer to "Media Services Card" on page 41.

> **Note:** You can upgrade the PEC Is on your 2.0 system to PEC IIIs.
> You cannot mix PEC Is with PEC IIIs.

- CTM (North American systems only) — The Calling line identification (CLID) Trunk media bay module (CTM) connects to four analog CLID PSTN lines.
- CTM 8 (North American systems only) — This CLID Trunk media bay module (CTM) connects to eight analog CLID PSTN lines.
- 4X16 (North American systems only) — This module combines a four-line CLID Trunk media bay module (CTM) with a 16-line Digital Station media bay module.
- DTM — The Digital Trunk media bay module (DTM) connects to standard digital PSTN T1, E1 or PRI lines.
- BRI — The Basic Rate Interface media bay module (BRI) connects to four BRI S/T ISDN lines. (NT1 required. S interface for Euro profiles; T interface for North American-based profiles)
- ASM 8 (North American systems only) — The Analog Station media bay module (ASM 8) connects to eight analog telephones or other analog equipment such as fax machines.

- DSM 16 — The 16-port Digital Station media bay module (DSM 16) connects to a maximum of 16 digital telephones.

- DSM 32 — The 32-port Digital Station media bay module (DSM 32) connects to a maximum of 32 digital telephones.

- DECT — This module allows radio-based cordless handsets to access systems that are configured to accept the Digital Enhanced Cordless Telecommunications (DECT) profile. The module connects to radio base stations, which receive and transmit signals to the handsets. Refer to "Mobility Services by Region" on page 259 to determine the profiles that can use the DECT protocol.

- FEM — The Fiber Expansion Media Bay Module (FEM) provides an easy upgrade from a fully-loaded Norstar system to a Business Communications Manager system by connecting the six Norstar expansion modules to the Business Communications Manager system.

- Business Communications Manager expansion unit — a separate cabinet with six additional bays for media bay modules. It connects to the server through an DS256 RJ45 connector. A Business Communications Manager five-meter DS256 cable is included with the expansion cabinet hardware.

- Telephones and adapters — Business telephones and adapters connect to the media bay modules installed in the Business Communications Manager system. Business Communications Manager supports Norstar and Business Series Terminal sets, as well as IP-based Nortel sets. Refer to "Telephones and Adapters" on page 65 for a description of the telephones that can be used with the system.

  The Nortel Networks i2004 IP telephone and Nortel Networks i2050 Software Phone have separate installation and operations documentation. Refer to the main index on your system CD.

Data Networking Components

The data networking components connect the Business Communications Manager system to your local area network (LAN) and/or the wide area network (WAN). These components are installed at the factory. However, additional cards can be added to an existing system.

- Modem card (North American systems only) — a V.90 modem that sends and receives data using the public telephone system.

  The modem card is a V.90 interface modem. This modem connects the Business Communications Manager system to the public switched telephone network. You can use this connection to:
  — manage the Business Communications Manager system from a different location
  — provide dialup backup for a WAN card

- LAN interface card — a 10/100 BaseT Ethernet network interface card that connects the Business Communications Manager system to the local area network.

- WAN interface card — a network interface card with a T1 interface and sync port that connects the Business Communications Manager system to the wide area network (WAN).

The WAN card connects to a T1 PSTN line with an integrated T1 DSU/CSUs (North American). The WAN card can also connect to a T1 PSTN line with an X.21 or V.35 interface (Europe, Middle East, Africa (EMEA)).

Media Services Card

The Media Services Card (MSC), a PCI card, performs call processing and media processing of the voice channels for the Business Communications Manager system, including the VoIP trunks. This card also offers connections for auxiliary features, including external, customer-supplied hardware for paging and music-on-hold.

Figure 6 shows the location of the MSC on the Business Communications Manager base unit.

Figure 6   MSC optional equipment ports
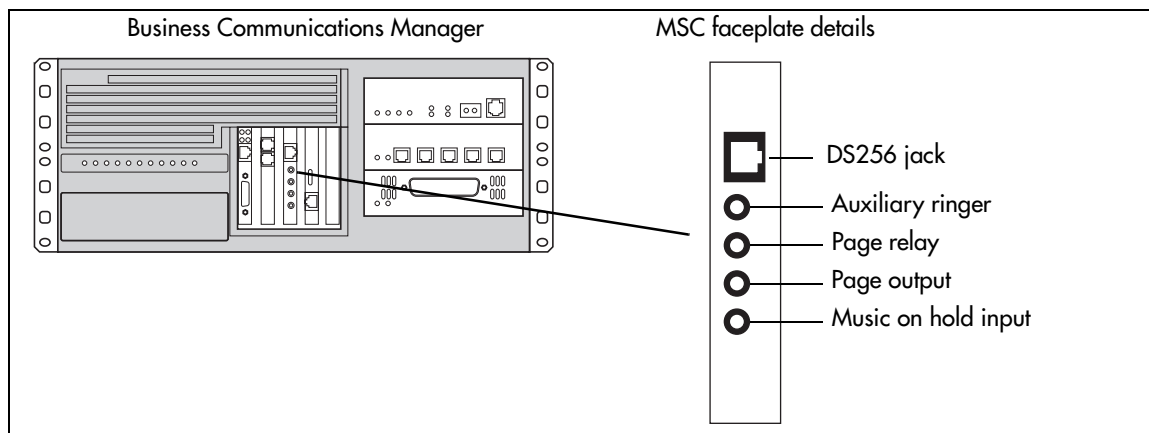
⚠ **Warning:** External equipment connected to the auxiliary ringer, page relay, page output and music on hold interfaces must use safety extra low voltage (SELV).
All four interfaces are (SELV) and the external equipment connected to these interfaces must be SELV. If these interfaces are not SELV, you must use external line isolation units (LIU).

The MSC faceplate offers the following optional connections.

- **DS256 connector**— The Business Communications Manager expansion unit connects to the Business Communications Manager base unit through the DS256 jack on the MSC faceplate.

  The DS256 cable to make this connection is provided with the purchase of an expansion cabinet.

- **Auxiliary ringer jack** — The Business Communications Manager base unit uses the auxiliary ringer jack to control the cadence of an auxiliary ringer (customer supplied). You must use this output in a low current, low voltage application only. Do not use this output for switching the auxiliary ringer directly.

- **Page relay jack** — When you use the page signal output jack to connect an external paging amplifier, you also use the page relay jack. The page relay jack connects a floating relay contact pair. The Business Communications Manager base unit uses this jack to control the external paging amplifier.

- **Page output jack** — The Business Communications Manager base unit uses the page output to connect an internally generated voice paging signal to an external paging amplifier (customer supplied).

- **Music on hold jack** — The Business Communications Manager base unit uses the Music on hold input to connect an external music source that supplies a signal to held lines (music on hold) or telephone speakers (background music). The input source can be any available radio or music source approved for connection to the network.

For directions on setting up these features, refer to Chapter 17, "Replacing the Hard Disk," on page 209.

MSC IP Call Processing Hardware

If your system requires a high volume of IP telephones and/or more IP trunks than the standard eight trunks, you have the option to switch a DS30 channel setting on the MSC from providing service for a media bay module, to providing digital processing service for additional IP telephones and/or trunks. As well, to ensure adequate data flow from the system, you can increase the number of PEC IIIs to four.

- DS30 channels are internal communication paths. Each DS30 channel provides a possible 32 signaling channels and 32 media channels.
  - two DS30 channels are exclusively dedicated to MSC data resources. Five paths within these channels have hard-coded applications. The other paths can be assigned to various data applications such as voice mail, dialup ISDN WAN, VoIP trunks, or IP telephony.
  - five DS30 channels are exclusively reserved for the media bay modules
  - The sixth DS30 channel can be switched to accommodate media bay modules or more channels for IP telephones or VoIP trunks. You control the use of the channel by your choice of using either a 2/6 or 3/5 DS30 channel split. This is set when you run the Quick Start Wizard at the initial startup of the system.

    For more details about deciding which DS30 channel configuration you want for your system, refer to "Determining Module Channel Requirements" on page 77 and to the chapter on configuring MSC Resources in the *Business Communications Manager 2.5 Programming Operations Guide*.

- PEC IIIs — The Business Communications Manager 2.5 uses PEC IIIs to deliver increased capacity for digital signal processing for voice mail, call center, FAX, VoIP trunks, IP telephony, and dialup ISDN WAN. The basic system comes with two PEC IIIs. Two more can be added to accommodate increased requirements for media processing. Refer to the chapter on configuring MSC Resources in the *Business Communications Manager 2.5 Programming Operations Guide*.

Connection Ports

You can connect to the Business Communications Manager base unit through the serial port or through a LAN card to perform the initial system initialization. Refer to Figure 7.

For initialization information, refer to "Using a Null Modem Serial Cable" on page 131 and "Connecting the Ethernet Crossover Cable" on page 135.

Figure 7   Base unit external points of connection

Serial   LAN
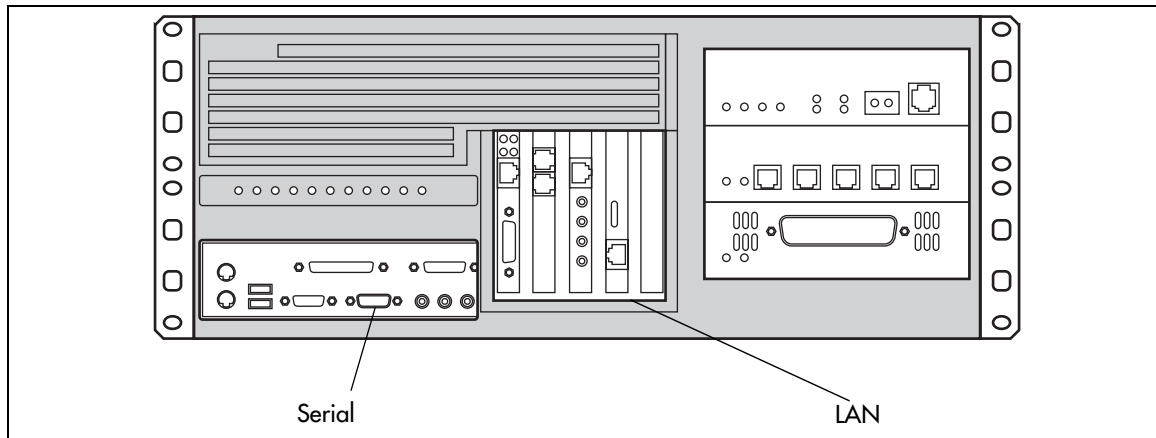
→ | **Note:** The other computer access ports currently are not used for Business Communications Manager operations.

Business Communications Manager Base Unit LEDs

A line of 10 LEDs display on the face of the Business Communications Manager base unit. Refer to Figure 8. These LEDs show the current state of various hardware components.

Figure 8 Business Communications Manager base unit operational LEDs
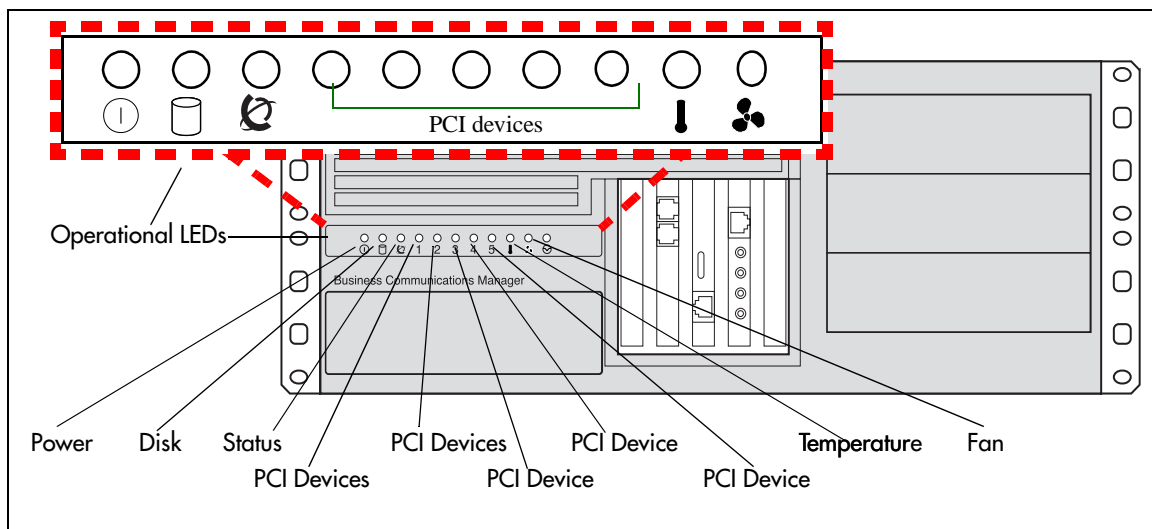
These LEDs monitor:

- power ( )
- disk drive ( )
- system status ( )
- five PCI power indicators

> **Note:** These LEDs correspond to the cards, not to the PCI slots.
> For example, a WAN card uses only one PCI slot, but has the capacity for two connections. In this case, both LEDs stay lit as long as a WAN card is present.

- temperature ( )
- fans ( )

The LED states are described in Table 25 on page 124.

The Unified Manager contains a monitoring tool, that allows you to determine the current condition of the LEDs from your computer. Refer to "Using the System Status Monitor to Monitor LEDs" on page 198.

System Options

The Business Communications Manager system provides a number of software applications that enhance basic functionality.

Some of these applications work immediately after you install the Business Communications Manager system, this is considered core software. Other applications are enabled when you enter software keycodes, which you generate when you buy one of these applications. Refer to the *Business Communications Manager Software Keycode Installation Guide* for specific directions for entering a code.

Telephony Features and Options

The telephony features and options have individual installation and features guides. This section lists the application guides and provides a brief description of the application function.

- *Programming Operations Guide* and *Telephone Features Programming Guide*

  These guides provide programming for core telephony features and user features, such as:

  — Voice telephony configuration for digital, IP, ISDN and radio-based telephones and equipment over analog, digital, ISDN, and voice over IP (VoIP) trunks.
  — How to use and program user telephony features at the telephone
  — Companion Application Server software that controls the interface between the Business Communications Manager system and the Companion wireless system (available for selected regions)
  — Networking DPNSS (upgrade) (requires keycode) provides private voice networking for the UK Market.
  — Networking MCDN and EDSI Q.SIG Voice Networking (requires keycode) allows you to network your Business Communications Manager system, or a number of Business Communications Manager systems to a Meridian system. This allows the network to use a common numbering plan, as well as common voice messaging and auto attendant systems connected to the Meridian.
  — Data setup applications and protocols to configure the Business Communications Manager system to be part of a LAN orWAN network. Refer to the next section for specifics.

- *Attendant Console Setup and Operation Guide* and *Attendant Console User Guide*

  Attendant Console (requires keycode) provides centralized call management and call activity reporting to a business. The three components of this application create a system that communicates with the Business Communications Manager, provides call management options, and reports how incoming calls are handled within a business.

- *Call Center Agent User Guide* and *Call Center Supervisor User Guide*

  Nortel Networks Call Center Agents (requires keycode) allows the addition of a specific number of call center agents to your system. Comes in versions for one, four, eight, 16, 32 and 64-seat authorization codes.

- Call Center Set Up and Operation Guide

— Nortel Networks Call Center (requires keycode)— this Automatic Call Distribution (ACD) system provides tools for handling incoming calls to an agent network. The application also provides administration, supervision, and reporting tools.

— Nortel Networks Professional Call Center (upgrade) (requires keycode)— this is an expanded version of the basic Call Center application.

• Call Center Reporting Set Up and Operation Guide

Nortel Networks Call Center Reporting (requires keycode) monitors the statistics of a call center. This application is also compatible with IP wallboards from Itel and SYMON.

• Call Detail Recording System Admin. Guide

Call Detail Recording (no keycode required) records and reports call activity from the Business Communications Manager. You can create reports from this information to help you manage system usage effectively.

• CallPilot Reference Guide

CallPilot is a core Business Communications Manager application. It works with the telephone system to provide automated receptionist service by answering incoming calls and routing them to telephones or mailboxes on the system. This guide explains what the various parts of the CallPilot application do.

• *CallPilot Manager Set Up and Operation Guide* and *CallPilot Programming Record*

— CallPilot Manager is the web-based application that you use to set up and administer CallPilot.

— Automated Attendant is the CallPilot answering service that answers incoming calls with a Company Greeting, plays a list of options to a caller, and performs call routing functions in response to caller selections.

— CallPilot (requires keycodes for additional voice mailboxes) provides a voice mail application as part of the core Business Communications Manager programming. CallPilot provides voice messaging, Automated Attendant, and Custom Call Routing features for Business Communications Manager telephony services.

— Voice Mailbox Expansion (requires keycode) allows you to add extra mailboxes to your voice messaging system. The application comes with a keycode that defines how many extra mailboxes are allowed.

• *CallPilot Fax Set up & Operation Guide* and *CallPilot Fax User Guide*

Fax Suite (requires keycode), a CallPilot optional feature, delivers fax messages to CallPilot mailboxes. Users can use the application to send and retrieve fax messages as easily as they send and retrieve voice messages.

• *CallPilot Message Networking Setup and Operation Guide* and *CallPilot Message Networking User Guide*

Message Networking (requires keycode to add extra mailboxes) links the CallPilot system with other voicemail systems and allows the exchange of voice messages between users at different sites. CallPilot supports Digital networking using Voice Profile for Internet Messaging (VPIM) standard, and Audio Messaging Interchange Specification (AMIS) networking.

• CallPilot Desktop Messaging Software Install and Maintenance Guide

Desktop Message Networking (requires keycode) provides a multimedia messaging application that works with an e-mail client to provide a single graphical user interface CallPilot voice, fax, and text messages, as well as e-mail messages.

- DECT Installation and Maintenance Guide (region-specific)

  The DECT radio-based system allows you to configure up to 32 cordless handsets that communicate through radio base stations deployed around a site. The handsets can be configured as stand-alone sets, or they can be twinned with stationary sets.

- IP Telephony Configuration Guide
  - i2004 IP telephone configuration requires a combination of data and telephony settings. This telephone can make calls through either VoIP or PBX lines.
  - Nortel Networks i2050 Software Phone turns your PC into a telephone interface which provides standard telephony operating features such as Voice Mail, Caller ID, and multiple telephone lines or line appearances. The features available to the application depend on what the connected system server provides. This application requires Windows 2000, a full duplex sound card, and a computer-telephony headset.
  - VoIP Gateway (requires keycode) converts the voice in a call into a packet format and sends the call using an intranet trunk. With Business Communications Manage rVoIP Gateway, you can make calls over any intranet connected to the Business Communications Manager system.

- LAN CTE Configuration Guide
  - LAN CTE (introduced in 2.5 to replace TSP) (requires keycode) provides an interface between a Personal Computer (PC), a telephone, and the Business Communications Manager server that allows third-party software to function on PCs on the same network as the BCM. This allows customized solutions for such applications as hotel/motel packages or text messaging programs.
  - TSP (version 2.0 systems only) (requires keycode) supplies the interface between the Business Communications Manager system and Microsoft TAPI. This interface allows you to useTAPI applications on the Business Communications Manager system.

- *Multimedia Call Center Setup and Operation Guide* and *Multimedia Call Center Web Developers Guide*

  Nortel Networks Multimedia Call Center (requires keycode) allows call agents and users to interact through either or both a telephone connection and an IP connection. This allows the conversation to occur over the voice connection or through text chatting. Further, this application allows exchange and viewing of web pages, and allows the attendant to show the client screen captures.

- Personal Call Manager User Guide

  Personal Call Manager, a TAPI-based application, provides a graphical interface that allows you to use your computer to manage your calls and address book, while still using your telephone for voice communication.

Data Features

The Business Communications Manager also offers the following data features. These features are described and configured in the *Business Communications Manager 2.5 Programming Operations* Guide.

- Integrated QoS Routing controls the router interface between the Business Communications Manager system and the local area network, wide area network, and internet.
- **DHCP (Dynamic Host Configuration Protocol)** — Business Communications Manager 2.5 provides DHCP service to branch office clients. This service dynamically assigns IP addresses to branch office PCs, so you do not manually assign an IP address to each PC. The Business Communications Manager can also be set to use this application as a relay agent to an external DHCP server on the network.
- **DNS (Domain Name System)** — Business Communications Manager 2.5 functions as both a gateway to the internet and as a DNS proxy for your network. The DNS service allows clients to enter a domain name, such as www.nortelnetworks.com, instead of an IP address when using web browsers.
- **IP Routing** — Business Communications Manager 2.5 supports the following IP routing protocols:
  — static routing
  — RIP (Routing Information Protocol)
  — OSPF (Open Shortest Path First)
- **IPX Routing** — Business Communications Manager 2.5 supports the following IPX Routing protocols in a NetWare environment:
  — static routing
  — RIP (Routing Information Protocol)
  — SAP (Service Advertising Protocol)
- **NAT (Network Address Translation)** — Business Communications Manager 2.5 supports both static and dynamic NAT for a number of packet types and protocols. NAT is a network security feature that translates the IP addresses used within your private network to different IP addresses known to internet users outside your private network.
- **Policy Management** — Business Communications Manager 2.5 allows you to implement classes of service and assign priority levels to different types of traffic using the DiffServ network architecture. You can configure policies that monitor the characteristics of traffic (for example, its source, destination, and protocol) and perform a controlling action on the traffic when certain user-defined characteristics are matched.
- **VPN (Virtual Private Networks)** — Business Communications Manager 2.5 uses the PPTP (point to point tunneling protocol) and IPSec (IP security) tunneling protocols to create secure extranets. These secure extranets provide safe transport of data to and from the Business Communications Manager using the public data network (PDN).

Business Communications Manager Expansion Unit

The Business Communications Manager expansion unit houses a maximum of six additional media bay modules. A Category 5 patch cable, which comes with the expansion unit, connects the expansion unit with the Business Communications Manager base unit through DS256 connectors.

The Category 5 patch cable must be 5 m (16 ft.) long. The cable connects into a DS256 port on the MSC of the Business Communications Manager base unit, and into a DS256 port on the center panel of the expansion unit. Refer to Figure 9.

> **Note:** The number of modules that actually can be installed is determined by the number of DS30 channels required by the modules and the number of channels available. Refer to Chapter 5, "Installing the Business Communications Manager Base Unit," on page 79.

Figure 9 DS256 connector on base unit and expansion unit

Installation Process Overview

Figure 10 provides an overview of the installation process described in this book.

Figure 10   Installation and initialization overview

Select the media bay modules you require.	The number of telephone lines and extensions you have determines the number and type of media bay modules you need. For instructions about how to select the media bay modules, refer to Chapter 5, "Installing the Business Communications Manager Base Unit," on page 79.
Install the base unit and (optional) expansion unit	The Business Communications Manager base unit performs the main computing tasks. It contains the telephony and data networking components. For instructions about how to install the base unit, refer to Chapter 6, "Installing the Business Communications Manager Expansion Unit," on page 89. If your system requires more than three media bay modules, you must install a Business Communications Manager expansion unit. For instructions about how to install the expansion unit, refer to Chapter 7, "Media Bay Module Switch Settings," on page 95.
Set the media bay module switches.	Before you install the media bay modules, you must set the switches on the back of the modules to select the DS30 channel the modules will use to access lines and extensions (DNs). For instructions about how to set the switches, refer to Chapter 8, "Installing Media Bay Modules," on page 115.
Install the media bay modules	After you have set the switches, install the media bay modules into the base unit or the expansion unit. For instructions about how to install the media bay modules, refer to Chapter 9, "Starting the System," on page 121.
Power up the base and expansion units	When you have the main hardware connected, start the system to ensure the first level of hardware and software is working. For instructions about how to correctly start the units, refer to Chapter 10, "Wiring the Modules," on page 137.

Continued on next page . . .

Installation overview, continued . . .

Connect
data
networking
equipment

The data networking components of the Business Communications Manager system provide network connection to your local area network (LAN) and/or your wide area network (WAN). For instructions about how to install the data networking components, refer to "Connecting the Data Networking Hardware" on page 125.

Initialize
the system

Systems are shipped with a default IP and subnet mask. You must change these settings to suit your system. Refer to "Initializing the System" on page 130, which also describes how to set up your computer to access the Quick Start Wizard, which you use to perform system configuration. Refer to the *Business Communications Manager 2.5 Programming Operations Guide* for details about the Quick Start Wizard.

Connect the
telephony
components

The telephony components of the Business Communications Manager system provide call processing and connection to the public telephone system. For instructions about how to install telephones and components, refer to Chapter 13, "Installing Analog Terminal Adapters," on page 183 and Chapter 14, "Installing Optional Telephony Equipment," on page 193.

Install
optional
mobile
equipment

The Companion system provides wireless service between mobile sets and stationary sets within the Business Communications Manager system.

The DECT module provides system connection for cordless handsets that can act as mobile sets or as standalone sets.

These applications are region-based. Refer to "Mobility Services by Region" on page 259.

For instructions about installing a Companion system, refer to Chapter 12, "Installing Companion or DECT Systems," on page 155. The DECT module has a separate installation and maintenance guide.

Set up
system and set
configurations

Refer to the *Business Communications Manager 2.5 Programming Operations Guide* to set up basic telephony and data configurations.

Refer to the separate application guides to set up optional applications such as call management or voice over IP functions.

Chapter 2
Telephony Hardware

The Business Communications Manager is a modular system. You can increase the capacity of your Business Communications Manager by adding more telephony hardware components known as media bay modules.

The number of media bay modules that can be added to your system is determined by the number of media bays that are open, combined with the number of DS30 channels each component occupies. Each Business Communications Manager has a maximum of six DS30 channels available to media bay modules.

If your system requires many IP lines or trunks, you can reduce the number of DS30 channels that are assigned to modules and increase the number of channels available to IP telephones. This is called a 3/5 DS30 channel split. In this case, you only have five DS30 channels available to media bay modules. Refer to "Understanding DS30 Channel Numbers" on page 75 for more information.

> ⚠ **Warning:** Changing the DS30 channel split
>
> If you change the channel split from 2/6 (default) to 3/5 after the system is initialized, any module set to DS30 channel 7 or requiring the use of channel 7 becomes inoperable.
>
> If you change the channel split from a 3/5 split to a 2/6 split after the system is initialized, all data is lost and all optional applications must be reinstalled and reconfigured.

Refer to Chapter 4, "Selecting the Media Bay Modules for Your System," on page 71 for details about determining how many media bay modules can be installed in a system.

As well, this chapter describes the various types of telephone equipment that can be used with the Business Communications Manager system. Figure 11 provides pointers to the sections that describe the modules and telephones that can be installed into the Business Communications Manager base unit.

Figure 11   Telephony hardware components.

"Trunk Media Bay Modules" on page 56

"Station Media Bay Modules" on page 60

"Specialized Media Bay Modules" on page 63

Refer to "Media Bay Module Availability by Region" on page 259 and "Trunk Availability by Region" on page 260 to determine which media bay modules and which types of trunk lines are available in your location.

"Telephones and Adapters" on page 65
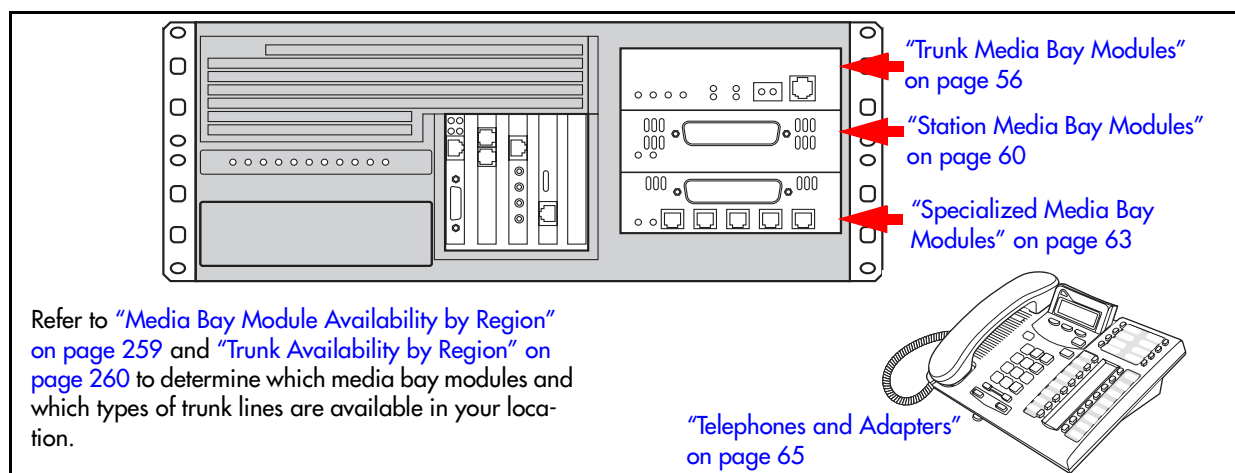
Media Bay Module Common Features

Media bay modules are designed within a common casing, which includes the following common features:

LEDs

All media bay modules have power and status LEDS.
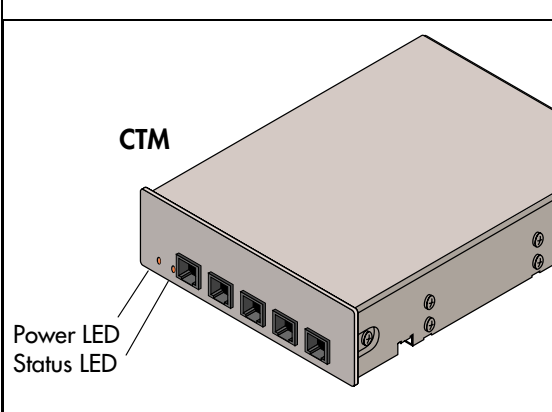
Figure 12 shows the location of the ⓘ (Power) and ✆ (Status) on a CTM. These LEDs are located in the same place on all modules. Table 3 describes the possible LED states.

Table 3 Module Power and Status LED states

Figure 12 Module LED locations	Power	Status	Description
	Off	Off	No power applied to the module, or failure of module power converter.
	On	Off	FPGA not downloaded.
	On	Blinking	Hardware is working, but there is an operational problem such as: • no DS256 link detected • DS256 frame alignment lost • bandwidth not allocated • module is in maintenance state
Power LED Status LED	Blinking	Blinking	Power is applied to module, but there is a hardware problem such as: • partial failure of power converter • thermal overload • fan failure
	On	On	The module is read to operate.

Power Connections

The back of the modules have a single connector that provides a DS256 channel and power to the module. These connectors plug into the back of the media bay on the Business Communications Manager base unit or expansion unit in the same way with all modules. Some modules also have a cooling fan that runs off the module power source. Figure 13 shows the rear views of the two types of modules.

Figure 13   Rear of modules showing DS256 channel and power connectors
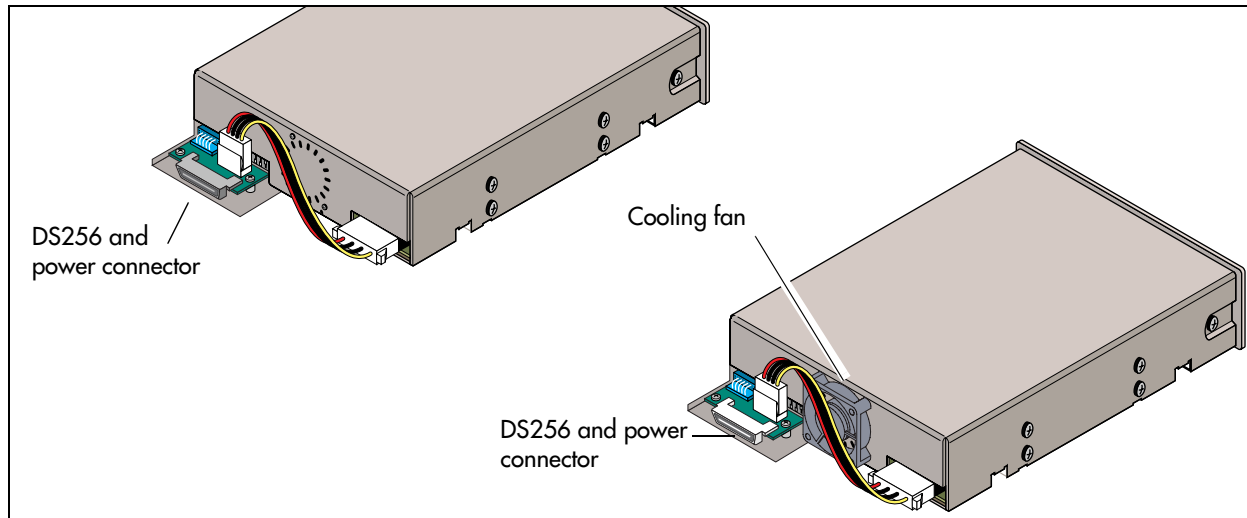
DIP Switches

The underside of most modules has a set of DIP switches that set the DS30 channel numbers and offsets used by the module. Figure 14 shows the location of the DIP switches on the module. The exception to this is the DECT module, where the switches are found on the rear of the module. Refer to "DECT DIP Switches" on page 64.

For more information about setting DIP switches, refer to Chapter 8, "Installing Media Bay Modules," on page 115.

Figure 14   Underside of module showing DIP switches
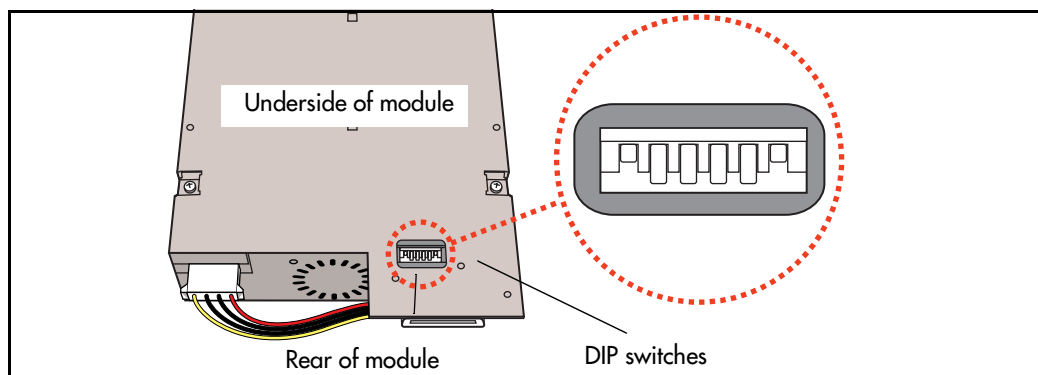
Trunk Media Bay Modules

You install the trunk media bay modules in the Business Communications Manager base unit or the Business Communications Manager expansion unit. The base unit holds a maximum of three media bay modules. The expansion unit holds a maximum of six media bay modules.

Trunk media bay modules connect telecommunications lines to the Business Communications Manager system.

These are determined by:

- which lines are available from your telephone service provider
- what lines you require for the types of telephones you want to use
- budget considerations

Table 4 lists the types of trunk media bay modules that are available for the Business Communications Manager system:

Table 4   Trunk media bay modules

Module type	What it does	Special notes
DTM "Digital Trunk Media Bay Module"	Connects digital public switched telephone lines to the Business Communications Manager system.	Can connect to four types of lines: TI, NA PRI, ETSI (in UK only), and Euro PRI.
CTM "Caller ID Trunk Media Bay Module" CTM8 "Caller ID Trunk Media Bay Module"	Connects a maximum of four analog public switched telephone lines to the Business Communications Manager system. Connects a maximum of eight analog public switched telephone lines to the Business Communications Manager system.	Only available for North American systems.
BRI "Basic Rate Interface Media Bay Module"	Connects a maximum of four ISDN BRI S/T interfaces	**Note:** The DECT module contains the equivalent of a BRI module and does not require a separate module for trunk line functions.

Digital Trunk Media Bay Module

The Digital Trunk media bay module (DTM) connects a standard digital PSTN line to the Business Communications Manager using either a digital or PRI line.

- On North American Business Communications Manager systems, the DTM connects to a T1 or PRI line. With a T1 line, you can add a maximum of 24 digital telephone lines. With a PRI line, you can add a maximum of 23 digital telephone lines.
- On International Business Communications Manager systems, the DTM connects to an ETSI or PRI digital line. With an ETSI or PRI line, you can add a maximum of 30 digital telephone lines.

The front bezel of the DTM has a RJ48C connector that connects the DTM to the service provider connection point. The faceplate also has a set of loopback connectors you can use to run loopback tests. For details on loopback tests, refer to the *Business Communications Manager 2.5, Programming Operations Guide*. Figure 15 shows the front of the module.

Figure 15   DTM module LEDs and connectors, front view
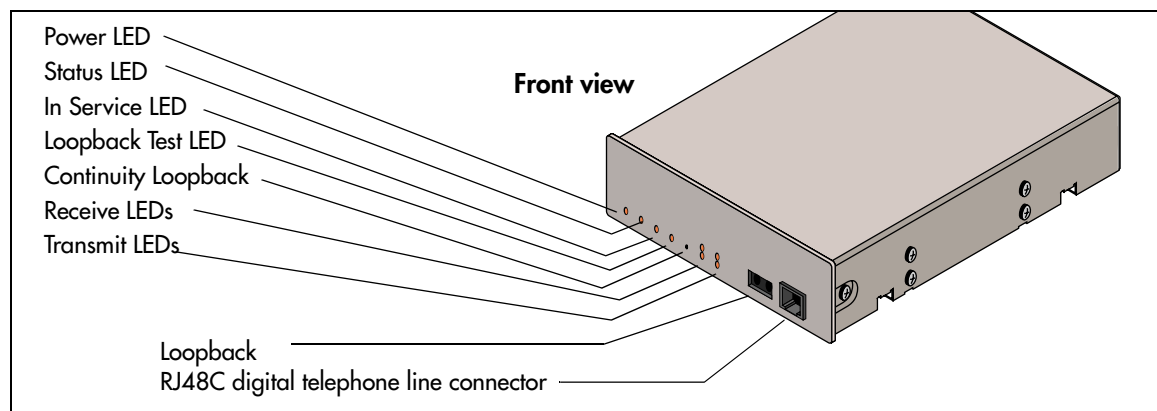
Table 5 provides a description of the function for each DTM LEDs.

Table 5   DTM LED functions

LED label	Function
(Power)	On indicates that the DTM is receiving +5 volts.
(Status)	On indicates there is data communication between the DTM and the MSC card.
In Service	Flashing indicates that the T1, ETSI or PRI trunks are out of service because a loopback test is running or the DTM is initializing.
Loopback	On indicates a continuity loopback test is running.
Receive Alarm	On indicates a problem with the received digital transmission. This half-duplex link does not work.
Receive Error	On indicates a small error as a result of degraded digital transmission. Possible causes are an ohmic connection, water ingress, or too long a loop.
Transmit Alarm	On indicates the DTM cannot transmit. The DTM sends an Alarm indication signal (AIS) to the terminating switch. This half-duplex link does not work.

Table 5 DTM LED functions (Continued)

LED label	Function
Transmit Error	On indicates the DTM is sending a remote alarm indication (RAI) carrier failure alarm (CFA) to the terminating switch. If the Transmit Alarm is not on, this error indicates a far-end or cable problem.
All LEDS flashing	All LEDs flashing continuously indicates that the DTM is initializing.

➡ **TIP:** You can install a maximum of three DTM modules in the Business Communications Manager system, depending on the available channels.

Caller ID Trunk Media Bay Module
(North American systems only)

The CTM and CTM 8 have the same functions.

• The Caller ID Trunk media bay module (CTM) connects a maximum of four analog calling line ID (CLID) interfaces to the Business Communications Manager system via four RJ11 jacks on the module face. These jacks are labeled: Line 1, Auxiliary, Line 2, Line 3, and Line 4. The auxiliary jack connects to Line 1.

• The CTM8 provides eight analog CLID interfaces to the Business Communications Manager via eight RJ11 jacks on the module face. Each jacks also supports disconnect supervision. There are also two auxiliary jacks on this module which connect to Line 1 and Line 5.

The auxiliary ports permit the connection of aV.90 modem, FAX machine or single line analog telephone. When the auxiliary device is active, the Business Communications Manager system blocks the associated line. Conversely, when the line is active, the auxiliary port line is blocked.

When you connect a single line analog telephone to the auxiliary port, you can use it as an emergency telephone because this line remains active if a power outage occurs.

Figure 16 provides a view of the front of the CTM and CTM8.

Figure 16 CTM and CTM8 LEDS and jacks
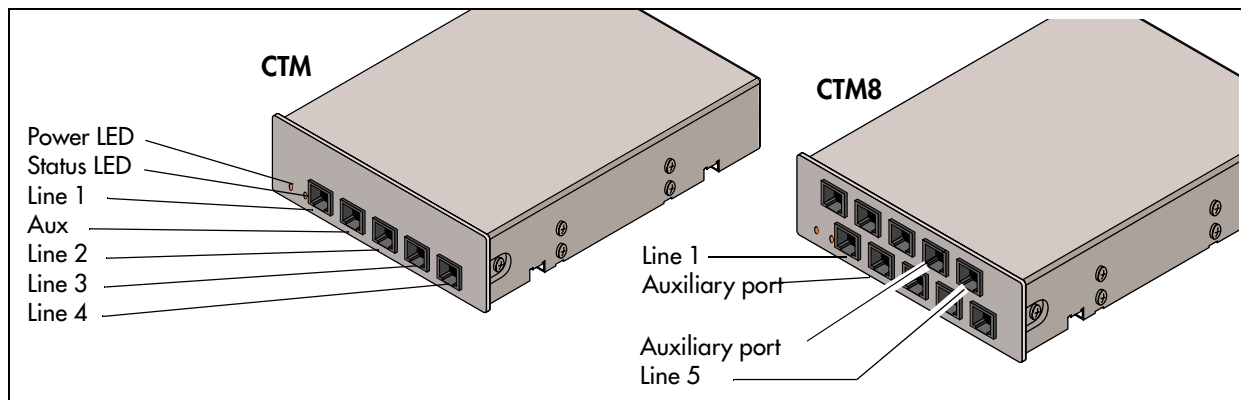
Basic Rate Interface Media Bay Module

The Basic Rate Interface media bay module (BRI) module connects a maximum of four BRI ISDN lines to the Business Communications Manager system.

European systems use an S interface. North American-based systems use a T interface with an external NTI line.

Each BRI ISDN line you connect adds two telephone lines to the Business Communications Manager system. Therefore, each BRI adds a maximum of eight telephone lines to the Business Communications Manager system via the four RJ48C jacks on the faceplate. You can also use this module for dial backup or dial-on-demand services for WAN connections.

Figure 17 shows a front view of the BRI.

The LEDs beside each RJ-48C jack are on when the ISDN line is active.

Figure 17   BRI LEDs and jacks
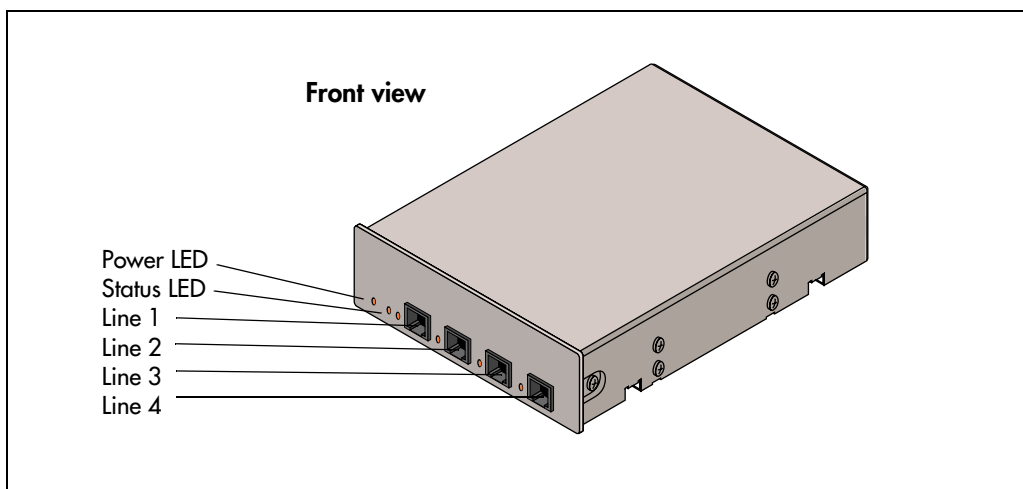
Station Media Bay Modules

You install the station media bay modules in the Business Communications Manager base unit or the Business Communications Manager expansion unit. The Business Communications Manager base unit can accommodate a maximum of three media bay modules. The Business Communications Manager expansion unit can accommodate a maximum of six media bay modules.

Station media bay modules connect telephones and analog telecommunication devices to the Business Communications Manager system.

Table 6 provides a list of the station modules that can be used on the Business Communications Manager system:

Table 6   Station modules

Module type	What it does	Availability
DSM 16 "Digital Station Media Bay Module" DSM 32 "Digital Station Media Bay Module"	Connects a maximum of 16 digital telephones Connects a maximum of 32 digital telephones to the Business Communications Manager system.	
4X16 Combination 4-line CTM and DSM16 (4x16) Media Bay Module "4X16 Media Bay Module"	Connects a maximum of four CLID lines for a maximum of 16 digital telephones	Only available for North American systems. This module can be combined with CTMs on the same DS30 channel.
ASM8 "Analog Station Media Bay Module"	Connects a maximum of eight analog devices to the Business Communications Manager system.	Only available for North American systems.

Digital Station Media Bay Module

Three types of media bay modules support digital telephones on the Business Communications Manager. Each module has a minimum of one amphenol connector on the faceplate. This section describes the two DSM modules. Refer to Figure 18 on page 61.

- Digital Station media bay module (DSM 16) supports 16 digital telephones
- Digital Station media bay module (DSM 32) supports 32 digital telephones through two amphenol connectors
- 4X16 supports 16 digital telephones and does not require a separate trunk module. Refer to "4X16 Media Bay Module" on page 61.

Figure 18   Faceplates of DSM 16 and DSM 32
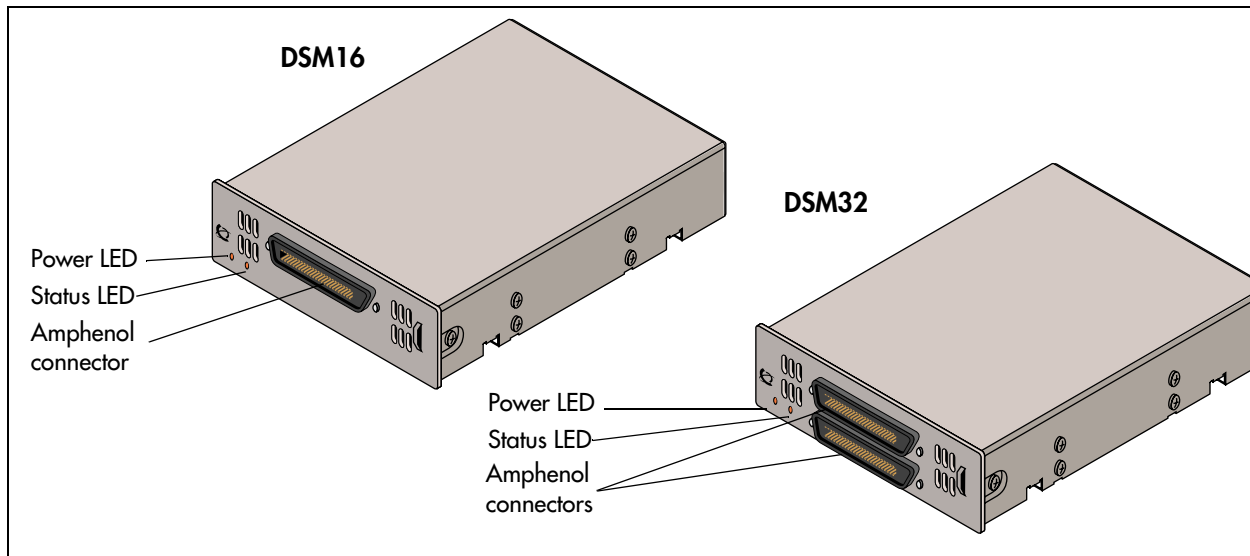
4X16 Media Bay Module
(North American systems only)

The 4X16 provides both analog trunk connections and connections to digital telephones. The module is a combination of a CTM media bay module, with four analog lines, and a DSM 16-digital telephone media bay module. Each of the four ports supports Caller ID and disconnect supervision. An auxiliary port beside Line 1 allows you to use an analog telephony device, such as a modem, fax or telephone, to share the trunk. Figure 19 shows a diagram of the 4X16.

The 4X16 has one amphenol connector and five RJ11 connectors on the faceplate. For details on the 4X16 wiring, refer to Chapter 13, "Installing Analog Terminal Adapters," on page 183.

Figure 19   Faceplate of 4X16 module LEDS, connectors, and jacks
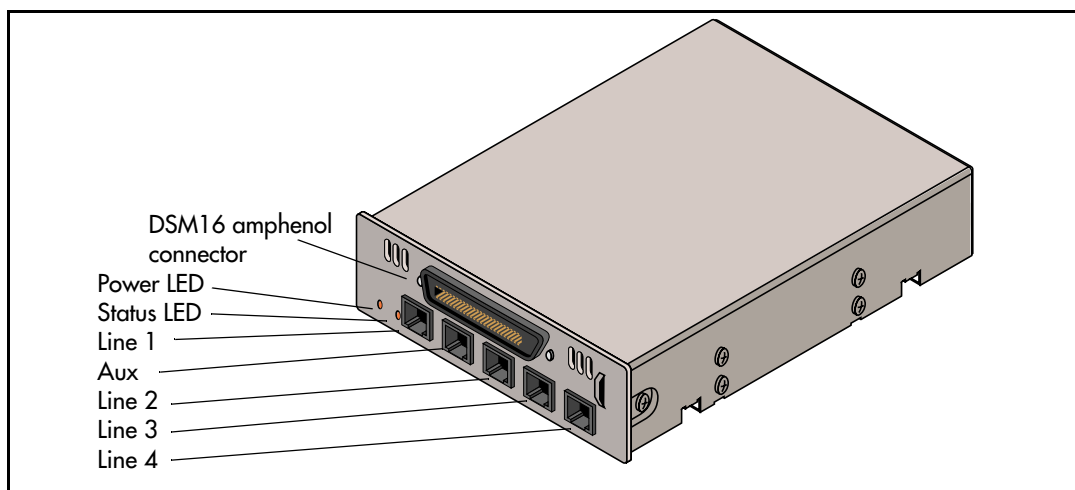
Analog Station Media Bay Module
(North American systems only)

The Analog Station media bay module (ASM 8) connects to eight analog telecommunication devices. These devices can be standard analog telephones, cordless telephones, FAX machines, answering machines, or modems. The maximum speed for a modem connection is 28.8 kbit/s. Figure 20 shows a diagram of the ASM 8.

The ASM 8 has one amphenol connector on the faceplate. For details about wiring the ASM 8, refer to Chapter 13, "Installing Analog Terminal Adapters," on page 183.

Figure 20   ASM 8 front view
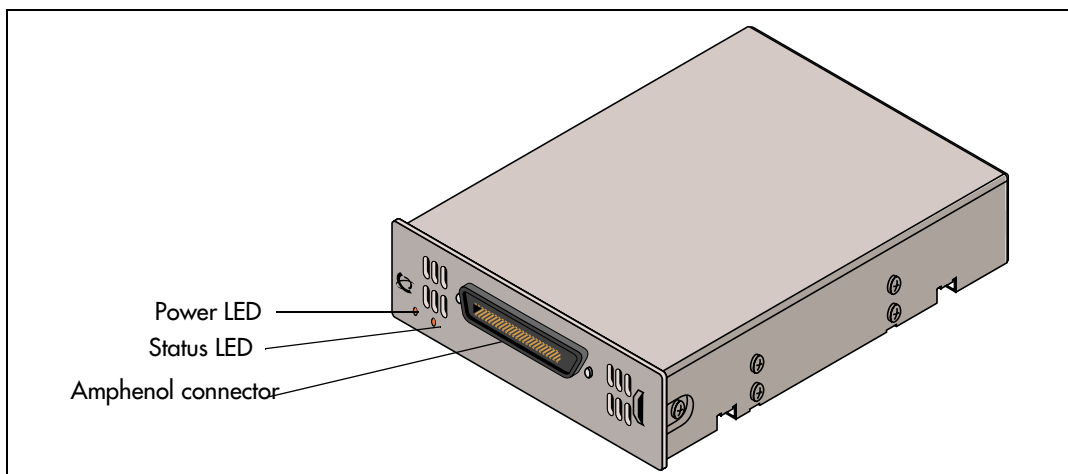
Specialized Media Bay Modules

This section describes the modules that perform a specific job outside of the trunk and station description. Refer to Table 7.

- The DECT (Digital Enhanced Cordless Telecommunications) module allows you to add radio-based cordless communication devices to your Business Communications Manager in areas where the DECT technology is available.
- The Fiber Expansion module (FEM), provides a fast way of upgrading from an existing Norstar system simply by plugging in Norstar expansion modules to the FEM box.

Table 7   Specialized modules

Module type	What it does	Special notes
DECT "DECT Media Bay Module"	connects a maximum of eight radio base stations which receives transmissions from registered cordless handsets (a maximum of 32).	Only available for some profiles. Refer to "Mobility Services by Region" on page 259.
FEM "Fiber Expansion Media Bay Module"	connects a maximum of six Norstar expansion modules	The switches on the FEM are used to turn fiber ports on and off. The FEM does not work correctly if you set these switches using the rules used for other media bay modules.

DECT Media Bay Module
(region-specific application)

The DECT media bay module has eight RJ45 jacks. The RJ45 jacks connect to base stations deployed around the coverage area. Each DECT module supports four ISDN lines, thus allowing a maximum of eight simultaneous call paths back to the Business Communications Manager.

Figure 21 shows a front view of the module. As well as a Power and Status LED, the DECT module has LEDs that indicate the Run state and base station power state.

Figure 21   DECT faceplate with eight RJ45 connectors
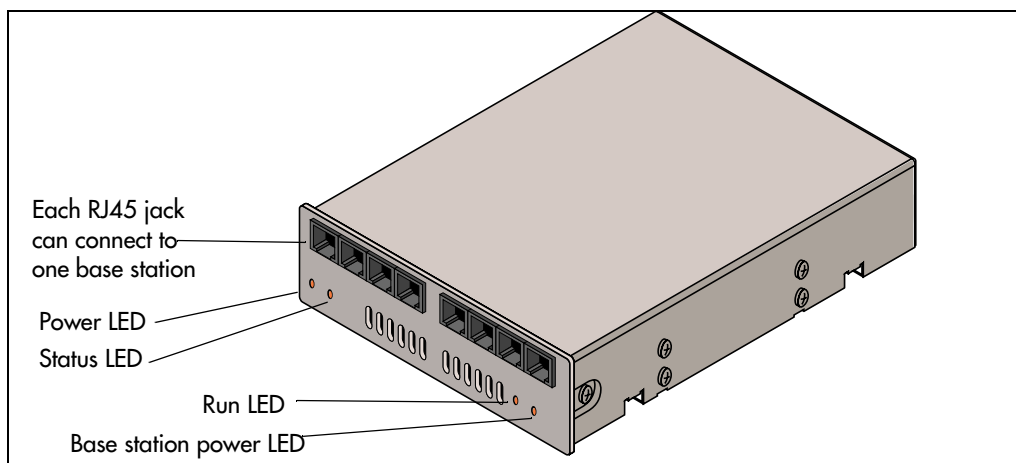
DECT DIP Switches

Figure 22 shows the location of the DIP switches on the DECT module. Refer to Chapter 8, "Installing Media Bay Modules," on page 115 for the switch settings required for the module.

Figure 22   DECT DIP switches
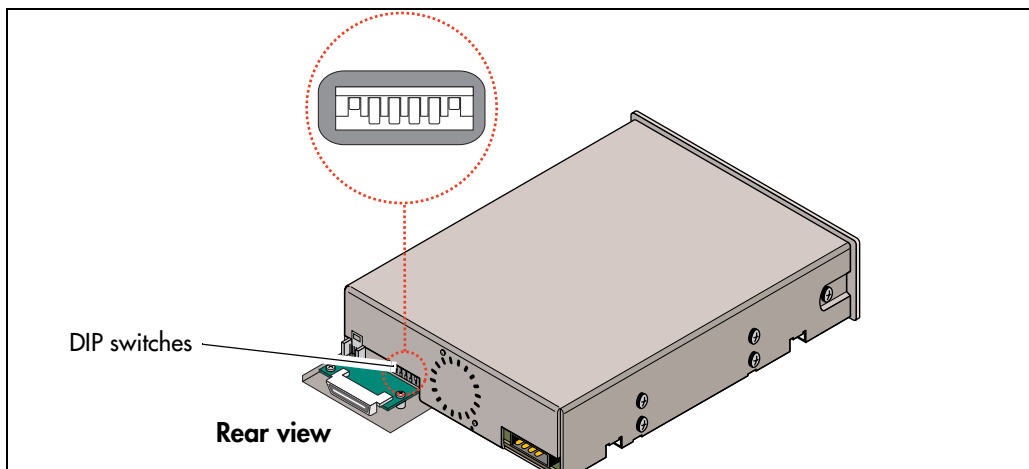
Fiber Expansion Media Bay Module

The Fiber Expansion media bay module (FEM) connects a maximum of six Norstar expansion modules to the Business Communications Manager system. These connections provide a quick way to upgrade a Norstar system to a Business Communications Manager system.

The front bezel of the FEM has six connectors. These connections are made using fiber cables between the FEM module and the Norstar expansion modules. Beside each connector, an LED lights when the fiber port is enabled.

The module has port status LEDs beside each port, as well as the usual power and status LEDs. Figure 23 shows the front of the FEM module. Each port that is turned on consumes one DS30 channel.

Figure 23   FEM LEDs
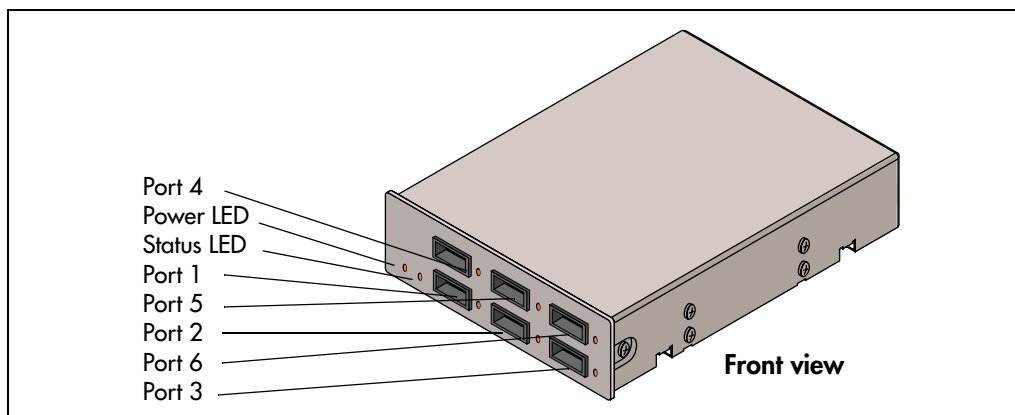
Telephones and Adapters

The following telephones and adapters can be used with the Business Communications Manager system.

Business Series Terminal T7100 — one-line display, one memory button, without indicator.

Business Series Terminal T7208 — one-line display, eight memory buttons with indicators
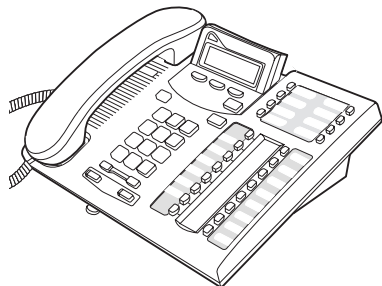
Business Series Terminal T7316 — two-line display with three display buttons, 16 memory buttons with indicators, eight memory buttons without indicators.

Business Communications Manager i2004 IP telephone — connects through a computer-based internet link. It can be used to call through VoIP or PBX lines.

Norstar M7100 — one-line display, one memory button, without indicator.

Norstar M7100N (UK and Australia only) — same features

Norstar M7000 (International only) — four memory buttons, without display or indicators.

Norstar M7208 — one-line display, eight memory buttons with indicators.

Norstar M7208N (UK and Australia only) same features
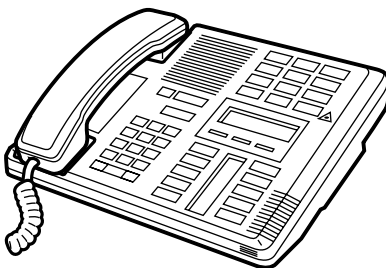
Norstar M7310 — two-line display with three display buttons, 10 memory buttons with indicators, 12 dual memory buttons without indicators.

Norstar M7310N (UK/Australia only) — same features

Norstar M7324 — two-line display with three display buttons, 24 memory buttons with indicators. Options: two CAP modules.

Norstar M7324N (UK and Australia only) — same features.

- **Central answering position (CAP)** (North American systems only) — connects to an M7324 telephone and provides 48 additional memory buttons. You need one Station Auxiliary Power Supply (SAPS) for every M7324 telephone that has CAP modules.

- **Central answering position (CAPN)** (UK and Australia only) — same features, connects to M7324N telephones

- **Companion** (region-specific) — provides twinning capability between a stationary set and a wireless mobile set. This system has three hardware components, which are described in "Companion System Components" on page 66.

- **DECT** (region-specific) — provides cordless access to the system through a DECT media bay module. The cordless handset can be twinned with a stationary set, or configured to act as an independent set. This system has three hardware components, which are described in "DECT System Components" on page 67.

Audio Conference Unit (ACU)— provides large-room audio conferencing. The keypad provides many of the set features of the basic Norstar M-series telephones without display or memory buttons. This set comes with three microphones.

- **Station auxiliary power supply (SAPS)** — provides power for the Business Communications Manager central answering position (CAP) module. Can also be used to extend the loop length between a telephone or terminal and the Business Communications Manager system from 1,000 to 2,600 feet. You must use a dedicated cable to connect the two locations.

- **Analog Terminal Adapter 2 (ATA 2)** — converts digital signals to analog signals to allow communication with analog devices such as FAX machines, modems and answering machines. The ATA 2 supports a maximum transmission rate of 28.8 kbit/s. With a single line telephone, the ATA 2 supports a long loop configuration. For more information, refer to Chapter 13, "Installing Analog Terminal Adapters," on page 183.

Companion System Components

The Companion system allows portable access from a fixed line. The system consists of the following hardware components:

- Companion base station — transmits and receives signals between the Business Communications Manager system and portable handsets. You install the base stations on walls or ceilings. Each base station provides radio coverage for a maximum of 32 cells.

> **Note:** Companion systems installed in the United States require a keycode to activate the base stations. Refer to "The Companion Wireless System" on page 155.

- **C3050 portable handset** — The C3050 CT2 Plus portable handset is available in Canada only. The Etiquette C3050 portable handset is available in the USA only.You can assign the C3050 Portable Handset a separate telephone number or the same telephone number as a desktop telephone. The C3050 supports basic features such as call forward, call transfer, conferencing and visual message waiting indication.

- **Remote power interconnect (RPI) Unit** — The RPI provides remote power for base station support. There are two types of RPIs: RPI-8 that supports a maximum of eight base stations and RPI-16 that supports a maximum of 16 base stations.

DECT System Components

The DECT system allows the user to access calls and call features while away from their stationary telephone. The following components combine with the DECT media bay module to provide this service:

- **Radio base station** — provides the radio link between the Business Communications Manager, through the DECT module, to the portable handsets.

- **Portable handsets** — communicate through radio base stations connected to the DECT module.

> **Note:**
>
> The DECT cordless handset can be configured to act as a separate set, either providing a point for target line calls, or with full call and receive capability, although some of the features are not available.
>
> The handset can also be twinned with desk sets to provide mobile coverage of one or more stationary sets.
>
> This set has no memory buttons.

DECT system installation and configuration information is contained in the *Business Communications Manager 2.5 DECT Installation and Maintenance Guide*.

Chapter 3
Auxiliary Requirements

You require a personal computer to run the Business Communications Manager Unified Manager application. This application is used to configure and manage the Business Communications Manager system.

For the easiest administration, you also require an internet connection with the correct browser setup.

This chapter describes the computer and internet specifications.

Computer Specifications

These are the minimum computer specifications you need to run the Business Communications Manager Unified Manager:

- 133 MHz Pentium CPU (or compatible)
- 64 MB RAM
- 10 MB disk space available
- screen resolution of 1024 x 768
- monitor large enough to support the screen resolution (suggested size: 17 inches)
- operating system: minimum — Windows 95/98, or NT, 2000 or the Millennium version

> **Note:** The ideal display setting for a monitor using Unified Manager is 1280 x 1024.
>
> Unified Manager is a web-based application that runs off the Business Communications Manager base unit computer. Therefore, you take up minimal space on your computer and you can run multiple applications on your computer. We recommend that you use Windows NT or 2000 to ensure optimal performance with the Unified Manager.

Browser Requirements

To use Business Communications Manager Unified Manager, you must have:

- Java Virtual Machine (JVM) 5.0 (build 5.0.0.3188 or greater)

  one of the following web browsers:

  — Netscape Communicator 4.5 or greater
  — Microsoft Internet Explorer 4.0 or greater

If you are using Netscape Communicator, set the following parameters:

- Enable Java: On
- Cached document comparison: Every time

If you are using Microsoft Internet Explorer, set the following parameters:

- Check for newer versions: Every visit to the page
- Java JIT compiler enabled: On

Preloading Java class Files On Your Workstation

To preload Java class files on your workstation:

1 Open Unified Manager from your desktop.

The first window displays a number of functional buttons.

2 Click the **Install Client** button.

3 From the list, choose the link to the Java Class for the browser you are using (Internet Explorer or Netscape Navigator).

Two more Java Class links appear.

4 Click on the *Java Class* link that applies to your browser.

A download wizard appears.

5 Follow the prompts on the wizard to download the Java Class files.

Optimizing Unified Manager Speed

The following are a number of suggestions about how to ensure you have the optimal connection to your Unified Manager while you program or maintain your Business Communications System.

- Use the LAN, WAN, or serial port to connect to your computer and use the Unified Manager to perform configuration.

- If you run multiple operations on your computer, we recommend that you use Windows NT or 2000 to ensure optimal performance with the Unified Manager.

- If your computer is using Windows 95/98, the interaction can be slower if you attempt to run more than one application.

Chapter 4
Selecting the Media Bay Modules for Your System

The media bay modules are the devices in the Business Communications Manager system that permit you to connect your extensions and the public switched telephone network (PSTN) lines to the call processing capabilities of the Business Communications Manager system.

A special media bay module called a Fiber expansion module (FEM) allows you to update from a Norstar system to a Business Communications Manager by reusing the Norstar expansion modules and the fiber cables to the modules.

When you order your Business Communications Manager system, there are no media bay modules installed in the Business Communications Manager base unit or Business Communications Manager expansion unit. This configuration allows you to select the number and type of media bay modules that best meet your requirements.

If you have a large Business Communications Manager system, there are some configuration restrictions that can apply to your system. For information about these restrictions, refer to "Rules for Assigning DS30 Channel Hierarchy" on page 95.

Figure 24   Process for determining modules
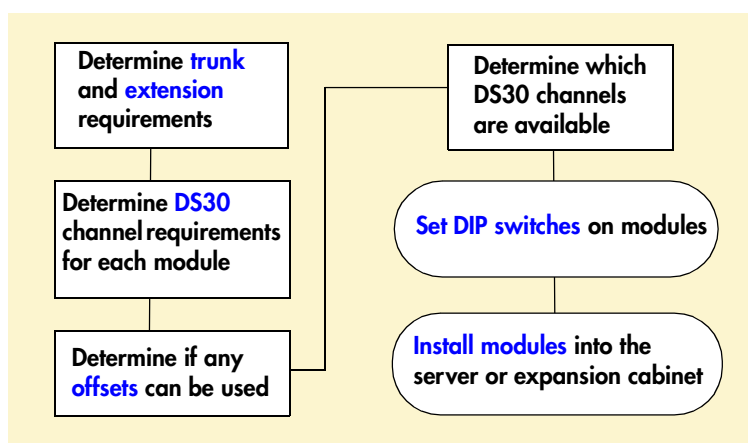
The first step in selecting the media bay modules is to determine the number of extensions (internal lines) and PSTN lines (trunk lines) you have or need. This determines how many media bay modules you require, and what type of modules you require. These following sections describe how to determine which modules, and how many, you require for your system.

After you determine which modules you want to use, you must ensure they fit into the available system resources. These sections describe how the modules work within the available DS30 channels of the Business Communications Manager.

Selecting the Trunk Media Bay Modules

The number and type of lines coming into your system determine which trunk media bay modules, and how many modules, you require to support your needs. Trunk lines come from either the public network (PSTN), or they support connections in a private network.

To select the trunk media bay modules:

1 Record the number of each type of line you have in Table 8. If you do not know the number or type of lines you have, contact your service provider. If you are setting up an entirely new system, a site survey must be done to determine your current and future needs. We recommend that you do the survey before you order any modules.

➡ **Note:** If you add any lines in the near future, include them in your initial estimates.

Table 8   Determining trunk module requirements

Type of lines	Number of lines	Type of media bay module	Number of lines per module	Number of modules required
T1 digital lines		DTM	24	_____ DTM
PRI digital lines (NA) (required for Companion wireless)		DTM	23	_____ DTM
E1 digital lines		DTM	30	_____ DTM
PRI digital lines (EMEA)		DTM	30	_____ DTM
Analog lines		CTM (North American systems only)	4	_____ CTM
Analog lines		CTM8 (North American systems only)	8	_____ CTM
Analog lines		4X16 combination module (North American system only)	4 (also requires a full DS30 channel for the DNs)	_____ CTM
BRI ISDN lines		BRIM S/T	4 ISDN loops	_____ BRIM S/T
Cordless handsets (DECT) (selected profiles only)		DECT	4 ISDN loops (requires a full DS30 channel)	_____ DECT

2 Use the number of lines and the number of lines per module to determine how many modules you need.

For example:

- If you require 24 T1 digital lines, you need one DTM because a single DTM can handle 24 T1 lines).
- If you require two analog lines and 24 T1 digital lines, you need one CTM and one DTM.

> ➡ **Note:** Although the DTM supports several types of digital lines, you cannot connect different types of lines to the same DTM.
> You can add a maximum of three DTMs to your Business Communications Manager system.

> ➡ **Tip:** The Business Communications Manager base unit can hold three media bay modules. If you require more than three modules, a Business Communications expansion unit can support a maximum of six additional modules.

Selecting the Station Media Bay Modules

The number and type of telephones and related equipment you have determines which station media bay modules you require.

1 In Table 9, record the number of each type of extension you have.

- Digital extensions are digital or IP telephones. For a list of the telephones that can be used with the Business Communications Manager system, refer to "Telephones and Adapters" on page 65.
- Analog extensions include single line telephones, fax machines, and modems.

> ➡ **Note:** If you are adding any extensions in the near future, include them in your calculations.

Table 9 Station media bay modules required

Type of extension	Number of extensions	Type of media bay module	Number of extensions per module	Number of modules required
Digital extensions		DSM 16	16	_____ DSM 16
Digital extensions		DSM 32	32	_____ DSM 32
Digital extensions		4X16	16	_____ DSM 16
Analog extensions		ASM 8	8	_____ ASM 8

2 Use the number of extensions and the number of extensions per module to determine how many modules you need.

For example:

- If you require 12 digital extensions, you need one DSM 16.
- If you require 24 digital extensions, you need one DSM 32.

→ **Note:** If you require only a few analog extensions, you can use a Business Communications Manager ATA 2 to connect these devices to your DSM 16, DSM 32 or the DSM connector on a 4X16 module. Each analog extension requires a Business Communications Manager ATA 2.

→ **Tip:** The Business Communications Manager base unit can hold three media bay modules. If you require more, you also need an Business Communications Manager expansion unit.

Upgrading from an Existing Norstar System

A special media bay module allows you to convert existing Norstar expansion modules from the Norstar ICS to full Business Communications Manager capability.

The FEM allows you to connect a maximum of six Norstar expansion modules to a Business Communications Manager base unit. Each expansion module connection requires one DS30 channel, therefore, the Business Communications Manager used for this purpose can only support one FEM module if you are converting a fully-configured Norstar system.

Determining System Capacity

After you have selected the modules you require, you must ensure that the Business Communications Manager can support all the modules. This is determined by the DS30 channel requirements of each module.

The following sections describe these channels and how you fit your modules into the overall system planning.

Understanding DS30 Channel Numbers

A DS30 channel is a block of virtual pathways.

On a default system, five DS30 channel blocks can be assigned to media bay modules. Which block the module is assigned to determines the range of line (trunk) numbers or extension numbers (DNs) that can be allocated by the module to the equipment connected to that module. The other two blocks are permanently routed to the PEC DSPs to support internal Business Communications Manager functions such as voice mail, VoIP trunks, and IP telephony functions. This configuration is called a 2/6 channel split.

You can change the DS30 channel allocation to a 3/5 split to accommodate increased IP telephony or VoIP trunk requirements. You do this by assigning one of the DS30 channels allotted for modules to the voice data sector. It is preferable that this choice gets made at startup. When you run the Quick Start Wizard, you have an option to change the split.

Figure 25 shows a model of how the DS30 channels are a subgroup of the DS256, which is located on the media services card (MSC). The diagram also shows how offsets, which are discussed in the next section, are a subgroup of the DS30 channels.

⚠ **Warning:** If you change the channel split after your system is configured, from 3/5 to 2/6, you will lose all the data and optional application connections.

Figure 25   DS30 channel model
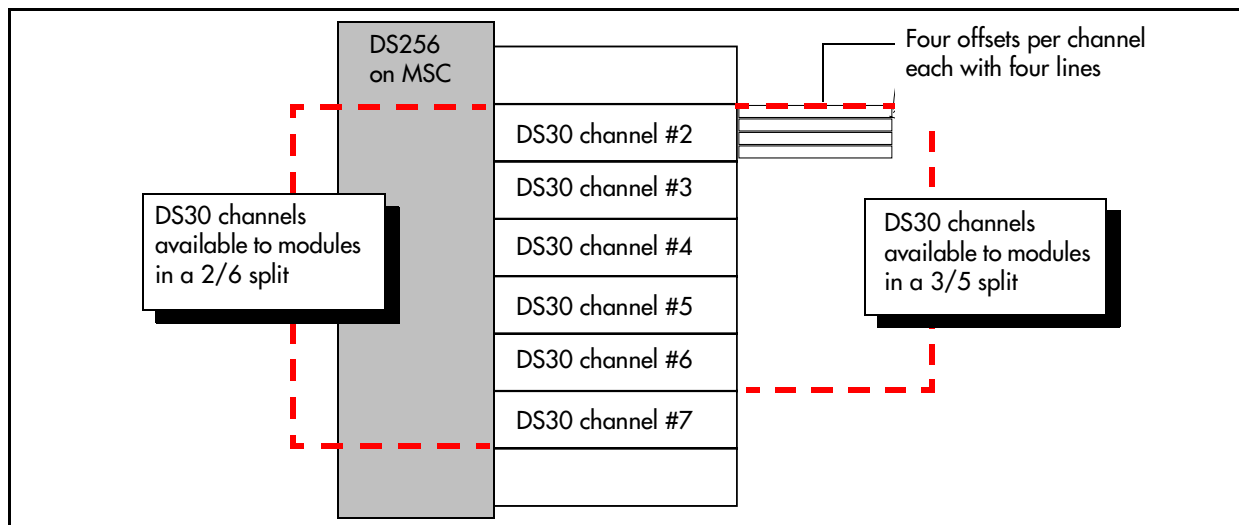
DS30 channel numbers are set using the 4, 5, and 6 DIP switches on the back or underside of the media bay modules. The exception is the FEM module. The FEM DIP switches turn on ports, each of which consumes one DS30 channel.

Setting Offsets

Each offset is one-quarter of a DS30 channel. Each DS30 channel, supports 16 lines (32 timeslots) for most modules.

Exceptions:

- DTM modules support 23 to 30 lines per channel
- FEM modules, where each DS30 channel supports one Norstar fiber module connection.

Offsets are numbered 0, 1, 2, and 3. Modules that require less than a full DS30 channel can be assigned a DS30 channel number and an offset number. This allows more than one module to be assigned the same DS30 channel number, but with a different offset number.

Modules that can have offsets assigned include CTM, CTM8, BRIM S/T, and ASM 8. For example, two CTM 8s can be assigned to the same DS30 channel number, with different offset numbers. However, you cannot assign a CTM8 and an BRIM S/T module to the same DS30 channel.

Offsets are assigned using DIP switches 1, 2, and 3 on the media bay module.

> **➡** **Note:** Media bay modules that do not or cannot share DS30 channels always assign the offset as 0 (zero). As well, if the module requires more than one DS30 channel, such as the 4x16 module, only the first DS30 channel is set on the DIP switches. The next consecutive DS30 channel number is automatically assigned by the module.

Figure 26 shows how a DS30 channel containing 16 line connections is broken down into four offset groups of four lines each.

Figure 26 Offsets are part of DS30 channel line groups
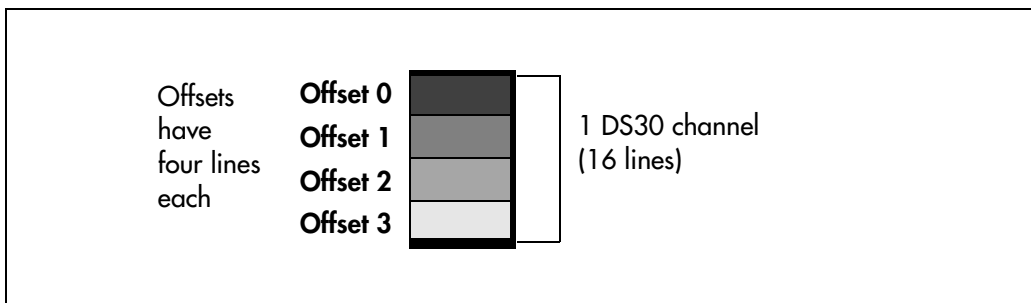
Determining Module Channel Requirements

Figure 27 shows how much of a DS30 channel each module requires.

Figure 27 Space requirements for media bay modules

Trunks (lines)

1 DS30 Channel/
offset set to 0

1 DTM
per DS30
channel

1 DS30 Channel/
offset set to 0, 1, or 2

3 BRIs
per DS30
channel

1 DS30 Channel/
offset set to 0, 1, 2, or 3

4 CTMs
per DS30
channel

1 DS30 Channel/
offset set to 0, 1, or 2

CTM8s
max. of
2 offsets
per DS30
channel

Stations (extensions)

1 DS30 Channel/
offset set to 0, 1, or 2

ASM8s
max. of
2 per DS30
channel

1 DS30 Channel/
offset set to 0

1 DSM 16
per DS30
channel

2 DS30 Channels/
offset set to 0

1 DSM 32
per 2 DS30
channels

Combination and specialized media bay modules

2 DS30 Channels/
offset set to 0, 1, 2, or 3

4X16
1 offset of
1 DS30 channel
for lines

1 full DS30
channel
for telephone
and equipment
connections

1 DS30 Channel/
offset set to 0

1 DECT
per DS30
channel
(1 DECT per system)

Note: The FEM module requires a
DS30 channel for each port that is
active. If all ports are active,
no other modules can be added to
the system.

Note: If you Choose a CTM8 or a 4X16 module, there are some restrictions about the offsets you can choose. Refer to the DIP switch settings in "CTM Switch Settings" on page 104 and "4X16 Switch Settings" on page 108 for details

1 Make a list of modules and the space requirements for each module you chose.
   Refer to Table 10

Table 10   Matching modules to DS30 channel capacity

Channel split 2/6 (default) _____ 3/5 (extra IP lines) _____		
Type of module	**Number required**	**DS30 channels/offsets required**

2 Set the channel numbers and offsets on the DIP switches of the module. Refer to Chapter 8, "Installing Media Bay Modules," on page 115.

3 Install the modules into the Business Communications Manager base unit or expansion unit. Refer to Chapter 9, "Starting the System," on page 121.

Chapter 5
Installing the Business Communications Manager Base Unit

This chapter describes how to install the Business Communications Manager base unit.

Preparation Checklist

Before you install the base unit, complete the following actions.

- Determine the location for the Business Communications Manager base unit, telephones, and other equipment based on spacing and electrical requirements. For more information about spacing and electrical requirements, refer to the and the .
- Order the required trunks from the central office.
- Check that all of the media bay modules are installed in the Business Communications Manager base unit.
- Ensure that you have all the equipment and supplies you require to install the system.

Environment Checklist

The installation area must be:

- minimum of 4 m (13 ft) from equipment such as photocopiers, electrical motors and other equipment that produces electromagnetic, radio frequency and electrostatic interference
- within 1.5 m (5 ft.) of a three-wire grounded electrical outlet
- clean, free of traffic and excess dust, dry and well ventilated
- within the temperature ranges of 0°C and 40°C (32°F and 95°F)
- between 20% and 80% non-condensing relative humidity
- enough space and strength to support the Business Communications Manager base unit
- minimum of 46 cm (18 in.) from the floor

> **Note:** The installation area must be of sufficient height from the floor to prevent water damage.

Electrical Requirements

The following electrical requirements must be met:

- Power must be supplied from non-switched, unobstructed outlet within 1.5 m (5 ft.) of the Business Communications Manager base unit.
- The supplied power must be a dedicated 110 V - 120 V ac nominal (or 220 V - 230 V ac nominal), 50/60 Hz, 15 A minimum service with a third wire safety ground. The third wire safety ground provides shock protection and avoids electromagnetic interference.

Danger: Risk of electric shock.

The safety of this product requires connection to an outlet with a third wire ground. Use only with a three wire power cord and outlet.

Caution: Check ground connections.

Ensure that the electrical ground connections of the power utility, telephone lines and internal metal water pipe system, if present, are connected together. If these ground connections are not connected together, contact the appropriate electrical inspection authority. Do not try to make the connections yourself.

The Business Communications Manager base unit power cord is 1.5 m (5 ft) long. You can connect the server to a power bar with a maximum length of 2 m (6.5 ft), including power bar. You must use a power bar approved by an appropriate National Test Body, with a third wire ground. Do not use an extension cord between the server and the power bar, or between the power bar and the electrical outlet.

The cable between the Business Communications Manager expansion unit and the Business Communications Manager base unit is supplied with the expansion unit. Do not use any other cables or connectors.

Internal Wiring Requirements

This section describes the requirements for a digital loop and an analog loop within the system.

Digital Loop

The following parameters must be met for a digital loop:

- one, two, or three twisted-pair cable(s) per telephone
- dc loop resistance of less than 64 Ω
- cable length (0.5 mm or 24 AWG) less than 300 m (975 ft.)
- use of a station auxiliary power supply (SAPS) for loops 300 m (975 ft.) to 1200 m (3900 ft.).
  In North America, the SAPS must be a CSA or UL approved Class 2 power source.
  In Europe, the SAPS must be a Class II power source and CE marked.
- no bridge taps

Analog Loop

The following parameters must be met for an analog loop.

- maximum dc loop resistance of 208 Ω
- maximum cable length (0.5 mm or 24 AWG) of 1220 m (4000 ft.)

System Equipment and Supplies

Use the following checklists to ensure that you have all the required equipment.

Basic Hardware

The Business Communications Manager system consists of some combination of the following hardware:

- Business Communications Manager base unit
- Business Communications Manager expansion unit
- media bay modules
- telephones
- cabling for connections between hardware units

You can place a maximum of three media bay modules in the Business Communications Manager base unit. You must install an Business Communications Manager expansion unit if you require more than three media bay modules.

Optional Equipment

The following equipment can be added to the system to support specific requirements beyond the base unit:

- Station auxiliary power supply (SAPS)
- Central answering position (CAP or CAPN) module to as many as five M7324 telephones in the system
- Business Communications Manager server Analog Terminal Adapter 2
  (ATA 2) if connecting analog equipment to a digital media bay station module
- Uninterruptable power supply (UPS) as a standalone device
- Analog emergency telephone

Companion Equipment

If you are installing a Companion system, check that you have the following hardware.

C3050 CT2 Plus (Canada)

- base station kit
- handsets (C3050)
- battery packs (NiCad 600 mAh)
- high-capacity battery charger

C3050 Etiquette (USA)

- base station kit
- handsets (C3050)
- battery packs (NiCad 600 mAh)
- high-capacity battery charger
- UTAM software keycode for base station activation

Optional Companion Equipment

- clip holster
- leather glove
- rugged protector
- headset – earbud (battery not included)
- headset – over the head (battery not included)

DECT Equipment

If you are installing a DECT system, check that you have the following hardware.

- DECT module
- base station kit
- handsets and rechargers

Equipment for Installing the Base Unit

For the installation, you need the following equipment:

- rack mounting bracket

> ➡ **Note:** Wall mounting brackets can be ordered separately.

- four rubber feet
- Phillips screwdriver #2
- flat blade screwdriver
- pliers
- antistatic grounding strap
- connecting tool
- surge protector (recommended)
- cables, 25-pair cable with amphenol connectors

Installing the Server in a Rack

The Business Communications Manager base unit fits into a standard 19-inch equipment rack. You can install the base unit in the same rack as your other networking and telecommunications equipment.

> **Caution:** When installing the Business Communications Manager base unit in a rack, do not stack units directly on top of one another in the rack.
>
> Fasten each unit to the rack with the appropriate mounting brackets. Mounting brackets cannot support multiple units.
>
> Refer to "Environment Checklist" on page 79 for acceptable environmental conditions before selecting a location for the Business Communications Manager base unit.

Attaching the Rack Mounting Brackets

1 Place the Business Communications Manager base unit on a table.

2 Align the screw holes between the base unit and the right rack mounting bracket.

3 Fasten the bracket to the base unit using four screws.

> **Caution:** Only use the screws supplied with the rack mounting bracket. Do not replace screws. Other screws can damage the Business Communications Manager base unit.

4 Align the screw holes between the base unit and the left rack mounting bracket.

5 Fasten the bracket to the base unit using four screws. Refer to Figure 28.

Figure 28   Attaching the rack mounting bracket to the base unit

Installing the Base Unit into the Rack

After the brackets are installed, perform the following steps to install the Business Communications Manager base unit in the equipment rack:

1 Determine the location in the rack you want to install the base unit.

2 Position the base unit in the rack.

3 Align the holes in the rack mounting bracket with the holes in the equipment rack rails.

4 Fasten the rack mounting brackets to the rack using four screws (not supplied).

Refer to Figure 29.

Figure 29 Fasten the base unit to the equipment rack
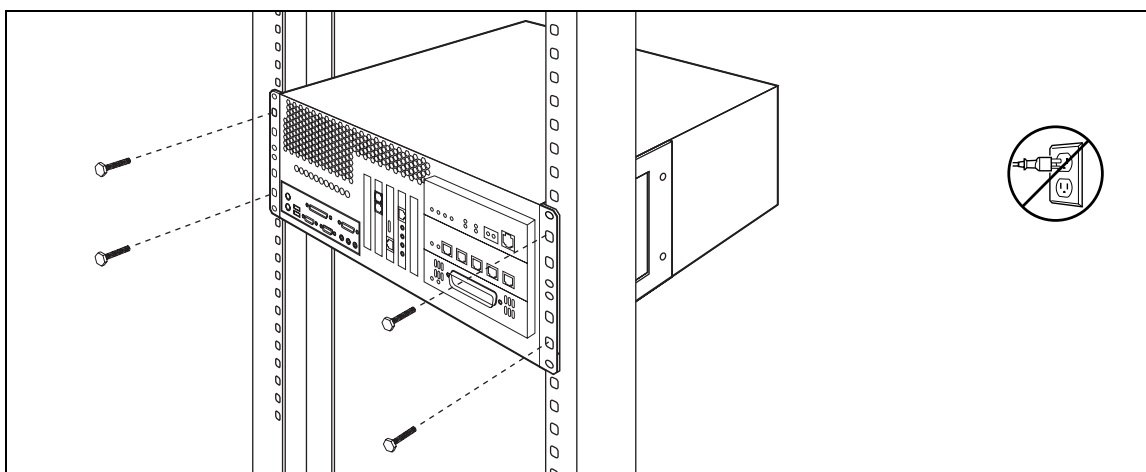
Installing the Base Unit on the Wall

To mount the Business Communications Manager base unit on the wall, you need:

• two rack mounting brackets or a wall-mount bracket kit

• four #10 x 2.5 cm (#10 x 1 in.) round head wood screws

• a plywood backboard 2 cm (3/4 in.) thick

Caution: Refer to "Environment Checklist" on page 79 for acceptable environmental conditions before selecting a location for the Business Communications Manager base unit.

Follow these steps to install the bracket.

> ➡ **Note:** You may use the two rack mounting brackets to do a wall installation. Or you can order a wall-mount kit, which contains a bracket that runs the entire length of the base unit. Refer to Figure 30.

1 Align the screw holes on one side of the base unit with both rack mounting brackets or with one of the wall mounting brackets.

> ➡ **Note:** The brackets suspend the Business Communications Manager base unit on the wall. Consider the direction you want the media bay modules to face, left or right, when you choose the side to install the rack mounting brackets on.

2 Fasten the bracket to the base unit using the screws provided with the bracket. Refer to Figure 30.

> ⬟ **Caution:** Use only the screws supplied with the rack mounting brackets. Do not replace screws. Other screws can damage the Business Communications Manager base unit.

Figure 30   Attaching the mounting brackets to the base unit

Rack mount brackets

Wall mount brackets
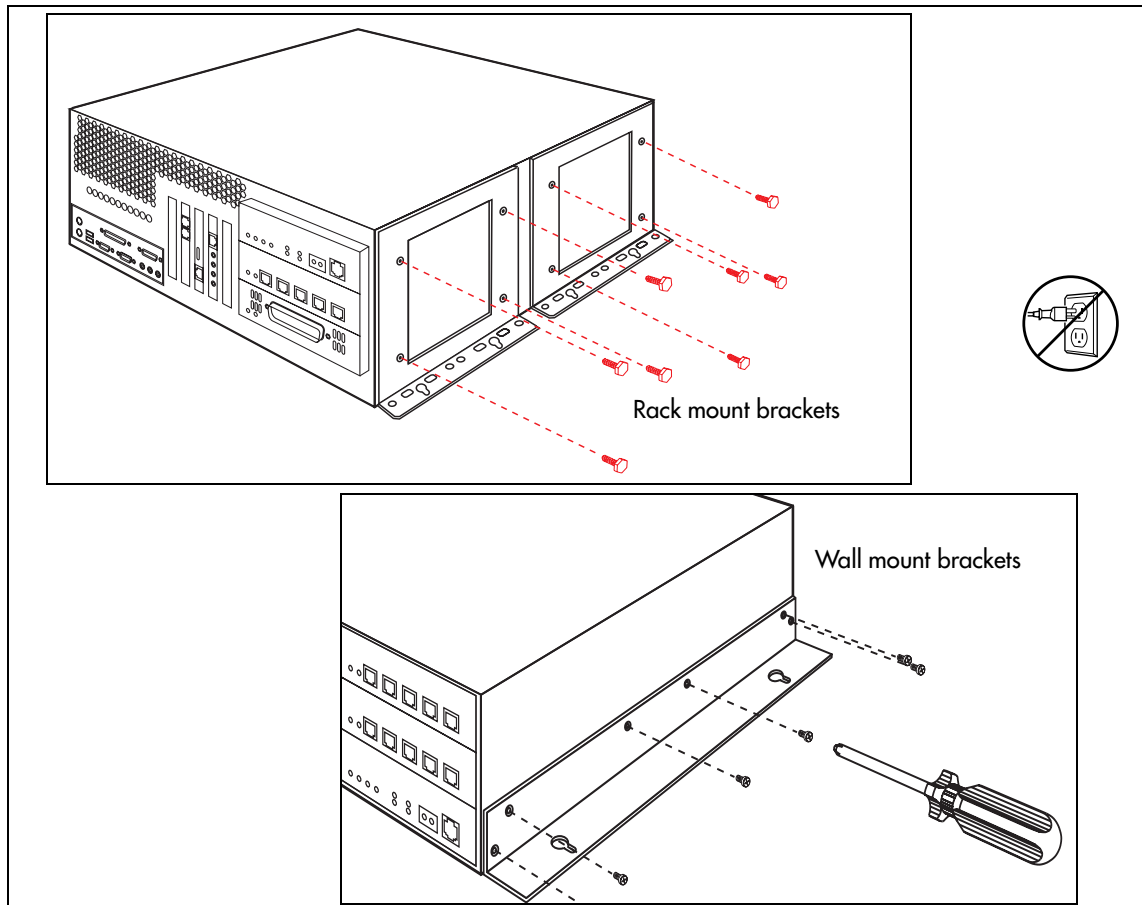
3 Install the 2 cm (3/4 in.) plywood backboard on the wall.

4 Insert two #10 x 2.5 cm (#10 x 1 in.) round-head wood screws in the backboard. The screws must be 34.5 cm (13.5 in.) apart and level.
Do not tighten the screws heads against the backboard. Leave approximately 0.5 cm (0.25 in.) of the screw out of the backboard.

> ➡ **Note:** Position the screws to leave enough space beside the Business Communications Manager base unit (23 cm or 9 in.) to insert and remove the media bay modules.

5 Hang the base unit on the two screws, using the outer two slotted holes. Make sure the base unit is level, the mounting brackets are against the wall, and the front cover is facing left or right. Refer to Figure 31.

Figure 31 Mount the Business Communications Manager base unit on the wall
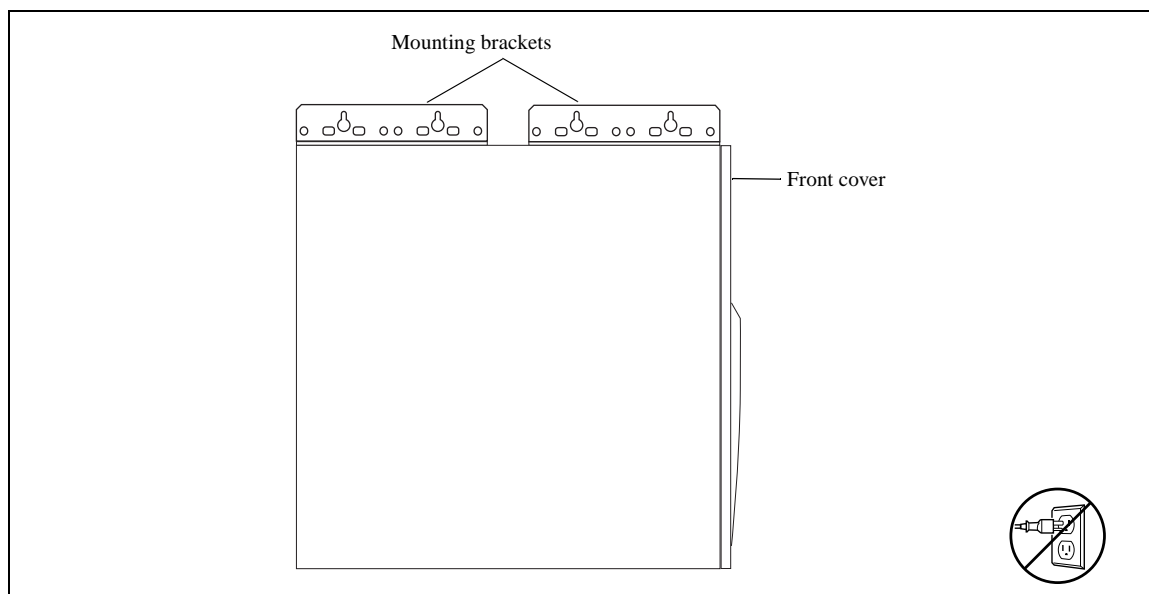
6 Insert two #10 x 2.5 cm (#10 x 1 in.) round-head wood screws in the other two slotted holes.

7 Insert a #10 x 2.5 cm (#10 x 1 in.) round-head wood screw in one of the unslotted holes.

8 Tighten all five screws.

Installing the Base Unit on a Flat Surface

You can install the Business Communications Manager base unit on any flat surface that can support the weight of the unit.

> **Caution:** Refer to "Environment Checklist" on page 79 for acceptable environmental conditions before selecting a location for the Business Communications Manager base unit.

To install the Business Communications Manager base unit on a table or shelf:

1 Attach four rubber feet to the corners on the bottom of the base unit.

2 Position the base unit on the table or shelf. Make sure you leave enough space around the unit for ventilation and access to the cables and media bay modules.

Chapter 6
Installing the Business Communications Manager Expansion Unit

This chapter describes how to install the Business Communications Manager expansion unit.

The Business Communications Manager expansion unit must be installed close enough to the base unit that the 5 m (16 ft) cable between the two units can be connected to the base unit without stress on the cable. The expansion unit has the same environmental and electrical requirements as the base unit. For more information about these requirements, refer to .

Installing the Expansion Unit into a Rack

The Business Communications Manager expansion unit fits into a standard 19-inch equipment rack. You must install the expansion cabinet in the same rack as the Business Communications Manager base unit.

> **Caution:** When installing the Business Communications Manager expansion unit in a rack, do not stack units directly on top of one another. Fasten each unit to the rack with the separate mounting brackets.

Attaching the Mounting Brackets to the Expansion Unit

You must install two rack brackets on the expansion unit to allow you to install the unit into the equipment rack. These brackets are supplied with the expansion unit.
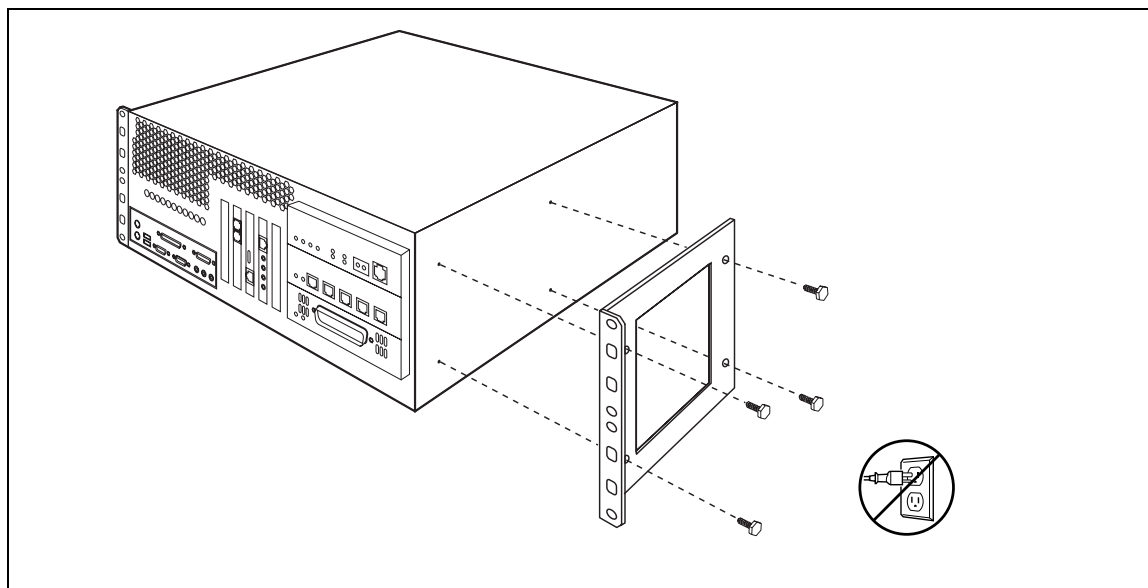
1 Place the Business Communications Manager expansion unit on a table.

2 Align the screw holes between the expansion unit and the right rack mounting bracket. Refer to Figure 32.

Figure 32 Attach the rack mounting bracket to the expansion unit
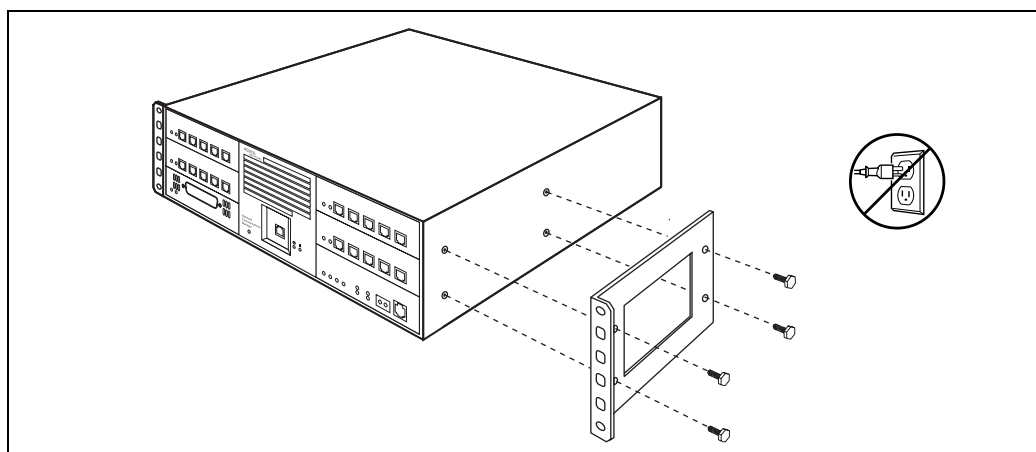
3 Fasten the bracket to the expansion unit using four screws.

4 Repeat steps 2 and 3 on the other side, with second bracket.

> **Caution:** Use only the screws that came with the bracket. Using other screws can damage the equipment.

> **Note:** Rack mount bracket
>
> The expansion unit rack mount bracket has an additional set of holes that allows you to install the brackets so that the expansion unit sits flush with the base unit in an equipment rack where space is limited.

Attaching the Expansion Unit to the Rack

The mounting brackets you attached to the expansion unit correspond with mounting holes located on the equipment rack.

> **Note:** You must supply your own screws to attach the expansion unit to the rack.

1 Determine the location in the rack you want to install the Business Communications Manager expansion unit.

2 Position the expansion unit in the rack. Refer to Figure 33.

3 Align the holes in the rack mounting bracket with the holes in the rails.

4 Fasten the rack mounting brackets to the equipment rack using four screws.

Figure 33 Fasten the expansion unit to the equipment rack
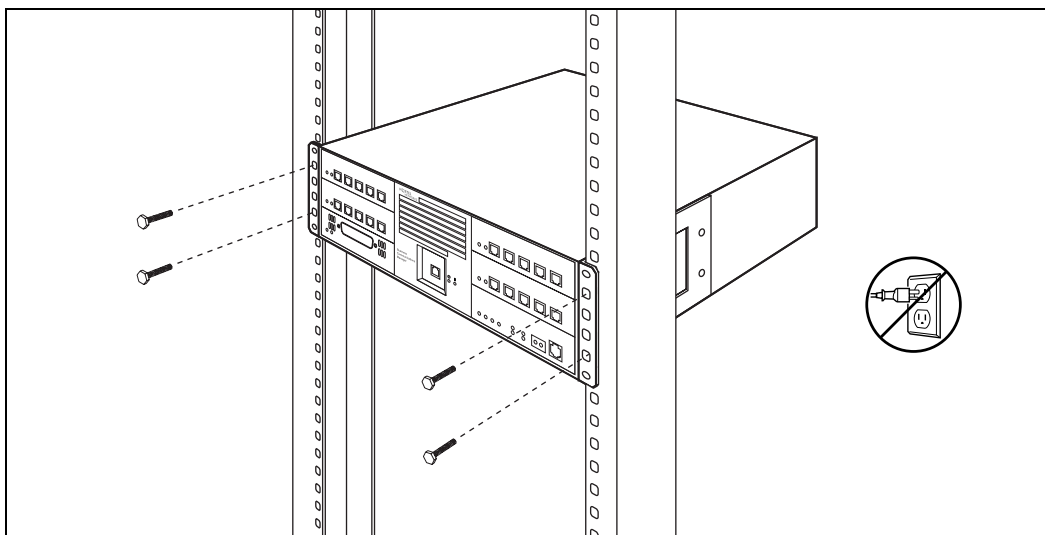
Installing the Expansion Unit on the Wall

You must install the Business Communications Manager expansion unit must be installed close enough to the base unit that the 5 m (16 ft) cable between the expansion unit and the Business Communications Manager base unit can be connected without stress on the cable.

> **Caution:** Refer to "Environment Checklist" on page 79 for acceptable environmental conditions before selecting a location for the Business Communications Manager expansion unit.

Required equipment:

- a wall mounting bracket (supplied with the expansion unit)
- two #10 x 2.5 cm (#10 x 1 in.) round head wood screws
- a plywood backboard 2 cm (3/4 in.) thick

Follow these steps to mount the expansion unit on wall:

1 Install the 2 cm (3/4 in.) plywood backboard on the wall.

> **Note:** If the backboard for the Business Communications Manager base unit has enough room for the expansion unit, you do not require a second backboard.

2 Choose a location on the backboard that is level and leaves enough space on the sides (23 cm or 9 in.) to insert and remove the media bay modules.

3 Use the slotted holes on the wall mounting bracket to mark the location for the two mounting screws.

4 Screw two #10 x 2.5 cm (#10 x 1 in.) screws into the backboard, leaving 6 mm (1/4 in.) of the two screws showing.

5 Align the screw holes between the expansion unit and the wall mounting bracket.

6 Fasten the wall mounting bracket using four screws. Refer to Figure 34.

Figure 34   Attaching the wall mounting bracket to the expansion unit
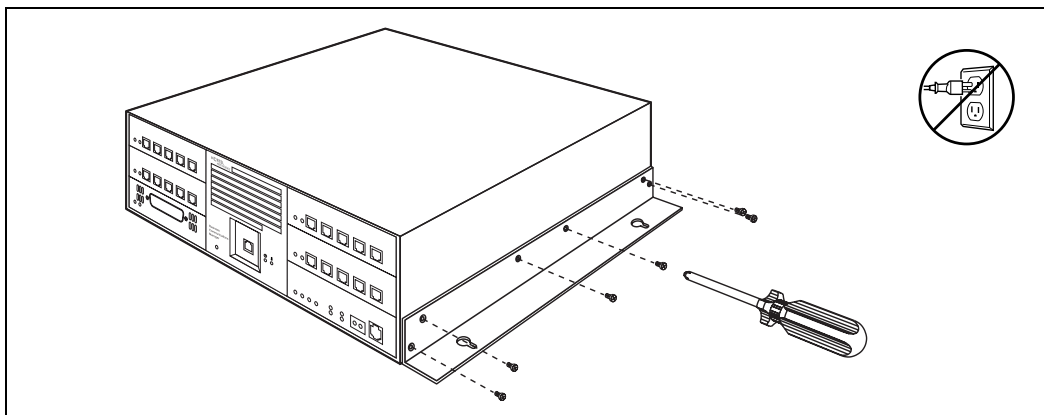
> **Caution:** Use only the screws supplied with the wall mounting bracket. Do not replace screws. Other screws can damage the Business Communications Manager expansion unit.

7 Align the slots on the wall mounting bracket over the screws.

8 Push the unit against the wall and slide it down so the slots rest on the screws.

9 Tighten the two screws to the wall mounting bracket.

Installing the Expansion Unit on a Flat Surface

You can install the Business Communications Manager expansion unit on any flat surface that can support the weight of the unit, and which is within 5 m (16 ft.) of the Business Communications Manager base unit.

1 Attach the supplied rubber feet to the corners of the bottom of the expansion unit.

2 Position the expansion unit on the table or shelf.

3 Ensure that you leave enough space around the unit for ventilation and access to the cables and media bay modules.

Connecting the Expansion Unit to the Base Unit

After the expansion unit has been installed in the desired location, use the supplied DS256 cable to connect it to the Business Communications Manager base unit.

1 Plug one end of the cable into the DS256 connector on the Business Communications Manager expansion unit. Refer to Figure 35.

Figure 35 DS256 connector on the expansion unit
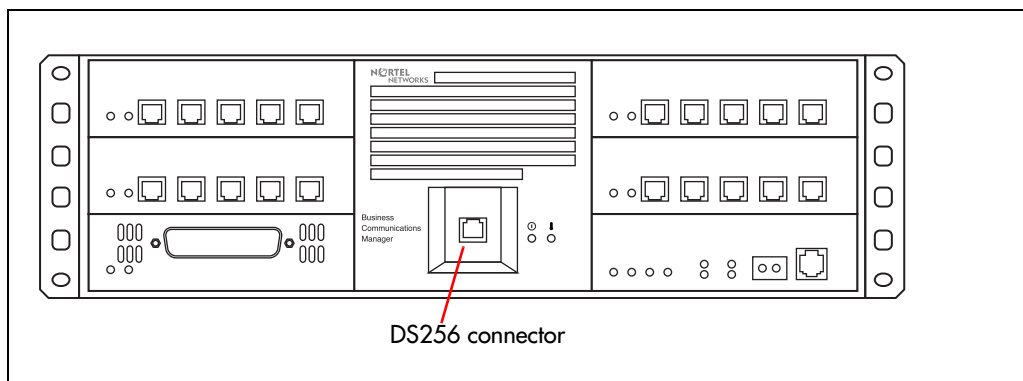
DS256 connector

2 Plug the other end of the cable into the DS256 connector on the faceplate of the MSC in the Business Communications Manager base unit. Refer to Figure 36.

Figure 36 Business Communications Manager base unit DS258 connector

DS256 connector
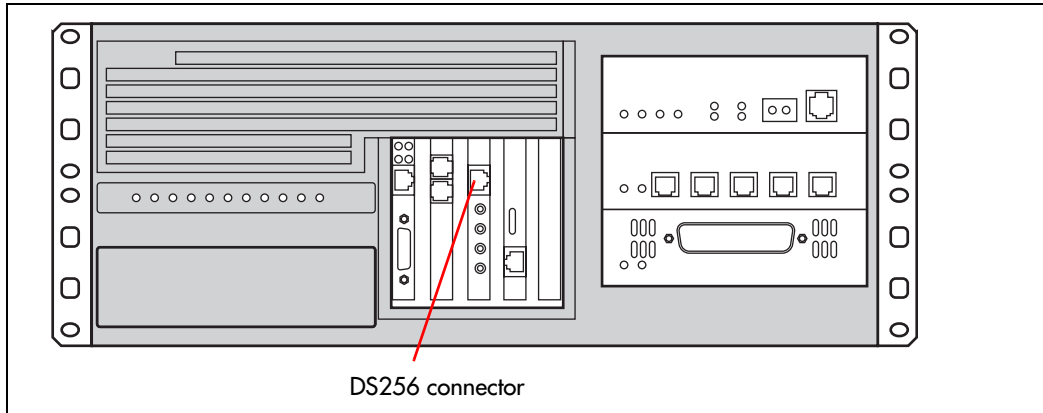
⚠️ **Warning:** The timing in the Business Communications Manager system is designed for a 5 m (16 ft.) Category 5 patch cable. The system cannot work properly if you connect the Business Communications Manager expansion unit using a cable that is any other length.

Chapter 7
Media Bay Module Switch Settings

Before you install a media bay module, assign switch settings for the media bay module. These settings determine which line numbers (trunks) or DNs (extensions) the equipment connected to the module will have access to. The DIP switches are located on the back or underside of the media bay module.

> ➡ **Note:** Fiber Expansion Module (FEM) switches
>
> The switches on the fiber expansion module (FEM) do not work in the same way as those on the other media bay modules. On the FEM, the switches turn the fiber ports on and off. For information about setting the switches on an FEM, refer to "FEM Switch Settings" on page 113.

Start from the list of modules you chose in Chapter 4, "Selecting the Media Bay Modules for Your System," on page 71.

After you determine which modules channels you want to use, and how much DS30 channel capacity each module requires, you determine the location of the modules on the DS30 array. From that information, you choose switch settings for each module. These settings are then set on the module DIP switches.

This chapter describes the latter process of positioning your modules in the DS30 hierarchy and determining and setting the DIP switch settings on the module.

Rules for Assigning DS30 Channel Hierarchy

Media bay modules are assigned to DS30 channels in a specific hierarchical manner. This section describes the preferred order of positioning for each type of module.

Notes About Assigning Modules

The following are some general notes about assigning modules:

- If you chose a 3/5 channel split for your system, DS30 channel 7 cannot be used by any module. For modules that require two channels, this means that you cannot set the DIP switches to channel 6 for those modules, because the second level of lines would fall into channel 7, and would not be accessible. Refer to Figure 37 on page 97.

  Refer to "Understanding DS30 Channel Numbers" on page 75 for more information about 2/6 and 3/5 DS30 channel splits.

- DSM 32 modules require two DS30 channel numbers. When you assign the first DS30 channel number to an DSM 32, the module automatically adds the next DS30 channel number. For example, if you assign DS30 channel number 2 to an DSM 32, it uses DS30 channel

numbers 2 and 3. However, you cannot choose DS30 channel 7 for the DSM32 module, because the second level of DSM lines would not be accessible. Refer to DSM Switch Settings on page 111.

• The DIP switches on the 4X16 module are used to set the DS30 channel and offset for the CTM part of the module. The module automatically assigns an additional DS30 channel for the 16 DSM lines. However, you cannot choose DS30 channel 7 for the 4X16 module, because the DSM lines would not be accessible. Refer to 4X16 Switch Settings on page 108

• Companion: configure the DSM or DSMs handling Business Communications Manager Companion to DS30 channel 6 or 7.You must change the module number of any trunk media bay modules configured to module 6 or 7 to an unassigned module number to prevent conflicts with Companion.

> **Note:** Companion DS30 split restrictions:
>
> If you choose a 3/5 channel split for your system, the second module cannot be assigned. Therefore, you can add a maximum of 16 Companion base stations, which support a maximum of 30 handsets.

• The CTM8 module uses two offsets. You assign the first offset to the module, and the second offset is automatically selected. This means that you can choose offset pairs 0-1, 1-2, or 2-3. Because the module requires two offsets on the same DS30 channel, you cannot select offset 3. Refer to CTM8 on page 106.

• Not all modules are available to all systems. Refer to Chapter 2, "Telephony Hardware," on page 53 for specifics about each module.

> **Note:** Remember, if you have chosen a 3/5 channel split for your system, channel 7 is no longer available for media bay modules.

Assign the media bay modules and DS30 channels in the order shown in Figure 37 on page 97. Note that Station modules are assigned starting with DS30 channel 2 and trunk modules are assigned, starting with DS30 channel 7.

Figure 37   Assigning the modules in a hierarchal order

After you choose your modules, choose where to
assign them on the DS30 channels

DS30 channels

DN assignment begins with Start DN (default: 221)

Station modules are assigned in this order. Start with the first available DS30 channel.

| DSM 32 |
| DSM 16 |
| ASM8 |

Trunk modules are assigned in this order of priority. Start with the last available DS30 channel

| DTM |
| CTM |
| CTM8 |
| 4X16 |
| BRI |
| DECT |

Lines start at 61 on DS30 channel 7

Example of North American-based setup

Example of a European- based setup

DS30 channels

DSM 32

CTM
CTM
CTM

4X16

Module 5 supports the station module part of the 4X16

DTM
Companion

DSM 32

DSM 16

BRI

BRI

DECT

3/5 channel split

DSM 32

Companion

* Module 7 is not available to any module if your system has been configured with a 3/5 DS30 channel split

Modules that require two DS30 channels, such as the DSM32 and the 4X16, must be assigned to channels higher than 6, to allow all their channels to be active.

Companion: Only a maximum of 16 Companion base stations (30 handsets) can be registered on a system configured with a 3/5 split.

Determining Module DIP Switch Settings

After you determine in which order you want to assign the modules, you determine the specific switch settings for each module.

1 Use Table 12 on page 99 to determine a switch setting for all modules except the DECT and FEM modules. Figure 38 shows an example of the table and how to do the following steps:

Step 1: On Table 12 circle the module names.

Step 2: Number the order in which you want to assign the modules.

Step 3: Determine the number of DS30 channels each module requires.

Step 4: Circle the DS30 channel and offset numbers.

Step 5: Follow the DS30 channel and offset number to the far right column where the switch settings are indicated. Circle the setting for each module.

➡ **Note:** If you must assign specific line or extension numbers to a module, refer to the individual switch tables in "Line and Extension Numbers for Specific Modules" on page 101 for line and DN listings.

Figure 38 How to use the configuration map

Table 12 shows possible DS30 channel and offset configurations for each type of module, and the corresponding switch settings. For DECT and FEM settings, refer to "DECT Switch Settings" on page 112 and "FEM Switch Settings" on page 113.

Example: Position your DSM 16 module (step 1), which requires one full DS30 channel (step 2), in DS30 channel 2 (step 3). Moving across, note that the offset is 0 (step 4). Set the DIP switches on the module to match the DIP switch settings indicated for that offset (step 5).

Table 12 Possible media bay module DIP switch settings

DS30 channel #	Offsets	DSM 16 Offsets 0	DSM 32 Offsets 0	4x16 Offsets 0,1,2,3 Line	4x16 Exten.	ASM 8 Offsets 0,1,2	DTM Offsets 0	CTM Offsets 0,1,2,3	CTM 8 Offsets 0,1,2	BRI Offsets 0,1,2,3	1	2 3 (offset)		4	5 6 (DS30 ch)	
2	0	0	0	0	Picks up ch. #3	0	0	0	0	0	on	on	on	on	on	on
	1			1				1	1	1	on	on	off	on	on	on
	2			2		1		2	2	2	on	off	on	on	on	on
	3			3				3			on	off	off	on	on	on
3	0	0	0	0	Picks up ch. #4	0	0	0	0	0	on	on	on	on	on	off
	1			1				1	1	1	on	on	off	on	on	off
	2			2		1		2	2	2	on	off	on	on	on	off
	3			3				3			on	off	off	on	on	off
4	0	0	0	0	Picks up ch. #5	0	0	0	0	0	on	on	on	on	off	on
	1			1				1	1	1	on	on	off	on	off	on
	2			2		1		2	2	2	on	off	on	on	off	on
	3			3				3			on	off	off	on	off	on
5	0	0	0	0	Picks up ch. #6	0	0	0	0	0	on	on	on	on	off	off
	1			1				1	1	1	on	on	off	on	off	off
	2			2		1		2	2	2	on	off	on	on	off	off
	3			3				3			on	off	off	on	off	off
6	0	0	0	0	Picks up ch. #7	0	0	0	0	0	on	on	on	off	on	on
	1			1				1	1	1	on	on	off	off	on	on
	2			2		1		2	2	2	on	off	on	off	on	on
	3			3				3			on	off	off	off	on	on
7***	0	0		Not supported		0	0	0	0	0	on	on	on	off	on	off
	1							1	1	1	on	on	off	off	on	off
	2					1		2	2	2	on	off	on	off	on	off
	3							3			on	off	off	off	on	off

☐ Module set to offset 0   ▨ Module set to offset 1   ▨ Module set to offset 2   ■ Module set to offset 3

Each shaded square represents the amount of the DS30 channel, and the offset, which the module requires.

***If your system is configured with a 3/5 DS30 channel split, DS30 channel 7 is not available to media bay modules.

2 Turn the media bay module upside down and locate the DIP switches.

Figure 39 Switches on the media bay module
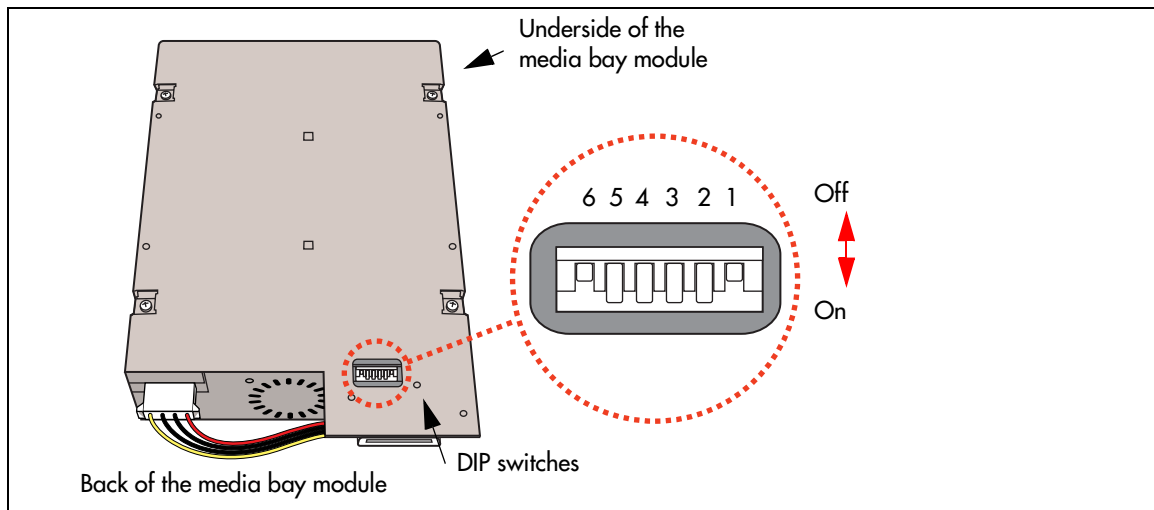
3 Set the switches to correspond with the settings you chose in step 3.

4 Repeat steps 2 and 3 for each media bay module you want to install.

> ➡ **Tip:** Create a label with the DS30 channel and DIP switch settings, and stick it to the front of the module to provide ease of reference for maintenance activities.

5 You are now ready to install the modules into the Business Communications Manager. Refer to for details.

Line and Extension Numbers for Specific Modules

The switch settings on the media bay module determine the line numbers and extension numbers the modules use. The tables in this section show the correspondence between DS30 channel numbers, switch settings, and the line/extension numbers for each type of module. The DS30 channel and switch settings correspond with Table 12 on page 99.

DTM Switch Settings

Although DTMs have more than 16 lines, they occupy only one DS30 channel per DTM.

Table 13 shows the switch settings for each DS30 channel, and the resulting line assignments.

Table 13 DTM switch settings (T1)

Select DS30 channel	Enter these switch settings						To assign these lines
	1	2	3	4	5	6	
2	on	on	on	on	on	on	211-233
3	on	on	on	on	on	off	181-203
4	on	on	on	on	off	on	151-173
5	on	on	on	on	off	off	121-143
6	on	on	on	off	on	on	91-113
***7	on	on	on	off	on	off	61-83
***If your system is configured with a 3/5 DS30 channel split, DS30 channel 7 is not available.							

Table 14 shows the switch settings for each DS30 channel, and the resulting line assignments.

Table 14 DTM switch settings (North American PRI)

Select DS30 channel	Enter these switch settings						To assign these lines
	1	2	3	4	5	6	
2	on	on	on	on	on	on	211-233
3	on	on	on	on	on	off	181-203
4	on	on	on	on	off	on	151-173
5	on	on	on	on	off	off	121-143

Table 14 DTM switch settings (North American PRI) (Continued)

Select DS30 channel	Enter these switch settings						To assign these lines
	1	**2**	**3**	**4**	**5**	**6**	
6	on	on	on	off	on	on	91-113
***7**	on	on	on	off	on	off	61-83
***If your system is configured with a 3/5 DS30 channel split, DS30 channel 7 is not available.							

Table 15 shows the switch settings for each DS30 channel, and the resulting line assignments.

Table 15 DTM switch settings (E1 and UK PRI)

Select DS30 channel	Enter these switch settings						To assign these lines
	1	**2**	**3**	**4**	**5**	**6**	
2	on	on	on	on	on	on	211-240
3	on	on	on	on	on	off	181-210
4	on	on	on	on	off	on	151-180
5	on	on	on	on	off	off	121-150
6	on	on	on	off	on	on	91-120
***7**	on	on	on	off	on	off	61-90
***If your system is configured with a 3/5 DS30 channel split, DS30 channel 7 is not available.							

BRI Switch Settings

You can install a maximum of three BRI modules per DS30 channel on the offsets indicated below. Table 16 shows the switch settings for each DS30 channel, and the resulting line assignments.

Table 16 BRI switch settings

Select DS30 channel	Select offset	Enter these switch settings						To assign these lines
		1	2	3	4	5	6	
2	0	on	on	on	on	on	on	211-218
	1	on	on	off	on	on	on	219-226
	2	on	off	on	on	on	on	227-234
3	0	on	on	on	on	on	off	181-188
	1	on	on	off	on	on	off	189-196
	2	on	off	on	on	on	off	197-204
4	0	on	on	on	on	off	on	151-158
	1	on	on	off	on	off	on	159-166
	2	on	off	on	on	off	on	167-174
5	0	on	on	on	on	off	off	121-128
	1	on	on	off	on	off	off	129-136
	2	on	off	on	on	off	off	137-144
6	0	on	on	on	off	on	on	91-98
	1	on	on	off	off	on	on	99-106
	2	on	off	on	off	on	on	107-114
***7	0	on	on	on	off	on	off	61-68
	1	on	on	off	off	on	off	69-76
	2	on	off	on	off	on	off	77-84

***If your system is configured with a 3/5 DS30 channel split, DS30 channel 7 is not available.

CTM Switch Settings

There are two models of CTMs.

- CTMs have four lines, therefore you can add a maximum of four CTMs per DS30 channel.

- CTM8s have eight lines. This module uses two offset settings per module. Therefore, you can add a maximum of two CTM8 modules per DS30 channel.

- You can also mix the two modules. For instance, if you have two existing CTM modules with offset 0 and 1, you can add a CTM8 on offset 2.

CTM

The CTM provides connections for four analog calling line identification (CLID) PSTN lines. Each voice line uses one line in the offset. Since each DS30 channel has four lines per offset, you can assign a maximum of four CTMs to a single DS30 channel, by making the offset switch settings different for each module. You can also combine three CTMs with the trunk module part of the 4X16 module on the same DS30 channel.

Table 17 shows the switch settings for each DS30 channel, and the resulting line assignments.

Table 17   CTM switch settings

Select DS30 channel	Select offset	Enter these switch settings						To assign these lines
		1	2	3	4	5	6	
2	0	on	on	on	on	on	on	211-214
	1	on	on	off	on	on	on	219-222
	2	on	off	on	on	on	on	227-230
	3	on	off	off	on	on	on	235-238
3	0	on	on	on	on	on	off	181-184
	1	on	on	off	on	on	off	189-192
	2	on	off	on	on	on	off	197-200
	3	on	off	off	on	on	off	205-208

Table 17   CTM switch settings (Continued)

Select DS30 channel	Select offset	Enter these switch settings						To assign these lines
		1	2	3	4	5	6	
4	0	on	on	on	on	off	on	151-154
	1	on	on	off	on	off	on	159-162
	2	on	off	on	on	off	on	167-170
	3	on	off	off	on	off	on	175-178
5	0	on	on	on	on	off	off	121-124
	1	on	on	off	on	off	off	129-132
	2	on	off	on	on	off	off	137-140
	3	on	off	off	on	off	off	145-148
6	0	on	on	on	off	on	on	91-94
	1	on	on	off	off	on	on	99-102
	2	on	off	on	off	on	on	107-110
	3	on	off	off	off	on	on	115-118
******7**	0	on	on	on	off	on	off	61-64
	1	on	on	off	off	on	off	69-72
	2	on	off	on	off	on	off	77-80
	3	on	off	off	off	on	off	85-88

***If your system is configured with a 3/5 DS30 channel split, DS30 channel 7 is not available.

CTM8

The CTM8 provides connections for eight analog calling line identification (CLID) PSTN lines. Each line uses one voice line. Since each DS30 channel has four lines per offset, you require two offsets for each module. Therefore, you can assign a maximum of two CTM8s to a DS30 channel, by making the offset switch settings different for each module.

You can also combine a CTM8 with a 4X16 module on the same DS30 channel.

When you choose an offset number for the CTM8, the system automatically adds the next offset number. You cannot assign offset 3 to the CTM8 module, because this does not allow the module to assign the second set of lines.

Table 18 shows the switch settings for each DS30 channel, and the resulting line assignments.

Table 18 CTM8 switch settings

Select DS30 channel	Select offset	Enter these switch settings						To assign these lines	
		1	2	3	4	5	6	Lower (Lines 1-4)	Upper (lines 5-8)
2	0	on	on	on	on	on	on	211-214	219-222
	1	on	on	off	on	on	on	219-222	227-230
	2	on	off	on	on	on	on	227-230	235-238
	3	on	off	off	off	on	off	Not supported	Not supported
3	0	on	on	on	on	on	off	181-184	189-192
	1	on	on	off	on	on	off	189-192	197-200
	2	on	off	on	on	on	off	197-200	205-208
	3	on	off	off	off	on	off	Not supported	Not supported
4	0	on	on	on	on	off	on	151-154	159-162
	1	on	on	off	on	off	on	159-162	167-170
	2	on	off	on	on	off	on	167-170	175-178
	3	on	off	off	off	on	off	Not supported	Not supported

Table 18 CTM8 switch settings (Continued)

Select DS30 channel	Select offset	Enter these switch settings 1	2	3	4	5	6	To assign these lines Lower (Lines 1-4)	Upper (lines 5-8)
5	0	on	on	on	on	off	off	121-124	129-132
5	1	on	on	off	on	off	off	129-132	137-140
5	2	on	off	on	on	off	off	137-140	145-148
5	3	on	off	off	off	on	off	Not supported	Not supported
6	0	on	on	on	off	on	on	91-94	99-102
6	1	on	on	off	off	on	on	99-102	107-110
6	2	on	off	on	off	on	on	107-110	115-118
6	3	on	off	off	off	on	off	Not supported	Not supported
***7	0	on	on	on	off	on	off	61-64	69-72
***7	1	on	on	off	off	on	off	69-72	77-80
***7	2	on	off	on	off	on	off	77-80	85-88
***7	3	on	off	off	off	on	off	Not supported	Not supported

***If your system is configured with a 3/5 DS30 channel split, DS30 channel 7 is not available.

4X16 Switch Settings

The 4X16 module combines a CTM and a DSM 16. The CTM only requires four lines on the DS30 channel. Therefore, it can be assigned any of the four offsets in a DS30 channel. The DSM module then automatically assigns the next DS30 channel number and all the assigned DNs.

This module can be combined with three other CTMs or one CTM8 on the same DS30 channel.

Table 19 shows the switch settings for each DS30 channel, and the assigned lines and dialing numbers (DNs) for each DS30 channel.

Table 19   4X16 switch settings

Select DS30 channel	Select offset	Enter these switch settings						To assign these lines	And this DS30 channel and DNs	**Custom DN range
		1	2	3	4	5	6			
2	0	on	on	on	on	on	on	211-214	DS30 channel 3 237-252	
	1	on	on	off	on	on	on	219-222		
	2	on	off	on	on	on	on	227-230		
	3	on	off	off	on	on	on	235-238		
3	0	on	on	on	on	on	off	181-184	DS30 channel 4 253-268	
	1	on	on	off	on	on	off	189-192		
	2	on	off	on	on	on	off	197-200		
	3	on	off	off	on	on	off	205-208		
4	0	on	on	on	on	off	on	151-154	DS30 channel 5 269-284	
	1	on	on	off	on	off	on	159-162		
	2	on	off	on	on	off	on	167-170		
	3	on	off	off	on	off	on	175-178		
5	0	on	on	on	on	off	off	121-124	DS30 channel 6 285-300	
	1	on	on	off	on	off	off	129-132		
	2	on	off	on	on	off	off	137-140		
	3	on	off	off	on	off	off	145-148		

Table 19 4X16 switch settings (Continued)

Select DS30 channel	Select offset	Enter these switch settings						To assign these lines	And this DS30 channel and DNs	**Custom DN range
		1	2	3	4	5	6			
6	0	on	on	on	off	on	on	91-94	DS30 channel 7*** 301-316	
	1	on	on	off	off	on	on	99-102		
	2	on	off	on	off	on	on	107-110		
	3	on	off	off	off	on	on	115-118		
***7		on	on	on	off	on	off	Not supported		
		on	on	off	off	on	off			
		on	off	on	off	on	off			
		on	off	off	off	on	off			

** The extensions listed are based on a three-digit DN with a Start DN of 221. If your system has longer DNs or a different Start DN, enter the range in the blank column.

*** If your system is configured with a 3/5 DS30 channel split, you cannot configure this module for DS30 channel 6 since DS30 channel 7 is not available for the second level.

ASM 8 Switch Settings

Two ASM units can share a DS30 channel number. shows the switch settings for each DS30 channel and the dialing numbers (DNs) assigned to each DS30 channel.

Table 20 ASM 8 switch settings

Select DS30 channel	Select offset	Enter these switch settings						To assign these DNs	**Custom DN range
		1	2	3	4	5	6		
2	0	on	on	on	on	on	on	221-228	
	1	on	on	off	on	on	on	229-236	
3	0	on	on	on	on	on	off	237-244	
	1	on	on	off	on	on	off	245-252	
4	0	on	on	on	on	off	on	253-260	
	1	on	on	off	on	off	on	261-268	

Table 20 ASM 8 switch settings (Continued)

Select DS30 channel	Select offset	Enter these switch settings						To assign these DNs	**Custom DN range
		1	2	3	4	5	6		
5	0	on	on	on	on	off	off	269-276	
	1	on	on	off	on	off	off	277-284	
6	0	on	on	on	off	on	on	285-292	
	1	on	on	off	off	on	on	293-300	
7***	0	on	on	on	off	on	off	301-308	
	1	on	on	off	off	on	off	309-316	

** The extensions listed are based on a three-digit DN with a Start DN of 221. If your system has longer DNs or a different Start DN, enter the range in the blank column.

*** If your system is configured with a 3/5 DS30 channel split, DS30 channel 7 is not available.

DSM Switch Settings

There are two types of DSMs:

- DSM 16s have 16 lines. These modules require a full DS30 channel each. The offset is always set to 0.

- DSM32s have 32 lines. These modules require two full, consecutive DS30 channel numbers. You set the first channel on the DIP switches. The system assigns the next channel.

Table 21 shows the switch settings for each DS30 channel, and the dialing numbers (DNs) assigned to each DS30 channel. Note that Companion sets can only be assigned on DS30 channel 6 and 7, and the handsets have a different set of default DNs than the digital sets.

Table 21   DSM 16 and DSM 32 switch settings

Select DS30 channel	Enter these switch settings						To assign these DNs DSM 16	To assign these DNs DSM 32		Companion DNs	**Custom DN range
	1	2	3	4	5	6					
2	on	on	on	on	on	on	221-236	221-252		N/A	
3	on	on	on	on	on	off	237-252		237-268		
4	on	on	on	on	off	on	253-268	253-284			
5	on	on	on	on	off	off	269-284		269-300		
6	on	on	on	off	on	on	285-300	285-316 ***		565-596****	
***7	on	on	on	off	on	off	301-316		N/A for DSM32		

**The extensions listed are based on a three-digit DN with a Start DN of 221. If your system has longer DNs or a different Start DN, enter the range in the blank column.

***If your system is configured with a 3/5 DS30 channel split, you cannot:
- use DS30 channel 7 for the DSM 16 module
- configure the DSM32 module for DS30 channel 6 because the second set of DNs cannot be accessed.

****If you need more DNs for Companion sets, use the range that starts at 597 (ISDN or DECT) and change the DN type to NA Portable.

Media Bay Modules with Special Settings

The following section describes the modules with characteristics that do not fit into the basic model.

DECT Switch Settings

The DECT module supports a maximum of eight DECT radio base station connections. This module occupies one full DS30 channel, which can support a maximum of 32 cordless handsets when all eight base stations are deployed.

For detailed instructions about using the DECT module, refer to the *Business Communications Manager 2.5 DECT Installation and Maintenance Guide*.

Table 22 shows the settings for each DS30 channel, and the assigned dialing numbers (DNs).

Table 22   DECT module settings

Select DS30 channel	Select offset	Set the switches						Use these DNs on 2.5 system	Use these DNs on updated 2.0 system	**Custom DN range
		1	2	3	4	5	6			
2	0	on	on	on	on	on	on	597-624*	501-532*	
3	0	on	on	on	on	on	off	597-624*	501-532*	
4	0	on	on	on	on	off	on	597-624*	501-532*	
5	0	on	on	on	on	off	off	597-624*	501-532*	
6	0	on	on	on	off	on	on	597-624*	501-532*	
7***	0	on	on	on	off	on	off	597-624*	501-532*	

*If you need more DNs, use DNs in the 565 to 596 range. Ensure no other devices are assigned to these DNs before you use them. Change the DN type field to ISDN and DECT.

**The extensions listed are based on a three-digit DN with a Start DN of 221. If your system has longer DNs or a different Start DN, enter the range in the blank column.

***If your system is configured with a 3/5 DS30 channel split, DS30 channel 7 is not available.

FEM Switch Settings

The DIP switches on the underside of the FEM module are used to turn the six ports on the front of the module on or off. You need to turn a port on for each Norstar expansion module you want to connect to the BCM. Each port also occupies one full DS30 channel. Therefore, if you have a full-configured, six-module Norstar system to convert, you need to turn on all six ports on the FEM, and, therefore, no other module can be installed in the Business Communications Manager.

> ➡ **Note:** The FEM module only supports connections to the Norstar trunk and station expansion modules.

To turn on a fiber port, set the DIP switch for the corresponding DS30 channel, as shown in Table 23.

For example, if you want to use fiber port 2, turn on DIP switch 2 (DS30 channel 3). After the module is installed, an LED lights beside each active fiber port.

Table 23 shows the switch for each fiber port.

Table 23   FEM switch settings

Choose a port to turn on	Set this switch to turn on the port						This DS30 channel gets assigned
	1	**2**	**3**	**4**	**5**	**6**	
1	ON						2
2		ON					3
3			ON				4
4				ON			5
5					ON		6
6						ON	7***
***If your system is configured with a 3/5 DS30 channel split, DS30 channel 7 is not available.							

> ➡ **Note:** If you turn on all six switches, you are using all the DS30 channels. In this case, the Business Communications Manager can support only the FEM module. All other media bays must be empty.

> ⚠ **Warning:** Do not attempt to turn on ports requiring a DS30 channel that is already in service to another media bay module located on the same Business Communications Manager. Doing this results in unpredictable behavior with both modules.

Chapter 8
Installing Media Bay Modules

After you set the switches on the media bay modules, you can install them in the Business Communications Manager base unit or the Business Communications Manager expansion unit.

The Business Communications Manager base unit accommodates a maximum of three media bay modules. If your system requires more than three media bay modules, you need to connect a Business Communications Manager expansion unit to the base unit.

Figure 40 provides an overview of the process for installing media bay modules.

> **→** **Note:** The number of media bay modules you can add varies, depending on the DS30 resources that are available. Refer to Figure 27 on page 77**.**

Figure 40   Overview of installing a media bay module
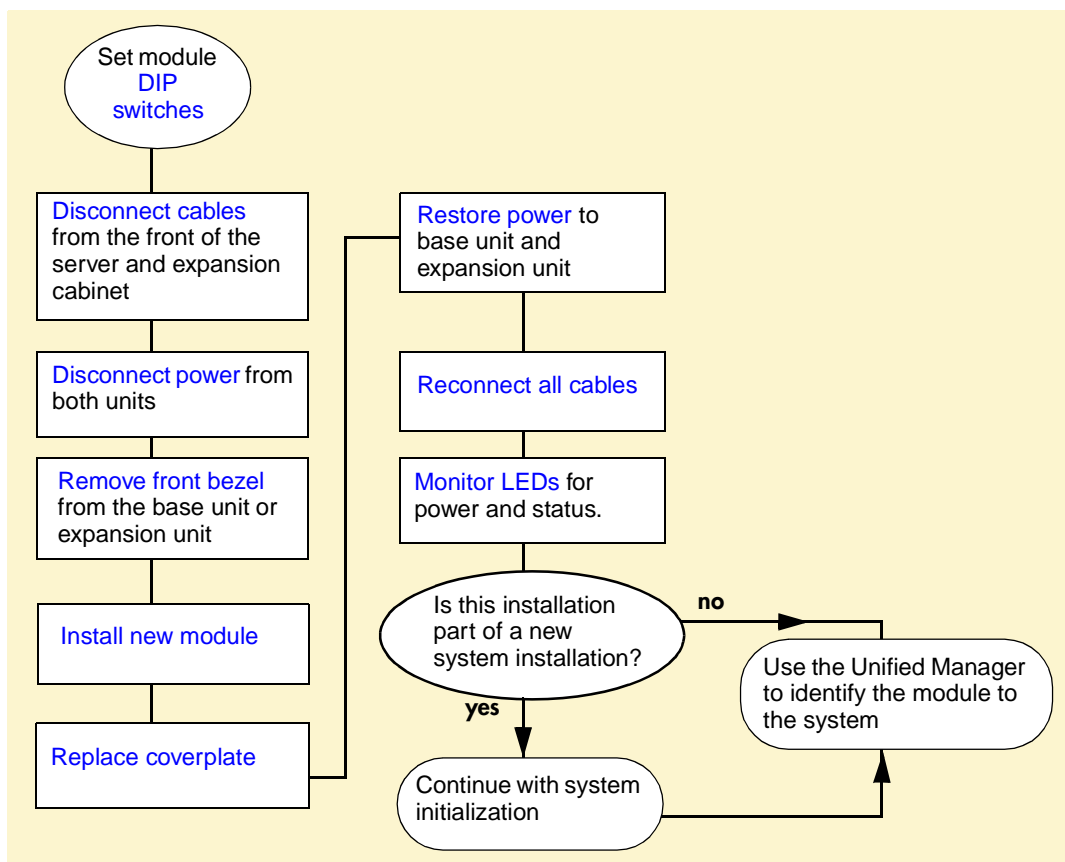
Shutting Down the System

Before you perform any maintenance procedures, read the following warnings to ensure you and your system are properly protected.

> **Warning:** If you are installing a new system, or new base unit or expansion unit, refer to Chapter 11, "Installing Telephones and Peripherals," on page 147 for instructions about installing a new system before you connect the system to the ac power outlet.
>
> **Warning:** DO NOT continue with module installation until you ensure the base unit and expansion unit are set to the correct voltages (version 2.0 systems with standard power supply).

> **Warning:** Failure to follow procedures to properly disconnect the Business Communications Manager base unit and expansion unit, can result in module or system damage.

> **Warning:** Ensure you are properly grounded before handling modules or any components that are part of the Business Communications Manager hardware.

This section describes the recommended procedure for shutting down the Business Communications Manager prior to installing new modules.

1 If you are adding or replacing a module in an active system, follow these steps first:

   a Choose **System**.

   b Click the **Logoff** menu and then click **Shutdown**.

   c Click the **Yes** button.

   d Wait until the Status changes to **Complete! It is safe to turn off the system**.

   e Click the **Done** button.

   f Exit the Unified Manager.

2 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.

3 Ensure the cables connected to the front of the base unit and the expansion unit are clearly marked.

4 Remove the cables from all the media bay modules and the MSC on the Business Communications Manager base unit front panel and the expansion unit, if there is one.

5 Disconnect the base unit and expansion unit power cords from the ac outlet.

Installing a Media Bay Module

After the system is powered down, you can install and remove media bay modules, as required. Follow these procedures to install a media bay module. Reverse the procedure to remove modules.

1   Ensure that the switches on the media bay module are set correctly. For information about how to set the switches, refer to Chapter 8, "Installing Media Bay Modules," on page 115.

In the case of FEM modules, the switches activate the front ports. Ensure that the switches accurately reflect the ports you require. Refer to "FEM Switch Settings" on page 113.

2   Remove the front bezel from the unit where you want to install or remove the module by grasping the edges and pulling forward. Refer to Figure 41.

Figure 41   Removing the front bezel
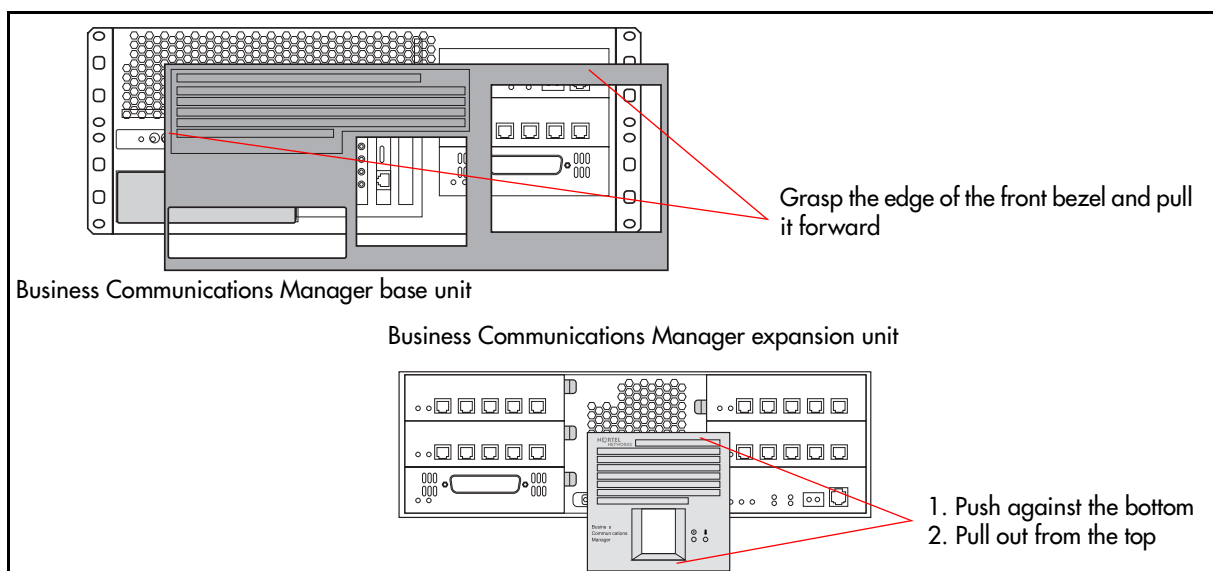
3   Select an open media bay.

4   Pull the latch beside the selected bay to release the media bay bezel. Refer to Figure 42.

Figure 42   Identifying the media bay module latches
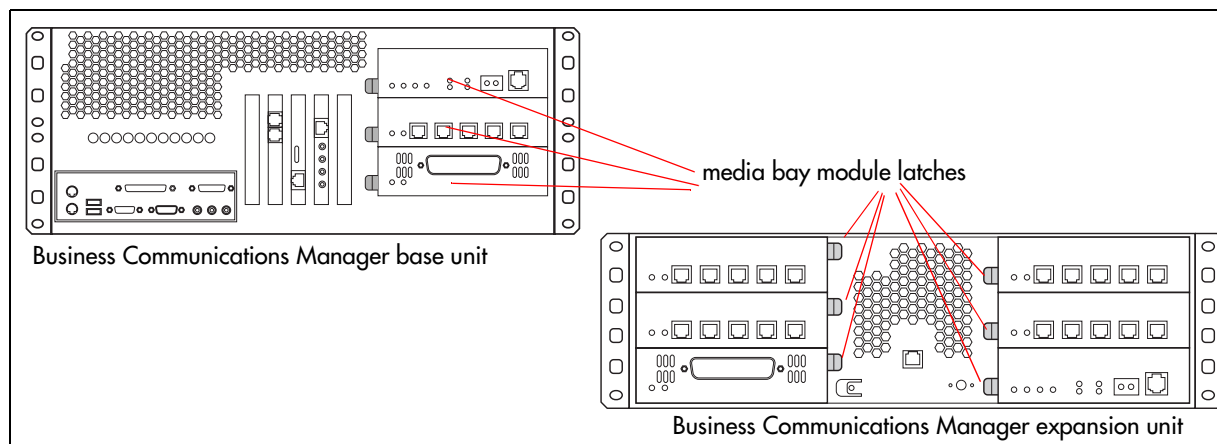
5   With the face of the module facing towards yourself, insert the media bay module into the open bay.

6   Push the media bay module into the unit. You will hear a click when the module is firmly seated in the media bay.

> ➡   **Note:** The module sits slightly forward from the face of the Business Communications Manager. When the front bezel is replaced, the module face is flush with the surface of the unit.

7   Repeat steps 4 to 6 for each media bay module you want to install.

8   Replace the front bezel on the base unit or expansion unit.

Reconnecting the Equipment

After you install the module correctly into the bay, you must return the equipment to operation in an orderly way.

Follow these steps carefully to ensure that you return your system to operation without endangering the equipment or yourself.

1   Plug the power cords for the Business Communications Manager base unit and the expansion unit, if there is one, back into the ac outlets.

> ➡   **Note:** The Business Communications Manager system starts up when you connect the ac power cord. System startup takes several minutes to complete.

2   Connect the cables to the proper outlets on the media bay modules and the MSC on the server.

> ⬛   **Caution:** DECT modules
>
> Plug the base station RJ45 cables into the DECT module one at a time. Ensure each base station begins the startup sequence before plugging in the next module.

3   Check that the LEDs on the modules are on and static. Refer to "Checking System Power and Status" on page 123 for a detailed description of the LED states.

4   Test existing functions to confirm their operation.

5   Configure the module. Refer to the *Business Communications Manager Programming Operations Guide* for details.

Replacing Media Bay Modules

When media bay modules require replacement, follow the steps in this section.

⚠️ **Warning:** This section describes replacing a module with the same type of module. If you want to replace a module with a different type of module, you must treat it as a new installation. Refer to Chapter 7, "Media Bay Module Switch Settings," on page 95 and review Figure 39 on page 100 to ensure the new module does not overrun any lines already assigned to other modules.

Figure 43   Overview of module replacement process
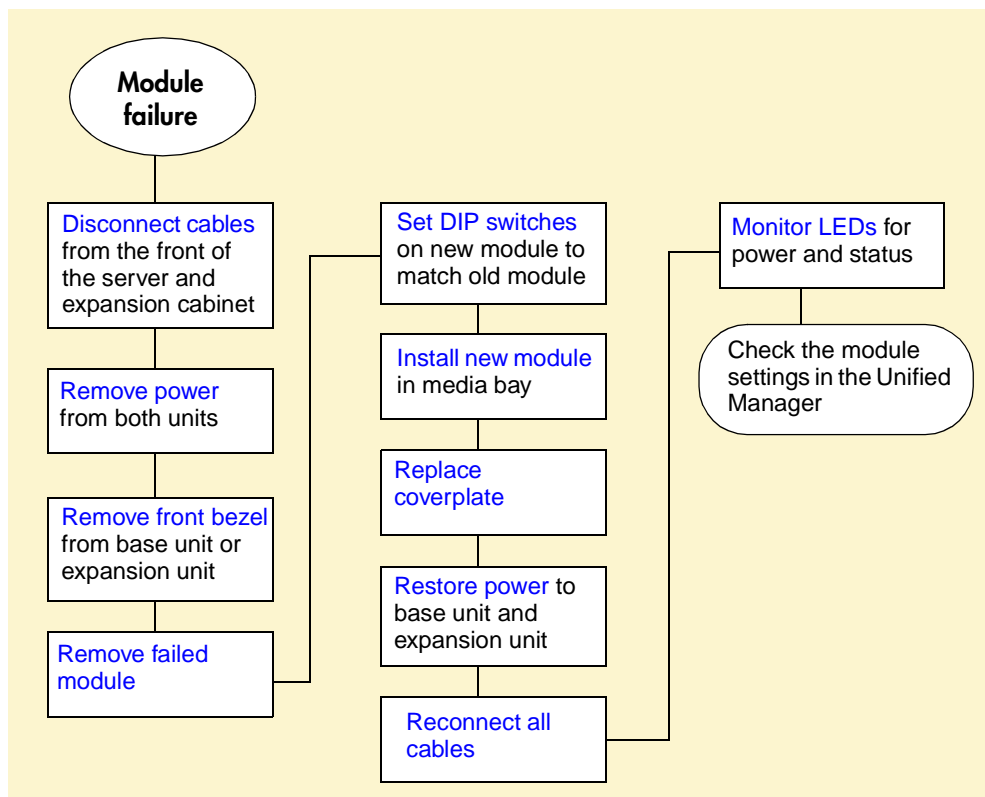
If a media bay module fails, follow this procedure to properly replace the module.

1   Follow the steps in "Shutting Down the System" on page 116 to ensure the system shuts down correctly.

2   Remove the front bezel from the unit where the module resides.

3   Pull the latch beside the module to be replaced to release the module. Refer to Figure 42 on page 117.

4   Slide the module out of the bay where it is installed.

5   Record the switch settings from the old module.

6 Set the DIP switches on the new module to match the settings you recorded in step 3.

7 Refer to "Installing a Media Bay Module" on page 117 to install the module into the media bay.

8 Refer to "Reconnecting the Equipment" on page 118 to restore the system to operation.

Installation/Replacement Troubleshooting

The Business Communications Manager media bay modules are working when both the Power and Status LEDs on the modules are on, with no blinking.

• If the Power LED does not light, refer to "Shutting Down the System" on page 116. After the Business Communications Manager is correctly shut down, remove the module and check the connectors at the back of the module for dirt or loose connections.

   After you reinstall the module, if the LED still does not light, install a different module into that bay to check for a possible fault in the backplate. If the second module works, assume that the first module is defective and replace it with a new module.

• If the Power LED lights, but the Status light does not light, or continues to blink, wait 10 minutes to allow for information download. If the light continues to blink, power down the system and check the DIP switch settings on the module.

• If the LEDs are on solid, but the module cannot communicate or be communicated with, check the Unified Manager settings for the module.

For information about the LEDs on the Business Communications Manager base unit and expansion unit, refer to See Table 24 on page 123.

Chapter 9
Starting the System

The Business Communications Manager base unit and expansion unit are each powered through an ac outlet. The voltage required depends on the geographical location of the units.

All systems are initially set at the factory, based on the intended destination.You must check that the voltage and wiring are correct for you system before you connect any of the units to the power source. Incorrect power settings result in equipment damage

Read the following warnings. You must protect yourself and the Business Communications Manager units from possible electrical shocks.

> ⚠️ **Warning:** Use only qualified persons to service the system.
>
> The installation and service of this unit must be performed by service personnel with the appropriate training and experience. Service personnel must be aware of the hazards of working with telephony equipment and wiring. They must have experience in techniques that minimize any danger of shock or equipment damage.

> ⚡ **Danger:** Electrical shock hazards
>
> Electrical shock hazards from the telecommunications network and ac mains are possible with this equipment. To minimize risk to service personnel and users, the Business Communications Manager system must be connected to an outlet with a third wire ground. In addition, all unused slots must have blank faceplates installed. The covers on all units must be in place at the completion of any servicing.

> ⚠️ **Warning:** Leakage currents
> Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events near network lines. These leakage currents normally safely flow to Protective Earth ground via the power cord.
>
> System shutdown: You must disconnect the media bay module cables from the system before disconnecting the power cord from an earthed.
>
> System startup: You must reconnect the power cords to an earthed outlet before reconnecting the cables to the media bay modules.

Checking Power and Wiring

The Business Communications Manager system is a global product. Therefore, you must ensure that the power supply is correct for your location.

- 2.0 hardware has a standard power supply which requires manual adjustment for the voltage by setting a switch located on the face of the power supply.
- 2.5 systems have standard power supplies and redundant power supplies which adjust automatically to the required voltage.

Follow this procedure to check the voltage and wiring, and power up the system:

1 Check all wiring before connecting power to the Business Communications Manager units.

> **Warning:** Connecting power
>
> Always connect power to the base and expansion units before you reconnect the cabling to the front of the units.

2 Connect the Business Communications Manager base unit power cord to an electrical outlet that is a non-switchable, third wire ground ac outlet.

If you use a power bar, plug the power cords into the power bar and connect the power bar to the ac outlet.

3 Connect the Business Communications Manager expansion unit power cord to an electrical outlet that is a non-switchable, third wire ground ac outlet.

> **Danger:** Do not fasten power supply cords.
> Do not fasten the Business Communications Manager base unit or Business Communications Manager expansion unit power supply cords to any building surface.

Checking System Power and Status

After you connect power to the Business Communications Manager system, the Power LED on the front of the base unit and expansion unit lights. Refer to Figure 44. Once the system services have reactivated, the Status LED turns solid green.

Figure 44   LEDs confirm that base unit is active

power/status
These two LEDs are solid green
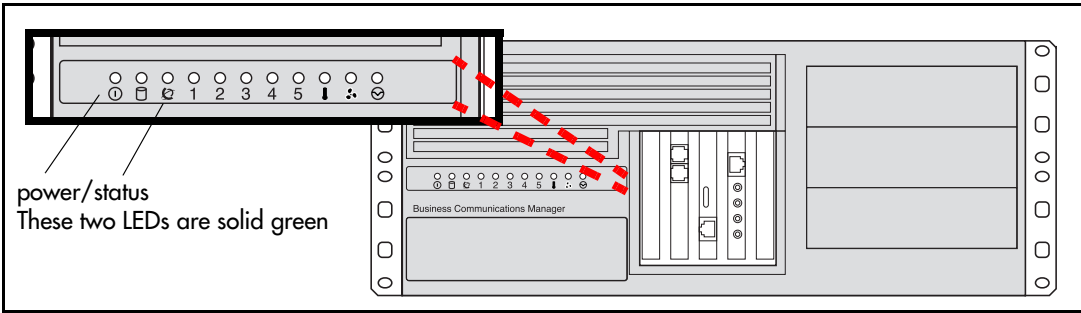
> **Note:** During system initialization, the system performs diagnostics on the hardware configuration size and installation. If the power fails, system data remains in memory.

Table 24 describes the possible operating states of the LEDs on the front of the Business Communications Manager base unit. The Business Communications Manager expansion unit has both a power and a status LED, which provide the same indicators as for the base unit.

Table 24   Business Communications Manager base unit LED states

LED Label	Description	Green LED On	Green LED Flash	Red LED On (Only)	Green LED Off
(power symbol)	Indicates state of system power.	OK	N/A	a minimum of 1 PS needs attention	N/A
(disk symbol)	Indicates access to the system disk drive	indicates heavy activity to the disk drive	N/A	N/A	N/A
(status symbol)	Indicates condition of system status	all monitored services are functioning	in startup/ shutdown mode	N/A	not all services are working
1	PCI Device/ WAN Port #1	Device is present and the driver is active	driver is not running	N/A	Device is not present.
2	PCI Device/ WAN Port #2	Device is present and the driver is active	driver is not running	N/A	Device is not present.
3	PCI Device	Device is present and the driver is active	driver is not running	N/A	Device is not present.

Table 24   Business Communications Manager base unit LED states (Continued)

LED Label	Description	Green LED On	Green LED Flash	Red LED On (Only)	Green LED Off
4	PCI Device	Device is present and the driver is active	driver is not running	N/A	Device is not present.
5	PCI Device	Device is present and the driver is active	driver is not running	N/A	Device is not present.
🌡	Temperature	Temperature is below threshold.	N/A	Temperature is in alarm status.	N/A
✹	Fans	All installed fans are working	N/A	There is a problem with a fan.	N/A

1   If the Power LED does not light:

    a   Disconnect the power cords.

    b   Check all cables and power connections. Ensure that the ac outlet has power.

    c   Reconnect the power cords.

2   When the system power is on, and the system has successfully booted, the power and status LEDs on the faceplates of the media bay modules are lit and remain constant. Figure 45 shows an example of a media bay module and the LEDs on the module faceplate.

Figure 45   Module power and status LEDs

All modules have a power and status LED

DSM16
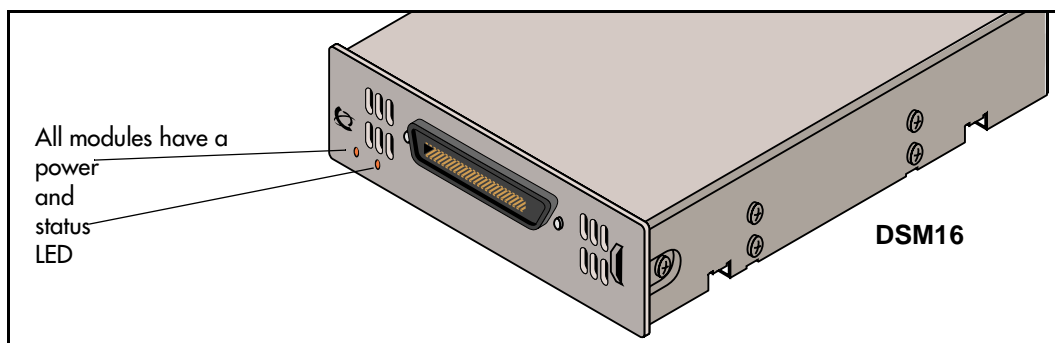
Table 25   Module power and status LED states

LED Label	Description	Green LED On	Green LED Flash	Red LED On (Only)	Green LED Off
⏻	Indicates state of system power.	OK	Check for hardware problem with fan, power or heat inside housing	a minimum of 1 PS needs attention	no power to the module
✪	Indicates condition of system status	all monitored services are functioning	in startup/shutdown mode check for problem with MSC wiring	N/A	not all services are working, MSC may not have started correctly

3   You are now ready to connect the system to the network and initialize it.

> ➡ **Note:** You can monitor the state of the base unit LEDs from your computer. Refer to "Using the System Status Monitor to Monitor LEDs" on page 198.

Connecting the Data Networking Hardware

This section describes how to connect network cards to the Business Communications Manager system.

> ⚠ **Warning:** Check with your network administrator before you connect the Business Communications Manager base unit to the network to ensure there are no IP address conflicts.
> The default address for the Business Communications Manager system:
>
> - IP: 10.10.10.1
> - Subnet: 255.255.255.0
>
> **Warning:** If the default IP address would create a network conflict, you must change the IP address of the Business Communications Manager base unit before you connect any network connections.
> To change the IP address outside of a network, you can use one of the following:
>
> - a terminal and a null modem cable
> - a computer and an ethernet crossover cable
>
> Refer to "Using a Null Modem Serial Cable" on page 131 or "Using an Ethernet Crossover Cable" on page 134 for detailed instructions about connecting to the base unit.

Connecting the Cards

The data networking hardware is installed in the Business Communications Manager base unit at the factory. All systems that use remote data management have one LAN card. Some systems have a LAN and a WAN card. Some systems can have two LAN cards. Some systems also have a modem card. Figure 46 shows one of four profiles available.

Figure 46   Locating the data cards on the base unit

WAN card   Modem card   LAN card

Note: This illustration shows a profile 1 data card setup. Your system may not have all the cards indicated.
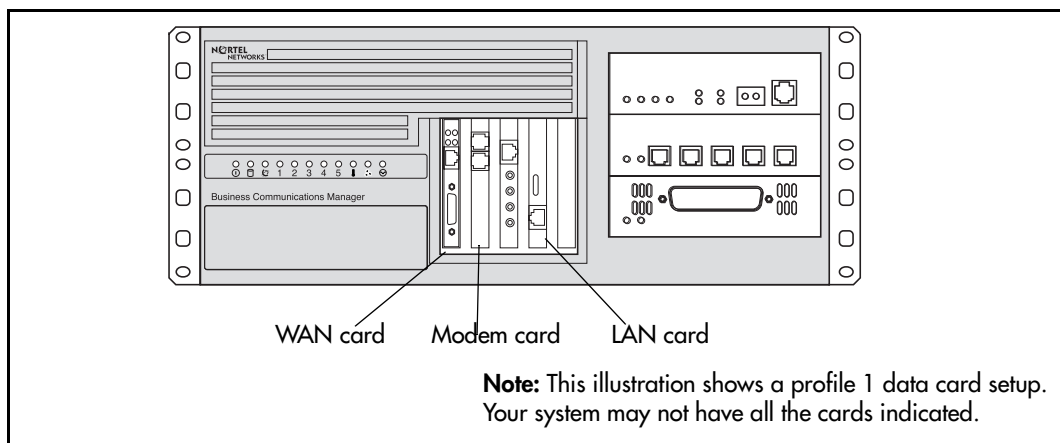
⚠️ **Warning:** Do not plug these cables into the system unless it is running.

For maintenance shutdowns, ALWAYS follow this process:

a   Shut down the software through the Unified Manager, if possible.

b   Remove all cable connects from the front of the base unit and expansion unit.

c   Remove power from the base unit and the expansion unit.

d   DO NOT RECONNECT the cables to the front of the units until the power connection has been restored.

Connecting Wiring to the LAN Card

LAN card face
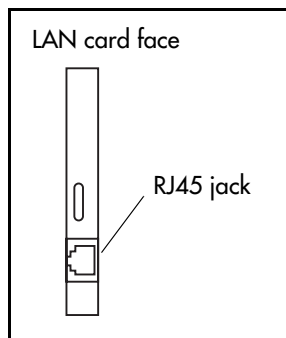
RJ45 jack

Ensure the system is powered up before connecting this cable.

To connect the LAN card, insert the local area network (LAN) cable into the RJ45 jack on the LAN card.

For information about the location of the LAN card, refer to Figure 46 on page 126.

Connect Wiring to the WAN Card

WAN card face

RJ48c jack

DB26 connector
(female)
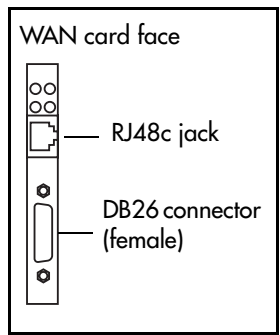
Ensure the system is powered up before connecting this cable.

To connect the WAN card using the RJ48C connector, insert the wide area network (WAN) cable into the RJ48C jack on theWAN card.

For information about the location of the WAN card, refer to Figure 46 on page 126.

To connect the WAN card using the DB26 connector, use an adapter cable to connect the wide area network (WAN) cable to the DB26 connector on the WAN card. These adapter cables are available from your Business Communications Manager supplier.

Note: Not all systems are equipped with a WAN card.

Table 26 shows the wire connections for a DB25 adapter cable.

Table 26 DB25 adapter cabl e

DB26 on WAN card	Signal	DB25 cable	DB26 on WAN card	Signal	DB25 cable
1	Chassis Ground	1	14		14
2	Transmit Data	2	15	Transmit Clock	15
3	Receive Data	3	16		16
4	Request to Send	4	17	Receive Clock	17
5	Clear to Send	5	18		18
6	Data Set Ready	6	19		19
7	Signal Ground/ Common Return	7	20	Data Terminal Ready	20
8	Data Carrier Detect	8	21		21
9		9	22		22
10		10	23		23
11		11	24	External Clock	24
12		12	25		25
13		13	26		

Connect Wiring to the Modem Card

Modem card face

RJ45 jack
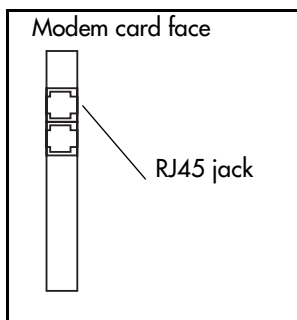
Ensure the system is powered up before connecting this cable.

To connect the modem card, insert a PSTN line into the Line jack on the modem card.

For information about the location of the modem card, refer to Figure 46 on page 126.

Note: Not all systems are equipped with a modem card.

Table 27 shows the wire connections for a RS-422/EIA 530 cable

Table 27   RS-422/EIA 530 adapter cable

DB26 on WAN card	Signal	RS-422/EIA 530 cable	DB26 on WAN card	Signal	RS-422/EIA 530 cable
1	Protective Ground	1	14	Transmit Data B	14
2	Transmit Data A	2	15	Transmit Clock A	15
3	Receive Data A	3	16	Receive Data B	16
4	Request to Send A	4	17	Receive Clock A	17
5	Clear to Send A	5	18		18
6	Data Set Ready A	6	19	Request To Send B	19
7	Signal Ground	7	20	Data Terminal Ready A	20
8	Data Carrier Detect A	8	21		21
9	Receive Clock B	9	22	Data Set Ready B	22
10	Data Carrier Detect B	10	23	Data Terminal Ready B	23
11	External Clock B	11	24	External Clock A	24
12	Transmit Clock B	12	25		25
13	Clear To Send B	13	26		

Table 28 shows the wire connections for a V.35 adapter cable.

Table 28   V.35 Adapter Cable

DB26 on WAN card	Signal	V.35 cable	DB26 on WAN card	Signal	V.35 cable
1	Protective Ground	A	14	Transmit Data B	S
2	Transmit Data A	P	15	Transmit Clock A	Y
3	Receive Data A	R	16	Receive Data B	T
4	Request to Send	C	17	Receive Clock A	V
5	Clear to Send	D	18		
6	Data Set Ready	E	19		
7	Signal Ground	B	20	Data Terminal Ready	H
8	Data Carrier Detect	F	21		
9	Receive Clock B	X	22		
10			23		
11	External Clock B	W	24	External Clock A	U
12	Transmit Clock B	AA	25		
13			26		

Table 29 shows the wire connections for a DB15 X.21 adapter cable.

Table 29   DB15 X.21 adapter cable

DB26 on WAN card	Signal	DB15 X.21 cable	DB26 on WAN card	Signal	DB15 X.21 cable
1	Chassis Ground	1	14	Transmit Data B	9
2	Transmit Data A	2	15		
3	Receive Data A	4	16	Receive Data B	11
4	Request to Send A	3	17	Receive Clock A	6
5	Clear to Send A	5	18		
6			19	Request To Send B	10
7	Signal Ground	8	20		
8			21		
9	Receive Clock B	13	22		
10			23		
11	External Clock B	14	24	External Clock A	7
12			25		
13	Clear To Send B	12	26		

Installing the Cards

Refer to Chapter 20, "Replacing Data Cards and Processing Hardware," on page 239 for the removal and installation process for these cards.

Initializing the System

After starting the Business Communications Manager system, you are ready to set the initial configuration parameters.

The initial configuration defines your Business Communications Manager to the network. It also gives the system a unique identity and initial parameters. From that point, you can continue with the specific configurations for your system, which are described in *Business Communications Manager 2.5 Programming Operations Guide*, and the other user guides for each optional application you choose to add to your system.

Required Data Parameters

Obtain the following parameter values from an Internet Service Provider (ISP) or corporate network administrator.

- initial IP address and netmask for each network interface
- primary (and optional secondary) DNS servers
- default next-hop router
- fractional T1 channel numbers (if you are using fractional TI)
- system name
- WAN link protocol
- frame relay DLCI / CIR (if applicable)
- V.90 modem settings (North America only)

Default IP Settings

All Business Communications Manager systems are shipped with this default address:

- IP: 10.10.10.1
- Subnet: 255.255.255.0

⚠ **Warning:** Before using this address on your network, check with your system administrator. If this address conflicts with the LAN settings, you can cause network damage if you connect the network without changing the IP address.

If you can use the default IP address, you can connect the Business Communications Manager server to the LAN, as described in "Connecting Wiring to the LAN Card" on page 126. This allows you to configure to the Business Communications Manager system from your PC through the Unified Manager.

Connecting When There is an IP Address Conflict

If you cannot use the default IP address, you must change the IP address of the Business Communications Manager system through one of these connections:

- a terminal and a null modem cable. Refer to "Using a Null Modem Serial Cable" on page 131.
- a computer and an Ethernet crossover cable. Refer to "Using an Ethernet Crossover Cable" on page 134.

After you set the initial parameters, you can connect to the Unified Manager through the network to complete the system setup using the Quick Start Wizard.

If you do not have a network connection, you can also access a Quick Start Wizard through a serial link.

For detailed information about configuring the Business Communications Manager system, refer to the *Business Communications Manager 2.5, Programming Operations Guide*

Using a Null Modem Serial Cable

You must use a null modem cable connection to the Business Communications Manager base unit if the default IP address is not compatible with your LAN or WAN network.

Required equipment:

- null modem cable
- VT100-compatible terminal or a computer that has a terminal program such as Hyperterminal
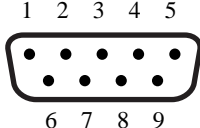
> ⚠ **Warning:** Your terminal must be VT100-compatible and must support the VT100 National Character set. If the terminal does not support the National Character set, the text displays incorrectly.

Setting Up the Null Modem Cable

Table 30 shows the correct wiring for the Business Communications Manager serial port of the null modem cable.

Table 30   Serial port pinout

Figure 47   Serial pinout

Pin	Signal
1	Data Carrier Detect (DCD)
2	* Serial data in (RX)
3	* Serial data out (TX)
4	Data Terminal Ready (DTR)
5	* Ground

Pin	Signal
6	Data Set Ready (DSR)
7	Request to Send (RTS)
8	Clear to Send (CTS)
9	Ring Indicator (RI)

1 2 3 4 5

6 7 8 9

* required connections

Transmission parameters:

- 9600 bits per second
- 8 data bits
- no parity
- 1 stop bit
- hardware flow control

→ **Note:** For instructions about how to set the transmission parameters, refer to the terminal or terminal emulation program documentation. The Business Communications Manager system supports carriage return.

Finding the Configuration Menus

To carry out this procedure, the Business Communications Manager base unit must be correctly powered up, as described in Chapter 9, "Starting the System," on page 121.

1 Attach the null modem cable to the serial port on the Business Communications Manager base unit.

> ➡ **Note:** The location of the transmit (TX) and receive (RX) pins on your terminal can vary. Refer to your terminal or computer documentation to confirm pin locations.

2 Attach the other end of the cable to the serial port on the terminal or computer.

3 Ensure that the Business Communications Manager base unit and your terminal or computer are turned on.

4 If you are using a computer, start your VT100 terminal program.

5 Press <ENTER>.

6 When prompted for a **User ID**, type:

ee_admin <ENTER>.

7 When prompted for a **Domain**, press <ENTER>.

8 When prompted for a **Password**, type: **eedge** <ENTER>

The Main Menu screen appears. Refer to Figure 48.

Figure 48   Main Menu

```
                    Main Menu
            *===========================*

            1. Initialization Menu
            2. System Configuration
            3. Configuration Wizard
            4. Media Services Card System ID
            5. Command line
            6. Reboot the system
            7. Diagnostics
            8. SSM Test
            X. Exit

            BCM ID  2.5
            Version 6.0.3
            Current Profile = 1

a selection:[1,2,3,4,5,6,7,8,X]?
```

> ➡ **Note:** If the Initialization Menu screen appears instead of the Main Menu shown above, your Business Communications Manager system is not initialized correctly.

9 If you just want to change the IP addressing, enter 2 (System Configuration) and follow the prompts.

10 If you want to configure the system through the serial port, enter 3 (Configuration Wizard). This wizard also allows you to change the IP addressing information.

This Wizard has the same information as the Quick Start Wizard that you access through the Unified Manager, but in a slightly different format. Refer to the *Business Communications Manager 2.5 Programming Operations Guide* for a detailed description of the fields that occur in the Configuration Wizard.

⚠ **Note:** When you change IP address, Region, Template and/or Start DN, the system prompts you for a restart after you accept the changes.
After the system restarts, you can continue with your system configuration.

Warning: Changing this information on an existing system completely erases the telephony programming and disables the telephony system. It also reboots the Business Communications Manager base unit and expansion unit.

Using an Ethernet Crossover Cable

You use an ethernet crossover cable connected to a computer with a network card to connect your computer to the LAN card in the Business Communications Manager base unit. With this connection, you can run Business Communications Manager Unified Manager to configure the Business Communications Manager system when you are unable to immediately connect your system to the live LAN card or your system does not have a network connection.

You use this type of connection in these situations:

• the computer you are using does not have access to the Business Communications Manager system through the network

• the Business Communications Manager is not connected to a LAN or WAN

• you have to change the IP address and netmask for the Business Communications Manager system before you connect it to the network

Setting the Crossover Connections

To connect to the Business Communications Manager using an Ethernet crossover cable, you need a computer equipped with a 10/100 Base T network interface card and TCP/IP protocol. Figure 49 shows the connections required.

Figure 49   Ethernet crossover cable

3TD+ ⟶ 3TD+
6TD- ⟶ 6TD-
1RD+ ⟶ 1RD+
2RD- ⟶ 2RD-
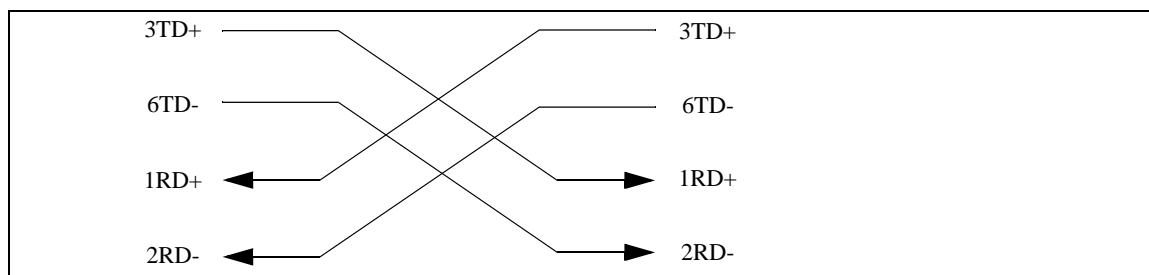
Configuring Your Computer

You must configure your computer before you use it to connect to the Business Communications Manager system.

→ **Note:** Your interface can differ, depending on what version of system software you are using. The task in this section is to specify IP and subnet addresses for the computer.

1 Click **Start, Settings, Control Panel**.

2 Double click the **Network** icon.

3 Select your TCP/IP adapter, and then click the **Properties** button.

4 Click the **IP Address** tab.

5 Click the **Specify an IP address** option.

6 In the **IP Address** field, enter `10.10.10.2`.

7 In the **Subnet Mask** field, enter `255.255.255.0`.

8 Click **OK**.

9 Click **OK**.

10 Click **Yes** to restart the PC.

Connecting the Ethernet Crossover Cable

After you configure the computer, connect the computer to the Business Communications Manager base unit in the following manner:

1 Shut down the computer.

2 Attach one end of the Ethernet crossover cable to the LAN card on the Business Communications Manager base unit.

3 Connect the other end of the cable to the network interface card on your computer.

4 Start the computer.

5 Log on to the Unified Manager using the default IP address.

6 Use the Quick Start Wizard to create the system configuration.

Refer to the *Business Communications Manager 2.5 Programming Operations Guide* for details about using the wizard. The Programming Operations Guide provides a detailed record about the information that you require to configure basic system programming.

⚠ **Warning:** If you change this information on an existing system the telephony programming is erased and the telephony system is disabled for a period of time. The Business Communications Manager also performs a cold start.

Entering the software keycodes

If you have purchased any of the optional Business Communications Manager applications that require keycode activation, refer to *Business Communications Manager 2.5 Software Keycode Installation Guide* for information about how obtain the keycodes and how to enter them into the Unified Manager. These codes can be entered after basic system configuration is complete.

Chapter 10
Wiring the Modules

This chapter describes how to wire the cables that connect to the station and trunk modules.

- Station modules require 25-pair wired cables to connect the modules to the equipment in the telephone room where your telco demarcation point is located. Use a qualified technical professional to ensure the cable wiring and your interior telephone wiring are correct.

- Trunk modules, DECT base stations, and FEM cables are connected using RJ-type jacks. These cables can be supplied by qualified technical personnel to ensure the correct pin-out.

⚠️ **Warning:** Use only qualified persons to service the system.

The installation and service of this unit must be performed by service personnel with the appropriate training and experience. Service personnel must be aware of the hazards of working with telephony equipment and wiring. They must have experience in techniques that minimize any danger of shock or equipment damage.

Warning: Leakage currents

Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events on network lines. These leakage currents normally safely flow to Protective Earth ground via the power cord. However, if the ac power is unplugged prior to disconnecting the cables from the front of the base unit, this hazard can occur.

System shutdown: You must disconnect the media bay module cables from the system before disconnecting the power cord from an earthed.

System startup: You must reconnect the power cords to an earthed outlet before reconnecting the cables to the media bay modules.

⚡ **Danger: Electrical shock hazards**

Electrical shock hazards from the telecommunications network and ac mains are possible with this equipment. To minimize risk to service personnel and users, the Business Communications Manager system must be connected to an outlet with a third wire ground. In addition, all unused slots must have blank faceplates installed. The covers on all units must be in place at the completion of any servicing.

Figure 50 on page 138 provides an overview of the process for connecting trunk and station wiring to the Business Communications Manager media bay modules.

Figure 50   Trunk and station wiring overview
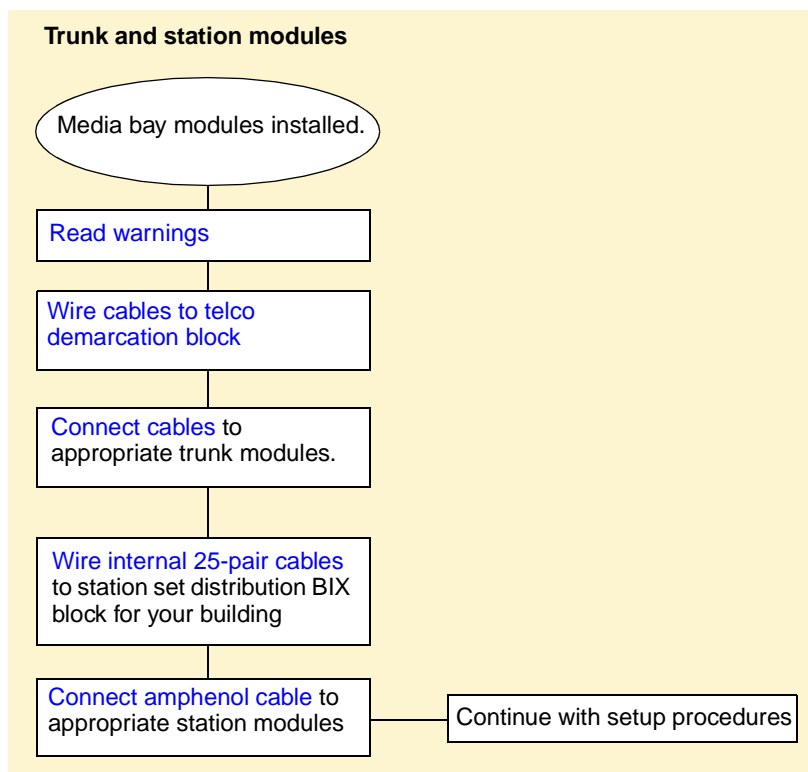
Module Wiring Warnings

⚠️ **Warning: Electrical shock warning**.

The Business Communications Manager media bay modules have been Safety approved for installation into Business Communications Manager base units and expansion units. It is the responsibility of the installer and user to ensure that installation of the Business Communications Manager hardware does not compromise existing Safety approvals.

BEFORE YOU OPEN the Business Communications Manager base unit or Business Communications Manager expansion unit ensure that the network cables are unplugged and the unit is disconnected from the ac power source.
Station modules: The ports on these modules are meant to be connected only to approved digital telephones and peripherals with the proper cables on a protected internal system.

Do not connect any telephones to wiring that runs outside of the building.

Read and follow the installation instructions carefully.

Connecting Media Bay Modules to Service Providers

To connect DTM, CTM, CTM8, 4X16 CTM, or BRI media bay modules to the network, follow these steps:

1 On the front of the module, locate the RJ48C socket (DTM), RJ45 sockets (BRI), or the RJ11 sockets (CTM and 4X16 modules).

2 Wire one end of the cable to the telco demarcation blocks of the building.

- • Figure 51 shows the wiring pin outs for a DTM to connect to a service provider.

Figure 51 DTM RJ48C wiring array

To network	To plug
Receive from network	1- Rring
	2 - Rtip
	3 - Rshield
Transmit to network	4-Tring
	5-Ttip
	6-Tshield
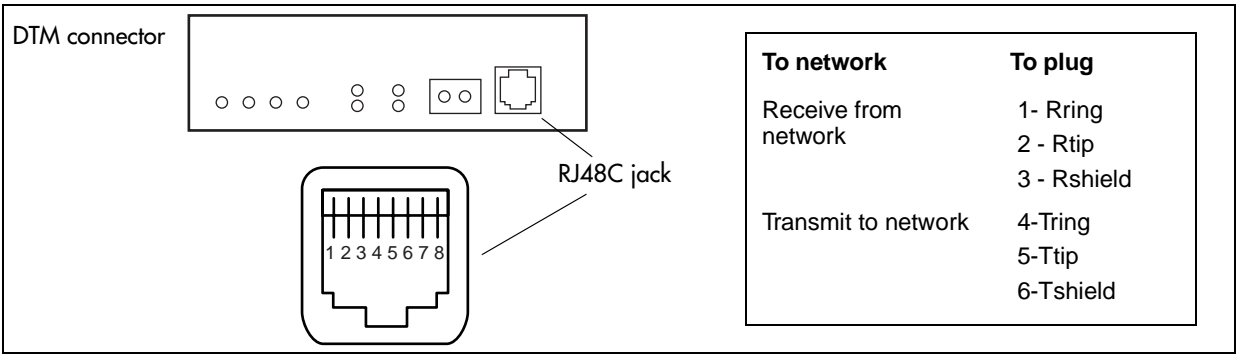
⚠ **Warning:** If you are using a service provider channel service unit (CSU), you must disable the Business Communications Manager system internal CSU using Business Communications Manager Unified Manager. For more information, refer to the *Business Communications Manager 2.5, Programming Operations Guide*.

- • Figure 52 shows the wiring pin-out for a CTM, a CTM8, or the CTM jacks on a 4X16 module, to connect to the service provider.

All the modules have an auxiliary jack (the CTM8 has two). Do not attempt to plug digital equipment into this jack.

Figure 52 CTM RJ11 wiring array

Pin #/connection
3- Ring
4 - Tip

The CTM 8 has eight RJ11 jacks, including two auxiliary jacks.

The 4X16 media bay module has four RJ11 jacks.
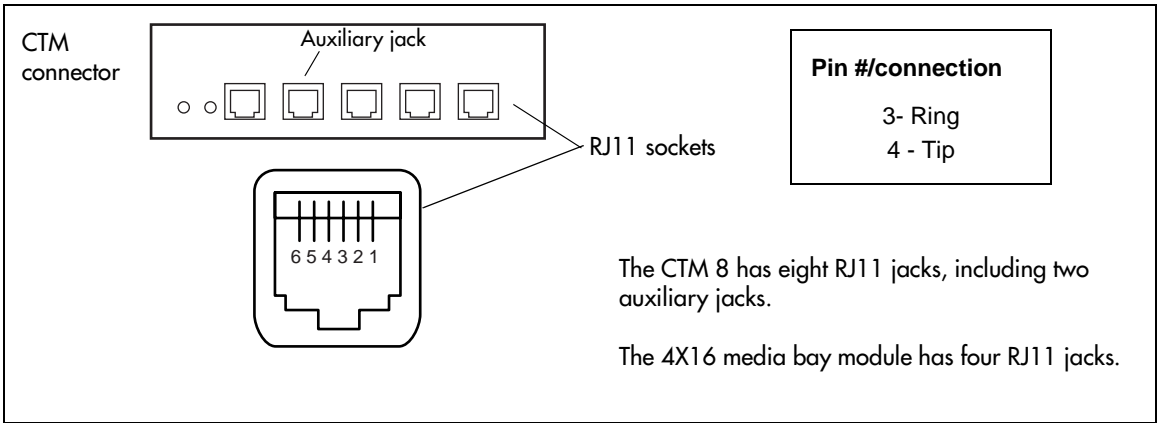
- Figure 53 shows the wiring pin-out for an BRI to the service provider.

> ⚠ **Warning:** The BRI must only be connected to an NT1 provided by the service provider. The NT1 must provide a Telecommunication Network Voltage (TNV) to Safety Extra Low Voltage (SELV) barrier.

Figure 53   BRIRJ45 wiring array
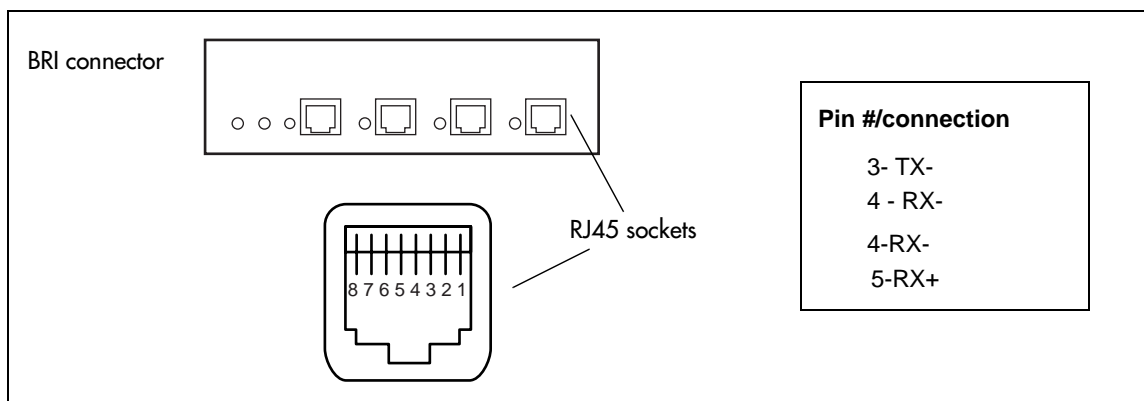
3   Insert the connector into the jack on the module.

Refer to the *Business Communications Manager 2.5 Programming Operations Guide* for steps about changing the default settings for each line/loop.

4   You can now use the Unified Manager to configure the lines or sets associated with the module. Refer to the Business Communications Manager 2.5 Programming Operations Guide.

Wiring Media Bay Modules to Internal Connections

After you have the trunk modules wired, you can install the wiring to the station modules. These are the modules which connect to the internal telephone sets.

All station module wiring uses 25-pair cable with a female amphenol connector at the module end.

> **Note:** DSM 32 modules require two 25-pair cables.

Follow these steps to connect the wiring for the DSM 16, DSM 32, ASM 8, or 4X16 modules:

1 Wire 16 wire pairs from the amphenol connector to the local connecting blocks so they connect to the 16 station sets you want connected to this module.

Use Table 31 and Figure 54 on page 142.

> **Note:** Use 16 wire pairs from each connector for the DSM 32.

> **Note:** If you are connecting an DSM 16, 4X16, or DSM 32, use Table 31 on page 142. If you are connecting an ASM 8, use the Table 32 on page 143.

For an overview of BIX wiring conventions, refer to the *Business Communications Manager 2.5 BIX Box Wiring Guide*.

Table 31 and Figure 54 provide the wiring scheme for the DSM 16, 4X16 and DSM 32 modules. The Sets heading indicates the position of the set on the BIX block. Set DNs are allocated by the Business Communications Manager based on the DS30 channel setting on the station module.

Figure 54   Wiring for DSM 16, 4X16, and DSM 32
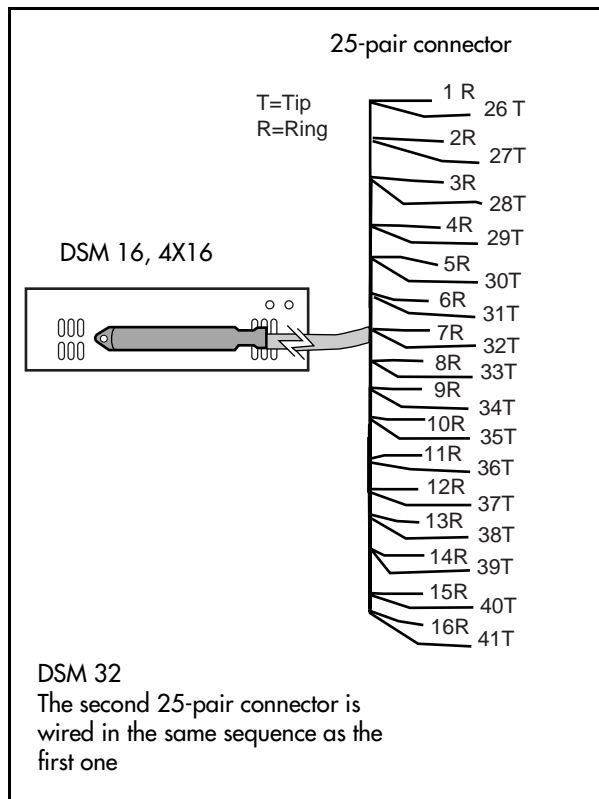
Table 31   DSM wiring chart

Pin	Wire color	Port	Sets 1st	Sets 2nd
26	White-Blue	X01	1	17
1	Blue-White	X01	1	17
27	White-Orange	X02	2	18
2	Orange-White	X02	2	18
28	White-Green	X03	3	19
3	Green-White	X03	3	19
29	White-Brown	X04	4	20
4	Brown-White	X04	4	20
30	White-Slate	X05	5	21
5	Slate-White	X05	5	21
31	Red-Blue	X06	6	22
6	Blue-Red	X06	6	22
32	Red-Orange	X07	7	23
7	Orange-Red	X07	7	23
33	Red-Green	X08	8	24
8	Green-Red	X08	8	24
34	Red-Brown	X09	9	25
9	Brown-Red	X09	9	25
35	Red-Slate	X10	10	26
10	Slate-Red	X10	10	26
36	Black-Blue	X11	11	27
11	Blue-Black	X11	11	27
37	Black-Orange	X12	12	28
12	Orange-Black	X12	12	28
38	Black-Green	X13	13	29
13	Green-Black	X13	13	29
39	Black-Brown	X14	14	30
14	Brown-Black	X14	14	30
40	Black-Slate	X15	15	31
15	Slate-Black	X15	15	31
41	Yellow-Blue	X16	16	32

Table 31   DSM wiring chart (Continued)

Pin	Wire color	Port	Sets 1st	Sets 2nd
16	Blue-Yellow	X16	16	32
42-40 17-25	no connections			

Table 32 and Figure 55 provide the wiring scheme for the eight pairs that connect to the ASM.

Figure 55   Wiring for an ASM 8

Table 32   ASM wiring chart

Pin	Wire color	Port	Set
26	White-Blue	X01	1
1	Blue-White	X01	1
27	White-Orange	X02	2
2	Orange-White	X02	2
28	White-Green	X03	3
3	Green-White	X03	3
29	White-Brown	X04	4
4	Brown-White	X04	4
30	White-Slate	X05	5
5	Slate-White	X05	5
31	Red-Blue	X06	6
6	Blue-Red	X06	6
32	Red-Orange	X07	7
7	Orange-Red	X07	7
33	Red-Green	X08	8
8	Green-Red	X08	8
34-50 9-25	no connection		
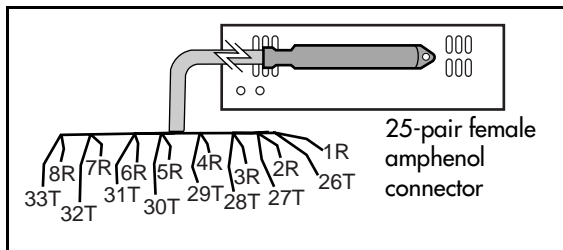
➡ **Note:** Refer to "Line and Extension Numbers for Specific Modules" on page 101 to see the relationship between the DS30 channel number and the DNs. Configuration information is included in the chapters on setting up modules and DNs in the *Business Communications Manager 2.5 Programming Operations Guide*.

2   Install the telephones and peripheral equipment (if new system):

    a   Attach the cables for the telephones to the connecting blocks.

    b   Install the telephones.

Refer to Chapter 14, "Installing Optional Telephony Equipment," on page 193.

3 Plug the female amphenol connector into the interface on the front of the module.

4 Continue with system setup.

- To install telephone sets, refer to Chapter 14, "Installing Optional Telephony Equipment," on page 193.
- To install a Companion system, refer to "The Companion Wireless System" on page 155.
- To install a DECT module, refer to "Installing DECT systems" on page 181 and the *DECT Installation and Maintenance Guide*.
- To connect analog equipment to a digit line, refer to Chapter 13, "Installing Analog Terminal Adapters," on page 183.

FEM Wiring

A Fiber Expansion module (FEM) allows you to upgrade from a Norstar system to a Business Communications Manager system by reusing the Norstar expansion modules. The expansion modules connect to the FEM module using the same fiber cable that connected them to the Norstar main housing.

⚠️ **Warning:** Handling optical fiber cables:

If the cable is too long, ensure that it is coiled correctly.
Coil excess fiber carefully.
Coil excess fiber cable carefully around the spool provided. Do not bend the cable around any tight corners. Bends in the fiber cable must not be less than 100 mm in diameter. Place the fiber cable spool into a slot at the back of the cable trough.

➡️ **Note:** If you enable all six jacks of the FEM module, the FEM module is the only module you can install on your Business Communications Manager system, because each port requires one DS30 channel. Refer to "FEM Switch Settings" on page 113.

Connecting the Fiber Cables

Follow these steps to connect your Norstar expansion modules to a FEM module installed into a Business Communications Manager base unit.

1 Ensure the Business Communications Manager is properly restarted.

2 Connect the fiber cables from the Norstar expansion modules to the jacks on the FEM module.

> ➡ **Note:** Which DIP switch settings you chose will determine which FEM ports are available. Refer to "FEM Switch Settings" on page 113.

   a Connect the Norstar Line Modules to the FEM beginning at fiber port 1.

   b Connect Norstar Extension Modules to the FEM beginning at fiber port 6.

3 Change the DN records in the Unified Manager or change the set wiring, as required, to match your system.

> ⚠ **Warning:** When you connect a Norstar station module to an FEM, the extension numbers of the telephones connected to the station module change. To keep the same extension numbers, change the DNs of the telephones or change the telephone wiring to correspond with the required DNs.

> ➡ **Note:** If you connect a Norstar station module amphenol cable directly to a DSM, you do not have to change any settings to maintain the DN assignments.

Table 33 compares the designated extension numbers on the Norstar and on the Business Communications Manager.

Table 33 Extension comparison chart

Ports	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DS30 channel 2, FEM port 1																
Norstar	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236
BCM	225	226	227	228	221	222	223	224	233	234	235	236	229	230	231	232
DS30 channel 3, FEM port 2																
Norstar	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252
BCM	241	242	243	244	237	238	239	240	249	250	251	252	245	246	247	248
DS30 channel 4, FEM port 3																
Norstar	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268
BCM	257	258	259	260	253	254	255	256	265	266	267	268	261	262	263	264

Table 33   Extension comparison chart

Ports	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DS30 channel 5, FEM port 4																
Norstar	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284
BCM	273	274	275	276	269	270	271	272	281	282	283	284	277	278	279	280
DS30 channel 6, FEM port 5																
Norstar	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
BCM	289	290	291	292	285	286	287	288	297	298	299	300	293	294	295	296
DS30 channel 7, FEM port 6																
Norstar	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316
BCM	305	306	307	308	301	302	303	304	313	314	315	316	309	310	311	312

Chapter 11
Installing Telephones and Peripherals

You can add telephones and peripherals before or after you initialize your system. Set configuration is determined by the which station module you are using, and what DS30 channel settings you chose for the module. Refer to Chapter 8, "Installing Media Bay Modules," on page 115.

The system creates default settings for the telephone DN records when it is first initialized. The settings are based on which telephony profile you chose. To change these settings, use the Unified Manager application. Specific instructions for configuring telephone operation through the Unified Manager are contained in the *Business Communications Manager 2.5 Programming Operations Guide*.

> ➡ **Note:** Programming occurs on the set when the Business Communications Manager recognizes the set on the system.

Digital and Analog Telephones

The Business Communications Manager system supports Norstar and Business Series Terminals as well as the Nortel Networks i2004 IP telephones and the Nortel Networks i2050 Software Phone. Refer to "Telephones and Adapters" on page 65 for a description of the sets the system supports.

Analog telephones are supported either through analog modules (ASMs) or by connecting to a digital module through an Analog Terminal Adapter 2 (ATA2).

Documentation describing installation and set features is supplied with each piece of equipment.

> ⬛ **Caution:** Do not use telephones as off-premises extensions (OPX)
> Digital and analog telephones must not be installed on any connections not protected by building equipment.

Analog Terminal Adapter

The Analog Terminal Adapter 2 (ATA 2) connects a standard analog voice device or data communication device to a digital line connector on the Business Communications Manager system.

Refer to Chapter 13, "Installing Analog Terminal Adapters," on page 183 for the requirements and procedure for installing the device.

Central Answering Position (CAP)

The Central Answering Position (CAP) module connects to an M7324 telephone. The module provides 48 additional memory buttons. For installation procedures for the CAP, refer to the installation documents that came with the CAP.

Telephone Port and DN Cross-reference

The media bay module the analog and digital telephones are connected to dictates DNs and port numbers. Use Table 34 to identify which port your telephones are connected to. For future reference, put a checkmark beside the ports where there are sets installed.

➡ **Note:** The following table is based on a system with three-digit DNs, with a start DN of 221. If your system has longer DNs, the system automatically adds a 2 for each additional DN length unit. i.e. 221 becomes 2221. Appendix B, "Media Bay Module Combinations," on page 269 contains a blank table to use if you changed the start DN on your system.

Table 34 Cross referencing ports and DNs

Pin	Wire color	DS 30 channel 2		DS 30 channel 3		DS 30 channel 4		DS 30 channel 5		DS 30 channel 6		DS 30 channel 7	
26	White-Blue	DN 221		DN 237		DN 253		DN 269		DN 285		DN 301	
1	Blue-White	Port 201		Port 301		Port 401		Port 501		Port 601		Port 701	
27	White-Orange	DN 222		DN 238		DN 254		DN 270		DN 286		DN 302	
2	Orange-White	Port 202		Port 302		Port 402		Port 502		Port 602		Port 702	
28	White-Green	DN 223		DN 239		DN 255		DN 271		DN 287		DN 303	
3	Green-White	Port 203		Port 303		Port 403		Port 503		Port 603		Port 703	
29	White-Brown	DN 224		DN 240		DN 256		DN 272		DN 288		DN 304	
4	Brown-White	Port 204		Port 304		Port 404		Port 504		Port 604		Port 704	
30	White-Slate	DN 225		DN 241		DN 257		DN 273		DN 289		DN 305	
5	Slate-White	Port 205		Port 305		Port 405		Port 505		Port 605		Port 705	
31	Red-Blue	DN 226		DN 242		DN 258		DN 274		DN 290		DN 306	
6	Blue-Red	Port 206		Port 306		Port 406		Port 506		Port 606		Port 706	
32	Red-Orange	DN 227		DN 243		DN 259		DN 275		DN 291		DN 307	
7	Orange-Red	Port 207		Port 307		Port 407		Port 507		Port 607		Port 707	
33	Red-Green	DN 228		DN 244		DN 260		DN 276		DN 292		DN 308	
8	Green-Red	Port 208		Port 308		Port 408		Port 508		Port 608		Port 708	
34	Red-Brown	DN 229		DN 245		DN 261		DN 277		DN 293		DN 309	
9	Brown-Red	Port 209		Port 309		Port 409		Port 509		Port 609		Port 709	

Table 34   Cross referencing ports and DNs (Continued)

Pin	Wire color	DS 30 channel 2		DS 30 channel 3		DS 30 channel 4		DS 30 channel 5		DS 30 channel 6		DS 30 channel 7	
35	Red-Slate	DN 230		DN 246		DN 262		DN 278		DN 294		DN 310	
10	Slate-Red	Port 210		Port 310		Port 410		Port 510		Port 610		Port 710	
36	Black-Blue	DN 231		DN 247		DN 263		DN 279		DN 295		DN 311	
11	Blue-Black	Port 211		Port 311		Port 411		Port 511		Port 611		Port 711	
37	Black-Orange	DN 232		DN 248		DN 264		DN 280		DN 296		DN 312	
12	Orange-Black	Port 212		Port 312		Port 412		Port 512		Port 612		Port 712	
38	Black-Green	DN 233		DN 249		DN 265		DN 281		DN 297		DN 313	
13	Green-Black	Port 213		Port 313		Port 413		Port 513		Port 613		Port 713	
39	Black-Brown	DN 234		DN 250		DN 266		DN 282		DN 298		DN 314	
14	Brown-Black	Port 214		Port 314		Port 414		Port 514		Port 614		Port 714	
40	Black-Slate	DN 235		DN 251		DN 267		DN 283		DN 299		DN 315	
15	Slate-Black	Port 215		Port 315		Port 415		Port 515		Port 615		Port 715	
41	Yellow-Blue	DN 236		DN 252		DN 268		DN 284		DN 300		DN 316	
16	Blue-Yellow	Port 216		Port 316		Port 416		Port 516		Port 616		Port 716	

Installing an Emergency Telephone

You can use the emergency telephone to make calls when there is no power to the Business Communications Manager system.

To install an emergency telephone on the Business Communications Manager system, connect a single line analog telephone to the auxiliary port on the CTM. When you make a call from the emergency telephone, the auxiliary port uses the telephone line connected to the Line 1 port of the CTM.

→ **TIP:** You can connect an emergency telephone to every CTM installed on your Business Communications Manager system.

Use the following steps to install the emergency telephone.

1   Connect a single line analog telephone to the auxiliary port on the CTM.

2   Connect an analog PSTN line cable to the Line 1 port of the CTM.

Installing IP Telephones

The Business Communications Manager currently supports the Nortel Networks i2004 IP telephone and the Nortel Networks i2050 Software Phone. The system automatically assigns DNs to these sets in the digital set range. Ensure that the DN type in each DN record is set to IP telephony.

- B1 line DNs can default to unused DNs from 221 to 376.
- B2 line DNs can default to unused DNs from 377 to 472.

For details about configuring DN records, refer to the *Business Communications Manager 2.5 Programming Operations Guide.*

Use Table 35 to record the DNs for your IP sets.

Table 35   IP telephony DNs

IP address	Default DN B1	Default DN B2	Notes

Installing Radio-based Portable Systems

There are two types of radio-based systems available for the Business Communications Manager system. Availability depends on the geographical location of the system and is determined by the region you select for the system during system configuration.

Companion Wireless Systems

In North America, you can install the Companion Wireless system, which allows you to provide wireless units that are tied to stationary sets. This allows you to accommodate users who are mobile within the range of the system.

You can add up to 60 Companion handsets on a fully-configured Companion system.

"Mobility Services by Region" on page 259 lists the region profiles that can accommodate the Companion system.

Refer to Chapter 12, "Installing Companion or DECT Systems," on page 155 for installation instructions.

DECT Systems

A DECT module installed into the Business Communications Manager provides a pathway for a maximum of 32 cordless handsets to access the system. The handsets can either be twinned with stationary sets, or they can act as independent sets.

Refer to "Mobility Services by Region" on page 259 lists the region profiles that can accommodate the DECT system.

The DECT system has a separate set of documentation describing the installation of the module, radio base station, and cordless handsets.

The *Business Communications Manager 2.5 DECT Installation and Maintenance Guide* describes:

- how to install the module and the base stations
- how to run the DECT Wizards to set up the module and make it ready for subscribing the handsets
- how to subscribe the handsets

Recording Installed Sets

Companion sets default to DNs in the 565 to 596 DN range and use the DN type NA Portable.

DECT sets are ISDN sets, and use the DN range of 597 to 624 with DN type ISDN and DECT. If you require more than 28 DECT handsets, use DNs from the NA Portable range and change the DN type to ISDN and DECT. The Unified Manager provides a DECT Wizard that helps you coordinate the handset DNs between the Business Communications Manager and the DECT module. Refer to the DECT documentation for details about using the Wizard.

> → **Note:** On systems upgraded from 2.0 to 2.5, with three-digit DNs starting at DN 221, DECT handsets default to the 501 to 532 DN range.
>
> These numbers are based on systems with three-digit DNs that use the default DN of 221. If you change either of those settings on your system, adjust the numbering accordingly.

Use Table 36 on page 153 to record the DNs for your Companion or DECT handsets.

Table 36 Wireless DNs

Companion			DECT			
DN	Custom DNs	Installed set	DN	Upgrade DNs	Custom DNs	Installed set

Moving Telephones

You can move an Business Communications Manager telephone to a new location within the system without losing its programmed settings if the telephone has been enabled with Set relocation. When you enable Set relocation (automatic telephone relocation), the internal numbers, autodial settings, and personal speed dial codes remain with the telephone when you disconnect the telephone.

However, if you connect a different telephone to the jack before you reconnect the moved telephone, the new telephone takes the programmed settings. The Business Communications Manager system can no longer identify the old telephone.

After you plug a moved set into a new jack, the Business Communications Manager system can take 45 seconds to identify the telephone. Programming relocation takes three minutes to complete. Wait for this to occur before you change any settings for the telephone in the system.

Warning: If you disconnect a relocated telephone before the relocation programming is complete, the telephone can lose the programmed settings.

Note: Automatic telephone relocation is disabled by default.

Chapter 12
Installing Companion or DECT Systems

This chapter describes the two radio-based systems that can be added to the Business Communications Manager system to provide mobile communications.

Both systems require radio-equipped base stations connected to specific types of media bay modules installed in the Business Communications Manager.

- The Companion requires a DSM module for the base stations to plug into. Refer to "The Companion Wireless System" on page 155.
- DECT provides virtual BRI loops within the DECT module. Refer to "Installing DECT systems" on page 181.

The Companion Wireless System

Your Companion portable telephone allows you to leave your desk without missing important telephone calls. The portable telephones can access most Business Communications Manager business features such as call forward, call transfer, voice conference, and voice messaging using feature codes.

Figure 56 provides an overview of the process for installing a Companion wireless system onto the Business Communications Manager system.

Figure 56   Overview of installing a Companion system
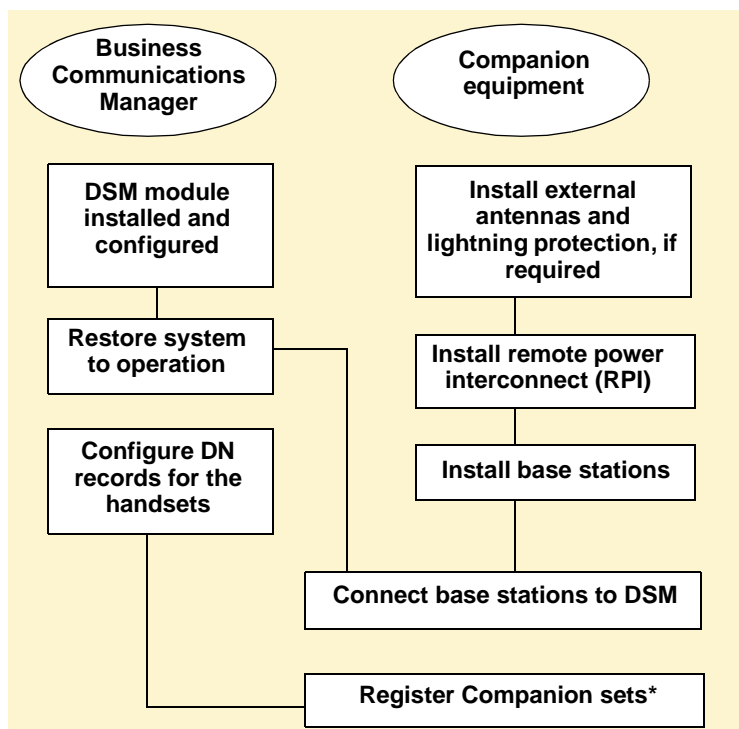
*In the United States, you must enter a UTAM keycode before you register the handsets.

> ➡ **Note:** Companion wireless availability is region-specific. Refer to "Mobility services, by region" on page 259. This option also requires a software keycode for activation.

Companion Components

Business Communications Manager Companion has four main components:

Software - Companion software manages the telephone traffic between Companion base stations and portable telephones. Base stations connect to Business Communications Manager in the same way that Business Communications Manager sets do. You register the Companion portable telephones on the system. They do not require any ports on the system. You can connect a maximum of 60 portable telephones and a maximum of 32 base stations (32 cells) to the system.

> ➡ **Note:** If you choose a 3/5 channel split for your system, you cannot assign a module to channel 7. This limits you to a maximum of 16 base stations, which can support a maximum of 30 handsets.

Companion base stations — Position the base stations around the coverage area to send and receive calls between the portable telephones and Business Communications Manager. Base stations use digital radio technology and support handoff and roaming within the coverage area. The coverage area can be a maximum of 160,000 square meters (1,700,000 square feet) when using the maximum number of base stations.

Companion wireless handsets — Business Communications Manager supports the following wireless handsets: Companion 3020, Companion C3050 Etiquette, Companion C3050 CT2Plus, and Companion C3060.

The portable telephones used with your Business Communications Manager system are small, lightweight units with complete digital performance to provide clear voice quality. Companion portable telephones feature a three-line, 16-character, alphanumeric display.

Administration and Maintenance Tools — Programming of the Companion system is easily and quickly done through the Business Communications Manager Unified Manager. You can assign portable telephones to the system, check base station parameters, and enable and disable registration through programming.

Companion Diagnostics Software allows you to run diagnostics on the wireless system. You run the diagnostics using a personal computer located at the customer site or in a remote location.

For more information about programming Companion and running diagnostics, see the *Business Communications Manager 2.5, Programming Operations Guide*.

Installing the Companion Hardware

The Companion hardware must be in place and configured before you can use the handsets to connect to the Business Communications Manager. This section describes the installation of the various pieces of hardware.

The base station has the option of using internal or external antennas. For most installations, the internal antenna will be used. If you need to install external antennas, refer to "Installing External Antennas and Lightning Surge Protection" on page 171.

Installing a RPI for the Base Stations

The remote power interconnect unit (RPI) provides remote power for base station support. Figure 57 shows a diagram of the RPI.

Caution: The RPI unit must have the DC backup power supplied by a UL listed universal power supply (UPS).

The UPS must have an output voltage rating of 44 to 52 V DC, with a maximum fault current limit of 6 A to protect the RPI output wiring. If these requirements are not met, it is necessary to use class 1 wiring.

Warning: You must install the RPI units inside a building.

The AC outlet powering the RPI must be installed near the equipment and must be easily accessible.

The length of the RPI cord, from the outside surface of the unit to the plug, must be a minimum of 1.3 m (4.5 ft) and a maximum of 4.6 m (15 ft).

Figure 57 RPI unit
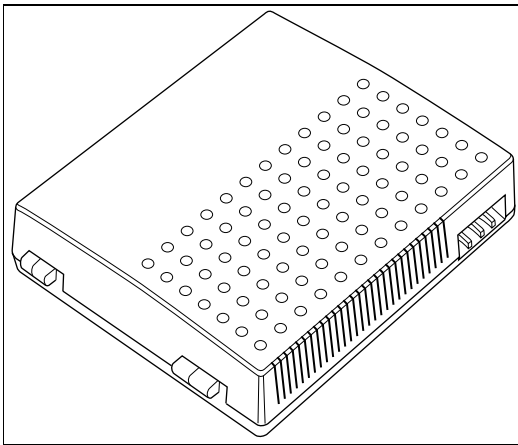
There are two versions of the RPI unit:

- The RPI-8 BIX UL supports a maximum of eight base stations.
- The RPI-16 BIX UL supports a maximum of 16 base stations.

Each RPI has a connection printed-circuit board and either one (RPI-8 BIX UL) or two (RPI-16 BIX UL) power supply units (PSUs). The maximum input power consumption of an RPI is 240 W. If you use a UPS 48 V dc backup source, the maximum input power requirement of the RPI is 140 W.

You can upgrade an RPI-8 BIX UL to an RPI-16 BIX UL by installing a second PSU to the RPI-8 BIX UL.

If you distribute the RPIs around the site, the number and type of RPIs depend on where you place and how you power the base stations.

To determine how many base stations and how many PSUs you need for the number of base stations, use the following table:

Table 37   RPI Requirements

Base stations	RPI-16 and RPI-8 required	PSUs required
1–8	1 RPI-8	1 PSU
9–16	1 RPI-16	2 PSUs
17–24	1 RPI-16 and 1 RPI-8	3 PSUs
25–32	2 RPI-16	4 PSUs

Mounting the RPI Unit

When you mount the RPI unit, ensure you follow these guidelines:

- To provide acceptable ventilation and to prevent overheating, leave a clearance of a minimum of 125 mm (5 in.) around the RPI.
- If you are installing two RPIs, one above the other, leave a clearance of a minimum of 300 mm (12 in.) between them to provide acceptable ventilation and to prevent overheating.
- Install RPIs a minimum of 300 mm (12 in.) from the ceiling.

This procedure explains how to mount the RPI unit.

1 Partially screw in two #10 50 mm (2 in.) screws using the dimensions shown in Figure 58.

Figure 58   RPI mounting holes
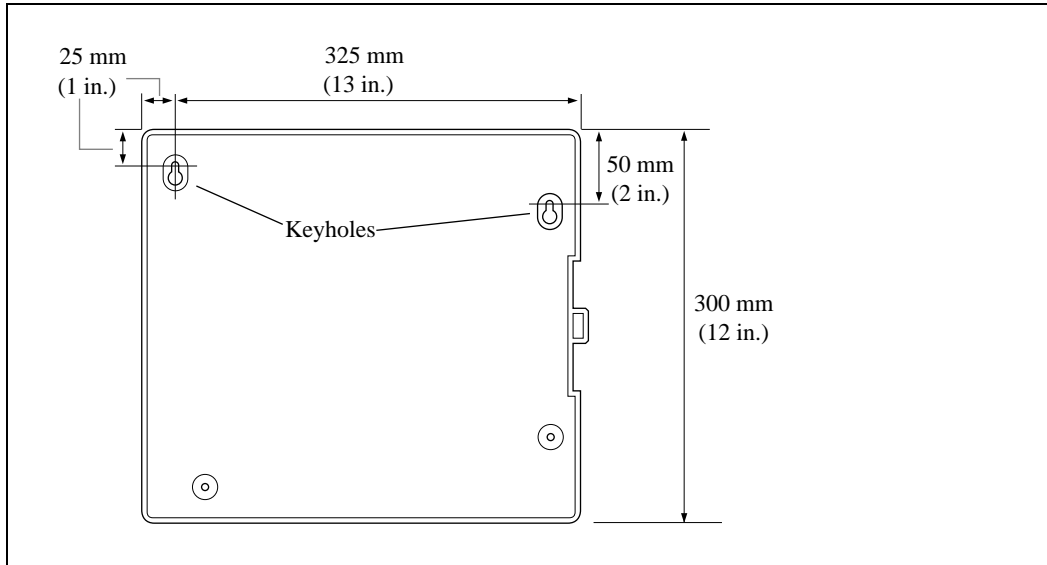
2 Open the cover with a screwdriver. Use the screwdriver to push in, and then down, to release the latch on the right side. Remove the cover by lifting it up. Refer to Figure 59.

Figure 59   Opening the RPI cover
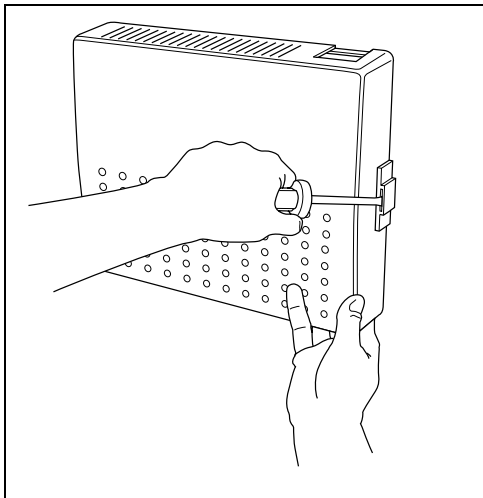
3 Hang the RPI on the two screws and tighten the screws.

4 Install the remaining two screws.

5 Feed the power cord through the bottom of the RPI and route it through the clip and around the strain relief support. Figure 60 shows how to route the power cord.

Figure 60   RPI components
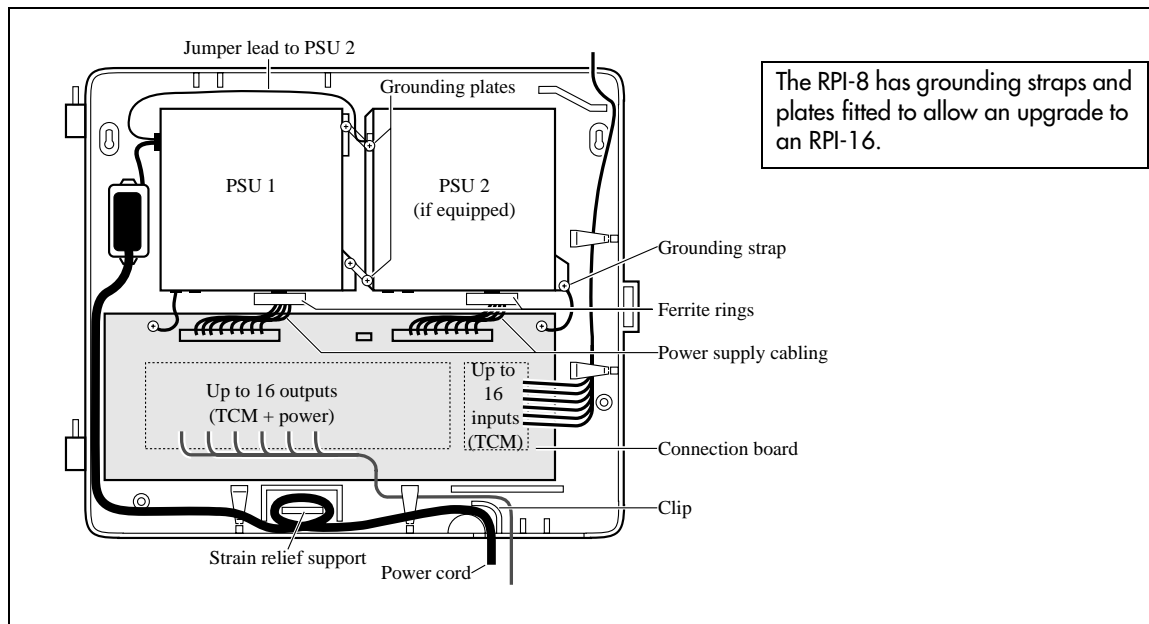
6 Route the power cord to the input power socket just to the left of PSU 1.

7 Connect the plug to the socket.

8 Follow the appropriate wiring instructions in the wiring charts in the next section, "Wiring the and Connecting the RPI".

Caution: Do not apply power to the RPI until its installation and wiring are complete.

9 After the cable is wired correctly, connect the RPI power cord to the ac outlet.

10 Label each RPI.

Wiring the and Connecting the RPI

The maximum two-way DC loop resistance for power pairs, including interconnections for each base station, is 75 ohms. You need one or two power pairs between the RPI and the base station. The number of power pairs depends on the wire size of the power pair and the distance between the base station and the RPI.

🛑 **Caution:** Do not run unprotected power cables outdoors.

The maximum cable distances allowed between the RPI and the base station depend on the size of wire you use. Refer to Table 38.

Table 38 Cable distances

Wire size	Single pair	Double pair
0.6 mm (22 AWG)	800 m (2,500 ft.)	1200 m (4,000 ft.)
0.5 mm (24 AWG)	500 m (1,500 ft.)	1000 m (3,000 ft.)

🛑 **Caution:** When you use two power pairs, connect both pairs with the same polarity.

Connecting the RPI

Connect the power pairs to the correct connectors. Figure 61 shows the location of the input and output connectors on the RPI connector printed-circuit board.

Figure 61 RPI connector printed-circuit board
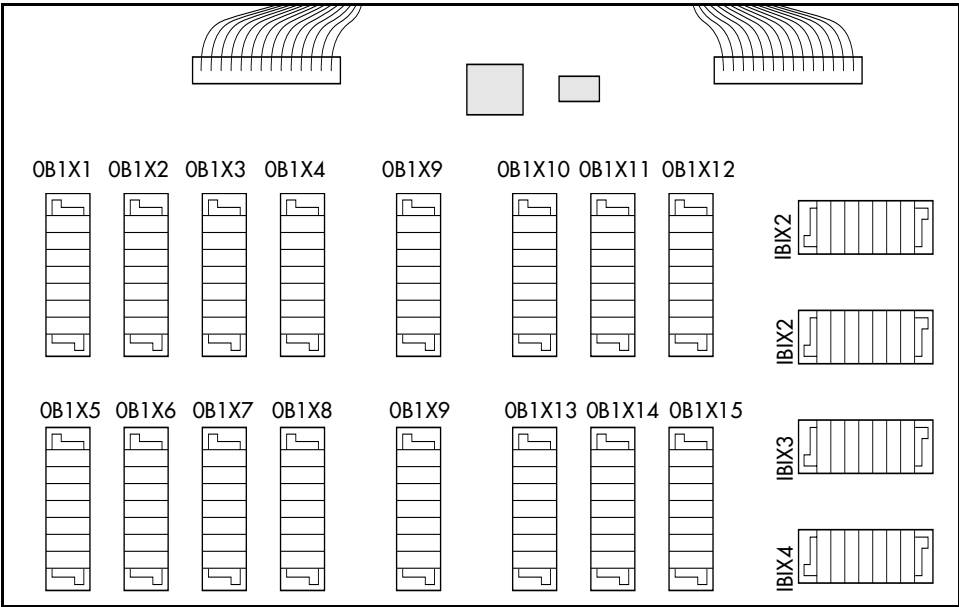
RPI Output Connections

Feed the output pairs in through the bottom of the RPI and route the pairs to the output connectors. Figure 62 shows how to route the output pairs. If you use one pair to power a base station, connect the power pair to -PWR(1) and +PWR(1). If you use two pairs to power a base station, connect one pair to -PWR(1) and +PWR(1), and the second pair to -PWR(2) and +PWR(2).

> **Caution:** Ensure both pairs have the same polarity.
> If you connect two power pairs with opposite polarities, you can damage the base station and RPI.

Figure 62   Output connector pinout
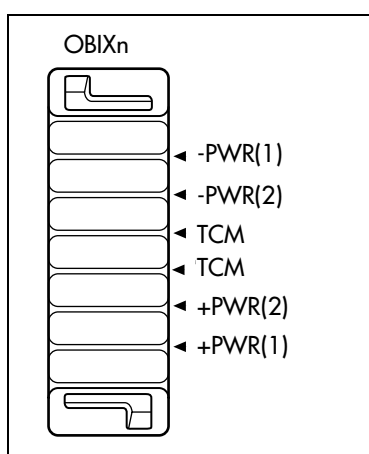
RPI Input Connections

Feed the TCM input pairs from the Business Communications Manager distribution frame through the top of the RPI and route them to the input connectors (IBIX1 to IBIX4).

Figure 63 shows how to route the input pairs. The maximum number of input pairs in an RPI installation is 16. Table 39 lists the pinout and signal references.

Figure 63   Input connector pinout
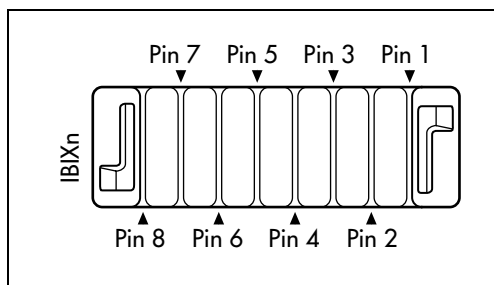
Table 39   Input wiring

Connector	Pin	Signal	Output connector
IBIX1	1, 2	TCM 1	OBIX1
	3, 4	TCM 2	OBIX2
	5, 6	TCM 3	OBIX3
	7, 8	TCM 4	OBIX4
IBIX2	1, 2	TCM 5	OBIX5
	3, 4	TCM 6	OBIX6
	5, 6	TCM 7	OBIX7
	7, 8	TCM 8	OBIX8
IBIX3	1, 2	TCM 9	OBIX9
	3, 4	TCM 10	OBIX10
	5, 6	TCM 11	OBIX11
	7, 8	TCM 12	OBIX12
IBIX4	1, 2	TCM 13	OBIX13
	3, 4	TCM 14	OBIX14
	5, 6	TCM 15	OBIX15
	7, 8	TCM 16	OBIX16

RPI-8 BIX Wiring Chart

Table 40 lists the wiring chart for the RPI-8 BIX.

Table 40   RPI-8 BIX wiring chart

Pin	RPI Connector printed-circuit board	Label	Wire color
26	OBIX1 BS1	-PWR	White-Blue
1			Blue-White
27		TCM	White-Orange
2			Orange-White
28		+PWR	White-Green
3			Green-White
29	OBIX2 BS2	-PWR	White-Brown
4			Brown-White
30		TCM	White-Slate
5			Slate-White
31		+PWR	Red-Blue
6			Blue-Red

Table 40   RPI-8 BIX wiring chart (Continued)

Pin	RPI Connector printed-circuit board	Label	Wire color
32	OBIX3 BS3	-PWR	Red-Orange
7			Orange-Red
33		TCM	Red-Green
8			Green-Red
34		+PWR	Red-Brown
9			Brown-Red
35	OBIX4 BS4	-PWR	Red-Slate
10			Slate-Red
36		TCM	Black-Blue
11			Blue-Black
37		+PWR	Black-Orange
12			Orange-Black
38	OBIX5 BS5	-PWR	Black-Green
13			Green-Black
39		TCM	Black-Brown
14			Brown-Black
40		+PWR	Black-Slate
15			Slate-Black
41	OBIX6 BS6	-PWR	Yellow-Blue
16			Blue-Yellow
42		TCM	Yellow-Orange
17			Orange-Yellow
43		+PWR	Yellow-Green
18			Green-Yellow
44	OBIX7 BS7	-PWR	Yellow-Brown
19			Brown-Yellow
45		TCM	Yellow-Slate
20			Slate-Yellow
46		+PWR	Violet-Blue
21			Blue-Violet
47	OBIX8 BS8	-PWR	Violet-Orange
22			Orange-Violet
48		TCM	Violet-Green
23			Green-Violet
49		+PWR	Violet-Brown
24			Brown-Violet

RPI-8 BIX Wiring Chart

Table 41 lists the wiring chart for the RPI-16 BIX.

Table 41   RPI-16 BIX wiring chart

Pin	RPI Connector printed-circuit board	Label	Wire color
26	OBIX9 BS9	-PWR	White-Blue
1			Blue-White
27		TCM	White-Orange
2			Orange-White
28		+PWR	White-Green
3			Green-White
29	OBIX10 BS10	-PWR	White-Brown
4			Brown-White
30		TCM	White-Slate
5			Slate-White
31		+PWR	Red-Blue
6			Blue-Red
32	OBIX11 BS11	-PWR	Red-Orange
7			Orange-Red
33		TCM	Red-Green
8			Green-Red
34		+PWR	Red-Brown
9			Brown-Red
35	OBIX12 BS12	-PWR	Red-Slate
10			Slate-Red
36		TCM	Black-Blue
11			Blue-Black
37		+PWR	Black-Orange
12			Orange-Black
38	OBIX13 BS13	-PWR	Black-Green
13			Green-Black
39		TCM	Black-Brown
14			Brown-Black
40		+PWR	Black-Slate
15			Slate-Black

Table 41   RPI-16 BIX wiring chart (Continued)

Pin	RPI Connector printed-circuit board	Label	Wire color
41	OBIX14 BS14	-PWR	Yellow-Blue
16			Blue-Yellow
42		TCM	Yellow-Orange
17			Orange-Yellow
43		+PWR	Yellow-Green
18			Green-Yellow
44	OBIX15 BS15	-PWR	Yellow-Brown
19			Brown-Yellow
45		TCM	Yellow-Slate
20			Slate-Yellow
46		+PWR	Violet-Blue
21			Blue-Violet
47	OBIX16 BS16	-PWR	Violet-Orange
22			Orange-Violet
48		TCM	Violet-Green
23			Green-Violet
49		+PWR	Violet-Brown
24			Brown-Violet

Installing Companion Base Stations

Before you install wireless equipment, ensure that a site planner determines base station locations and records the base station information in a provisioning record.

> **Caution:** You must install all base stations within 1230 m (4000 ft., TCM wiring length) of the Business Communications Manager system or base station module.
> To optimize seamless hand off, the difference in TCM wiring length between neighboring base stations must not exceed 300 m (1,000 ft.).

Before you install or move wireless equipment in the United States, check that you have approval from UTAM Inc.

The United States FCC has appointed UTAM Inc. as the body responsible for coordinating and verifying the installation or relocation of unlicensed, personal wireless communication devices. To comply with UTAM Inc., the system uses keys and credits to control user capacity and to ensure system location verification. You require these software keys and credits to activate Companion services. You purchase these credits at the time you place the order.

Positioning a Companion Base Station

Avoid installing base stations on large concrete or marble columns because these columns affect radio coverage. If possible, place the base station a minimum of 1 m (40 in.) from these types of columns. Do not install a base station with the antenna housings near metal objects. Be careful not to damage existing wiring or panels.

Do not position base stations in ducts, plenums, or hollow spaces used to transport environmental air except where the duct, plenum or hollow space is created by a suspended ceiling having lay-in panels. When you need more than one base station in a cell to meet traffic requirements, position the base stations at the same cell center. To place all base stations in the same cell center:

• for the USA, a minimum of 54 in. and a maximum of 9 ft. 9 in. distance between the center of one base station to the center of another

• for Canada, a minimum of 9 cm and a maximum of 1.5 m distance from edge to edge

> **Warning:** Never install base stations in rows.

Position base stations away from office areas or areas with high portable telephone traffic. Table 42 on page 168 shows the minimum distance between office areas and base stations. Install the base station on the ceiling or high on walls to maintain these minimum distances.

Table 42   Minimum distance between office areas and base stations

Number of base stations in the cell	Minimum distance between office areas and base stations
1	1 m (40 in.)
2	1.4 m (56 in.)
3	1.8 m (72 in.)
4	2 m (80 in.)

Attaching a Companion Base Station

Install base stations on a wall or on a ceiling. When installing base stations on a wall, install them with their covers at the bottom, as shown in Figure 65 on page 169. Allow for clearances around the base station as indicated in Table 43.

Table 43   Clearance for the base stations

Clearance conditions	Canada	USA
Clearance from all other objects	9 cm	3.5 in.
Vertical clearance from base station center to base station center	27 cm	54 in.
Horizontal clearance from base station center to base station center	41 cm	54 in.

To install a base station:

1   Fasten the bracket into position using two #8 38-mm (1-1/2 in.) screws.

2   Route the cable from the Business Communications Manager system through the top or bottom opening.

3   Wind any excess cable around the posts, then fasten the cable under the strain relief.

4   Connect the wires to the BIX connector on the bracket termination board as shown in Figure 64.

Figure 64   Bracket termination board
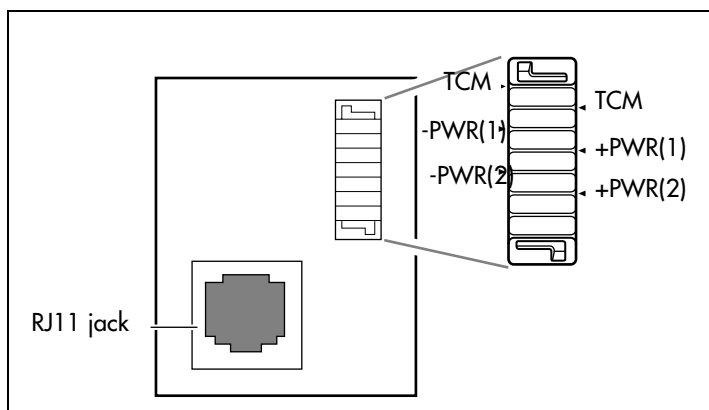
The polarity of the TCM connections is not important. If you connect the two power pairs to the bracket terminal board of the base station, you must connect the power pairs with the same polarity.

Caution: Ensure that the RPI is off before connecting power pairs to the base station.

5 Install the base station on the bracket. Snap it into position.

6 Connect the power RJ-11 jumper lead to the RJ-11 jacks on the termination board and the base station.

7 For plug top power supplies only, connect the power supply connector to the base station power connector. Make sure the base station uses a class 2 plug top power source only.

Caution: If you insert the power supply connector in the wrong direction, you can damage the plug top power supply and the base stations.
Position the power supply connector in the correct direction and push it into place.

8 In the space provided on the label attached to the lower right corner of the mounting bracket, record the port number used.

Include the marking information for all of the base stations on the completed installation floor plans.

9 Slide the cover on the bracket, using the guide to position it correctly. Refer to Figure 65.

10 Snap it into place.

Figure 65 Slide the cover on bracket
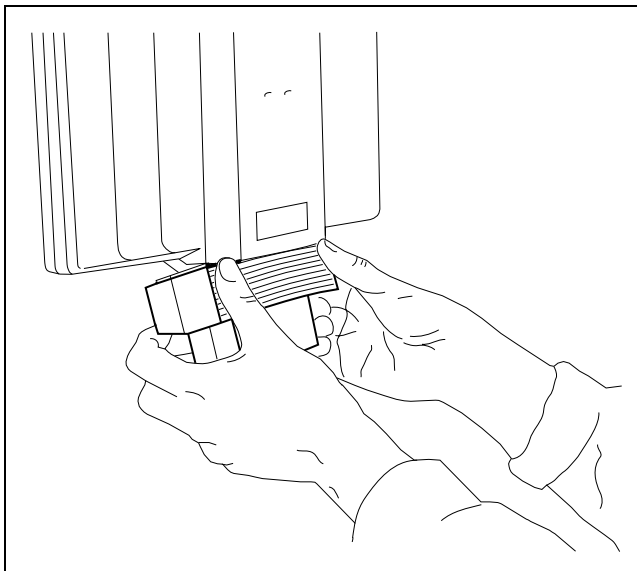
Registering Companion Sets

To use Companion portable telephones, you must first install radio base stations to transmit and receive radio signals to and from the portable telephones. See "Installing Companion Base Stations" on page 167.

You use a different method to install portable telephones than desktop telephones. There are no direct connections between the portable telephones and the system. Do the following:

- Install the batteries and battery charging units for each portable, using the instructions that come with the portable.
- Enter the software keys for Companion in the Business Communications Manager Unified Manager under **Software** keys
- Register every Companion portable for use with the system.

> → **Note:** You must register a portable telephone before you can use it. By default, Companion portable telephones are not assigned extension numbers. The range of portable extensions available for wireless registration is 061 to 118. For more information about registering and programming Companion portables, see the *Business Communications Manager 2.5, Programming Operations Guide*.

Restarting the System

If you added a base station that requires a software update, the system begins downloading the software to the base station. The display shows **BS-1 Dload Start**.

1 Press **CLEAR** to clear the message. When the base station software finishes downloading, the **BS-1 Dload Done** appears.

2 Press **CLEAR** to clear the message. Some base stations do not power up at the same time, and this message repeats at the beginning of each download.

In the United States, the display shows one of the messages listed in Table 44 after restarting:

Table 44   UTAM messages

If display shows	See
UTAM code req'd	System logical identifier (LID) information
UTAM test failed	See alarm codes in the Windows NT event log.

> ⚠ **Warning:** A loss of unlicensed transition and management for microwave (UTAM) information occurs when upgrading US Business Communications Manager systems. You need UTAM Recovery Codes.

Installing External Antennas and Lightning Surge Protection

You can use external antennas to provide a broad range for your Companion system. Ensure that any external installations comply with local regulations and include lightning surge protection.

Read Before You Install Equipment

- You must install the antenna vertically. For more information, refer to
- Use #8, 12 mm to 50 mm ($^1/_2$ in. to 2 in.) screws to install the antenna bracket and lightning surge protector bracket to the wall.
- Always ensure that the antenna is clear of any adjacent obstruction or metal objects. If you use more than one external antenna at a cell center, separate the antennas at by least 1 m (40 in.) to avoid radio interference problems.
- When running the coaxial cable inside or outside, be careful not to damage the cable. Damage to the cable affects its performance. The minimum recommended bending radius is 200 mm (8 in.).
- The coaxial cable length must not exceed 10 m (33 ft).
- Use RG-58AU coaxial cables to connect the antennas to the base stations.
- You can attach a proprietary extension cable between the lightning surge protector and the antenna or between the lightning surge protector and the base station. Make sure you keep the total cable length as short as possible and use only the recommended extension cable when necessary.
- You must install a lightning surge protector for each external antenna.

> ⚠ **Warning:** FCC requirements.
> In the United States, the FCC requires that you connect only approved antennas to Companion base stations.

> ⊖ **Caution:** Do not install the outdoor antenna or the lightning surge protector during an electrical storm.
> Always turn off the base station power before connecting the coaxial cable of an outdoor antenna.
> Always install the lightning surge protector at the cable entry point into the building.
> Connect the lightning surge protector to ground before you connect the coaxial cable.

Installing Antennas (United States of America)

The following points cover special information about installations in the United States of America.

- The outdoor antenna connectors on the base station are special proprietary BNC connectors.
- Antennas are supplied with cables attached and terminated with special proprietary BNC plugs to join with the connector on the base station.
- Cables are not supplied with outdoor antennas.

Before You Install an Outdoor Antenna (USA)

Before you install an outdoor antenna, check the following points:

- Locate the antenna on the external wall of the building.
- Keep the outdoor antenna as close as possible to the base station connected to it. The base station must always be inside the building. The recommended installation height for the antenna is 13 to 16 ft. above ground.
- Always install a lightning surge protector between an outdoor antenna and a base station. Refer to Figure 66.

Figure 66 Installed antenna and lightning surge protectors (USA)
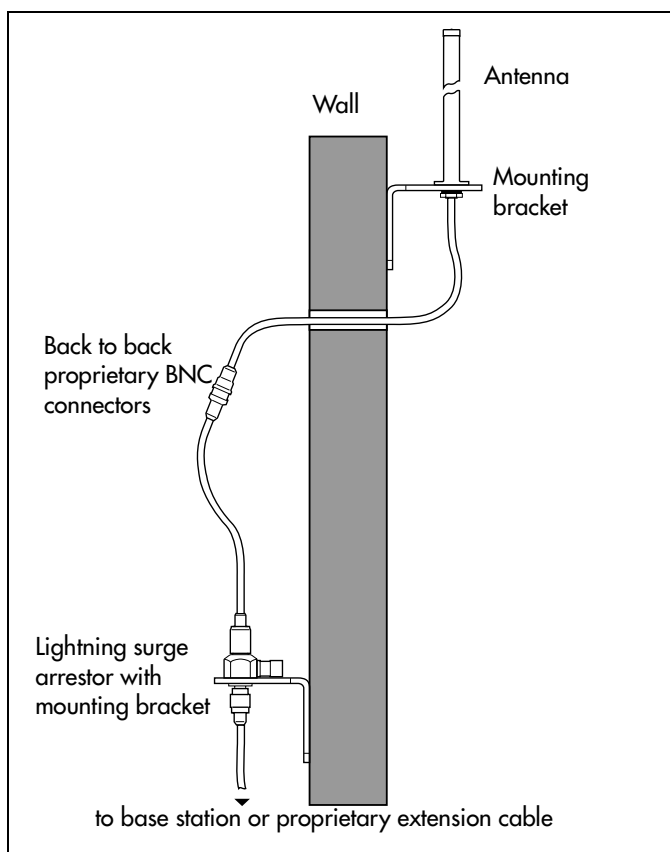
Installing an Outdoor Antenna (USA)

To install an outdoor antenna, follow these steps:

1 Make a hole for the coaxial cable.

2 Install conduit for the antenna cable according to local building and wiring codes.

3 Screw the antenna bracket to the wall so that the antenna is vertical on the exterior wall of the building.

4 Loosen the nut on the antenna.

5   Slide the antenna into the slot of the bracket and tighten the nut. Refer to Figure 67.

6   Feed the coaxial cable through the wall to the lightning surge protector on the interior wall.

Figure 67   Antenna with antenna bracket (USA)
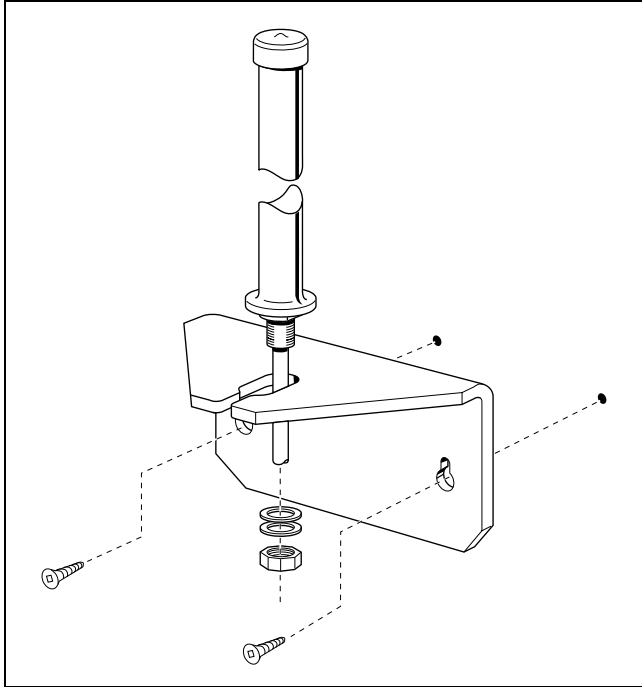
Installing a Lightning Surge Protector (USA)

Install the lightning surge protector to protect the Companion components from electrical surges.

To install a lightning surge protector, follow these steps:

1   Install the lightning surge protector on the interior wall as close as possible to the entry point of the coaxial cable from the outdoor antenna.

    Before you connect the ground lead to the lightning surge protector, attach the ground lead to an approved ground. Refer to the Wiring information tips box on the next page.

2   Route and connect the coaxial cable from the outdoor antenna to the lightning surge protector.

3   Route and connect the coaxial cable from the lightning surge protector to the appropriate base station connector. Refer to Figure 68 on page 174.

> **Tip:** Wiring information
>
> The recommended wire gauge is 6 AWG.
>
> Connect the ground lead to the building ground. Do not connect to a ground rod or series of ground rods.
>
> If you cannot connect the ground lead to the building ground, connect the ground lead to the metal frame of the building. The connection must be no more than six to 10 ft.
>
> You can connect the ground lead to the 120 V ac conduit, which is connected to the building ground. However, using the ac conduit is not the preferred method of installation.
>
> The connector between the antenna and the lightning surge protector and between the lightning surge protector and the base station is a proprietary BNC connector. You must align the BNC connectors before you can make the connection.

Figure 68   Lightning surge protector and bracket (USA)
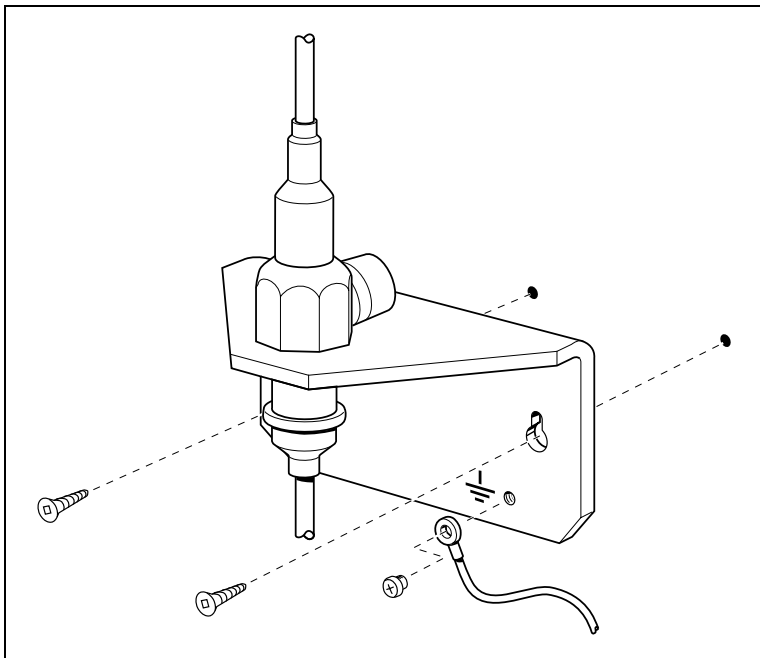
Installing Antennas (Canada)

There are three types of external antennas available in Canada:

- indoor directional antenna
- indoor omnidirectional antenna
- outdoor omnidirectional antenna

Each type of installation requires a specific installation technique. As well, you must install a lightning surge protector for every outdoor antenna installed.

Outdoor Requirements

Before you install the antenna, ensure that your plan meets the following requirements:

- If you are installing an outdoor antenna on a metal surface greater than 18 cm (7 in.) in diameter, position the antenna perpendicular to the surface.
- When running the coaxial cable inside or outside, be careful not to damage the cable, which affects its performance. The minimum recommended bending radius is 20 mm (0.8 in.).
- Always ensure that the antenna is clear of any adjacent obstruction or metal objects. If you use more than one outdoor antenna at a cell center, separate the antennas at by least 0.5 m (20 in.) to avoid radio interference problems.
- Use RG-58/U coaxial cables to connect the antennas to the base stations.

> **Caution:** Use only passive antennas to connect to the Companion base stations. The coaxial cable you use to connect the external antenna to a Companion base station must have an impedance of 50 ohms.

Installing an Indoor Directional Antenna

The indoor directional antenna has a backplate that allows for easy installation on a wall. The antenna is installed half way between the floor and the ceiling.

For some applications (for example, a stairwell), you can install the antenna on the ceiling.

1 Use four screws to install the antenna. Refer to Figure 69.

Figure 69 Indoor directional external antenna (Canada)
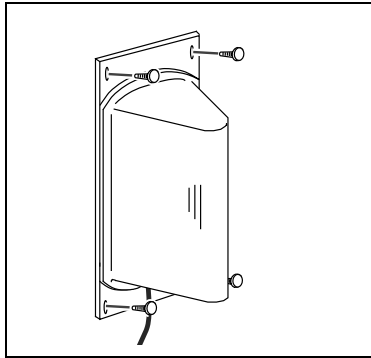
2 To prevent stress on the coaxial cable, fasten the cable to the mounting surface.

3 Connect the antenna to the appropriate base station radio.

➡ **Note:** The coaxial cable length must not exceed 10 m (33 ft.).

Installing an Indoor Omnidirectional Antenna (Canada)

To install an indoor omnidirectional antenna, use the following guidelines:

• Use the bracket supplied to install the antenna on a wall or ceiling. This bracket provides the necessary clearance between the floor or wall and the antenna.
• Mount the bracket so that the external antenna is vertical. The recommended installation position on a wall is halfway between the floor and the ceiling.

Figure 70 shows the two methods of installing the indoor omnidirectional external antenna.

Figure 70   Indoor omnidirectional external antenna (Canada)
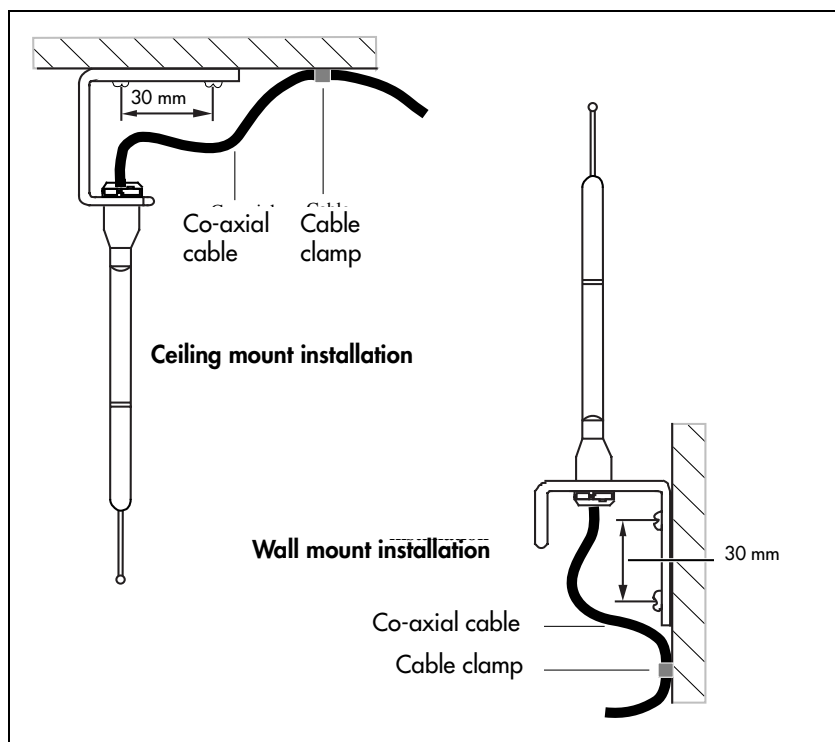
1 Insert the antenna in the bracket so that the antenna is vertical.

2 Use two screws to install the bracket to the wall or ceiling.

3 To prevent cable stress on the coaxial cable, fasten the cable to the mounting surface with a clamp.

4 Connect the external antenna to the appropriate base station.

→ **Note:** The length of the coaxial cable must not exceed 10 m (33 ft.).

Installing an Outdoor Omnidirectional Antenna (Canada)

When installing an outdoor omnidirectional external antenna, ensure you follow these guidelines:

- Locate the antenna on the external wall of the building.

> **→** **Note:** You must install the antenna on a vertical surface.

- Keep the outdoor omnidirectional external antenna as close as possible to the base station. The base station itself must always be located inside the building.
- The recommended installation height is 4 m (13 ft) to 5 m (16.5 ft) above ground level.
- Always install a surge protector between an outdoor omnidirectional external antenna and a base station.

> **→** **Note:** The connector on the outdoor omnidirectional external antenna is a TNC female connector. To connect the antenna, you need an adapter to connect the TNC connector to the BNC coaxial cables or a coaxial cable with a TNC male connector on one end and BNC male connector on the other end.

> **⬤** **Caution:** Fit lightning protection to the antenna if appropriate.
> See "Installing a Lightning Surge Protector (Canada)" on page 180 for more information.

> **⬤** Important points to remember:
>
> - Do not install the external antenna or the lightning surge protector during an electrical storm.
>
> - Always turn off the base station power before connecting the coaxial cable of an outdoor antenna.
>
> - Always install the antenna at the cable entry point into the building.
>
> - Connect the lightning surge protector to ground before connecting the coaxial cable.

To install an outdoor omnidirectional external antenna, follow these steps:

1 Screw the antenna mounting plate vertically to the exterior wall of the building with lag bolts or other appropriate hardware. Figure 71 shows how to fasten the mounting plate.

Figure 71 Install the outdoor omnidirectional external antenna (Canada)
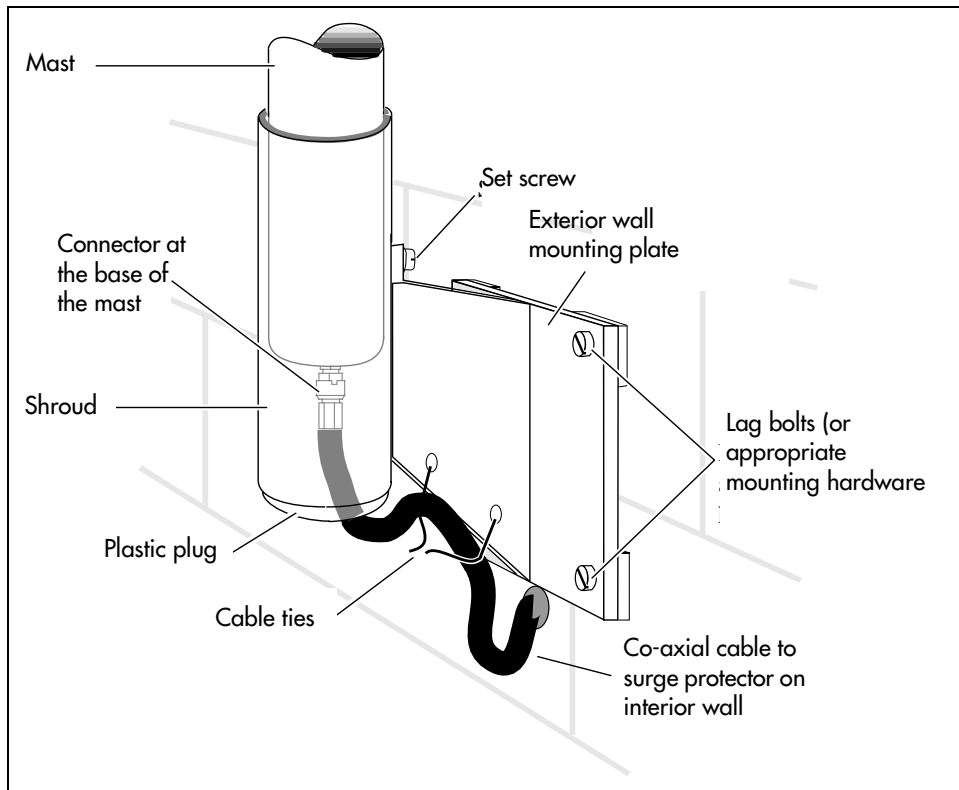
2 Feed one end of the coaxial cable up through the bottom of the antenna cover and attach the BNC connector to the base of the mast.

3 Slide the mast down into the cover until it fits.

4 Rotate the mast until the threaded hole in the base of the mast aligns with the set screw hole in the cover. Tighten the set screw.

5 Route the coaxial cable along the bottom edge of the plate between the cover and the wall plate.

> **Note:** The total length of the coaxial cables from the outdoor antenna to the base station must not exceed 10 m (33 ft.).

6 Tie the cable to the mounting plate.

7 Insert the plastic plug into the base of the cover to keep moisture out.

8 Feed the coaxial cable through the wall to the surge protector on the interior wall.

Installing a Lightning Surge Protector (Canada)

Install the lightning surge protector for the outdoor omnidirectional external antenna to protect it from electrical surges. The recommended lightning surge protector is part number A0382082. Refer to the installation instructions from the manufacturer for more details on its installation. To install a lightning surge protector, follow these steps:

1 Install the surge protector on the interior wall as close as possible to the entry point of the coaxial cable from the outdoor antenna.

Figure 72 shows where to locate the surge protector. Follow the installation instructions provided with the surge protector.

Figure 72 Install the lightning surge protector (Canada)
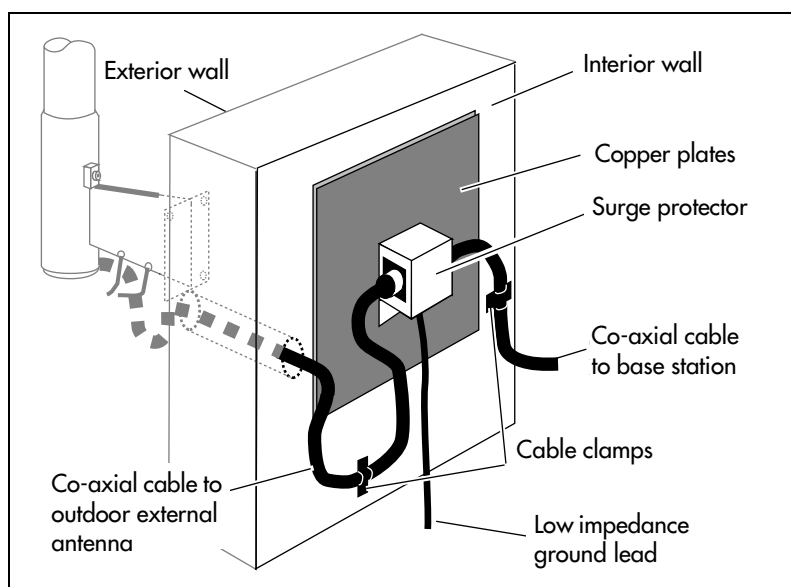
2 Attach the ground lead to an approved ground, before you connect the ground lead to the surge protector.

The recommended wire gauge is 6 AWG (4 mm). Connect the ground lead to the building ground. Do not connect to a ground rod or series of ground rods. If you cannot connect the ground lead to the building ground, connect the ground lead to the metal frame of the building. The connection must be no more than 2 m (6.5 ft.) to 3 m (10 ft.) long.

You can connect the ground lead to the 120 V ac conduit (which is connected to the building ground). However, Nortel Networks does not recommend using the 120 V ac conduit.

3 Route and connect the coaxial cable from the outdoor antenna to the surge protector.

4 Route and connect the coaxial cable from the surge protector to the appropriate base station BNC connector.

> **Note:** The total length of the coaxial cables from the outdoor antenna to the base station must not exceed 10 m (33 ft.).

Installing DECT systems

The DECT system requires a DECT media bay module to allow communication between the DECT handsets and the Business Communications Manager. The module installs in the Business Communications Manager base unit or expansion unit. A maximum of eight base stations, which are distributed throughout the transmission area, are connected to the module. After this step is complete, the handsets are subscribed to the Business Communications Manager system.

For detailed installation refer to the *Business Communications Manager 2.5 DECT Installation and Maintenance Guide*.

Each jack on the DECT module corresponds to an internal port on the DECT module. These numbers are used to access the base stations when you disable them to turn mobile recording on when you subscribe new handsets,.

> ⚠ **Warning:** Plug each base station in sequentially. Ensure that each base station starts to perform the startup sequence before plugging in the next base station. You can check base station states through the DECT module interface.
>
> **Warning:** For detailed information, refer to the *DECT Installation and Maintenance Guide*. Figure 73 demonstrates these connections.

Figure 73   R451 connectors on the DECT media bay module
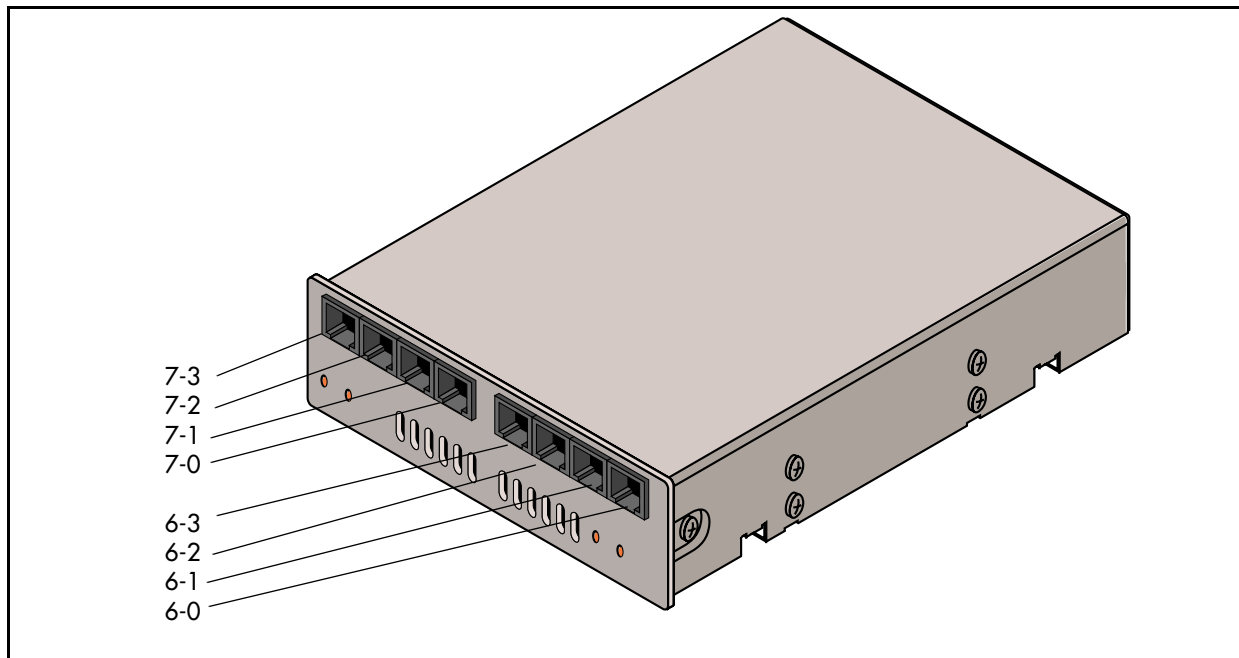
Chapter 13
Installing Analog Terminal Adapters

This chapter provides installation instructions for the Analog Terminal Adapter 2 (ATA 2).

The Analog Terminal Adapter 2 (Business Communications Manager ATA 2) connects a standard analog voice device or data communication device to the Business Communications Manager system. Examples of analog voice devices are single-line telephones or answering machines. Examples of data communication devices are modems and fax machines.

The Business Communications Manager ATA 2 provides on-premise service only (unexposed plant only).

Before Installation

Before you attempt to install an ATA 2 device, ensure that your system and environment meet the requirements listed in this section.

Environmental Requirements

Check the following environment requirements for the Business Communications Manager ATA 2:

Line voltage (120 V)	102 – 132 V ac
Line voltage (230 V)	207 – 253 V ac
Temperature	0 – 50°C (32 – 122°F)
Relative humidity	5% – 95% non-condensing
Bridge taps	Not allowed between the Business Communications Manager system loading coils and Business Communications Manager ATA 2

Operating Requirements

The following are requirements for operating other analog or data communication devices:

Ringing signal (North America):	20 Hz ± 1 Hz
Frequency Voltage:	80 V rms ± 10%
Ringing signal (Europe):	25 Hz ± 1 Hz
Frequency voltage:	75 V rms ± 10%
Ringer equivalence number	3
Battery feed voltage	- 48 V dc ± 10%
Loop current	20 mA minimum

FIC code	OL13ABC
Business Communications Manager ATA 2 to Business Communications Manager system loop resistance (cable only)	135 ohms maximum (for example: 800 m of 0.5 mm wire or 2,600 ft. of 24 AWG wire)
Analog loop resistance on terminal side for voice applications (cable only)	1,300 ohms maximum (for example: 4,600 m of 0.4 mm wire or 15,000 ft. of 26 AWG wire)
Analog loop resistance on terminal for data applications (cable only)	200 ohms maximum (for example: 730 m of 0.4 mm wire side or 2,400 ft. of 26 AWG wire)

Analog Transmission Parameters
(North American systems only)

The following are the required analog parameters for anATA2:

Input impedance at tip and ring	600 ohms
Return loss	> 20 dB for 200 to 3,400 Hz (when Network terminated with 600 ohms)
Insertion loss on an internal call	Business Communications Manager ATA 2 to Business Communications Manager system loss 3.0 dB ± 0.5 dB
Insertion loss on an external call	Business Communications Manager ATA 2 to Business Communications Manager system loss 2.2 dB ± 1.0 dB
	Business Communications Manager system to Business Communications Manager ATA 2 loss 0.5 dB ± 1.0 dB

The maximum loss for Business Communications Manager ATA 2 to Central Office (CO) configuration, shown in Figure 74, must not exceed 10 dB.

Figure 74 Insertion Loss from the CO to the single-line telephone

Longitudinal balance to ground	50 dB 60 to 4,000 Hz With IEEE 455-1976 test
Overload level	3 dB
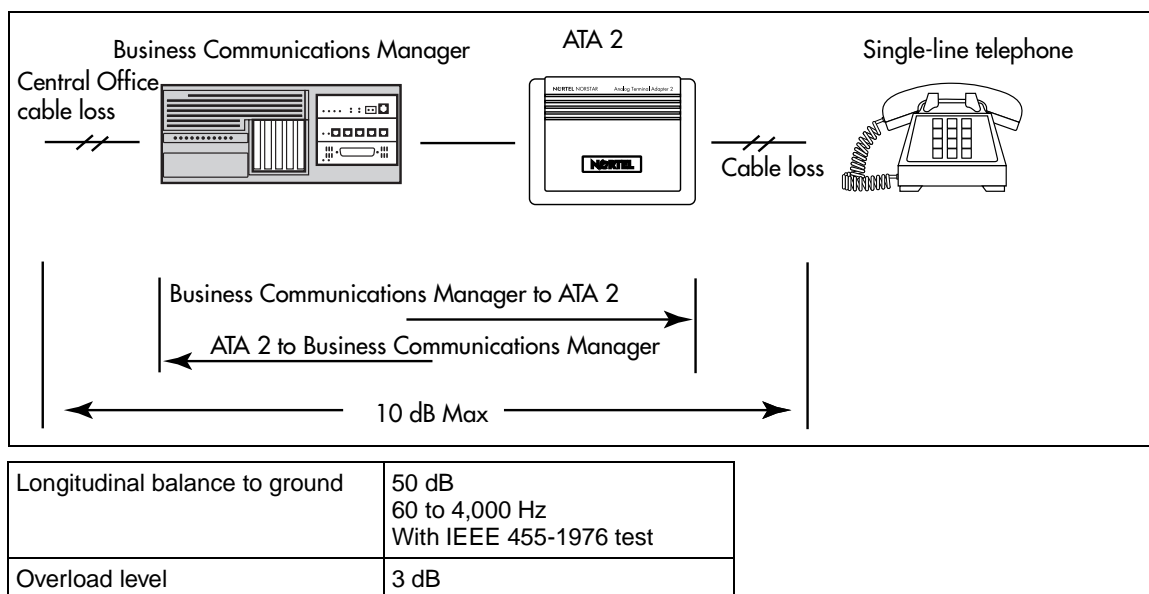
Insertion Loss Measurement

Measure the total insertion loss between the CO and voice messaging device by using standard dial up test lines with a transmission test set. For example, Hewlett-Packard 4935A Transmission Test Set.

For CO to Analog Device Measurement

To measure the insertion loss from the CO to the voice messaging device:

1 Establish a connection to the 1 mW, 1 kHz, CO service line with a single-line telephone attached to the Business Communications Manager ATA 2.

2 Ensure that the analog port terminates correctly in 600 ohms:

   a Replace the single-line telephone with the test set

   b Use RECEIVE/600 OHM/HOLD mode on the test set

3 Ensure that the test set connects in parallel to the service line before removing the single-line telephone or the line drops.

4 Remove the single-line telephone.

5 Measure the 1 kHz tone at the far end of the analog port, which is where the analog loop ends and where the voice messaging device connects.)

> ➡ **Note:** The tone must be greater than - 10 dB (for example: - 9 dB is acceptable).

For Analog Device to CO Measurement

To measure the insertion loss from the voice messaging device to the CO:

1 Establish a connection to a silent termination on the CO service line with a single-line telephone attached to the Business Communications Manager ATA 2.

2 Make sure the analog port terminates correctly in 600 ohms by:

   • replacing the single-line telephone with the test set

   • using TRANSMIT/600 OHM/HOLD mode on the test set

3 Make sure the test set connects in parallel to the service line before removing the single-line telephone or the line drops.

4 Remove the single-line telephone.

5 Introduce a 1 kHz tone into the analog line at - 10 dBm, and measure the level at the CO exchange.

> ➡ **Note:** The difference in levels is the transmit loss and must be less than 10 dB (for example, 9 dB is acceptable).

Connecting the Business Communications Manager ATA 2

After you have determined that the proper environment exists, you can connect the ATA 2 to the line and set. Refer to Figure 75.

Figure 75 Single line telephone installation overview
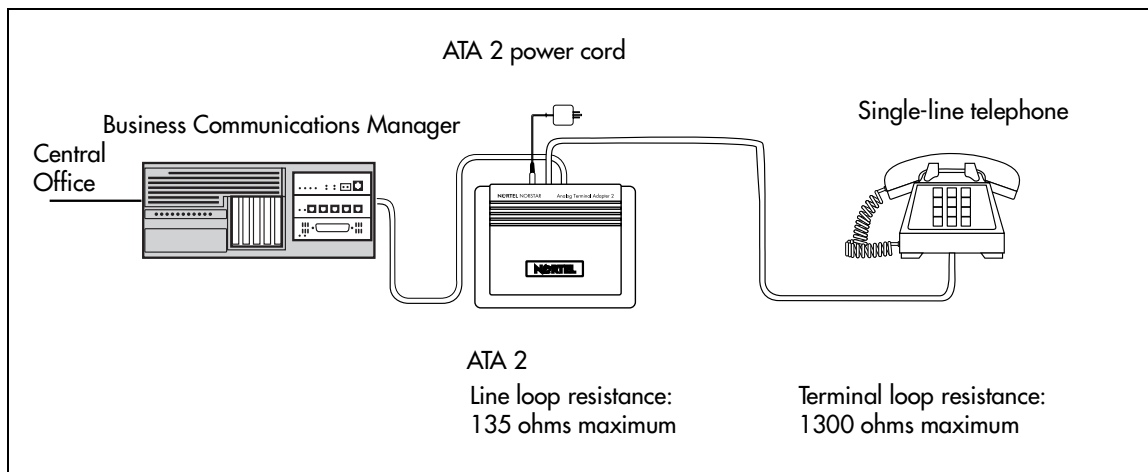
Figure 76 shows the pinouts for the connection cables.

Figure 76 ATA 2 pin outs
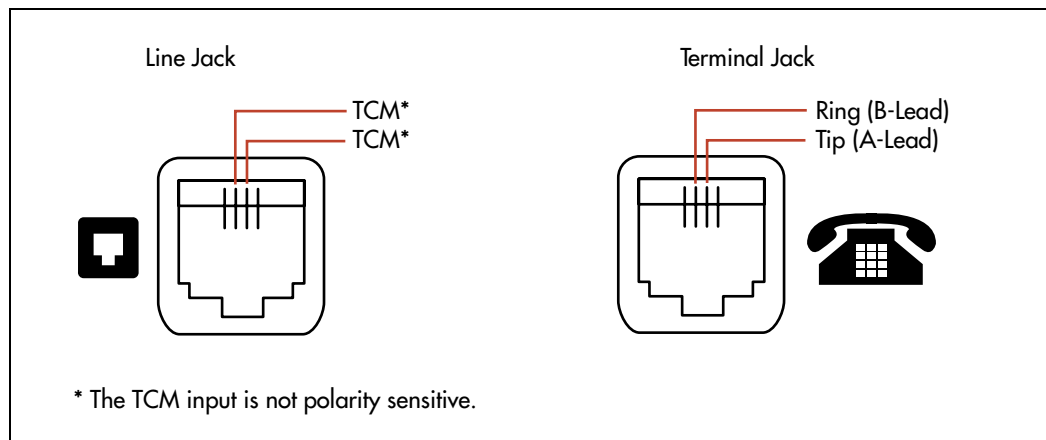
Follow these steps to connect the cable.

1   Connect one end of a line cord to the ATA2 Terminal jack. Refer to Figure 77.

Figure 77   ATA 2 top view

Line jack   Terminal jack   Power supply connector receptacle
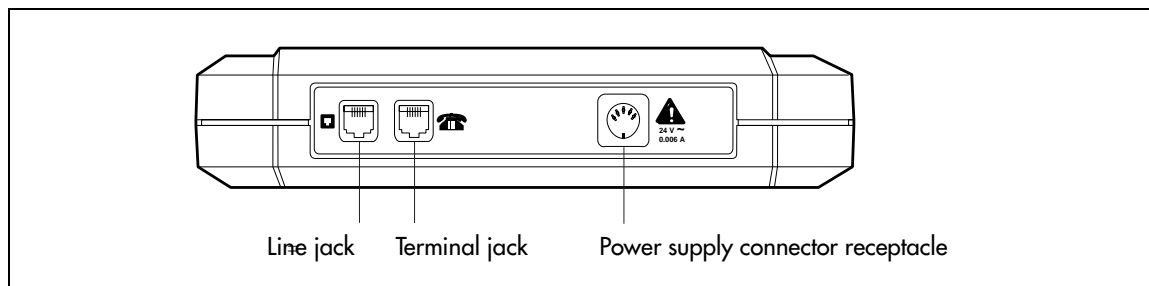
2   Connect the other end to your telephone, modem or FAX.

3   Connect one end of a line cord to the ATA2 Line jack.

4   Connect the other end to an available station port on the Business Communications Manager.

5   For a 120 V or 230 V system, plug the DIN connector of the power supply cord into the power supply connector receptacle. Plug the adapter into a standard ac outlet.

> **Caution:** In North America, the Business Communications Manager ATA 2 must be powered from a Class 2 power source that is UL and CSA approved.
> In Europe, the Business Communications Manager ATA 2 must be powered from a Class II power source that is CE marked.

Mounting the Business Communications Manager ATA 2

After the ATA 2 is correctly connected, you can mount the unit on a wall, as described in this section.

1   When using 0.5 mm wire (24AWG), select a location within 800 m (2,600 ft.) of the Business Communications Manager system.

2   Allow 12.5 cm (5 in.) clearance for the line jack, terminal jack, and power supply connector.

3   Screw two 4 mm (#8) screws into the wall, 130 mm (5 1/4 in.) away from each other. Leave 6 mm (1/4 in.) of the two screws showing.

4   Align the slots at the back of the Business Communications Manager ATA 2 unit over the screws. Push the unit against the wall. The line jack, terminal jack and power supply connector must be at the top of the Business Communications Manager ATA 2. Refer to Figure 78 on page 188.

Figure 78 ATA 2 back view

Mounting keyhole slots
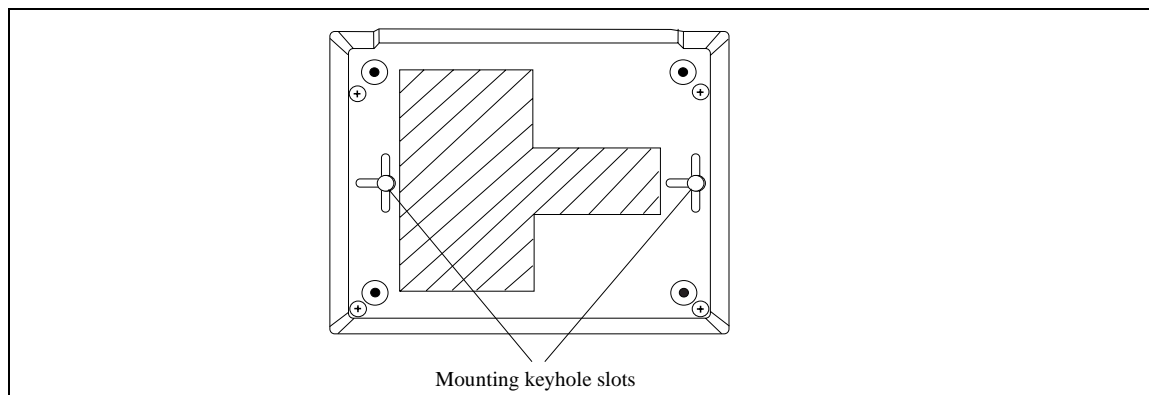
Determining the ATA 2 extension number

You must determine the extension number for every Business Communications Manager ATA 2 before you can perform administration.

1 Connect a single-line telephone to the Business Communications Manager ATA 2.

2 Lift the handset.

3 If you do not hear dial tone, press ⌷Link⌷ ⌷9⌷ to access an intercom line.

> → **Note:** ⌷Link⌷ appears as ⌷Recall⌷ on some telephones. If you are using a telephone without a ⌷Link⌷ or ⌷Recall⌷ button, refer to the *ATA 2 User Guide* for details.
>
> Some phones have a Flash button, which is the equivalent to ⌷Link⌷ or ⌷Recall⌷.

4 Dial the extension number of an Business Communications Manager telephone with a display. If you hear a busy signal, repeat steps 3 and 4 using a different extension number.

5 When the telephone rings, the display shows: Set <nn> calling.

6 The number that appears on the display is the Business Communications Manager ATA 2 extension number. Record the extension number.

> → **Note:** The Automatic Set Relocation feature works with Business Communications Manager ATA 2.

Configuring the ATA 2

Configure the Business Communications Manager ATA 2 using Business Communications Manager Unified Manager. For detailed information about using Unified Manager, refer to the *Business Communications Manager 2.5, Programming Operations Guide*.

1   Open the Unified Manager.

2   Assign the following line features to the Business Communications Manager ATA 2:

- assign one external line to the telephone
- set ringing for this line ON or OFF, as required
- assign one intercom line
- assign Held Line Reminder to ON
- disable Full Handsfree
- disable Handsfree Answerback
- disable Paging Reception

3   Assign an external line, an intercom line, or a line pool as the Prime Line for the Business Communications Manager ATA 2.

> **Note:** Direct access to a CO line for modems, fax machines and credit card verification machines is possible using the Hotline feature. For direct access to a CO line, program an external line as the Hotline. Enter a pause to replace the telephone number for the Hotline (F78).

4   Exit the Unified Manager.

5   Set the Business Communications Manager ATA 2 to Tones ON when you are assigning an analog voice device.

Set the Business Communications Manager ATA 2 to Tones OFF when you are assigning a data communication device.

For details, refer to the *Business Communications Manager ATA 2 User Guide*. The default is Tones OFF.

Testing the ATA 2

Confirm that the Business Communications Manager ATA 2 is operating by connecting a single-line telephone to the Business Communications Manager ATA 2. Make an internal call and an external call using the telephone connected to the ATA 2. Next, call the Business Communications Manager ATA 2 from an system telephone. Refer to the *Business Communications Manager ATA 2 User Guide* for details.

ATA 2 Data Communication

The Business Communications Manager ATA 2 connects a standard analog data device, such as a FAX or modem, to the Business Communications Manager system. This section shows the additional steps required to install ATA 2 for data communication.

Data Transmission Requirements

When using the Business Communications Manager ATA 2 for data transmission, the analog loop resistance must not exceed 200 ohms. (for example: 730 m of 0.4 mm wire or 2,400 ft. of 26 AWG wire.)

The external line assigned to the ATA 2 must follow the transmission network requirements described in the data communication device specifications.

Transmission rates (baud) over 1,200 bps require a modulation design compatible with the telephone line bandwidth. Use a conditioned external line to prevent data corruption during transmission.

> **Note:** Maximum loss from the ATA 2 analog terminal to the CO must be 10 dB or less at 1 kHz. If the loss exceeds this limit, condition the line. This loss ensures correct data transmission for different types of data terminals.

FAX and Modem Transmission Compatibility

The Business Communications Manager ATA 2 is compatible with all commercial FAX and modem protocols. When connected to an ATA 2, the Business Communications Manager system supports data transmission rates a maximum of and including 28.8 kbit/s.

> **Note:** Nortel Networks cannot guarantee the maximum data transmission rate because the maximum rate is subject to the quality of the end-to-end channel.

Installing a Data Communication Device

Figure 79 shows the hardware configuration for connecting a data communication device through an ATA 2 to the Business Communications Manager.

Figure 79   Data communication device installation overview
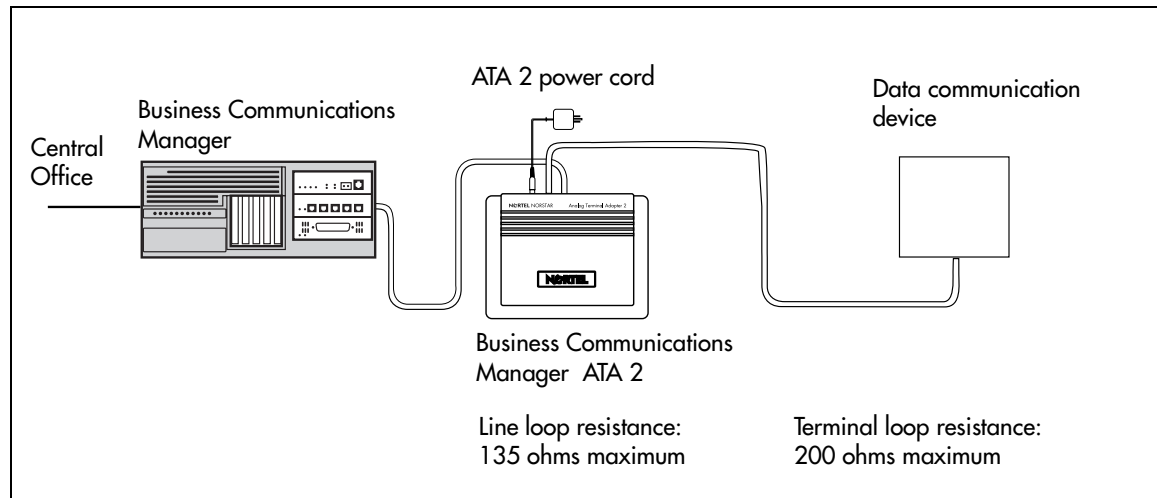
The following steps explain how to install an ATA 2 to a data communication device.

1   Connect a single-line telephone to the Business Communications Manager ATA 2.

2   Check that the Business Communications Manager ATA 2 is in theTones OFF mode, lift the handset and enter Link   1   8 .

> **Note:** Link   appears as Recall   on some telephones. If you are using a telephone without a Link   or Recall   button, refer to the *ATA 2 User Guide* for details.

3   Make sure the terminal loop resistance is less than or equal to 200 ohms.

> **Note:** If necessary, install the Business Communications Manager ATA 2 near to the data communication device to maintain a maximum loop resistance of less than 200 ohms. When using 0.4 mm wire (26 AWG), the ATA 2 must be within 800 m (2,600 ft.) of the Business Communications Manager system.

4   Disconnect the single-line telephone from the ATA 2.

5   Plug the data communication device into ATA 2.

Chapter 14
Installing Optional Telephony Equipment

This chapter tells you how to connect the optional ringer, page, and music telephony equipment to the media services card (MSC) connectors on the front of the Business Communications Manager base unit.

Auxiliary Ringer
(customer supplied)

An auxiliary ringer is a customer-supplied piece of hardware that provides external ringing capability to telephones on the Business Communications Manager, if the telephones are set to allow it.

To install this equipment, follow these steps:

1 Use the installation instructions that came with the ringer hardware to install the auxiliary ringer.

2 Connect the ringer generator miniature jack to the auxiliary ringer output on the MSC. Refer to Figure 80.

Figure 80 Auxiliary ringer jack

Auxiliary ringer jack

Ring

Tip

Sleeve

MSC faceplate
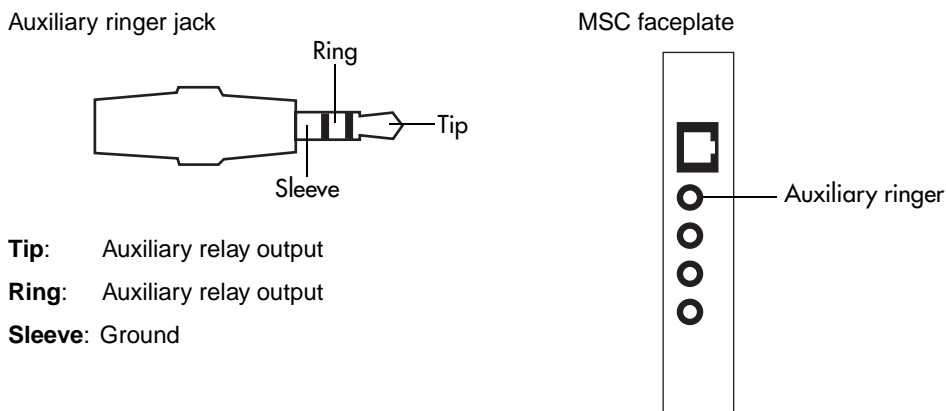
Auxiliary ringer

Tip: Auxiliary relay output

Ring: Auxiliary relay output

Sleeve: Ground

⚠️ **Warning:** The auxiliary ringer must not be connected to exposed plant.
The ringer must not draw more than 50 mA from a 40 V DC source.

Auxiliary Ringer Programming

You can activate the auxiliary ringer by setting auxiliary ring for specific external lines and Business Communications Manager telephones. Refer to the *Business Communications Manager 2.5, Programming Operations Guide* for programming details.

External Paging System
(customer supplied)

You can connect an external paging system to provide paging over external loudspeakers.

Ensure the paging system follows these guidelines:

- The paging output from the MSC is 100 mV rms across an input impedance of 600 Ω.
- The output level is 0 dBm0 with reference to 600 ohms, for a PCM encoded signal at 0 dBm. There is no dc voltage across the page output terminals.
- The page output uses the tip and ring terminals of the jack. The sleeve terminal of the jack connects to ground. You must use a stereo plug to connect the page signal output.

When you use the page signal output jack to connect an external paging amplifier, you also use the page relay jack which contains a floating relay contact pair. The system uses this jack to control the external paging amplifier.

- The contact pair has a switch capacity of 50 mA (non-inductive) at 40 V (maximum). You must remove any inductive load on the output.
- The page relay contacts connect to the tip and ring terminals of the jack. The sleeve terminal of the jack connects to ground. You must use a stereo plug to connect the page relay.

Connecting the Paging System

Install the external paging system using the installation instructions that came with the paging system.

1   Connect the paging system audio input to the Page output on the MSC. Refer to Figure 81.

Figure 81   Audio input jack
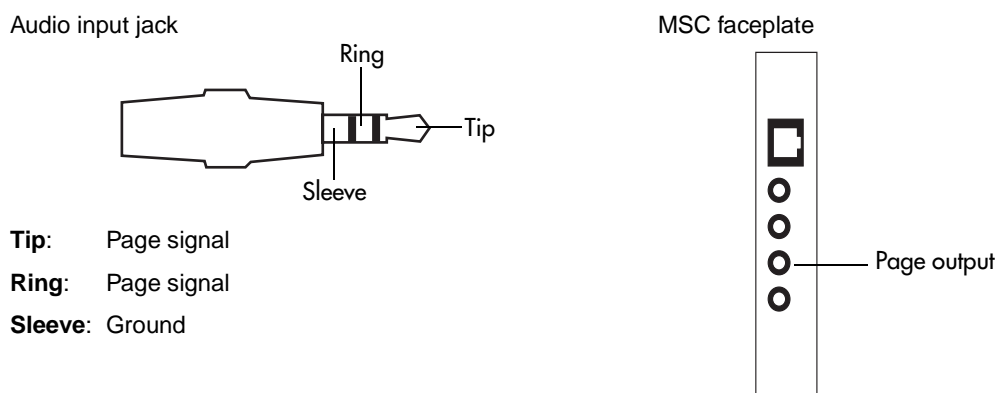
2 Connect the paging system relay to the Page relay output on the MSC.
Refer to Figure 82.

Figure 82 Page relay jack

Page relay jack

Ring

Tip

Sleeve

MSC faceplate

Page relay

Tip: Page relay output
Ring: Page relay output
Sleeve: Ground
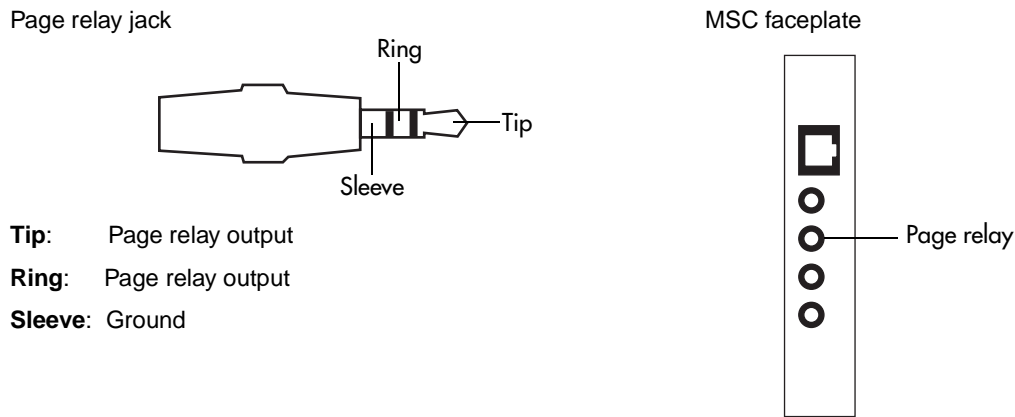
> ⚠ **Warning:** The paging connections must not be connected to exposed plant.

> ➡ **Tip: Paging tips**
>
> Business Communications Manager external paging does not support talk back paging equipment unless you use an external line port.
>
> The Business Communications Manager system provides paging over the telephone speakers when there is no external paging equipment.

External Music Source
(customer supplied)

You can use any approved low power device as a music source. This would include equipment such as a radio with a high impedance earphone jack, as a music source.

Music on Hold Specifications

Ensure that the music source follows these guidelines.

- Nominal input impedance is 3.3 kilohms.
- Nominal sensitivity of this interface returned to digital encoded PCM is -22 dBm0 for a 0.25 V rms input signal.
- The input is limited so that the encoded analog content at the digital interface to the network does not exceed -12 dBm when averaged over any three-second interval.
- The maximum non-clipped input level is 1 V rms.
- The interface is protected against ringing cross.

Connecting the External Music Source

Follow these steps to connect the external music source to the Business Communications Manager jack.

1   Connect the miniature jack of the music source output to the music-on-hold input on the MSC. Refer to Figure 83.

Figure 83   Music-on-hold jack

Tip: Music signal

Ring: No connection

Sleeve: Ground
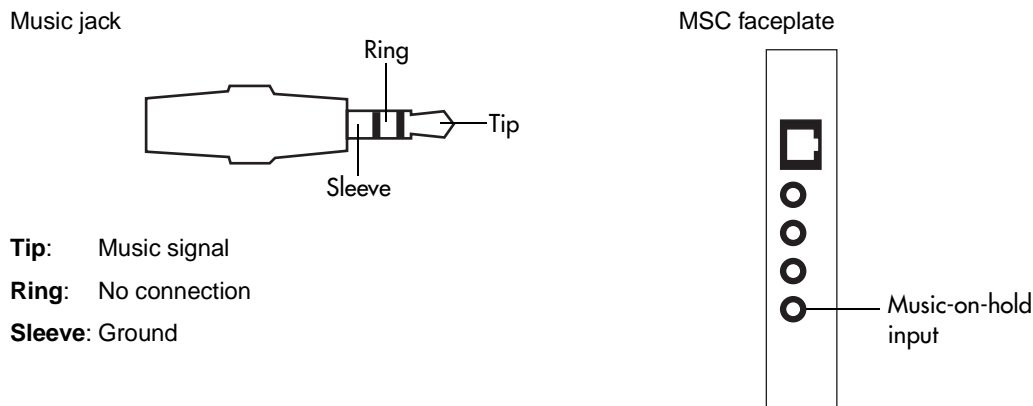
2   Adjust the volume of the music source to a good level by activating Background Music and adjusting the volume at the music source.

➡   **TIP:** You can adjust the Background Music volume at every telephone.

External Music Source Programming

You must enable Music for callers on Hold and for Background Music through programming. Refer to the *Business Communications Manager 2.5, Programming Operations Guide* for more details.

Chapter 15
Troubleshooting

This chapter describes how some troubleshooting options for determining the cause of misfunctions or failure of the Business Communications Manager hardware.

To analyze a Business Communications Manager problem, you must determine the cause of the problem and if there is a damaged hardware component.

After you have corrected the problem, test the Business Communications Manager system to confirm that the system is functioning correctly.

⚠ **Danger: Electrical shock warning**.

Disconnect the power cord, telephone cables and network cables before opening the computer. Read and follow installation instructions carefully.

Hardware problems appear as any of the following:

- The operational LEDs on the Business Communications Manager base unit or on the media bay modules are not reacting as expected
- Business Communications Manager system does not function at all.
- The emergency telephone does not function.
- ATA 2 does not function.

Using the System Status Monitor to Monitor LEDs

The LEDs on the Business Communications Manager base unit are part of the System Status Monitor (SSM) board.

Figure 84 shows what the board looks like from inside the Business Communications Manager server. When installing new equipment that connects to this board, ensure that the connector for that LED is properly seated.

Figure 84 SSM board connections
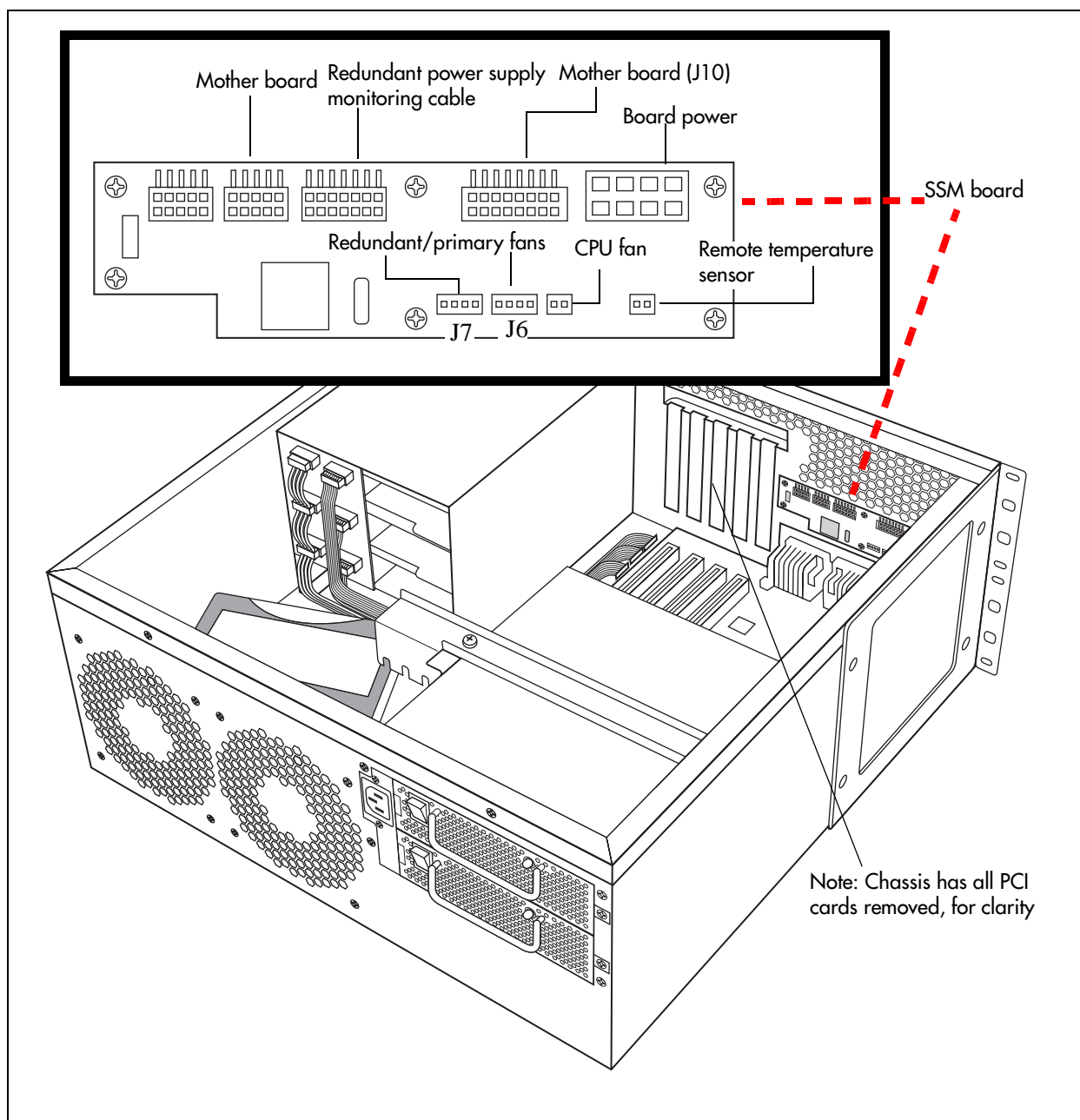
Figure 85 shows what the LEDs look like on the outside of the base unit. The labels in the illustration indicate which part of the hardware each LED supports.

Figure 85   LED locations on the face of the base unit
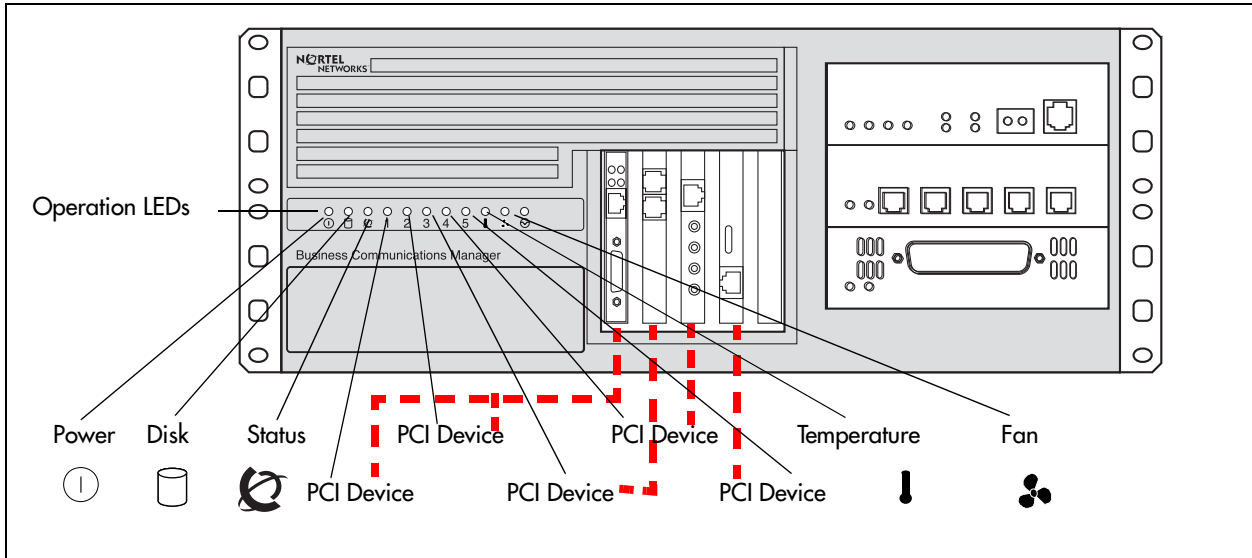
The Business Communications Manager System Status Monitor allows you to view the status of the system LEDs on your PC. This allows you to make preliminary decisions regarding the type of intervention required without necessarily having to view the Business Communications Manager hardware.

You can enter the System Status Monitor through the Unified Manager:

1   Open the Unified Manager.

2   Under **Diagnostics**, click on **System Status Monitor**.

The LED Display screen appears.

Figure 86   System Status Monitor LED Display screen

This screen displays the current status of the operational LEDS.

3   To set the parameters for the System Status Sanity check, click the LED Settings tab.

The LED Settings record appears.

Figure 87   System Status Monitor LED Settings record
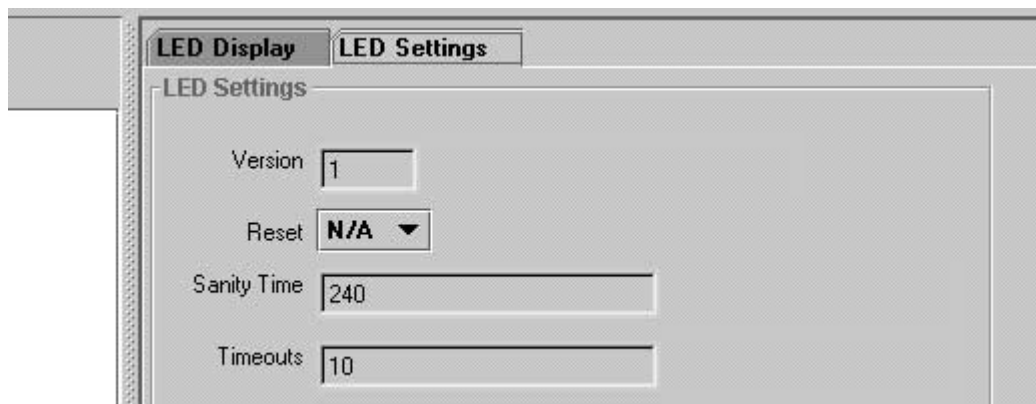
Table 45 lists the values on the LED Settings screen.

Table 45   LED Display screen settings

Attribute	Values	Description
Version	Read only.	The current version of the LED monitoring application.
Reset	Yes, No, N/A	Use Yes to allow the system status monitor board to reset the computing platform in the event that the sanity check fails the user set parameters.
Sanity Time	60-255 Default: 240	The time in seconds between sanity checks.
Timeouts	0-254 Default: 10	The number of sanity checks that must fail before the system status monitor sends a reset signal to the computing platform.

Emergency Telephone Does Not Function

If the emergency telephone is connected to the system, use the following procedure:

1   Check the power LED on the ASM 8 to check that the ASM 8 is receiving power.

2   Check that the emergency telephone has dial tone.

3   Check the external line and emergency telephone connections.

4   To avoid damage to the emergency telephone, connect the telephone directly to the external line and check for dial tone.

5   Replace the MSC.

If the emergency telephone is connected to the CTM, use the following procedure:

1   Check that the system has a CTM installed.

2   Check that there is no dial tone at the emergency telephone.

3   Replace the CTM.

ATA 2 Does Not Function

If the Business Communications Manager ATA 2 does not function. Follow these steps to troubleshoot the problem.

1 Make sure there is ac power connected to the ATA 2 unit.

2 Make sure that ATA 2 is in the Tones OFF mode. (For Data Applications only.)

3 Correctly configure the ATA 2 telephone port for data communication.

4 Allow sufficient start up time.

5 Assign the prime line.

6 Assign a ringing line if required, for example, auto-answer modems, FAX).

Checking the Wiring

Check the following connections:

1 ATA 2 to the terminal. The resistance must be 200 ohms or less for data applications and 1,300 ohms or less for voice applications.

2 Business Communications Manager system to ATA 2. The wiring must be equivalent to 800 m of 0.5 mm wire (2,600 ft. of 24 AWG) or less. Do not use bridge taps and loading coils between the Business Communications Manager system and ATA 2.

3 External line to the Business Communications Manager system. Ensure the external line is correctly connected to the Business Communications Manager system and make sure there is dial tone.

Checking for Dial Tone at the ATA 2

Check to ensure there is dial tone from the set and from the ATA 2 module.

1 If there is no dial tone, replace a single-line telephone for the data communication device.

2 If there is no dial tone at the ATA 2 unit:

   a Disconnect the line side of ATA 2. Connect an Business Communications Manager telephone to the ATA 2 port.

   b Check that the connection from ATA 2 to the Business Communications Manager system is functioning correctly (the telephone has dial tone).

Checking for Trunk Line Dial Tone to the ATA 2

Use the following steps to check for trunk line dial tone to the ATA 2.

1 Disconnect ATA 2 external line from the Business Communications Manager system and connect the data device directly to this external line.

2 Make a call.

3 If the problem continues, the device or the external line is possibly at fault.

4 Plug the device into a different line.

5 If the problem continues, the device is possibly at fault.

For more information about ATA 2, contact your customer service representative.

Chapter 16
Preparing Hardware for Maintenance or Upgrades

When you need to replace or update a piece of hardware on the Business Communications System, you must ensure the system is safely disconnected from the trunk lines and shut down. To replace interior components on these units, you can remove the top to access the inside of the units. Also, if you are replacing any of the PCI cards (base unit only) or any of the media bay modules, you also need to remove the front bezel of the unit.

Figure 88 provides an overview of the process for preparing the Business Communications Manager hardware for maintenance or upgrade procedures.

Figure 88   Preparing for maintenance overview
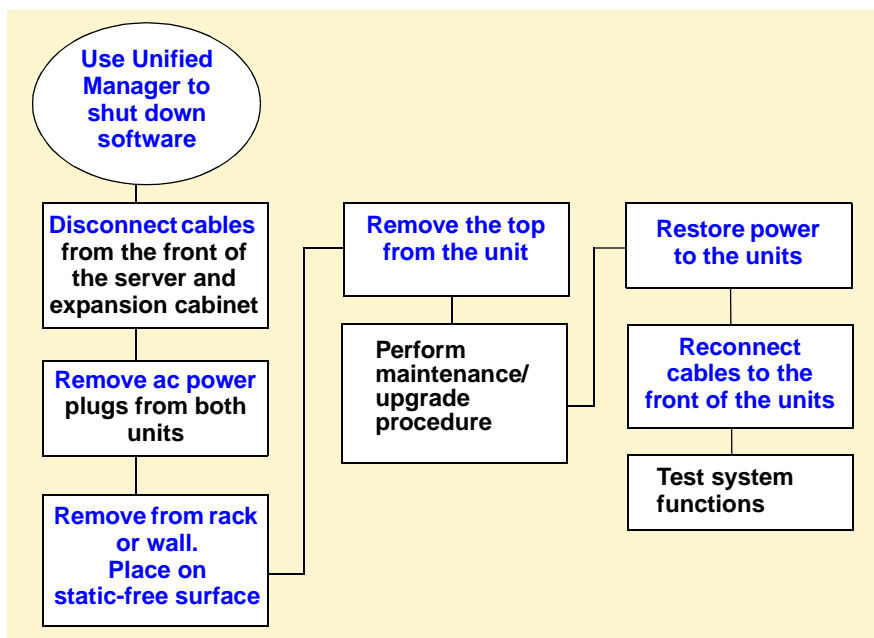
Special Tools

Before you replace the components, ensure you have the following equipment:

- Phillips screwdriver #2, with a blade 3.5 in. long
- 3/16 inch slot screwdriver
- antistatic grounding strap

> **Caution:** You must wear an antistatic grounding strap at all times when handling electronic components. Failure to do so can result in damage to the equipment.

Shutting Down the System Software

The Business Communications Manager system requires a controlled shutdown to guarantee the integrity of the file system. Sometimes this may not be possible, for instance if a hard drive fails. However, as long as you have access to the Unified Manager, perform the following procedures before removing power from the system:

1   Start a web browser on a computer with a LAN connection to the Business Communications Manager system.

2   Enter the IP address of the Business Communications Manager system and the port number for Business Communications Manager Unified Manager (:6800). For example: **http:// 10.10.10.1:6800**.

3   Click the **Configure** button.

4   Type your user name in the **Login** box. The default user name is supervisor.

5   Type your password in the **Password** box. The default password is visor.

6   Choose **System**.

7   Click the **Logoff** menu and then click **Shutdown**.

8   Click the **Yes** button.

9   Wait until the Status changes to **Complete! It is safe to turn off the system**.

10 Click the **Done** button.

11 Quit the web browser.

Shutting Down the System Hardware

After the system has gracefully exited from the software, you can shut down the hardware.

> ⚠ **Warning:** You must remove all of the connections to the Business Communications Manager base unit before you power the system down.
>
> Failure to disconnect lines before power down can cause damage to the system.

Follow these steps in order to ensure a safe shutdown of the system.

1   Remove the cables from the front of the Business Communications Manager server and expansion cabinet, if there is one. This includes the data connections on the MSC.

Mark the cables so you can ensure they get reconnected correctly.

2   Disconnect the base unit and expansion unit power cords from the ac outlet.

> ⚠ **Warning:** You must disconnect power from the Business Communications Manager base unit after you have performed a Unified Manager shutdown. The Business Communications Manager base unit, cannot start operating again until after power has been disconnected and then reconnected.

3 Ensure you have room to access the part you are working on. Remove the server from the rack, if necessary.

Removing the Top Cover from the Unit

You must remove the top cover to access any of the internal components of the Business Communications Manager base unit.

1 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.

2 Remove the two screws from the cover, at the back of the unit.

3 Lift the back of the cover and slide it back and up. Refer to Figure 89.

Figure 89 Remove the top cover
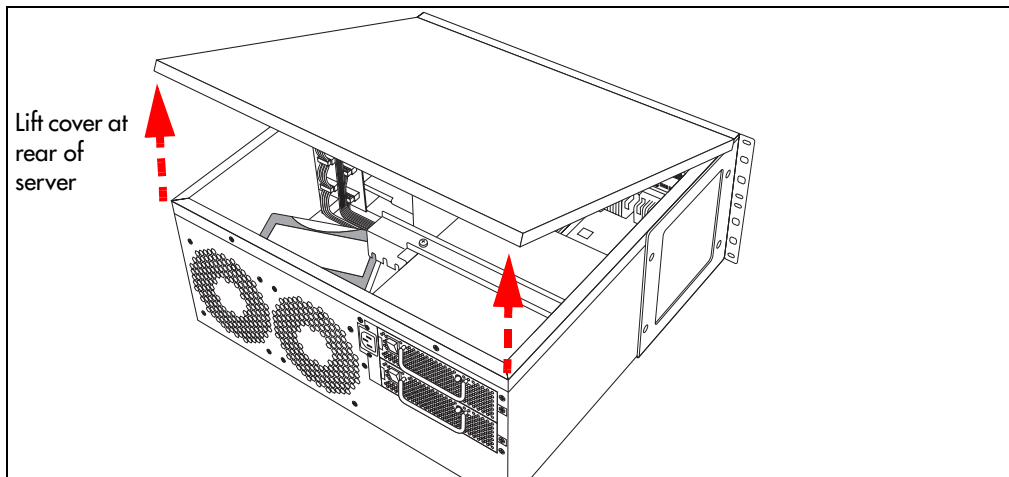
Removing the Front Bezel

The front bezel is a plastic cover installed on the front of the Business Communications Manager base unit. You must remove the bezel to add or remove the Business Communications Manager cards or the media bay modules. Refer to Figure 90.

1 To remove the front bezels:

Base unit: Grasp the edge of the front bezel and pull it forward.

Expansion unit: Push against the bottom of the bezel, and then pull the bezel out from the top.

Figure 90 Removing the front bezel

Business Communications Manager base unit

Grasp the edge of the front bezel and pull it forward

Business Communications Manager expansion unit

1. Push against the bottom
2. Pull out from the top
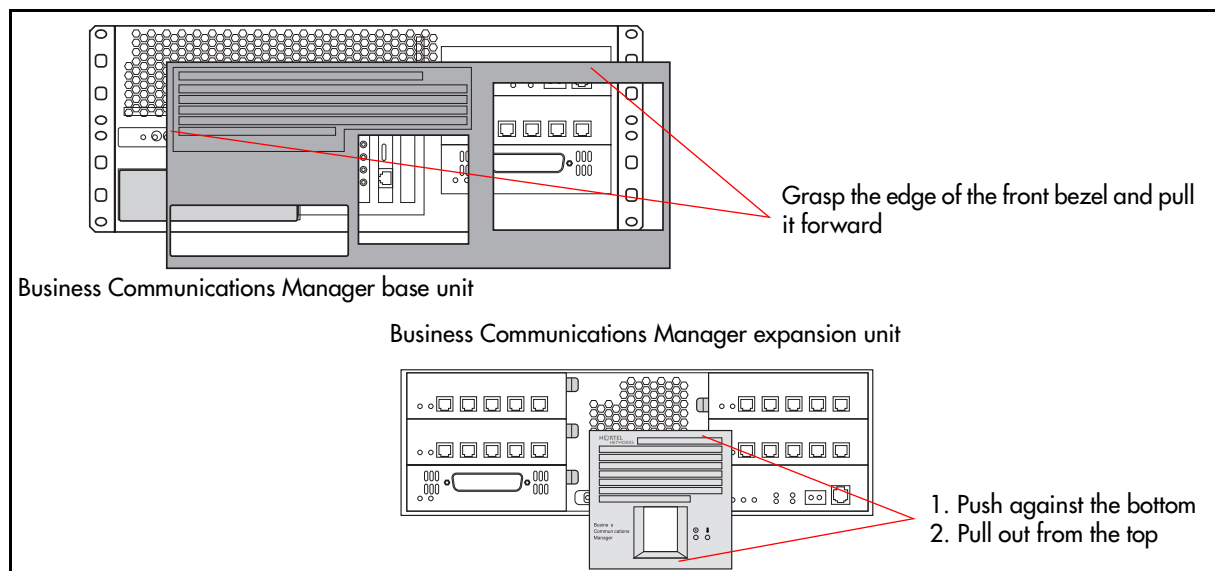
Restarting the System

When you finish your maintenance procedures, restart the Business Communications Manager system in the order described in this section.

Restoring the System to Operation

To restore the system to operation after a maintenance session, follow these steps:

1 Ensure that all cables inside the housing are connected snuggly to the correct boards and excess cable bundled neatly, out of the way.

2 Put the bezel back on the base unit or expansion unit, if you removed it.

3 Put the lid back on the unit and replace the screws.

4 If you removed the base unit from the rack or wall, replace it.

5 Plug the expansion unit, if there is one, back into the ac power source.

6 Plug the base unit back into the ac power source.

The Business Communications Manager automatically starts booting.

> ⚠️ **Warning:** When you restart the system, all IP clients/voice mail and VoIP ports are not available until the system services restart.

7 Replace all the connectors to the front of the units.

The reboot can take up to 10 minutes.

Software Restart

If you did not shut the system power down, restart the software

1 Refer to "Shutting Down the System Software" until you get to step 7.

2 At this point, select **Reboot** on the **Logoff** menu.

3 Continue with the intructions.

Chapter 17
Replacing the Hard Disk

The Business Communications Manager base units for the 2.5 system include one factory-installed hard disk.

Figure 91 provides an overview of the hard disk replacement process.

Figure 91   Hard disk replacement overview
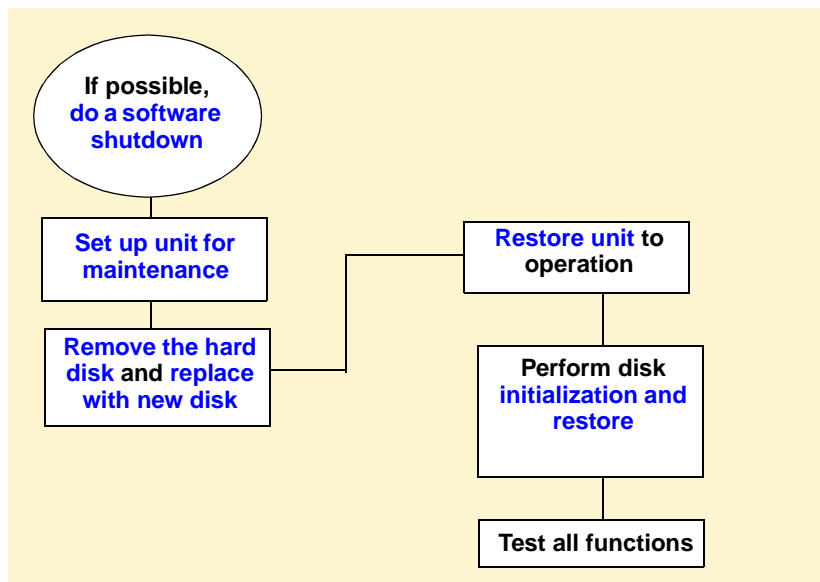
This chapter explains how to change a hard disk.

> ⚠ **Warning:** Maintain a current backup of your system.
> When you replace the hard disk, you must restore the Business Communications Manager 2.5 system programming from the backup.

> ⬤ **Caution:** Use only a Nortel Networks approved replacement kits.

Remember to take suitable precautions when working inside the Business Communications Manager 2.5 server. Maintain a clean and static-safe site.

> ⚡ **Danger:** Electrical shock warning
> Disconnect the telephone and network cables, and the power cord before opening the server.
> **Danger:** Read and follow all instructions carefully.

> **Caution:** Do not use an electric screwdriver near the hard disk.You can lose the information stored on the disk.
> Shock can damage the hard disk. Do not drop or hit the hard disk drive.

Removing the Hard Disk

When a hard disk is causing problems or fails, you must remove the unit from the Business Communications Manager server cabinet. The following steps describe that process.

1 If you still have access to the Unified Manager, shut down the system by following the instructions in "Shutting Down the System Software" on page 204. Otherwise, skip to step 2.

2 Set up the server for maintenance, as described in "Shutting Down the System Hardware" on page 204.

3 Inside the server, disconnect the power supply wiring and ribbon cable from the hard disk connectors.

4 Remove the four screws holding the hard disk bracket to the Business Communications Manager base unit box. Refer to Figure 92 and Figure 93 on page 211.

Figure 92 Hard disk wiring and screw locations (2.0 hardware)
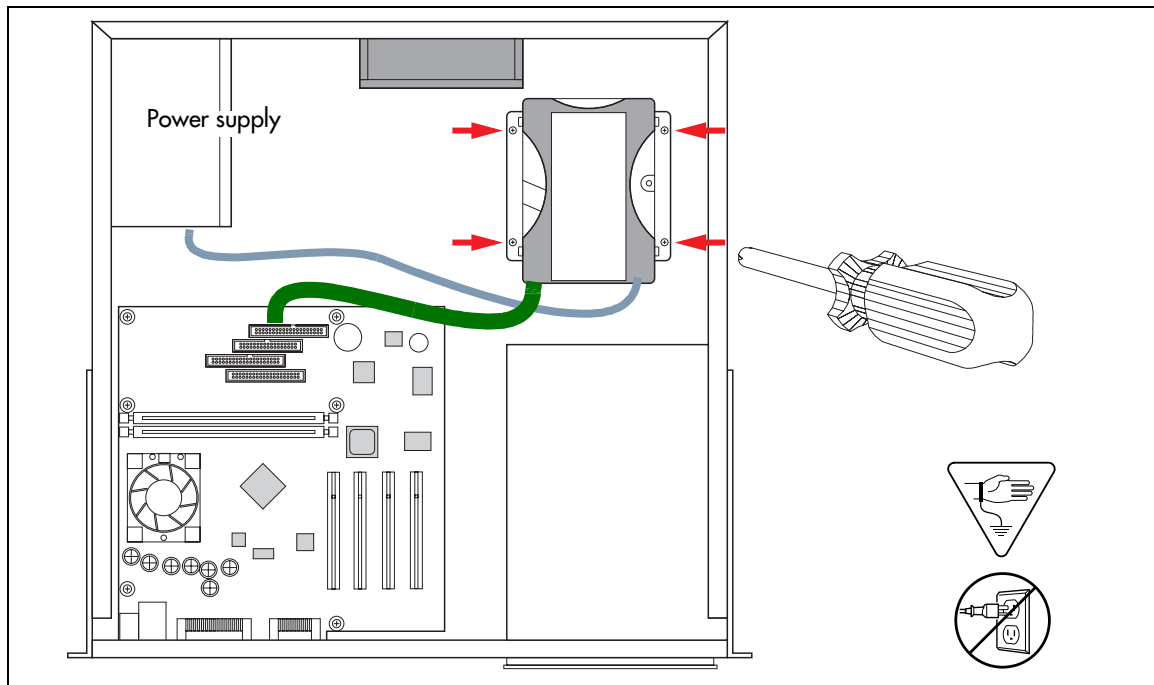
Figure 93   Hard disk screw locations (2.5 version hardware)
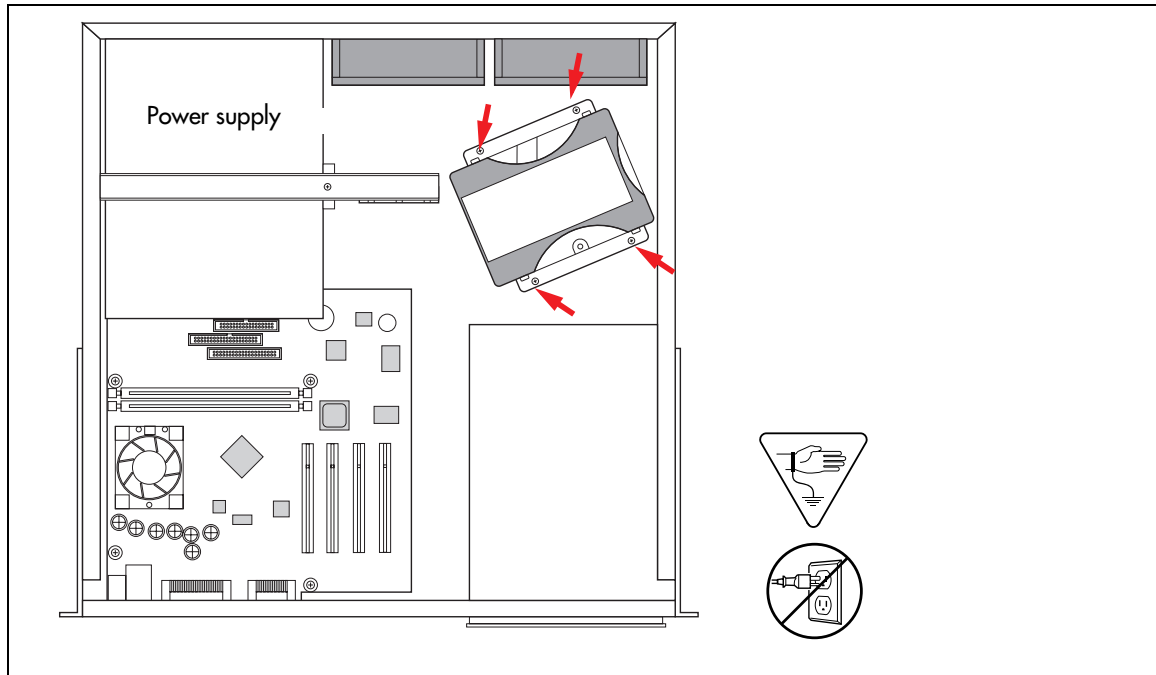
5   Lift the hard disk out of the unit.

6   Remove the screws that fasten the brackets to the hard disk. Refer to Figure 94.

Figure 94   Remove the brackets from the hard disk
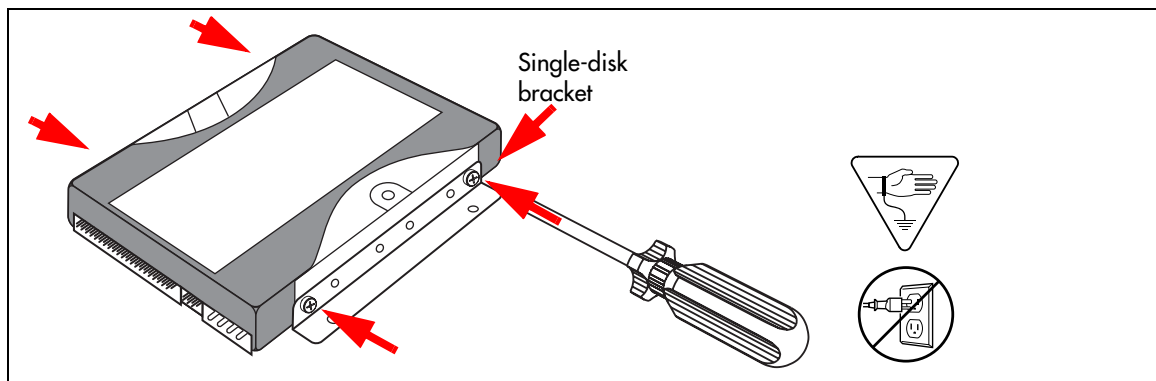
→   **Note:** If you are returning the hard disk to a Nortel Networks repair facility, package it carefully in the replacement hard disk box. If you do not have the original box, package the drive in another box with shock absorbing material.

Installing a New Hard Disk

This section describes what you need to do to install a new hard disk into the Business Communications Manager base unit.

⚠️ **Warning:** You must initialize the Business Communications Manager system when you install a new hard disk on a single-disk system.

Mounting the hard disk

This process describes how to install a new hard disk.

1 Ensure you have followed the directions in "Removing the Hard Disk" on page 210.

2 Attach the new hard disk to the brackets.

Fasten both brackets to the hard disk. Position the hard drive with the exposed electronic components facing down. Refer to Figure 95.

Figure 95 Connect the brackets to the hard disk

Single-disk bracket
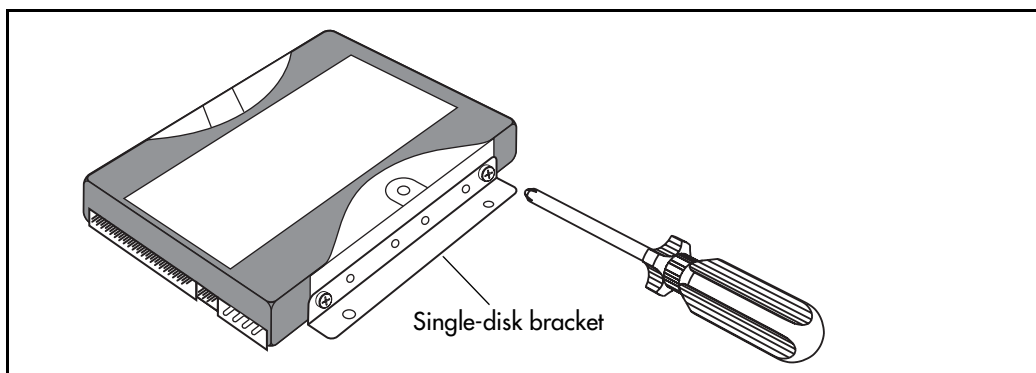
3 Place the hard disk assembly back into the Business Communications Manager base unit.

    a Align the holes in the brackets with the holes in the bottom of the inside of the Business Communications Manager base unit.

    b Ensure that the power supply and ribbon cable connectors are toward the MSC card.

    c Fasten the hard disk to the Business Communications Manager base unit.

4 Reconnect the drive to the system:

➡️ **Note:** All connectors have a notch that allows you to align the connectors correctly. If you cannot push a connector in easily, do not force it.

Connect the power supply to the hard disk connector, and the IDE cable from the controller to the hard disk.

5 Replace the cover on the server.

6 Restore the units to operation. Refer to "Restarting the System" on page 206.

7 Set up the disk:

Initialize the hard disk. Refer to "Initializing the Hard Disk" on page 213.

After the disk is initialized, restore your data from your backups. If you did not backup your keycodes, re-enter them.

Initializing the Hard Disk

The Business Communications Manager system is normally initialized at the factory. However, if you have to replace the hard drive in a Business Communications Manager base unit, you must re-initialize the Business Communications Manager.

After you replace the hard disk and the system has booted up, perform the initialization as follows:

1 Make sure the **Status** LED on the Business Communications Manager base unit is lit. This LED indicates that the Business Communications Manager base unit is operating correctly.

2 Attach the base unit and a computer through the serial port, as described in "Setting Up the Null Modem Cable" on page 132.

3 Enter the terminal emulation program, as described in "Finding the Configuration Menus" on page 133,

- If the hard disk does not require initialization, the main menu appears. Refer to Figure 96.

Figure 96 Initialization Menu screen

```
Nortel Networks                                    Business Communications
*=========================================================================

                         Main Menu
                *=============================*

                1. Initialization Menu
                2. System Configuration
                3. Configuration Wizard
                4. Media Services Card System ID
                5. Command line
                6. Reboot the system
                7. Diagnostics
                8. SSM Test
                X. Exit

                BCM ID  2.5
                Version 6.0.8
                Current Profile = 1

Make a selection:[1,2,3,4,5,6,7,8,X]?█
```

- If the hard disk requires initialization, the Platform Initialization Menu appears. Refer to Figure 97.

Figure 97   Platform Initialization Menu screen

```
  =============================================================================
Nortel Networks                              Business Communications Manager
  =============================================================================
                        Platform Initialization Menu
                        ==============================
                    1.  Select the hardware profile for this unit.
                    2.  Upload an Etiquette core load to the MSC.
                    3.  Upload an CT2 Plus core load to the MSC.
                    4.  Upload an E1 core load to the MSC.
                    5.  Upload an E1 Global core load to the MSC.
                    6.  Upload an CALA core load to the MSC.
                    7.  Toggle the automatic MSC upload. (Enabled)
                    8.  Upload the System Status Monitor firmware.
                    M.  Main Menu

Note:
Selections 2-6 enable you to upload the MSC software for your region.

Make a selection: (1, 2, 3, 4, 5, 6, 7, 8, M)?
```

a   Enter the number beside the upload for the software you want to install. If you do not know which software to upload, refer to "Core Software and Regions" on page 255.

b   Next you need to ensure the correct MSC configuration has been entered.
Enter 1 (Select the hardware profile for this unit). The screen shown in Figure 98 appears.

Figure 98   Platform Initialization Menu screen

```
  ===============================================================================
  Nortel Networks                              Business Communications Manager
  ===============================================================================
                                              Default
                                              MSC
                        Slot 1   Slot 2   Slot 3   Slot 4   Image
                     =========================================
   ** 1. -BCM-WVMN-CONFIG   WAN    V.90     MSC     NIC    ETQ
      2. -BCM=NVMN-CONFIG   NIC    V.90     MSC     NIC    ETQ
      3. =BCM-INMN-CONFIG   IWAN   NIC      MSC     NIC    E1
      4. -BCM-N_MN-CONFIG   NIC             MSC     NIC    E1
   *  5. -Base Platform     n/a    n/a      MSC     NIC    n/a

      6. Select an alternate MSC image to load.
      M. Return to the Main Menu.

            BCM Rls ID 2.5 RC 10
            Version 7.1.8
            Hardware Profile 2 CORE UPLOAD
  Notes:
  ** Indicates the hardware profile detected on this system.
  * Indicates the hardware profile configured on this system.
  PRESS a NUMBER (1, 2, 3, 4, 5, 6, M) ?
```

a The current MSC configuration is indicated with two asterisks (**) Note the Image column.

If you want to change this, select 6 (Select an alternate MSC image to load). The system checks to see if a core upload is required. This takes about 45 minutes.

If you do not want to change the MSC load, enter the number of the selection with the asterisks.

4 The system automatically reboots as part of the initialization process. When the process is complete, the telnet session disconnects.

5 Do one of the following:

- Run the Quick Start Wizard to create the system parameters and defaults. Then restore your system data from your backup disk.

- Restore system and data information from your backup disk.

Note: The detailed processes for performing steps 4 and 5 are contained in the *Business Communications Manager 2.5 Programming Operations Guide*.

Chapter 18
Adding or Replacing a Cooling Fan

Cooling fans circulate air through the chassis of the Business Communications Manager base unit and expansion unit to prevent the components from overheating.

This chapter describes how to replace a cooling fan. It also describes how to add a redundant fan to two versions of the base unit.

> ➡ **Note:** A redundant cooling fan is included in the kit when you add a redundant power supply to the server.

Figure 99 provides an overview of the fan replacement process.

> ➡ **Note:** 2.5 hardware
>
> The cooling fan connections on the Business Communications Manager server 2.5 hardware connect to the system status module (SSM). Ensure that you follow the directions provided for this version of the hardware when reconnecting new fans.

Figure 99   Fan replacement overview
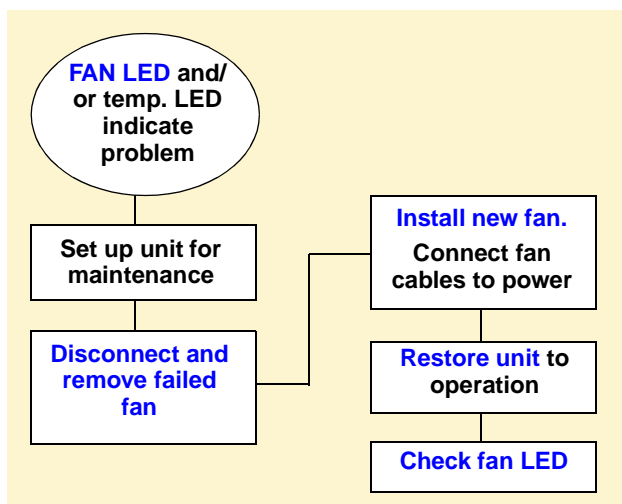
Troubleshooting Fans

There are two LEDs on the front of the Business Communications Manager server and one on the front of the expansion cabinet that can be used to assess fan function. Refer to Figure 100.

Figure 100   Business Communications Manager base unit operational LEDs
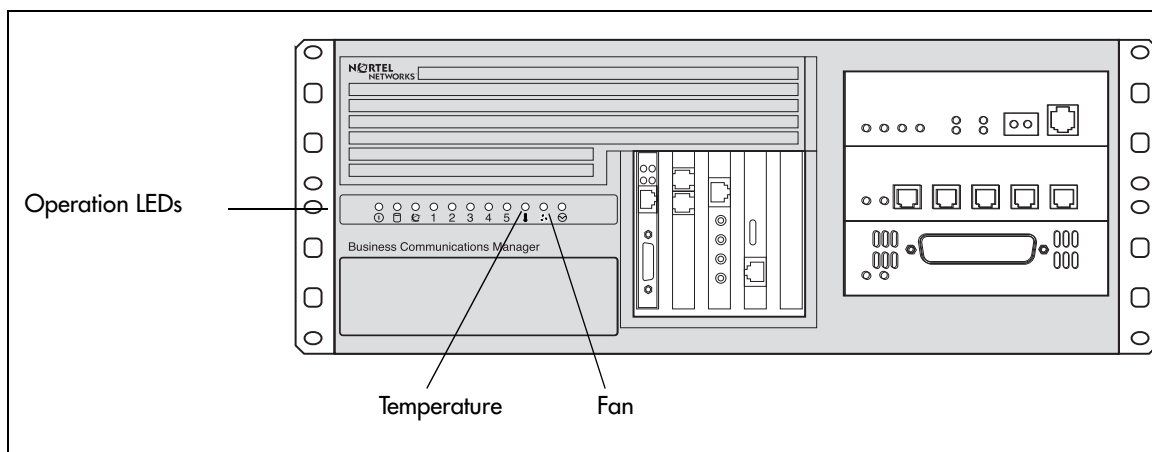
Table 46 describes the possible states of the fan and temperature LEDs.

Table 46   Fan and temperature LEDs on the server

LED Label	Description	Green LED On	Red LED On (Only)
🌡	Temperature	Temperature is below threshold.	Temperature is in alarm status. One of the problems could be that one of the fans has failed.
⚙	Fans	All installed fans are working	There is a problem with a minimum of one fan.

Removing a Fan from the Base Unit

The Business Communications Manager base unit can have one or two fans.

If the base unit has two fans, before you shut down the system, determine which fan has failed.

1   If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to "Shutting Down the System Software" on page 204. Otherwise, skip to step 2.

2   Set up the server for maintenance, as described in "Shutting Down the System Hardware" on page 204.

3   Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.

4   Remove the fan cable from wherever it is connected.

Refer to Figure 101 and Figure 102 on page 220.

Figure 101   Remove the fan cable from motherboard (pre-2.5 chassis)
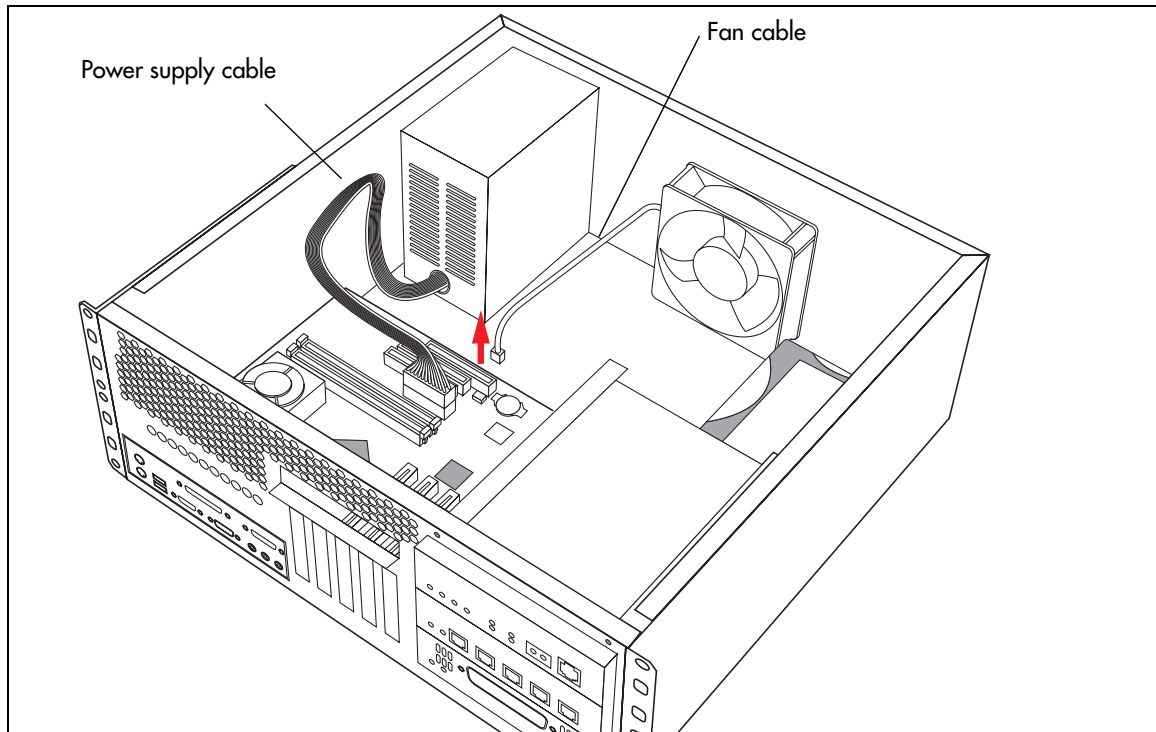
> **Note:** Redundant fans
>
> If the fans are piggy-backed, the back fan connects directly to a power supply connector through a patch connector.
>
> If the fans are side by side, then both fans are connected on the SSM board. Fan wires run under the power supply and are connected to J7 or J6 on the SSM board.

Figure 102 Remove the fan cables from SSM board (2.5 models)
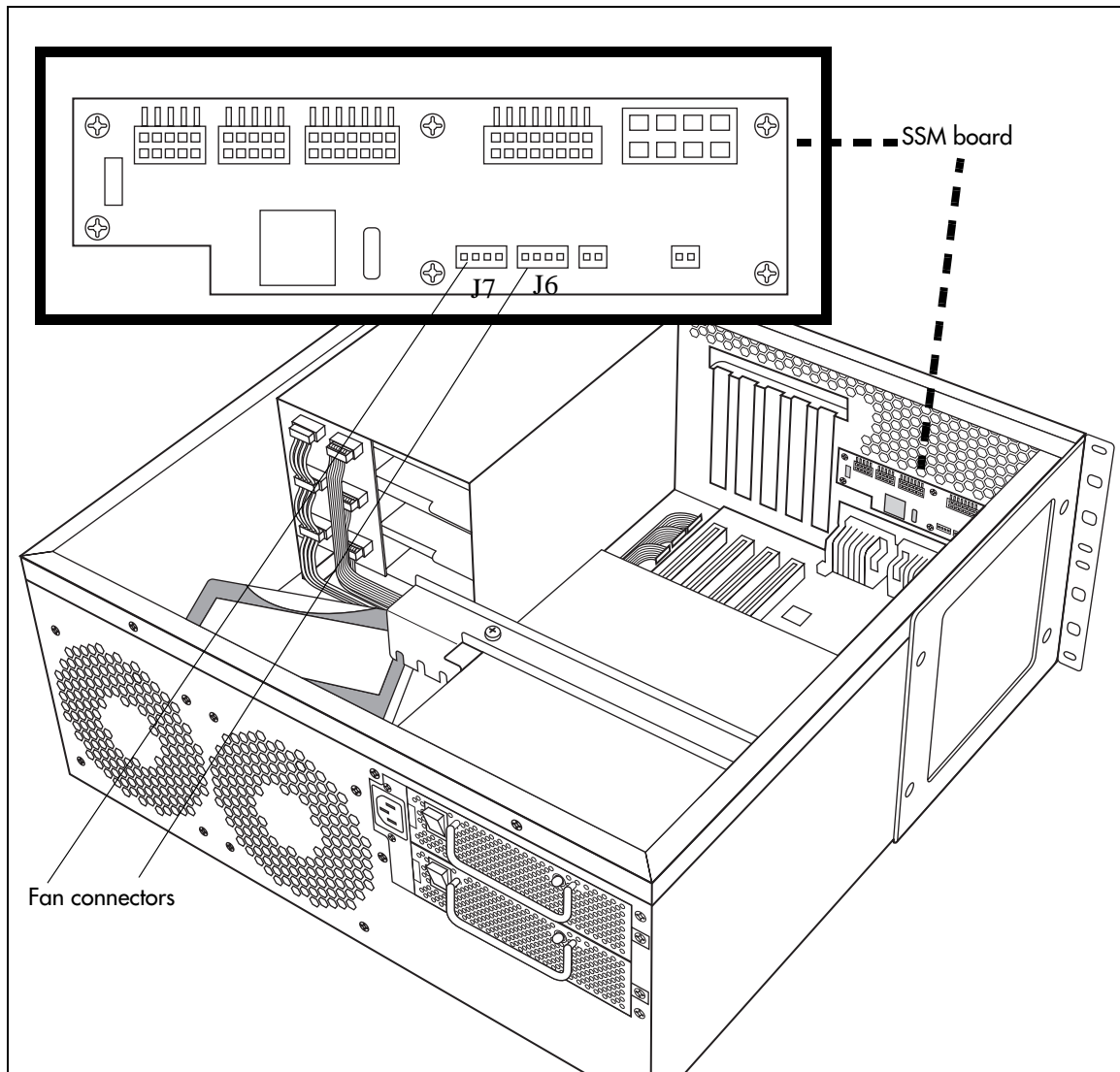
5 Remove the snap rivets that hold the fan to the base unit. Refer to Figure 103 and Figure 104 on page 221.

6 Lift the old fan out of the base unit.

Figure 103   Removing the fan (2.5 single-fan model)
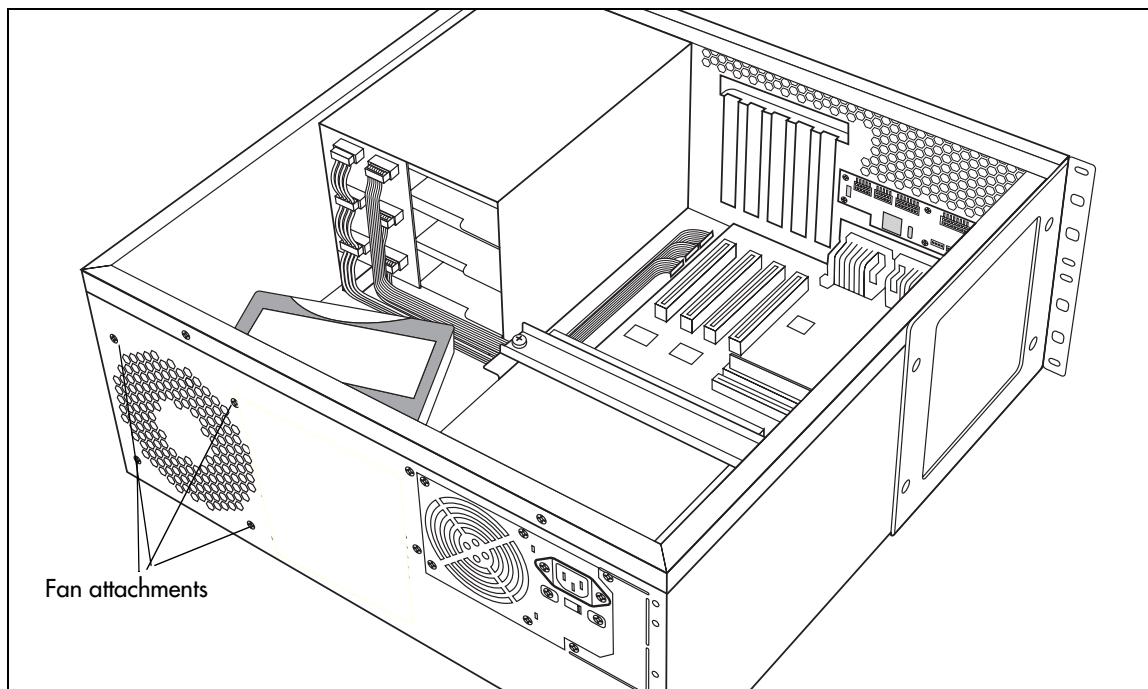
Fan attachments

Figure 104   Screw attachments beside fan holes (2.5 redundant model)

Fan attachments
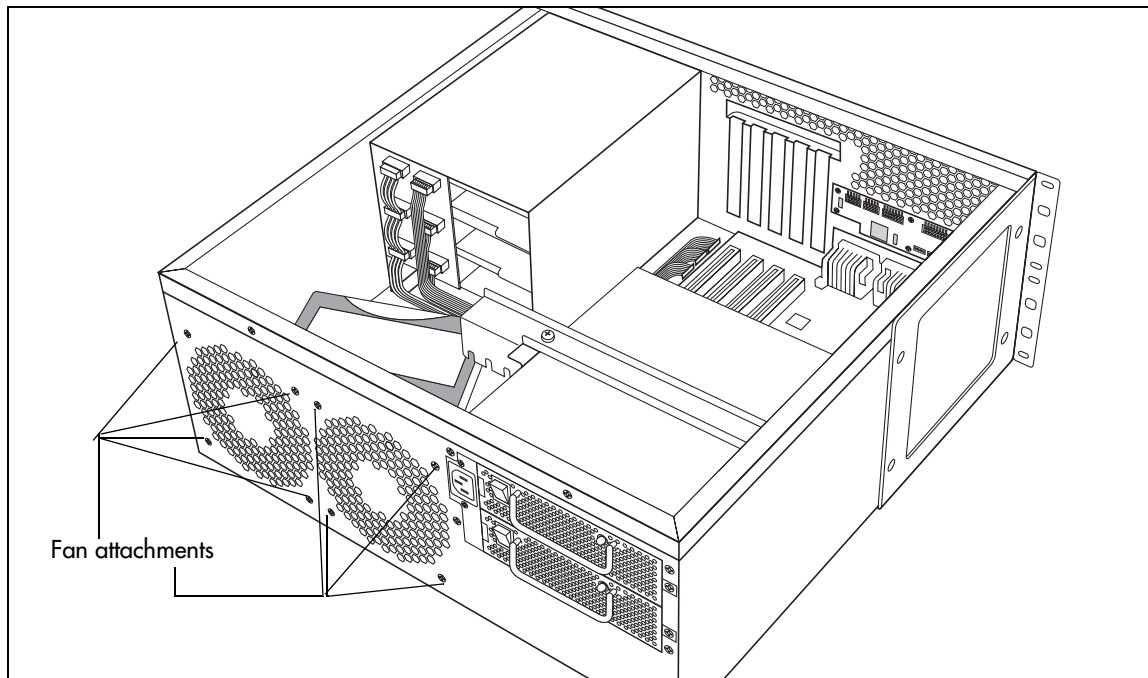
Replacing the Cooling Fan

To replace the fan in the base unit, follow these steps:

1 Place the new fan in the Business Communications Manager base unit in the position from which you removed the failed fan.

> **Note:** Ensure the label of the new fan faces the back wall of the Business Communications Manager base unit server.

> **Note:** Piggy-backed redundant fan
>
> If you are installing or replacing a piggy-back redundant fan in a 2.0 Business Communications Manager server that has been updated with a redundant power supply, place the redundant fan against the existing fan. Ensure that the blades are positioned in the same direction as the existing fan (fan labels both face in the same direction).
>
> Use the four screws and nuts that are supplied with the redundant fan to attach the redundant fan to the existing fan.

Figure 105 Installing piggy-backed fans
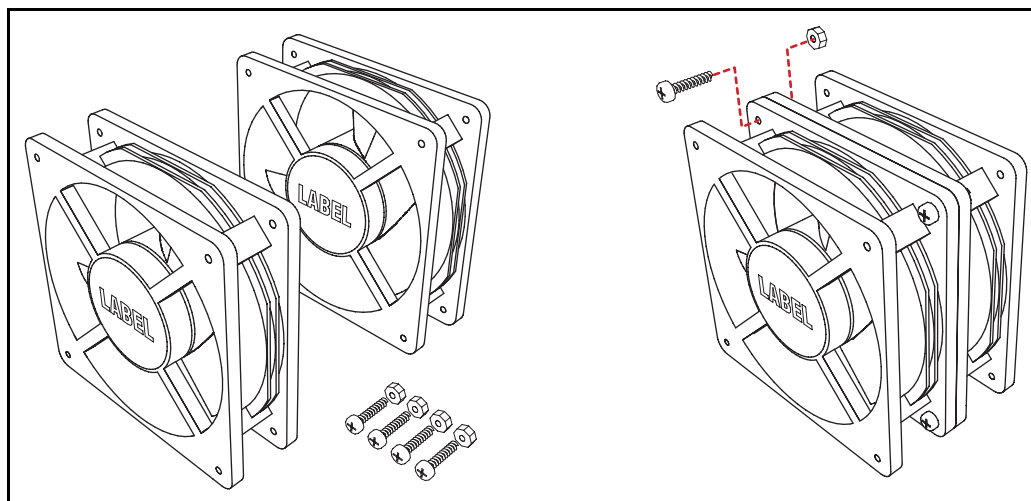
> **Note:** Side-by-side redundant fan
> If you are installing a second fan in a 2.5-model Business Communications Manager server, you must remove the cover label on the back of the server to expose the fan air holes and mounting holes.

2 Align the screw holes in the fan with the screw holes on the server.

3 Attach the fan to the Business Communications Manager base unit using the four screws (2.0 hardware) or plastic rivets (2.5 hardware). Refer to .

4   Connect the power supply cables for each fan to the SSM board. Refer to Figure 102 on page 220.

> ➡   **Note:** Piggy-backed redundant fan
>
> Connect the redundant power supply cable to the power cable adapter. Refer to Figure 106.
>
> Then connect the power cable adapter to an available power supply cable.

Figure 106   Connect the redundant fan cable to the adapter
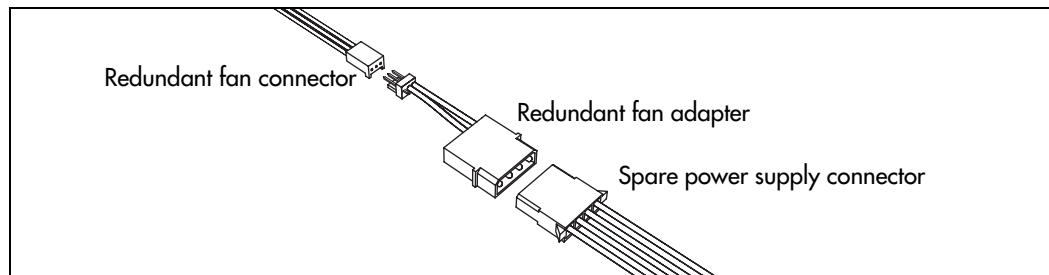
5   Replace the cover.

6   Restore the unit to operation. For details, refer to "Restarting the System" on page 206.

The Business Communications Manager system starts up when you connect the ac power cord. This takes several minutes to complete.

Remove the Fan from the Expansion Unit

The Business Communications Manager expansion unit comes either with one fan or a redundant fan set. The single-fan unit is not upgradeable.

Follow these steps to remove a malfunctioning fan:

1   Shut down the system following the directions in "Removing a Fan from the Base Unit" on page 218.

2   Disconnect the fan power cable from the hub card.

> ➡   **Note:** If the unit has redundant fans, each fan has a connector on the hub board.

3   Locate the screws that fasten the fan casing to the expansion unit back wall and remove them. Refer to Figure 107.

4   Remove the four screws that hold the fan to the expansion unit.

5   Lift the failed fan out of the expansion unit.

Figure 107 Fan screws location in expansion unit, 2.0 models.

Fan connector on
hub board

Screws attached to fan
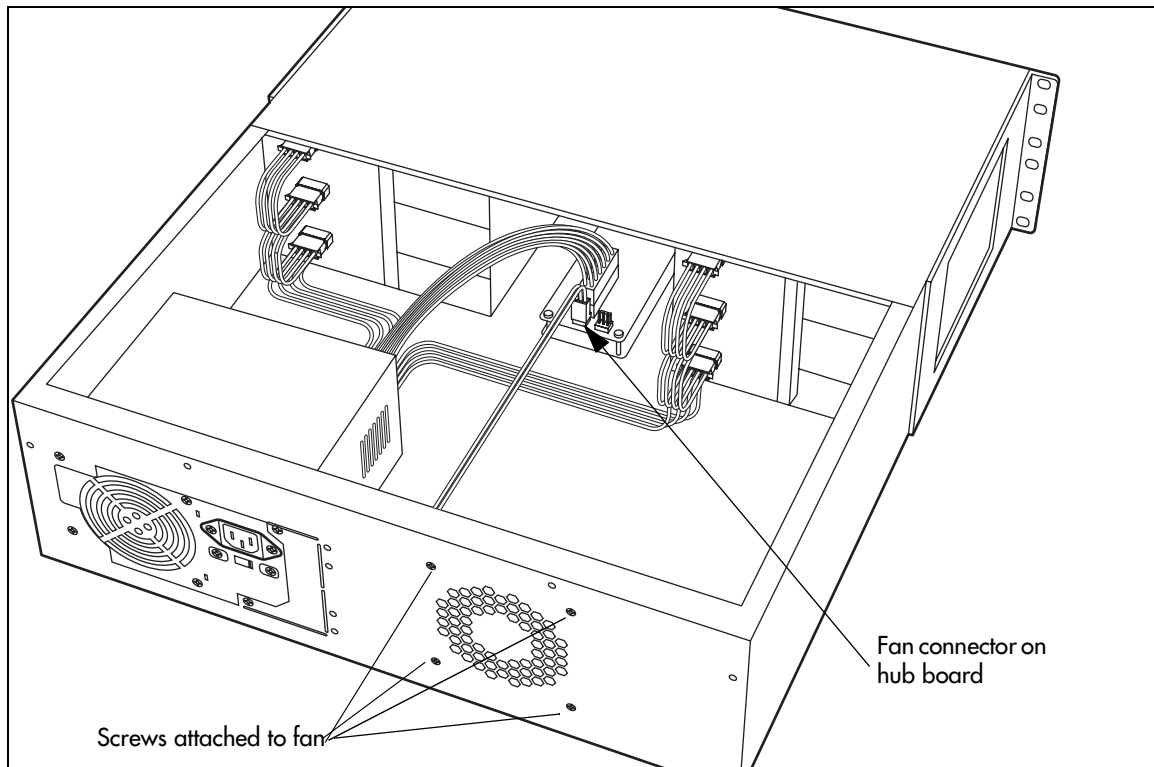
Figure 108 Fan screws location in expansion unit, 2.5 redundancy models.

Fan connectors
on hub board

Fan connector
on hub board

Screws attached to fan
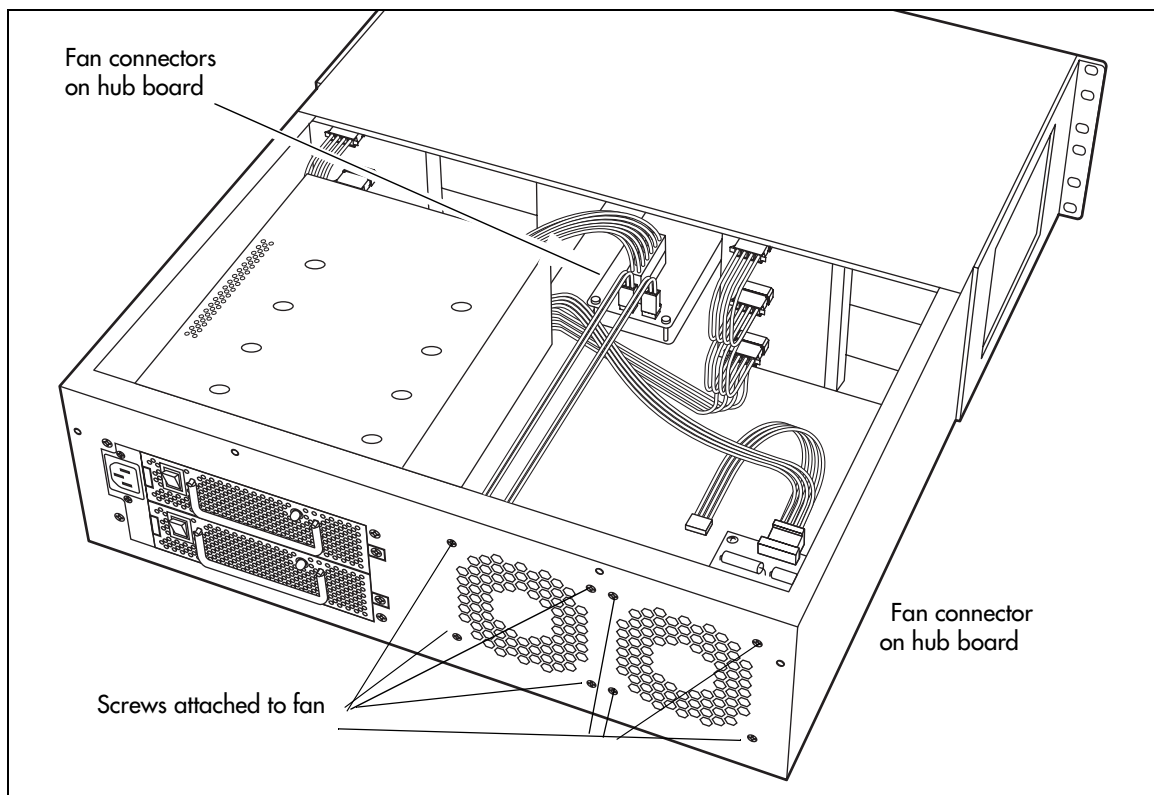
Replace the Fan into the Expansion Unit

Follow these steps to replace the fan in the Business Communications Manager expansion unit.

1 Place the fan in the expansion unit so that the label faces the back wall of the unit.

2 Align the screw holes in the fan with the screw holes in the expansion unit and attach the fan.

3 Connect the fan power supply cable to the hub board.

4 Replace the cover.

5 Restore the unit to operation. For details, refer to "Restarting the System" on page 206.

The Business Communications Manager system starts up when you connect the ac power cord. This takes several minutes to complete.

Chapter 19
Replacing a Power Supply

Business Communications Manager base units and expansion units can have standard or redundant power supplies.

This chapter describes

- how to replace a standard power supply
- how to upgrade from a standard power supply to a redundant power supply (Business Communications Manager base unit, only)
- how to replace the power supply module in a redundant power supply system

Replacing a Standard Power Supply

If the server or expansion cabinet has a standard power supply that fails, then all activity on the system ceases. Figure 109 provides an overview of the process for replacing a standard power supply.

Figure 109   Standard power supply replacement overview
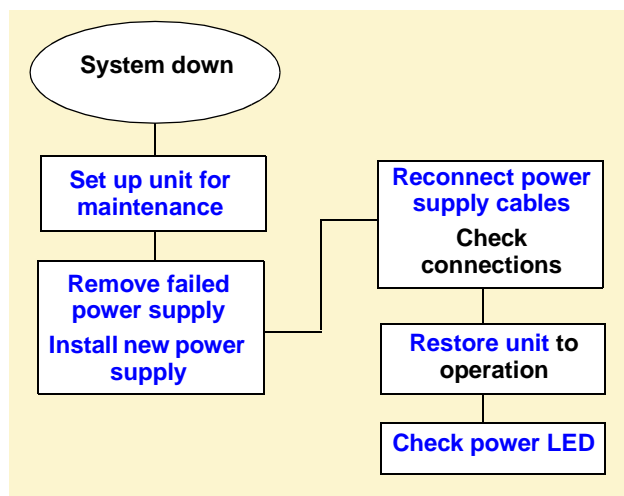
Removing the Standard Power Supply

If the standard power supply fails, the system will be down. Follow these steps to remove the power supply.

1 Set up the server for maintenance by removing all the cables from the front of the base unit, then disconnect the base unit and the expansion unit, if there is one, from the ac power connection.

2 Remove the cover from the base unit.

3 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.

4 Remove the power supply cables from the motherboard, media bays, and hard disk.

> → **Note:** If you have an updated system with a piggy-back fan arrangement, the rear fan will be connected to a power supply cable.

5 Cut the cable ties that hold the power cables to the Business Communications Manager base unit.

6 Remove the power supply bracket screw.

Figure 110 demonstrates this.

Figure 110   Removing power supply bracket (single-power supply models)
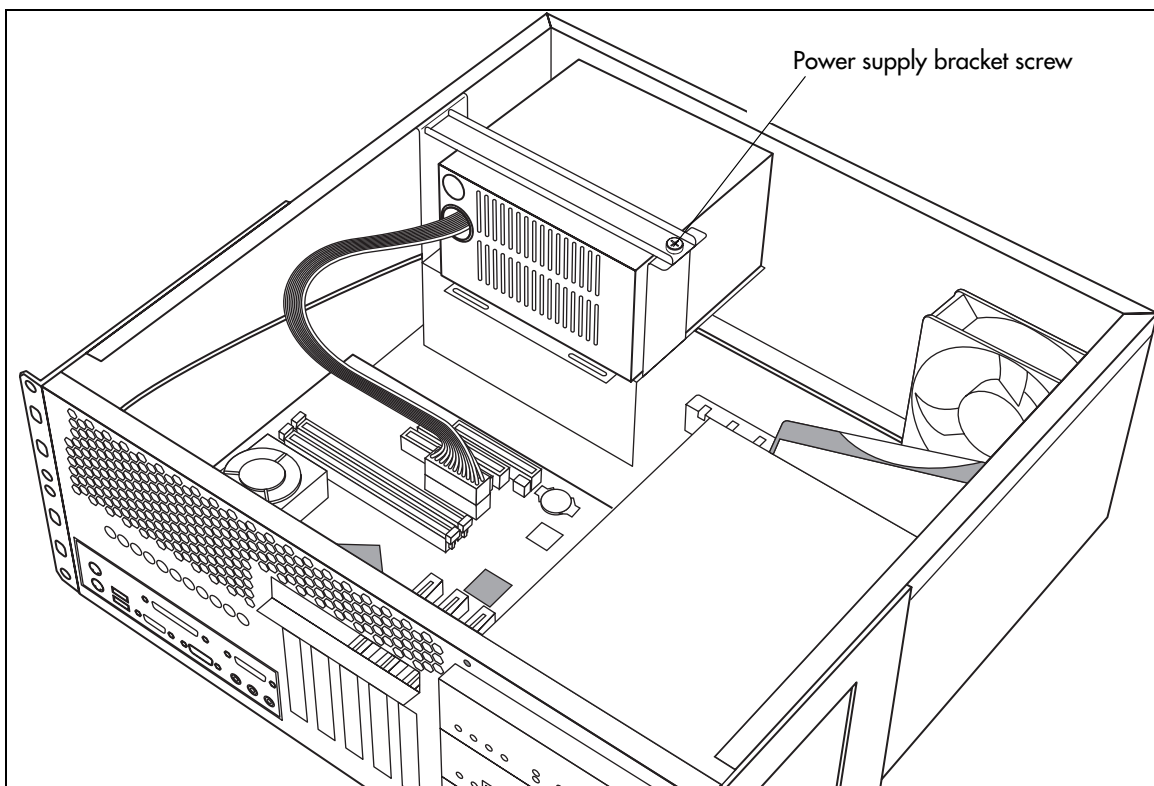
7 Remove the power supply bracket.

8 Remove the four power supply screws from the back of the Business Communications Manager base unit. Refer to Figure 111.

Figure 111   Remove the power supply screws
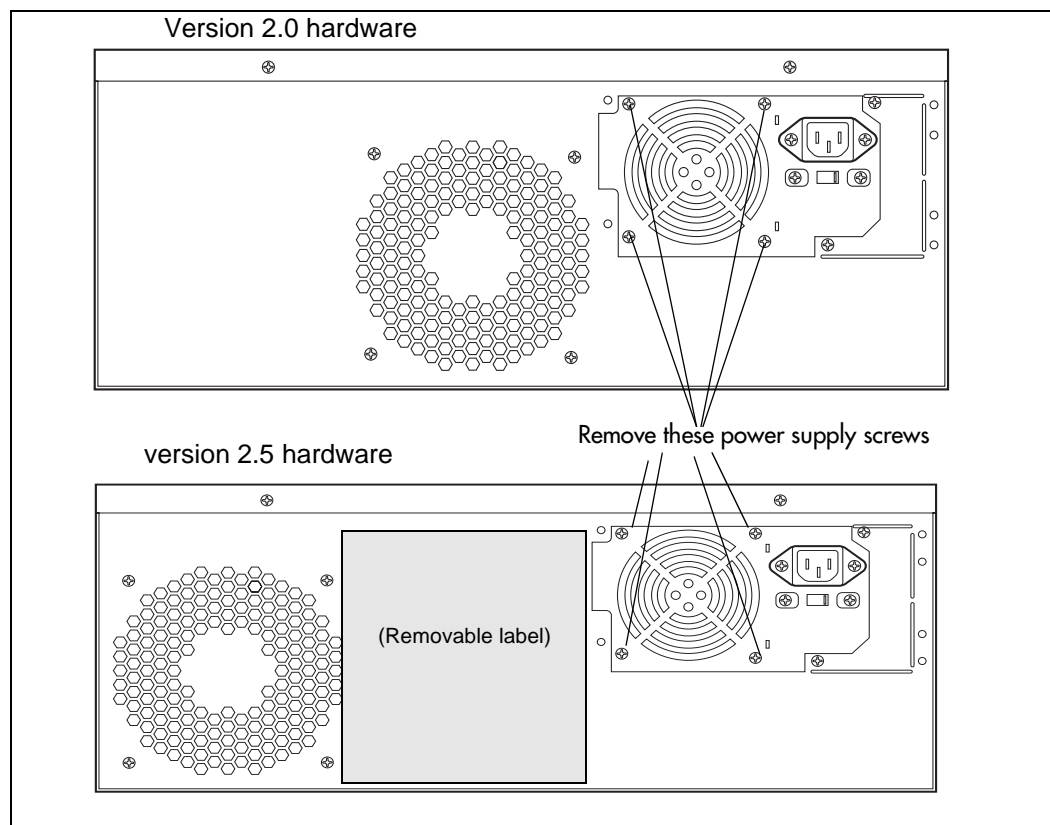
9 Remove the power supply from the chassis.

Installing a Standard Power Supply

Follow these steps to install a standard power supply.

1 Check to see if the new power supply is an auto-adjust power supply. This means the power supply does not have voltage switch. Otherwise, set the switch to the same ac voltage as the power supply you removed.

2 Place the new power supply into the Business Communications Manager base unit.

3 Align the screw holes in the housing with the screw holes in the base unit.

4 Secure the housing with screws.

5 Inside the unit, reconnect the power supply cables.

6 Replace the cover.

7 Restore the unit to operation. For details, refer to "Restarting the System" on page 206.

8 Monitor the power LED. Refer to Table 47.

Table 47 Power supply LED

LED Label	Description	Green LED On	Green LED Flash	Red LED On (Only)	Green LED Off
⏻	Indicates state of system power.	OK	N/A	a minimum of 1 PS needs attention*	N/A
				*Older models may not have a Red LED	

The Business Communications Manager system starts up when you connect the ac power cord. This takes several minutes to complete.

Upgrading to a Redundant Power Supply

The redundant power supply allows you to change a failed power supply without turning off the system. You can add a redundant power supply to a Business Communications Manager base unit currently equipped with a standard power supply.

➡ **Note:** A Business Communications Manager expansion unit with a standard power supply cannot be updated. You must replace the cabinet.

Figure 112 provides an overview of the steps required to upgrade your system from a standard power supply to a redundant power supply module.

Figure 112 Redundant power supply upgrade overview
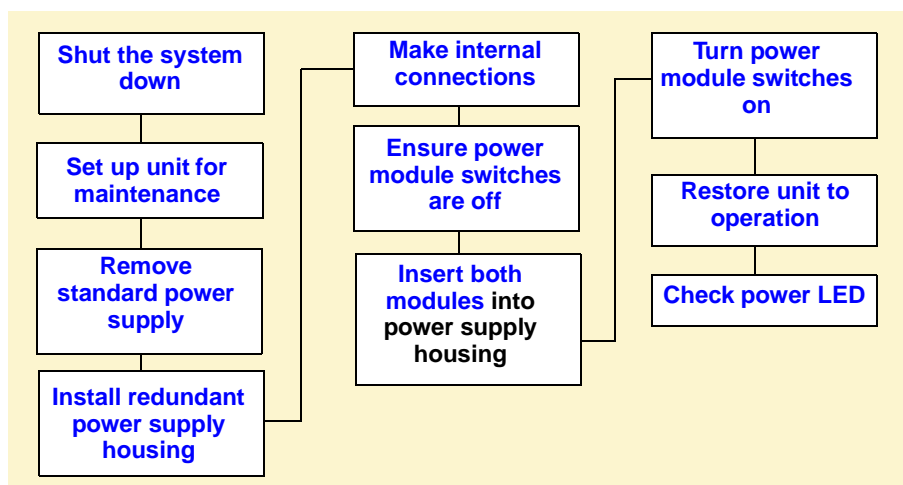
Removing and the Standard Power Supply

This section describes the steps for removing an existing standard power supply and replacing it with a redundant power supply. After the redundant power supply is installed, insert the two power supply modules. Redundant power supply modules can be changed while the system is running, as long as one of the modules remains active.

> **Note:** When you upgrade to a redundant power supply, you must also put in a redundant fan. Refer to "Adding or Replacing a Cooling Fan" on page 217.

1   If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to "Shutting Down the System Software" on page 204. Otherwise, skip to step 2.

2   Set up the Business Communications Manager base unit for maintenance, as described in "Shutting Down the System Hardware" on page 204.

3   Disconnect the power supply from the internal connections.

4   Cut the cable ties that hold the power cables to the base unit.

5   Remove the power supply bracket screw. Refer to Figure 113.

Figure 113   Removing power supply bracket

Power supply bracket screw
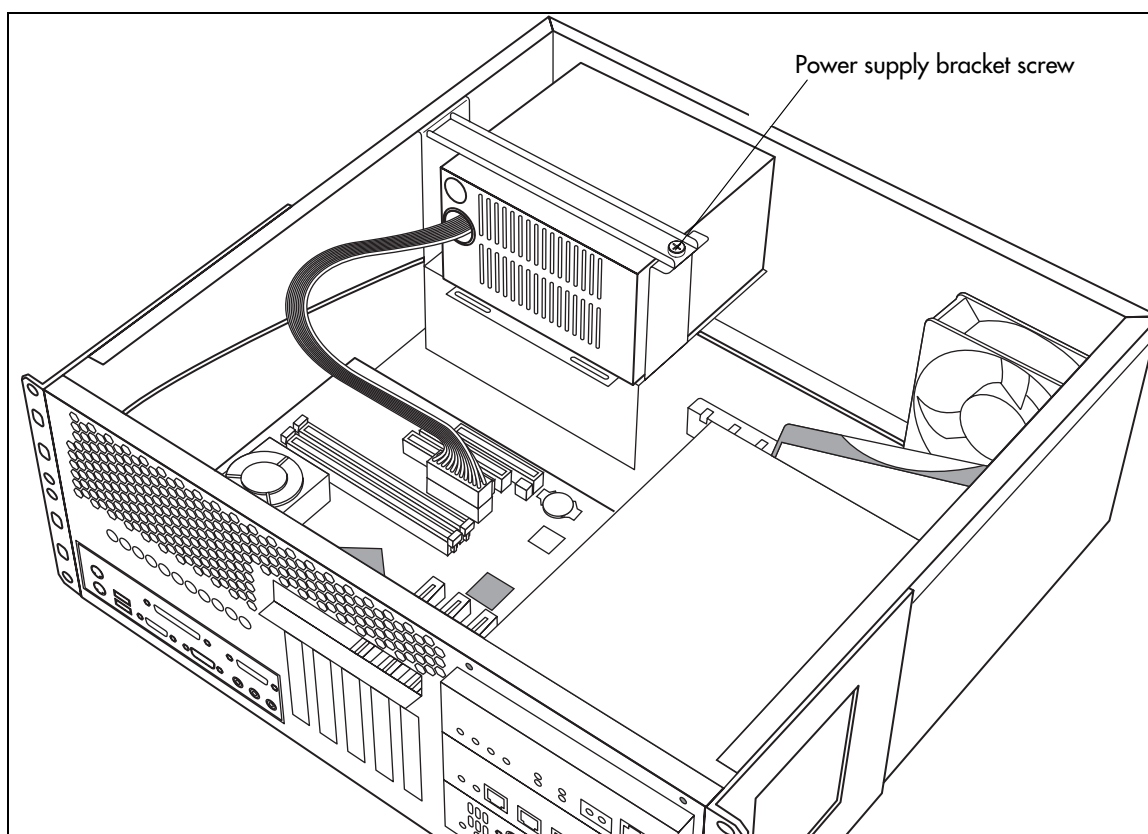
6 Remove the power supply bracket.

7 Remove the four power supply screws from the back of the base unit.

> ➡ **Note:** Figure 114 shows the back of a Business Communications Manager base unit, version 2.5. If the unit was delivered with two fans, both sets of fan holes are uncovered. Base units delivered with a single fan have one of the sets of fan holes covered with a label.
>
> Version 2.0 systems have only one set of fan holes, and the redundant fan is piggy-backed on to the existing fan.

Figure 114   Remove the power supply screws

Remove these power supply screws
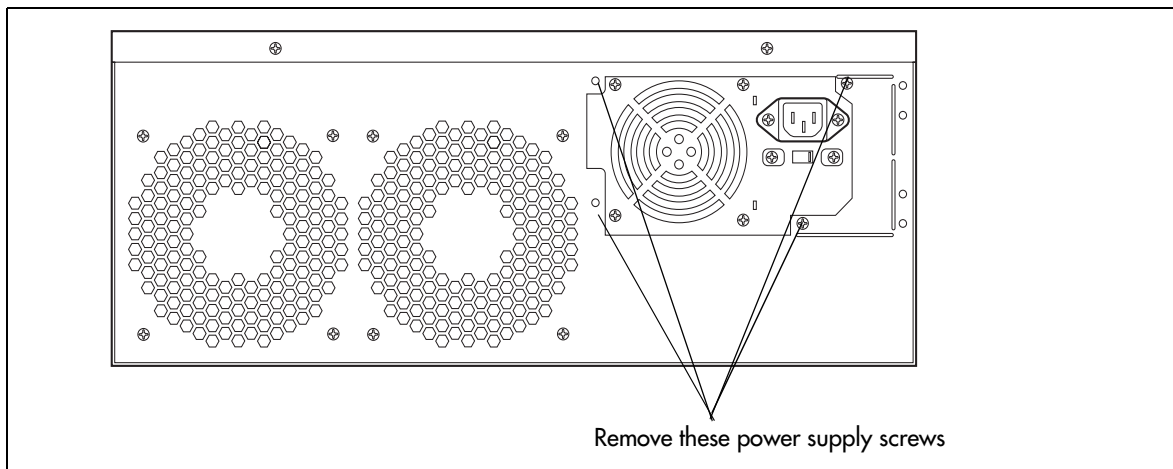
8 Remove the power supply from the chassis.

9 Remove the knockout plate from the back of the Business Communications Manager base unit. Refer to Figure 115.

Figure 115   Remove the knockout

Remove this bracket to accommodate redundant power supply
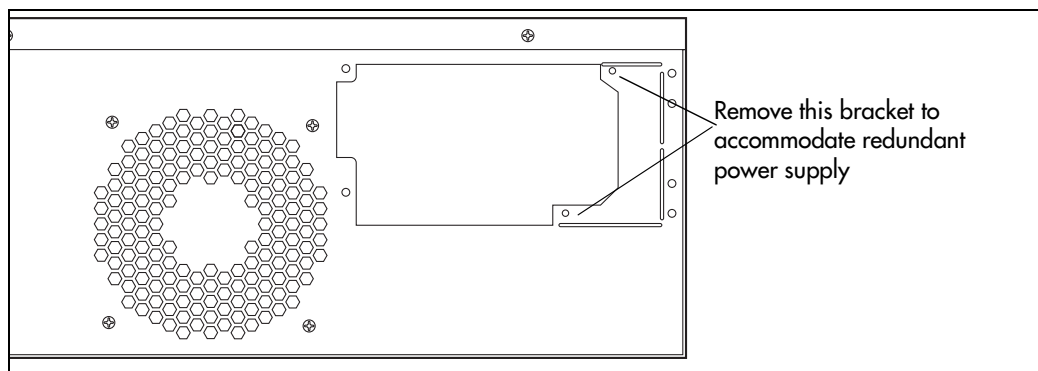
Installing the Redundant Power Supply

After you have prepared the Business Communications Manager base unit to accommodate the redundant power supply, follow these steps to insert the housing.

1 Remove the power supply modules from the redundant power supply housing.

 a Check the rocker switch on the left side of the module and ensure that it is in the off position.

 b Grasp the handle and pull the tab beside the rocker switch towards the handle.

 c Pull the module out of the housing.

2 Position the redundant power supply housing in the Business Communications Manager base unit.

3 Align the screw holes in the redundant power supply with the screw holes in the base unit.

4 Attach the redundant power supply housing to the base unit using the two screws inserted into the top and bottom holes. Refer to Figure 116.

Figure 116   Attach the redundant power supply housing
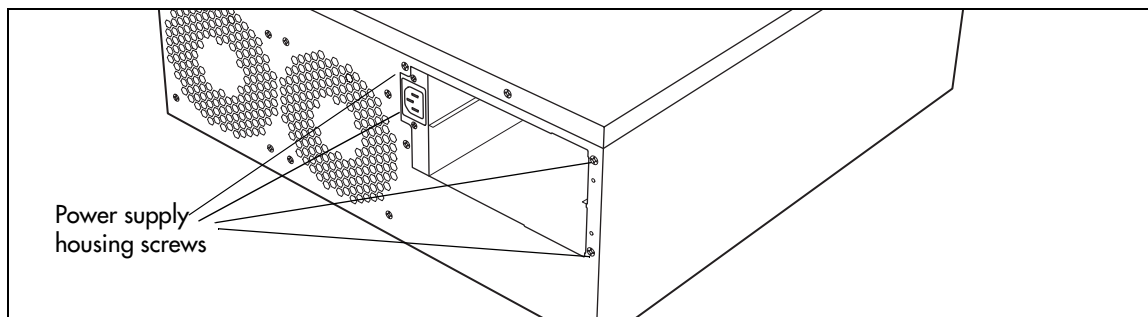
5 Insert the power supply bracket and secure it with a screw. Refer to Figure 117.

Figure 117   Securing the power supply bracket
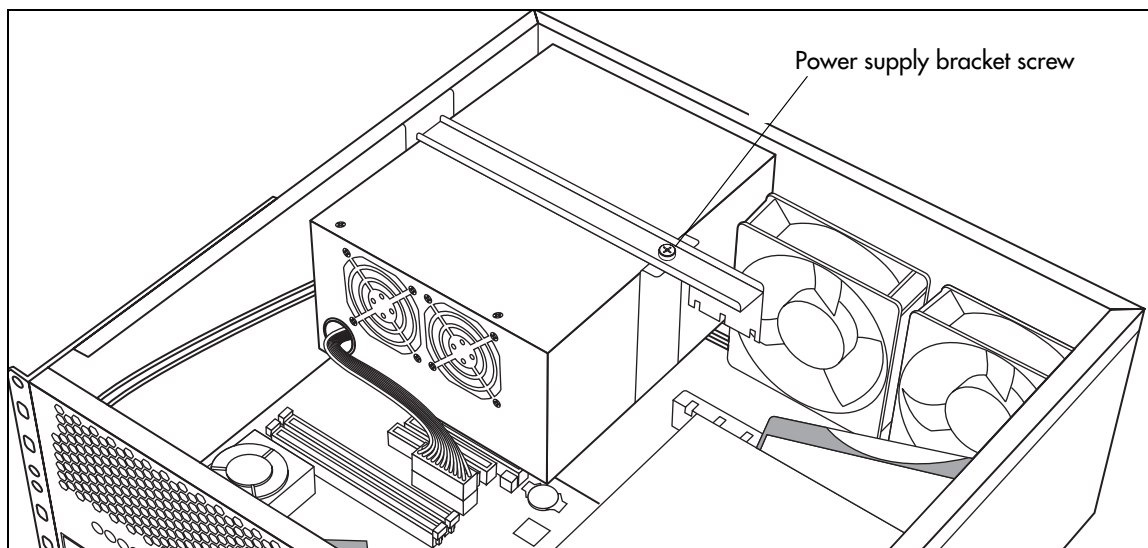
6 If you have not already done so, install a redundant fan into the unit. Refer to "Adding or Replacing a Cooling Fan" on page 217.

7 Inside the cabinet, reconnect the power supply and fan cables.

8 Reconnect the power supply and fan cables.

9 Replace the cover.

10 Ensure that you position the power modules correctly before inserting them into the power supply housing.

   a The green LED sits at the top of the unit.

   b Check the rocker switch on the left side of the module and ensure that it is in the OFF position.

11 Insert the power modules into the redundant power supply housing at the back of the server.

   a The face of the module is flush with the casing. You hear a click when it is properly seated.

   b Secure each module with a screw through the tab on the right side of the module. These holes align with the middle two holes on the right of the power supply housing. Refer to Figure 118.

Figure 118   Insert and attach the modules
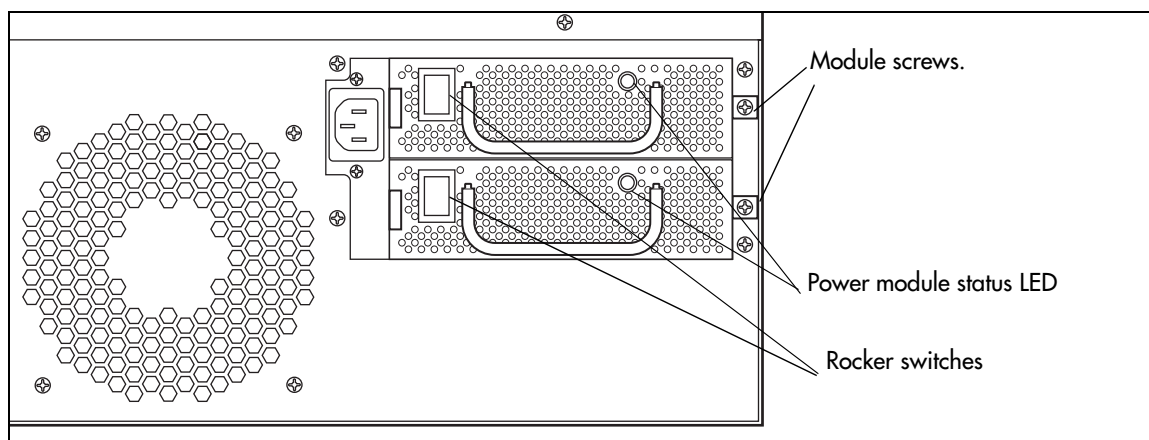
12 Turn on the switches for both power modules.

13 Restore the units to operation as described in "Restarting the System" on page 206.

The Business Communications Manager system starts up when you connect the ac power cord. System recovery takes several minutes to complete.

The LEDs on the power supply are on when the ac power is connected.

Replacing a Redundant Power Supply Module

If the green LED for the power supply is not lit, but the power switch on the module is still on, it indicates that the module has failed.

> → **Note:** It is not necessary to remove power from the Business Communications Manager base unit or expansion unit to replace a redundant power supply module.

Follow these steps to replace the redundant power supply module.

1 Turn the module switch to OFF.

2 Remove the screw from right-hand tab.

3 Grasp the handle on the module and, at the same time, pull the locking tab on the left of the module towards the handle of the module.

4 Pull the module straight forward and out of the housing. Refer to Figure 119.

Figure 119 Removing the power module
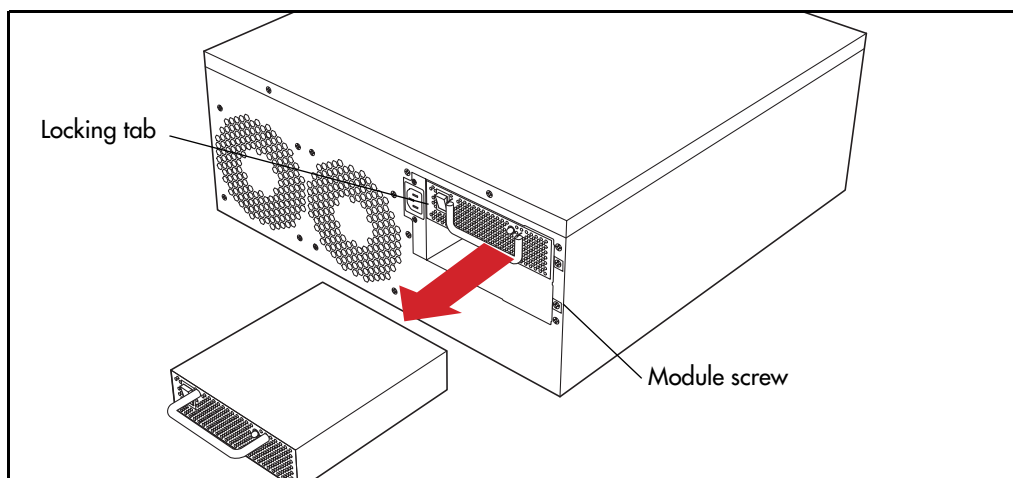
5 Ensure the switch on the replacement module is off.

6 Insert the replace module into the empty slot in the power supply housing.

7 Secure with a screw in the tab located on the right side of the module.

8 Turn the module switch to the on position.

9 Restore the units to operation as described in "Restarting the System" on page 206.

The Business Communications Manager system starts up when you connect the ac power cord. System recovery takes several minutes to complete.

The LEDs on the power supply are on when the ac power is connected.

Replacing a Power Supply in an Expansion Unit

The power supply in the Business Communications Manager expansion unit is exactly the same type of power supply as that in the Business Communications Manager base unit. The only difference is that 2.5 version expansion units come with either a standard power supply or redundant power supply. In this case the standard power supply cannot be updated to a redundant power supply. You must upgrade the entire expansion unit.

→ **Note:** Version 2.0 conversion

If you still have a version 2.0 expansion unit, which is larger than the 2.5 versions, you can upgrade to a redundant power supply. To perform this upgrade, follow the instructions for updating the base unit power supply, "Upgrading to a Redundant Power Supply" on page 230.
In this configuration, the redundant fan would be installed as a piggy-back unit. The plug for the redundant unit plugs in beside the first unit. Refer to Figure 121 on page 237. Note that the version 2.0 cabinets only have one set of fan perforations, as shown in Figure 120.

To replace a standard or redundant power supply in a version 2.5 Business Communications Manager expansion unit, you can follow the instructions given in the sections noted below.

- Standard supply expansion unit: "Replacing a Standard Power Supply" on page 227. Refer to Figure 120.

- Redundant power supply: "Replacing a Redundant Power Supply Module" on page 235. Refer to Figure 121 and Figure 122 on page 237.

Figure 120   Expansion unit, standard power supply interior connections

Power supply screws

Cooling fan cable connectors
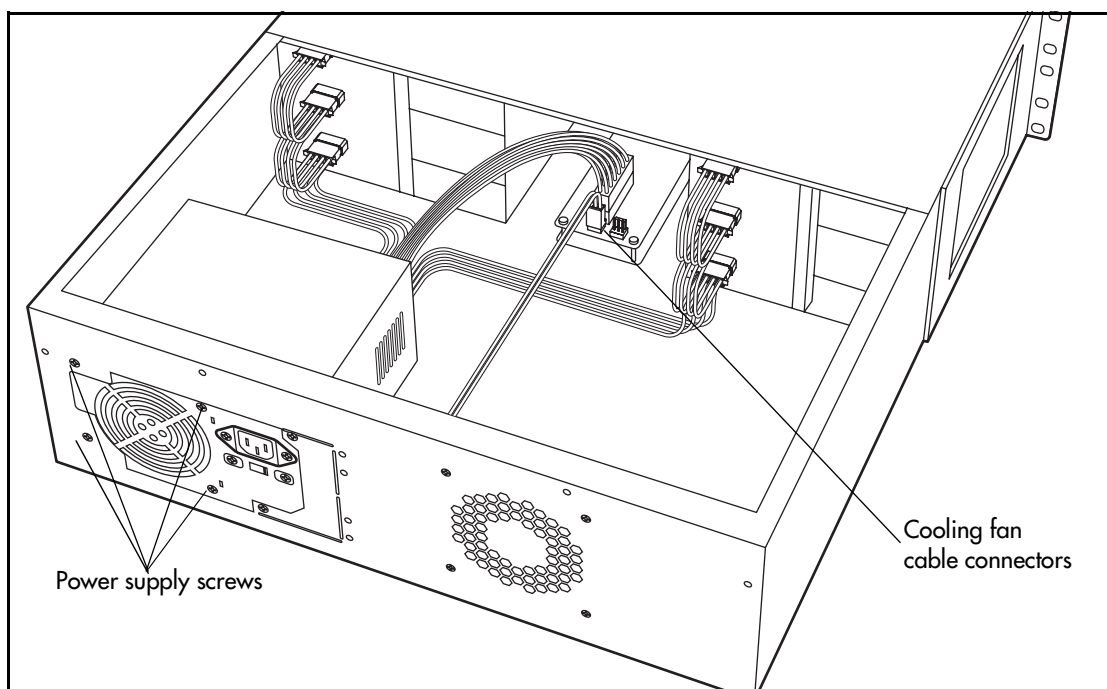
Figure 121   Expansion unit, redundant power supply interior connections
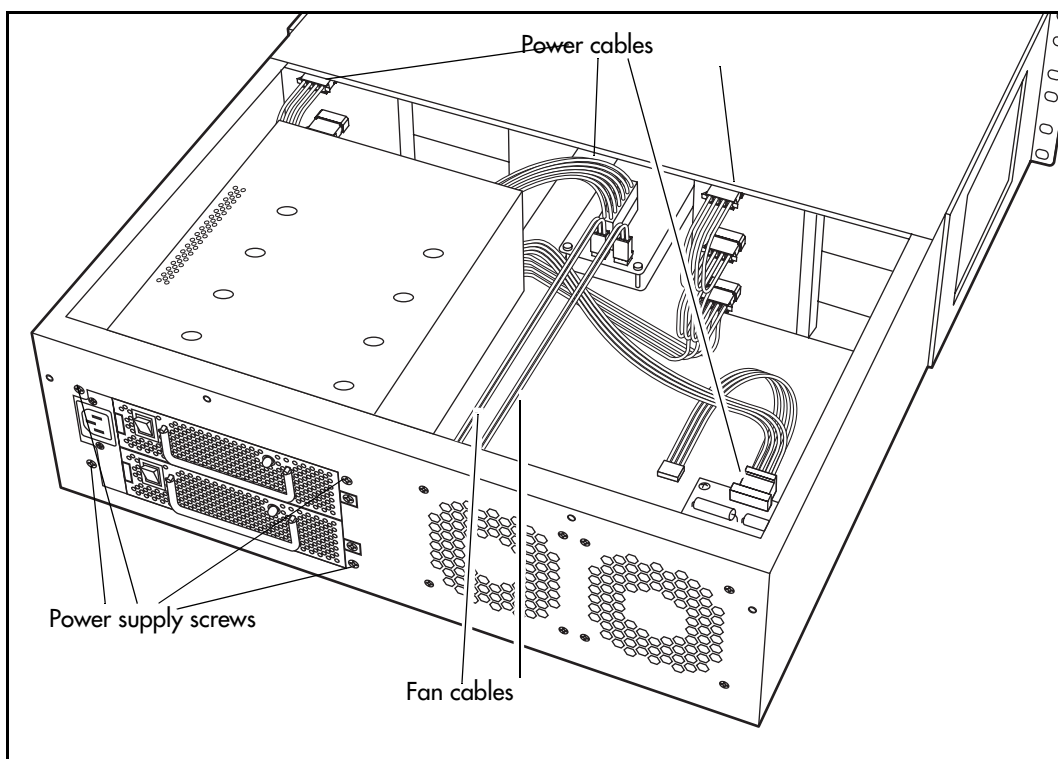
Figure 122   Installing the power module in a redundant expansion unit
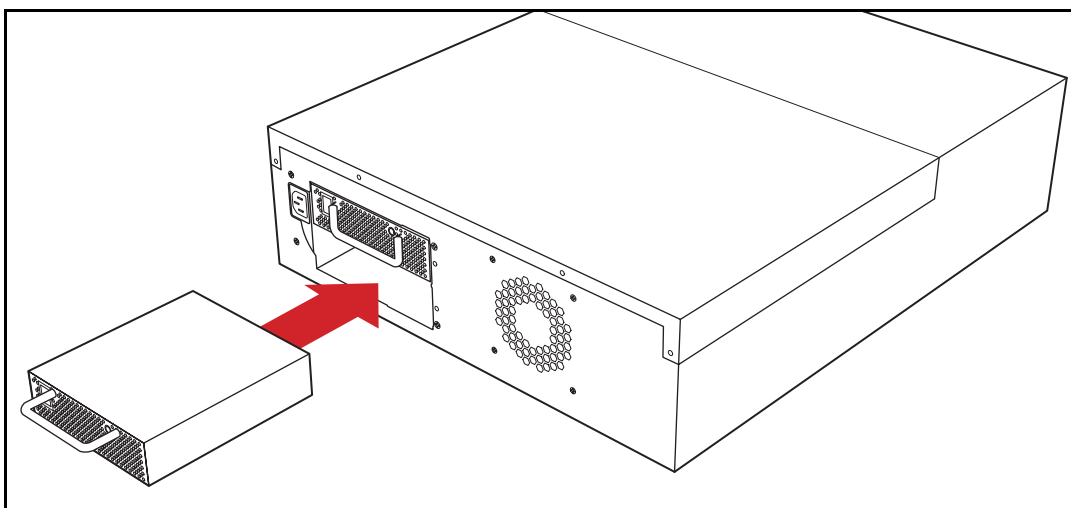
Chapter 20
Replacing Data Cards and Processing Hardware

Besides the hard disk, power supply, and cooling fans, a number of components the Business Communications Manager system uses for data functions can be replaced.

These components can be replaced:

- WAN cards
- LAN cards
- modem cards
- computer memory
- PEC cards
- motherboard battery

Replacing Data Cards

Depending on your location, you can have various configurations of data cards that can include WAN card, LAN, and modem cards (North America, only). All three types of cards are removed and replaced in the same manner, the only difference being which PCI slot they are inserted into.

For a description of the function of each type of card on the Business Communications Manager system, refer to "Data Networking Components" on page 40.

Figure 123 provides a general procedure for card replacement in the PCI slots of the Business Communications Manager server.

Figure 123   LAN card replacement overview
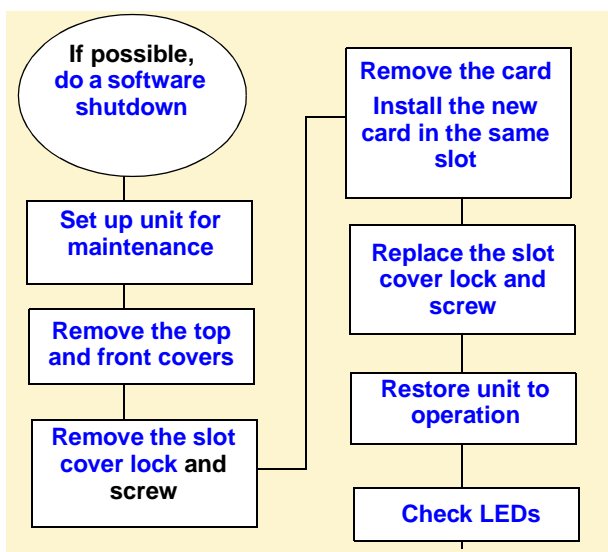
Removing a Data Card

Five LEDs on the front of the Business Communications Manager base unit indicate PCI card status. LAN cards can be inserted any of the first three PCI slots. Refer to Figure 124. Table 48 lists the various LED states.

→ **Note:** There are four possible profiles for data card placement in the Business Communications Manager base unit. Figure 124 shows the configuration for profile 1. Note that theWAN card is connected to the first two PCI LEDs.

If the data card placement on your base unit differs, ensure that you replace the cards in the same slots they were removed from. Not all systems can support all cards.

Figure 124   Business Communications Manager base unit LAN card LEDs
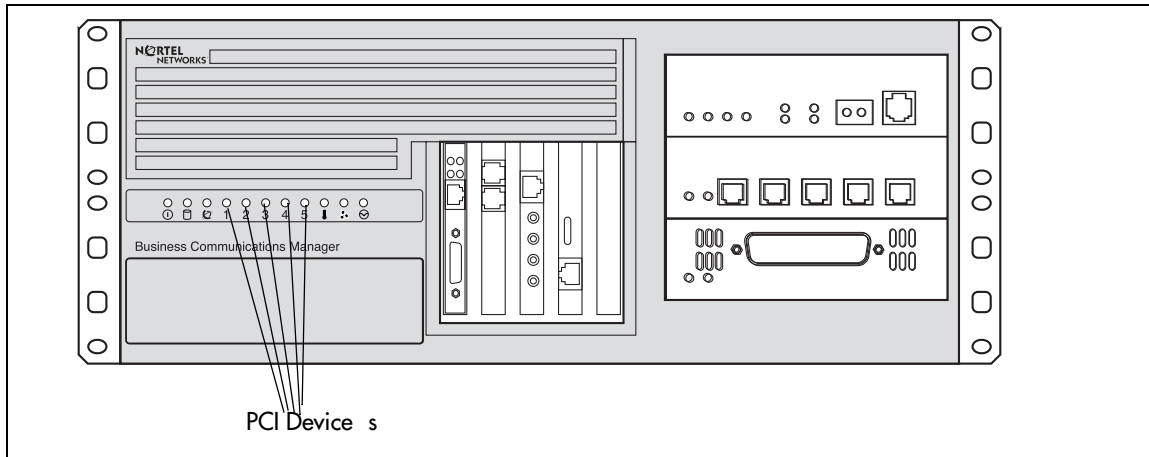
Table 48   Base unit PCI LED states

LED Label	Description	Green LED On	Green LED Flash	Green LED Off
1	PCI Device/ WAN Port #1	Device is present and the driver is active	driver is not running	Device is not present.
2	PCI Device/ WAN Port #2	Device is present and the driver is active	driver is not running	Device is not present.
3	PCI Device	Device is present and the driver is active	driver is not running	Device is not present.
4	PCI Device	Device is present and the driver is active	driver is not running	Device is not present.
5	PCI Device	Device is present and the driver is active	driver is not running	Device is not present.
Note: The MSC is not field-replaceable				

Follow these steps to remove the LAN, WAN or modem cards:

1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to "Shutting Down the System Software" on page 204. Otherwise, skip to step 2.

2 Set up the server for maintenance, as described in "Shutting Down the System Hardware" on page 204.

3 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.

4 Remove the front cover.

5 Remove the slot cover lock screws. Refer to Figure 125 for the location of the slot cover lock.

Figure 125   Slot cover lock
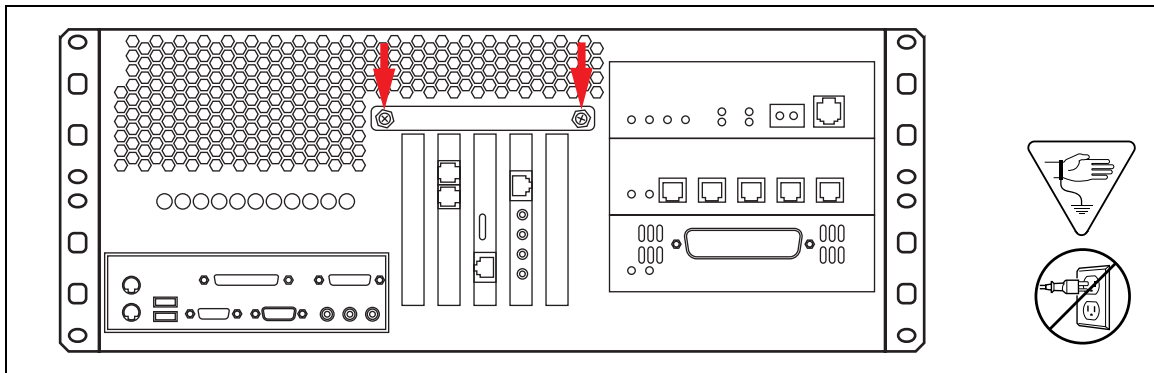
6 Remove the slot cover lock.

7 Use both hands to carefully hold the card along the top. Lift the card straight up and out of the module.

Installing the Card

Follow these steps to replace the LAN, WAN, or modem cards:

1 Insert the new card in the same PCI slot from which you removed the damaged card. Refer to Figure 126.

2 Push the card down until it sits firmly in the connector.

3 Fasten the slot cover screw in the modem slot cover.

4 Replace the slot cover lock.

5 Replace the front cover.

6 Replace the top cover.

7 Restore the unit to operation. For details, refer to "Restarting the System" on page 206.

Figure 126   Install the LAN card
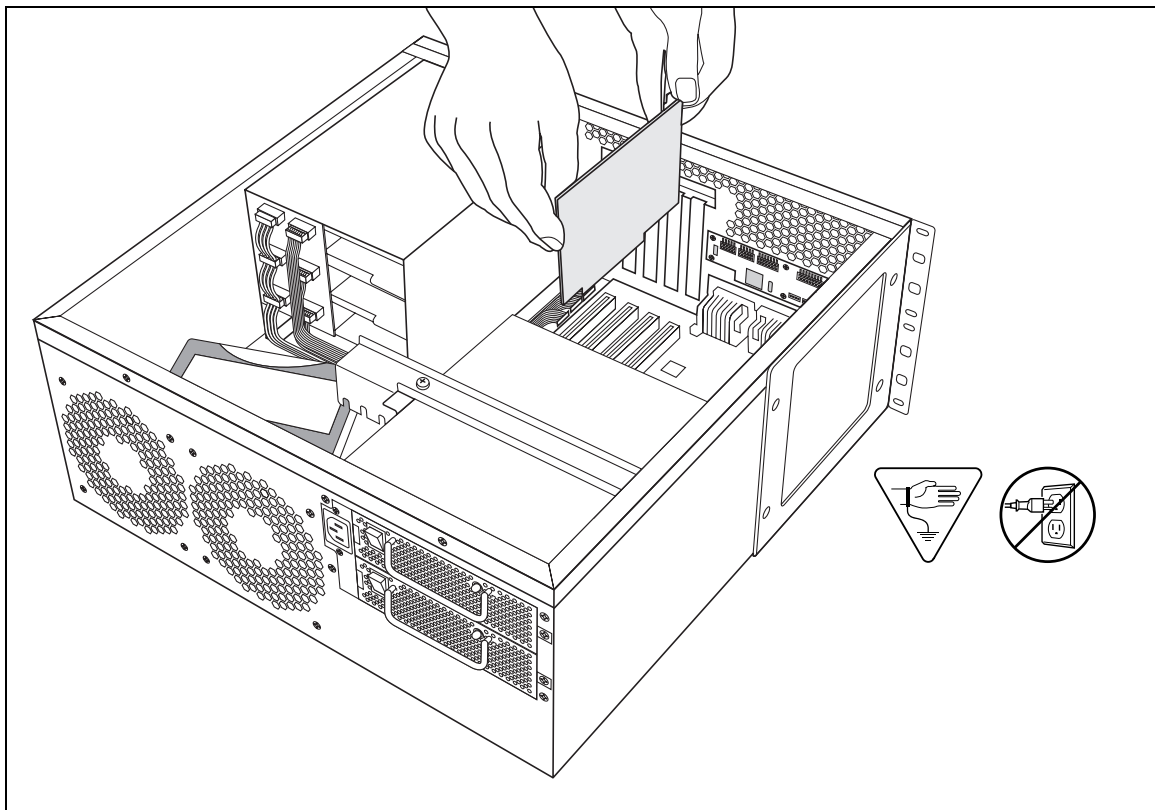
Replacing PECs

The Business Communications Manager base unit 2.5 comes equipped with two Processor expansion cards (PEC III) mounted on the Media services card (MSC). These modules provide signal processing capabilities for such applications as voice mail and IP telephony applications.

The 2.0 version of the server contains four PEC Is. If you want to start using IP telephony resources, you may want to upgrade to PEC IIIs. Or if you started with a basic 2.5 system with two PEC IIIs, you may want to add more when you start increasing your IP telephony requirements.

This chapter describes the processes for removing and replacing a PEC module.

Figure 127 provides an overview of the process for replacing the PEC.

Figure 127   PEC replacement overview

⚠ **Danger:** Electrical shock warning.
Disconnect the power cord, telephone cables and network cables before opening the computer.
Read and follow installation instructions carefully.

⛔ **Caution:** Use only a Nortel Networks approved replacement. Contact your account representative for the current list of approved replacement parts.

Removing PECs

The following steps describe the process for removing PECs from a Business Communications Manager base unit MSC.

1   Ensure you have a current data backup of your system.

2   Shut down the system using the Shutdown command. For details refer to "Shutting Down the System Software" on page 204. Otherwise, skip to step 2.

3   Set up the server for maintenance, as described in "Shutting Down the System Hardware" on page 204.

4   Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.

5   Grasp the top edge of the PEC you want to remove and pull upward. Refer to Figure 128.

Figure 128   Removing or replacing a PEC
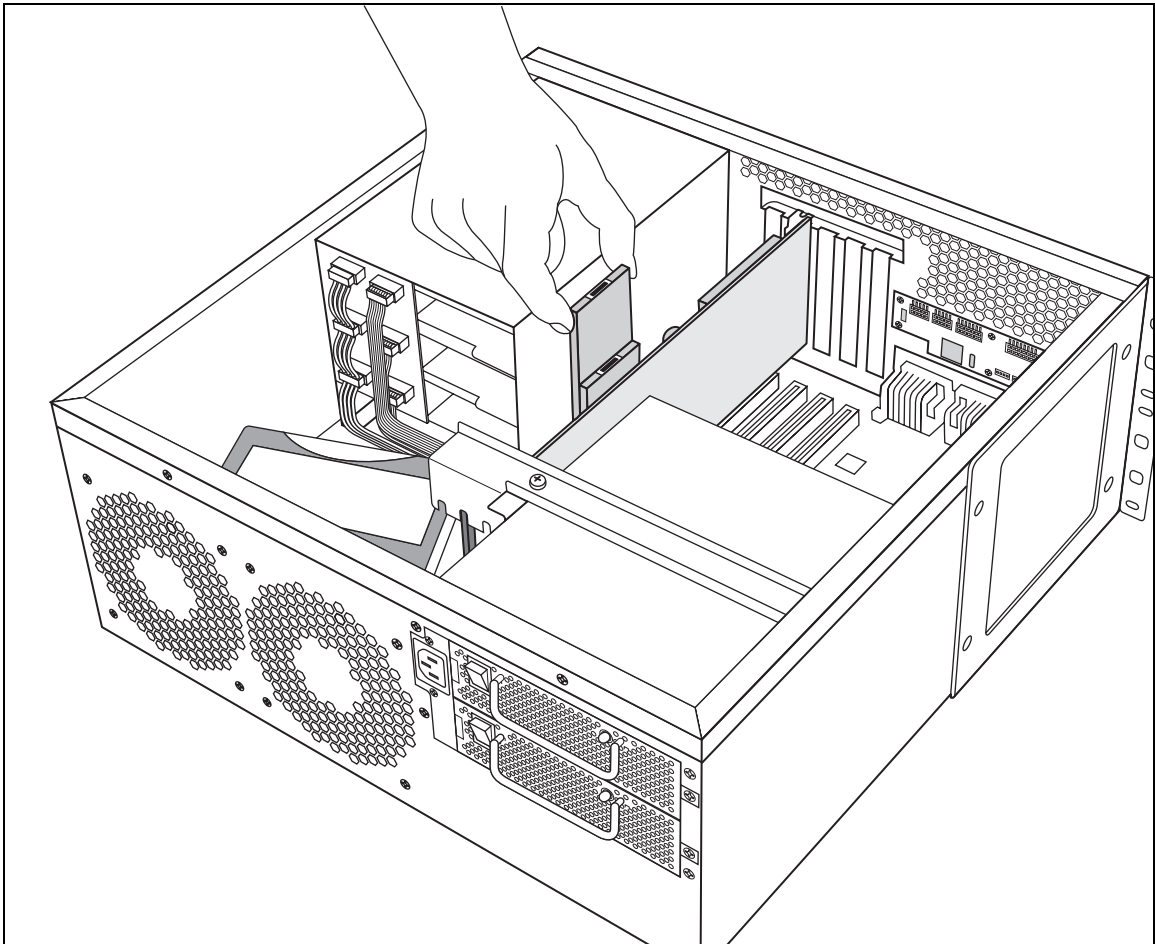
Installing a PEC

When you replace or add PECs, ensure you have followed the directions for shutting down the system from the previous section. Also ensure you have a current data backup of your system.

> ⚠ **Warning:** Possible data loss
>
> Ensure that you do not touch the PEC casing to any of the components on the MSC. This may cause shorting top occur, which can erase memory or cause a loss of telephony programming.
>
> If this occurs, complete the installation of the PEC, and then restore the data from your backup medium.

Follow these steps to correctly install a PEC.

1   Decide which slot you are going to install the PEC into on the MSC board.

2   Line the card up between the rails of the slot.

3   Carefully push the PEC down into the slot until it is firmly seated.

> ➡ **Note:** Do not force the card into its slot. If the PEC does not slide in easily, check the alignment.

4   Replace the cover.

5   Restore the unit to operation. Refer to .

Replacing Memory

The version 2.5 Business Communications Manager base unit comes equipped with 256 MB of Random Access Memory (RAM). The previous version 2.0 release of the hardware contained 128 MB of RAM. In both cases, the memory resides on a Dual In-line Memory Module (DIMM) in center of the main printed-circuit board. This board contains space to add a second DIMM, or you can upgrade the existing DIMM.

Figure 129 provides an overview of the process for replacing or adding memory chips.

Figure 129   Memory replacement overview
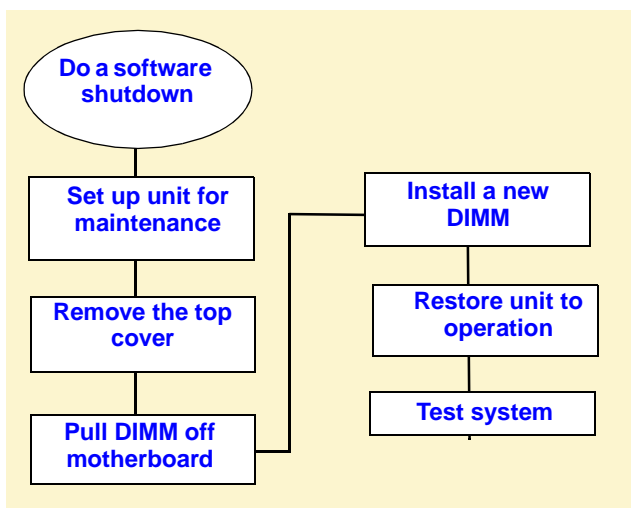
> **Danger:** Risk of shock.
> Disconnect the power cord, telephone cables and network cables before opening the computer.
> Read and follow installation instructions carefully.

> **Caution:** Use only a Nortel Networks approved replacement. Contact your account representative for the current list of approved replacement parts

Replacing Memory DIMM Chips

You replace a DIMM when the DIMMs fails or when you want to increase the amount of RAM in the Business Communications Manager base unit.

> **Note:** There must be at least one DIMM installed in the Business Communications Manager base unit in order for the system to function.

1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to "Shutting Down the System Software" on page 204. Otherwise, skip to step 2.

2 Set up the base unit for maintenance, as described in "Shutting Down the System Hardware" on page 204.

3 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.

> **Note:** If you are adding a new DIMM to the second DIMM slot, go to step 6.

4 Carefully push down on the fastening tabs on either side of the DIMM you want to remove.

As you press down on the fastening tabs, the DIMM lifts out of the DIMM slot.

5 Remove the DIMM from the slot by grasping either end, as shown in Figure 128 on page 244.

Figure 130   Removing and replacing the DIMMs
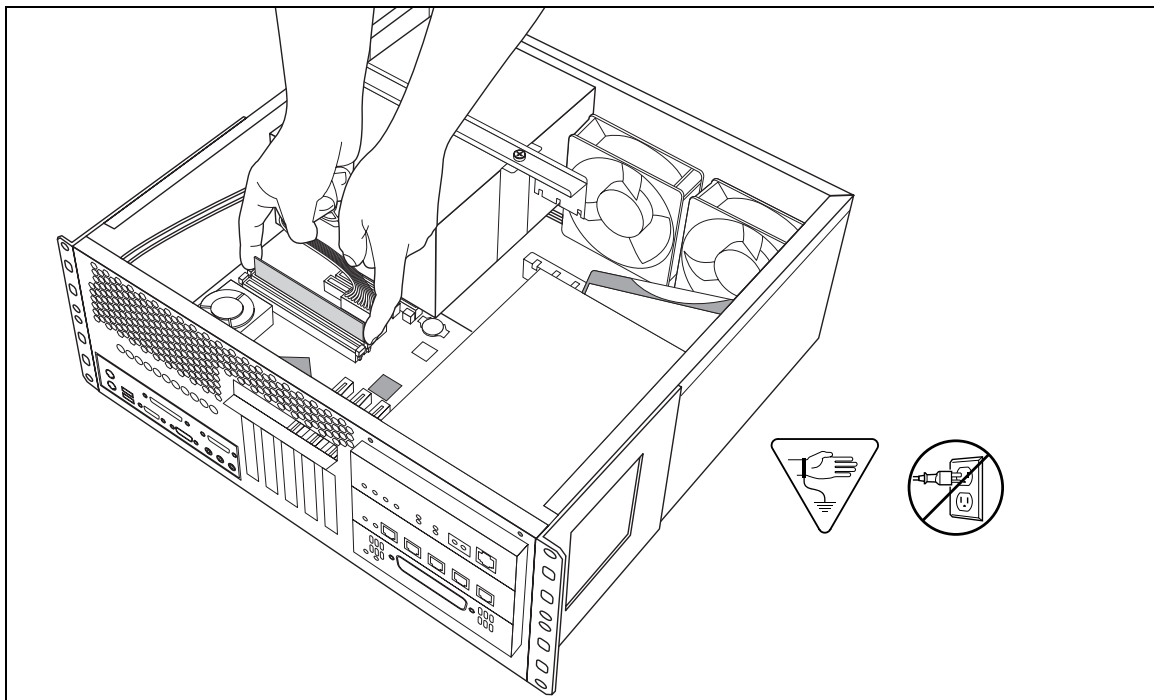
6 Slide the new DIMM, edge connectors first, into the slot.

→ **Note:** The DIMM has two notches on the edge connector. Position the DIMM so that one of the notches is on the side of the slot nearest to the Business Communications Manager cards.

7 Carefully push the DIMM down until the fastening tabs clip to the side of the DIMM.

→ **Note:** Do not force the DIMM into its slot. If the DIMM does not slide in easily, check the alignment of the DIMM.

8 Replace the cover.

9 Restore the unit to operation. Refer to "Restarting the System" on page 206 for details.

Replacing the Clock/Calendar Battery

The clock/calendar battery supplies the power required to keep the BIOS information current if there is a power failure. Figure 127 provides an overview of the process of replacing this component.

> ⚠️ **Warning:** You must replace the battery with a CR2032, 3v Maxell coin cell battery. Do not use any other manufacturer because this may invalidate the safety approval of the Business Communications Manager base unit and possibly cause a fire or explosion.

Figure 131   Battery replacement overview
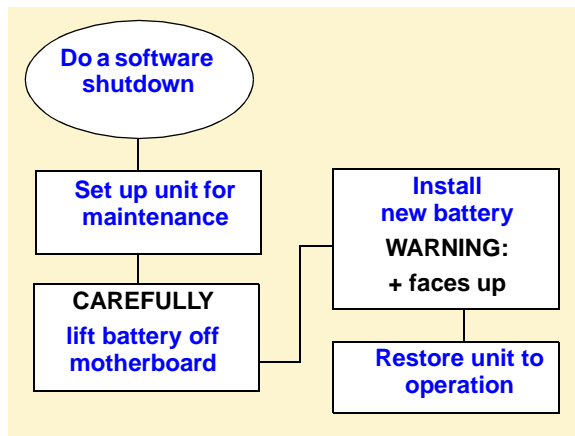
> ⚡ **Danger:** Disconnect the power cord, telephone cables and network cables before opening the computer.
> Read and follow installation instructions carefully.

Removing the Clock/Calendar Battery

This section explains how to correctly remove the clock/calendar battery.

1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to "Shutting Down the System Software" on page 204. Otherwise, skip to step 2.

2 Set up the server for maintenance, as described in "Shutting Down the System Hardware" on page 204.

3 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.

4 Use your finger to carefully lift the battery out of the socket.

For the location of the battery socket, refer to Figure 132.

Caution: Do not use any type of tool to remove the battery.

Figure 132 Removing the clock/calendar battery

The battery is located under the edge of the power supply

Front of unit
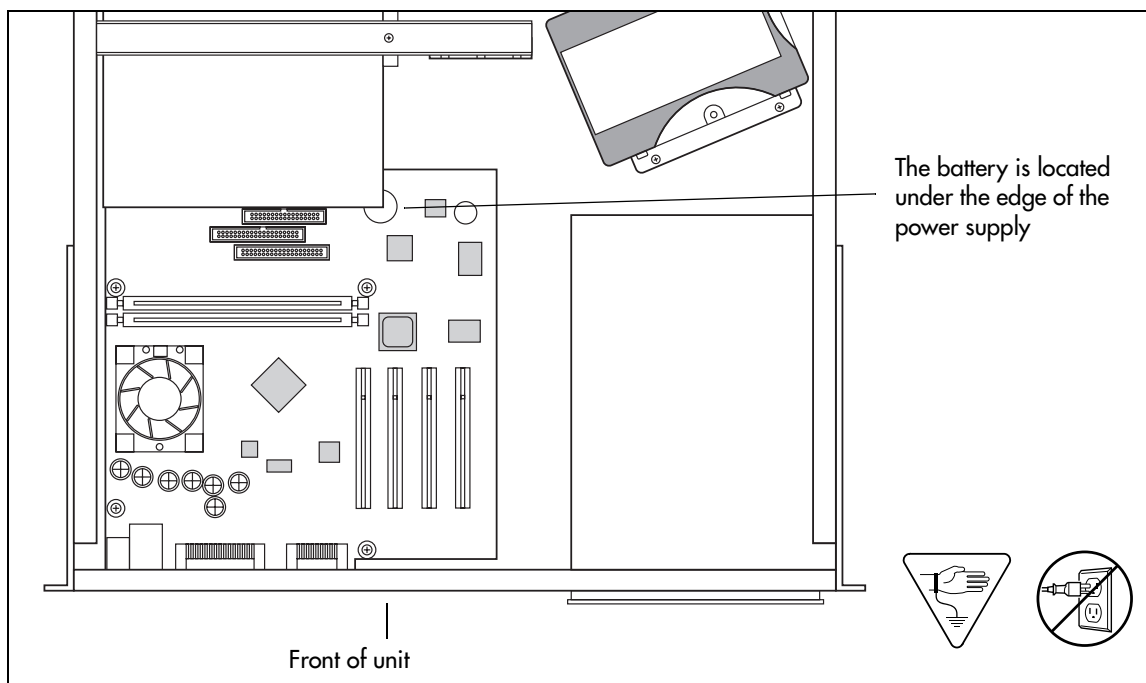
Installing the New Battery

This section describes how to replace the clock/calendar battery into the base unit.

> ⚠️ **Warning:** There is a danger of explosion if you do not replace the battery correctly.
> You must replace the battery with a CR2032, 3v Maxell coin cell battery.
> The positive side of the battery must face up.
> The battery must sit securely in the battery socket.

1 Ensure you have the positive side of the battery facing up when you position it in the socket.

2 Push down until the battery snaps into the socket.

3 Replace the cover.

4 Restore the unit to operation. For details, refer to "Restarting the System" on page 206.

Chapter 21
Replacing Telephones

When the Business Communications Manager system is on, you can replace a telephone with a new one and the new set will pick up the current programming, if it is the same model as the set that was removed. A new telephone is one that was not previously in service within the system.

For a description of the telephones that can be used on the Business Communications Manager system, refer to "Telephones and Adapters" on page 65.

For information on installing and replacing the i2004 telephone, refer to the *IP Telephone Configuration Guide*.

Determining the Status of a Telephone

To discover the system status of a telephone, you must know the DN of the set and which port on the Business Communications Manager the set is connected to. If the tables in Chapter 14, "Installing Optional Telephony Equipment," on page 193 were filled out when the telephone were installed, refer to them to determine the port each set is attached to.

To find out the status of a set:

1 Open the Unified Manager.

2 Click **Resources/Media Bay Modules/Bus #**.

Bus # is the DS30 channel connected to the media bay modules supporting the telephone line.

3 Click **Port #**.

Port # is the port connected to the telephone.

4 Click **Channels**.

5 Click on **B1** or **B2** to view the appropriate DN number.

6 State indicates the state the set is in.

Replacing Telephones with Different Models

If you disconnect a digital or analogy telephone and connect a new telephone of a different type into the same jack, for example, replacing an T7310 telephone with an M7324, the new telephone keeps the old extension number but does not retain the user parameters. The new telephone receives a default profile for a telephone of its type. Refer to the *Business Communications Manager Manager 2.5 Programming Operations Guide* for set configuration information.

If the new telephone has fewer lines than the old one, automatic outgoing line selection cannot work with the Handsfree/Mute feature. You must select a line manually.

> **Note:** If you replace a digital telephone with an IP telephone, or vice versa, programming is lost because the connection method is different and the DNs are assigned differently. Refer to the IP Telephony Configuration Guide for directions for installing and moving an IP telephone.

Status of the Replaced Telephone

The replaced telephone loses its programming and internal number. If the telephone is plugged in again at another jack, the Business Communications Manager considers the replaced telephone a new telephone.

Appendix A
System Region Attributes

This appendix provides a number of tables that show the relationship of system programming to the region or software that you select at system startup.

Each region is designed using a set of system defaults that provide specific functionality for the region in which the system is deployed. This can include specific languages, and a specific order in which the languages are set as default (language 1), whether Companion or DECT mobility will be allowed, and what type of trunks can be used.

Core Software and Regions

Each Region setting requires a specific core software to perform correctly. Table 49 shows the core software available.

Table 49   Core software, defined by region and carrier profile

Core Software (Carrier s/w ID)	T1 CT2 Plus	T1 Etiquette	E1 Euro	E1 Global	E1 CALA
Region	Caribbean Hong Kong North American Taiwan	Caribbean Hong Kong North American Taiwan	Denmark Europe France Germany Holland Italy Norway Spain Sweden Switzerland United Kingdom	Australia CALA Global PRC	Australia CALA Global PRC
South American and Central American countries are assigned to regions in the following way: • Caribbean includes Antigua, Bahamas, Barbados, Bermuda, Cayman Islands, Dominican Republic, Jamaica, USVI, Puerto Rico, and Trinidad • CALA refers to all other Caribbean and Latin American countries with European-based standards.					

Languages

Table 50 lists the languages available for each region and a specific order in which the languages are set as default.

Table 50   Languages

Region	Language
CALA Caribbean Hong Kong North American PRC Taiwan	NA English, NA French, NA Spanish
Australia United Kingdom	UK English
Denmark	Danish, Norwegian, Swedish, NA English
France	Euro French, NA English
Germany	German, NA English
Global	NA English, NA French, NA Spanish, Turkish
Holland	Dutch, Euro French, NA English
Italy	Italian, NA English
Norway	Norwegian, Swedish, Danish, NA English
Spain	Euro Spanish, NA English
Sweden	Swedish, Norwegian, Danish, NA English
Switzerland	German, Euro French, Italian, NA English

Table 51 shows a breakdown of the language support for South American and Central American countries.

Table 51   South/Central America language breakout

Language	Spanish		English		French
Country	Dominican Republic Jamaica Puerto Rico Argentina Bolivia Chile Columbia Costa Rica Guatemala Mexico Nicaragua	Peru Panama Uruguay Venezuela El Salvador Honduras Ecuador Paraguay	St. Thomas USVI Aruba Bahamas Bermuda Curacao Trinidad Anguilla Antigua Barbados Dominica Grenada	Guyana Montserrat St. Kitts St. Lucia St. Maarten Suriname Turks & Caicos St. Vincent St. Thomas Cayman Islands Belize	Haiti

Caller ID Displays

The North American region supports the following format: 5554775 (613)

All other regions display the numbers in a continuous string of a maximum of 14 characters: 6135554775

Companding Law by Region

Table 52 shows the companding law used for each region.

Table 52   Companding law

Companding Law	
µ-law	A-law
Caribbean Hong Kong North American Taiwan	Australia CALA Denmark France Germany Global Holland Italy Norway PRC Spain Sweden Switzerland United Kingdom

ISDN Line Services

Table 53 shows the ISDN private network services that are supported by the Business Communications Manager. Table 54 shows the network-based ISDN supplementary services and the features available for each.

Table 53   ISDN line services

MCDN over PRI (SL-1)	DPNSS	DASS2	ETSI QSIG
Basic Call	Basic Call	Basic Call	Basic Call
DDI	DDI	DDI	DDI
Name display	Diversion	Originating line identity (OLI)	Name display
Number display	Redirection	Terminating Line Identity (TLI)	Number display
Centralized voice mail	Centralized voice mail	Call Charge Indication (CCI)	

Table 53 ISDN line services (Continued)

MCDN over PRI (SL-1)	DPNSS	DASS2	ETSI QSIG
Camp-on	Call Offer	Call Charge Rate Indication (CCRD)	
ISDN Call Connection Limit	Loop avoidance		
Network Call Transfer	Executive Intrusion		
Break-in	Three Party		
Trunk Route Optimization (TRO)	Route Optimization		
Trunk Anti-Tromboning			

Table 54 ISDN services, by Protocol

Protocol	Available ISDN services
NI (Caribbean. North America)	Basic Call DID Name display Number display ONN blocking
ETSI Euro (Australia. CALA, Denmark, France, Germany, Global, Holland, Hong Kong, Italy, Norway, PRC, Spain, Sweden, Switzerland, Taiwan, United Kingdom)	Basic Call DDI subaddressing (on S-loop) ETSI Call Diversion (partial rerouting) AOC-E (specific changes for Holland and Italy) MCID CLIP COLP CLIR

Mobility Services by Region

Table 55 shows the Mobility services that are supported by the Business Communications Manager, and the regions that can use each type.

Table 55   Mobility services, by region

Profile	Available Mobility Service
Caribbean North American PRC	Companion (CT2-Plus, Etiquette)
CALA	Companion (CT2-Plus)
Hong Kong Taiwan	Companion (CT2-Plus, Etiquette) DECT
Australia Denmark France Germany Global Holland Italy Norway Spain Sweden Switzerland United Kingdom	DECT

Media Bay Module Availability by Region

Some of the media bay modules are customized for a specific type of line and are not available to all regions. Table 56 lists a cross-reference between regions and the type of modules that can be used within the related area.

Table 56   Module availability, by profile

Region	DSM16/DSM32	ASM	CTM/CTM8	4X16	BRI	DTM	DECT
Australia	✔	✔			✔	✔	✔
Caribbean	✔	✔	✔	✔	✔	✔	
CALA	✔	✔	✔	✔	✔	✔	
Denmark	✔	✔			✔	✔	✔
France	✔	✔			✔	✔	✔
Germany	✔	✔			✔	✔	✔
Global	✔	✔	✔	✔	✔	✔	✔
Holland	✔	✔			✔	✔	✔
Hong Kong	✔	✔	✔	✔	✔	✔	✔

Table 56 Module availability, by profile (Continued)

Region	DSM16/DSM32	ASM	CTM/CTM8	4X16	BRI	DTM	DECT
Italy	✔	✔			✔	✔	✔
North American	✔	✔	✔	✔	✔	✔	
Norway	✔	✔			✔	✔	✔
PRC	✔	✔	✔	✔	✔	✔	
Spain	✔	✔			✔	✔	✔
Sweden	✔	✔			✔	✔	✔
Switzerland	✔	✔			✔	✔	✔
Taiwan	✔	✔	✔	✔	✔	✔	✔
United Kingdom	✔	✔			✔	✔	✔

Trunk Availability by Region

Different countries have different available trunk types. provides a cross-reference between regions and available trunks types.

Table 57 Trunk availability, by region

Region	BRI S/T 2/4	BRI U2/4	PRI ETSI = 30 channels NA = 23 channels	Analog DID	E&M	CLASS	Country-specific analog trunk card
Australia	✔		✔				✔
CALA	✔	✔	✔	✔	✔	✔	
Caribbean	✔	✔	✔	✔	✔	✔	
Denmark	✔		✔				
France	✔		✔				✔
Germany	✔		✔				✔
Global	✔		✔		✔	✔	
Holland	✔		✔				✔
Hong Kong	✔		✔	✔	✔	✔	
Italy	✔		✔				
North American	✔	✔	✔	✔	✔	✔	
Norway	✔		✔				
PRC	✔		✔		✔	✔	

Table 57   Trunk availability, by region (Continued)

Region	BRI S/T 2/4	BRI U2/4	PRI ETSI = 30 channels NA = 23 channels	Analog DID	E&M	CLASS	Country-specific analog trunk card
Spain	✓		✓				
Sweden	✓		✓				
Switzerland	✓		✓				
Taiwan	✓		✓	✓	✓	✓	
United Kingdom	✓		✓				✓

Table 58   PRI line protocol supported, by region

Region	BRI T side	BRI S side	PRI	T1
Australia	ISDN ETSI 300 403	ISDN ETSI 300 102	DASS2 DPNSS MCDN ISDN ETSI 300 403, ETSI QSIG 300 239,	
Brazil CALA	ISDN ETSI 300 403, ETSI QSIG 300 239	ISDN ETSI 300 102	ETSI QSIG 300 239, ISDN ETSI 300 403, MCDN	
Caribbean North American	NI-2	NI-2	NI-2 4ESS DMS100 DMS250 MCDN	Loop E&M DID Ground Fixed trunk types
Hong Kong Taiwan	ITU-T	ITU-T	ITU-T	Loop E&M DID Ground Fixed trunk types
Denmark France Germany Global Holland Norway PRC Spain Sweden Switzerland	ETSI QSIG 300 239, ISDN ETSI 300 403	ISDN ETSI 300 102	DASS2 DPNSS MCDN ETSI QSIG 300 239 ISDN ETSI 300 403	

Table 58 PRI line protocol supported, by region (Continued)

Region	BRI T side	BRI S side	PRI	T1
Italy	ISDN ETSI 300 102 ETSI QSIG 300 239	ISDN ETSI 300 102	DASS2 DPNSS MCDN ETSI QSIG 300 239 ISDN ETSI 300 102	
United Kingdom	ETSI QSIG 300 239, ISDN ETSI 300 403	ISDN ETSI 300 102	DASS2 DPNSS MCDN ETSI QSIG 300 239 ISDN ETSI 300 403	

BRI and PRI line types

Table 59 provides a description of the types of lines that BRI and PRI trunks can provide. These are set under Resources/Media Bay Modules/Bus XX/Module X on the Unified Manager.

Note that some of these line types are only available when specific regions are chosen.

Table 59 BRI and PRI line types (DTM and BRI modules)

Digital trunk types	Description
T1	digital line that carries data on 24 channels at 1.544 Mbps (North American); 30 channels at 2,048 Mbps (Europe) Loop, E&M, DID and ground start lines are also versions of T1 lines. You can program auto-answer T1 loop start, T1 E&M trunks, T1 DID, T1 ground start trunks, PRI and IP trunks to map to target lines to provide for attendant bypass (calling directly to a department or individual) and line concentration (one trunk can map onto several target lines).
DID	This is a type of T1 trunk line that allows an outside caller to dial directly into a line on the Business Communications Manager 2.5.
Loop	This is a type of T1 line. This type of line is used on systems where the service provider supports disconnect supervision for the digital loop start trunks. These trunks provide remote access to the Business Communications Manager from the public network. This trunk must have disconnect supervision to allow the trunk to be set to auto-answer, which provides the remote access portal.
Ground	T1-groundstart trunk These lines offer the same features as loop start trunks, but are used when the local service provider does not support disconnect supervision for digital loop start trunks. Ground start trunks work with T1 only. By configuring lines as ground start, the system will be able to recognize when a call is released at the far end.
E&M	T1 and E&M. This type of trunk line is used to create simple network connections to other phone systems. This trunk always operates in a disconnected supervised mode.

Table 59   BRI and PRI line types (DTM and BRI modules) (Continued)

Digital trunk types	Description
PRI	ISDN interface with 23 B channels and 1 D channel at 1.544 MBps (in Europe: 30 B channels and 2 D channels at 2.048 Mbps)
	This is the module that controls system timing.
	These lines give you incoming and outgoing access to an ISDN network and are auto-answer trunks, by default.
	These lines provide a fast, accurate and reliable means of sending and receiving data, images, text and voice information. using PRI lines allows for faster transmission speeds and the addition of a variety of powerful business applications, including remote LAN access, video conferencing, file transfer and internet access.
BRI	ISDN loop that provides both T, S and U2 and U4 (region-specific) reference point loops.
	These loops can support both network (T and S loops) and terminal equipment (S loop) connections.
	This type of line provides incoming and outgoing access to an ISDN network. ETSI ISDN BRI is the European Telecommunications Standards Institute specification for BRI ISDN service. BRI provides two bearer B-channels operating at 64 kbits/s and a data D-channel which operates at 16 kbits/s. The D-channel is used primarily to carry call information. Like loop start trunks, BRI lines can be configured as manual-answer or auto-answer.
DASS2	(British) Trunk provides multi-line IDA interconnection to the British Telecom network.
DPNSS	(international term: Q.Sig or Q.931) a digital private network signaling system which allows phone systems from different manufacturers to be tied together over E1 lines, offering significant enhancements to Business Communications Manager 2.5 networking capabilities.
	DPNSS makes it easier to support centralized network functionality within private networks, for operators and attendants dealing with large numbers of calls. Its routing capabilities provide more of the larger-network capabilities without the expense of installing a new system, re-configuring all the nodes and worrying about a lot of downtime. Most functionality over DPNSS lines is transparent once the DPNSS is programmed into the system.
	DPNSS allows a local node, acting as a terminating node, to communicate with other PBXs over the network using E1 lines. For example, corporate offices separated geographically can be linked over DPNSS lines to other Business Communications Manager 2.5 systems, bypassing the restrictions of the PSTNs to which they may be connected. This allows connected Business Communications Manager 2.5 systems to function like a private network.
Analog trunk types	
Public	Provides potential access for any set on the system.
Private	Provides potential access for a specific set.

Defining Time Zones by Country and Language

Time zones are based on the actual time zone where the Business Communications Manager base unit is located. The Time Zone dropdown list on the initialization screen, allows you to be very specific in choosing a compatible time zone. If your exact location is not on the list, choose the one with the time zone closest to you. Note that some time zones are individualized because they do not switch from Standard Time to Daylight Saving Time. For example, this is the case for Saskatchewan.

The format of the time and date changes are based on the prime language of the region. Table 60 provides a list of formats based on language or country.

Table 60 Time/date formats based on language

Language/Country	Time/Date format
Danish	2001-01-01 13:57
Dutch	1 Jan 01 13:57
EuroFrench	1 jan 13:57
EuroSpanish	1 Ene 13:57
German	1 Jan 13:57
Italian	1 Gen 13:57
NA English	Jan 1 1:57 pm
NA French	2001-01-01 13:57
NA Spanish	Ene 1 1:57 pm
Norwegian	1 Jan 13:57
Swedish	2001-01-01 13:57
Turkish	1 Ock 13:57
UK English	1 Jan 1:57 pm

System Defaults

Table 61 compares the system defaults for the North American, Global and UK regions. In addition, the following functionality applies:

- Regions for Denmark, Holland and Sweden are the same as the Global region except for the default to local languages and local tones and cadences.
- The Region for the Caribbean is the same as the North American region except that it supports the M7000 telephone.
- The Region for CALA is the same as the Caribbean region, except NI ISDN is replaced by ETSI ISDN (u-law).
- The Region for Europe is the same as the United Kingdom region except there are no default dialing restrictions, and ATA parameters are set to European values.

Table 61   Region defaults

Functionality	Attribute	North American	Global	United Kingdom
Direct Dial Access code		0	0	0
DTMF parameters	Tone duration	120 msec	120 msec	120 msec
	Pause time	1.5	1.5	3.5
	Interdigit time	80 msec	80 msec	100 msec
Conference tone		disabled	disabled	enabled
Call Back Kill time		180 sec	180 sec	360 sec
PCM Companding Law		mu-law	a-law EBI	a-law EBI
Race Integration		disabled	disabled	disabled
OLI digits		fixed 10 digits	fixed 10 digits	variable length a maximum of 8
Dial Tone Detection		enabled	enabled	enabled
Hunt Groups	Show in second	disabled	disabled	disabled
	Default delay	4 ring cycles	4 ring cycles	4 ring cycles
	Queue timeout	60 sec	60 sec	60 sec
	If busy	busy tone	busy tone	busy tone
	Mode	broadcast	broadcast	sequential
Target line if busy setting		prime	prime	busy tone
M7000 set		disabled	enabled	enabled
Fax switch		enabled	enabled	enabled
Service Schedule time	Night	start 23:00 end 07:00	start 23:00 end 07:00	start 23:00 end 07:00
	Evening	start 17:00 end 23:00	start 17:00 end 23:00	start 17:00 end 23:00
	Lunch	start 12:00 end 13:00	start 12:00 end 13:00	start 12:00 end 13:00
	Service 4	start 00:00 end 00:00	start 00:00 end 00:00	start 00:00 end 00:00
	Service 5	start 00:00 end 00:00	start 00:00 end 00:00	start 00:00 end 00:00
	Service 6	start 00:00 end 00:00	start 00:00 end 00:00	start 00:00 end 00:00
Call Forward Delay	Show in second	disabled	disabled	disabled
	Default	4 ring cycles	4 ring cycles	2 ring cycles
	Options	• 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles • 10 ring cycles	• 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles • 10 ring cycles	• 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles • 10 ring cycles

Table 61 Region defaults (Continued)

Functionality	Attribute	North American	Global	United Kingdom
DRT Delay	Show in second	disabled	disabled	disabled
	Default	4 ring cycles	4 ring cycles	4 ring cycles
	Options	• 1 ring cycles • 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles • 10 ring cycles	• 1 ring cycles • 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles • 10 ring cycles	• 1 ring cycles • 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles
Handsfree		none	none	none
Pickup Group		none	none	none
Remind Delay		60 secs	60 secs	60 secs
Allow SLR		disabled	disabled	disabled
Transfer Callback	Show in second	disabled	disabled	disabled
	Default	4 ring cycles	4 ring cycles	4 ring cycles
	Options	• 3 ring cycles • 4 ring cycles • 5 ring cycles • 6 ring cycles • 12 ring cycles	• 3 ring cycles • 4 ring cycles • 5 ring cycles • 6 ring cycles • 12 ring cycles	• 3 ring cycles • 4 ring cycles • 5 ring cycles • 6 ring cycles • 12 ring cycles
Dialling Plan		market dependent (defined in application but controlled by market profile ID)	market dependent (defined in application but controlled by market profile ID)	market dependent (defined in application but controlled by market profile ID)
ONN Blocking	VSC for analog tone	n/a	n/a	141
	VSC for analog pulse	n/a	n/a	141
	VSC for BRI	n/a	n/a	141
	VSC for PRI	n/a	n/a	141
	State for BRI/PRI	n/a	n/a	send feature code
Default CO lines		2	2	4
UTAM		enabled	disabled	disabled
	Portable credits	0	defined in the application (max)	n/a
Release reason	Release text	none	none	detail
	Release code	disabled	disabled	disabled
	Display duration	3 sec	3 sec	3 sec
Overlap Receiving		disabled	enabled	disabled
Local Number length for ISDN overlap receiving		8	8	8

Table 61   Region defaults (Continued)

Functionality	Attribute	North American	Global	United Kingdom
Tandem alerting		disabled	disabled	disabled
TON/NPI		national/E.164	national/E.164	unknown/unknown
National number length		10	10	0
national number prepend		n/a	n/a	0
Provide tone on PRI		enabled	n/a	disabled

Appendix B
Media Bay Module Combinations

This section describes some combinations of trunk and station modules to demonstrate how to fit the modules into the DS30 channel resources. These configurations are meant to help demonstrate how your system can be configured using the information in this guide and do not necessarily reflect real-life configurations.

Combining CTMs and 4X16s

The 4X16 combination media bay module is a combination of a CTM and a DSM. A maximum of four CTMs can fit into a DS30 channel, when each is given a different offset. Therefore, you can combine a maximum of three CTMs with a 4X16 combination module. This configuration would occupy two full DS30 channels.

Which means, you can install a maximum of three of these combinations in a Business Communications Manager box with an extension box added to it. Table 62 demonstrates this configuration of CTMs and 4X16 modules, including the switch settings for each module.

Table 62 CTMs combined with 4X16 modules

DS30 channel #	2 4x16s Offset 3	4 CTMs Offset 0, 1 and 2	1 CTM8 Offset 2	1	2	3	4	5	6
2		0	CTM settings:	on	on	on	on	on	on
		1	CTM settings:	on	on	off	on	on	on
		2	CTM settings:	on	off	on	on	on	on
	3		Switch settings for 4X16:	on	off	off	on	on	on
3									
4		0	CTM settings:	on	on	on	on	off	on
			2	on	on	off	on	off	on
				on	off	on	on	off	on
	3		Switch settings for 4X16:	on	off	off	on	off	on
5									

Fully-loaded Setup

This section describes a system containing one DSM 32, one DSM 16, two ASM 8s, and two DTMs. This configuration uses all the DS30 channels, with the exception of two offsets.

Table 63 demonstrates this combination, including the switch settings for each module.

Table 63   DSM combined with 2 DTMs and 2 ASMs

DS30 channel #	Each heavily-outlined and shaded square represents one module.				Switch setting					
	1 DSM 32 Offset 0	1 DSM 16 Offset 0	2 ASM 8s Offset 0 and 1	2 DTMs Offset 0	1	2	3	4	5	6
2	0	DSM 32 settings:			on	on	on	on	on	on
3										
4		0	DSM 16 settings:		on	on	on	on	off	on
5			0	ASM8 settings:	on	on	on	on	off	off
			1	ASM8 settings:	on	on	off	on	off	off
6				0	on	on	on	off	on	on
7				0	on	on	on	off	on	off

DECT Combinations

This section describes a system containing a DECT module, three BRI modules and two DSM 32s. This configuration uses all the DS30 channels, with the exception of one offset.

➡️ **Note:** DECT systems are not available for all profiles. Refer to "Mobility Services by .

Table 64 demonstrates this combination, including the switch settings for each module.

Table 64   Three BRI modules, two DSM 32s and 1 DECT module

| DS30 channel # | Each heavily-outlined and shaded square represents one module. | | | Switch setting | | | | | |
	1 DECT Offset 0	3 BRI Offset 0, 1 and 2	2 DSM 32s Offset 0	1	2	3	4	5	6
2			0	on	on	on	on	on	on
3									
4			0	on	on	on	on	off	on
5									
6	0	DECT switch settings:		on	on	off	on	on	on
7		0 BRI settings		on	on	on	off	on	off
		1 BRI settings		on	on	off	off	on	off
		2 BRI settings		on	off	on	off	on	off

Changing Configurations

Here are some points to consider when changing modules in existing or in new Business Communications Manager systems:

- Trunk and analog station modules cannot share a DS30 channel.
- Modules that require more than one DS30 channel automatically assign the next channel in chronological order.
  Therefore, if an existing, installed module uses either of the required DS30 channels, remove the installed module. You must then assign the DIP switches for both modules so there is no conflict between them or with any other installed module.
- The goal is to have a balanced mix of trunk and station modules.
- Write the DIP switch settings for each module in a place that is handy to reference when you decide to change or add modules.
- If you update your Norstar system to Business Communications Manager, your station amphenol connectors can be connected into the media bay modules without adjustment. Trunk connectors must be converted to RJ11 (CTM) or RJ45 (BRI) connectors.
  However, if you use the FEM module to connect your Norstar modules to the Business Communications Manager, the station wiring needs to be adjusted. Refer to "FEM Wiring" on page 144.

System Setup

Use the following table to make a note of your basic system setup. Post this page near the Business Communications Manager hardware for future reference.

	DS30 channel 2	DS30 channel 3	DS30 channel 4
Media bay module			
DIP switch setting			
Line/set type			
Line/Loop/DN range			

	DS30 channel 5	DS30 channel 6	DS30 channel 7
Media bay module			
DIP switch setting			
Line/set type			
Line/Loop/DN range			

Set DNs and Port Numbers

The media bay module, based on the switch settings of the module, defines which DNs and port numbers can be populated with telephones. If you have changed the default start DN for your system, use Table 65 to identify the DNs and ports for your sets. If you are using the default start DN (211), a completed chart is provided in Table 34 on page 148.

Table 65   Cross referencing ports and DNs

Pin	Wire color	DS30 channel 2		DS30 channel 3		DS30 channel 4		DS30 channel 5		DS30 channel 6		DS30 channel 7	
26	White-Blue	DN Port 201		DN Port 301		DN Port 401		DN Port 501		DN Port 601		DN Port 701	
1	Blue-White												
27	White-Orange	DN Port 202		DN Port 302		DN Port 402		DN Port 502		DN Port 602		DN Port 702	
2	Orange-White												
28	White-Green	DN Port 203		DN Port 303		DN Port 403		DN Port 503		DN Port 603		DN Port 703	
3	Green-White												
29	White-Brown	DN Port 204		DN Port 304		DN Port 404		DN Port 504		DN Port 604		DN Port 704	
4	Brown-White												
30	White-Slate	DN Port 205		DN Port 305		DN Port 405		DN Port 505		DN Port 605		DN Port 705	
5	Slate-White												
31	Red-Blue	DN Port 206		DN Port 306		DN Port 406		DN Port 506		DN Port 606		DN Port 706	
6	Blue-Red												
32	Red-Orange	DN Port 207		DN Port 307		DN Port 407		DN Port 507		DN Port 607		DN Port 707	
7	Orange-Red												
33	Red-Green	DN Port 208		DN Port 308		DN Port 408		DN Port 508		DN Port 608		DN Port 708	
8	Green-Red												
34	Red-Brown	DN Port 209		DN Port 309		DN Port 409		DN Port 509		DN Port 609		DN Port 709	
9	Brown-Red												
35	Red-Slate	DN Port 210		DN Port 310		DN Port 410		DN Port 510		DN Port 610		DN Port 710	
10	Slate-Red												
36	Black-Blue	DN Port 211		DN Port 311		DN Port 411		DN Port 511		DN Port 611		DN Port 711	
11	Blue-Black												
37	Black-Orange	DN Port 212		DN Port 312		DN Port 412		DN Port 512		DN Port 612		DN Port 712	
12	Orange-Black												
38	Black-Green	DN Port 213		DN Port 313		DN Port 413		DN Port 513		DN Port 613		DN Port 713	
13	Green-Black												
39	Black-Brown	DN Port 214		DN Port 314		DN Port 414		DN Port 514		DN Port 614		DN Port 714	
14	Brown-Black												
40	Black-Slate	DN Port 215		DN Port 315		DN Port 415		DN Port 515		DN Port 615		DN Port 715	
15	Slate-Black												
41	Yellow-Blue	DN Port 216		DN Port 316		DN Port 416		DN Port 516		DN Port 616		DN Port 716	
16	Blue-Yellow												

Glossary

access code

A unique digit or digits entered by the user to access some telephony features such as Line pools, Call park, external lines, Direct-Dial telephone, and Auto DN.

address

A unique identifier assigned to networks and stations that allows each device to receive and reply to messages.

Analog terminal adapter (ATA)

A device that connects analog telecommunication devices, such as fax machines, answering machines, and single line telephones to the Business Communications Manager system through a Digital station module.

Application program interface (API)

An application program uses this interface to make requests of the operating system or another application. The API is an interface to an operating system or a program.

asynchronous

A method of transmission where the time intervals between characters are not required to be equal and signals are sourced from independent clocks with different frequencies and phase relationships. Start and stop bits may be added to coordinate character transfer.

autodial button

A memory button that provides one-touch dialing out.

automatic daylight savings time

A feature that switches the system to standard or daylight savings time at programmed times. Assigns automatic daylight savings time under **Daylight time** in System programming.

automatic telephone relocation

 A feature that maintains personal and system programing for a telephone keep when the telephone gets moved to a different modular jack. Enable Automatic Telephone Relocation under Set relocation in System programming.

auxiliary ringer

An external telephone ringer or bell which rings when a line or a telephone rings. Enables the auxiliary ringer under **Capabilities** under System DNs programming. Program an auxiliary ringer in **Services** programming.

B channel (bearer channel):

An ISDN standard transmission channel used for voice or data transmission. Also known as a media channel.

background music

A feature that plays music from the speaker of your telephone. Background Music is available when you attach a music source to the system and enable the feature under Feature settings in System programming.

base station

This is the radio/telephony unit that allows communication between wireless handsets, such as Companion or DECT, to the Business Communications Manager system.

basic rate interface (BRI)

An ISDN interface that uses two B channels and a D channel (2B+D). ETSI BRI is the European Telecommunications Standards Institute specification for BRI ISDN service

baud rate

A unit of measurement of data transmission speed. Baud rate is approximately equivalent to Bits Per Second (BPS). Typical baud rates are 300, 1200, 2400, 4800, and 9600.

BIOS (basic input output system)

A program contained in Read Only Memory (ROM) that acts as the interface between software programs and the computer hardware.

bit

A bit is the smallest unit of information identified by the computer. A bit has one of two values, 0 or 1, to indicate off or on.

Bus

A collection of communication lines that carry electronic signals between components in the system.

Call Forward

A feature that forwards all the calls arriving at a telephone to another telephone in the system. To have calls forwarded outside the system, use Line Redirection.

Call Forward No Answer

A feature that forwards all calls arriving at a telephone to another selected telephone in the system. The system transfers the calls after a specific number of rings. Assign Call Forward No Answer under **Capabilities** in System DNs programming.

Call Forward On Busy

A feature that forwards all calls at a telephone to another selected telephone if the original telephone is busy. Assign this feature under **Capabilities** in System DNs programming.

Call Forward Override

An automatic system feature that allows the user to call another user and ask that user to stop forwarding calls to their set.

call log

An incoming call log accessed through the set that displays the following information for every call:

- sequence number within the Call Log
- name and number of caller
- long distance indication
- call answered indication
- time and date of the call
- number of repeated calls from the same source
- name of the line that received the call

Camp-on

A feature that allows the user to reroute a call to a telephone when all the lines on that telephone are busy. To answer a camped call, use Call Queuing or select a line if the camped call appears on the set. Queued calls get priority over camped calls.

camp timeout

The length of a delay before a camped call returns to the telephone that camped the call. Set the length of delay under Feature settings in System programming.

central answering position (CAP)

An M7324 telephone that provides backup answering and set monitoring. Assign a CAP under CAP assignment in System programming.

channel service unit (CSU)

A device on the Digital Trunk Interface that is the termination point of the T1 lines from the T1 service provider. The CSU collects statistics on the quality of the T1 signal. The CSU ensures network compliance with FCC rules and protects the network from harmful signals or voltages.

client

A client is a computer system or process that requests a service of another computer system or process. For example, a workstation requesting the contents of a file from a file server is a client of the file server.

cold start

A cold start occurs when you lose all system programming, such as after a power failure, or if the system was down for maintenance and you want to start it up again.

Companion portable telephone

Hand held wireless telephones that allow complete mobility within the reach of Companion base stations or an external antenna. Portable telephones provide many but not all standard system features. They also share some of the same programming as desk telephones.

Companion Wireless

The name for the communication systems which use radio technology to transmit and receive signals between its components and the Business Communications Manager.

Conference

A feature that allows the user to establish a three-way call.

D channel (Data channel)

An ISDN standard transmission channel which is packet-switched. The channel is used for call setup, signaling, and data transmission.

data link connection indentifier (DLCI)

The DLCI is used to identify a PVC in frame relay networks.

DECT cordless telephone system

Hand held wireless telephones that allow complete mobility within the reach of DECT base stations. Portable telephones provide many but not all standard system features. They also share some of the same programming as desk telephones.

Delayed Ring Transfer (DRT) to prime

This feature allows the system to transfer unanswered calls on external line to the prime telephone related to the called set. The number of rings can be adjusted. Activate this feature under Feature settings in System programming.

dial-up connection

A dial-up connection is a temporary connection between computers. This connection is established over an analog or digital telephone line.

dialing restriction

Restrictions are numbers you cannot dial when the dialing filter with those numbers is in effect.

Digital Private Network Signaling System (DPNSS)

DPNSS is a networking protocol that provides operators with access to Enterprise Edge features over multiple combined networks. Corporate offices, separated geographically, can be linked over DPNSS to other Enterprise Edge systems, bypassing the restrictions of the PSTNs to which they may be connected. This allows connected Enterprise Edge systems to function like a private network. DPNSS is available for International systems only.

directory number (DN)

A unique number that the Business Communications Manager system assigns to every telephone or data terminal.

disconnect supervision

A feature that enables the system to detect if an external caller hangs up. Enable Disconnect Supervision under Trunk/Line data in Lines programming.

Do Not Disturb

A feature that stops calls from ringing at a telephone. Only Priority Calls ring at the telephone when this feature is set. A line button flashes when a call is received, but the set does not ring.

domain name

The domain name is used to translate Internet IP addresses into common language to allow for easier user access.

Domain Name Server (DNS)

The domain name system or server is the system that maps names of objects into IP numbers or other resource record values.

dual tone multifrequency (DTMF)

Two distinct telephone signaling tones used for dialing.

dynamic IP address

This feature is provided by an IP address server which assigns an IP address to a computer every time it logs on to the network.

Emergency 911 dialing

The ability to access a public emergency response system by dialing the digits 9-1-1.

emergency telephone

A single-line telephone that becomes active when there is no power to the Business Communications Manager. This telephone is also referred to as a 500/2500 telephone.

Ethernet

A local area network that networks computers with coaxial cable or twisted pair wiring. This protocol makes use of Carrier Sense Multiple Access/Collision Detect (CSMA/CD) LAN to allow computers, such as the Business Communications Manager to listen for pauses before they communicate.

event message

These are messages generated by the system to record activity. The messages are written to the system log.

external call

A call to or from a destination outside the Business Communications Manager system.

external line

A line assigned to a telephone that allows calls to the PSTN.

external paging

A feature that allows voice announcements over an externally-installed loudspeaker connected to the Business Communications Manager. The external speaker is not an Business Communications Manager component.

FAX

FAX works with Business Communications Manager Voice Messaging. FAX allows a caller to send a fax document to a voice mailbox.

feature code

A unique code used to access Business Communications Manager features and options on the telephones.

filtering

Filtering is the process of examining a data packet on the network to determine the destination of the data and whether the packet gets passed along on the local LAN, copied to another LAN, or dropped.

frame relay

A frame relay is a high-speed, packet switching WAN protocol designed to provide efficient, high-speed frame or packet transmission with minimum delay. Frame relay uses minimal error detection and relies on higher level protocols for error control.

gateway

A system that links two different types of networks and enables them to communicate with each other. The Business Communications Manager can provide the gateway to an intranet or internet.

ground start trunk

Ground start trunks provide the same features as loop start trunks. Use this type of trunk when the local service provider does not support disconnect supervision for the digital loop start trunks. By configuring lines as ground start, the system can identify when a caller hangs up the telephone at the far end. Ground start trunks are available only on a Digital Trunk Interface (DTI).

Handsfree

A feature used to make calls without using the telephone receiver. Activate Full Handsfree under **Capabilities** in System DNs programming. When activated, the Business Communications Manager assigns a Handsfree/Mute button to the telephone.

Handsfree (HF) Answerback

This feature automatically turns on the microphone at a telephone that receives a Voice Call so that the person receiving the call can respond without lifting the receiver. Activate Handsfree Answerback under **Capabilities** in System DNs programming.

Held (Line) Reminder

A telephone rings and displays the message On hold: LINENAM when you place an external call on hold for programmed period of time.

host name

The name that identifies a computer, on a network that provides services to other computers in the domain, such as databases or other Business Communications Manager systems.

Hotline

This feature automatically calls a pre-assigned number when the user lifts the telephone receiver or presses the Handsfree/Mute button. Assign Hotline under **Capabilities** in System DNs programming.

Hypertext Transfer Protocol (HTTP)

The set of rules used for exchanging text, graphic images, sound, video, and other multimedia files on the world wide web.

Hz (hertz)

A unit of measure for indicating frequency in cycles per second.

Integrated Services Digital Network (ISDN)

A digital telephone service that allows for a combination voice and data transfer over a single, high-speed connection over the same copper twisted-pair telephone line as analog telephone service.

intercom button

A button that provides access to internal lines used for calls within a Business Communications Manager system. These buttons also provide access to external lines through a line pool or external code. Assign intercom buttons under Line access in System DNs programming.

internal line

A line on your telephone dedicated to making calls to destinations inside your system. An internal line can connect you with an external caller if you use it to access a line pool. Also, you can answer an external caller using the call handling features such as Call Park or Call Pickup Directed.

Internet Protocol (IP)

The protocol that supports data being sent from one computer to another through an interconnection (internet) of networks. IP is a connectionless protocol, which means that there is no established connection between the end points that are communicating.

IP address

The internally-assigned address that identifies a destination and transmitting computer over a internet. See also static IP address and dynamic IP address.

IP address server

The IP address server manages the assignment of IP addresses to the devices that access the system. The server assigns an IP address to the device whenever it logs on to the network.

ISDN DN

A directory number (DN) used by ISDN terminal equipment connected to the system. The Business Communications Manager system uses a maximum of 30 ISDN DNs. The DECT cordless handsets use this type of DN.

kbyte

The abbreviation for kilobyte. A kilobyte is equal to 1024 bytes.

keycode

These numerical codes, generated for specific applications and for individual sites, allow access to additional features on the Business Communications Manager system. Refer to the Software Keycode Installation guide for details.

line

The complete path of a voice or data connection between one telephone, or other device, and another.

line number

A number that identifies an external line. The total number of lines depends on the number and type of trunk media bay modules installed.

line pool

Lines grouped in a common pool that assigned telephones can access to make external calls. Assign a line to be part of a line pool under Trunk/Line data in Lines programming.

Line Redirection

A feature that allows you to redirect all calls on an incoming line to a destination outside the system. You can set up the system to ring briefly when a call comes in on a redirected line, under **Capabilities** in System DNs programming.

This feature is different from Call Forward in two ways. Line redirection redirects only external calls, and redirects calls to destinations outside the system. Call forward redirects calls only to destinations within the system.

Link

If the Business Communications Manager system is connected to a Private Branch Exchange (PBX), the Link signal is used to access special features. The Link signal can be included as part of a longer stored sequence on an External Autodial button or in a Speed Dial code. The Link symbol uses two of the 24 spaces in a dialing sequence.

Local Area Network (LAN)

A network of interconnected computers, such as the Business Communications Manager, sharing the resources of a single processor or server within a relatively small geographic area.

mailbox

A storage place for voice messages on Business Communications Manager Voice Messaging.

Meridian 1 ISDN Primary Rate Interface

This is the MCDN protocol which is used between members of the Nortel Networks Meridian family of Private Telecommunication Network Exchanges. The signalling information is carried via time slot 16 of a 2.048 Mbit/s digital transmission system.

MHz

A unit of measure indicating frequency in millions of cycles per second.

microprocessor

The Central Processing Unit (CPU) component that controls all activity inside the Business Communications Manager.

modem

A communications device that allows computers to exchange data over telephone lines.

music source

You can connect a radio or other source of music to the system to provide music for the Music on Hold and Background Music features. A music source is not part of the Business Communications Manager system components.

Network Basic Input/Output System (NetBIOS)

An interface and upper-level protocol developed by IBM for use with a proprietary adapter for its PC network product. NetBIOS provides a standard interface to the lower networking layers. The protocol provides higher-level programs with access to the network.

network

Two or more computers linked electronically to share programs and exchange data.

network device

A network device is a hardware entity characterized by its use as a communications component within a network.

network DN

A number supplied by the ISDN network service provider for ISDN terminal equipment.

network interface card (NIC)

This card is installed inside a computer so the computer can be physically connected to a network device such as the Business Communications Manager server.

On hold

A setting that controls what external callers hear: music, tones, or silence, when you place the call on hold. Program On hold under Feature settings in System programming.

overflow

A setting in Routing Service that allows users to decide which path an outgoing call takes if all the lines used in a selected route are in use.

packet

A packet is a unit of data that is routed between an origin and a destination. Each packet is separately numbered and includes the Internet address of the destination.

Packet and *datagram* are similar in meaning. A protocol similar to TCP, the User Datagram Protocol (UDP) uses the term datagram.

page

A feature you can use to make announcements over the Business Communications Manager system using the telephone speakers and/or external speakers.

Page Time out

A setting that controls how long a Page Announcement can last. Assign the Page Time out under Feature settings in System programming.

Page zone

An area in the office that receives internal page announcements that other areas of the office do not hear. Assign telephones to page zones under Capabilities in System DNs programming.

Parallel port

A port that transfers data through multiple wires. Parallel ports normally use a 25-pin interface that transmits and receives data using a separate data line for every bit.

Peripheral Component Interconnect (PCI) Slot

Socket on the Business Communications Manager main printed-circuit board that connects to the Business Communications Manager cards.

Personal Speed Dial

Two-digit codes (71-94) that can be programmed on the set to dial external telephone numbers. You can access Personal Speed dial numbers only at the telephone on which they are programmed.

Pin-1

An indicator on the first pin on an electronic component. You use this indicator to help you correctly align the component when attaching or installing it.

Port

A connector on the Business Communications Manager that allows data exchange with other devices, such as a printer or mouse.

portable telephone

Typically a handset containing keypad, receiver and transmitter that communications using a radio link to a base station connected to the Business Communications Manager. Examples: Companion, DECT.

Primary Rate Interface (PRI)

An ISDN interface that uses 23 B channels and a D channel (23B+D).

Prime line

The line the system selects for your telephone when you lift the receiver, press the Handsfree/Mute button, or use an external dialing feature. Assign a Prime Line to a telephone under Line access in System DNs programming.

Priority Call

If you get a busy signal when you call a person in your office, you can interrupt that person for an urgent call. Enable this feature for a telephone under Capabilities in System DNs programming.

Private branch exchange (PBX)

A PBX is a telephone system within an enterprise that switches calls between enterprise users on local lines while allowing all users to share a certain number of external telephone lines. The main purpose of a PBX is to save the cost of requiring a line for each user to the telephone company central office since the PBX is owned and operated by the enterprise rather than the telephone company.

protocol

A set of rules and procedures for exchanging data between computers or Business Communications Managers on a network or through the Internet.

Proxy

A server that acts on behalf of another.

pulse/tone dialing

Pulse is the traditional method of dialing used by rotary-dial or push-button single-line telephones. Tone dialing allows telephones to communicate with other devices such as answering machines. You require tone dialing to access the features that PBX systems can provide or to use another system remotely.

Quality of Service (QoS)

On the Internet and in other networks, QoS refers to guaranteed throughput level. QoS allows a server to measure, improve and, to some level, guarantee the transmission rates, error rates, and other data transmission characteristics. QoS is critical for the continuous and real-time transmission of video and multimedia information.

Q reference point signalling (QSIG)

QSIG is an ETSI standard signalling for multi-vendor peer-to-peer communications between PBXs and/or central offices. This is an International standard and not available in North America.

Random Access Memory (RAM)

Computer memory that stores data temporarily. RAM stores the data used by the microprocessor because it executes instructions. The contents of RAM are erased when you restart or turn off the Business Communications Manager.

Remote access

The ability to dial into an Business Communications Manager system from outside the system and use selected features. The Class of Service determines which lines, features, and dialing capabilities are available.

Restriction filter

Restriction filters prevent selected telephone numbers or feature codes from being dialed. Restriction filters can be applied to lines, sets, specific lines on a set, and to Class of Service passwords.

Read Only Memory (ROM)

Memory that stores data permanently. ROM contains instructions that the Business Communications Manager needs to operate. The instructions stored in ROM are used by the Business Communications Manager each time it is turned on or restarted.

Router

A device that forwards traffic between networks, based on network layer information and routing tables. A router decides which path network traffic follows using routing protocols to gain information about the network and algorithms to choose the best route based on a routing matrix.

Routing

The path a message takes from its origin to its destination on a network or the Internet.

Serial port

A port that sends and receives data one bit at a time.

Software keycode

Refer to Keycode.

static IP address

A static or fixed IP address that is permanently assigned to a computer.

Station Auxiliary Power Supply (SAPS)

A device which provides power to a telephone that is more than 300 m (975 ft.) and less than 1200 m (3900 ft.) from the server, or to a CAP module.

Station media bay module

Physical units installed in a Business Communications Manager that connect the telephone lines to the system.

subnet mask

A value used to route packets on TCP/IP networks. When the IP layer has to deliver a packet through an interface, it uses the destination address contained in the packet, together with the subnet mask of the interface to select an interface, and the next hop in that subnet

synchronous

A synchronous signal is sourced from the same timing reference. A synchronous signal causes the interval between successive bits, characters, or events to remain constant or locked in to a specific clock frequency.

System speed dial code

A two-digit code (01 to 70) that you program to dial a telephone number a maximum of 24 digits long. You can program System speed dial codes for the complete system under the **System Speed** heading.

T1

Digital carrier system or line that carries data at 1.544 Mb/s.

Target lines

Lines used only to answer incoming calls. A target line routes a call according to digits it receives from an incoming trunk. You refer to target lines in the same way as physical lines.

Telephony Application Program Interface (TAPI)

A standard program interface that allows communication over telephones or video phones to people or phone-connected resources elsewhere in the world.

Transfer

A feature that allows you to redirect a call to another telephone in your Business Communications Manager system, over a network, or outside your system.

Transmission Control Protocol/Internet Protocol (TCP/IP)

A language controlling communication between computers on the Internet.

TCP:

- checks packets of information for errors
- sends requests for re-transmission in the event of errors
- returns multiple packets of a message into the original sequence when the message reaches its destination

IP:

- controls how packets are sent out over networks
- has a packet addressing method that allows any computer on the Internet forward a packet to another computer that is a step or more nearer to the recipient

Trunk

The public telephone system or private network connection between the Business Communications Manager system and the outside world.

Trunk media bay module

Physical units installed in a Business Communications Manager that connect the system to the outside world.

User Speed Dial

Two-digit codes (71-94) programmed to dial external telephone numbers. These numbers are available only at the telephone on which they are programmed.

V.90

A data transmission standard used by the modem installed in the Business Communications Manager. This standard allows data to be transmitted to the modem at 56 kbit/s and transmitted from the modem at 33 kbit/s.

Voice Message Center

If you have subscribed to Call Display services, you can receive visual Voice Message Waiting Indication on a display telephone. If you have Voice Message Waiting Indication, you can program the telephone numbers required to access a maximum of five external voice message centers. You can program which of the five centers is to be accessed by each specific line.

Voice over IP (VoIP)

The capability to deliver voice using the Internet Protocol. In general, this means sending voice information in digital form in discrete packets rather than in the traditional circuit-committed protocols of the public switched telephone network (PSTN).

Weighted Fair Queuing (WFQ)

WFQ is a queuing method that allows low volume traffic, such as Telnet, to be given priority. Interactive traffic receives higher priority than batch transfers.

Wide Area Network (WAN)

A collection of computers or Business Communications Managers connected or networked to each other over long distances, normally using common carrier facilities.

Index

D