

Part No. P0993133 03

**Business Communications  
Manager  
BCM200/400  
Installation and Maintenance  
Guide**

**NORTEL**  
NETWORKS™

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## 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 unit 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 unit.

If installation of additional hardware and /or servicing is required, disconnect all telephone cable connections prior to unplugging the Business Communications Manager.

Ensure the Business Communications Manager and Business Communications Manager expansion unit are plugged into the wall socket using a three-prong power cable before any telephone cables are connected.

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**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.

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## 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 3.0 Programming Operations Guide*.

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## 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.

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## 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 332D-5980A and FCC US:AB6KF15B20705 (key system), US:AB6MF15B20706 (hybrid system), and US:AB6PF15B23740 (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 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.

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## 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 term "IC" before the certification number located on the host equipment only signifies that the Industry Canada technical specifications were met. 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

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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.

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### *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.

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## 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.

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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.

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**16 Save these instructions.**

## International Regulatory Information

	<p>The CE Marking on this equipment indicates compliance with the following:</p> <p>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.</p>	
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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.

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## 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.

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## Preface

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This guide describes how to install, initialize and maintain the hardware for the Business Communications Manager BCM200 and BCM400 systems.

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

To use this guide, you must:

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

## Display Tips

You can read this publication from your computer monitor or printed hard copy. For best on-screen display results, use Adobe Acrobat Reader (TM) version 4.0 or 5.0.

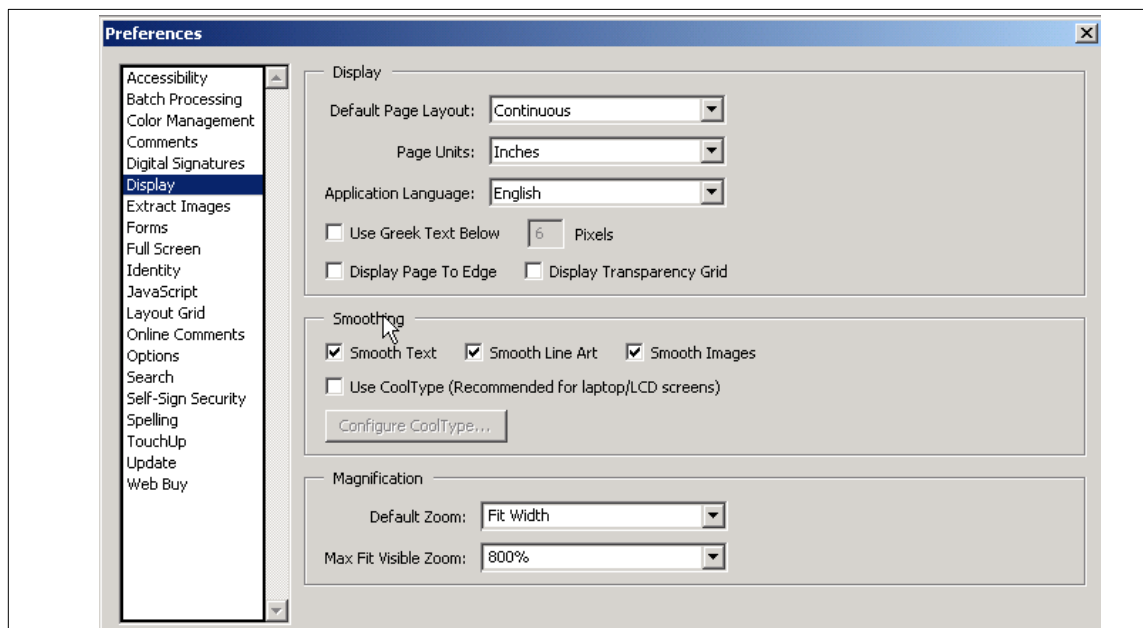
If you use Adobe Acrobat Reader, version 4.0, perform the following to optimize the illustrations:

- Increase display magnification
- Print the document

For Adobe Acrobat Reader, version 5.0, perform the following steps to optimize the graphical display:

- 1 Start the Adobe Acrobat Reader, version 5.0 application.
- 2 From the top line menu, select: **Edit -->Preferences -->General**.
- 3 Select **Display**, from the preferences menu at the left side of the setup screen.
- 4 Select the following smoothing options from the Display setup screen:
  - **Smooth Text**
  - **Smooth Line Art**
  - **Smooth Images**

See Figure 1 to review Acrobat Reader version 5.0 display selections.

**Figure 1** Acrobat Reader display setup selections

## Symbols used in this guide

This guide uses the following symbols to draw your attention to important information:



---

**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:

<b>bold Courier text</b>	Indicates command names and options and text that you need to enter in a command-line interface. Example: Use the <b>dinfo</b> command. Example: Enter <b>show ip {alerts routes}</b> .
<i>italic text</i>	Indicates file and directory names, new terms, book titles, Web addresses, and variables in command syntax descriptions.
<b>bold text</b>	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

This guide uses the following acronyms (alphabetical order):

ANSI	American National Standards Institute
ASM	Analog station media bay module
AWG	American wire gauge
BIOS	Basic input output system
BPS	Bits per second
BRI	Basic rate interface media bay 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 identifier
DN	Directory number
DNS	Domain name server
DPNSS	Digital private network signalling system
DRT	Delayed ring transfer to prime
DSM	Digital station media bay module
DTM	Digital Trunk media bay module
DTMF	Dual tone multifrequency.
FEM	Fiber expansion media bay 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, related media bay modules, extension equipment, and system applications and software:

- *Business Communications Manager 3.0 Programming and Operations Guide (P0993211)* describes core system operational configuration and how to program the Business Communications Manager equipment.
- *Telephone Features Programming Guide (P0993136)* provides feature descriptions and programming for the numerous telephone features available to users through the buttons on digital telephone sets.
- *Business Communications Manager 3.0 BIX Box Wiring Guide (P0993134)* 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 these application user guides, refer to “Telephony Features and Options” on page 353.

Guide type	Title	CPC code
CallPilot applications	CallPilot Manager Set Up and Operation Guide	P0919415
	CallPilot Reference Guide	P0919417
	CallPilot Fax Set up & Operation Guide	P0919426
	CallPilot Fax User Guide	P0919427
	CallPilot Message Networking Setup and Operation Guide	P0919429
	CallPilot Message Networking User Guide	P0919430
	CallPilot Programming Record	P0941757
	CallPilot Unified Messaging Installation and Maintenance Guide	P0945074
Call center applications	Call Center Set Up and Operation Guide	P0919436
	Call Center Agent User Guide	P0919437
	Call Center Supervisor User Guide	P0919438
	Call Center Reporting Set Up and Operation Guide	P0919439
	Multimedia Call Center Setup and Operation Guide	P0935737
	Multimedia Call Center Web Developers Guide	P0935740
Applications	Personal Call Manager User Guide	P0936569
	Attendant Console Setup and Operation Guide	P0936570
	Attendant Console User Guide	P0936571
	Call Detail Recording System Administration Guide	P0993139
Installation & Maintenance	LAN CTE Configuration Guide	P0993138
	IP Telephony Configuration Guide	P0993474

## How to Get Help

Your local distributor provides technical support for your Business Communications Manager system or has 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

## Introduction to the Business Communications Manager Platform Hardware

The Nortel Networks Business Communications Manager (BCM) system provides private network and telephony management capability to small and medium-sized businesses. The Business Communications Manager integrates voice and data capabilities, VoIP gateway functions and quality of service (QoS) data-routing features into a single telephony system. Business Communications Manager is a compact system that allows you to create and provide telephony applications for use in a business environment.

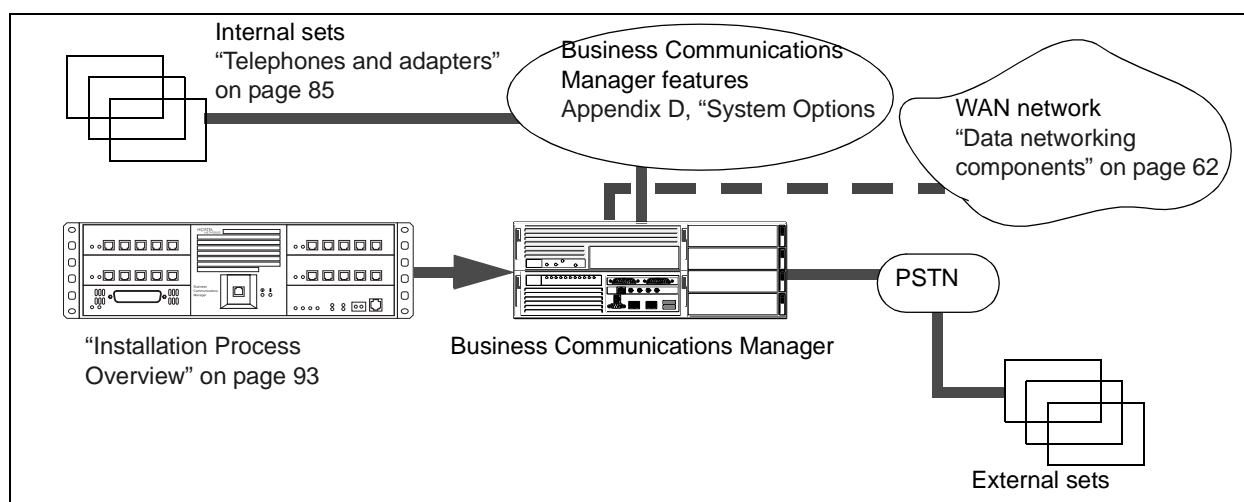
The Business Communications Manager system includes software and hardware components that provide data networking, telephony service, voice messaging and service applications.

The Business Communications Manager requires version 3.0 software and is available in the following three product configurations:

- BCM200
- BCM400 Standard (STD)
- BCM400 Redundant feature option (RFO)

Figure 2 provides an overview of the core Business Communications Manager system.

**Figure 2** 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.

## Business Communications Manager Field Replaceable Units

Table 2 provides a list of field replaceable units (FRUs) for the BCM200 and BCM400 base hardware platforms. Use Table 2 to Table 7 as a reference when you need to order, replace or install component hardware. The tables indicate the component's product engineering code (PEC), and references to the description and installation procedures. Note that the codes may change over time; consult the catalogue for the latest information.

**Table 2** Card field replaceable units

Component description	BCM200 PEC	BCM400 PEC	FRU Description	Installation procedure
BCM embedded modem	NTAB9854	NTAB9854	Modem card on page 63	Install the modem card on page 229
Media services card	NT5B15AAAK	NT5B15AAAH	Media services card (MSC) on page 57	Install the media services card (MSC) on page 226
Media services PEC III	NTBB80AAAB	NTBB80AAAB	page 60	Install a processor expansion card (PEC) on page 233
WAN interface card with CSU/ V.35 (North America only)	NTAB3212	NTAB3212	WAN interface card on page 62	Install the WAN card on page 221
WAN interface card with CSU/ V.35/ X.21 (International only)	NTAB3213	NTAB3213	WAN interface card on page 62	Install the WAN card on page 221
256MB memory module	NTAB3421	NTAB3421	Main card on page 60	Install the dual in-line memory module (DIMM) card on page 237

**Table 3** Chassis field replaceable units

Component description	BCM200 PEC	BCM400 PEC	FRU Description	Installation procedure
Base function tray	NTAB9858	NTAB9857	Base Function Tray Component Hardware on page 54	Install the base function tray on page 151

**Table 3** Chassis field replaceable units

Component description	BCM200 PEC	BCM400 PEC	FRU Description	Installation procedure
Wall mount kit	NTAB3422	NTAB3422		Install the Platform Base Chassis on the Wall on page 102
BCM Field redundancy upgrade kit	Not applicable	NTAB3420	BCM400 platform redundant feature option (RFO) configuration on page 49	<ul style="list-style-type: none"> <li>• Upgrade to a redundant power supply on page 203</li> <li>• Hard Disk Replacement Procedures on page 165</li> <li>• Install or Replace a Cooling Fan on page 179</li> </ul>

**Table 4** Hard drive field replaceable units

Component description	BCM200 PEC	BCM400 PEC	FRU description	Installation procedure
BCM 3.0 hard drive, Programmed (20GB)	NTAB3392	NTAB3392	Hard Disk on page 67	Install a New Hard Disk on page 171
BCM RAID upgrade kit	NTAB9861	NTAB3418	RAID upgrade kit on page 67	Hard Disk Replacement Procedures on page 165
BCM replacement blank hard drive	NTAB3316	NTAB3316	Hard Disk on page 67	Hard Disk Replacement Procedures on page 165

**Table 5** Power supply field replaceable units

Component description	BCM200 PEC	BCM400 PEC	FRU Description	Installation procedure
BCM Universal power supply	NTAB3423	NTAB3423	Platform Power Supply on page 65	Replace a Standard Power Supply on page 192
BCM400 redundant power supply module (single)	Not applicable	NTAB3419	BCM400 redundant power supply on page 66	Upgrade to a redundant power supply on page 203

**Table 6** Cooling fan field replaceable units

Component description	BCM200 PEC	BCM400 PEC	FRU Description	Installation procedure
BCM2.5/BCM400 Cooling fan (4-wire base unit)	Not applicable	NTAB3315	Cooling Fan on page 68	Install a BCM400 cooling fan on page 182
BCM Expansion Unit Cooling Fan FRU	Not applicable	NTAB9650	Cooling Fan on page 68	Install an expansion unit fan on page 190
BCM200 Chassis cooling fan	NTAB3424	Not applicable	Cooling Fan on page 68	Install the BCM200 cooling fan on page 187

**Table 7** Media bay module

Component description	BCM200 PEC	BCM400 PEC	FRU Description	Installation procedure
BCM MBM Bay Filler Blanking Plate FRU	NTAB3279	NTAB3279	BCM MBM Metal filler	Install a Media Bay Module on page 109
DTM MBM	NT7B04AAAC	NT7B04AAAC	Digital trunk media bay module on page 75	Install a Media Bay Module on page 109
CTM4 - CLID Trunk MBM	NT5B18AAAD	NT5B18AAAD	Caller ID trunk media bay module on page 76	Install a Media Bay Module on page 109
CTM8-CLID MBM	NT5B18ABAA	NT5B18ABAA	Caller ID trunk media bay module on page 76	Install a Media Bay Module on page 109
BRI S/T MBM	NT7B76AAAH	NT7B76AAAH	Basic rate interface media bay module on page 77	Install a Media Bay Module on page 109

**Table 7** Media bay module

<b>Component description</b>	<b>BCM200 PEC</b>	<b>BCM400 PEC</b>	<b>FRU Description</b>	<b>Installation procedure</b>
DSM-16+ MBM	NT7B08AAAD	NT7B08AAAD	Digital station media bay module (DSM) on page 78	Install a Media Bay Module on page 109
DSM-32+ MBM	NT7B09AAAC	NT7B09AAAC	Digital station media bay module (DSM) on page 78	Install a Media Bay Module on page 109
CMB4X16 MBM	NT5B42AAAA	NT5B42AAAA	4X16 Media Bay Module on page 79	Install a Media Bay Module on page 109
ASM8 MBM	NT7B16AAAE	NT7B16AAAE	Analog station media bay module on page 80	Install a Media Bay Module on page 109
FEM6 MBM	NT7B07AAAC	NT7B07AAAC	Fiber expansion media bay module (FEM) on page 82	Install a Media Bay Module on page 109
DDIM MBM	NT5B52AAA	NT5B52AAA	Digital Drop & Insert MUX (DDIM) on page 83	Install a Media Bay Module on page 109

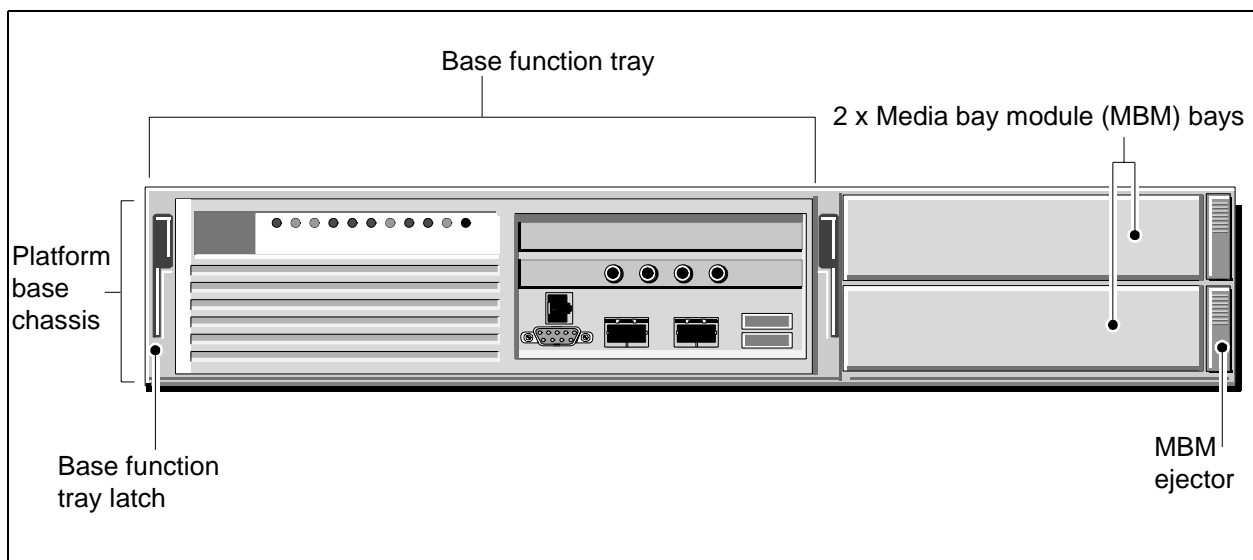
## BCM200 Platform Base Hardware

The BCM200 platform base hardware has the following primary components:

- 1 x Platform base chassis (see “BCM200 platform base chassis” on page 44)
- 2 x Media bay module bays (MBM) (see “Media bay modules (MBMs)” on page 71)
- 1 x Sliding base function tray (BFT) (see “Base Function Tray Component Hardware” on page 54)

Figure 3 illustrates the BCM200 configuration primary components. The figure shows the base function tray installed in the BCM200 platform base chassis.

**Figure 3** BCM200 platform base chassis and primary components



### BCM200 platform base chassis

The BCM200 platform base chassis design provides multiple points of access to the base platform hardware components. The front of the chassis has three assemblies that house one base function tray and two media bay modules (MBMs). The rear of the chassis provides mount points for the fan and power supply. The rear of the chassis also has a removeable panel to provide access to the hard disk. The top cover has a removable section to allow access to the cables, connectors, power supply, hard disk and cooling fan.

Rack mount brackets allow you to install the chassis in a server rack. An optional wall mount bracket is available separately. Rubber feet attach under the platform base chassis if you want to place the Business Communications Manager unit on a flat surface. For further information on chassis bracket installation, refer to Chapter 3, “Install the Business Communications Manager & Expansion Unit Platform Base Chassis”.

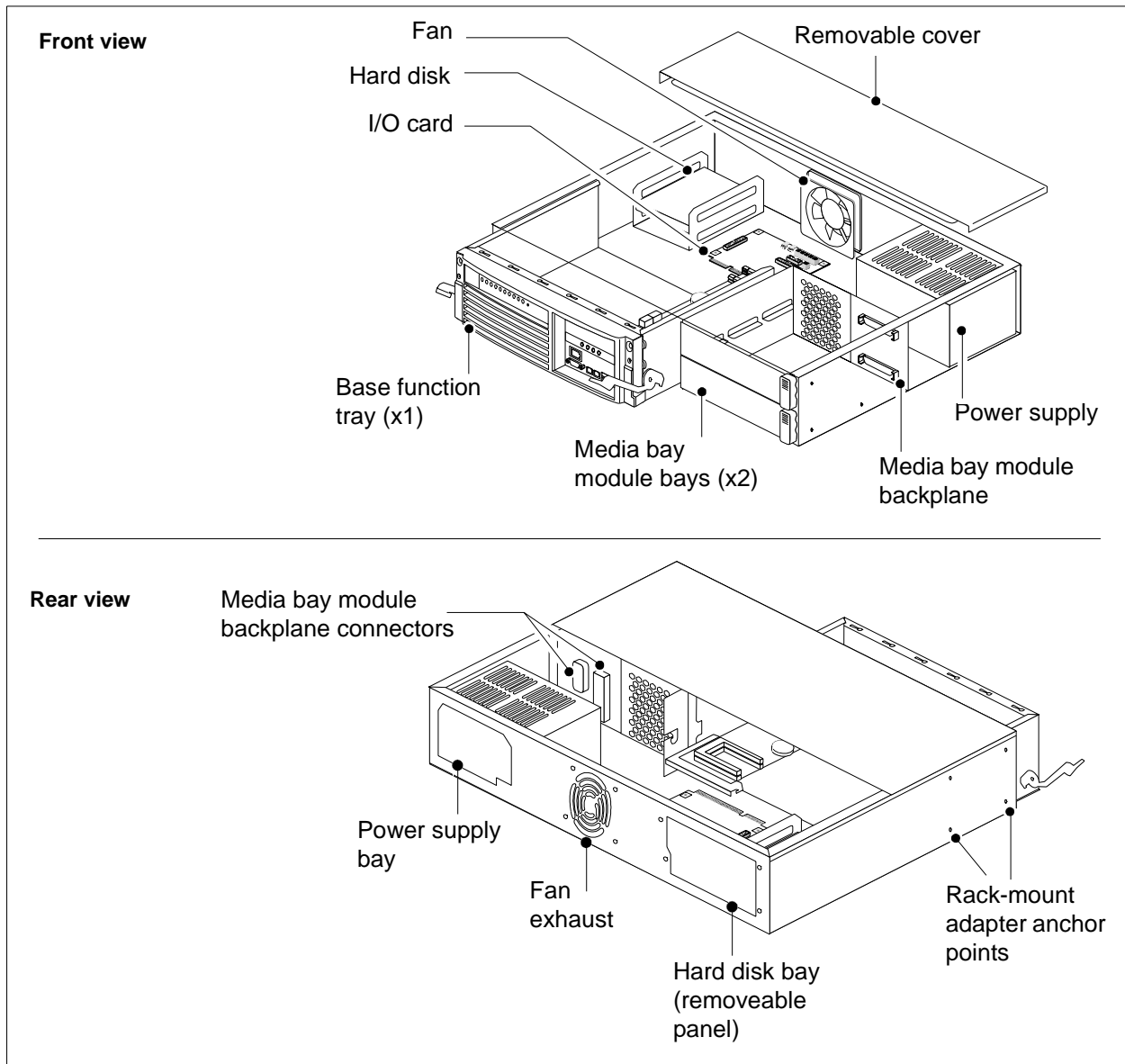


The chassis interior contains the following hardware components:

- 1 x Programed hard drive (or field redundancy upgrade provides an additional hard disk and RAID controller card) - see “Hard Disk” on page 67.
- 1 x Auto-sensing power supply (standard) - see “Platform Power Supply” on page 65.
- 1 x System cooling fan - see “Cooling Fan” on page 68.

Figure 4 shows the location of the hardware components in the BCM200 platform base chassis. Nortel Networks recommends that you know the location of the different components before attempting to install or maintain the system.

**Figure 4** BCM200 platform base chassis



## BCM400 Platform Base Hardware

The BCM400 platform consists of a platform base chassis equipped with advanced and base function trays, and four media bay module bays. The advanced function tray contains a hard disk and a bay for future use. The base function tray provides call processing functions and interface connections. The media bay modules provide telephony features.

Rack mount brackets allow you to install the chassis in a server rack. Rubber feet attach under the platform base chassis if you want to mount the Business Communications Manager unit on a flat surface. An optional wall mount bracket is available.

The BCM400 platform is available either in a Standard (STD) or Redundant Feature Option (RFO) configuration. The BCM400 STD and RFO platform base hardware share the following common components:

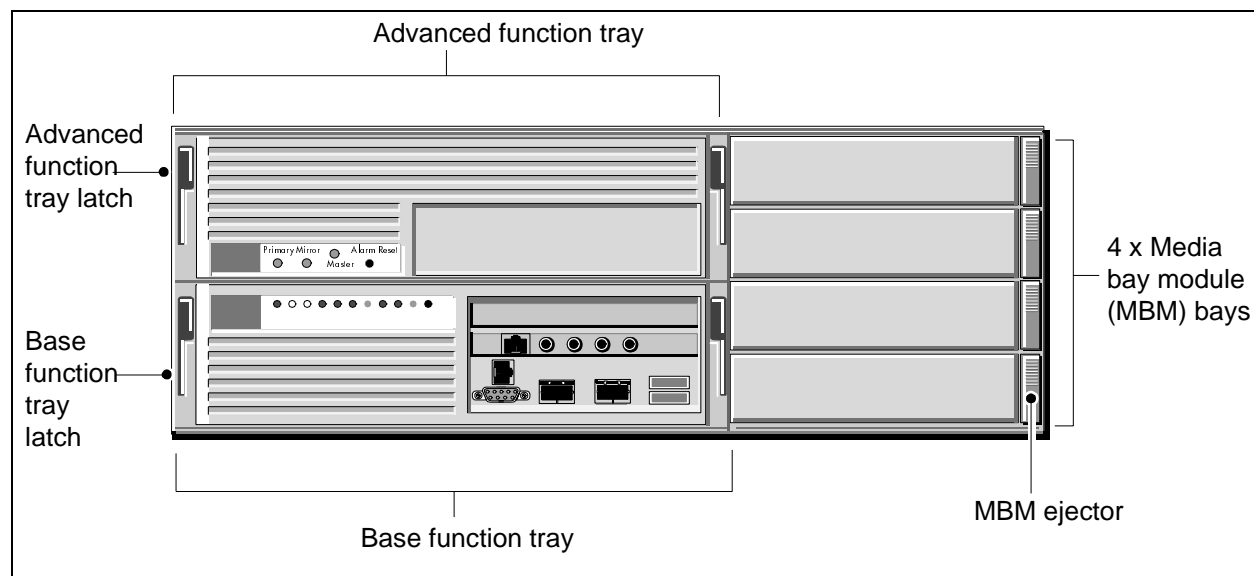
- 1 x Platform base chassis
- 1 x Sliding advanced function tray (AFT)
- 4 x Sliding media bay module bays (MBM)
- 1 x Sliding base function tray (BFT)

The BCM400 RFO additional components are as follows:

- RAID controller card
- Additional hard disk for RAID controller card
- Redundant chassis cooling fan and fan panel
- Redundant power supply cage and power supply modules

Figure 5 illustrates the BCM400 RFO configuration. The figure shows the base and advanced function trays installed in the BCM400 platform base chassis.

**Figure 5** BCM400 platform base chassis and primary components



## BCM400 platform base chassis

The BCM400 platform is available in either a standard (STD) or RFO configuration. Nortel Networks recommends that you know the location of the different components before attempting to install or maintain the system.

The BCM400 platform base chassis design provides multiple points of access to the base platform hardware components. The front of the chassis has two, sliding tray assemblies that house the base function tray and advanced function tray. Four bays accommodate the media bay modules (MBMs). For more information on the chassis interior hardware components, see Media bay modules (MBMs) on page 71.

The rear of the chassis provides mount points for the fan and power supply. The top cover has fixed and removable sections. Remove the rear portion of the cover to access the cabling, power supply cage and hard disk components. Chassis adapters allow you to install the chassis in a server rack. An optional wall mount bracket is available separately.

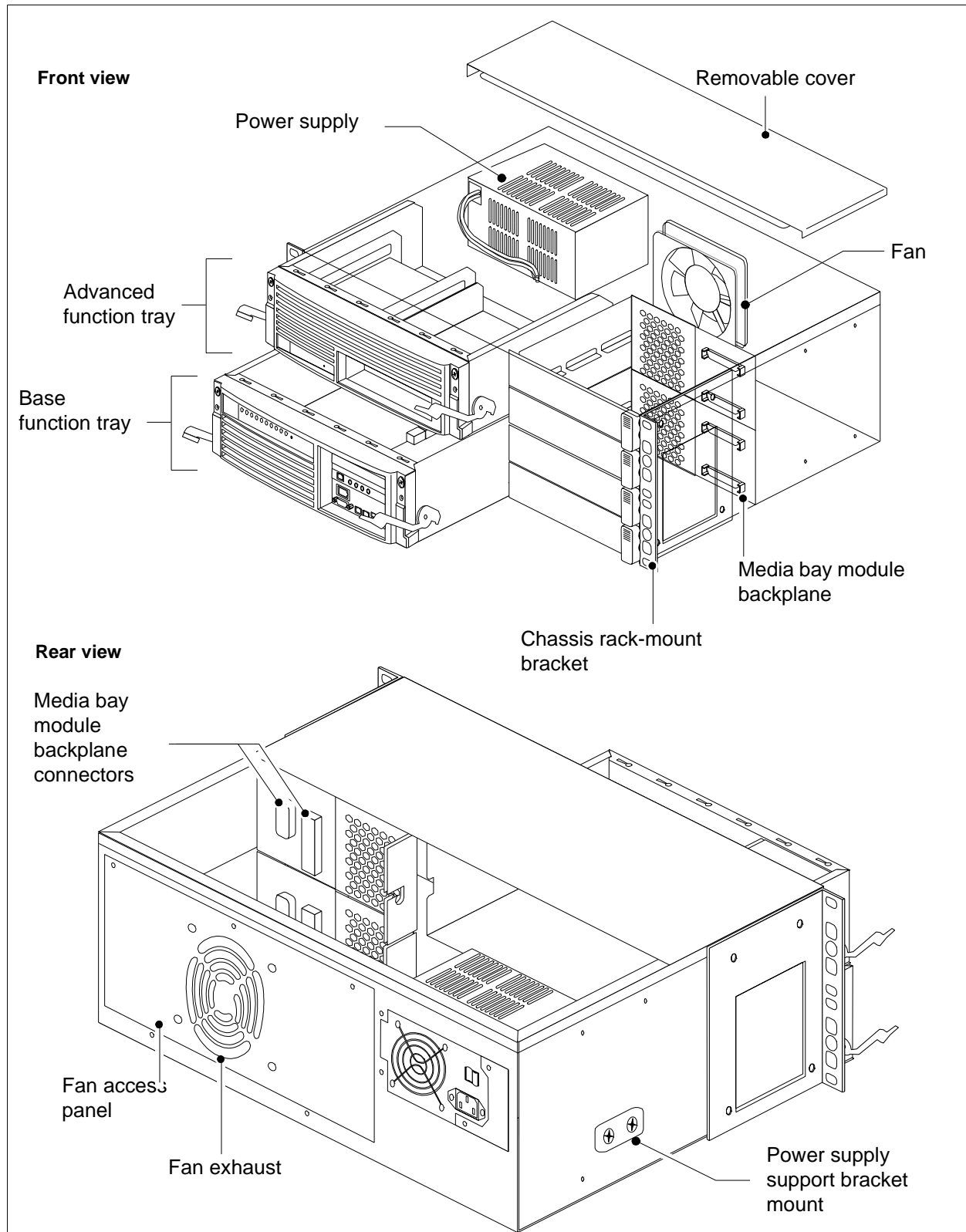
### BCM400 standard (STD) configuration hardware components

The BCM400 standard configuration is equipped as follows:

- 1 x Main card
- 1 x Media services card (MSC) with 2 processor expansion cards (2 additional cards can be added)
- 1 x Programmed hard drive
- 1 x auto-sensing power supply
- 1 x System cooling fan

Figure 6 shows the location of the hardware components (standard configuration) in the BCM400 platform base chassis.

**Figure 6** BCM400 platform base chassis (standard configuration)

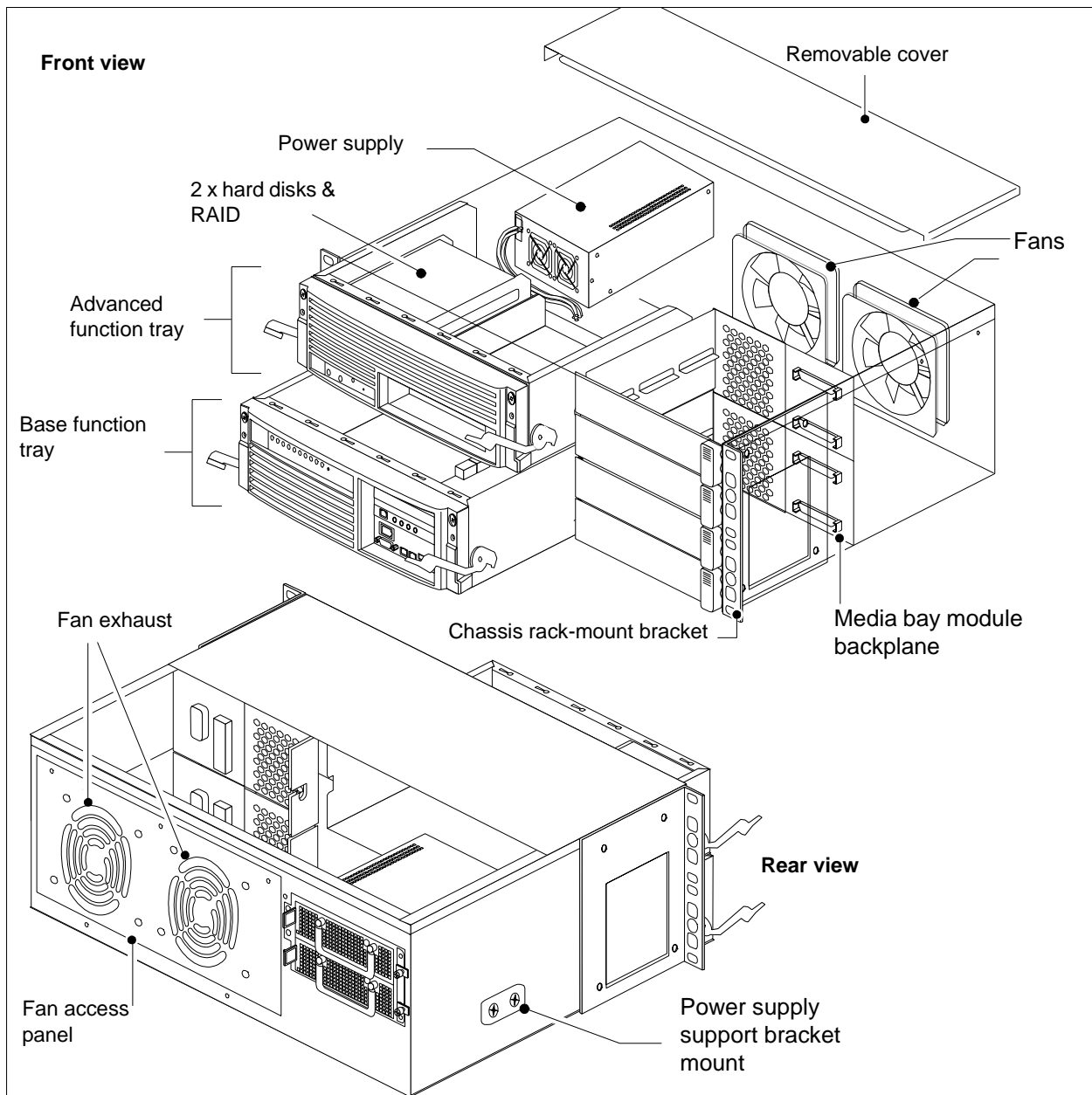


## BCM400 platform redundant feature option (RFO) configuration

Figure 7 shows the location of the hardware components in the RFO configuration platform base chassis.

- 1 x Media services card (MSC) with 2 processor expansion cards (2 additional cards can be added).
- 2 x hard disks and RAID controller card
- 2 x System cooling fans
- 2 x Redundant, hot-swappable power supply modules

**Figure 7** BCM400 platform base chassis (RFO configuration)

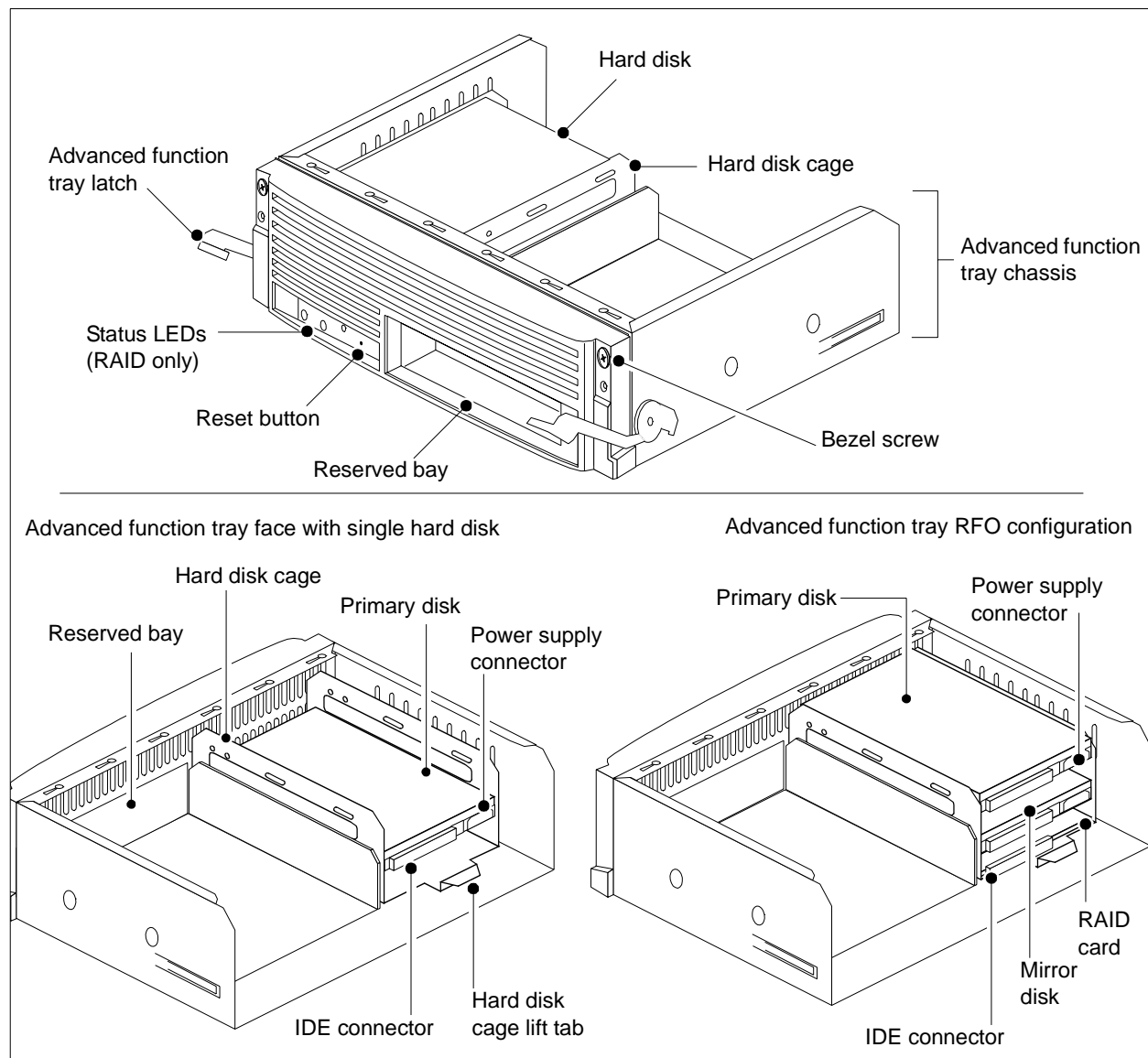


## BCM400 advanced function tray (AFT)

The advanced function tray (AFT) houses the hard disk and an extra, unpopulated bay. The standard configuration contains a single hard disk and has no RAID LED display. The AFT, in the RFO configuration contains two hard disks, a RAID controller card and has an LED display to monitor RAID status. The extra, unpopulated bay is reserved for future development. The advanced function tray mounts in the upper BCM400 platform base chassis bay. The advanced function tray slides out and away from the front of the chassis for hard disk maintenance, RAID upgrade or exchange purposes.

Figure 8 illustrates the advanced function tray chassis and faceplate interfaces for the BCM400 standard (STD) and redundant feature option (RFO) platform configurations.

**Figure 8** Advanced function tray



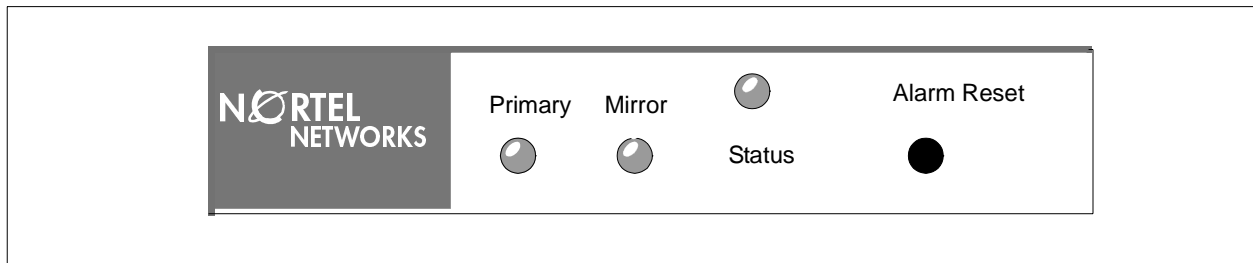
## BCM400 advanced function tray RAID status LEDs

Three LEDs are located on the bezel face of the advanced function tray. The LEDs show the current state of RAID hardware components.

The RAID status LEDs indicate monitoring of the following:

- Primary hard disk activity
- Mirror hard disk activity
- Card status activity

**Figure 9** Advanced function tray RAID status LEDs

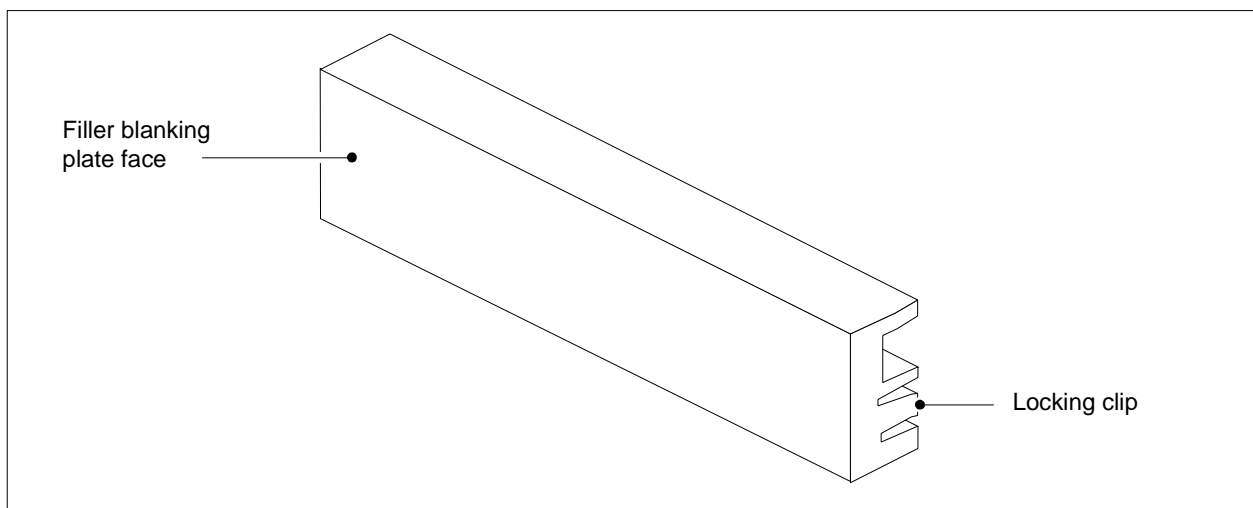


## Platform Media Bay Module Bays and Backplane

The number and configuration of the media bay modules depend on the number of bays available in the platform base chassis and DS30 system resources. The BCM200 platform base chassis provides two media bay module bays. The BCM400 platform base chassis provides four media bay module bays.

All media bay module bays must contain either a media bay module or a MBM filler blanking plate. Populate the bays with media bay modules as required. Fill unpopulated media bay module bay openings in the platform base chassis with the MBM filler blanking plate (see Figure 10).

**Figure 10** Media bay module filler blanking plate



The media bay modules slide into the MBM bays and lock into place. Pull on the MBM ejector to release the MBM or filler blanking plate. The module or filler blanking plate partially ejects from the bay. Slide the the media bay module out of the bay to remove from the platform base chassis.

Figure 11 shows the BCM200 platform MBM bays and release mechanism.

**Figure 11** BCM200 media bay module bays

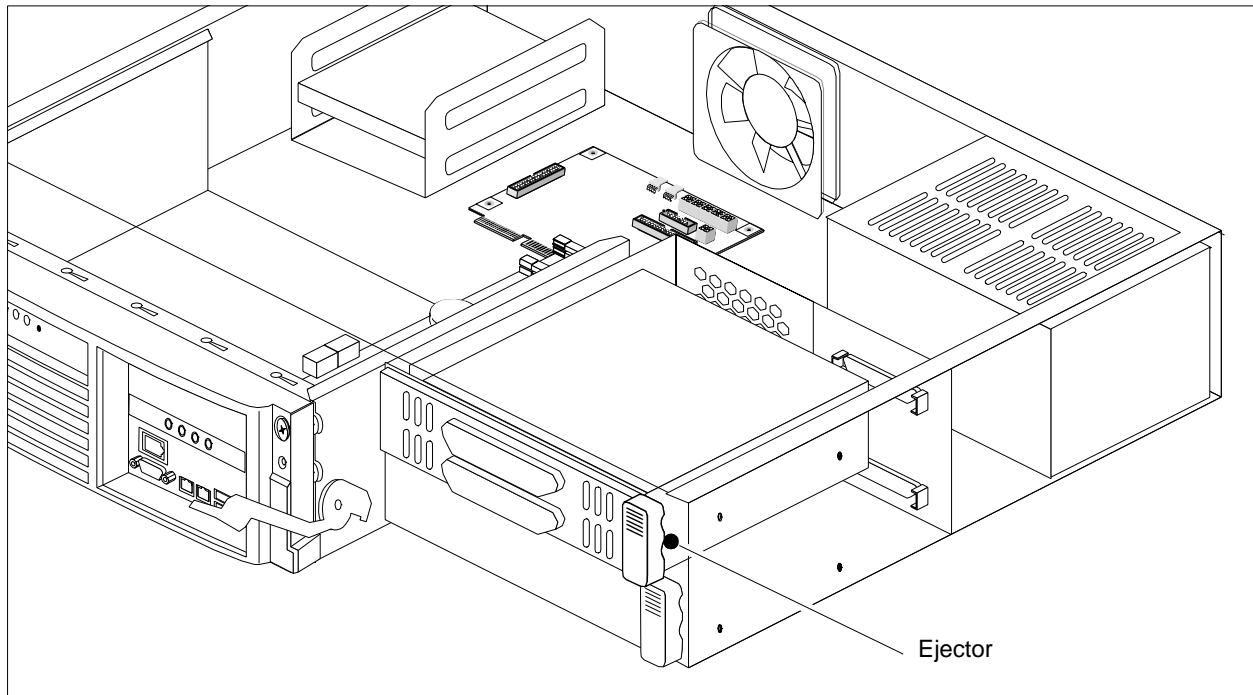
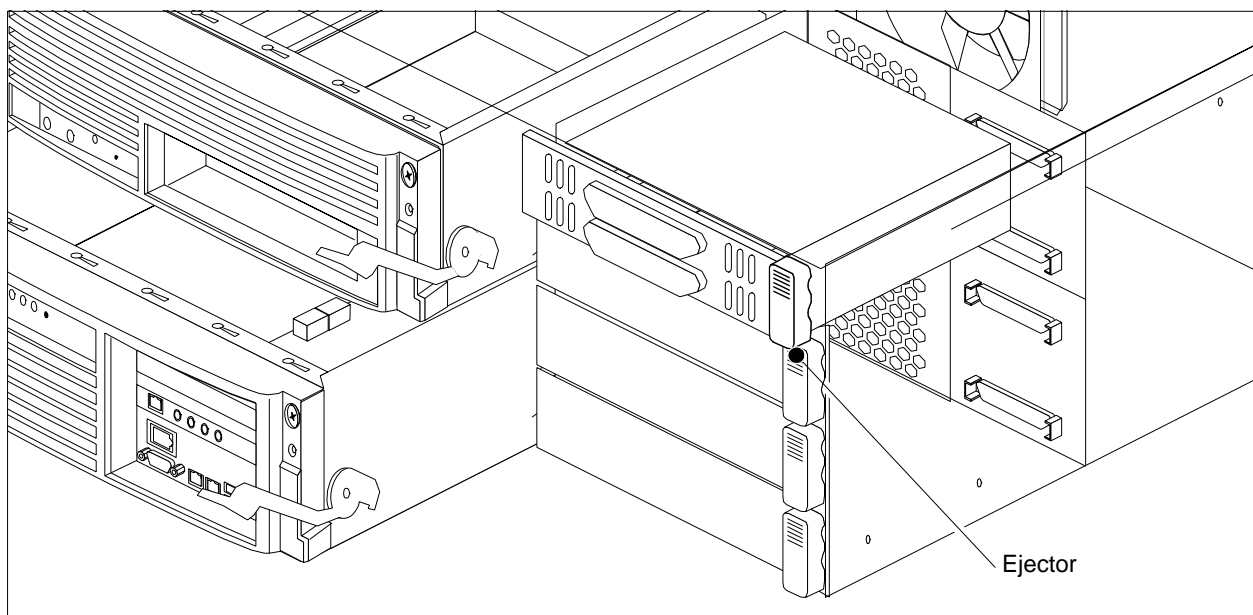


Figure 12 shows the BCM400 platform MBM bays and release mechanism.

**Figure 12** BCM400 Media bay module bays





The media bay module (MBM) backplane provides the media bay module component interface to the power supply and main card. The media bay module backplane mounts at the rear of the media bay module bays and is a non-replaceable chassis component. Figure 13 illustrates the media bay module backplane and connectors for the BCM200 platform. Figure 14 illustrates the media bay module backplane and connectors for the BCM400 platform.

**Figure 13** BCM200 media bay module backplane

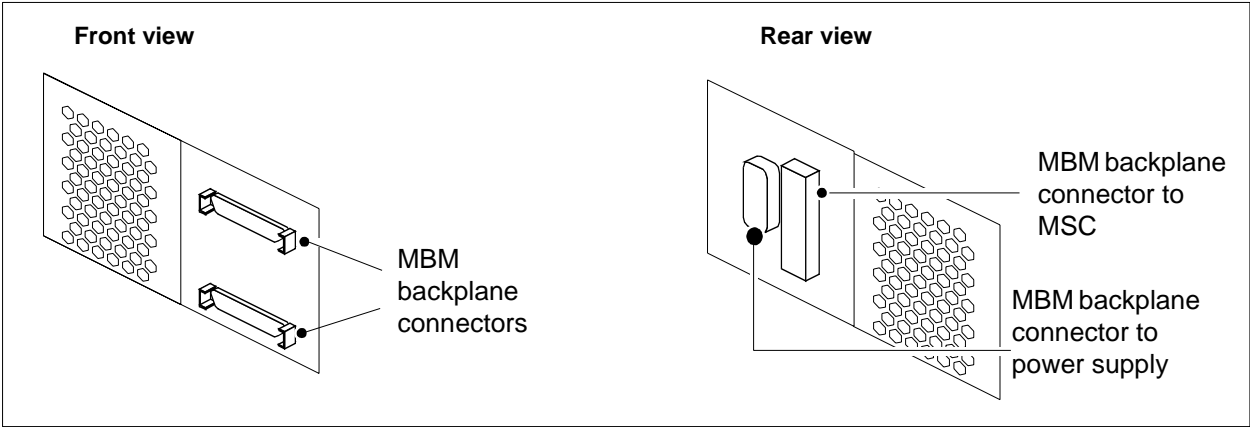
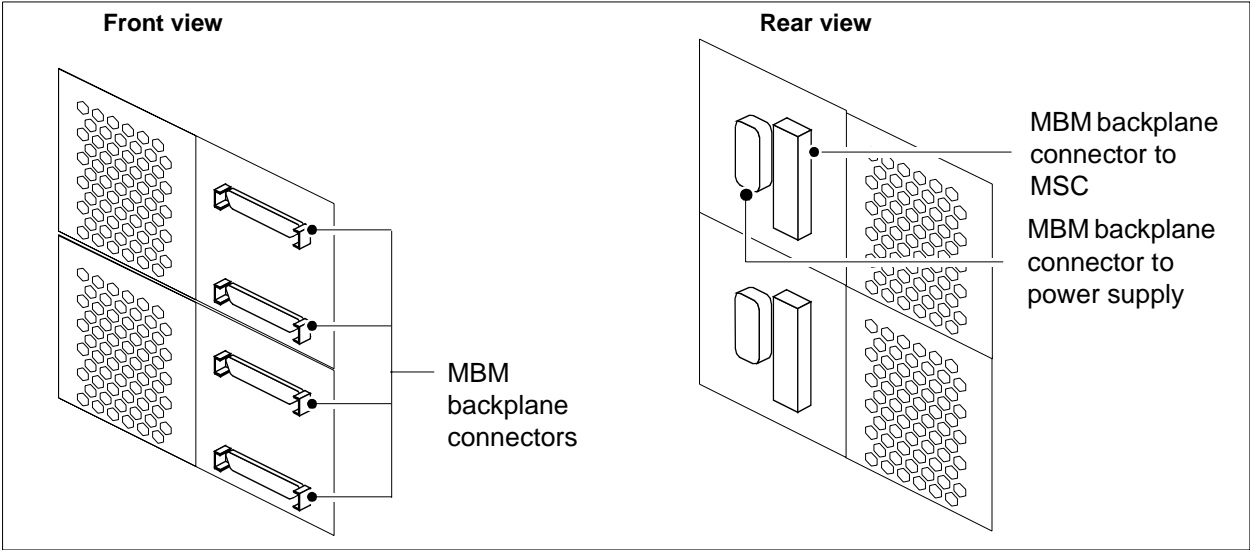


Figure 14 illustrates the BCM400 media bay module backplane and connectors.

**Figure 14** BCM400 media bay module backplane



## Base Function Tray Component Hardware

The base function tray hardware controls all data and telephony tasks, such as call processing, voice messaging, and data routing. The base function tray contains the following hardware components:

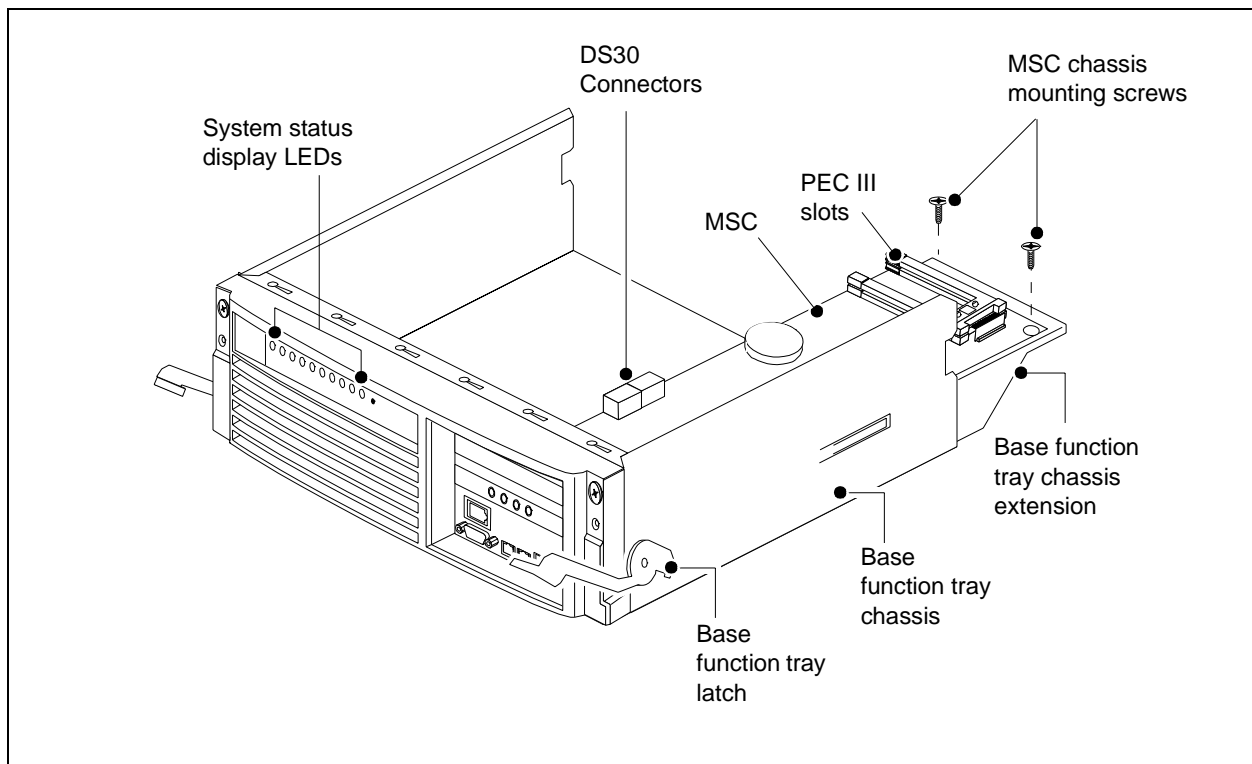
- 1 x Base function tray chassis
- System status display (LEDs)
- 1 x Media services card
- 1 x Main card
- 1 x Wide area network (WAN) card (available only as a field upgrade)
- Processor expansion cards (PEC III) - (1 for BCM200 or 2 for BCM400)
- 1 x V.90 modem (North America only)

### Base function tray chassis

The base function tray installs in the platform base chassis and houses the main card with the system interfaces.

Figure 15 illustrates the base function tray chassis layout (BCM200 configuration shown).

**Figure 15** Base function tray hardware and chassis



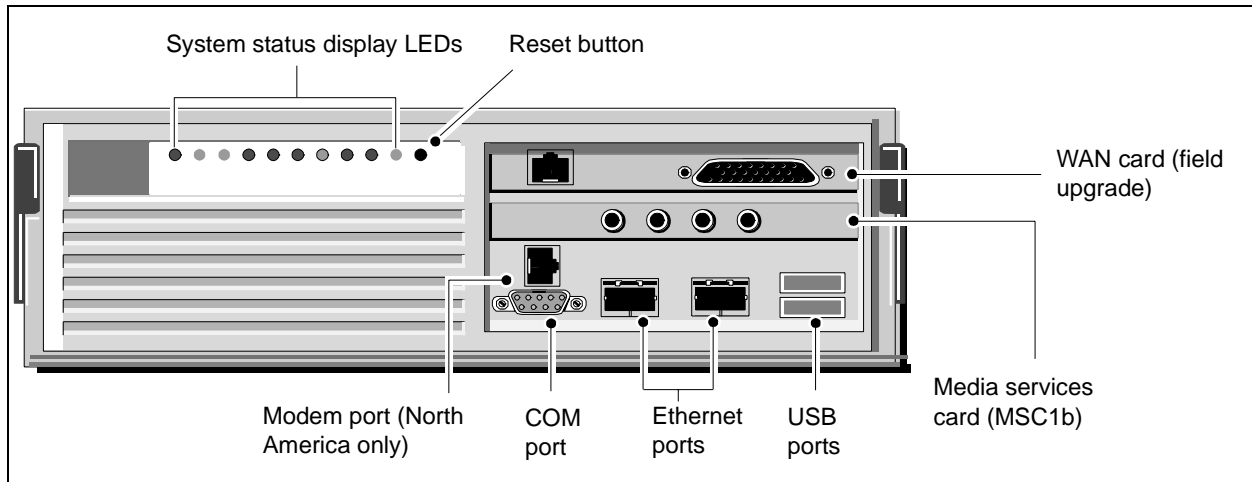
## Base function tray interfaces

You can connect to the base function tray through the serial port or through a LAN port to perform the system initialization. The data networking components connect the Business Communications Manager system to your local area network (LAN) and/or the wide area network (WAN).

For initialization information, refer to “Use of a null modem serial cable” on page 137 and “Connect the Ethernet crossover cable” on page 141.

Figure 16 illustrates the base function tray ports for the BCM200 platform.

**Figure 16** Base function tray faceplate ports



## Base function tray system status display LEDs

A line of 10 LEDs display on the face of the base function tray (see Figure 17). The LEDs show the current state of various hardware components. The Unified Manager contains a monitoring tool, that allows you to determine the current condition of the LEDs from your computer. Refer to “Access the System Status Monitor to Monitor LEDs” on page 292.

The system status LEDs indicate monitoring of the following:

- Power status (LED 1): Indicates the status of all power components. Green indicates normal status. Red indicates an excessive voltage deficiency or a component failure (such as a redundant power supply fan or module). An LED that monitors a component will also show a fault in combination with the Power LED.
- Hard disk activity (LED 2): Green indicates hard disk access.
- System status (LED 3): Solid green indicates the system is normal and operational. Green blink indicates one or more telephony services are not operational.<sup>1</sup>

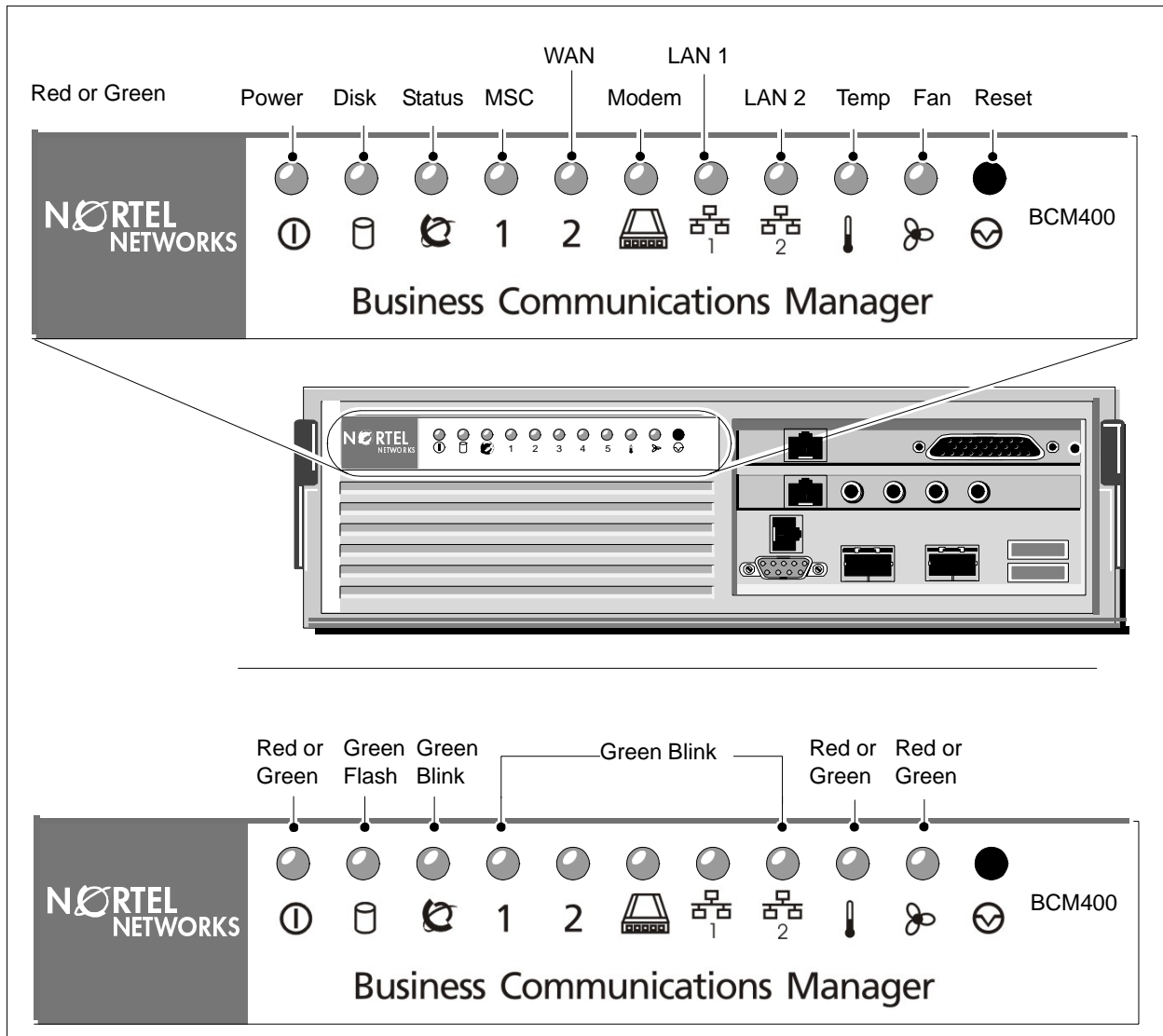
<sup>1</sup> Six, non-blinking LEDs in the center indicates monitoring software is not active.

- PCI device monitoring (LED 4-8): These LEDs monitor the peripheral components (2 x NICs, 1 x WAN, 1 x Modem, 1 x MSC). A steady green LED indicates the device is detected and operationally normal. A flashing green LED indicates that software detects the hardware, but there is no device driver. No color indicates the device is defective or missing.
  - LED 4: Monitors the MSC
  - LED 5: Monitors the WAN (if installed)
  - LED 6: Monitors the modem (if installed)
  - LED 7: Monitors the NIC 1
  - LED 8: Monitors the NIC 2
- Chassis/CPU temperature (LED 9): Green indicates a normal, operational temperature range for the chassis. Red indicates either a sensor is not operational or the chassis temperature is out of range.
- Fan activity (LED 10): Green indicates that all fans are operational. Red indicates that one (or more) fan is not operating correctly.
- Reset button: The reset button when depressed, restarts the system. The reset button is recessed to prevent an accidental reboot.



**Note:** The system status LEDs correspond to the devices, not to the PCI slots.

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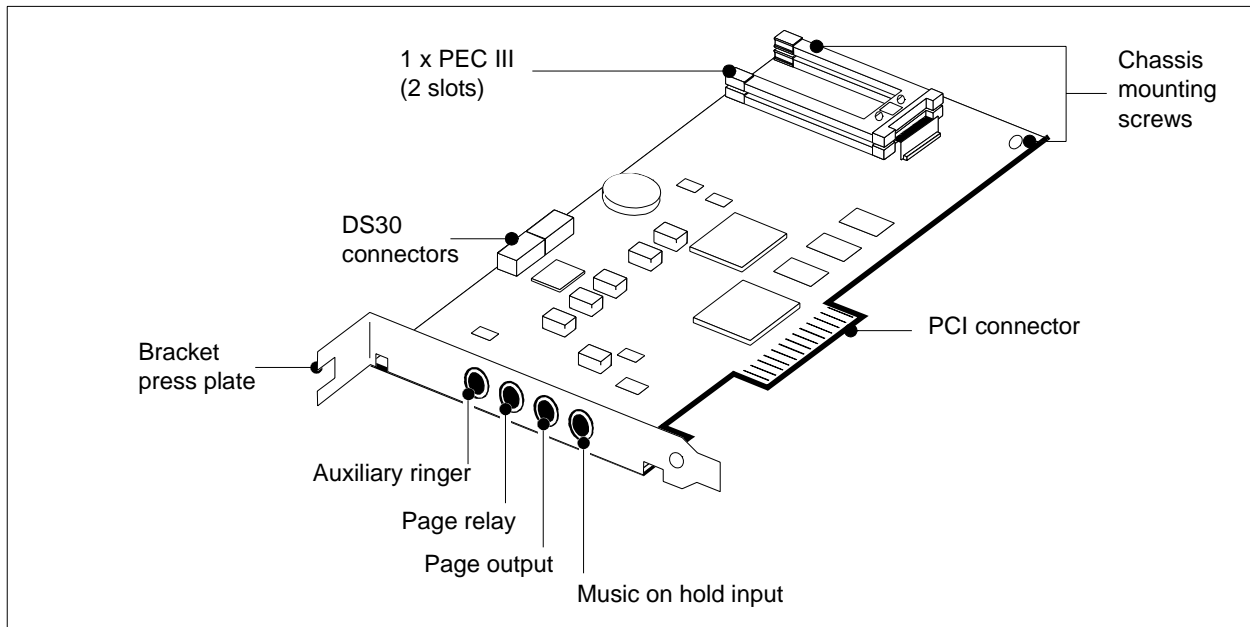
**Figure 17** Business communication manager base function tray system status display LEDs

## Media services card (MSC)

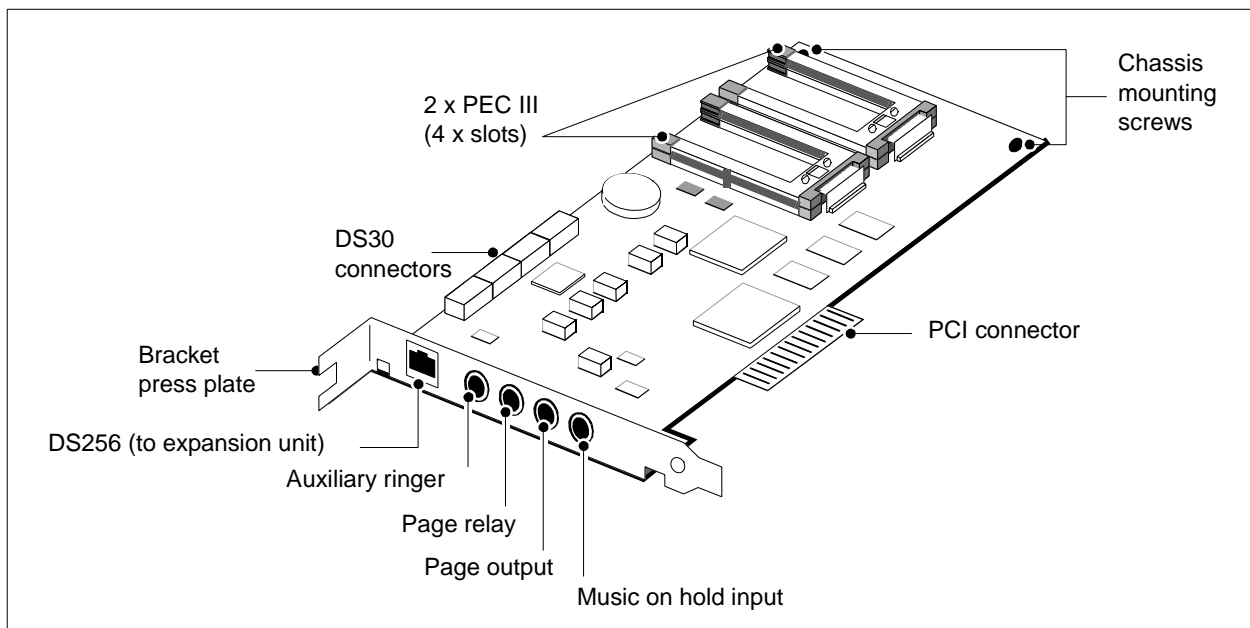
The Media Services Card (MSC), a PCI card, performs call processing and media processing of the voice channels for the Business Communications Manager system, including the VoIP trunks. This card also offers connections for auxiliary features, including external, customer-supplied hardware for paging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

Figure 18 shows the MSC components for the BCM200 platform. Figure 19 shows the MSC components for the BCM400 platform.

**Figure 18** BCM200 Media services card



**Figure 19** BCM400 Media services card



**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 (BCM400)**— The Business Communications Manager expansion unit connects to the base function tray through the DS256 jack on the MSC faceplate.  
  
The DS256 cable to make this connection is provided with the purchase of an BCM1000e expansion chassis.
- **Auxiliary ringer jack** — The base function tray 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 base function tray uses this jack to control the external paging amplifier.
- **Page output jack** — The base function tray uses the page output to connect an internally generated voice paging signal to an external paging amplifier (customer supplied).
- **Music on hold jack** — The base function tray 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 “Media Service Card Connections” on page 287.

## 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 bus setting on the MSC from providing service for a media bay module, to providing digital processing service for additional IP telephones and/or trunks. To ensure adequate data flow from the system, you can increase the number of PEC III cards (BCM200 has a maximum of 2 cards, BCM400 has a maximum of 4).

- DS30 channels are internal communication paths. Each DS30 bus provides a possible 32 signaling channels and 32 media channels.
  - two DS30 buses 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 bus 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 bus 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 bus configuration you want for your system, refer to “Determining module channel requirements” on page 320 and to the chapter on configuring MSC Resources in the *Business Communications Manager 3.0 Programming Operations Guide*.

- **PEC IIIs** — The Business Communications Manager 3.0 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 BCM200 platform uses one PEC III card (expandable to 2). The BCM400 platform uses two PEC IIIs (expandable to 4) to accommodate increased requirements for media processing. Refer to the chapter on configuring MSC Resources in the *Business Communications Manager 3.0 Programming Operations Guide*.

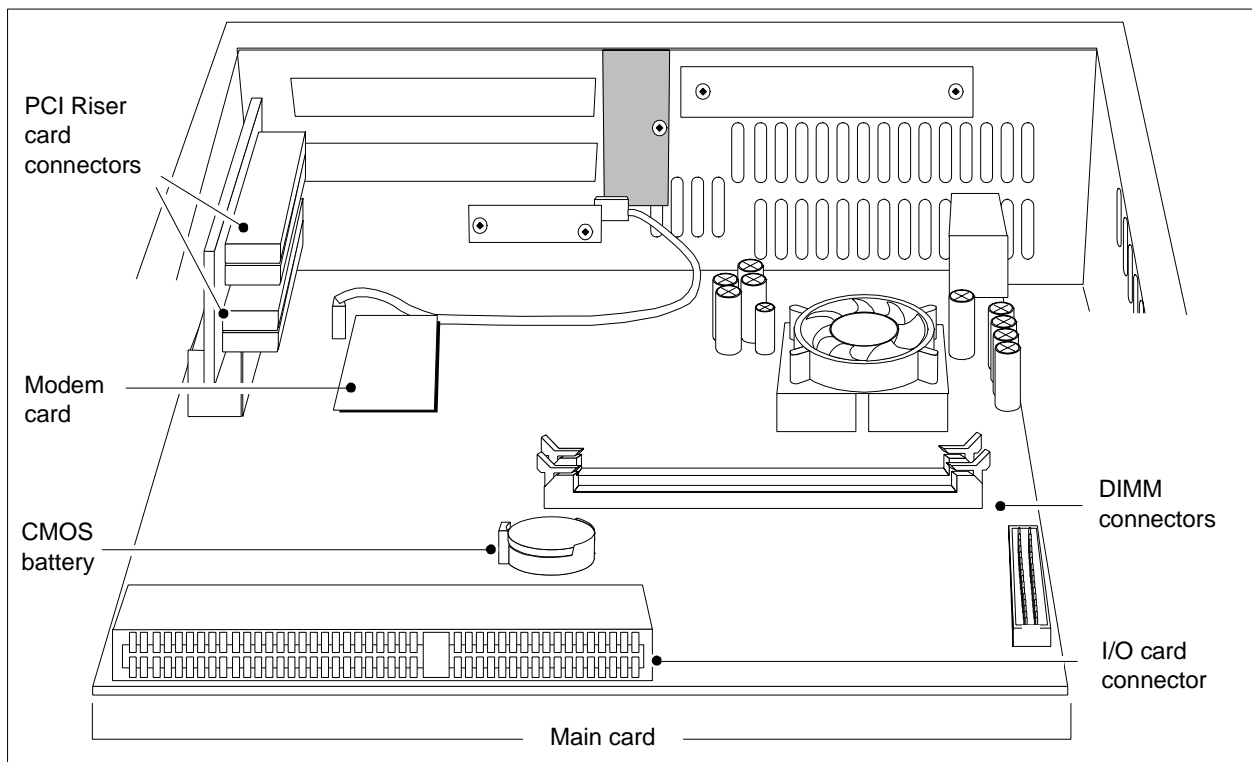
## Main card

The main card contains several field replaceable units (FRUs) such as the RAM, modem card and CMOS battery. A riser card, set at right angles to the main card, provides connections for the MSC and field installed wide area network card. In North America only, an embedded modem provides connection for a backup analog trunk. Figure 20 shows the layout of the main card as installed in the base function tray.

The main card contains the following hardware:

- 1 x Processor
- 1 x 168-pin 256MB DIMM (maximum of 2 x 256MB DIMMS)
- 1 x modem card (North American system only)
- 1 x lithium coin battery cell (CMOS)
- 1 x 2-slot PCI riser card

**Figure 20** Main card connectors

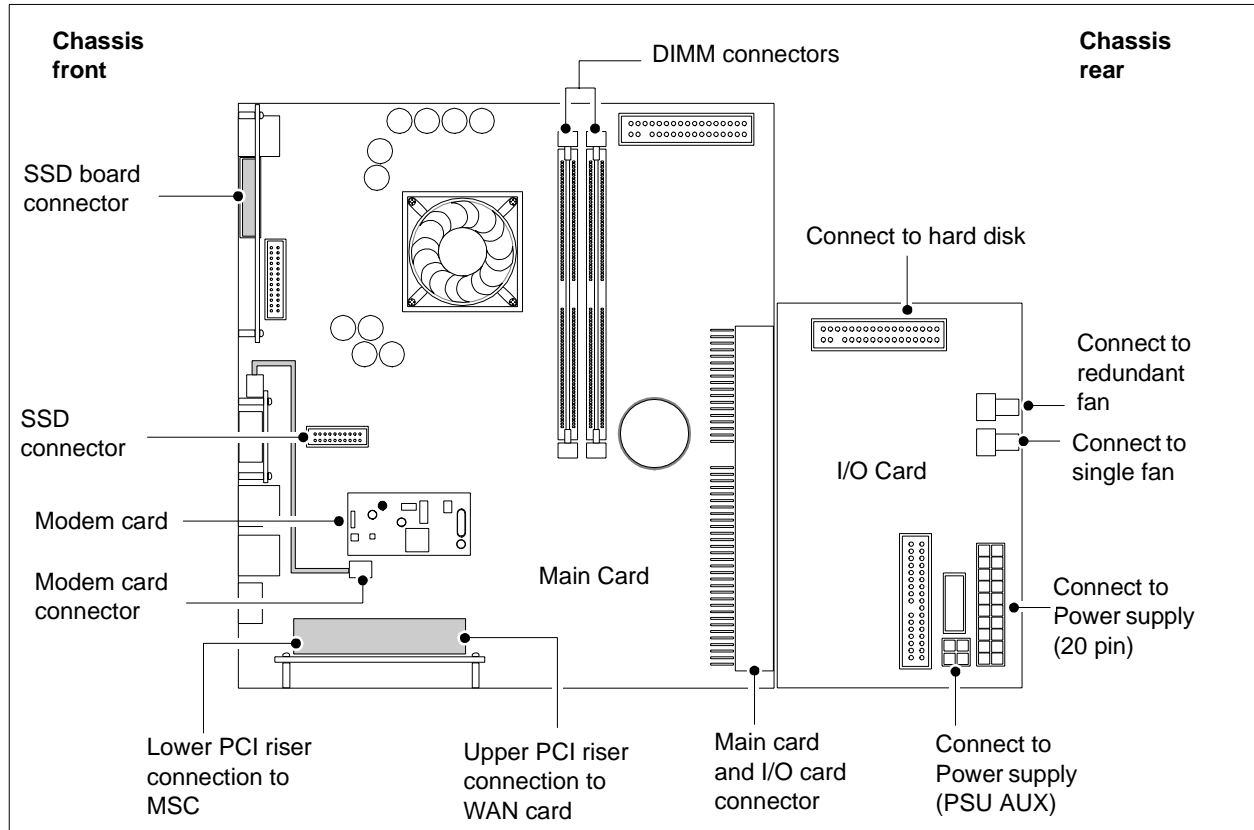




## Main card connections

The main card provides peripheral and telephony processing control for the Business Communications Manager system. The main card connects to the I/O card, system status display (SSD) card, modem interface card. Figure 21 shows the main card and I/O card connectors.

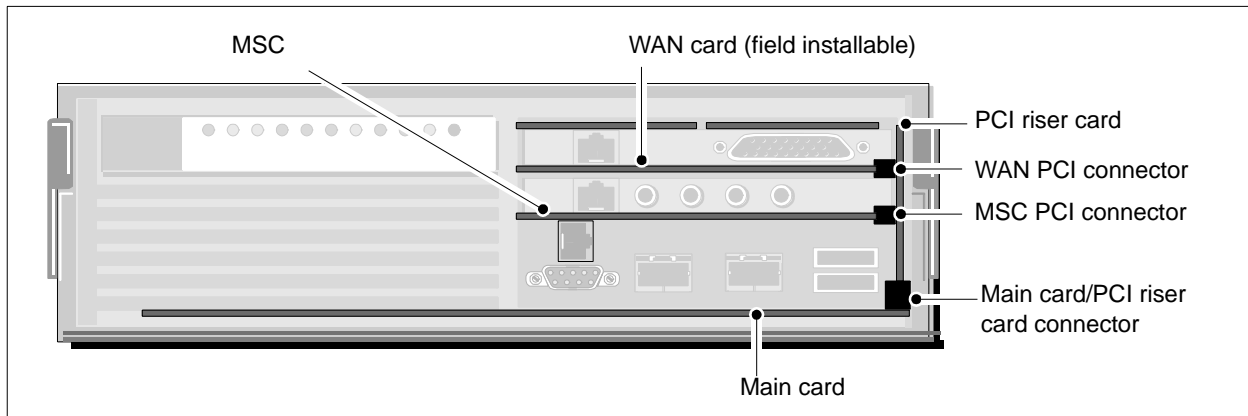
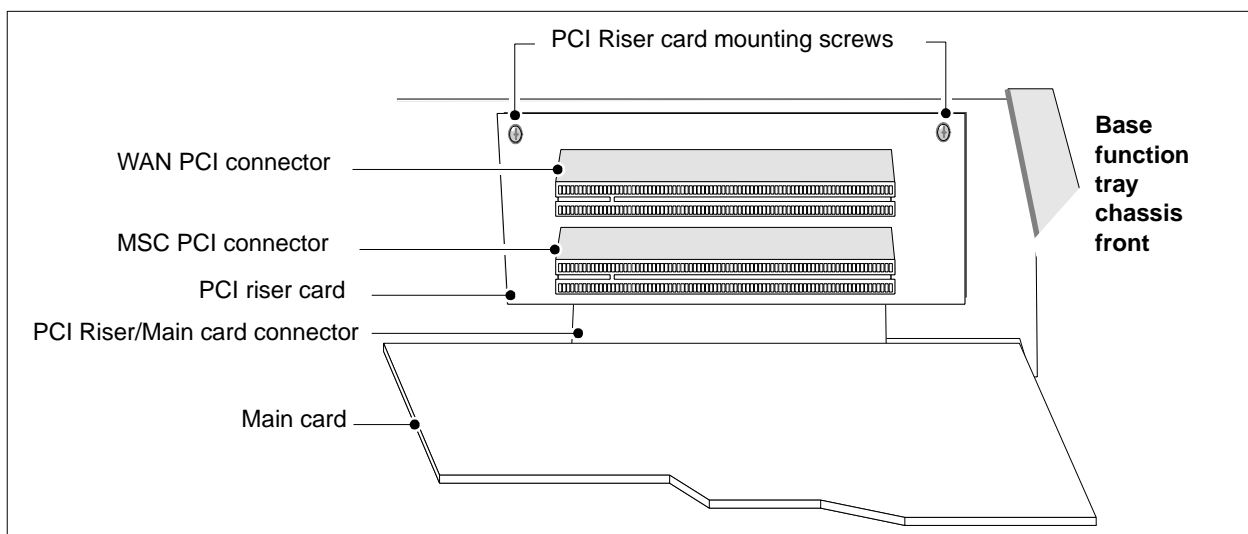
**Figure 21** Card connections



## PCI riser card

The PCI riser card extends upward, and at a right angle, from the main card. The PCI riser card provides a peripheral component interface (PCI) for the MSC and field installed WAN cards. Figure 22 shows the PCI riser card installed in the Base function tray.

Figure 23 shows the PCI connectors without the MSC or WAN cards. Two screws at the top of the PCI riser card attach the card to the side of the BFT chassis.

**Figure 22** PCI Riser card**Figure 23** PCI Riser card connectors

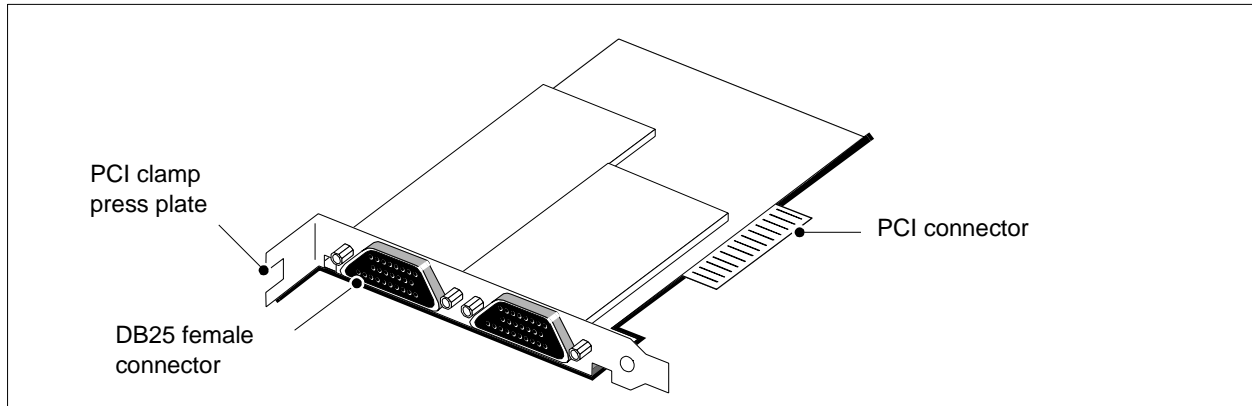
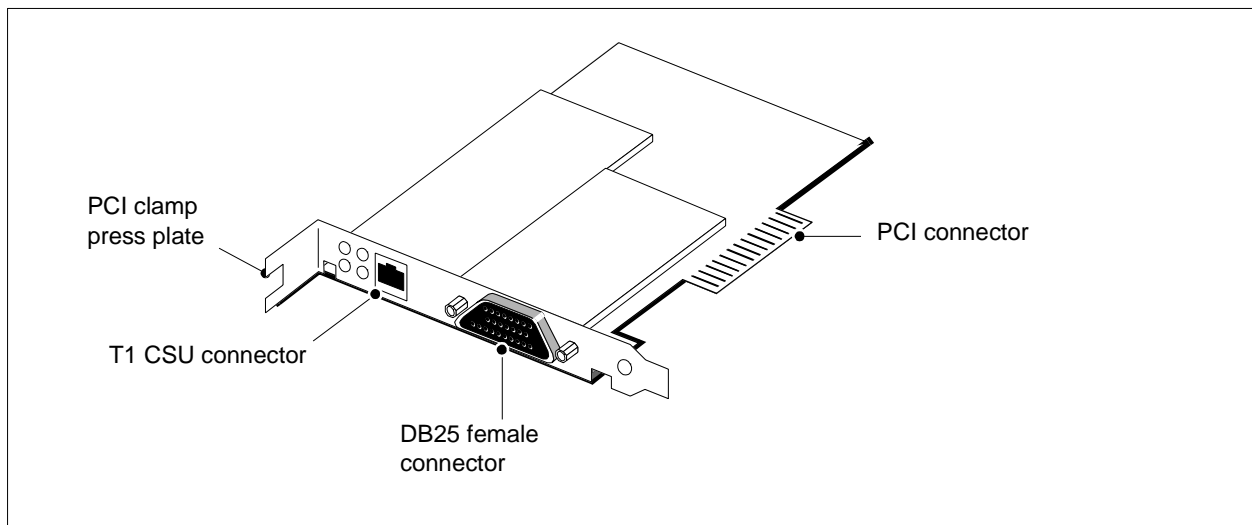
## Data networking components

The data networking components connect the Business Communications Manager system to the wide area network (WAN).

### WAN interface card

The network interface card uses a T1 interface and sync port that connects the Business Communications Manager system to the wide area network (WAN). The WAN card is available as a field installed unit.

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)).

**Figure 24** WAN interface card (international version)**Figure 25** WAN interface card (North American version)

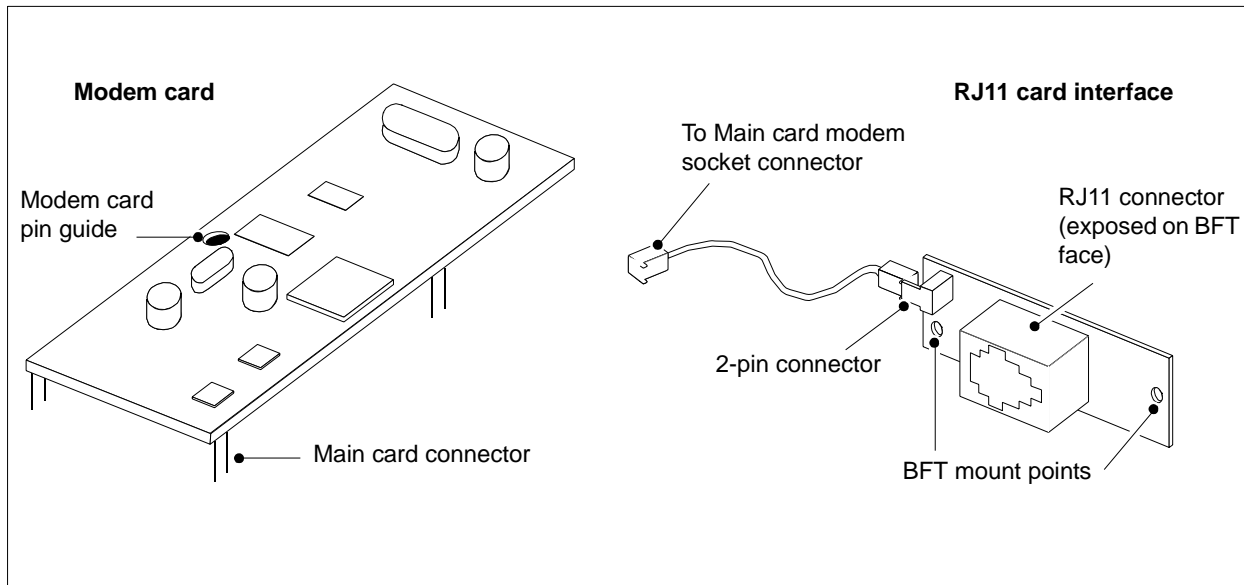
## Modem card

Modem card (Standard on North American systems, optional for APAC/EMEA) — a V.90 modem that sends and receives data using the public telephone system. The modem kit consists of a modem card, RJ11 interface and connector cable.

The modem connects the Business Communications Manager system to the public switched telephone network. Figure 26 shows the modem components.

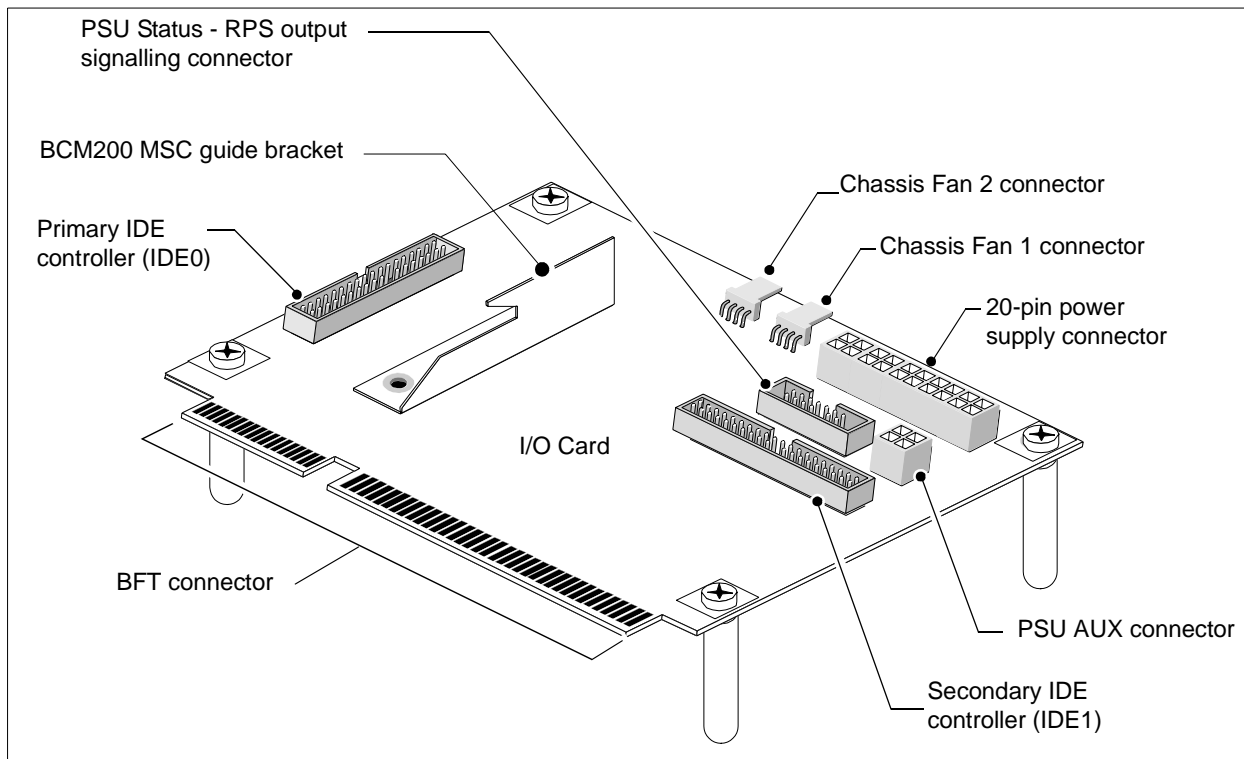
Use the modem connection to:

- manage the Business Communications Manager system from a different location
- provide dialup backup for a WAN card

**Figure 26** Modem card and interface

## I/O Interface card

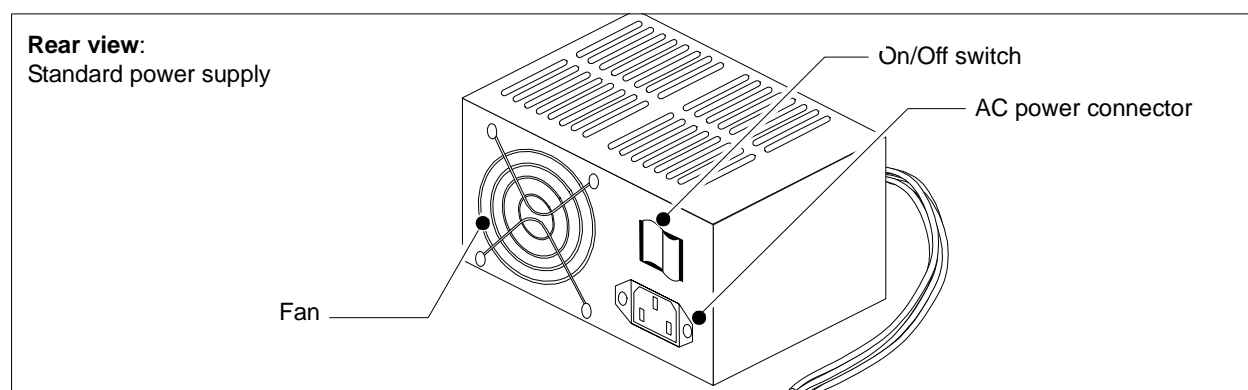
The I/O interface card provides a signal junction between the Base function tray, hard disk, power supply and cooling system. Figure 27 shows the I/O interface card and connections.

**Figure 27** I/O interface card

## Platform Power Supply

The BCM200 and BCM400 (STD) base platforms use a switched power supply. Internal cabling routes to the I/O card, media bay backplane and hard disk. External cabling extends to the line power supply outlet. Figure 28 illustrates the standard platform power supply.

**Figure 28** BCM200 and BCM400 (STD) platform power supply (rear view)



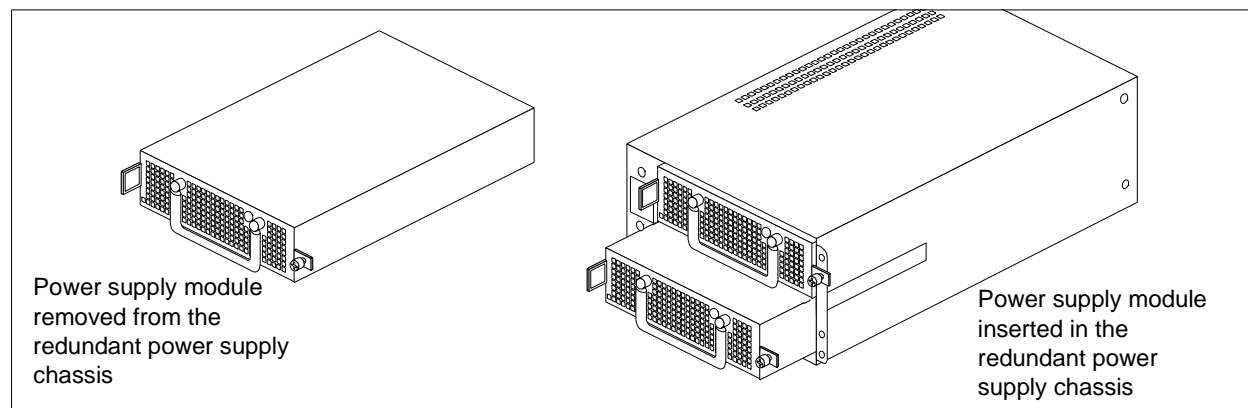
**Figure 29** Standard power supply connectors

Connector Configuration for Standard Sparkle Power Supply	New Lengths	Purpose and Notes
	525mm	MBM Back plane
	525mm	MBM Back plane for BCM400, not required for BCM200
	500mm to first, +50mm to next, +100mm to last (total 650mm) tie wrapped every 5cm	Hard disk cage, extra connectors to be tucked under the hard disk
	430mm to first (right angle) , +150mm to next (total 580mm)	Reserved for future use
	480mm	I/O Card
	480mm	I/O Card

## BCM400 redundant power supply

The redundant power supply (RPS) is available as a field replaceable unit (FRU). The redundant power supply consists of two power supply modules and a power supply chassis. The power supply modules are interchangeable and can be exchanged one at a time during power-on conditions. Figure 30 illustrates the redundant power supply chassis and modules. Figure 31 provides details on the redundant power supply connectors.

**Figure 30** BCM400 platform redundant power supply and modules



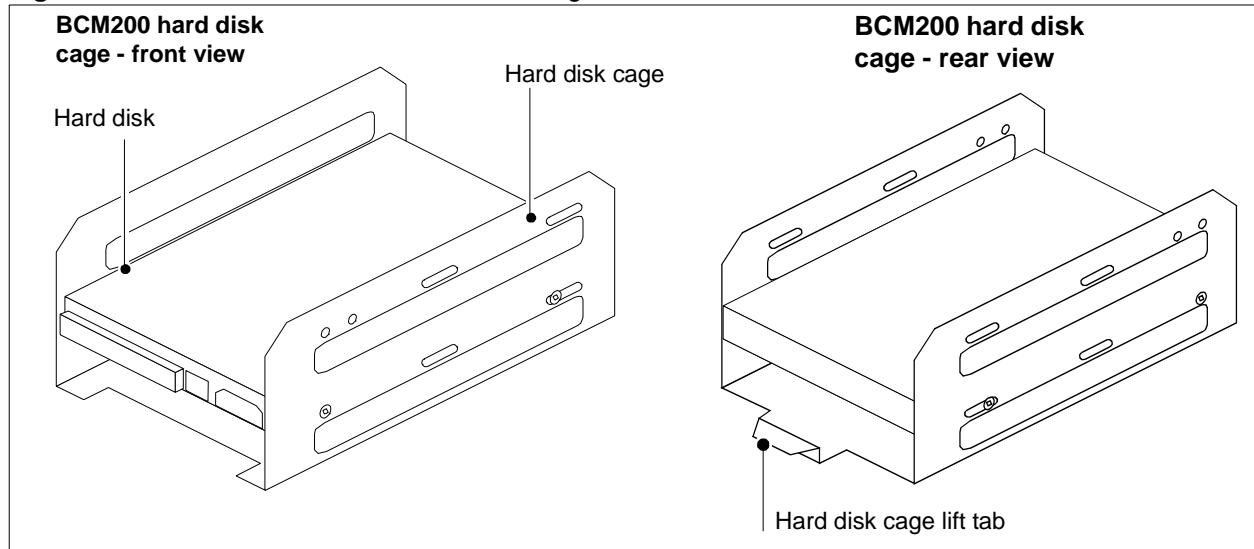
**Figure 31** BCM400 Redundant power supply connectors

Connector Configuration for Redundant Sparkle Power Supply	Cable Lengths and Markings	Purpose and Notes
	550mm (P2)	Route to Media bay backplane 1: Tie any slack at the connector (behind MBM)
	550mm (P3)	Route to Media bay backplane 2: Tie any slack at the connector (behind MBM)
	325mm to first (P4), +50mm to next (P5), +100mm to last (P6) (total 475mm)	To hard disk: Tie any slack at the power supply. Tuck any loose connectors under hard disk cage.
	340mm to first (P7)(right angle), +150mm to next (P8) (total 490mm)	Unused. Tie to the center of the hard disk cage.
	515mm (P1)	Route to I/O card.
	515mm (P9)	Route to I/O card.
	515mm (PA)	Route to I/O card.
	300mm (PB)	Unused

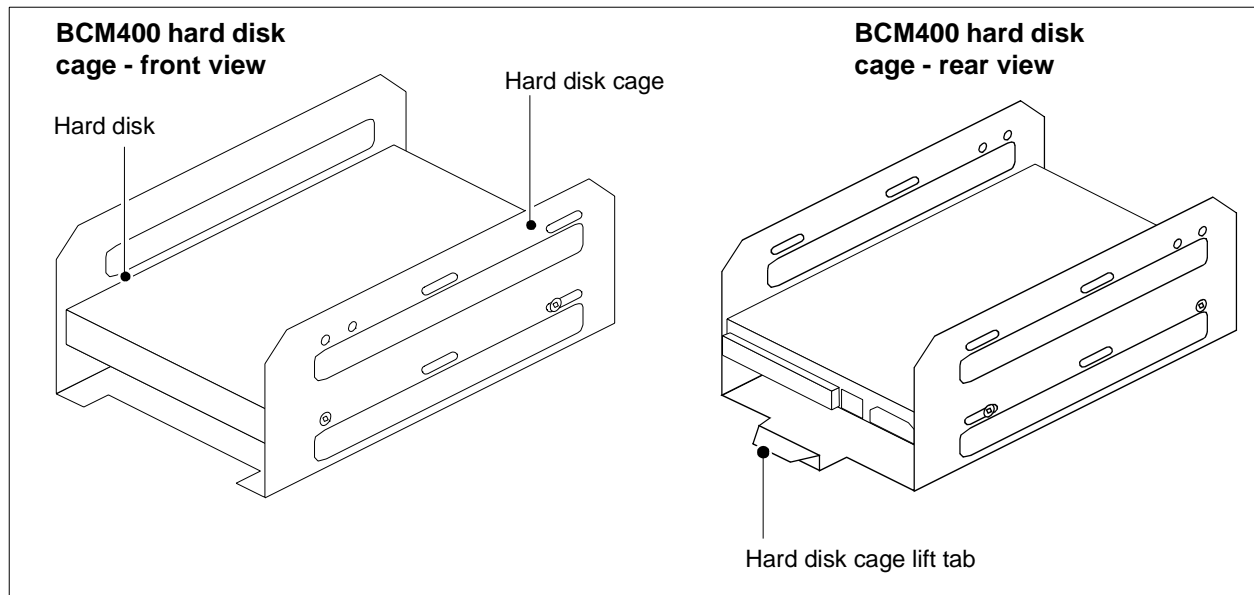
## Hard Disk

The BCM200 and BCM400 standard configurations use a single hard disk (see Figure 32, Figure 33).

**Figure 32** BCM200 standard hard disk and cage



**Figure 33** BCM400 standard hard disk and cage



## RAID upgrade kit

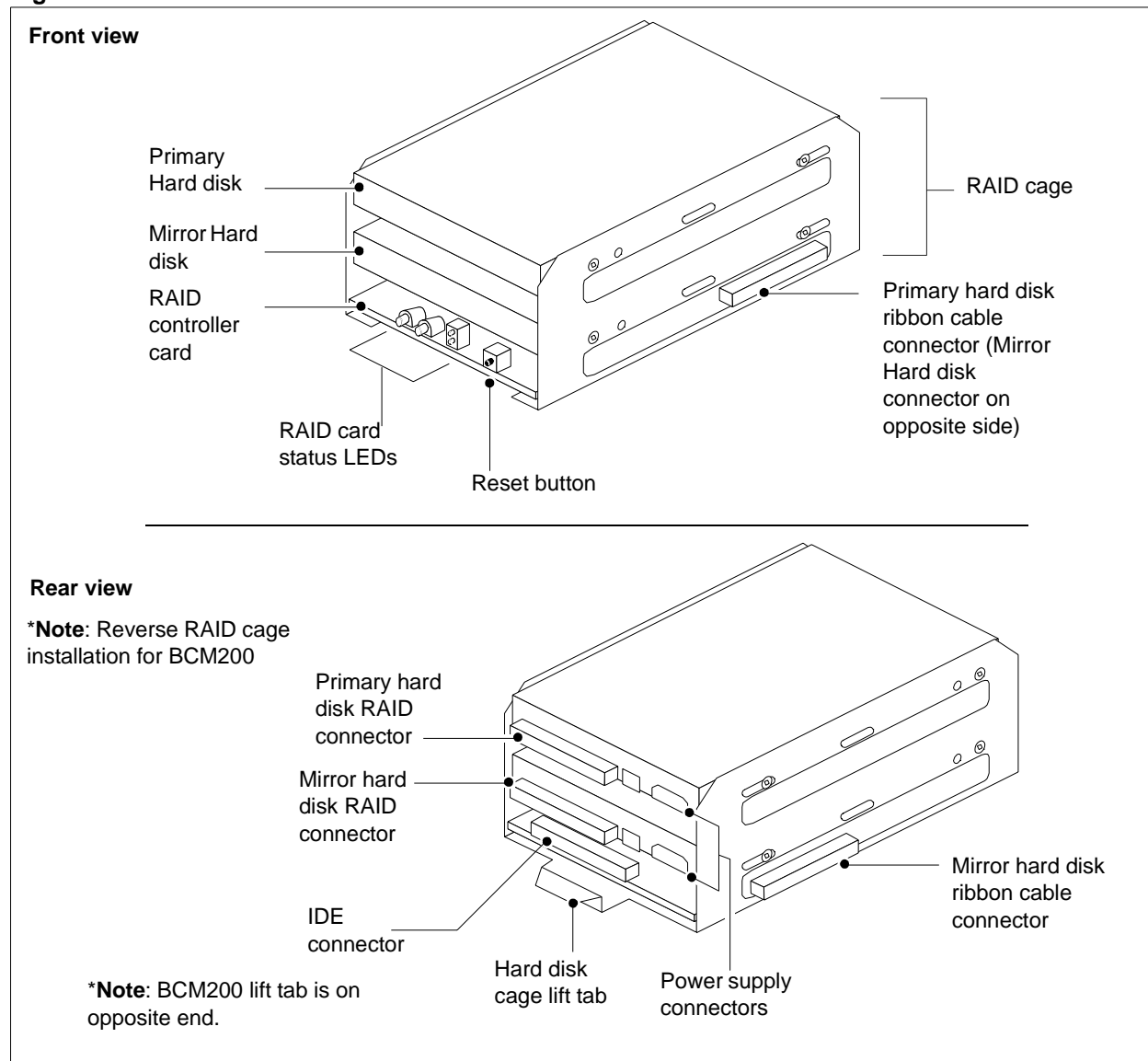
The BCM200, BCM400 standard configurations can be equipped with a RAID (redundant array of independant disks) upgrade kit. The BCM200 and BCM400 RAID upgrade kits come with an additional hard disk and RAID controller card. Your current disk is used as the primary, the other

disk in the kit is the mirror disk. The information is written to both disks simultaneously. The dual hard disk configuration provides RAID 1 fault tolerance capability.

The RAID card has three ribbon cable connectors. The hard disk connectors are mounted on the right and left sides of the RAID controller card.

The third ribbon cable connection, mounted at the rear of the card, connects to the primary IDE connector on the I/O card. Figure 34 illustrates the RAID components. For installation methods, refer to Chapter 7, “Hard Disk Replacement Procedures”.

**Figure 34** BCM200/400 2xHDD + RAID controller



## Cooling Fan

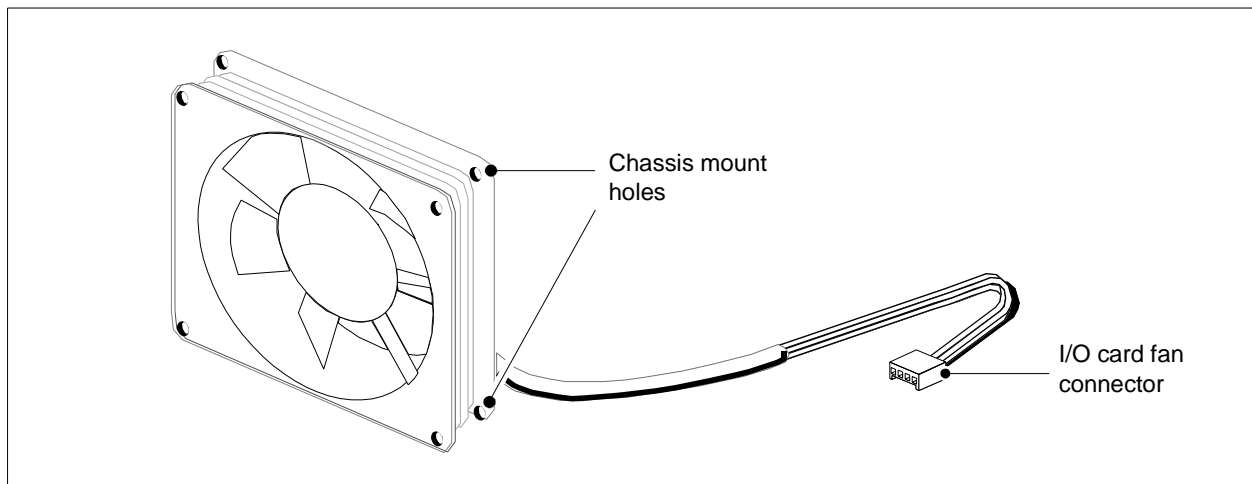


The BCM200/400 standard platforms use a single cooling fan. The BCM400 RFO configuration uses two fans. The BCM200 cooling fan mounts on the rear of the platform base chassis.

The BCM400 cooling fan(s) mount on a removable panel at the rear of the platform base chassis. For further information on the platform cooling fans, refer to Chapter 9, “Replace or Upgrade a Power Supply”.

Figure 35 illustrates a cooling fan and connectors.

**Figure 35** Cooling fan



## 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 3.0 MSC contains two PEC IIIs that provide additional voice channel processing for the MSC. Refer to “Media services card (MSC)” on page 57.
- **Media bay modules:** The MBMs connect with external devices to implement various types of voice trunks and stations. Install the MBMs in the media bay module bays in the BCM200, BCM400 base platforms and the expansion unit. For further information on the media bay modules, refer to Appendix , “Telephony Hardware Selection and Settings.
- **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 85 for a description of the telephones that can be used with the system. The Nortel Networks i2002, i2004 IP telephones and Nortel Networks i2050 Software Phone have separate installation and operations documentation. Refer to the main index on your system CD.

The system also supports four types of cordless telephone systems: Companion, DECT, T7406 Business Series Terminal, and the Symbol NetVision and NetVision Data telephones. Companion installation information is included in this guide and in the *Programming Operations Guide*. Installation documentation for the other three systems is provided in separate documentation for each system. Refer to “Telephones and adapters” on page 74 for information about the handsets and the hardware they use to connect to the system.

This section describes the media bay module (MBM) telephony components and various types of telephone equipment used with the Business Communications Manager system. Figure 36 points to the sections that describe the modules and telephones that can be installed into the base function tray.

The Business Communications Manager system is modular. You can increase the capacity of the system by adding more telephony hardware components (media bay modules - MBMs). Each Business Communications Manager allocates a maximum of six DS30 channels to the 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 uses.

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 known as a 3/5 DS30 channel split. In this case, you only have five DS30 channels available for use by the media bay modules. Refer to “Understand DS30 numbers” on page 317 for more information.



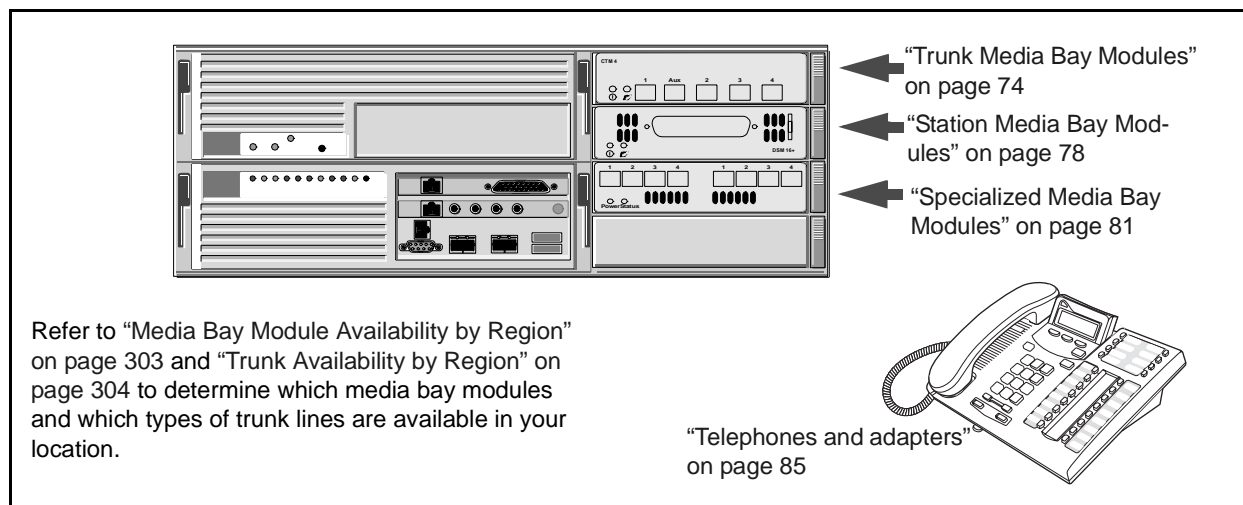
**Warning:** Changing the DS30 channel split

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.

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Refer to Chapter 4, “Install, remove or replace the Media Bay Modules,” on page 109 for details about determining how many media bay modules can be installed in a system.

**Figure 36** Telephony hardware components.

## Media bay modules (MBMs)

The MBMs connect with external devices to implement various types of voice trunks and stations. Install the MBMs in the media bay module bays in the BCM200, BCM400 base platforms and the expansion unit. There are three types of media bay modules. Twelve media bay modules available as optional equipment (as shown in Table 8).

**Table 8** Media bay module list

Module type	Media bay module name	Faceplate acronym	Reference
Trunk media bay module	Digital trunk interface	DTM	Digital trunk media bay module on page 75
	Caller ID trunk (CLID) 4 line trunk	CTM 4	Caller ID trunk media bay module on page 76
	Caller ID trunk (CLID) 8 line trunk	CTM 8	Caller ID trunk media bay module on page 76
	ISDN BRI S/T Interface	ISDN BRI	Basic rate interface media bay module on page 77
Station media bay module	16 digital station interface (DSI) double density	DSM 16+	Digital station media bay module (DSM) on page 78
	32 digital station interface (DSI) double density	DSM 32+	"Digital station media bay module (DSM)" on page 78
	Combination CTM4 x DSM16	4X16	"4X16 Media Bay Module" on page 79
	Analog Station Interface	ASM 8	Analog station media bay module on page 80
Specialized media bay module	DECT Base Station Module	DECT8	Digital enhanced cordless telecommunications (DECT) media bay module on page 81
	DECT Base Station Module (u-law)	DECT8	Digital enhanced cordless telecommunications (DECT) media bay module on page 81
	Fibre Expansion Module	FEM 6	Fiber expansion media bay module (FEM) on page 82
	Digital Drop & Insert MUX	DDI Mux	Digital Drop & Insert MUX (DDIM) on page 83

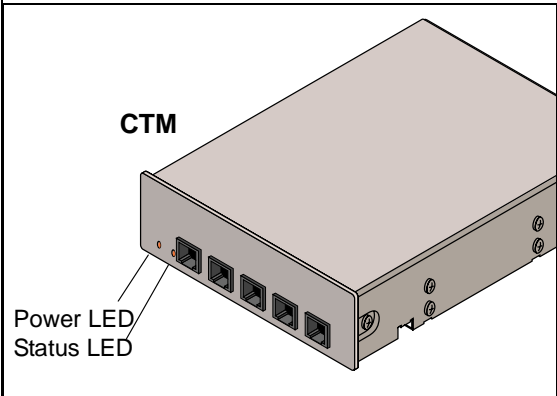
Media bay modules are designed within a common casing, that include the following common features:

- LEDs: All media bay modules have power and status LEDS.
- Power connections: located at the rear of the media bay module
- DIP switches: located at the rear of the media bay module

### Media bay module LED indicators

Figure 37 shows the location of the ① (Power) and ② (Status) on a CTM. The power and status LEDs are located in the same place on all modules. The figure describes the possible LED states.

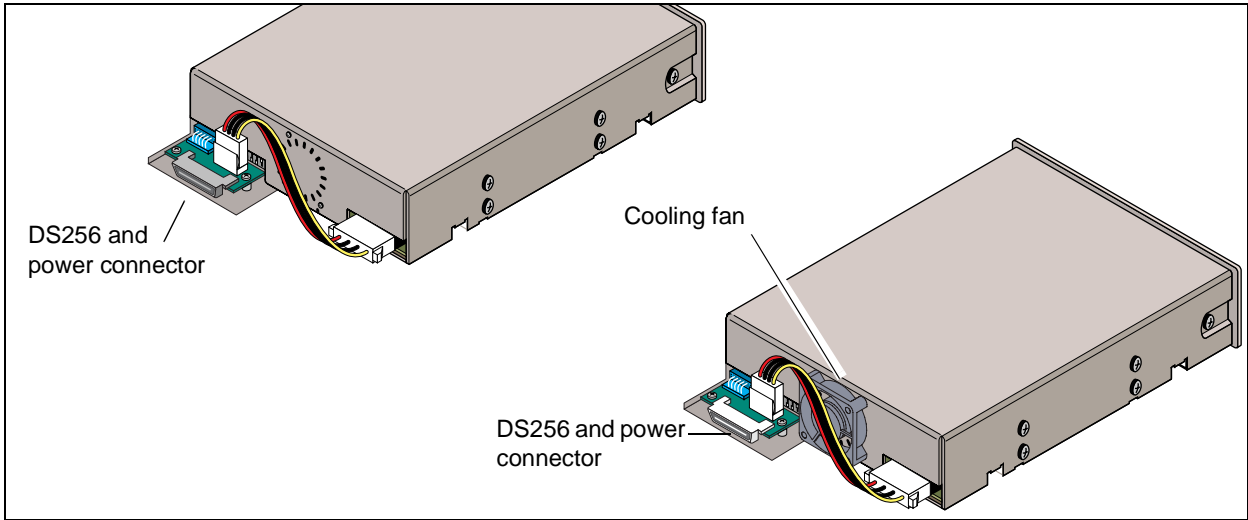
Figure 37 Module Power and Status LED states

	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: <ul style="list-style-type: none"><li>no DS256 link detected</li><li>DS256 frame alignment lost</li><li>bandwidth not allocated</li><li>module is in maintenance state</li></ul>
	Blinking	Blinking	Power is applied to module, but there is a hardware problem such as: <ul style="list-style-type: none"><li>partial failure of power converter</li><li>thermal overload</li><li>fan failure</li></ul>
	On	On	The module is read to operate.

### Media bay module 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 media bay backplane on the base function tray or expansion unit. Some modules also have a cooling fan that runs off the module power source. Figure 38 shows the rear views of the two types of modules.

Figure 38 Rear of modules showing DS256 channel and power connectors

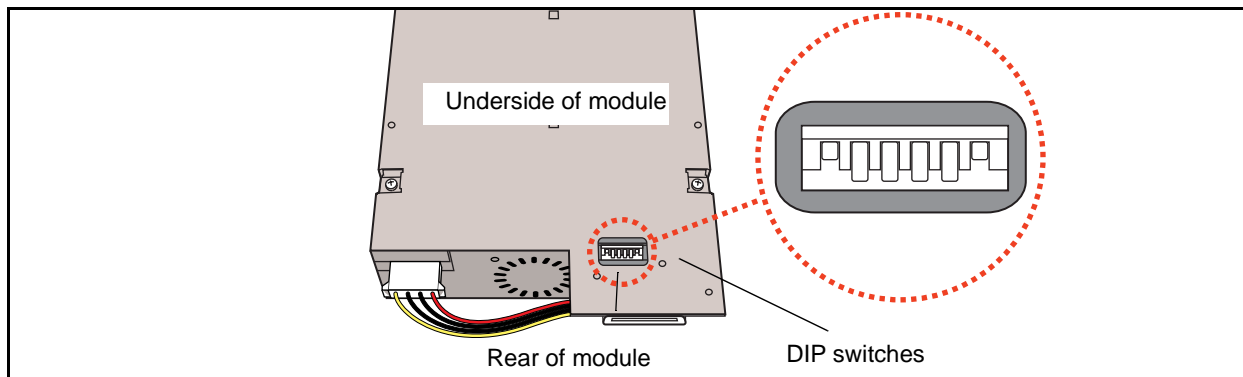


## Media bay module DIP switches

The underside of most modules has a set of DIP switches that set the DS30 channel numbers and offsets used by the module. Figure 39 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 “Digital enhanced cordless telecommunications (DECT) media bay module” on page 81.

For more information about setting DIP switches, refer to Appendix , “Telephony Hardware Selection and Settings.

**Figure 39** Underside of module showing DIP switches



## Trunk Media Bay Modules

You install the trunk media bay modules in the base function tray or the Business Communications Manager expansion unit. The BCM200 holds a maximum of two media bay modules. The BCM400 holds a maximum of four 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 9 lists the types of trunk media bay modules that are available for the Business Communications Manager system:

**Table 9** 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: T1, NA PRI, ETSI (in UK only), and Euro PRI.

**Table 9** Trunk media bay modules (Continued)

CTM “Caller ID trunk media bay module”	Connects a maximum of four analog public switched telephone lines to the Business Communications Manager system.	Only available for North American systems.
CTM8 “Caller ID trunk media bay module”	Connects a maximum of eight analog public switched telephone lines to the Business Communications Manager system.	
BRI “Basic rate interface media bay module”	Connects a maximum of four ISDN BRI S/T interfaces	<b>Note:</b> 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 to standard digital PSTN T1/fT1, E1/fE1 or PRI ISDN line using either a digital or PRI line. The DTM also supports DASS2, DPN22, Q.SIG and MCDN over ISDN.

- 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 3.0 Programming Operations Guide*. Figure 40 shows the DTM module interfaces.

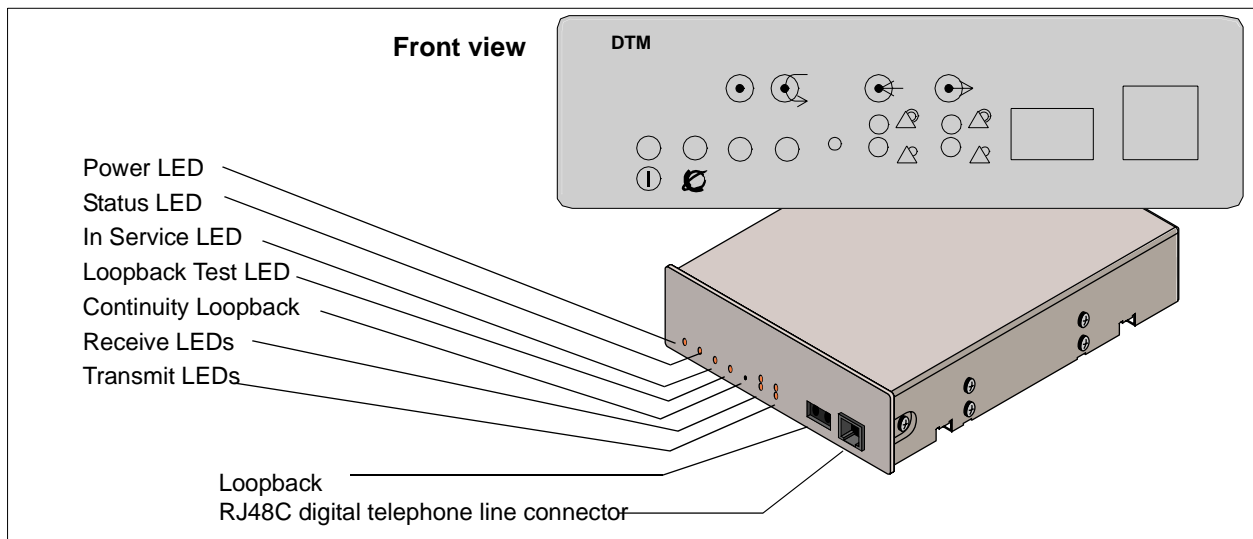


**Figure 40** Digital Trunk Interface Module (DTM) faceplate

Table 10 provides a description of the function for each DTM LEDs.

**Table 10** 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.
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.

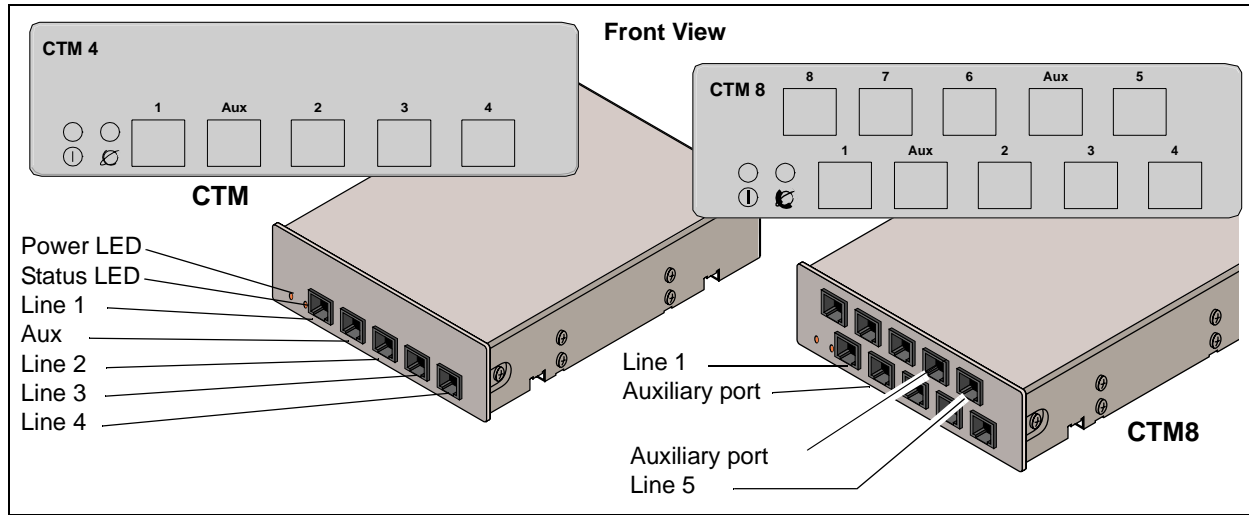
## Caller ID trunk media bay module (North American systems only)

- The 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 connection of a V.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 41 shows a view of the front of the CTM and CTM8.

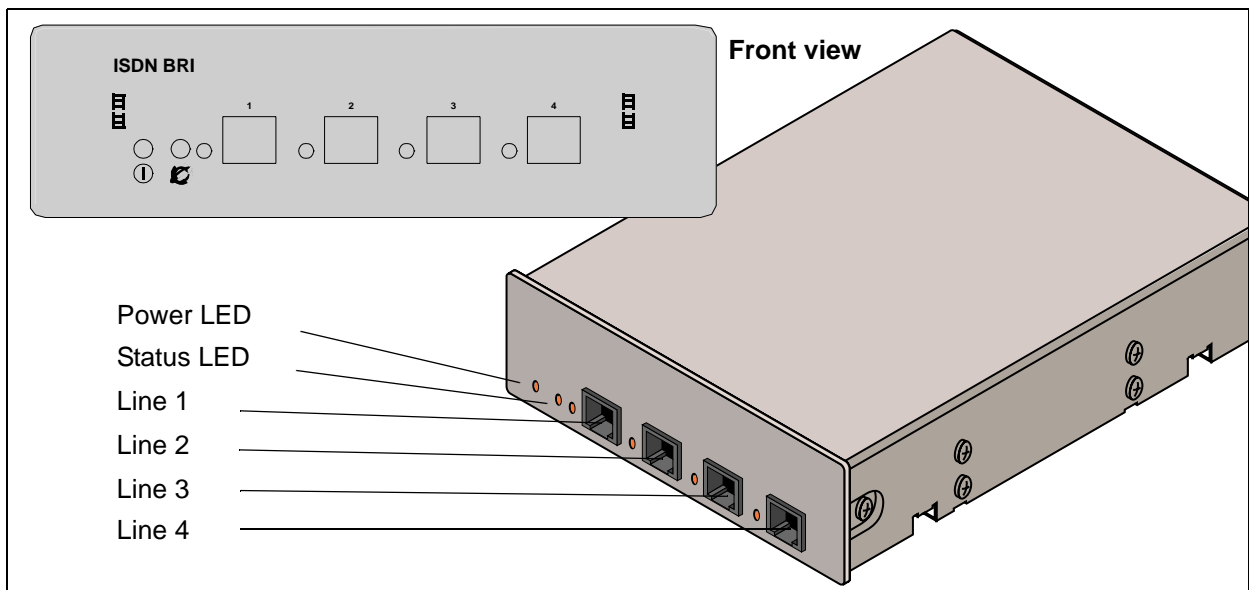


**Figure 41** CTM and CTM8 LEDs and jacks

### Basic rate interface media bay module

The Basic Rate Interface media bay module (ISDN 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 ISDN 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. The LEDs beside each RJ-48C jack are on when the ISDN line is active. Figure 42 shows the BRI faceplate LEDs and connections.

**Figure 42** ISDN BRI media bay module LEDs and jacks

## Station Media Bay Modules

Install the station media bay modules in the base function tray or the Business Communications Manager expansion unit. Station media bay modules connect telephones and analog telecommunication devices to the Business Communications Manager system.

Table 11 provides a list of the station modules available by region:

**Table 11** Station module regional availability

Module type	What it does	Availability
DSM 16+ "Digital station media bay module (DSM)"	Connects a maximum of 16 digital telephones	
DSM 32+ "Digital station media bay module (DSM)"	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 (DSM)

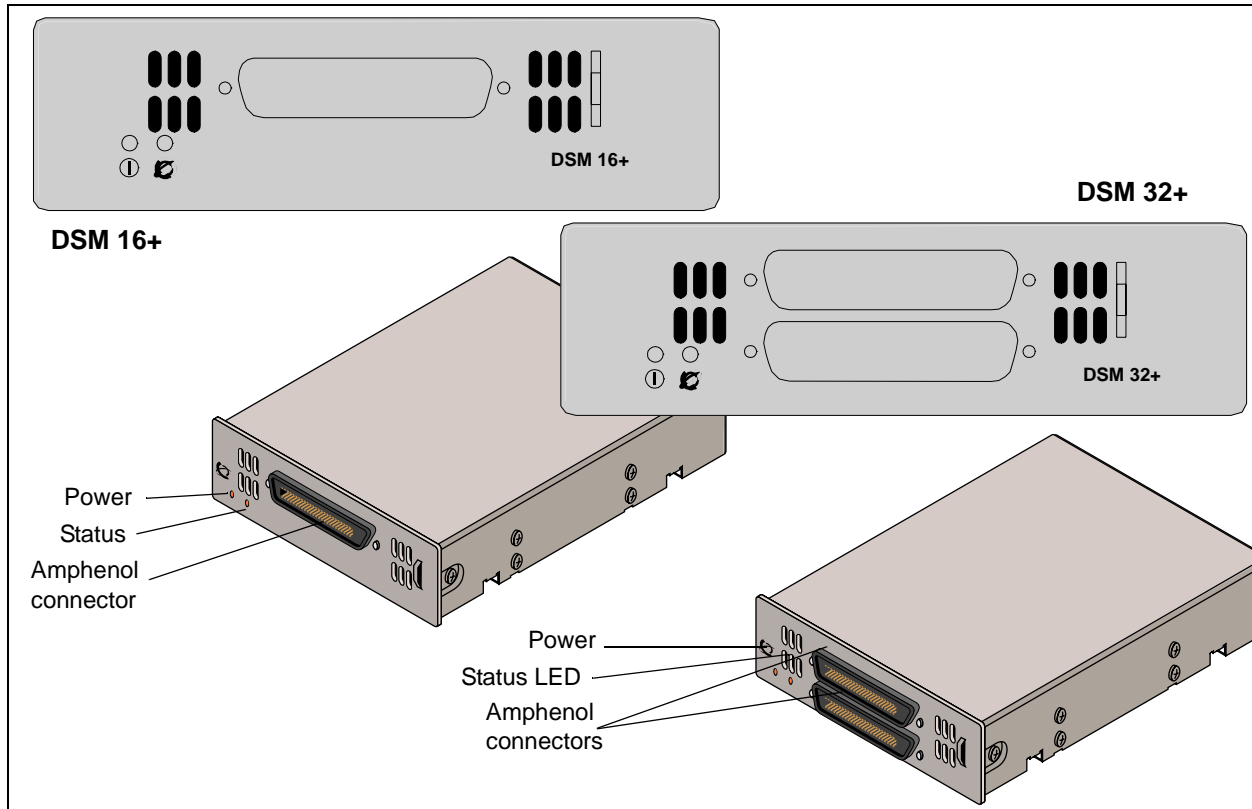
Three types of media bay modules support digital telephones on the Business Communications Manager. This section describes the two DSM modules. Refer to Figure 43 on page 79.

- Digital Station media bay module (DSM 16+) supports 16 digital telephones. Set the full double density (FDD) switch to enable the module to carry 16 extensions over a half DS30 channel. If required, install a second DSM 16+ and set the FDD switch to occupy the second half of the DS30 channel (setting the FDD switch) to expand the number of extensions to 32.
- Digital Station media bay module (DSM 32+) supports 32 digital telephones through two amphenol connectors. Set the full double density (FDD) switch to enable the module to carry 32 extensions over a half DS30 channel. If required, install a second DSM 32+ and set the FDD switch to occupy the second half of the DS30 channel (setting the FDD switch) to expand the number of extensions to 64.



**Note:** Devices that share a DS30 channel must be identical. Use two DSM 16+ modules in full double density mode on a single DS30 channel. Likewise, use two DSM 32+ modules in full double density mode on a single DS30 channel.

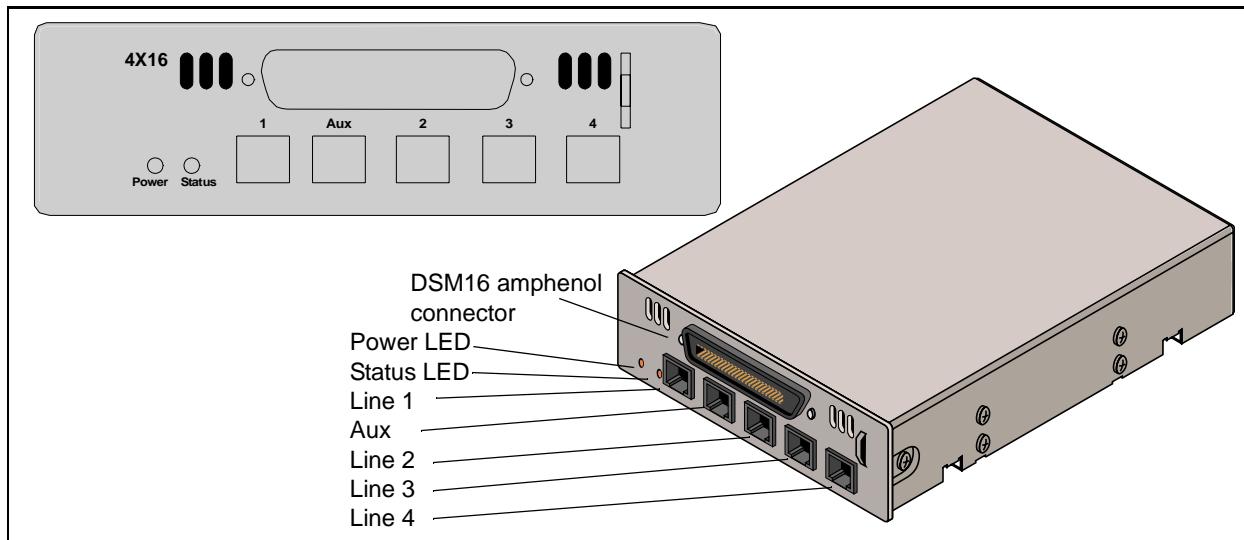
- 4X16 supports 16 digital telephones and does not require a separate trunk module. Refer to "4X16 Media Bay Module" on page 79.

**Figure 43** 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 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.

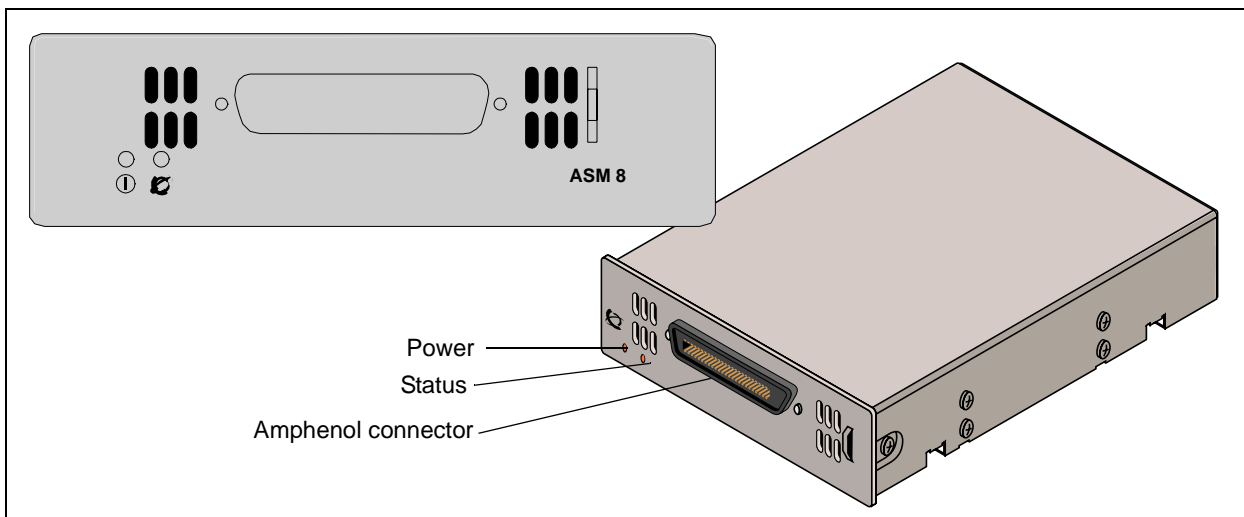
Figure 44 shows a diagram of the 4X16. The 4X16 has one amphenol connector and five RJ11 connectors on the faceplate. For details on the 4X16 wiring, refer to Chapter 13, “Install Analog Terminal Adapters,” on page 277.

**Figure 44** 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 45 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, “Install Analog Terminal Adapters,” on page 277.

**Figure 45** 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 12.

- 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.

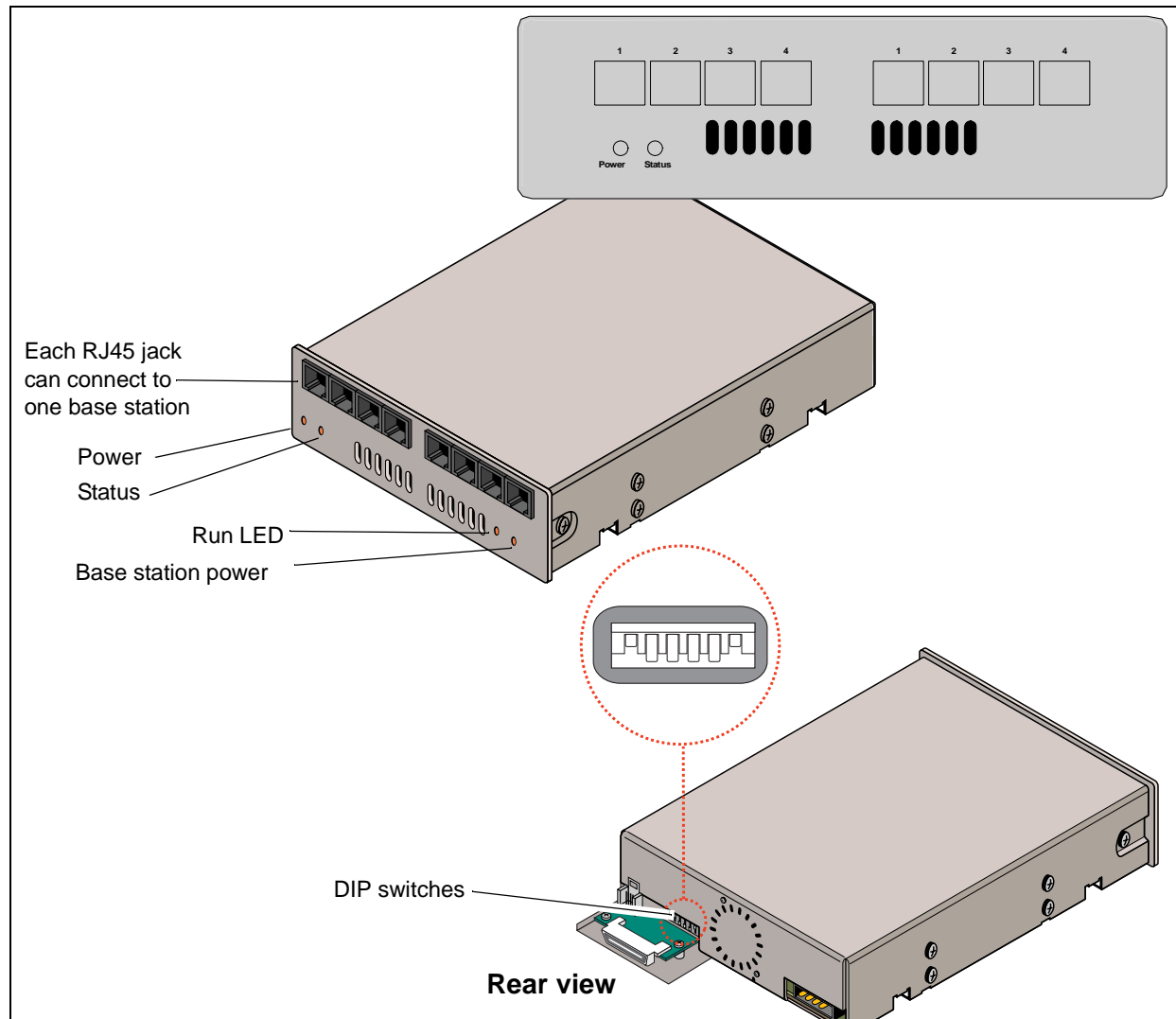
**Table 12** Specialized modules

Module type	What it does	Special notes
DECT “Digital enhanced cordless telecommunications (DECT) media bay module”	connects a maximum of eight radio base stations which receives transmissions from registered cordless handsets (a maximum of 32).	Refer to “Mobility Services by Region” on page 303.
FEM “Fiber expansion media bay module (FEM)”	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.
DDIM “Digital Drop & Insert MUX (DDIM)”	enables a Business Communications Manager system to share its connection to a Universal T1 network with a LAN	

### Digital enhanced cordless telecommunications (DECT) media bay module (region-specific application)

The Digital Enhanced Cordless Telecommunications (DECT) module allows radio-based cordless handsets to access systems that are configured to accept the 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 303 to determine the profiles that can use the DECT protocol.

Figure 46 shows a front view of the module. The DECT media bay module has eight RJ45 jacks that connect to base stations deployed around the coverage area. Each DECT module supports four ISDN lines and allows a maximum of eight simultaneous call paths back to the Business Communications Manager. The DECT module LEDs indicate module power, status, run state and base station power state. The figure also shows the location of the DIP switches on the DECT module. Refer to “DECT switch settings” on page 343 for the switch settings required for the module.

**Figure 46** DECT faceplate with eight RJ45 connectors

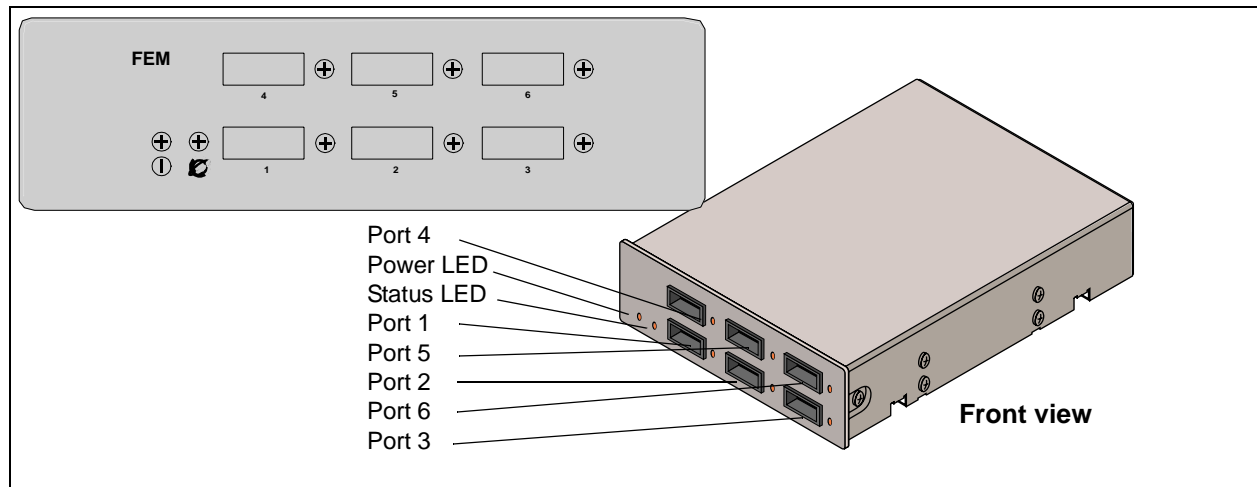
### Fiber expansion media bay module (FEM)

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 47 shows the front of the FEM module. Each enabled port consumes one DS30 channel.

**Figure 47** Fiber expansion media bay module (FEM) LEDs



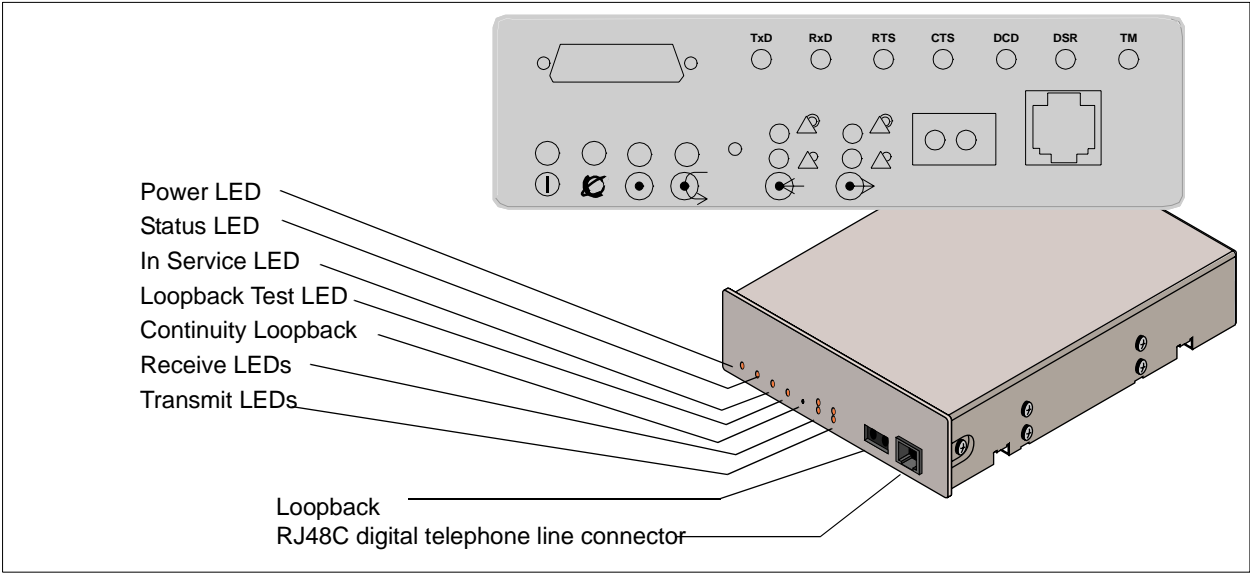
## Digital Drop & Insert MUX (DDIM)

The Digital Drop & Insert MUX (DDIM) module supports 1 x MUX T1 trunk with a user-defined combination of voice and data channels. The DDI MUX enables a Business Communications Manager system to share its connection to a Universal T1 network with a local area network (LAN).

The DDI MUX:

- provides the functionality of a DTM media bay module (T1 digital lines only)
- splits the incoming T1 line so that some of the lines are used for voice traffic and some of the lines are used for data traffic
- provides either the CSU (Channel Service Unit) or DSU (Data Service Unit) functionality to support connections to data terminal equipment (DTE), such as a router or a bridge
- connects to network devices that support V.35 interfaces
- provides end-to-end transparent bit service
- supports loopbacks between the [Product Name (short)] and the internal Business Communications Manager components, and between the [Product Name (short)] and digital terminal equipment

Figure 48 Digital Drop & Insert (DDIM) faceplate





## Telephones and adapters

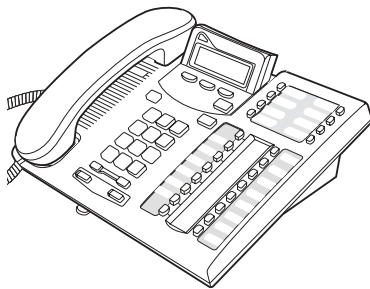
The following telephones and devices can be used with the Business Communications Manager system.



### **Business Series Terminal T7100**

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

**T7000 (not shown)** (International only) — four memory buttons, without display or indicators.



### **Business Series Terminal T7316**

— two-line display, three display buttons, 16 memory buttons with indicators, eight memory buttons without indicators.

### **Business Series Terminal T7208**

— one-line display, eight memory buttons with indicators



### **i2004 IP telephone**

— connects through an internet link to the Business Communications Manager.

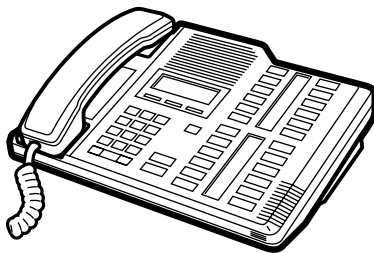
Multi-line display, six memory keys with indicators. It can be used to call through VoIP or PBX lines.

Not shown: i2002 IP telephone and i2050 Software Phone interface.



### **Norstar M7324**

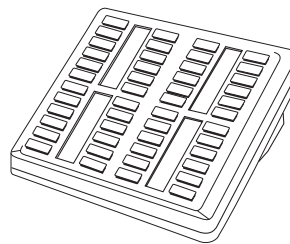
— two-line display with three display buttons, 24 memory buttons with indicators. Options: two CAP modules.



### **Norstar**

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

Note: There is no Business Series Terminal equivalent to this telephone.



• **Central answering position (CAP)** (North American systems only) — connects to an M7324 telephone and provides 48 additional memory buttons. You need one Station

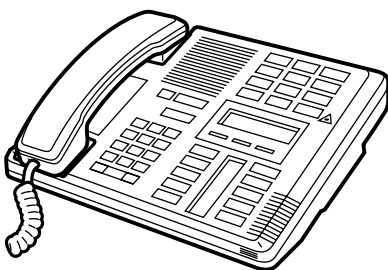
Auxiliary Power Supply (SAPS) for every M7324 telephone that has CAP modules.

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



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

**Norstar M7100N** (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

#### Mobility options

**Companion** (region-specific) — provides twinning capability between a stationary set and a wireless mobile set. These handsets communicate through a stationary base station, which is wired to a digital station media bay module on the Business Communications Manager. Depending on your system configuration, you can have up to 64 sets assigned to your system. For installation instructions, refer to “Companion Hardware Installation” on page 251.

Provides two-line display, but no line, memory or display buttons. The handset accesses a restricted set of system features.

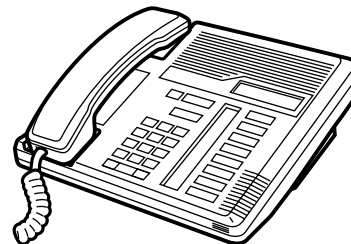
**DECT** (region-specific) — provides cordless access to the system through a DECT media bay module. The cordless handsets can be twinned with a stationary set, or configured to act as an independent set. You can register up to 32 sets on a module. Each Business Communications Manager system, can support one DECT module.

Has display, but no line, display or memory buttons and has access to a restricted list of system features.

For base station installation and handset registration instructions, refer to the *DECT Installation and Maintenance Guide*.

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

**Norstar M7208N** (UK and Australia only) same features



**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. Installation

instructions are provided by the vendor.



**T7406 Cordless Telephone system** — provides cordless mobility in a small office environment. Each base station supports three telephones. Function is based on the T7316/M7310 telephone. The base station connects to a digital station media bay module on the system. Provides six memory buttons with indicators and a two-line display with three display buttons.

For installation instructions, refer to the *T7406 Cordless Telephone Installation Guide*.



**Symbol® NetVision and NetVision Data telephones** — H.323+ based IP telephones provide eMobility access through a LAN/WAN connection via a wireless access point. A display menu provides access to user and call feature.

Provides multi-line display capability, but no line, memory or display buttons.



### Accessories

- **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, “Install Analog Terminal Adapters,” on page 277.

## Portable systems

The following sections describe the portable systems that are compatible with the Business Communications Manager system, and the hardware components that are required.

### 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 249.

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- **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.

---

DECT system installation and configuration information is contained in the *Business Communications Manager 3.0 DECT Installation and Maintenance Guide*.

## T7406 system components

The T7406 wireless system allows the user to access calls and call features while away from their desk. The following components provide this service:

- **Radio base station** — provides the radio link between the Business Communications Manager, through a station media bay module, to the portable handsets (three handsets per base station).
- **Portable handsets** — based on T7316/M7310 functionality, including six line buttons and a two-line display.

## NetVision system components

The NetVision and NetVision Data telephones provide an internet telephone connection to the Business Communications Manager. These eMobility wireless telephones are based on an enhanced implementation of H.323, referred to as H.323+, and IEEE 802.11 protocol for wireless LANs.

The NetVision system consists of the following components:

- **Access point** — provides the radio link between the NetVision telephones and an internet connection. This hardware is ordered separately, and comes with complete installation instructions. This component is not specific to Business Communications Manager.

- **Portable handset** — communicates through the internet to the Business Communications Manager. This handset is wireless. However, the access point through which it communicates connects to the internet, therefore, the handset appears as an IP telephone to the Business Communications Manager.
- **Handset administration** — A Business Communications Manager running version 2.5, Feature Pack 1 or newer software, provides a link to the NetVision Phone Administrator (NVPA). This application, which is specific to the Business Communications Manager, resides on your computer. It provides a set of handset options where you specify the features and settings for each handset. This file is then uploaded by the handset through a serial cable from your computer.

The *Business Communications IP Telephony Configuration Guide* describes how to integrate this telephone into the Business Communications Manager system. Symbol provides a user manual that describes the handset-based features and how they work. The NetVision Telephone Feature Card, provided on your Business Communications Manager CD, describes how to use the Business Communications Manager features that can be accessed by the handset.

**Note:**

The NetVision handsets can be configured to act as a stand-alone telephone, either providing a point for target line calls, or with full call and receive capability, although some of the features are not available. It can also be twinned with stationary telephones to provide mobile coverage of one or more stationary telephones.

This handset has no memory buttons. Instead, a pre-programmed display menu provides access to Business Communications Manager features.

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## Business Communications Manager Expansion Unit

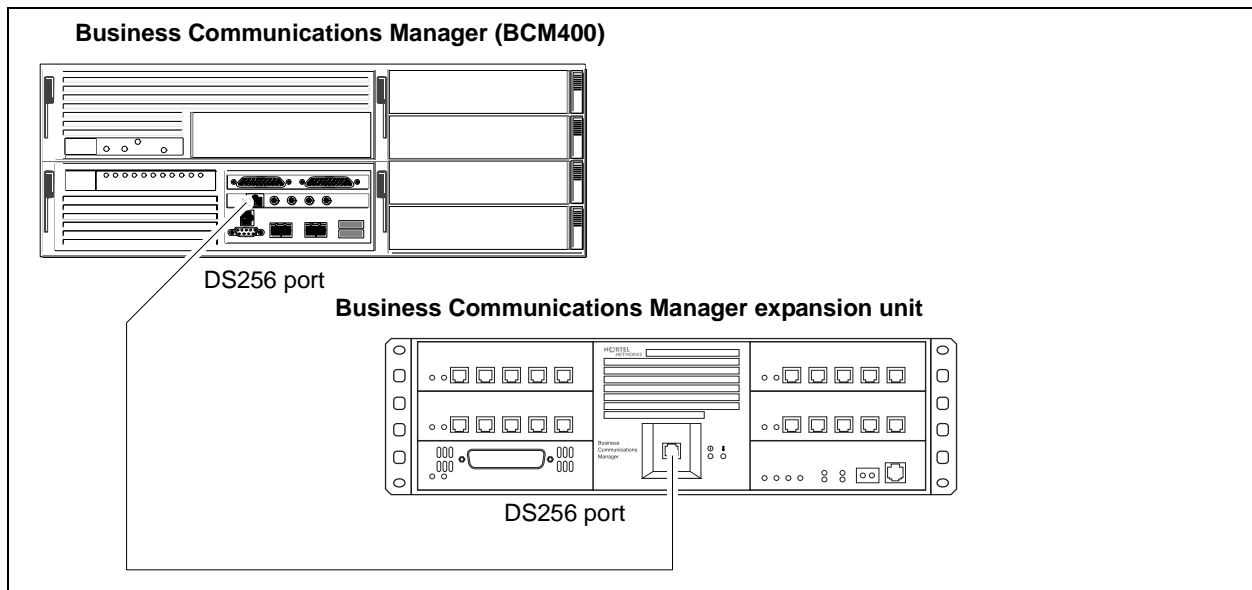
The Business Communications Manager expansion unit contains six additional bays for media bay modules. The Business Communications Manager expansion unit is available for use only with the BCM400.

The supplied DS256 cable is 5 m (16 ft.) long. Use of any other cable is not supported. The cable connects into a DS256 port on the MSC of the base function tray, and into a DS256 port on the center panel of the expansion unit. Refer to Figure 49.



**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 3, “Install the Business Communications Manager & Expansion Unit Platform Base Chassis,” on page 99.

**Figure 49** Business communication manager DS256 connectors and expansion unit



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## Chapter 2

# Auxilliary Requirements and Installation Process Overview

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This chapter provides a description of the prerequisite computing platform and network specifications to operate the Business Communications Manager Unified Manager software. This chapter also provides summary of the installation process for the Business Communications Manager, telephony components and Business Communications Manager expansion unit.

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

For administration purposes, you also require an network connection with the correct browser setup.

## 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 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.

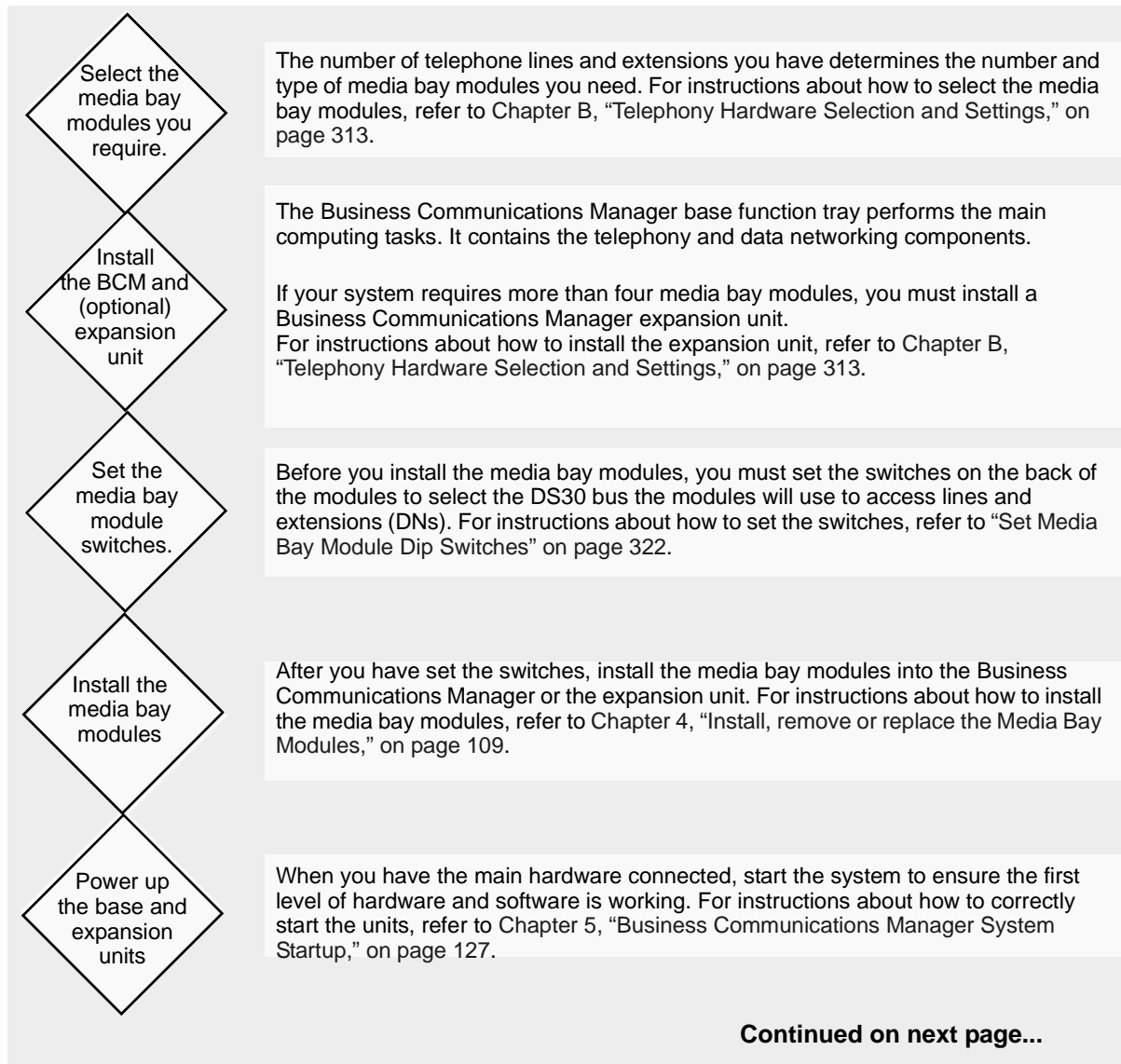
- Use the LAN, WAN, or serial port to connect to your computer and use the Unified Manager to perform configuration.
- If you run multiple operations on your computer, we recommend that you use Windows NT or 2000 to ensure optimal performance with the Unified Manager.
- If your computer is using Windows 95/98, the interaction can be slower if you attempt to run more than one application.

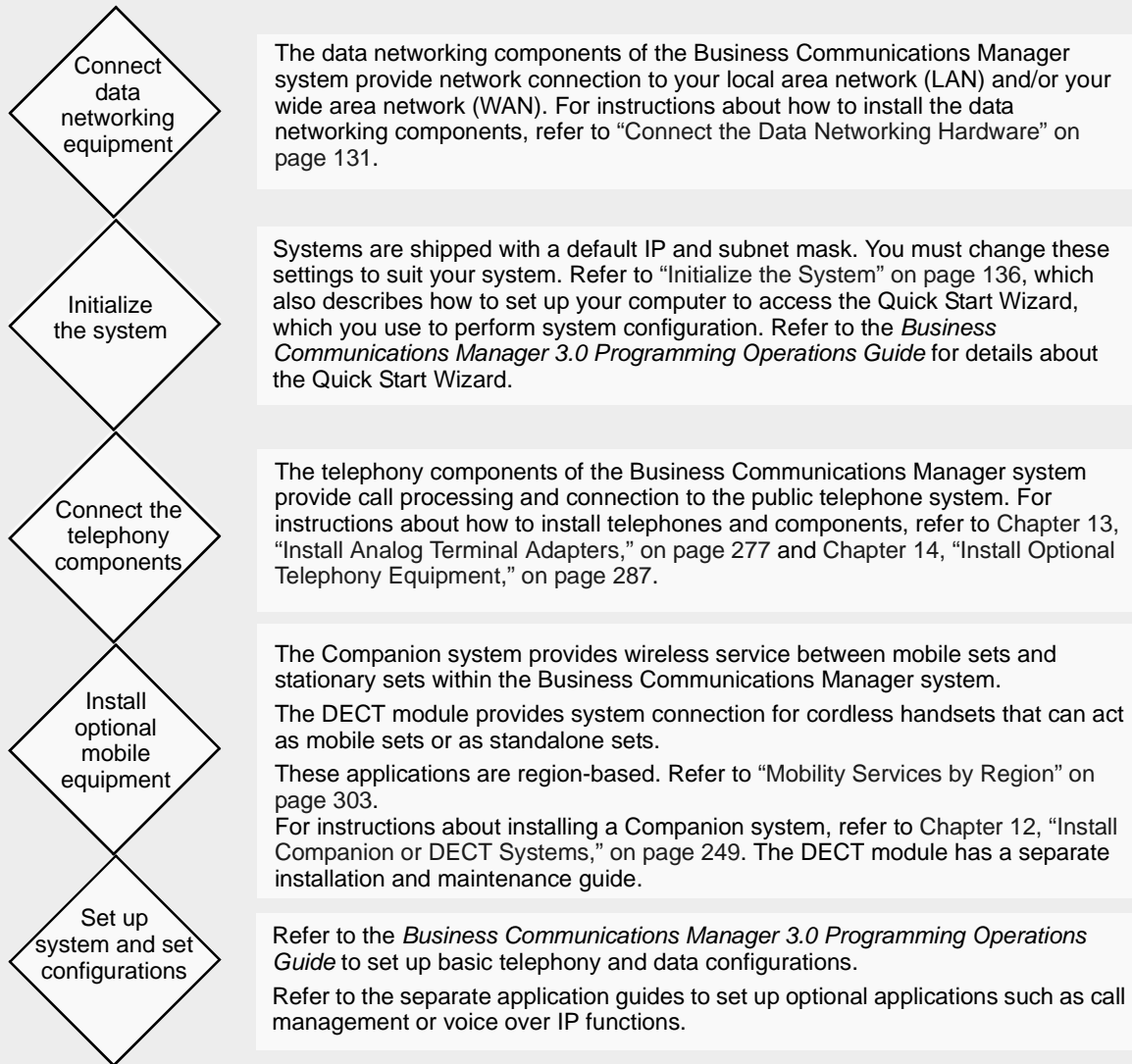


## Installation Process Overview

Figure 50 provides an overview of the installation process. Use the overview information as a quick reference to prepare the Business Communications Manager for installation. The overview information provides the correct installation sequence.

**Figure 50** Installation and initialization overview



**Installation overview, continued...**

## Installation Preparation Checklist

Before you install the base BCM platform base or expansion unit hardware, complete the following actions.

- Determine the location for the Business Communications Manager (or expansion unit), telephones, and other equipment based on spacing and electrical requirements. For more information about spacing and electrical requirements, refer to the “Environment Checklist” on page 95 and the “Electrical Requirements” on page 95.
- Order the required trunks from the central office.
- Check that all of the media bay modules are installed in the Business Communications Manager or expansion 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 10°C and 40°C (50°F and 95°F)
- between 20% and 80% non-condensing relative humidity
- enough space and strength to support the Business Communications Manager
- 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 or expansion 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 (or expansion unit) power cord is 1.5 m (5 ft) long. You can connect the power cord 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 platform base chassis 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 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  $\Omega$
- 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  $\Omega$
- maximum cable length (0.5 mm or 24 AWG) of 1220 m (4000 ft.)

## System Equipment and Supplies

Use the checklists in this section to ensure you have all the required equipment.

### Basic hardware

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

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

You can place a maximum of two media bay modules in the BCM200 and four media bay modules in the BCM400 platform base chassis. Install and use an expansion unit (only with a BCM400 system) if you require more than four media bay modules.

### Optional equipment

The following equipment can be added to the system to support specific requirements beyond the BCM platform base hardware:

- 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 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
- WAN card field replaceable unit (FRU) if the Business Communications Manager base system requires connection to a WAN. There are two WAN card types available. The North America version has a T1 and v.35 interface. The international version has a x.21 and v.35 interface.
- Countries outside of North America must order separately, a power cord that conforms to their specific requirements or standards. All North American base and expansion systems are equipped with a North American power cord.

## 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)

## Other cordless systems

The DECT cordless system, T7406 cordless handset, and Symbol NetVision wireless IP handsets all have installation documentation specific to the installation of base stations and registration of the handsets to the Business Communications Manager.

## 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 platform base chassis

For the installation, you need the following equipment:

- rack mounting bracket
- 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

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## Chapter 3

# Install the Business Communications Manager & Expansion Unit Platform Base Chassis

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This chapter describes how to install the Business Communications Manager platform base chassis and expansion unit in your physical environment.

## Install the Platform Base Chassis in a Rack

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



**Caution:** When installing the Business Communications Manager platform base chassis 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 95 for acceptable environmental conditions before selecting a location for the Business Communications Manager platform base chassis.



**Caution:** For desk mount installations, do not place anything directly on top of the Business Communications Manager base platform chassis.

## Attach the rack mounting brackets

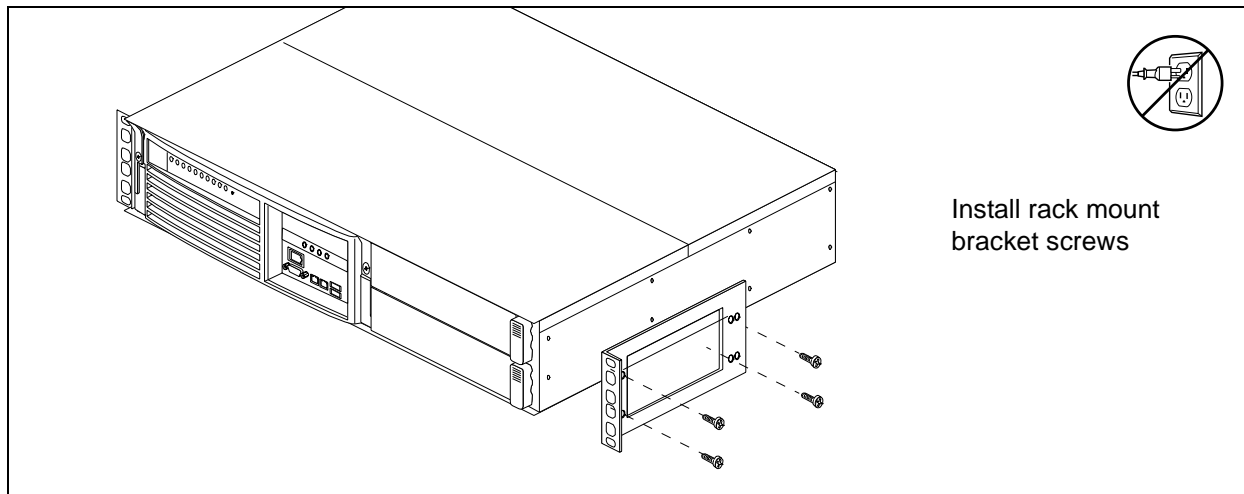
- 1 Place the Business Communications Manager platform base chassis on a flat, clean surface.
- 2 Align the screw holes between the Business Communications Manager platform base chassis and the right rack mounting bracket.
- 3 Fasten the bracket to the Business Communications Manager platform base chassis using four screws.



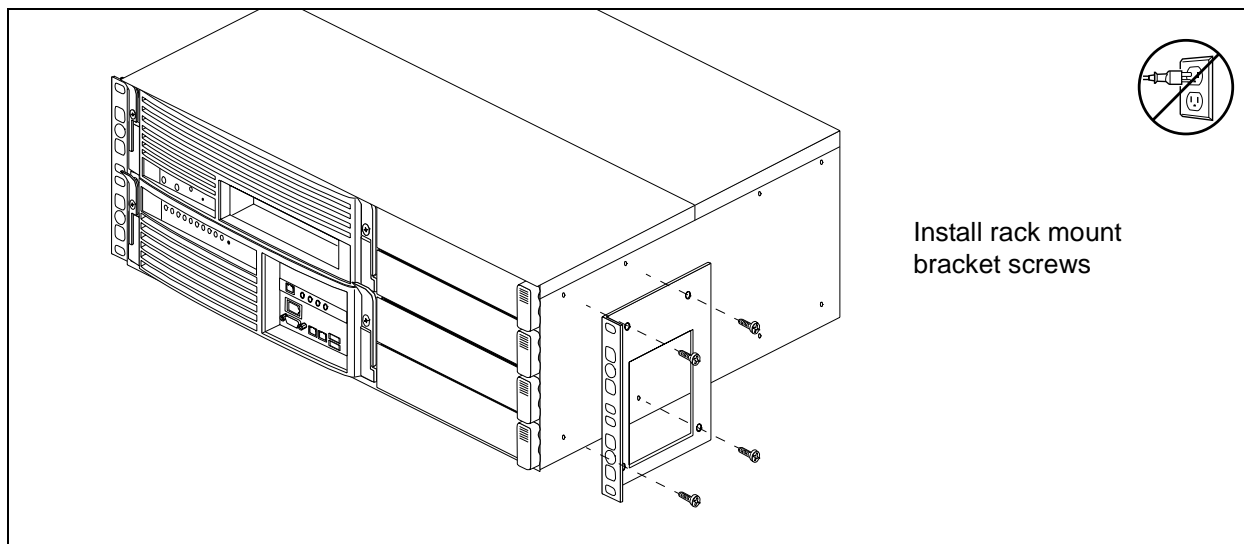
**Caution:** Only use the screws supplied with the rack mounting bracket. Do not replace screws. Other screws can damage the Business Communications Manager platform base chassis.

- 4 Align the screw holes between the Business Communications Manager platform base chassis and the left rack mounting bracket.
- 5 Fasten the bracket to the platform base chassis using four screws. Refer to Figure 52.

**Figure 51** Attach the rack mount bracket to the BCM200 chassis



**Figure 52** Attach the rack mount bracket to the BCM400 chassis



## Mount the platform base chassis into an equipment rack

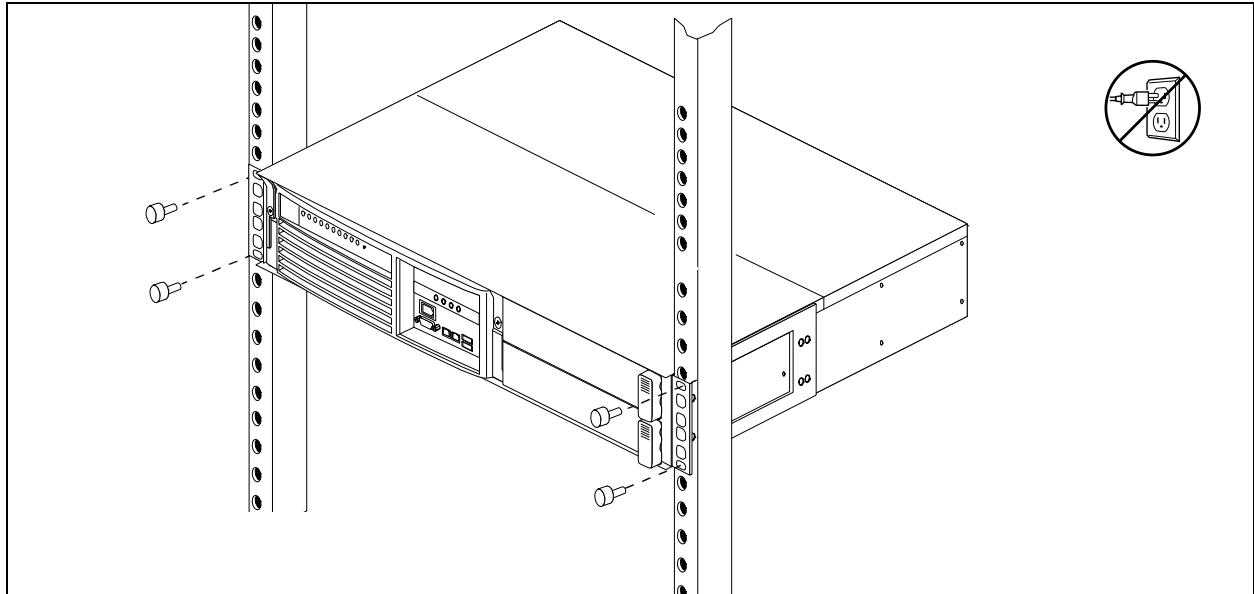
Use the procedure in this section to install the Business Communications Manager platform base chassis in an equipment rack.

- 1 Determine the location in the rack where you want to install the platform base chassis.
- 2 Position the unit in the rack. Have an assistant hold the platform base chassis.
- 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 (supplied).

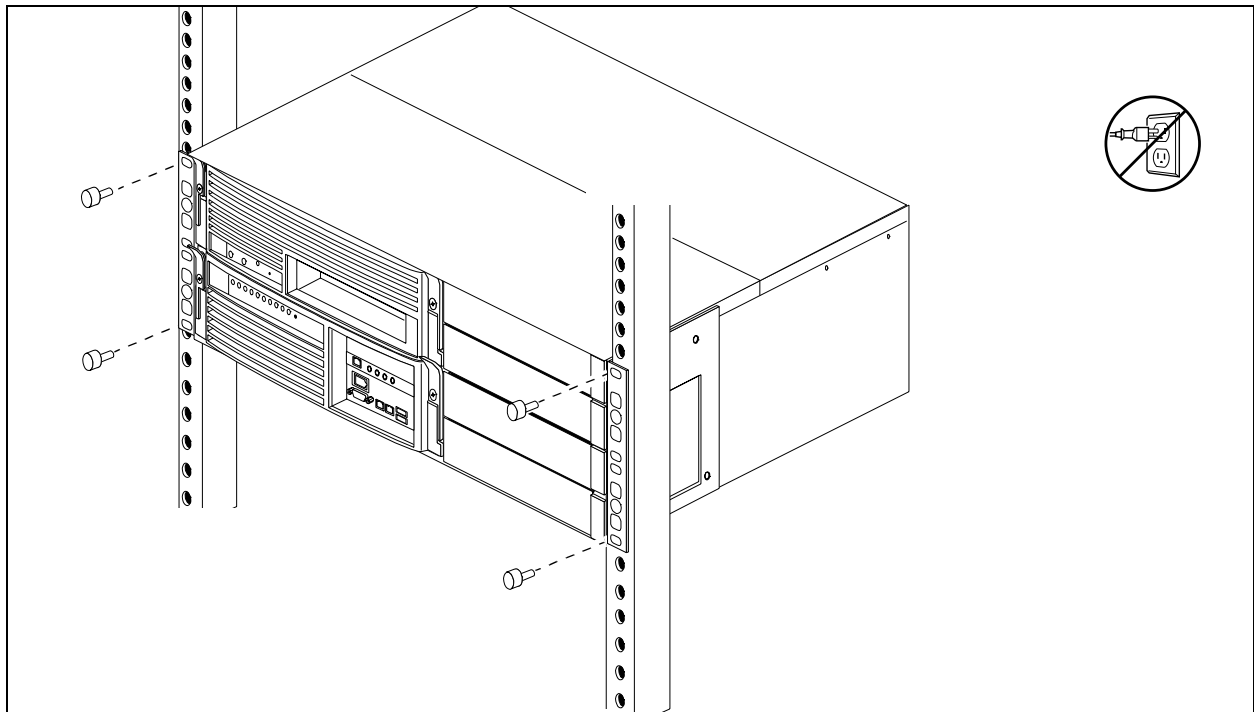
Refer to Figure 53.



**Figure 53** Fasten the BCM200 platform base chassis to an equipment rack



**Figure 54** Fasten the BCM400 platform base chassis to an equipment rack



**5** This procedure is complete.

## Install the Platform Base Chassis on the Wall

This procedure describes how to mount the BCM200 or BCM400 platform base chassis to a wall.

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

- a wall-mount bracket kit NTAB3422
- 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 95 for acceptable environmental conditions before selecting a location for the Business Communications Manager platform base chassis.

---



**Note:** Nortel Networks does not recommended use of the rack-mount brackets for wall mount applications.

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- 1 Mark the location of the plywood backboard on the wall using a pencil. Use a ruler and bubble-level to check that the plywood backboard is level with respect to the wall.
- 2 Mount the plywood backboard securely to the wall.
- 3 Mark the location of the wall mount bracket holes on the plywood backboard.
  - a Use the wall mount bracket as a template.
  - b Use a bubble-level to check that the wall mount bracket is level with respect to the plywood backboard.
- 4 Install four #10 x 2.5 cm (#10 x 1 in.) round-head wood screws in the backboard (supplied).
  - a Do not tighten the screws heads against the backboard. Leave approximately 0.5 cm (0.25 in.) of the screw exposed from the backboard.
  - b Perform a trial-installation of the wall mount bracket on the plywood backboard. Ensure the wood screw heads seat in the wall mount bracket slots. If the wood screws are too tight, loosen until the screw heads fit fully in the slots.
  - c Ensure that the wall mount bracket is level with respect to the plywood backboard.
  - d Remove the wall mount bracket.
- 5 Align the screw holes on one side of the Business Communications Manager platform base chassis with the wall mounting bracket.



**Note:** The bracket suspends the Business Communications Manager platform base chassis 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 bracket.

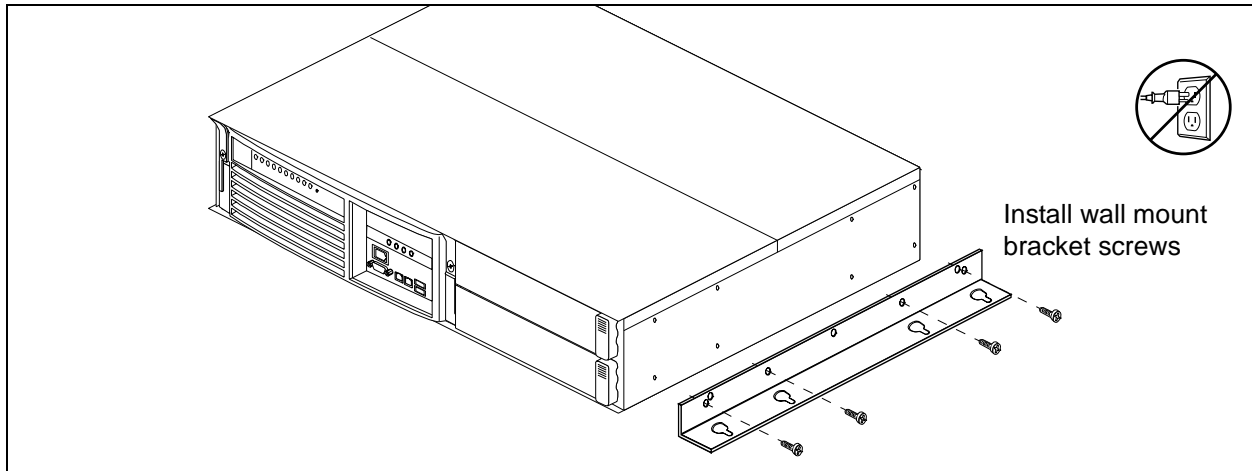
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- 6 Fasten the wall mount brackets securely to the Business Communications Manager platform base chassis using the screws provided. Refer to Figure 56.

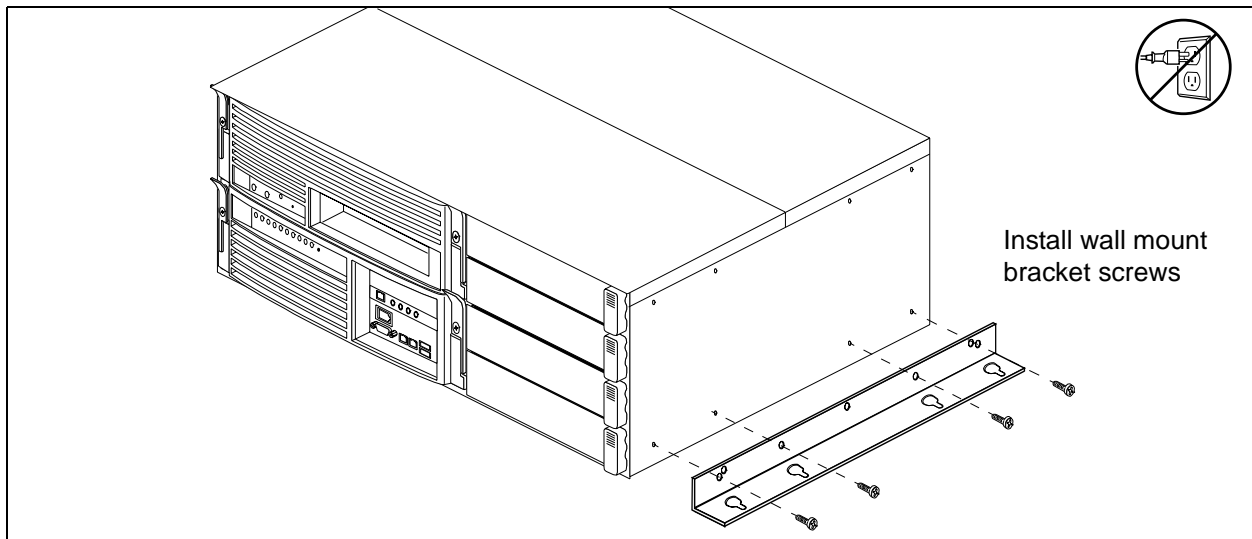


**Caution:** Use only the screws supplied with the wall mounting bracket. Do not replace screws. Other screws can damage the Business Communications Manager platform base chassis.

**Figure 55** Attach the wall-mount brackets to the BCM200 platform base chassis



**Figure 56** Attach the wall-mount brackets to the BCM400 platform base chassis



- 7 Hang the Business Communications Manager platform base chassis on the backboard screws. Make sure the platform base chassis is level. Ensure the wood screwheads seat fully into the wall mount bracket slots.
- 8 Tighten the wood screws against the wall mount bracket.
- 9 This procedure is complete.

## Install the Platform Base Chassis on a Flat Surface

Use this procedure to install the Business Communications Manager platform base chassis on any flat surface that can safely support the weight of the unit.



**Caution:** Refer to “Environment Checklist” on page 95 for acceptable environmental conditions before selecting a location for the Business Communications Manager platform base chassis.

---



**Caution:** Possible damage to the platform base chassis. Do not place anything directly on top of the Business Communications Manager base platform chassis.

---

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

- 1 Attach four rubber feet to the corners on the bottom of the platform base chassis.
- 2 Position the platform base chassis 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.
- 3 This procedure is complete.

## Install the Expansion Unit into a Rack

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

The Business Communications Manager expansion unit must be installed close enough to the Business Communications Manager that the 5 m (16 ft) cable between the two units can be connected to the Business Communications Manager without stress on the cable. The expansion unit has the same environmental and electrical requirements as the Business Communications Manager. For more information about these requirements, refer to “Installation Preparation Checklist” on page 95.

The Business Communications Manager expansion unit fits into a standard 19-inch equipment rack. Install the expansion unit in the same rack as the Business Communications Manager platform base chassis.



**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.

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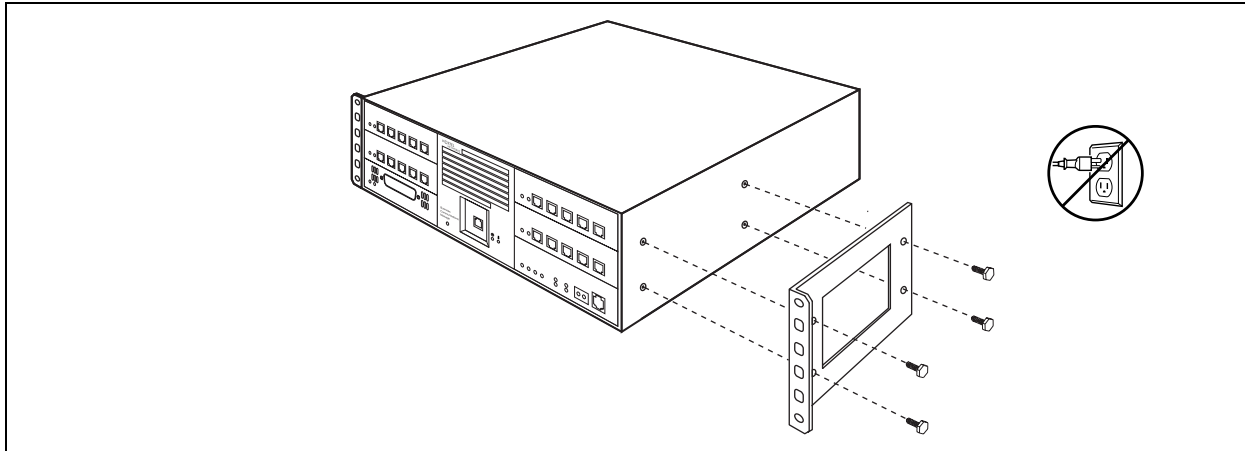
## Attach the mounting brackets to the Expansion Unit

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 57.

**Figure 57** 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 Business Communications Manager chassis in an equipment rack.

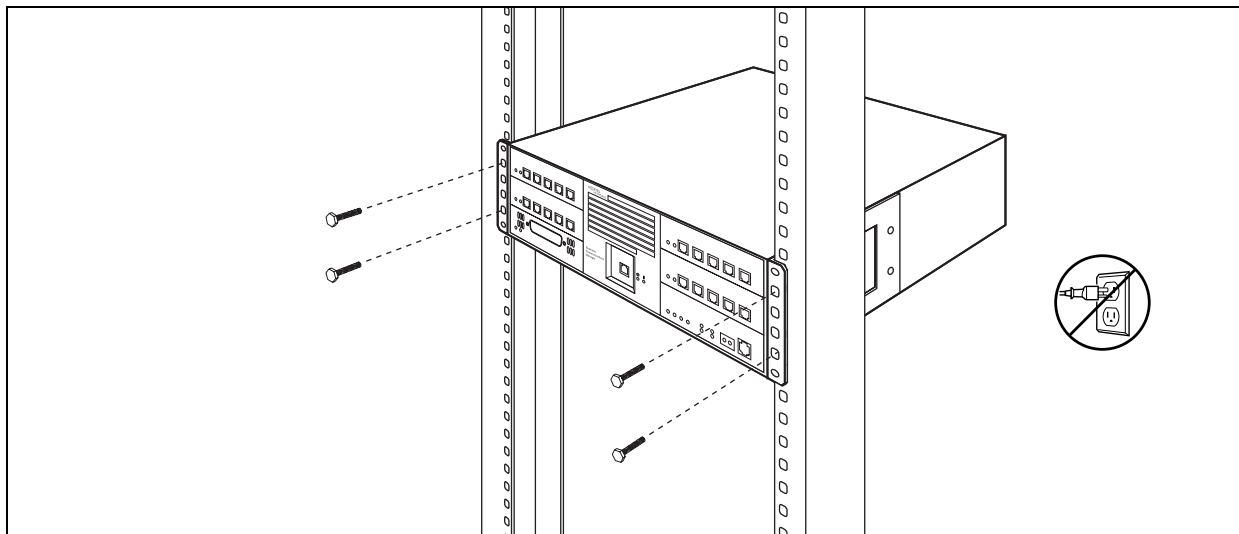
## Mount the Expansion Unit to the rack

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 58.
- 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 58** Fasten the expansion unit to the equipment rack

## Install 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 platform base chassis.



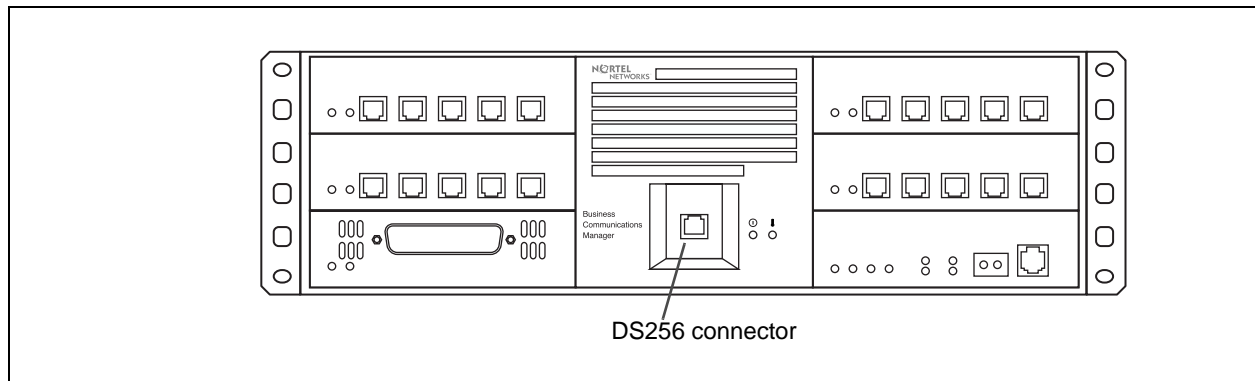
**Note:** Do not place anything on top of the expansion unit chassis.

- 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.

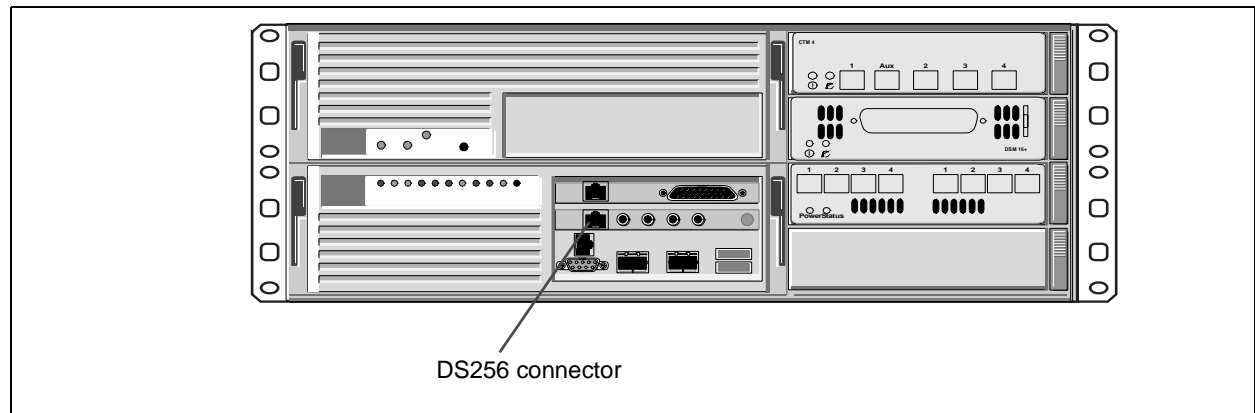
## Connect the Expansion Unit to the Business Communications Manager

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

- 1 Plug one end of the cable into the DS256 connector on the Business Communications Manager expansion unit. Refer to Figure 59.

**Figure 59** DS256 connector on the expansion unit

- 2 Plug the other end of the cable into the DS256 connector on the faceplate of the MSC in the Business Communications Manager platform base chassis. Refer to Figure 60.

**Figure 60** Business Communications Manager platform base chassis DS258 connector

**Warning:** The timing in the Business Communications Manager base unit system is critical, you must use the correct length cable as supplied with the expansion chassis. The system may not work properly if you connect the Business Communications Manager expansion unit using a cable that varies in length.





## Chapter 4

# Install, remove or replace the Media Bay Modules

Use the procedure in this chapter to install, remove or replace the media bay modules in the Business Communications Manager platform base chassis and the expansion unit.

## Install a Media Bay Module

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

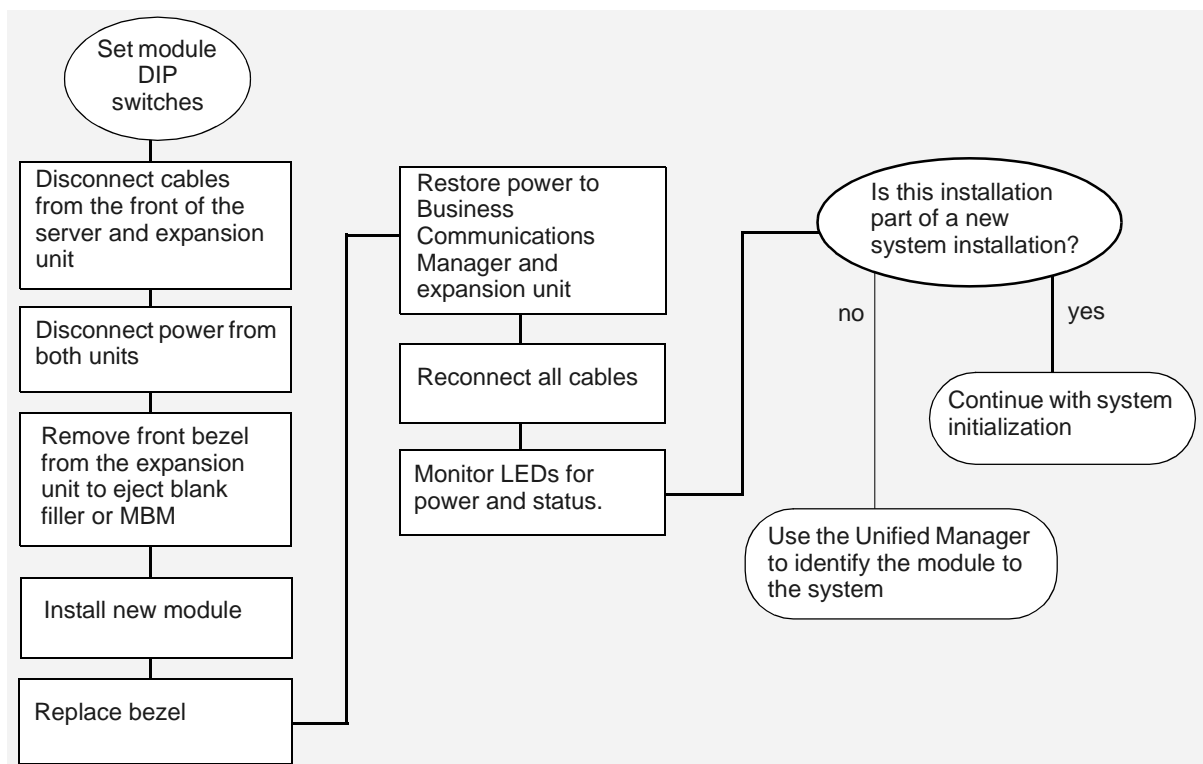
The BCM200 platform accommodates a maximum of two media bay modules. The BCM400 platform accommodates a maximum of four media bay modules. If your BCM400 system requires more than four media bay modules, you need to connect a Business Communications Manager expansion unit to the Business Communications Manager.

Figure 61 provides an overview of the process for installing media bay modules.



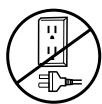
**Note:** The number of media bay modules you can add varies, depending on the DS30 resources that are available. Refer to Figure 195 on page 320.

**Figure 61** Overview of installing a media bay module



## Shut down the system

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



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**Warning:** If you are installing a new system, or new Business Communications Manager or expansion unit, refer to Chapter 11, “Install Telephones and Peripherals,” on page 243 for instructions about installing a new system before you connect the system to the ac power outlet.

---



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

---



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**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 media bay modules.

- 1 If you are adding or replacing a module in an active system, follow these steps first:
  - a Access the Unified Manager
  - b Choose **System**.
  - c Click the **Logoff** menu and then click **Shutdown**.
  - d Click the **Yes** button.
  - e Wait until the Status changes to **Complete! It is safe to turn off the system**.
  - f Click the **Done** button.
  - g 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 Business Communications Manager and the expansion unit are clearly marked as to how they are connected.
- 4 Remove the cables from all the media bay modules and the MSC on the Business Communications Manager base function tray and the expansion unit (if attached).
- 5 Disconnect the Business Communications Manager and expansion unit power cords from the ac outlet.

## **Install a media bay module in the Business Communications Manager platform base chassis**

Use this procedure to install a media bay module in the Business Communications Manager platform base chassis. Only install the media bay modules when the system is powered down.

- 1 Ensure that the switches on the media bay module are set correctly. For information about how to set the switches, refer to “Set Media Bay Module Dip Switches” on page 322.

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 344.

- 2 Select an open media bay.
- 3 With the face of the media bay module facing toward you, insert the media bay module into the open bay.
- 4 Push the media bay module completely into the unit. You will hear a click when the module is firmly seated in the media bay.
- 5 Repeat steps 2 to 4 for each media bay module you want to install.

## **Install a media bay module in the expansion unit**

Use this procedure to install a media bay module in the Business Communications Manager expansion unit chassis. Install the media bay modules when the system is powered down.

- 1 Ensure that the switches on the media bay module are set correctly. For information about how to set the switches, refer to “Set Media Bay Module Dip Switches” on page 322.

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 344.

- 2 Select an open media bay.
- 3 With the face of the media bay module facing toward you, insert the media bay module into the open bay. Ensure that any cables at the rear of the module are clear of the platform base chassis.
- 4 Push the media bay module into the unit. You will hear a click when the module is firmly seated in the media bay.
- 5 Repeat steps 2 to 4 for each media bay module you want to install.
- 6 Install the front bezel on the expansion unit
- 7 This procedure is complete.

## Reconnect the equipment

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

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 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.

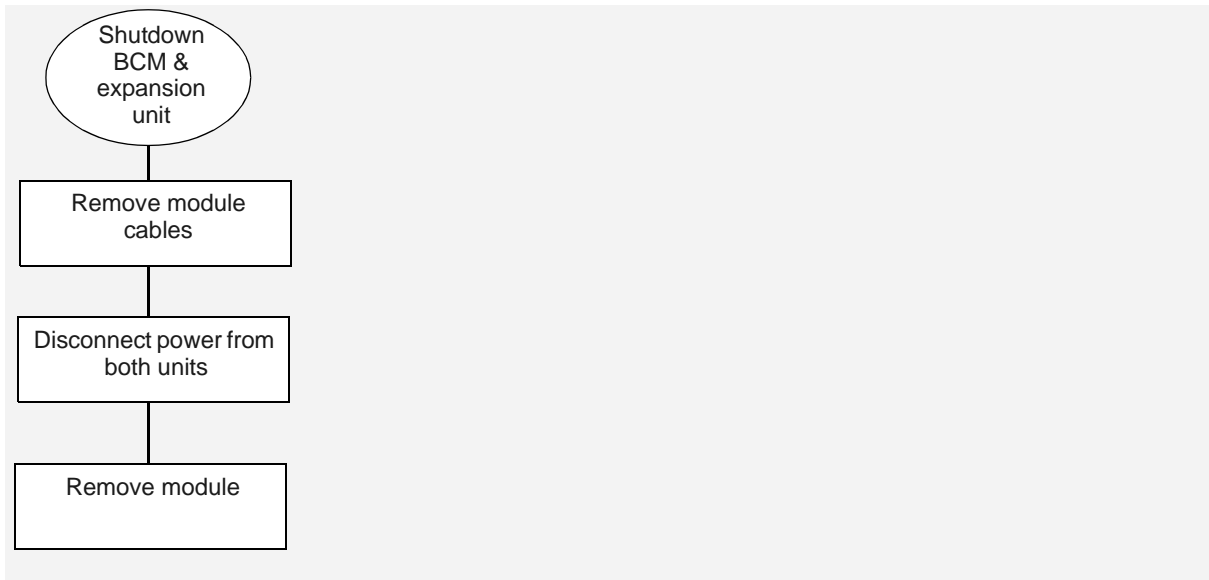
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- 3 Check that the LEDs on the modules are on and indicating the correct state. Refer to “Check system power and status” on page 129 for a detailed description of the LED states.
- 4 Test existing functions to confirm their operation.
- 5 Configure the module. Refer to the *Business Communications Manager Programming Operations Guide* for details.
- 6 This procedure is complete.

## Remove a media bay module

Use the procedures in this section to remove one or more media bay modules from a Business Communications Manager platform base chassis or expansion unit.

Figure 62 provides an overview of the process for removing media bay modules

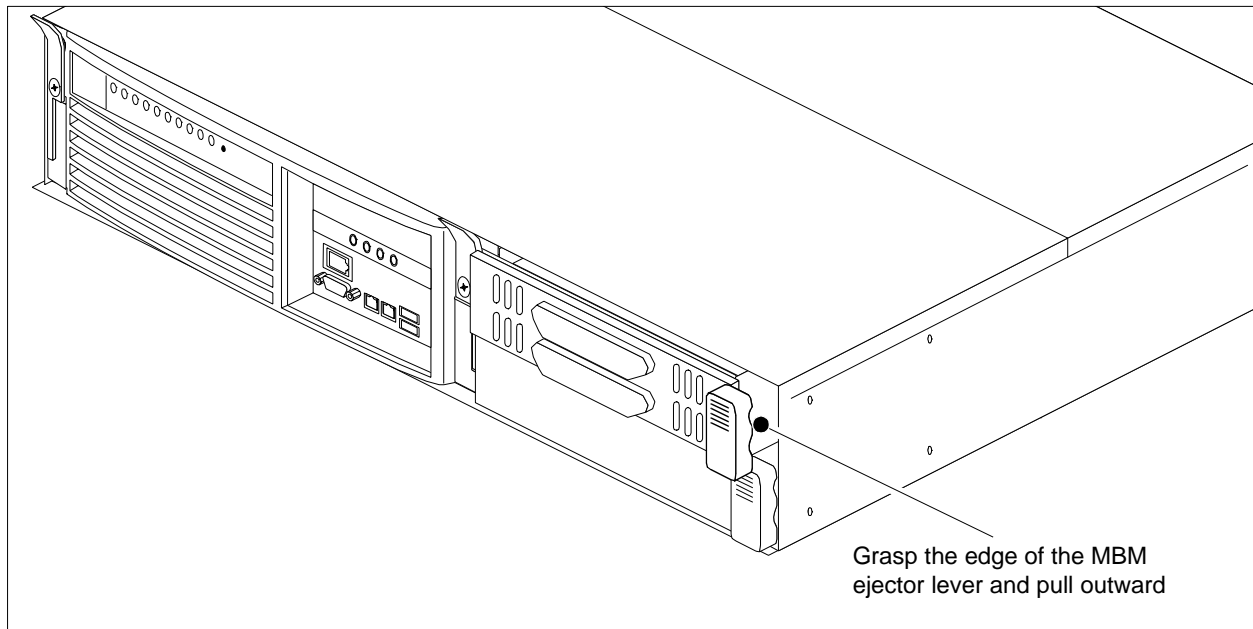
**Figure 62** Overview of removing a media bay module

## Remove a media bay module from the Business Communications Manager platform base chassis

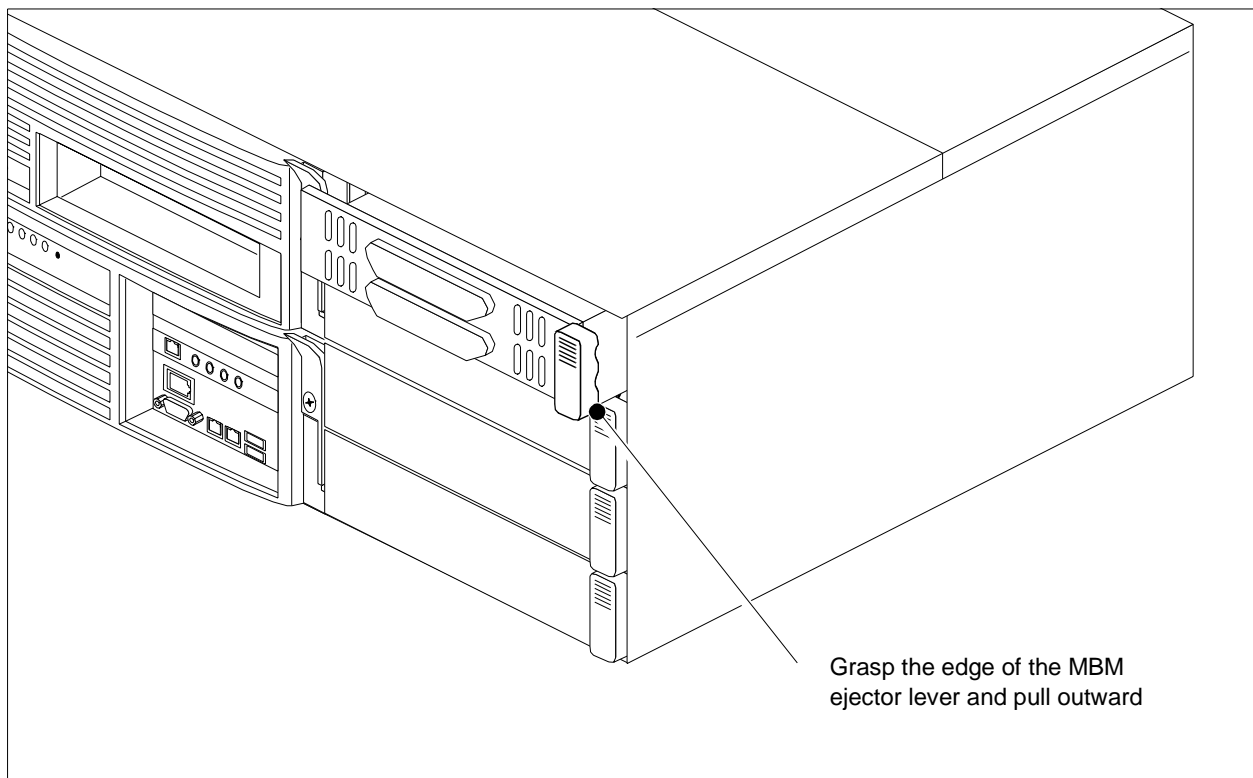
Use this procedure to remove a media bay module from the Business Communications Manager platform base chassis. Remove the media bay modules after the system is powered down.

- 1 Power down the Business Communications Manager system (see Shut down the system on page 110).
- 2 Remove any cabling from the media bay module faceplate.
- 3 Grasp the right edge of the MBM ejector lever with your thumb, index and middle fingers. Pull outward to partially eject the media bay module bay. Pull further on the lever to eject the media bay module from the bay. Refer to Figure 63 or Figure 64.
- 4 Grasp the top and bottom edges of the media bay module. Remove the media bay module from the Business Communications Manager platform base chassis MBM bay (see Figure 63, Figure 64). Place the media bay module in a clean, safe and static free area.

**Figure 63** Remove a BCM200 media bay module



**Figure 64** Remove a BCM400 media bay module



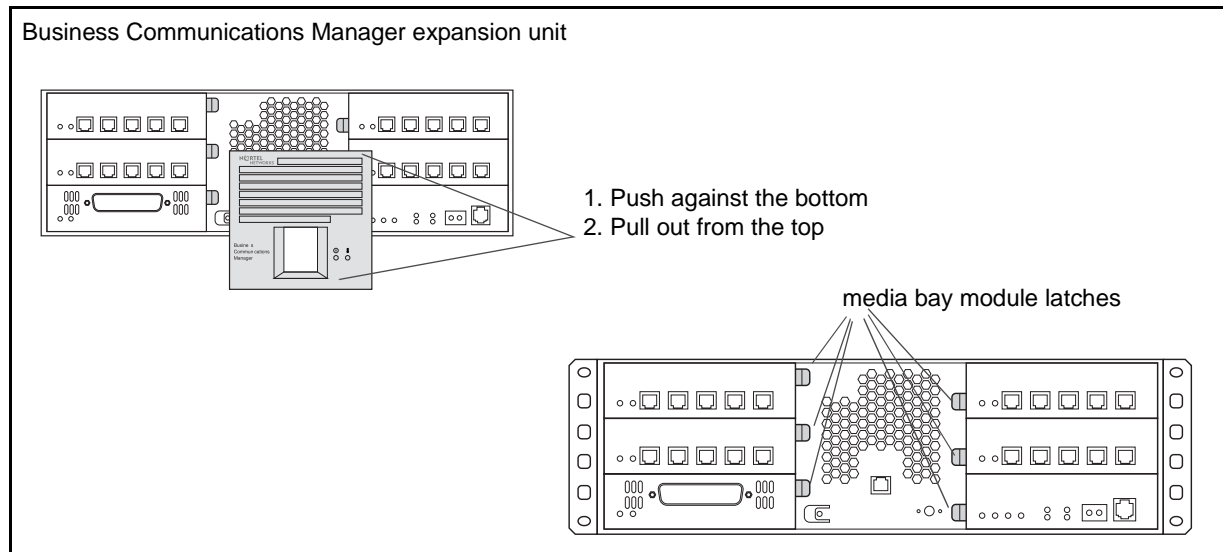
**5** This procedure is complete.

## Remove a media bay module from the expansion unit

Use this procedure to remove a media bay module from the Business Communications Manager expansion unit. Remove the media bay modules after the system is powered down.

- 1 Remove any cabling from the media bay module faceplate.
- 2 Power down the Business Communications Manager expansion unit system (see Shut down the system on page 110).
- 3 Remove the expansion unit front bezel.
- 4 Grasp the right edge of the MBM ejector lever. Pull outward to eject the media bay module. Refer to Figure 65.

**Figure 65** Remove the expansion unit front bezel



- 5 Grasp the top and bottom edges of the media bay module. Remove the media bay module from the Business Communications Manager expansion unit. Place the media bay module in a clean, safe and static free area.
- 6 This procedure is complete.

## Replace a Media Bay Module

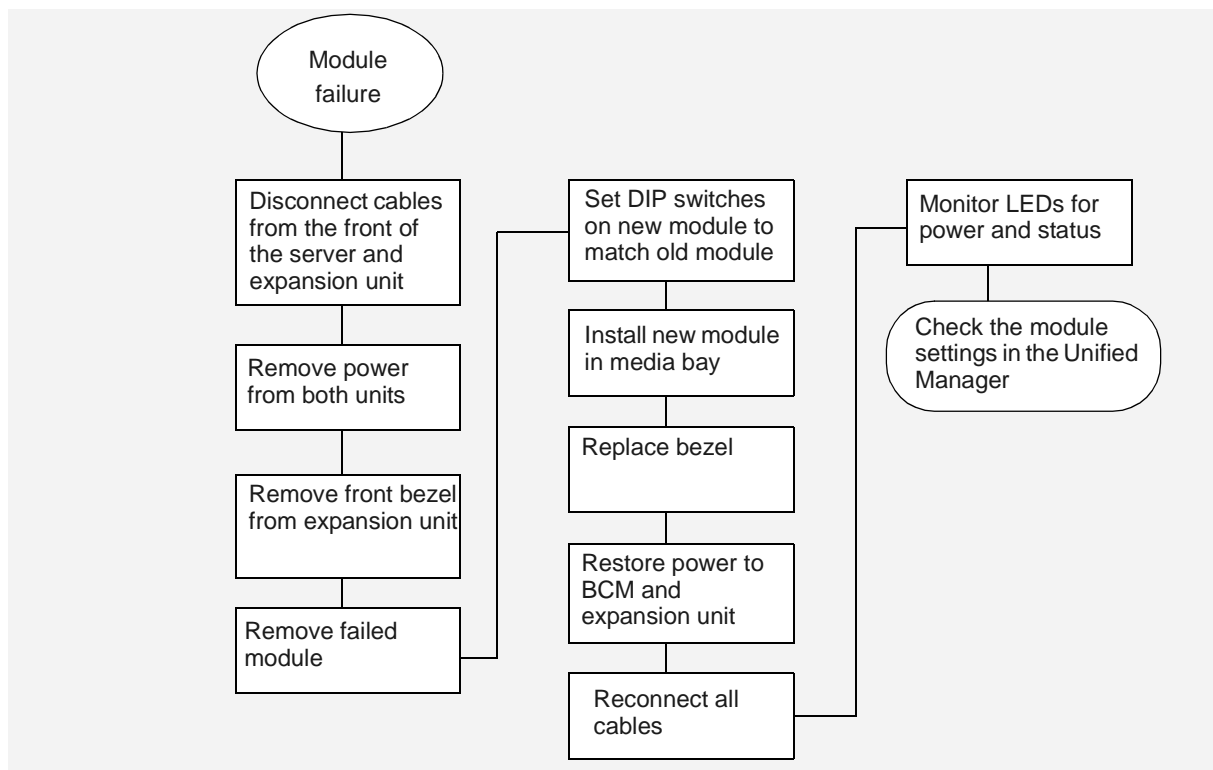
When media bay modules require replacement, follow the steps in this section.



**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 B, “Telephony Hardware Selection and Settings and review Figure 200 on page 330 to ensure the new module does not overrun any lines already assigned to other modules.

Figure 66 provides an overview of the process for replacing media bay modules.

**Figure 66** Overview of module replacement process



If a media bay module fails, follow this procedure to properly replace the module.

- 1** Follow the steps in “Shut down the system” on page 110 to ensure the system shuts down correctly.
- 2** Remove all cables and disconnect the Business Communications Manager from the AC power outlet.
- 3** Remove the front bezel from the unit where the module resides.
- 4** Pull the latch beside the module to be replaced to release the module. Refer to Figure 63 on page 114.
- 5** Slide the module out of the bay where it is installed.
- 6** Record the switch settings from the old module.
- 7** Set the DIP switches on the new module to match the settings you recorded in the previous step.
- 8** Refer to “Install a Media Bay Module” on page 109 to install the module into the media bay.
- 9** Refer to “Reconnect the equipment” on page 112 to restore the system to operation.
- 10** This procedure is complete.



## Wire the Media Bay Modules

This section 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 and DECT base stations 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 function tray, this hazard can occur.

**System shutdown:** You must disconnect the media bay module cables from the system before disconnecting the power cord from a grounded outlet.

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

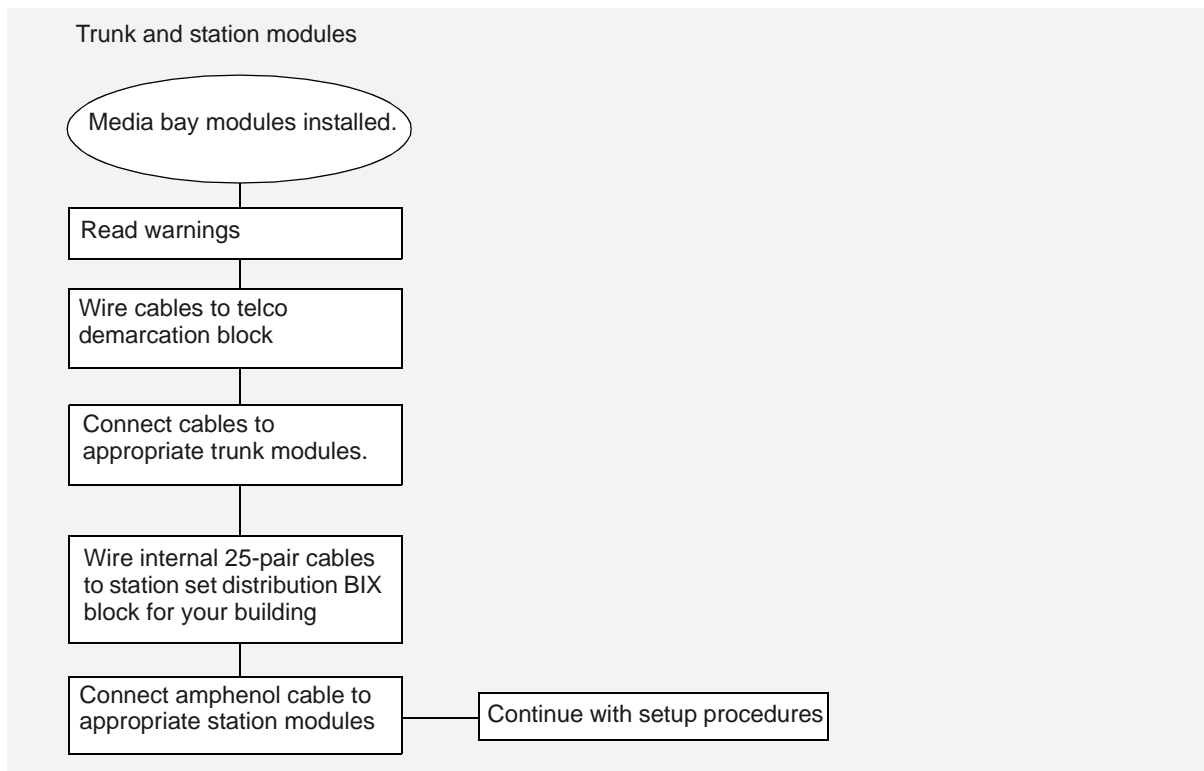


### **Danger: Electrical shock hazards**

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 67 on page 118 provides an overview of the process for connecting trunk and station wiring to the Business Communications Manager media bay modules.

**Figure 67** 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 or Business Communications Manager expansion unit ensure that the network telecom cables are unplugged and the unit is then 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 wiring system.

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

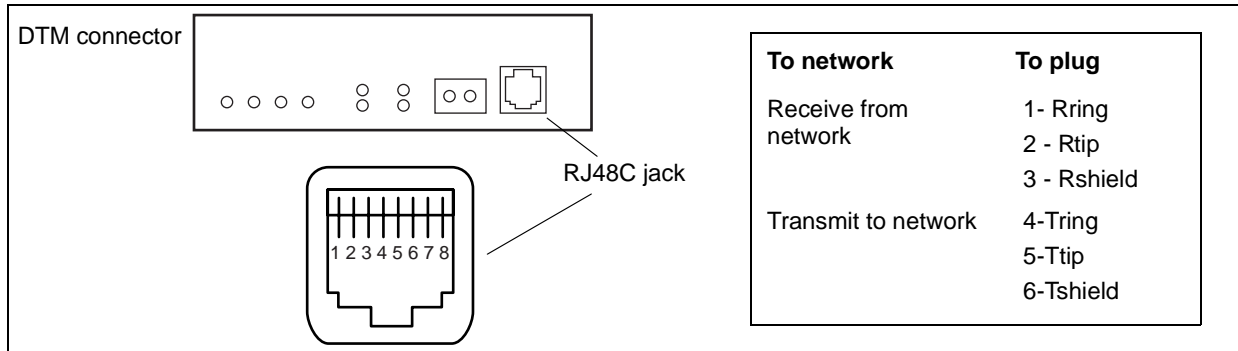
Read and follow the installation instructions carefully.

## Connect the Media Bay Modules to Service Providers

To connect DTM, CTM, CTM8, 4X16 CTM, or BRIM S/T media bay modules to the network, follow these steps:

- 1 On the front of the module, locate the RJ48C jack (DTM), RJ45 jack (BRI), or the RJ11 jacks (CTM and 4X16 modules).
- 2 Wire one end of the cable to the telco demarcation blocks of the building.
  - Figure 68 shows the wiring pin outs for a DTM to connect to a service provider.

**Figure 68** DTM RJ48C wiring array

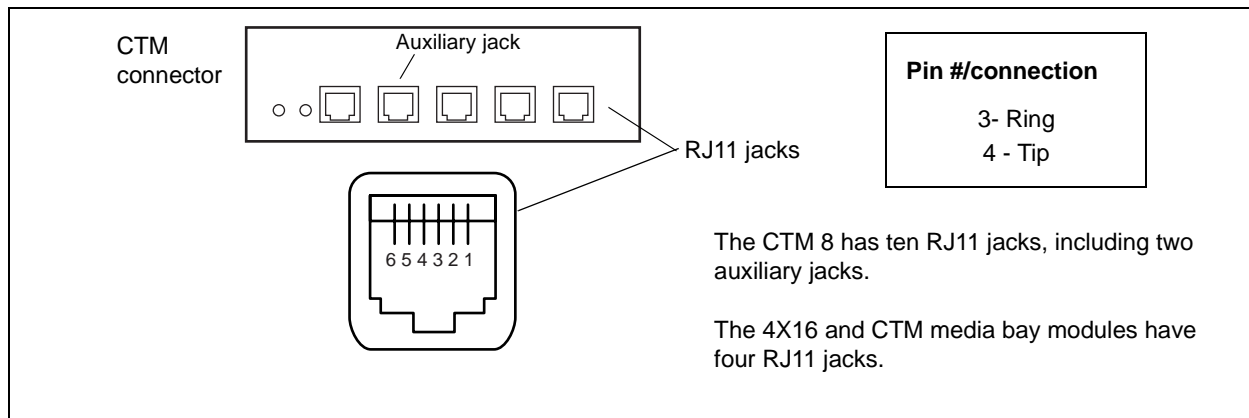


**Warning:** If you are using a service provider channel service unit (CSU), you must disable the Business Communications Manager system internal CSU using Business Communications Manager Unified Manager. For more information, refer to the *Business Communications Manager 3.0, Programming Operations Guide*.

- Figure 69 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 69** CTM RJ11 wiring array

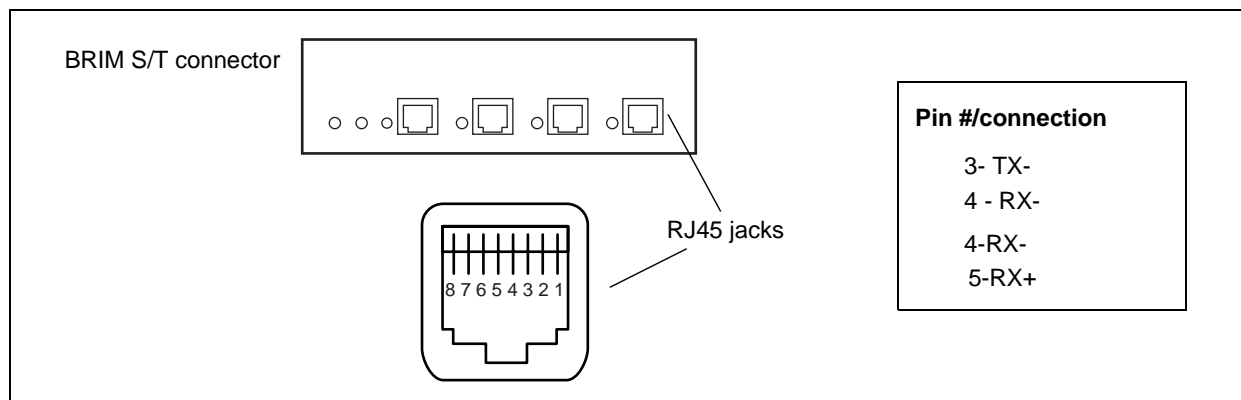


- Figure 70 shows the wiring pin-out for an BRIM S/T to the service provider.



**Warning:** The BRIM S/T 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 70** BRIM S/T RJ45 wiring array



- 3 Insert the connector into the jack on the module.

Refer to the *Business Communications Manager 3.0 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 3.0 Programming Operations Guide*.

## Wire 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 (BIX) so they connect to the 16 station sets you want connected to this module.

Use Table 13 and Figure 71 on page 122.



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

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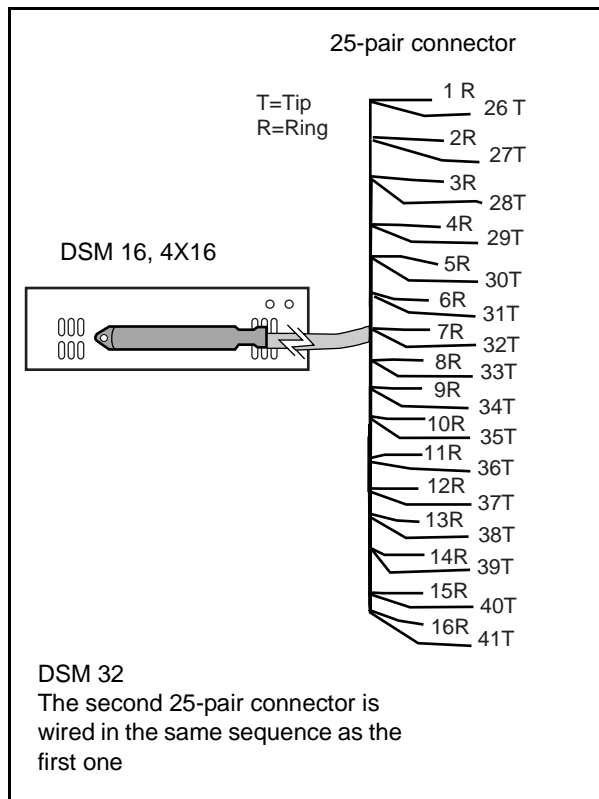
**Note:** If you are connecting an DSM 16, 4X16, or DSM 32, use Table 13 on page 122. If you are connecting an ASM 8, use the Table 14 on page 123.

---

For an overview of BIX wiring conventions, refer to the *Business Communications Manager 3.0 BIX Box Wiring Guide*.

Table 13 and Figure 71 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 71** Wiring for DSM 16, 4X16, and DSM 32

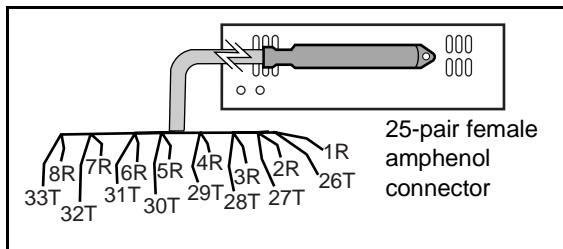


**Table 13** DSM wiring chart

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
16	Blue-Yellow	X16	16	32
42-40 17-25	no connections			

Table 14 and Figure 72 provide the wiring scheme for the eight pairs that connect to the ASM.

**Figure 72** Wiring for an ASM 8



**Table 14** 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	no connection		
9-25			



**Note:** Refer to “Line and extension numbers for specific modules” on page 332 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 3.0 Programming Operations Guide*.

- 2 Install the telephones and peripheral equipment (if a new system):
  - a Attach the cables for the telephones to the connecting blocks (BIX).
  - b Install the telephones. Refer to Chapter 14, “Install Optional Telephony Equipment,” on page 287.
- 3 Plug the female amphenol connector into the interface on the front of the module.
- 4 Set up any mobile system you are using.
  - Ensure the base stations are correctly installed and connected to the appropriate modules on the Business Communications Manager. In the case of the NetVision wireless system, ensure that the access point is correctly set up to connect to the Business Communications Manager LAN or WAN.

- Configure and register the handsets according to the instructions provided for each type of system.
  - Companion: *Programming Operations Guide*
  - DECT: *DECT Installation and Maintenance Guide*
  - T7406: *T7406 Cordless Handset Installation Guide*
  - NetVision and NetVision data: *IP Telephony Configuration Guide*

5 This procedure is complete.

## 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 fiber expansion card.



**Warning:** Handling optical fiber cables:

If the cable is too long, ensure that it is coiled correctly using the fiber spool. 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 in the Norstar module.

---



**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 344.

---



## Connect the fiber cables

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

- 1 Ensure the Business Communications Manager is powered-up and functional.
- 2 Connect the fiber cables from the Norstar expansion modules to the jacks on the FEM module.



**Note:** The DIP switch settings you chose determines which FEM ports are available. There are only six ports available. Refer to “FEM switch settings” on page 344.

- 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 may change. To keep the same extension numbers, you will have to 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 modify the wiring connections. Ensure you select the correct DS30 number.

Table 15 compares the designated extension numbers on the Norstar and on the Business Communications Manager.

**Table 15** Extension comparison chart

Ports	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<b>DS30 channel 2, FEM port 1</b>																
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
<b>DS30 channel 3, FEM port 2</b>																
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
<b>DS30 channel 4, FEM port 3</b>																
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 15** Extension comparison chart

Ports	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<b>DS30 channel 5, FEM port 4</b>																
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
<b>DS30 channel 6, FEM port 5</b>																
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
<b>DS30 channel 7, FEM port 6</b>																
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

## Installation/Replacement Troubleshooting

The Business Communications Manager media bay modules are working when both the Power and Status LEDs on the modules are on, and are not blinking.

- If the Power LED does not light, refer to “Shut down the system” on page 110. 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 backplane. 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. Ensure the connector is clean and free from debris.
- 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 and expansion unit, refer to See Table 16 on page 129.

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## Chapter 5

# Business Communications Manager System Startup

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This chapter describes initial system startup procedures for the Business Communications Manager.

The Business Communications Manager 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 your 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 a grounded outlet.

**System startup:** You must reconnect the power cords to a grounded outlet before reconnecting the cables to the media bay modules.

---

## Check Power and Wiring

The Business Communications Manager system is available as North American and International versions. 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 and 3.0 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 Business Communications Manager platform system and expansion units before you reconnect the cabling to the front of the units.

---

- 2 Connect the Business Communications Manager 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 or Business Communications Manager expansion unit power supply cords to any building surface.

---

- 4 This procedure is complete.

## Check system power and status

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

The Power LED can indicate RED if the system is in standby mode whereby power is available, but shutdown by the operating system (when UPS) or Overtemp.

LEDs in position 3-8 will flash when the SSM is not communicating (during startup, shutdown or operating system hang).





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

**Table 16** Business Communications Manager LED states

LED Label	Description	Green LED On	Green LED Flash	Red LED On (Only)	Green LED Off
	Indicates state of all powered components.	OK	N/A	voltage irregularity or component failure	N/A
	Indicates access to the system disk drive	indicates disk drive activity	N/A	N/A	N/A
	Indicates condition of system status	all monitored services are functioning	Failure in one or more telephony service	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.
	Modem	Device is present and the driver is active	driver is not running	N/A	Device is not present.
	LAN 1	Device is present and the driver is active	driver is not running	N/A	Device is not present.
	LAN 2	Device is present and the driver is active	driver is not running	N/A	Device is not present.

**Table 16** Business Communications Manager LED states (Continued)

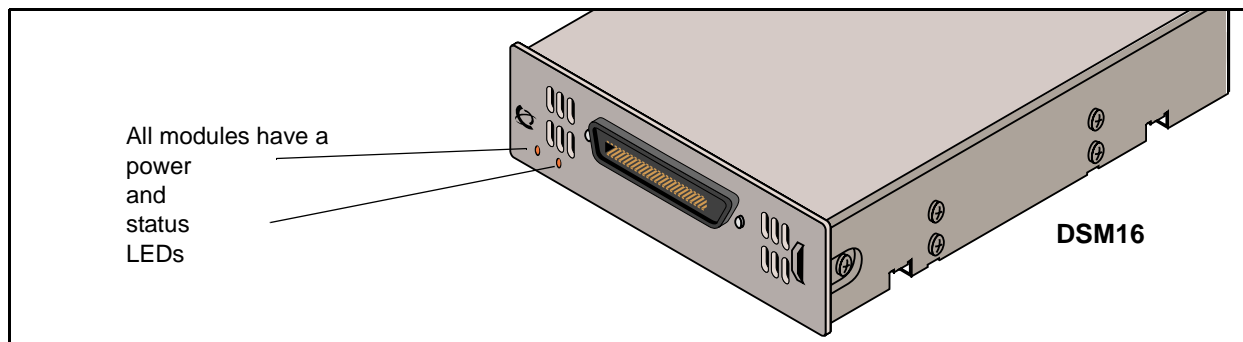
LED Label	Description	Green LED On	Green LED Flash	Red LED On (Only)	Green LED Off
	Temperature	Temperature is below threshold.	N/A	Sensor is non-operational or Temperature is out of range.	N/A
	Fans	All installed fans are working	N/A	Fan failure.	N/A

- 1 If the base function tray 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 If the Power LED is red and there is no power, use a paper-clip to select the reset button. Alternatively power cycle the system to restart.
- 3 You are now ready to connect the system to the network and initialize it.





**Note:** You can monitor the state of the Business Communications Manager LEDs from your computer. Refer to “Access the System Status Monitor to Monitor LEDs” on page 292.

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 73 shows an example of a media bay module and the LEDs on the module faceplate.

**Figure 73** Module power and status LEDs

**Table 17** 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

## Connect 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 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 before you connect any network connections.

To change the IP address outside of a network, you can use one of the following:

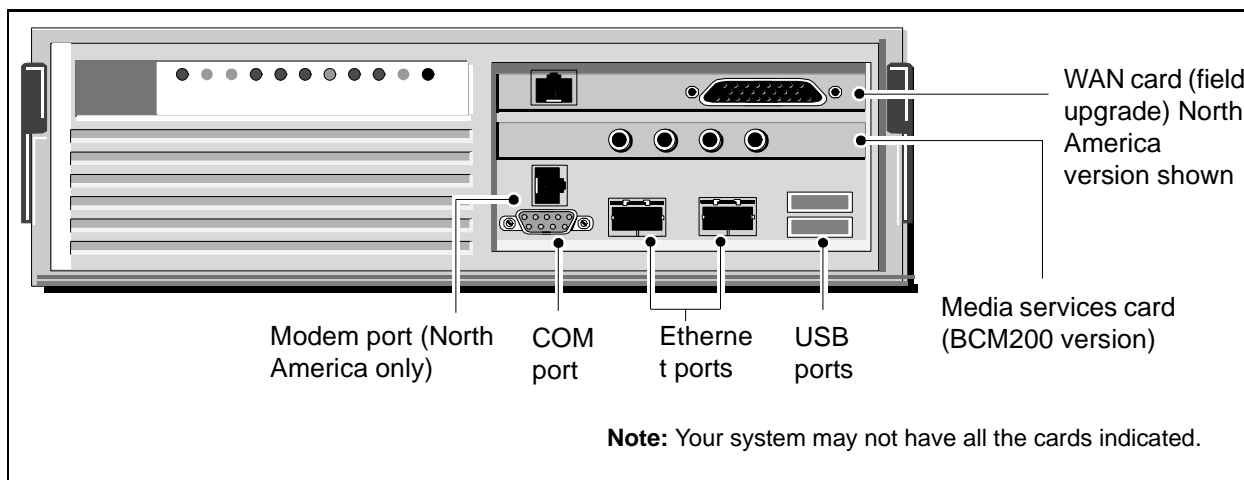
- a terminal and a null modem cable
- a computer and an ethernet crossover cable

Refer to “Use of a null modem serial cable” on page 137 or “Ethernet crossover cable usage” on page 140 for detailed instructions about connecting to the Business Communications Manager.

## Connect the cards

The data networking hardware (MSC) is installed in the Business Communications Manager at the factory. All systems have dual embedded ethernet interfaces. Some models come with an embedded V.90 modem. WAN cards and modems are ordered separately. Figure 74 shows a BCM200 configuration with a field-installed WAN card.

**Figure 74** Base function tray data cards



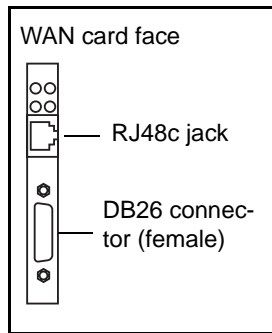
**Warning:** Do not plug the WAN or modem cables into the system unless it is running.

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 function tray and expansion unit.
- c** Remove power from the Business Communications Manager and the expansion unit.
- d** DO NOT RECONNECT the cables to the front of the units until the power connection has been restored.



## Connect wiring to the WAN card



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 the WAN card.

For information about the location of the WAN card, refer to Figure 74 on page 132.

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 18 shows the wire connections for a DB25 adapter cable.

**Table 18** DB25 adapter cable

DB26 on WAN card	Signal	DB25 cable
1	Chassis Ground	1
2	Transmit Data	2
3	Receive Data	3
4	Request to Send	4
5	Clear to Send	5
6	Data Set Ready	6
7	Signal Ground/ Common Return	7
8	Data Carrier Detect	8
9		9
10		10
11		11
12		12
13		13

DB26 on WAN card	Signal	DB25 cable
14		14
15	Transmit Clock	15
16		16
17	Receive Clock	17
18		18
19		19
20	Data Terminal Ready	20
21		21
22		22
23		23
24	External Clock	24
25		25
26		

## Connect wiring to the modem

Ensure the system is powered up before connecting this cable.

To connect the modem, insert a PSTN line into the Line jack on the base function tray modem interface. For information about the location of the modem interface, refer to Figure 74 on page 132.

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

Table 19 shows the wire connections for a RS-422/EIA 530 cable

**Table 19** RS-422/EIA 530 adapter cable

DB26 on WAN card	Signal	RS-422/EIA 530 cable
1	Protective Ground	1
2	Transmit Data A	2
3	Receive Data A	3
4	Request to Send A	4
5	Clear to Send A	5
6	Data Set Ready A	6
7	Signal Ground	7
8	Data Carrier Detect A	8
9	Receive Clock B	9
10	Data Carrier Detect B	10
11	External Clock B	11
12	Transmit Clock B	12
13	Clear To Send B	13

DB26 on WAN card	Signal	RS-422/EIA 530 cable
14	Transmit Data B	14
15	Transmit Clock A	15
16	Receive Data B	16
17	Receive Clock A	17
18		18
19	Request To Send B	19
20	Data Terminal Ready A	20
21		21
22	Data Set Ready B	22
23	Data Terminal Ready B	23
24	External Clock A	24
25		25
26		

Table 20 shows the wire connections for a V.35 adapter cable.

**Table 20** V.35 Adapter Cable

DB26 on WAN card	Signal	V.35 cable
1	Protective Ground	A
2	Transmit Data A	P
3	Receive Data A	R
4	Request to Send	C
5	Clear to Send	D
6	Data Set Ready	E
7	Signal Ground	B
8	Data Carrier Detect	F
9	Receive Clock B	X
10		
11	External Clock B	W
12	Transmit Clock B	AA
13		

DB26 on WAN card	Signal	V.35 cable
14	Transmit Data B	S
15	Transmit Clock A	Y
16	Receive Data B	T
17	Receive Clock A	V
18		
19		
20	Data Terminal Ready	H
21		
22		
23		
24	External Clock A	U
25		
26		

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

**Table 21** DB15 X.21 adapter cable

DB26 on WAN card	Signal	DB15 X.21 cable
1	Chassis Ground	1
2	Transmit Data A	2
3	Receive Data A	4
4	Request to Send A	3
5	Clear to Send A	5
6		
7	Signal Ground	8
8		
9	Receive Clock B	13
10		
11	External Clock B	14
12		
13	Clear To Send B	12

DB26 on WAN card	Signal	DB15 X.21 cable
14	Transmit Data B	9
15		
16	Receive Data B	11
17	Receive Clock A	6
18		
19	Request To Send B	10
20		
21		
22		
23		
24	External Clock A	7
25		
26		

## Install the cards

Refer to Chapter 10, “Replace Data Cards and Processing Hardware,” on page 217 for the removal and installation process for these cards.

## Initialize 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 3.0 Programming Operations Guide*, and the other user guides for each optional application you choose to add to your system.

## Data parameter requirements

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. 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 “Use of a null modem serial cable” on page 137.
- a computer and an Ethernet crossover cable. Refer to “Ethernet crossover cable usage” on page 140.

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 3.0, Programming Operations Guide*

### Use of a null modem serial cable

You must use a null modem cable connection to the Business Communications Manager base function tray 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



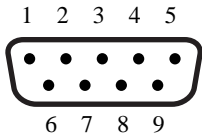
**Warning:** Your terminal must be VT100-compatible and must support the VT100 National Character set. If the terminal does not support the National Character set, the text displays incorrectly.

---

## Null modem cable setup

Table 22 shows the correct wiring for the Business Communications Manager serial port of the null modem cable.

**Table 22** Serial port pinout

Figure 75 Serial pinout		Pin	Signal	Pin	Signal
		1	Data Carrier Detect (DCD)	6	Data Set Ready (DSR)
		2	* Serial data in (RX)	7	Request to Send (RTS)
		3	* Serial data out (TX)	8	Clear to Send (CTS)
		4	Data Terminal Ready (DTR)	9	Ring Indicator (RI)
		5	* Ground		
		* 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.

## Display the configuration menus

To perform this procedure, the Business Communications Manager must be correctly powered up, as described in “Check system power and status” on page 129.

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

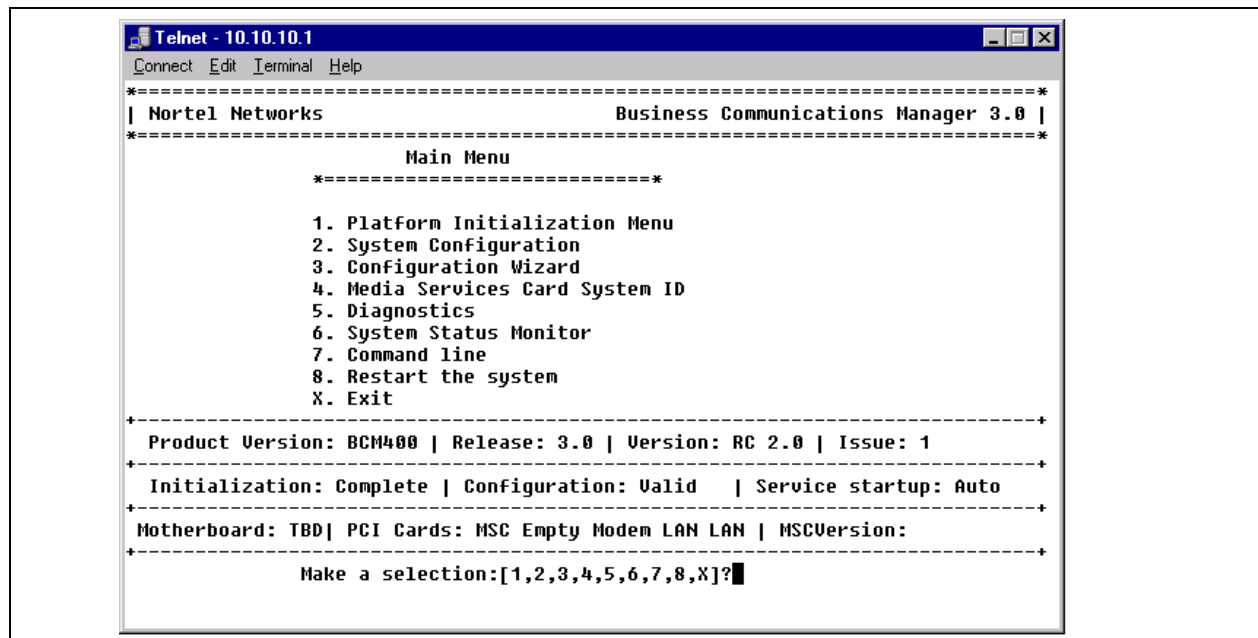


**Note:** The location of the transmit (TX) and receive (RX) pins on your terminal can vary. Refer to your terminal or computer documentation to confirm pin locations.

- 2 Attach the other end of the null modem cable to the serial port on the terminal or computer.
- 3 Ensure that the Business Communications Manager 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 76.

**Figure 76** Main Menu



**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 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 3.0 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 and expansion unit.

---

## Ethernet crossover cable usage

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. 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.

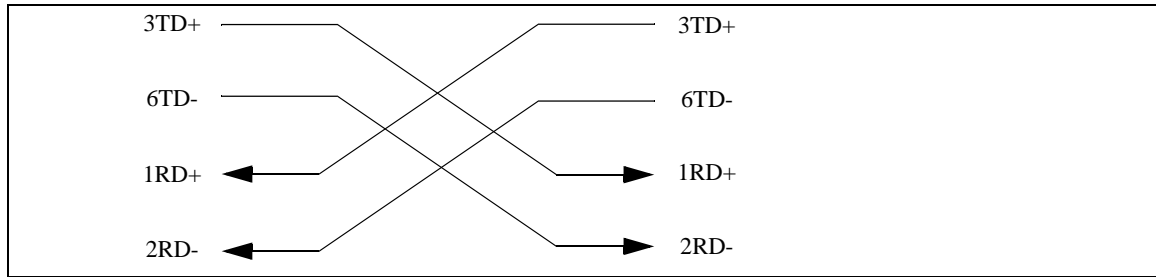
You use this type of connection in these situations:

- 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

### Set 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 77 shows the connections required.



**Figure 77** Ethernet crossover cable

## Configure 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.

## Connect the Ethernet crossover cable

After you configure the computer, connect the computer to the Business Communications Manager base function tray 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.
- 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 3.0 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.

---

## Enter the software keycodes

If you have purchased any of the optional Business Communications Manager applications that require keycode activation, refer to *Business Communications Manager 3.0 Software Keycode Installation Guide*. The guide provides information about how to obtain the keycodes from the Nortel Networks Keycode Retrieval System (KRS) and how to enter them into the Unified Manager. These codes can be entered after basic system configuration is complete.

## Regenerating keycodes after system replacement

If you replace your media services card (MSC), you need to regenerate all your keycodes to reflect the new system identification. Enter the keycodes after you perform your system data restore. Access the Nortel Networks Keycode Retrieval System (KRS) website for information on how to regenerate keycodes.

---

## Chapter 6

# Prepare Hardware for Maintenance or Upgrades

---

This chapter describes how to prepare the Business Communications Manager system for maintenance activities. The following topics are covered in this chapter:

- Precautions
- Tools
- System shutdown and startup
- Platform base chassis maintenance procedures (remove & install the Base function tray, Advanced function tray, chassis cover)

## Precautions

Before you replace or update any hardware on the Business Communications Manager system, disconnect the system from the trunk lines.

Remove the top cover to access the standard power supply, I/O card or backplane components. For fan, hard disk or power supply maintenance, remove the appropriate chassis panels. Remove the base function tray to replace any PCI cards. Remove the advanced function tray from the BCM400 platform base chassis to replace or upgrade the hard disk. If applicable, remove the platform base chassis from a server rack.

Observe the following precautions when working inside the Business Communications Manager system. Maintain a clean and static-safe site..



**Danger:** Electrical shock warning.

Disconnect the power cord, telephone cables and network cables before opening the Business Communications Manager platform base chassis. Read and follow installation instructions carefully.

---



**Danger:** Electrical shock warning.

Partially remove the power supply module from the power supply cage. Do not completely remove the power supply module. **IMPORTANT:** Wait several seconds before removing the power supply module completely from the power supply cage to ensure complete electrical discharge.

---



**Caution:** Use only a Nortel Networks approved replacement. Contact your account representative for the current list of approved replacement parts.

---



**Warning:** Maintain a current backup of your system.

When you replace the hard disk, you must restore the Business Communications Manager system programming from the backup.



**Caution:** Do not use an electric or magnetized 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.



**Warning:** You must remove all of the connections to the Business Communications Manager base function tray before you power the system down.

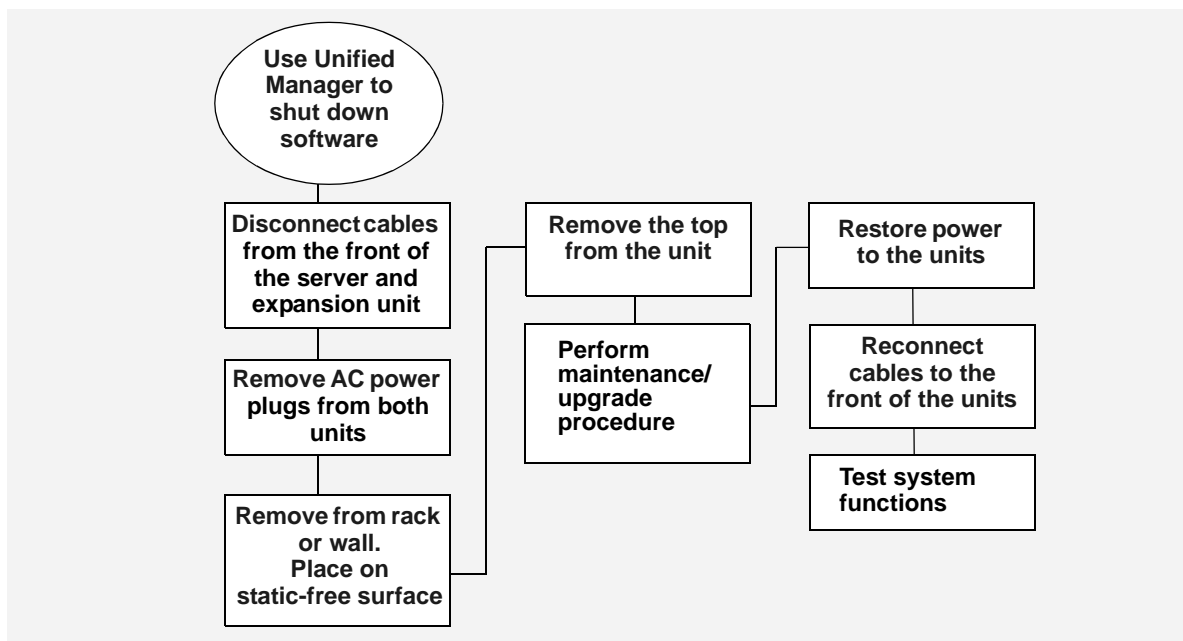
Failure to disconnect lines before power down can cause damage to the system.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

Figure 78 provides an overview of the process for preparing the Business Communications Manager hardware for maintenance or upgrade procedures.

**Figure 78** Prepare 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 wrist 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.

---

## Controlled System Shutdown

Use the procedures described in this section to perform a controlled software and hardware system shutdown.

The Business Communications Manager system requires a controlled shutdown to guarantee the integrity of the file system. The procedures in this section assume you have access to the Unified Manager.

If a controlled shutdown is not possible, disconnect the power cord from the AC power outlet power-down the Business Communications Manager.

### Shut down the system software

Use this procedure to ensure a safe shutdown of the Business Communications Manager software 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.
- 12 This procedure is complete.

## Shut down the system hardware

Perform the procedure: “Shut down the system software” on page 145 before attempting this procedure.



**Warning:** Remove all of the connections to the Business Communications Manager before you power the system down.

Failure to disconnect lines before power down can cause damage to the system.

---

Use this procedure to ensure a safe shutdown of the Business Communications Manager hardware system.

- 1 Remove the DS256 cables from the front of the Business Communications Manager and expansion unit, if there is one. This includes the data connections on the MSC.  
Mark the cables to ensure correct reconnection.
- 2 Disconnect the Business Communications Manager and expansion unit power cords from the AC outlet.



**Warning:** You must disconnect power from the base platform after you have performed a Unified Manager shutdown. The platform base chassis, 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 Business Communications Manager platform base chassis from the rack, if necessary.
- 4 This procedure is complete.

## Restart the System after Maintenance

When you finish your power-off maintenance procedure, restart the Business Communications Manager system in the order described in this section.

### Restore the System to Operation

To restore the system to operation after maintenance activities, follow these steps:

- 1 Ensure that all cables inside the housing are connected snugly to the correct boards and excess cable bundled neatly, out of the way.
- 2 Replace the bezel on the Business Communications Manager platform base chassis, if you removed it.
- 3 Replace the platform base chassis top cover and replace the screws.
- 4 If you removed the Business Communications Manager from the rack or wall, replace it.
- 5 Plug the expansion unit, if there is one, into the AC power source.
- 6 Plug the Business Communications Manager 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 several minutes to complete.
- 8 This procedure is complete.

### Software Restart

Use this procedure to perform a software reboot. If you did not shut the system power down, restart the software.

- 1 Refer to “Shut down the system software” until you get to step 7.
- 2 At this point, select **Reboot** on the **Logoff** menu.
- 3 Continue with the instructions shown on the display terminal.
- 4 This procedure is complete.

## Base Function Tray Maintenance Procedures

The base function tray contains the core processing components. To prepare for base function tray removal, perform a software and hardware shutdown. Use the Unified manager interface to properly deactivate and isolate the Business Communications Manager from the network. Set up the server for maintenance, as described in “Shut down the system hardware” on page 146.

Use this procedure only under the following conditions:

- to replace the MSC, modem, memory DIMMs, battery, PEC III, or WAN (if applicable)
- to replace the base function tray. Remove the components from the old base function tray and install in the replacement base function tray.



**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.

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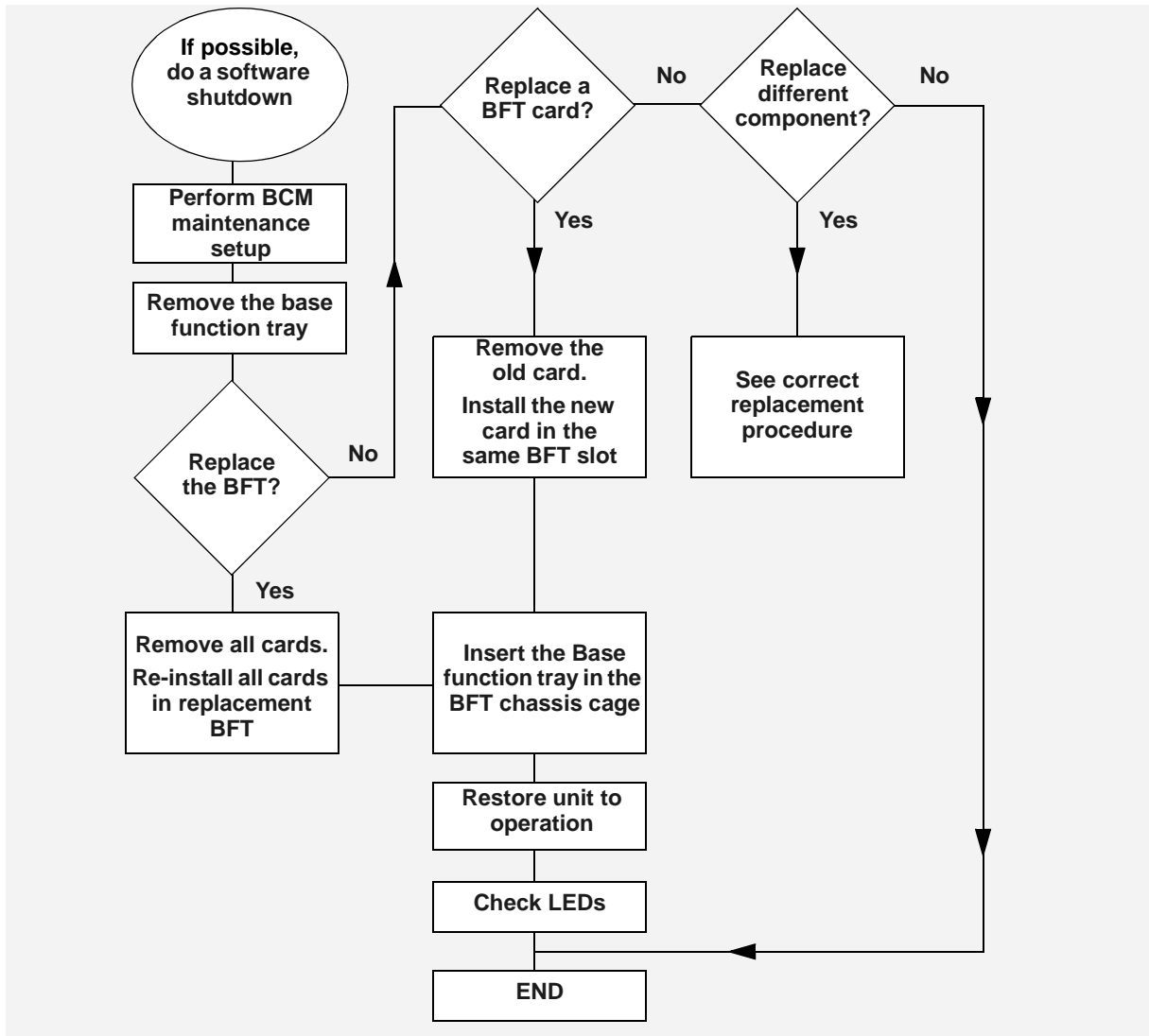


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

---

Use the flow chart shown in Figure 79 as a summary guide to replace the base function tray.



**Figure 79** Base function tray replacement overview

## Remove the base function tray

This procedure describes how to remove the base function tray to perform maintenance or replacement activities.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

---



**Warning:** Use care when removing or inserting the Base function tray. Do not forcefully remove or insert the base function tray. You could damage or stretch the cables.

---

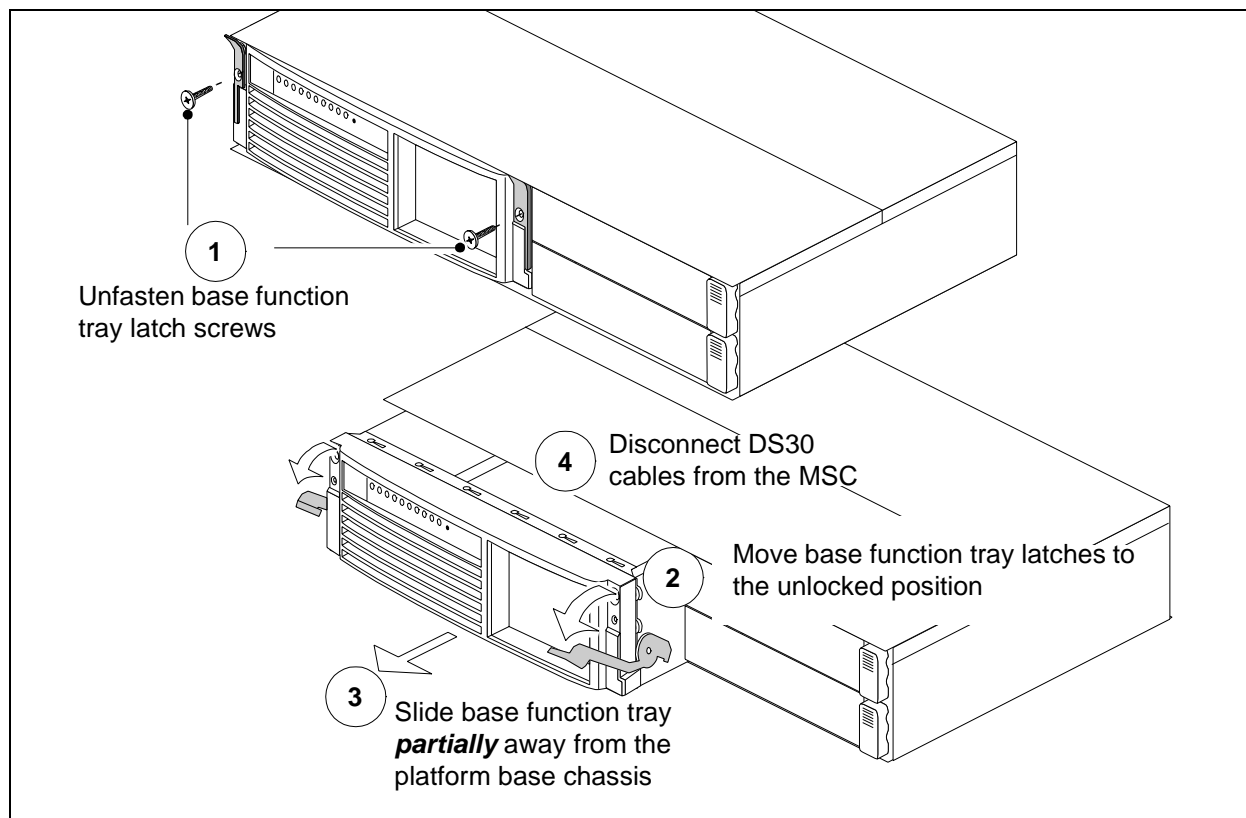


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

---

Use the following steps to remove the base function tray from the platform base chassis:

- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the server for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the Business Communications Manager from the AC power outlet.
- 4 Disconnect any connectors from the front of the base function tray.
- 5 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 6 Remove the platform base chassis top cover. Refer to “Remove the platform base chassis top cover” on page 161.
- 7 Remove the base function tray latch screws and place in a safe location.
- 8 Move the base function tray latches to the unlocked position. See Figure 80.
- 9 Grasp the base function tray latches and partially remove the base function tray from the platform base chassis. Do not exert force on the DS30 cables or connectors.
- 10 Disconnect DS30 cable connectors from the media services card. If necessary, remove the WAN card to access the DS30 cables, see “Remove the WAN card” on page 219.

**Figure 80** Remove the base function tray

- 11** Remove the base function tray completely from the platform base chassis. Remove the base function tray carefully to prevent damage to the cables and connectors.
- 12** Place the base function tray on a flat, clean and static-free surface.
- 13** This procedure is complete.

## Install the base function tray

Use this procedure to insert the base function tray in the platform base chassis.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container or work area.

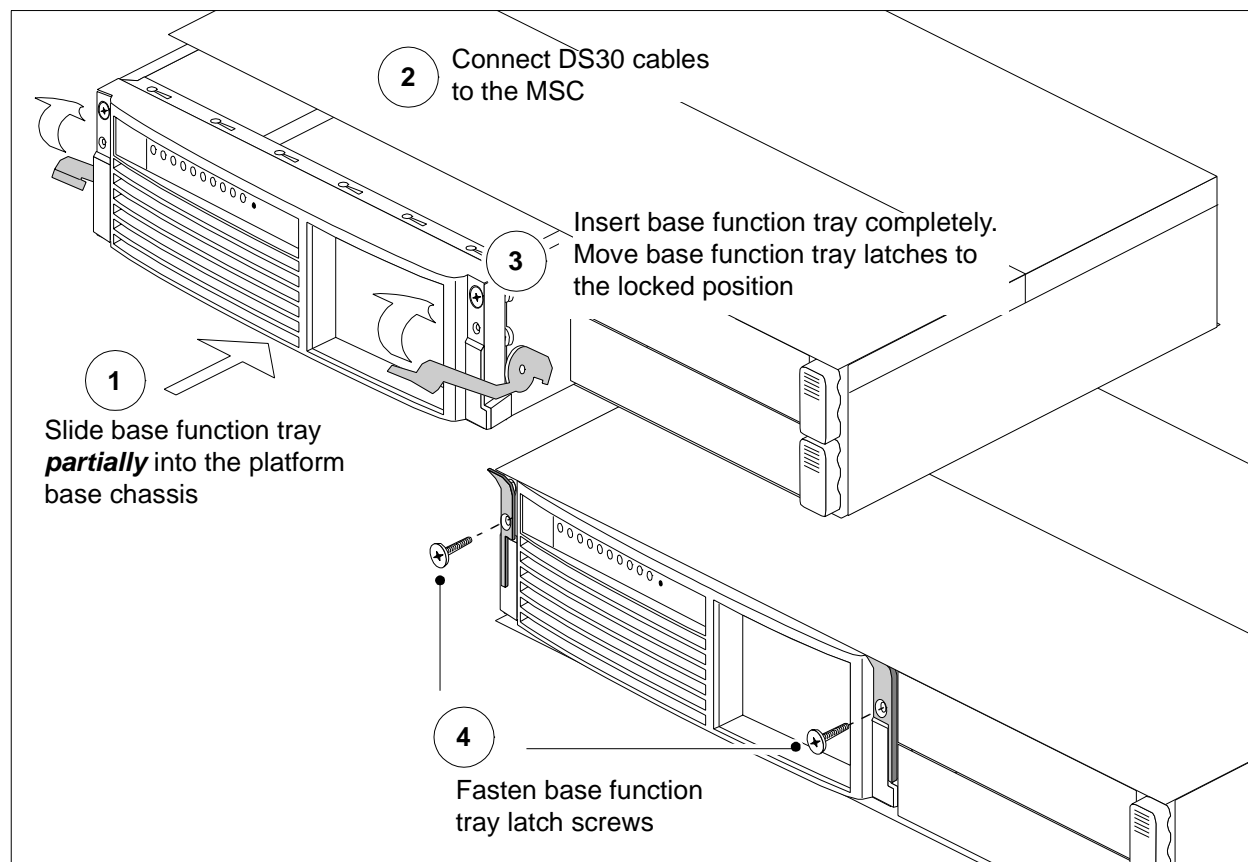


**Warning:** Use care when removing or inserting the Base function tray. Do not forcefully remove or insert the base function tray. You could damage or stretch the cables.

- 1** Disconnect the Business Communications Manager from the AC power outlet.
- 2** Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.

- 3 Move the base function tray latches to the unlocked position.
- 4 Position the base function tray in the correct platform base chassis bay.
- 5 Partially insert the base function tray into the platform base chassis (see Figure 81).
- 6 Connect the DS30 connectors to the MSC. If necessary, install the WAN card (see “Install the WAN card” on page 221 - return to this step when complete).
- 7 If required, install the base function tray bezel (see “Install the base function tray bezel” on page 154). Return to this step when complete.
- 8 Push the base function tray completely into the chassis. Be careful not to crimp the DS30 cables.
- 9 Move the base function tray latches to the locked position.
- 10 Install the base function tray latch screws.

**Figure 81** Install the base function tray



- 11 Insert all connectors in the correct locations on the base function tray face.
- 12 Restore the Business Communications Manager system to operation. See: “Restart the System after Maintenance” on page 147.
- 13 Observe the system status monitor LEDs to ensure the base function tray initializes correctly.
- 14 This procedure is complete.

## Remove the base function tray bezel

Use this procedure to remove the base function tray bezel. Remove the base function tray bezel to remove or install the PCI cover plate (during processor card removal or installation).



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

---



**Warning:** Use care when removing or inserting the Base function tray. Do not forcefully remove or insert the base function tray. You could damage or stretch the cables.

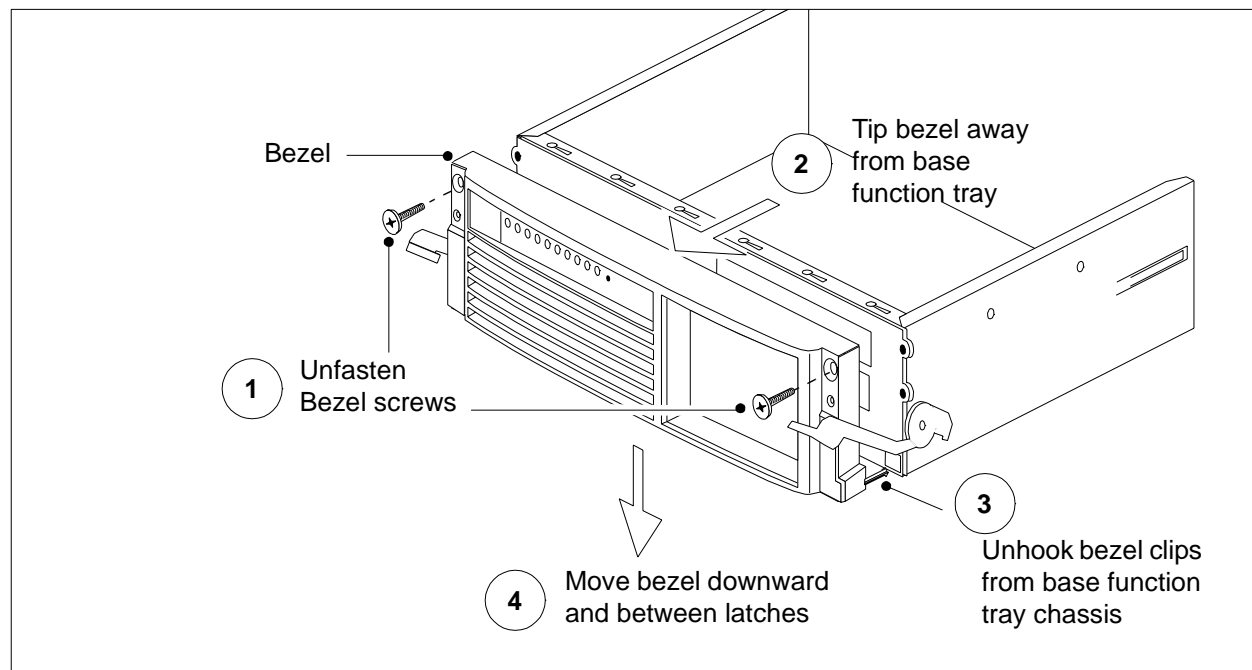
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**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

---

- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the server for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the Business Communications Manager from the AC power outlet.
- 4 Disconnect any connectors from the front of the base function tray.
- 5 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 6 Remove the base function tray latch screws and place in a safe location.
- 7 Move the base function tray latches to the unlocked position. See Figure 80.
- 8 Grasp the base function tray latches and partially remove the base function tray from the platform base chassis. Do not exert force on the DS30 cables or connectors.
- 9 Unfasten the bezel screws from the base function tray face. Place the screws in a safe location.
- 10 Pull and tip the bezel away from the base function tray until the bezel clips are clear of the base function tray chassis. Move the bezel in a downward direction between the base function tray latches. Place the bezel in a safe location. See Figure 82.

**Figure 82** Remove the base function tray bezel

**11** This procedure is complete.

## Install the base function tray bezel

Use this procedure to install the base function tray bezel.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container or work area.

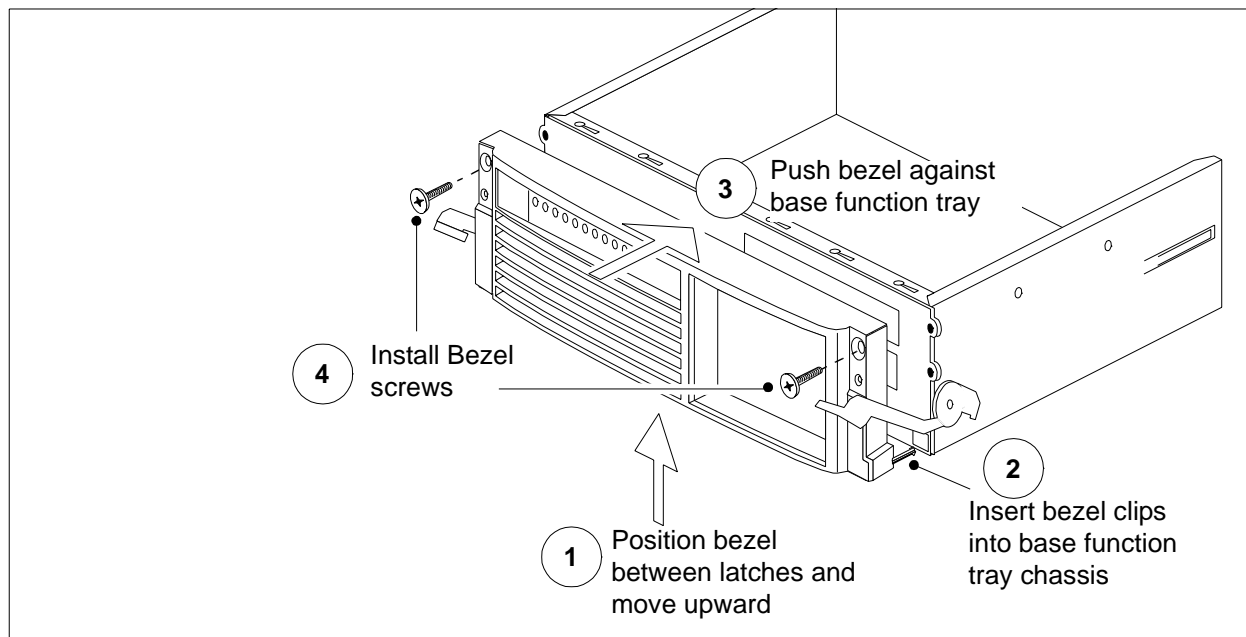


**Warning:** Use care when removing or inserting the Base function tray. Do not forcefully remove or insert the base function tray. You could damage or stretch the cables.

- 1** Disconnect the Business Communications Manager from the AC power outlet.
- 2** Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 3** Remove the base function tray latch screws (if applicable). Place the screws in a safe location.
- 4** Move the base function tray latches to the unlocked position.
- 5** Position the bezel below and between the base function tray latches. Lift the bezel until the bezel clips line-up with the corresponding base function tray bezel holes.
- 6** Tilt the bezel forward, then push the bottom of the bezel into the base function tray chassis to engage the bezel clips.

- 7 Push on the face of the bezel so that it rests flush with the face of the base function tray chassis.
- 8 Install the base function tray bezel screws. See Figure 83.

**Figure 83** Install the base function tray bezel



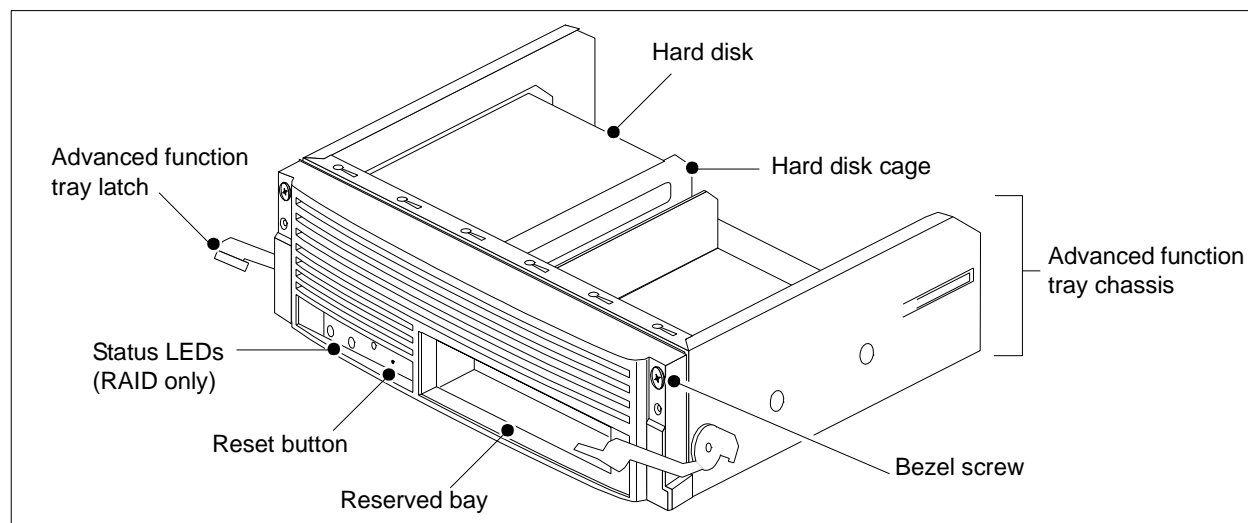
- 9 If required, install the base function tray in the platform base chassis. Refer to “Install the base function tray” on page 151. Continue to the next step of this procedure when complete.
- 10 This procedure is complete.

## Advanced Function Tray Maintenance Procedures

This procedure applies only to the BCM400 platform. This procedure describes how to remove and install the advanced function tray in the platform base chassis. Use this procedure for maintenance purposes.

The advanced function tray (AFT) houses the hard disk or RAID components for the BCM400 platform (see Figure 84). For further information see also “BCM400 advanced function tray (AFT)” on page 50.

**Figure 84** Advanced function tray



For information on how to replace the hard disk, refer to “Remove a hard disk cage from a BCM400 platform base chassis” on page 168.



**Danger:** Electrical shock warning.

Disconnect the power cord, telephone cables and network cables before opening the Business Communications Manager platform base chassis. 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.



**Warning:** Use care when removing or inserting the advanced function tray. Do not forcefully remove or insert the advanced function tray. You could damage or stretch the cables.

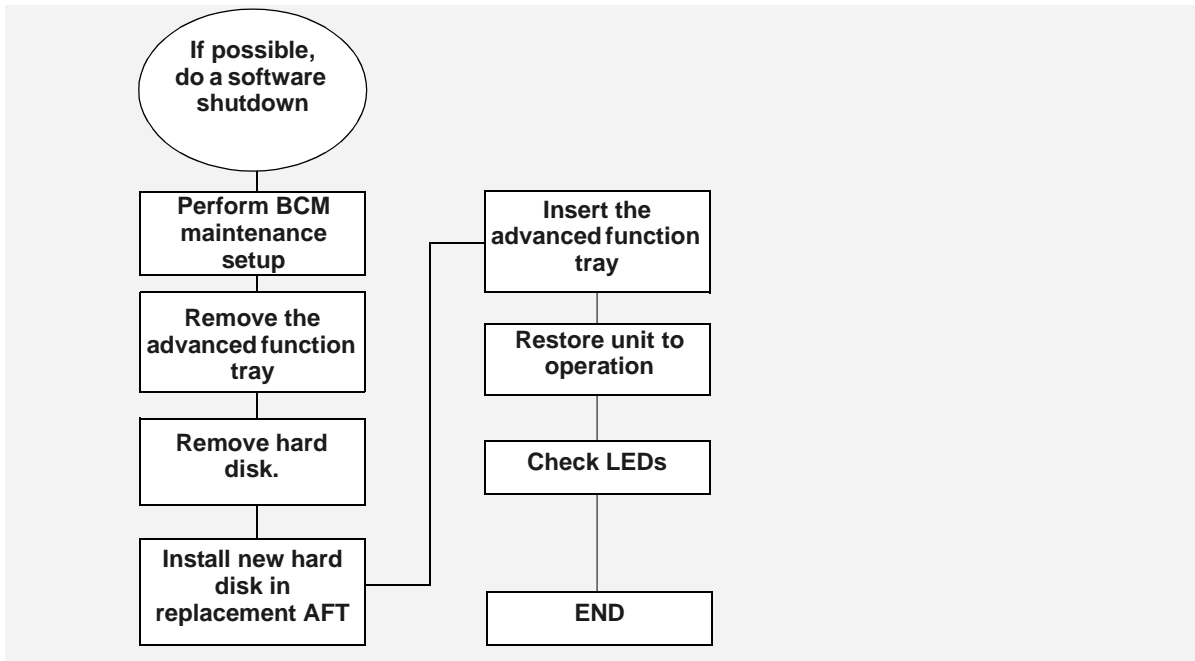


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container or work area.



Use the flow chart shown in Figure 85 as a summary guide to maintain the advanced function tray.

**Figure 85** Advanced function tray replacement overview



## Remove the advanced function tray

Use this procedure to remove the advanced function tray from the BCM400 platform base chassis.



**Warning:** Use care when removing or inserting the advanced function tray. Do not forcefully remove or insert the advanced function tray. You could damage or stretch the cables.

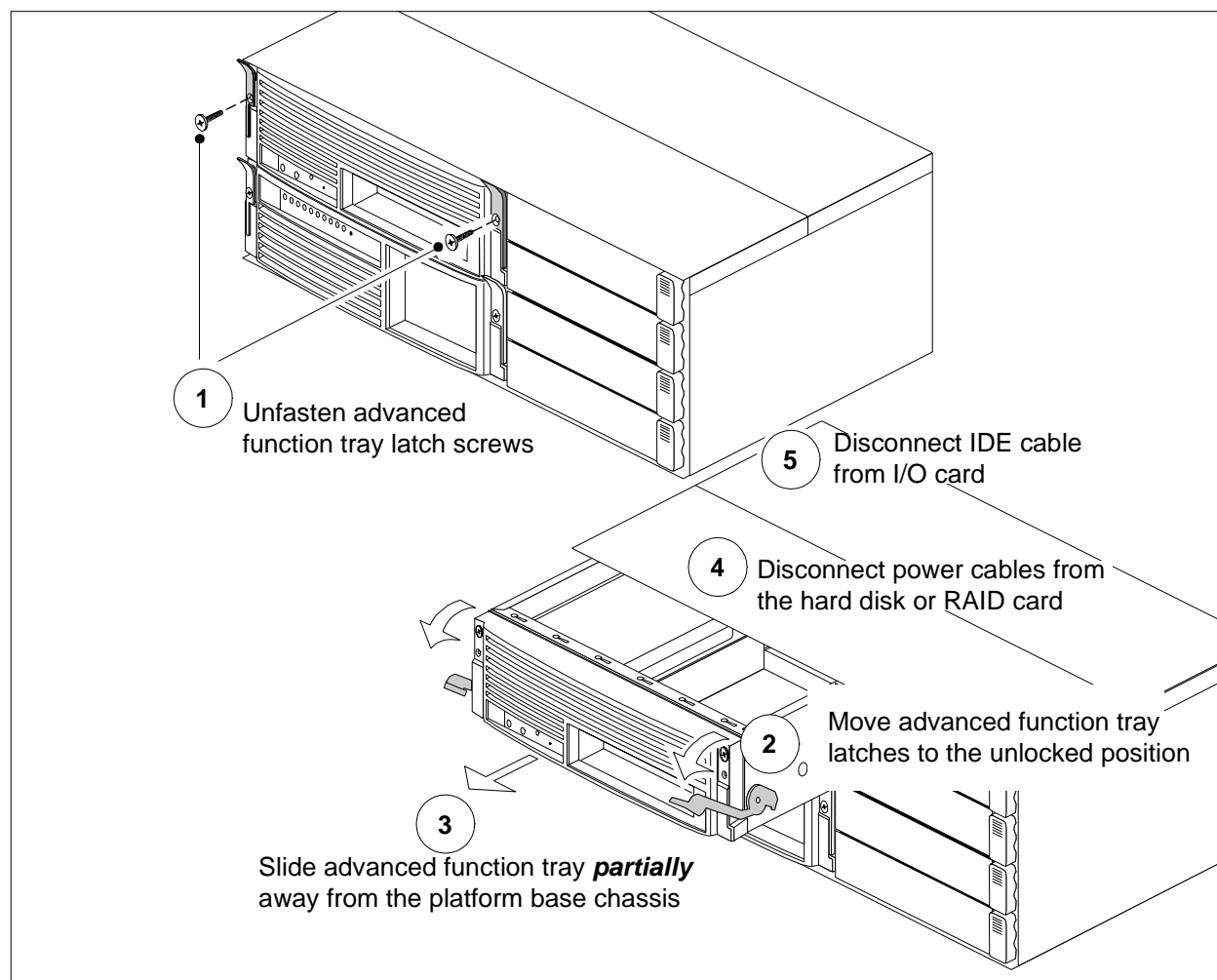


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container or work area.

- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the server for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the Business Communications Manager from the AC power outlet.
- 4 Remove the platform base chassis top cover (see “Remove the platform base chassis top cover” on page 161). Return to this step when complete.

- 5 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 6 Remove the advanced function tray latch screws (see Figure 86). Place the screws in a safe location.
- 7 Move the advanced function tray latches to the unlock position.
- 8 Grasp the advanced function tray latches and partially remove the unit from the platform base chassis. Do not exert force on the hard disk power cables and connectors.
- 9 Disconnect hard disk power cable connectors.
- 10 Disconnect the IDE connector.
- 11 Remove the advanced function tray completely from the platform base chassis.
- 12 Place the advanced function tray on a flat, clean and static-free surface. If you need to remove the hard disk component, refer to See “Remove a hard disk cage from a BCM400 platform base chassis” on page 168

**Figure 86** Remove the advanced function tray



- 13 This procedure is complete.

## Install the advanced function tray

Use this procedure to install the advanced function tray in the platform base chassis.



**Warning:** Use care when removing or inserting the advanced function tray. Do not forcefully remove or insert the advanced function tray. You could damage or stretch the cables.

---

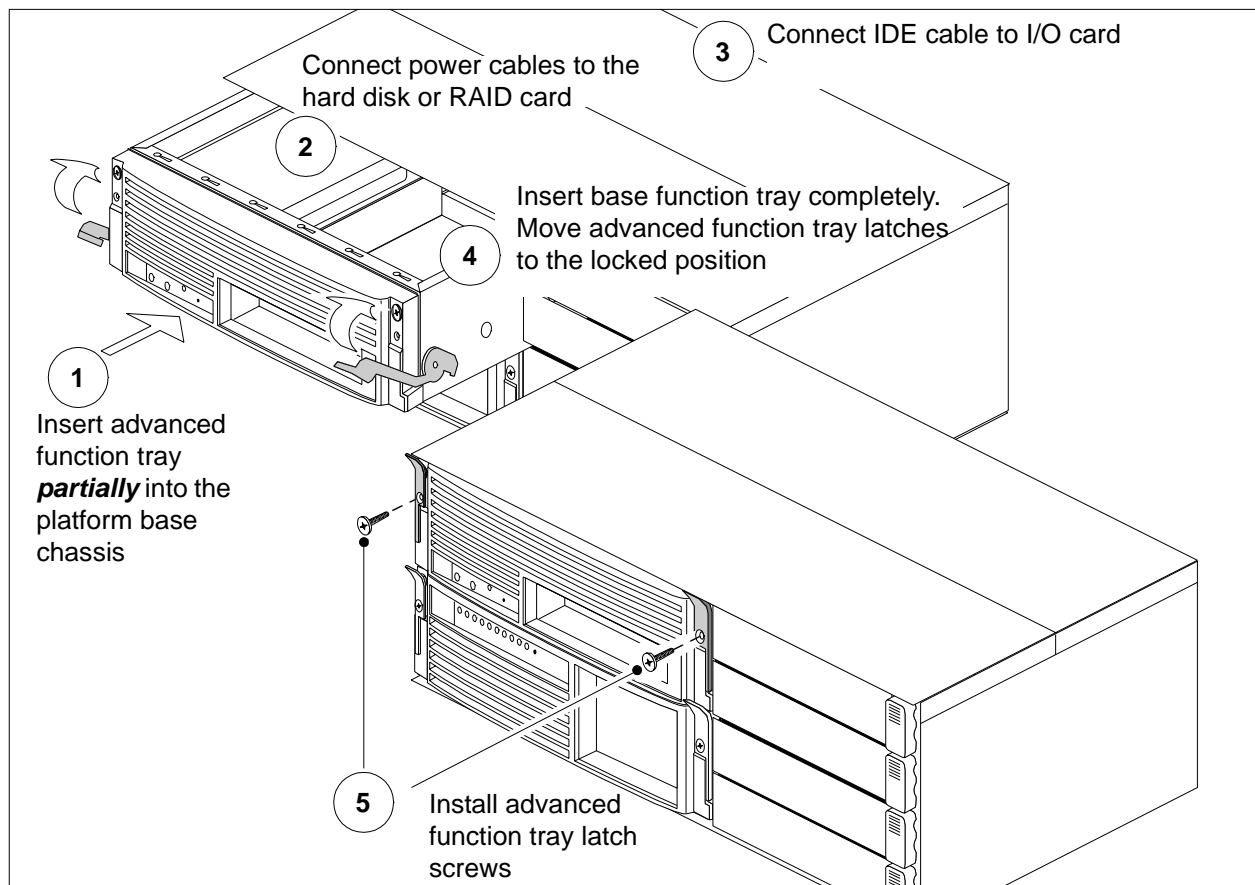


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container or work area.

---

- 1 Disconnect the Business Communications Manager from the AC power outlet.
- 2 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 3 Remove the platform base chassis top cover - see “Remove the platform base chassis top cover” on page 161.
- 4 Remove the advanced function tray latch screws. Place the screws in a safe location. If the screws are already removed, skip to the next step.
- 5 Move the advanced function tray latches to the unlocked position.
- 6 Position the advanced function tray in the correct platform base chassis slot.
- 7 Partially insert the advanced function tray into the platform base chassis (see Figure 87).
- 8 Connect the hard disk power cable connectors. Use the first connector. Tuck any excess cable under the hard disk.
- 9 Connect the IDE connector.
- 10 Push the advanced function tray completely into the chassis. Be careful not to crimp the cables (see Figure 87).
- 11 Move the advanced function tray latches to the locked position.
- 12 Install the advanced function tray latch screws.
- 13 Install the platform base chassis top cover. Refer to “Install the Platform Base Chassis Top Cover” on page 163.
- 14 Restore the Business Communications Manager to operation. See: “Restart the System after Maintenance” on page 147.
- 15 Observe the system status display LEDs to ensure the advanced function tray initializes correctly.

**Figure 87** Install the advanced function tray



**16** This procedure is complete.

## Remove and Install the Platform Base Chassis Top Cover

Use the procedures in this section to either remove or install the top cover of the platform base chassis. You must remove the top cover to access the cabling or hardware components such as standard power supply, I/O card or backplanes.

### Remove the platform base chassis top cover

Use this procedure to remove the top cover of the BCM200 or BCM400 platform base chassis. This procedure assumes that you intend to perform maintenance activities. Do not operate the Business Communications Manager with the top cover removed. Do not leave the top cover removed for extended periods of time.

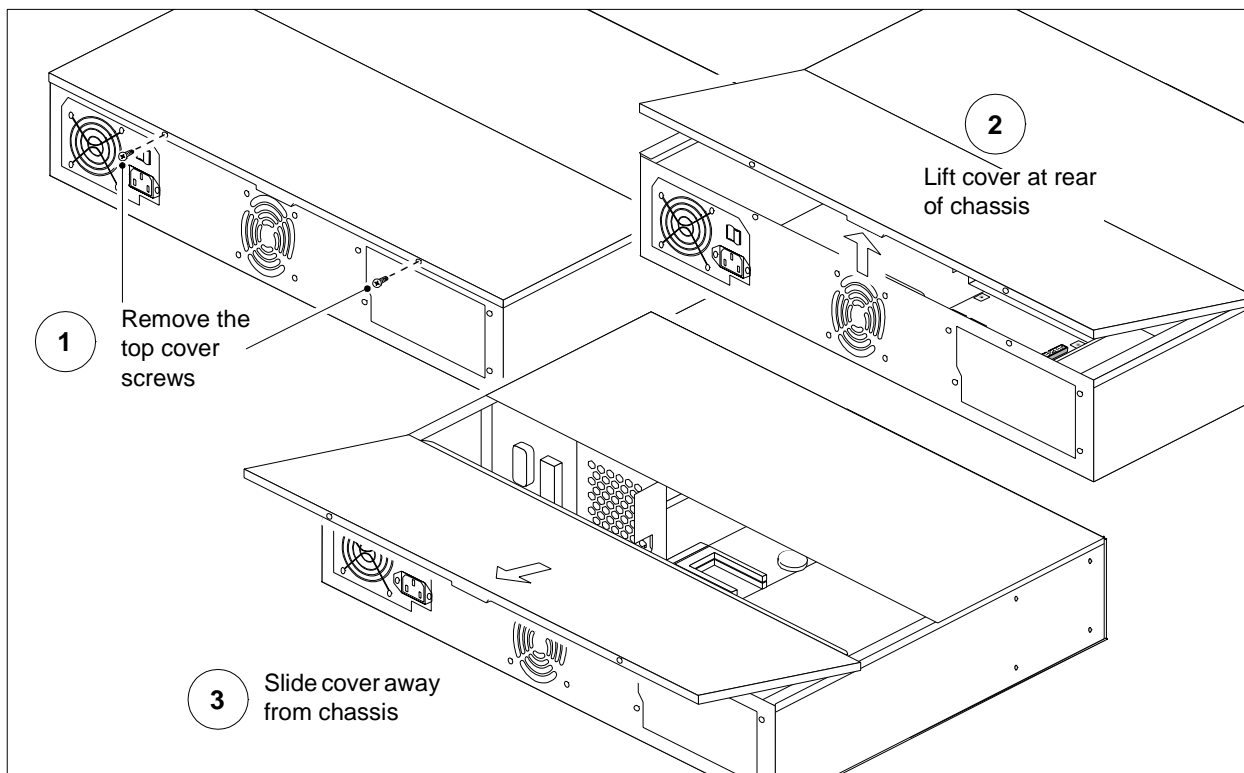


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container or work area.

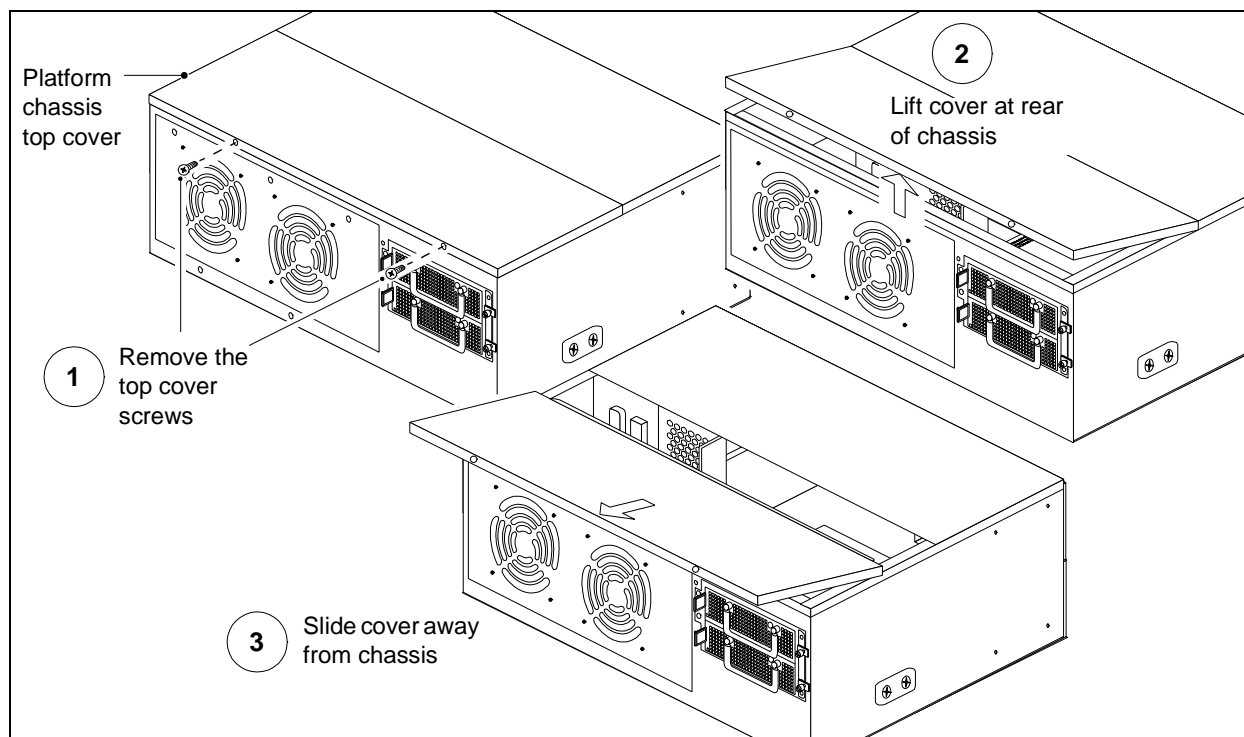
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- 1** If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2** Set up the server for maintenance, as described in “Shut down the system hardware” on page 146.
- 3** Disconnect the Business Communications Manager from the AC power outlet.
- 4** If required, remove the platform base chassis from the server rack.
- 5** Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 6** Remove the two top cover screws located at the rear of the platform base chassis. Place the screws in a safe location.
- 7** Lift the back of the cover and slide rear-ward until it disengages from the platform base chassis. Refer to Figure 89 or Figure 89.
- 8** Lift the top cover up and away from the platform base chassis. Place the cover in a safe location.

**Figure 88** Remove the BCM200 top cover



**Figure 89** Remove the BCM400 top cover



**9** This procedure is complete.

## Install the platform base chassis top cover

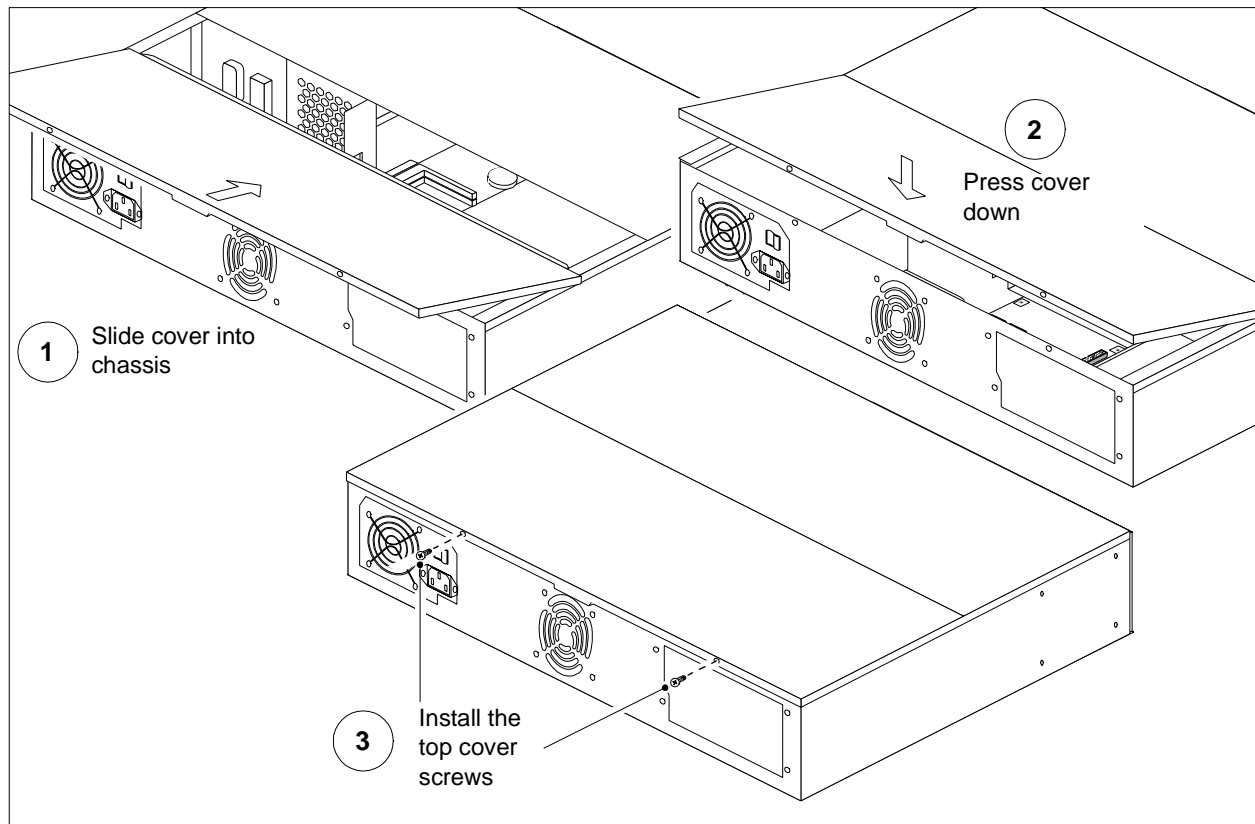
Use this procedure to install the top of the platform base chassis cover. This procedure assumes that maintenance or installation activities are complete and that you are ready to start the Business Communications Manager.



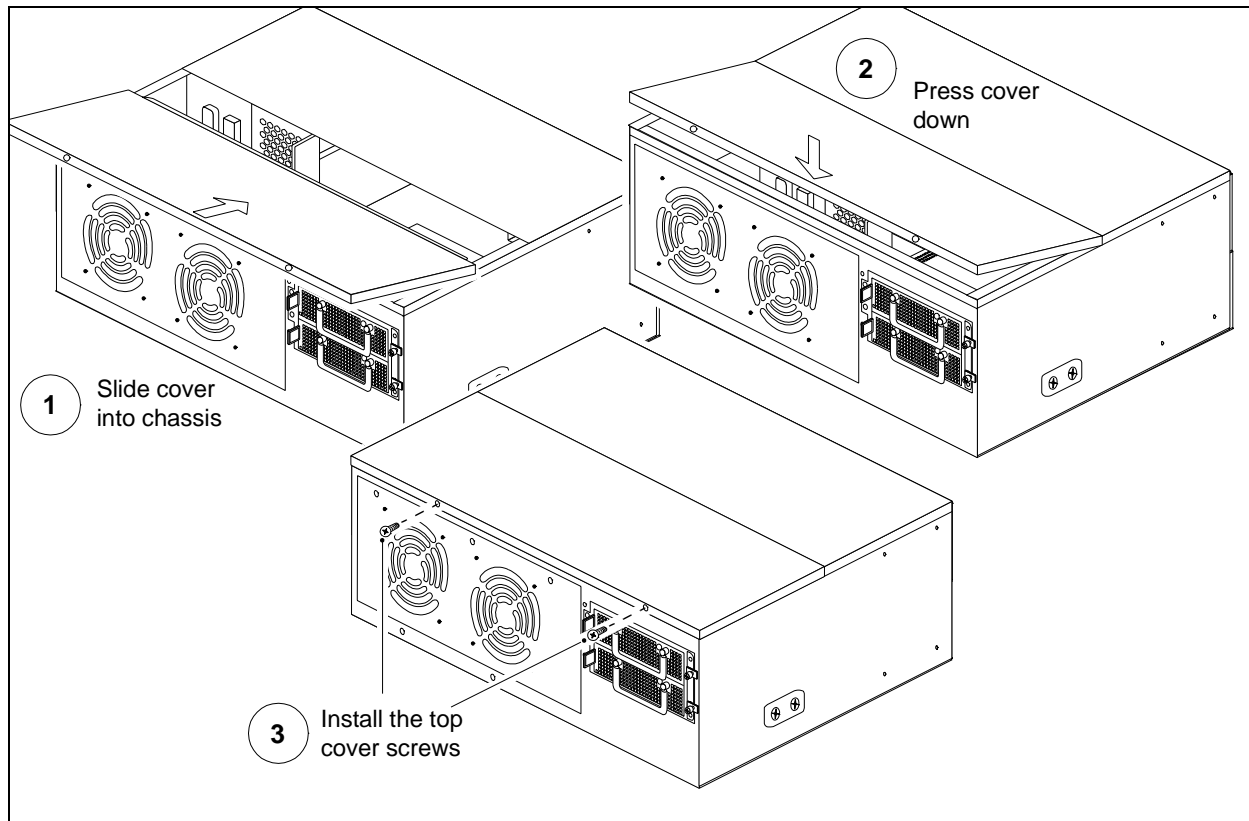
**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container or work area.

- 1 Disconnect the Business Communications Manager from the AC power outlet.
- 2 If required, remove the platform base chassis from the server rack.
- 3 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 4 Set the top cover on the platform base chassis.
- 5 Slide the top cover forward until the cover engages with the platform base chassis.
- 6 Press the top cover down until it rests on the chassis. Refer to Figure 90 or Figure 91.
- 7 Install the two top cover screws at the rear of the platform base chassis.

**Figure 90** Install the BCM200 top cover



**Figure 91** Install the BCM400 top cover



**8** This procedure is complete.



---

## Chapter 7

# Hard Disk Replacement Procedures

---

The hard disk is a core software and data storage component. For BCM200 platform base configurations, the hard disk assembly installs at the rear of the platform base chassis. For BCM400 platform base configurations, the hard disk assembly installs in the advanced function tray (AFT) chassis.

The standard Business Communications Manager configuration includes one factory-installed hard disk. The RFO Configuration includes 2 hard disks and RAID controller card. The field upgrade includes a mirror hard disk and RAID controller card.

Use this procedure under the following conditions:

- if you need to replace an existing hard disk
- if you need to upgrade to RAID

Remember to take suitable precautions when working inside the Business Communications Manager system. Maintain a clean and static-safe site.



**Danger:** Electrical shock warning.

Disconnect the power cord, telephone cables and network cables before opening the Business Communications Manager platform base chassis. 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.

---



**Warning:** Maintain a current backup of your system.

When you replace the hard disk, you must restore the Business Communications Manager system programming from the backup.

---



**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.

---



**Warning:** You must remove all of the connections to the Business Communications Manager base function tray before you power the system down.

Failure to disconnect lines before power down can cause damage to the system.

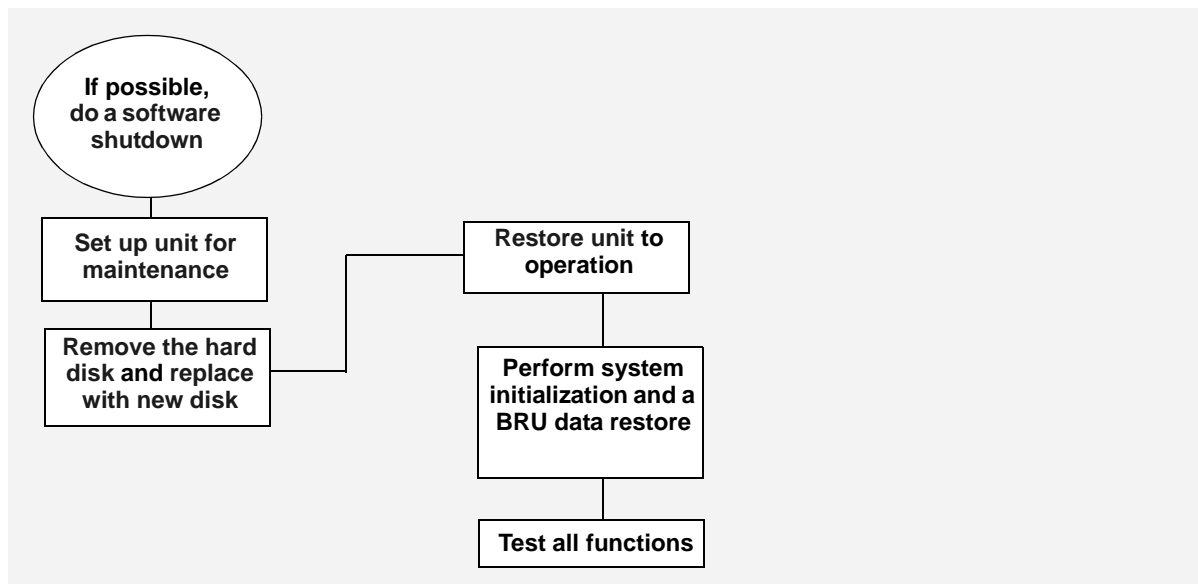
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**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

Figure 92 provides an overview of the hard disk replacement process.

**Figure 92** Hard disk replacement overview



## Remove a Hard Disk

When a hard disk is causing problems or fails, you must remove the unit from the BCM200 base platform chassis or the BCM400 advanced function tray. This section describes two processes to remove a hard disk:

- Remove a hard disk cage (containing the hard disk)
- Remove a hard disk (from the hard disk cage)

### Remove a hard disk cage from a BCM200 platform base chassis

Use this procedure to remove the hard disk cage from the BCM200 base platform chassis. Use this procedure to remove a BCM200 RAID upgrade kit.

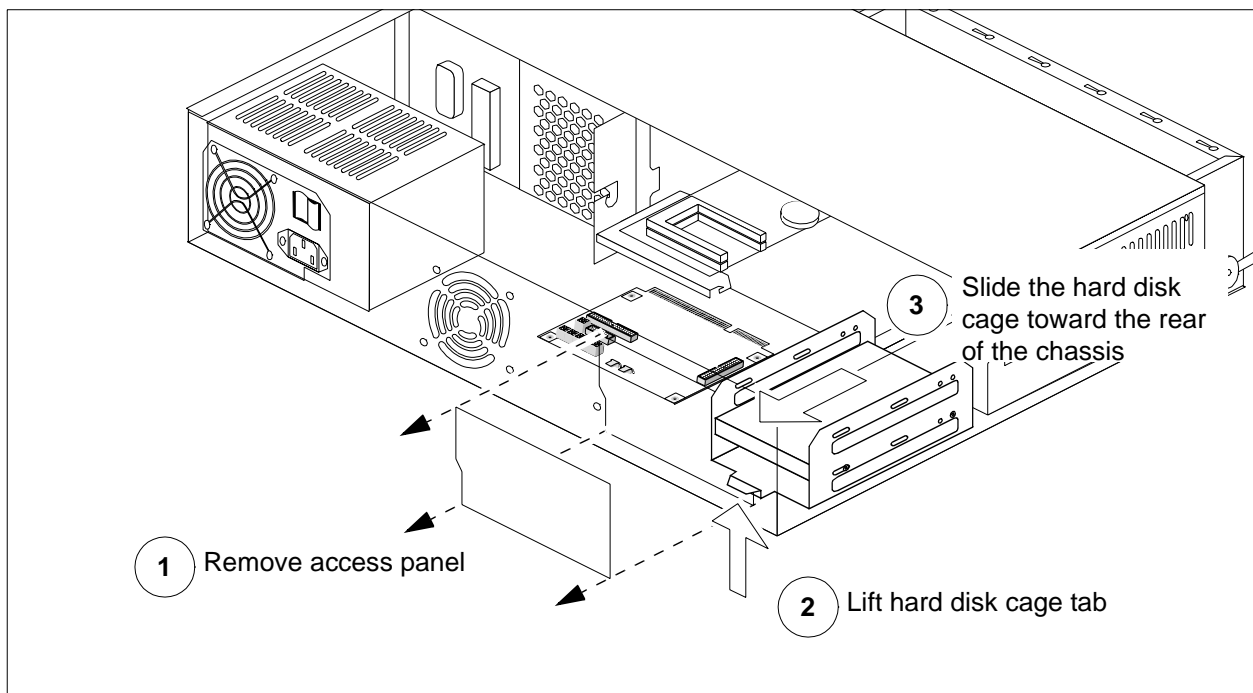


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

- 1 If you still have access to the Unified Manager, shut down the system by following the instructions in "Shut down the system software" on page 145. Otherwise, skip to step 2.

- 2 Set up the server for maintenance, as described in “Shut down the system hardware” on page 146. Continue to the next step of this procedure when complete.
- 3 Disconnect the Business Communications Manager from the wall power outlet.
- 4 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 5 Access the hard disk from a panel at the rear of the platform base chassis. Remove the four hard disk access panel screws (see Figure 4 on page 45). Place the panel and screws in a safe location.
- 6 Remove the BCM200 platform base chassis top cover (see “Remove the platform base chassis top cover” on page 161). Continue to the next step of this procedure when complete.
- 7 Place your fingers under the tab located at the bottom rear of the hard disk cage. Lift firmly on the tab. At the same time, slide the hard disk cage in the direction shown in Figure 93 until the unit detaches from the mounting points on the chassis.
- 8 Disconnect the hard disk from the system:
  - a Disconnect the power supply connector from the hard disk.
  - b Disconnect the hard disk connector at the I/O card.

**Figure 93** Detach the hard disk cage from the BCM200 platform base chassis



- 9 Remove the hard disk cage from the BCM200 platform base chassis. Place the hard disk cage on a flat, clean and static-free surface.
- 10 This procedure is complete.

## Remove a hard disk cage from a BCM400 platform base chassis

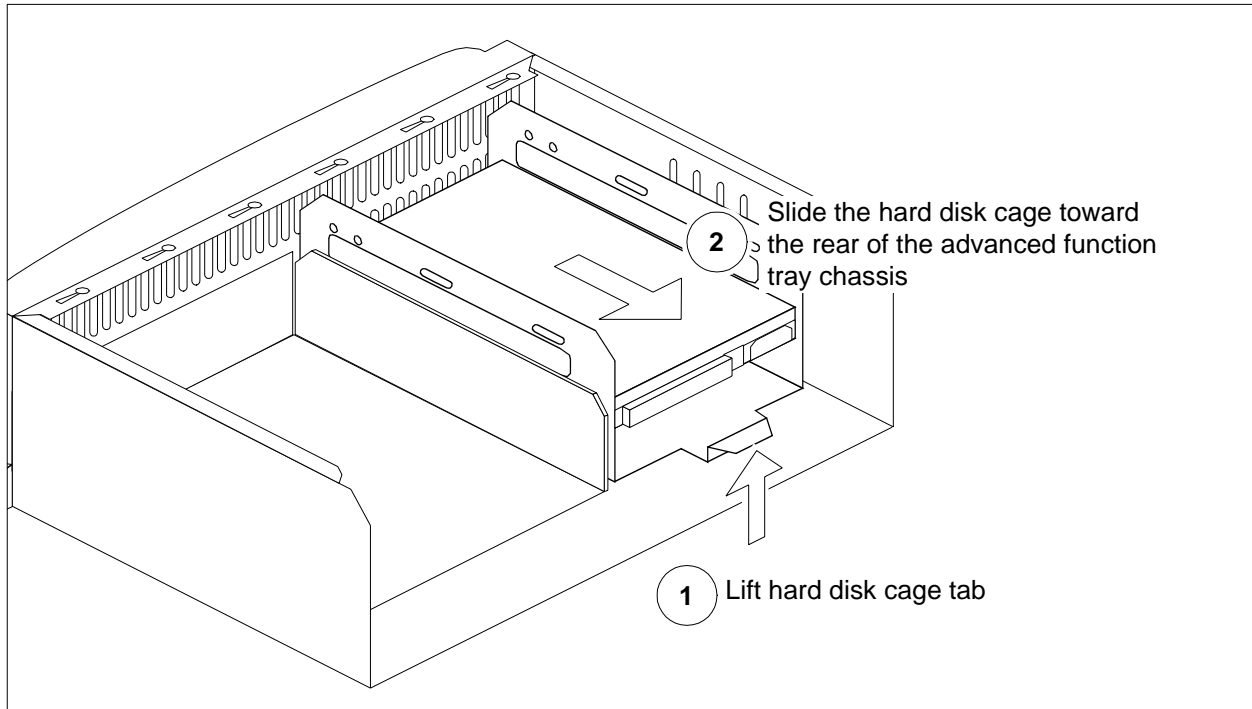
Use this procedure to remove the hard disk cage from the BCM400 advanced function tray. Use this procedure to remove a BCM400 RAID upgrade kit.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

---

- 1 If you still have access to the Unified Manager, shut down the system by following the instructions in “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the server for maintenance, as described in “Shut down the system hardware” on page 146. Continue to the next step of this procedure when complete.
- 3 Disconnect the Business Communications Manager from the AC power outlet.
- 4 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 5 Partially remove the BCM400 advanced function tray (see “Remove the advanced function tray” on page 157). Do not pinch or stretch any cables when sliding the advanced function tray partially out of the platform base chassis.
- 6 Locate the hard disk in the advanced function tray.
- 7 Disconnect the hard disk cables from the system:
  - a Disconnect the power supply connector from the hard disk.
  - b Disconnect the hard disk connector at the I/O card.
- 8 Carefully remove the advanced function tray. Do not pinch or stretch any cables when sliding the advanced function tray completely out of the platform base chassis.
- 9 Remove the transportation HDD cage restraint screw and keep in a safe place.
- 10 Place your fingers under the tab located at the bottom rear of the hard disk cage. Lift firmly on the tab. At the same time, slide the hard disk cage in the direction shown in Figure 94 until the unit detaches from the mounting points on the chassis.

**Figure 94** Detach the hard disk cage from the BCM400 advanced function tray chassis

**11** Remove the hard disk cage from the BCM400 advanced function tray chassis. Place the hard disk cage on a flat, clean and static-free surface.

**12** This procedure is complete.

## Remove a hard disk from the hard disk cage

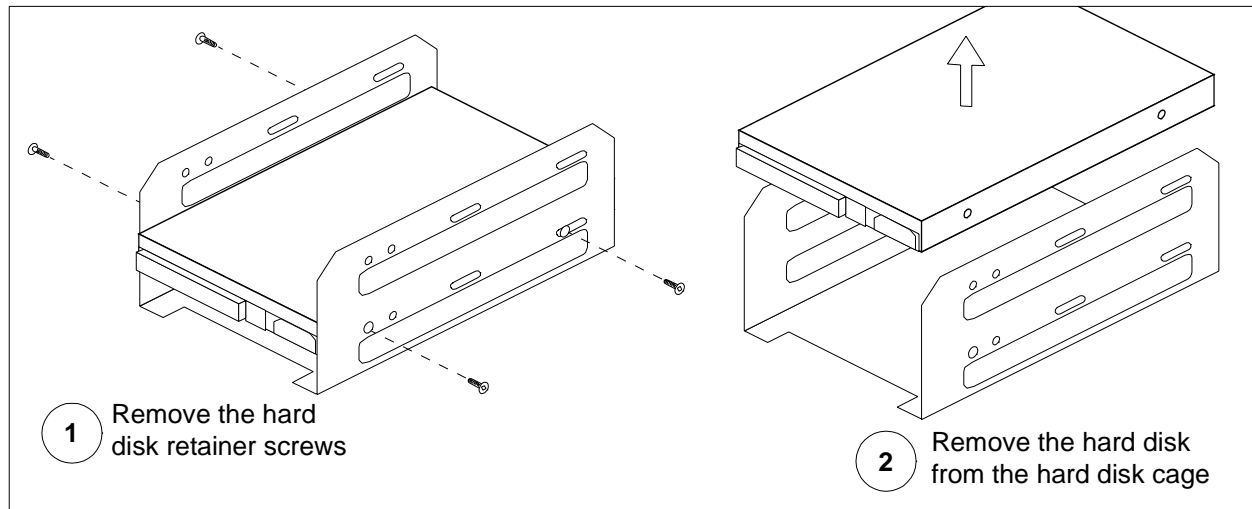
Use this procedure to remove the hard disk from the hard disk cage. Use this procedure also to remove hard disks from a BCM200 or BCM400 RAID upgrade unit.



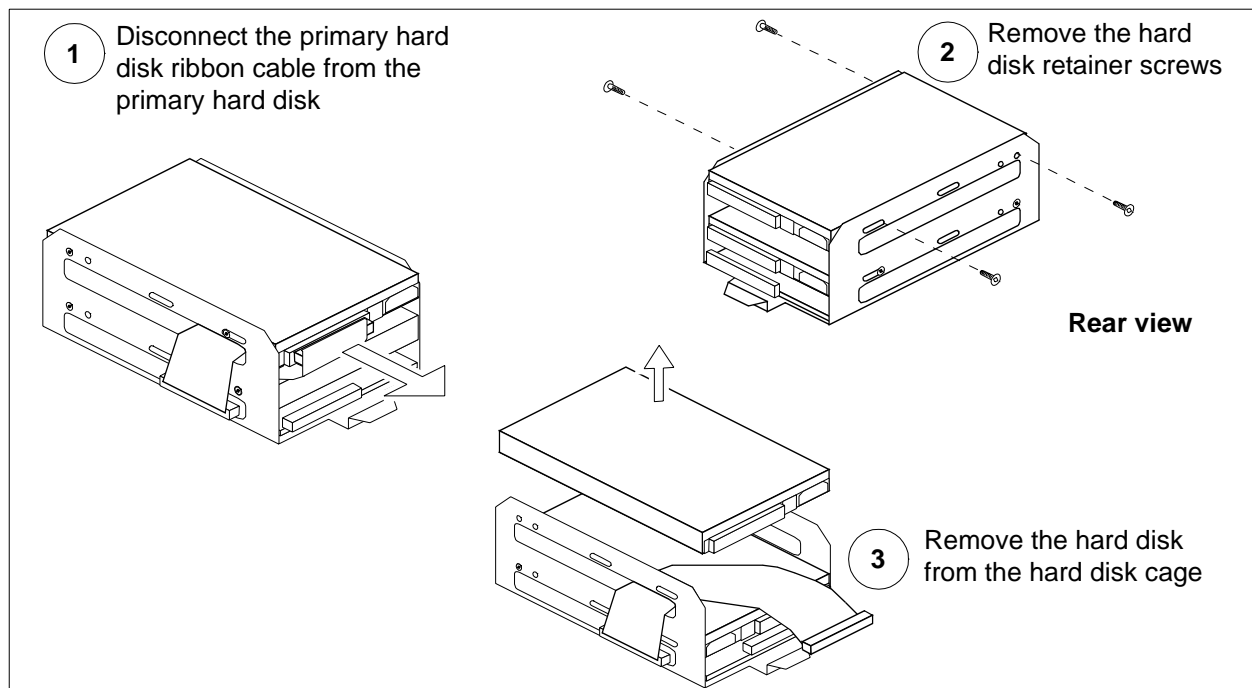
**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

- 1** Remove the hard disk cage from the chassis (see “Remove a Hard Disk” on page 166). Continue to the next step in this procedure when complete.
- 2** Unscrew the hard disk retainer screws from both sides of the hard disk cage. Place the retainer screws in a safe location (see Figure 95).
- 3** Remove the hard disk from the hard disk cage. Place the hard disk on a flat, clean and static-free surface.

**Figure 95** Remove the hard disk from the hard disk cage



**Figure 96** Remove the primary hard disk from the RAID hard disk cage



**4** This procedure is complete.

## Install a New Hard Disk

This section describes the procedures to install a new hard disk into the Business Communications Manager. This section describes two processes to install a hard disk:

- Install a hard disk (into the hard disk cage)
- Install a hard disk cage (containing the hard disk) into the platform base chassis



**Warning:** You must initialize the Business Communications Manager system when you install a new hard disk on a single-disk system.

---

### Install a hard disk into a hard disk cage

Use this procedure to install a hard disk into a hard disk cage for a BCM200 or BCM400 platform.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

---

- 1 Position the hard disk into the hard disk cage.



**Note:** For a BCM200 platform, orient the hard disk such that the power and IDE connectors are on the bottom and opposite to the hard disk cage lift tab (see Figure 97).

For a BCM400 platform, orient the hard disk such that the power and IDE connectors are on the bottom and on the same side as the hard disk cage lift tab (see Figure 98).

---

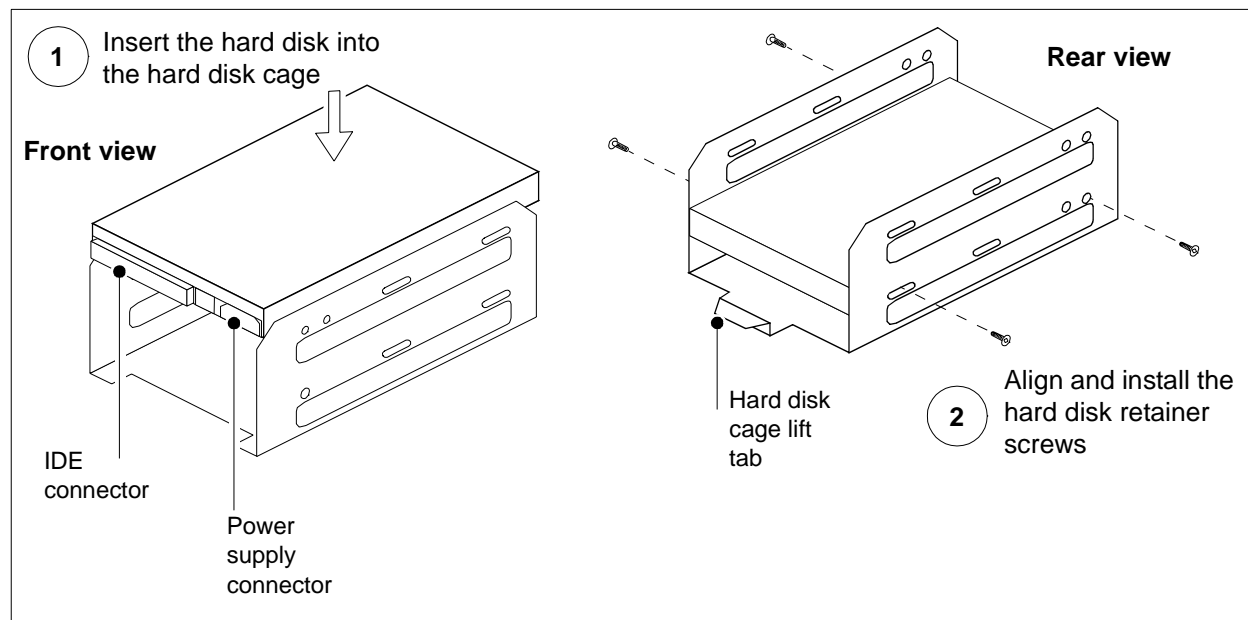
- 2 Align the hard disk and hard disk cage retaining screw holes. Fasten the hard disk cage retainer screws into both sides of the hard disk cage (see Figure 97 or Figure 98).



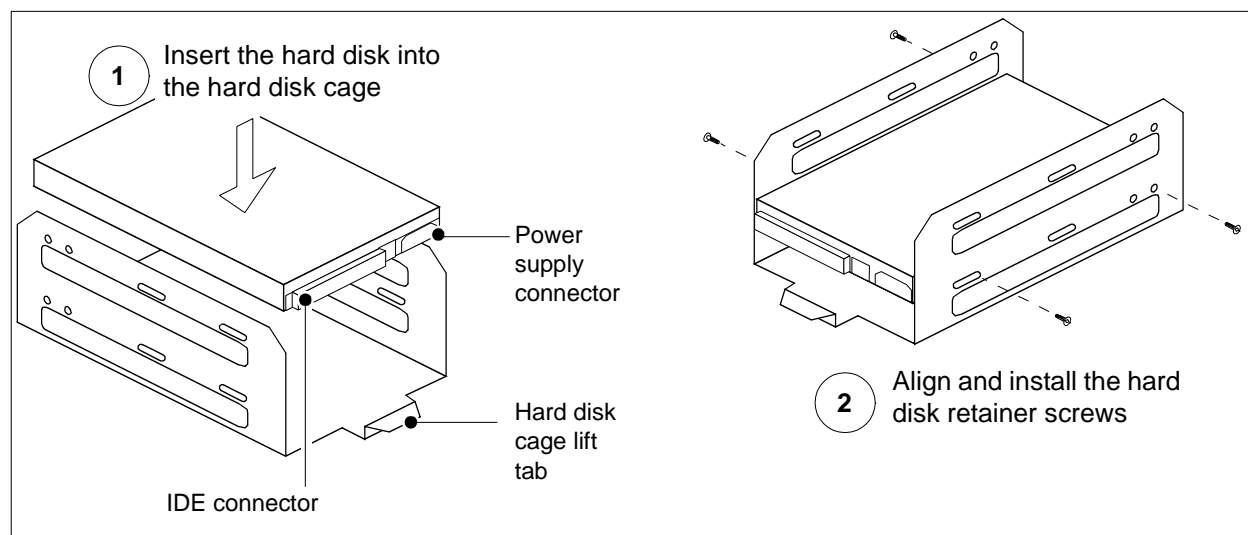
**Note:** For a RAID upgrade kit, the mirror disk and primary disk ribbon cables are pre-installed. If applicable, install the programmed hard disk from your single disk system into the RAID hard disk cage (see Figure 98).

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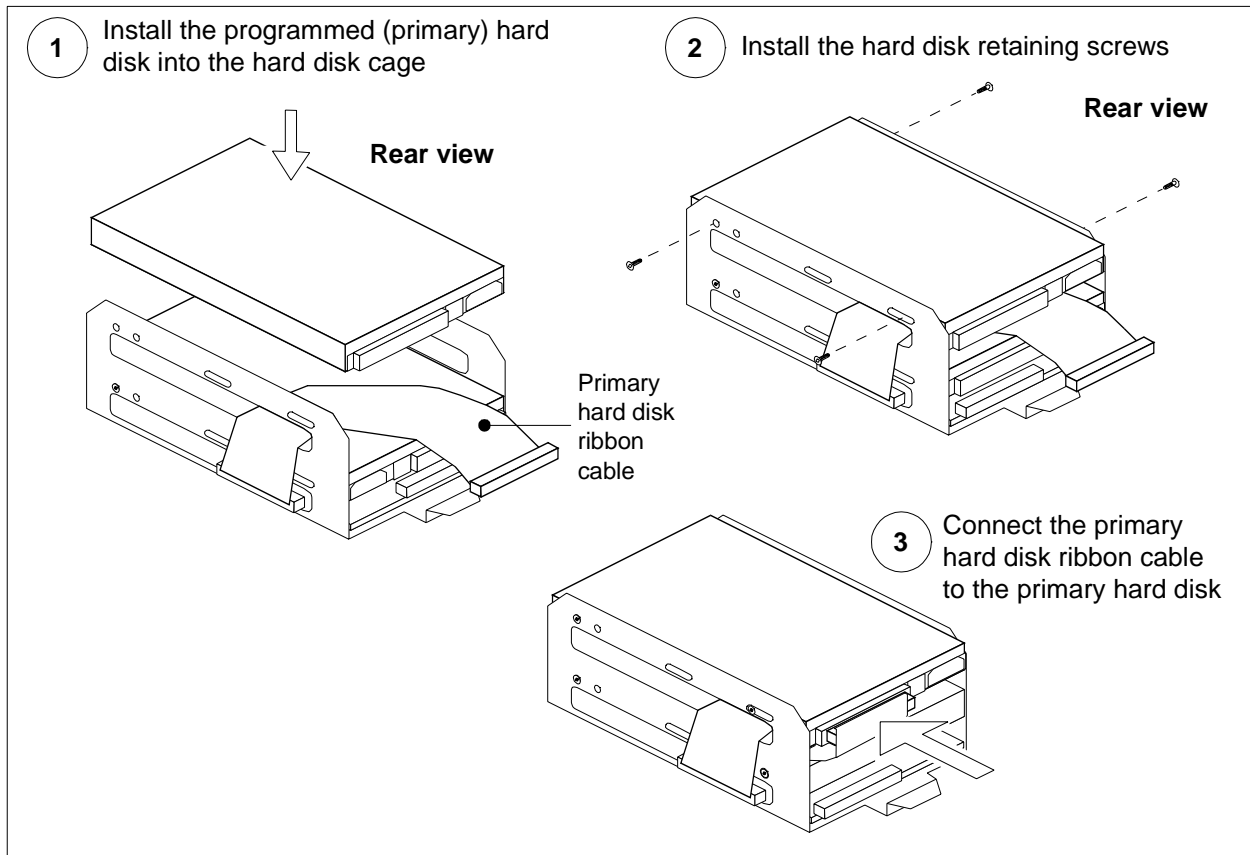
**Figure 97** Install a BCM200 hard disk in the hard disk cage



**Figure 98** Install a BCM400 hard disk in the hard disk cage





**Figure 99** Install the programmed hard disk into the RAID hard disk cage

**3** This procedure is complete.


## Install a hard disk cage in a BCM200 platform base chassis

Use this procedure to install the hard disk cage into the BCM200 platform base chassis.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

- 1** Disconnect the Business Communications Manager from the AC power outlet.
- 2** Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 3** Remove the platform base chassis top cover (see “Remove the platform base chassis top cover” on page 161).
- 4** You can access the hard disk location from a panel at the rear of the platform base chassis. Remove the four hard disk access panel screws (see Figure 93). Place the panel and screws in a safe location.
- 5** Install the hard disk in the hard disk cage.

-  **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.

## Install a hard disk cage in a BCM400 platform base chassis

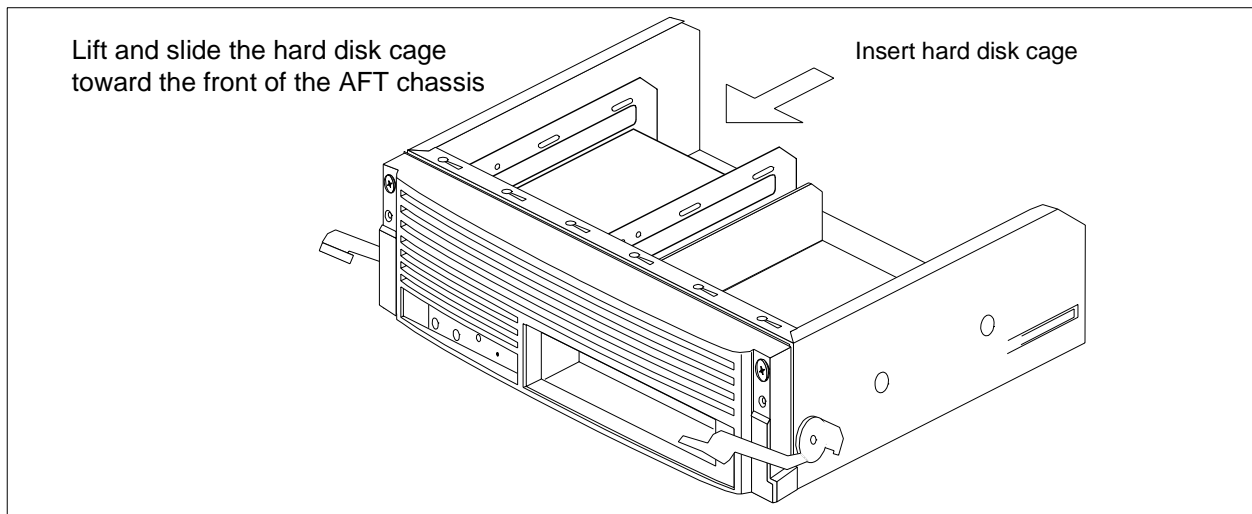
Use this procedure to install the hard disk cage into the BCM400 platform advanced function tray.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

- 1 Disconnect the Business Communications Manager from the AC power source.
- 2 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 3 Install the hard disk in the hard disk cage (see “Install a hard disk into a hard disk cage” on page 171).
- 4 Position the hard disk cage in front of the cage chassis mounting points in the advanced function tray. The hard disk cage lift tab is at the rear of the hard disk cage.
- 5 Slide the hard disk cage in the direction shown in Figure 101 until the unit engages with the chassis mounting points in the advanced function tray.

**Figure 101** Insert the hard disk cage to the BCM400 advanced function tray chassis



- 6 Partially insert the advanced function tray into the BCM400 platform base chassis. Ensure you do not pinch any cables against the chassis or internal components.
- 7 Connect the hard disk to the system:
  - a Connect the hard disk to the IDE interface ribbon cable.
  - b Connect the power supply to the hard disk.



**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.

- 8 Slide the advanced function tray completely into the BCM400 platform base chassis (see “Install the advanced function tray” on page 159).
- 9 Restore the Business Communications Manager to operation. Refer to “Restart the System after Maintenance” on page 147.
- 10 Set up the hard disk:
  - a Initialize the hard disk. Refer to “Initialize the Hard Disk” on page 176.
  - b After the disk is initialized, restore your data from your backups. If you did not backup your keycodes, re-enter them.
- 11 This procedure is complete.

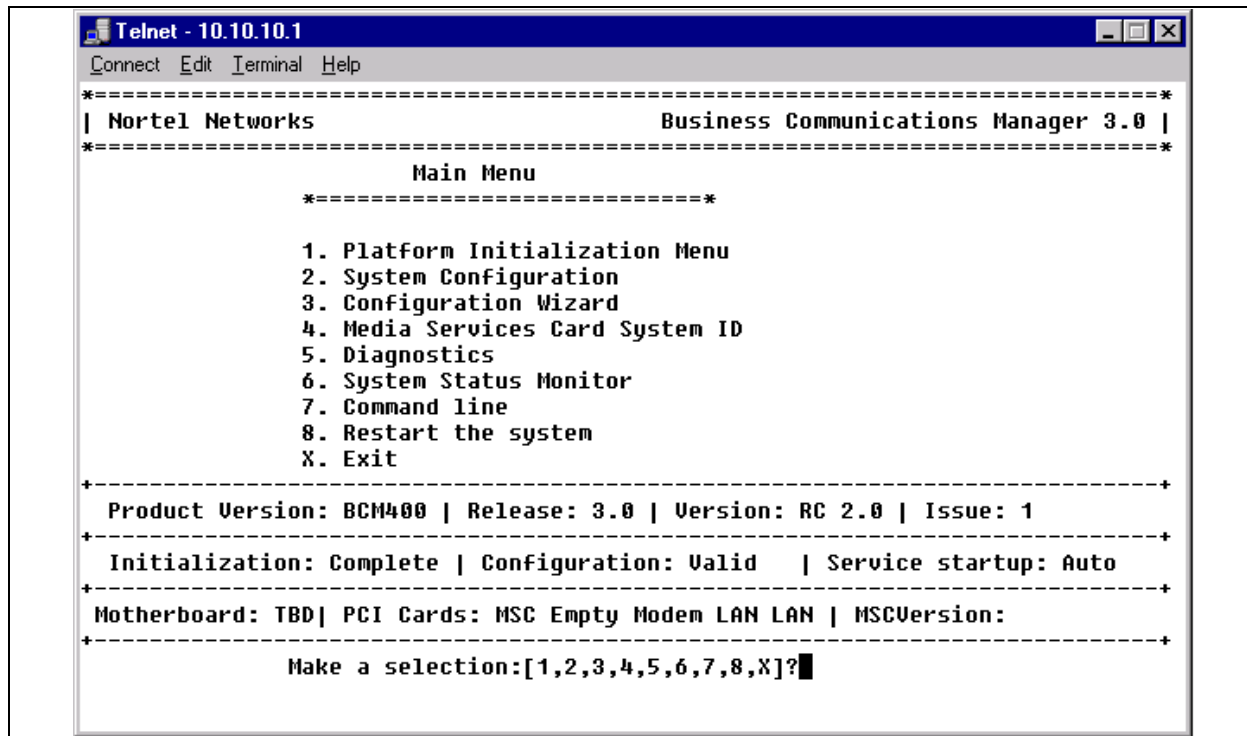
## Initialize the Hard Disk

The Business Communications Manager system is normally initialized prior to shipment. However, if you have to replace the hard drive in a Business Communications Manager, 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:

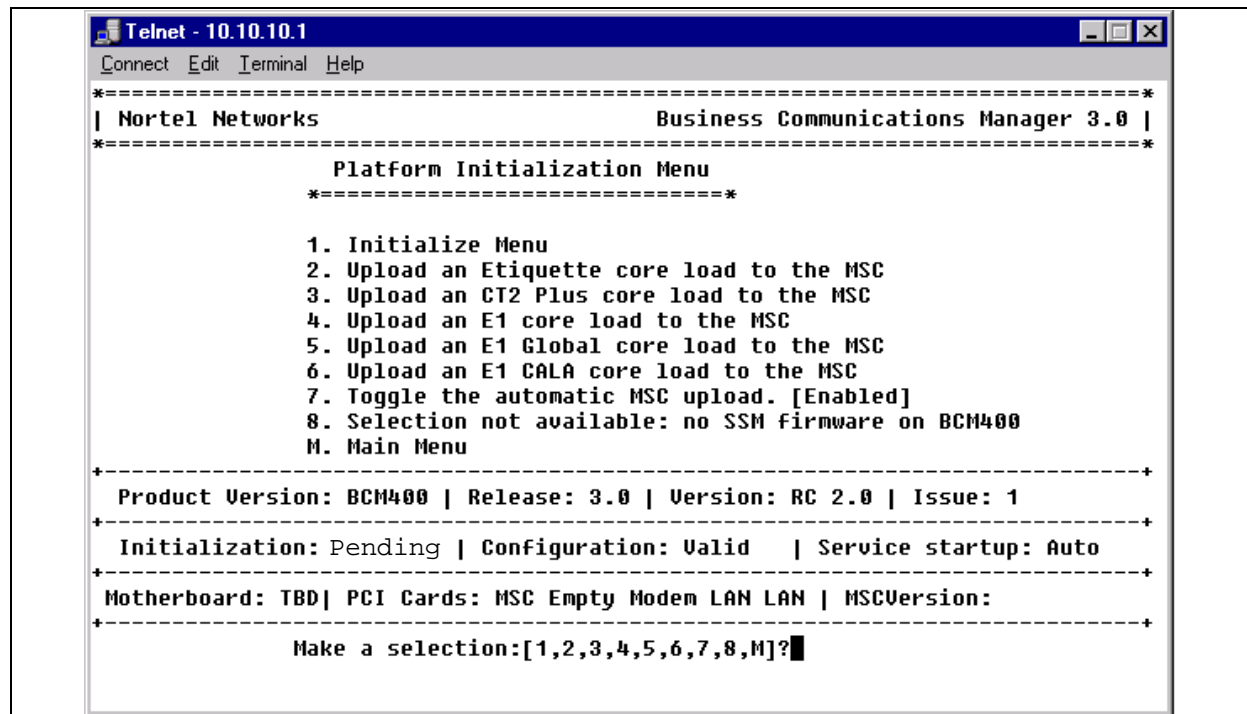
- 1 Make sure the **Status** LED on the Business Communications Manager is lit. This LED that all services have started and the Business Communications Manager is operating correctly.
- 2 Attach the base function tray and a computer through the serial port, as described in “Null modem cable setup” on page 138.
- 3 Enter the terminal emulation program, as described in “Display the configuration menus” on page 139,
  - If the hard disk does not require initialization, the main menu appears. Refer to Figure 102.

Figure 102 Main Menu screen



- If the hard disk requires initialization, the Platform Initialization Menu appears. Refer to Figure 103.

Figure 103 Platform Initialization Menu screen



- 4 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 299.
- 5 Ensure the correct MSC configuration has been entered.  
Enter 1 (Select the hardware profile for this unit).
- 6 The current MSC configuration is indicated on screen.  
  
If you want to change this, make a different selection from the Platform Initialization menu. The system checks to see if a core upload is required. This takes about 10 minutes.  
  
If you do not want to change the MSC load, enter the number of the selection with the asterisks.
- 7 The system automatically reboots a number of times as part of the initialization process. When the first reboot occurs, the telnet session disconnects.
- 8 Do one of the following:
  - Run the Quick Start Wizard to create the system parameters and defaults. Then restore your system data from your data backup.
  - Restore system and data information from your backup data.



**Note:** The detailed processes for performing steps 6 and 7 are contained in the *Business Communications Manager 3.0 Programming Operations Guide*.

---

- 9 This procedure is complete.

## Chapter 8

# Install or Replace a Cooling Fan

This chapter describes how to replace a cooling fan in the BCM200 and BCM400 platform base chassis. This chapter also describes how to add a second fan the BCM400 platform base chassis (available through the field redundancy upgrade kit).



**Note:** For the BCM400 RFO factory configuration, a redundant cooling fan and power supply is included.



**Warning:** You must remove all of the connections to the Business Communications Manager platform base chassis before you power the system down.

Failure to disconnect lines before power down can cause damage to the system.



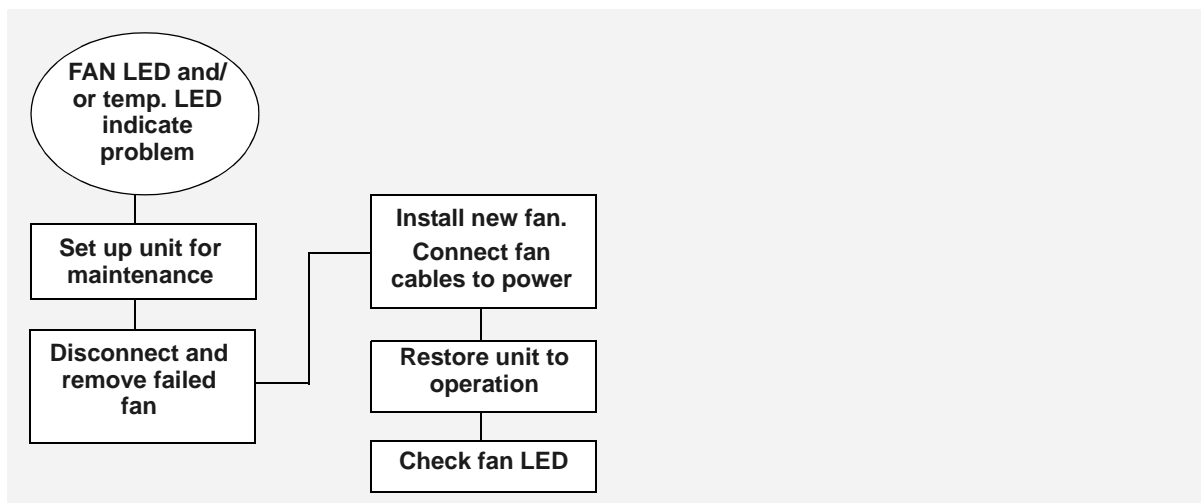
**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

## Cooling Fan Replacement Process

Cooling fans circulate air through the chassis of the Business Communications Manager platform base chassis and expansion unit to prevent the components from overheating.

Figure 104 provides an overview of the fan replacement process.




**Figure 104** Chassis cooling fan replacement overview



## Troubleshooting Fans

There are three LEDs on the front of the Business Communications Manager base function tray and one on the front of the expansion unit used to assess fan function. Table 23 describes the possible states of the fan and temperature LEDs.

**Table 23** Fan and temperature LEDs on the base function tray

LED Label	Description	Green LED On	Red LED On (Only)
	Temperature	Temperature is below threshold.	Temperature is in alarm status. Possible fan(s) failure.
	Fans	All installed fans are working	There is a problem with a minimum of one fan.
	Power	All components are working	Component failure

## Remove a BCM400 cooling fan

Use this procedure to remove the cooling fan(s) in a BCM400 standard or redundant feature option (RFO) platform configuration. The standard Business Communications Manager platform base chassis has one fan. The BCM400 RFO version has two fans.

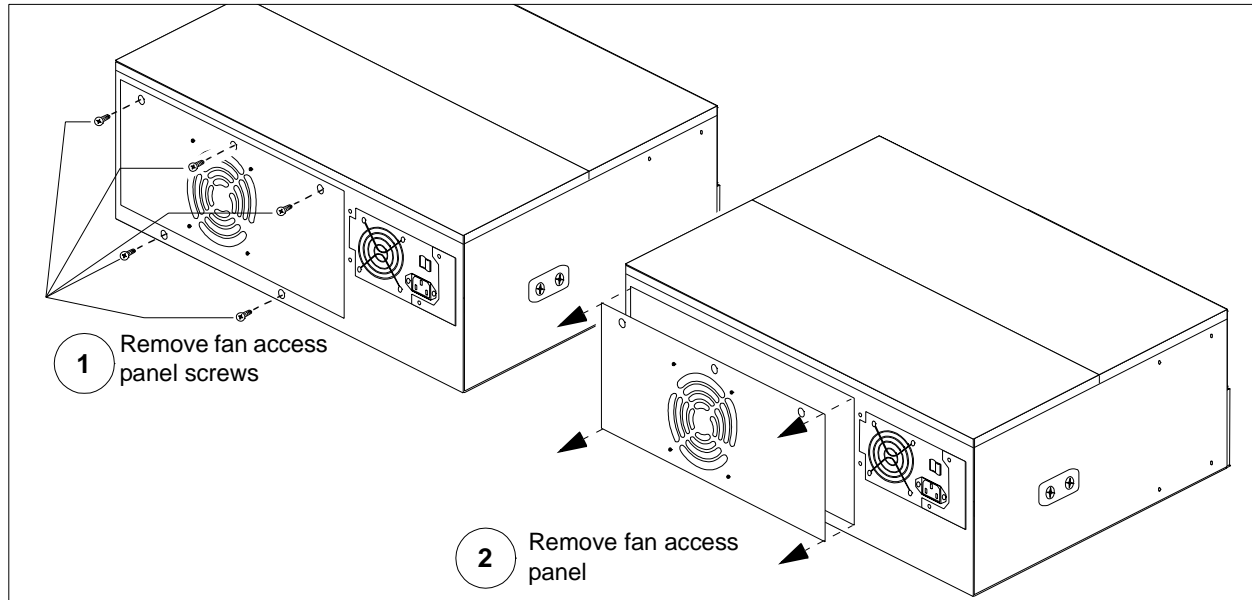


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

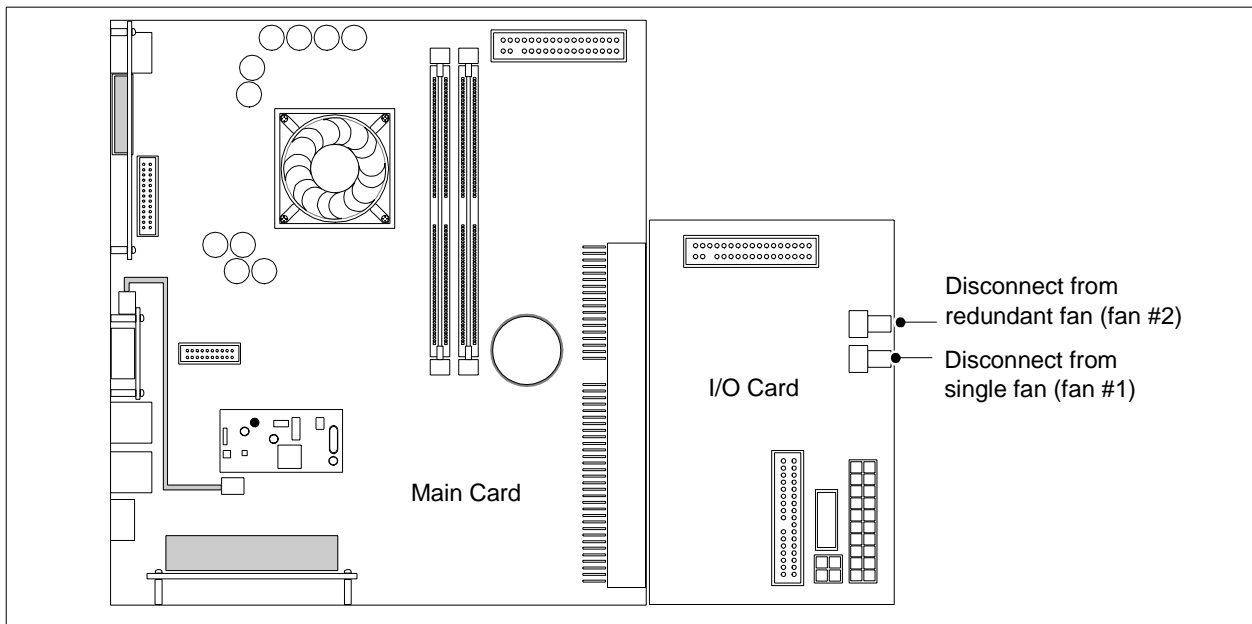
Before you shut down the system, determine if a fan (in the redundant version) has failed. Refer to Table 23.

- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to the next step.
- 2 Set up the Business Communications Manager for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the Business Communications Manager system from the AC power outlet.
- 4 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 5 Remove the fan access panel at the rear of the platform base chassis (see Figure 105):
  - a Remove the fan access panel screws at the top and bottom of the panel. Place the screws in a safe location.
  - b Tip the top of the fan access panel toward you.
  - c Grasp the fan access panel with both hands and lift the away from the platform base chassis. Do not stretch the fan cable(s).

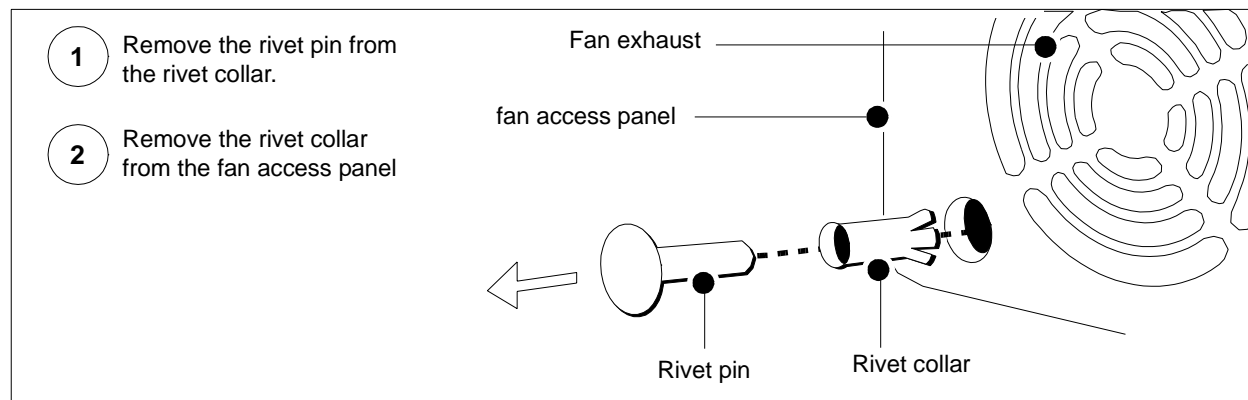


**Figure 105** Remove the BCM400 fan access panel

- 6** Disconnect the I/O card fan cable(s) - see Figure 106. For the BCM400 RFO configuration, disconnect both fan cables from the I/O card.

**Figure 106** Disconnect the fan cable from the I/O card

- 7** Remove the snap rivets that hold the fan to the fan access panel. The snap rivet has two parts; a center pin and a collar. Gently separate the plastic rivet pin with your fingernails from the center of the rivet collar. Remove the rivet pin and collar from the fan access panel. Place the rivet pin and collar in a safe location.

**Figure 107** Remove the snap rivets from the BCM400 fan access panel

- 8 Lift the fan away from the fan access panel and place it in a safe location.
- 9 Repeat Steps 7 and 8 to remove the redundant fan on the BCM400 RFO configuration.
- 10 This procedure is complete.

## Install a BCM400 cooling fan

Use this procedure to install a single or redundant cooling fan in a BCM400 platform base chassis.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

- 1 Place the new fan in the fan access panel in the position from which you removed the old fan. Ensure the I/O card connector cable is oriented to the bottom of the fan and that the fan label is closest to the grill on the panel.

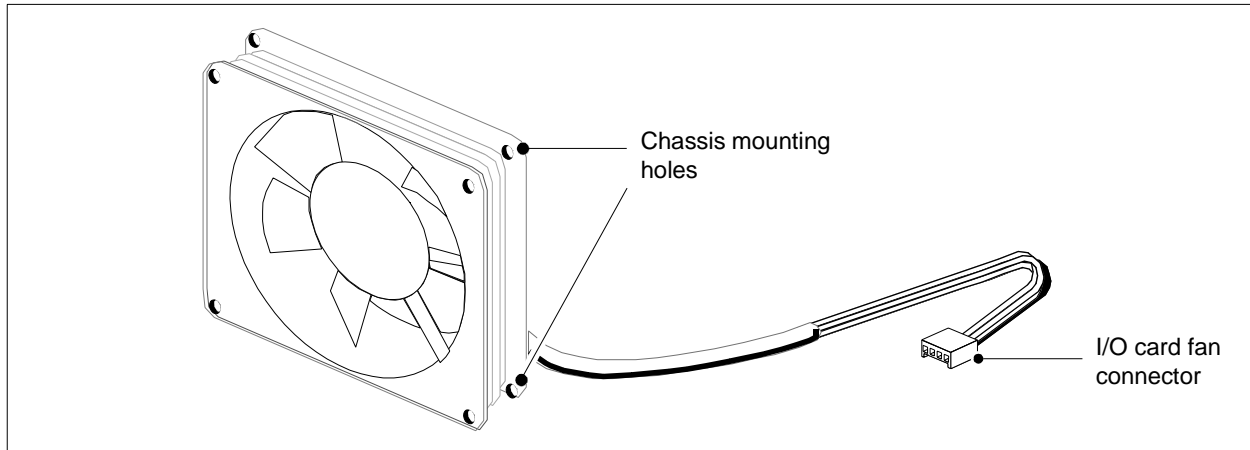


**Note:** Ensure the label of the new fan faces the back wall of the Business Communications Manager platform base chassis. Airflow is out of the chassis as indicated by the arrows imprinted on the fan.

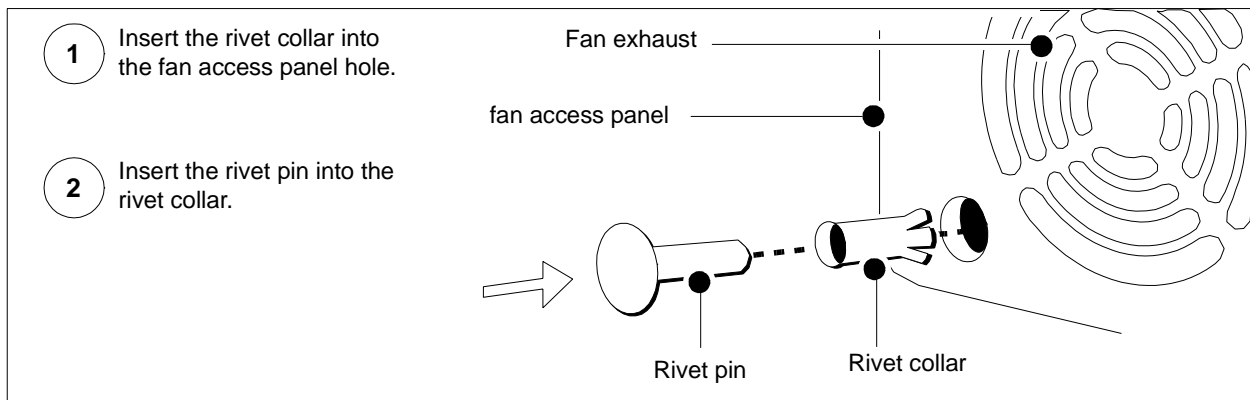


**Note:** Redundant feature option (dual fans)  
If you are installing a second fan, you must use the new fan access panel (included with the redundant feature option kit) on the back of the Business Communications Manager platform base chassis. The redundant fan access panel has two fan exhausts.

- 2 Attach the fan to the fan access panel using the four plastic rivets.
  - a Align the fan chassis mounting holes with the holes in the fan access panel (see Figure 108).

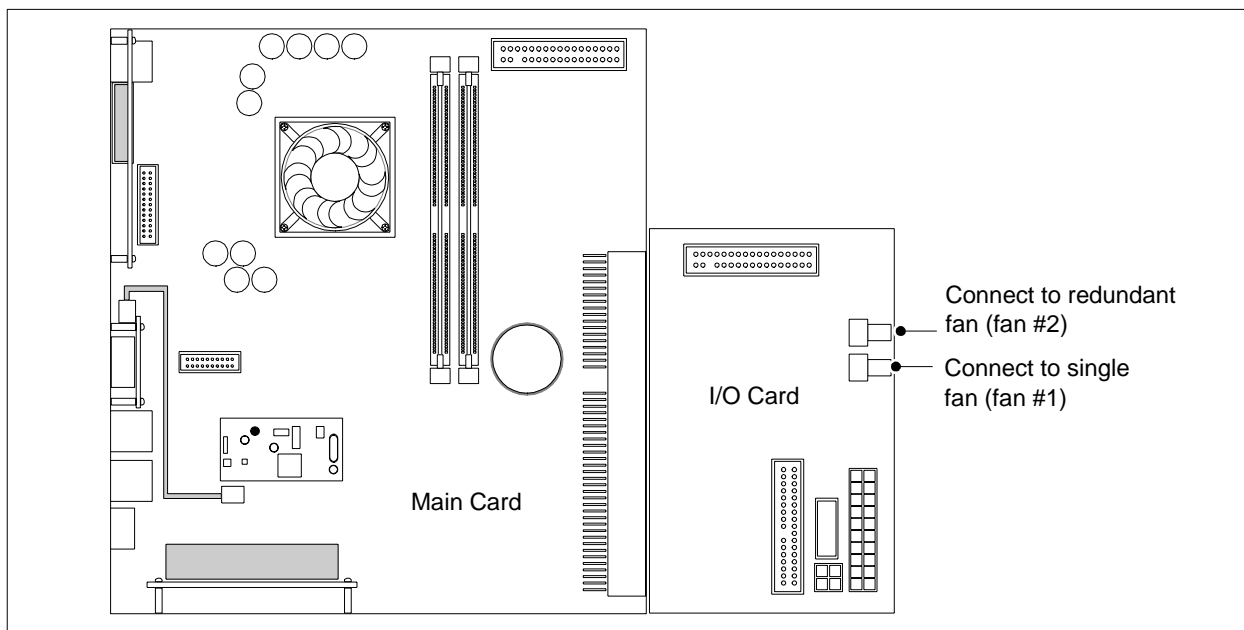
**Figure 108** Fan chassis mounting holes

- b** Hold the fan in place against the fan access panel. Push the rivet collar through the fan access panel and fan chassis mounting holes.
- c** Insert the rivet pin into the rivet collar. Repeat this step for the second fan in the BCM400 RFO configuration (see Figure 109).

**Figure 109** Insert the snap rivets into the BCM400 fan access panel

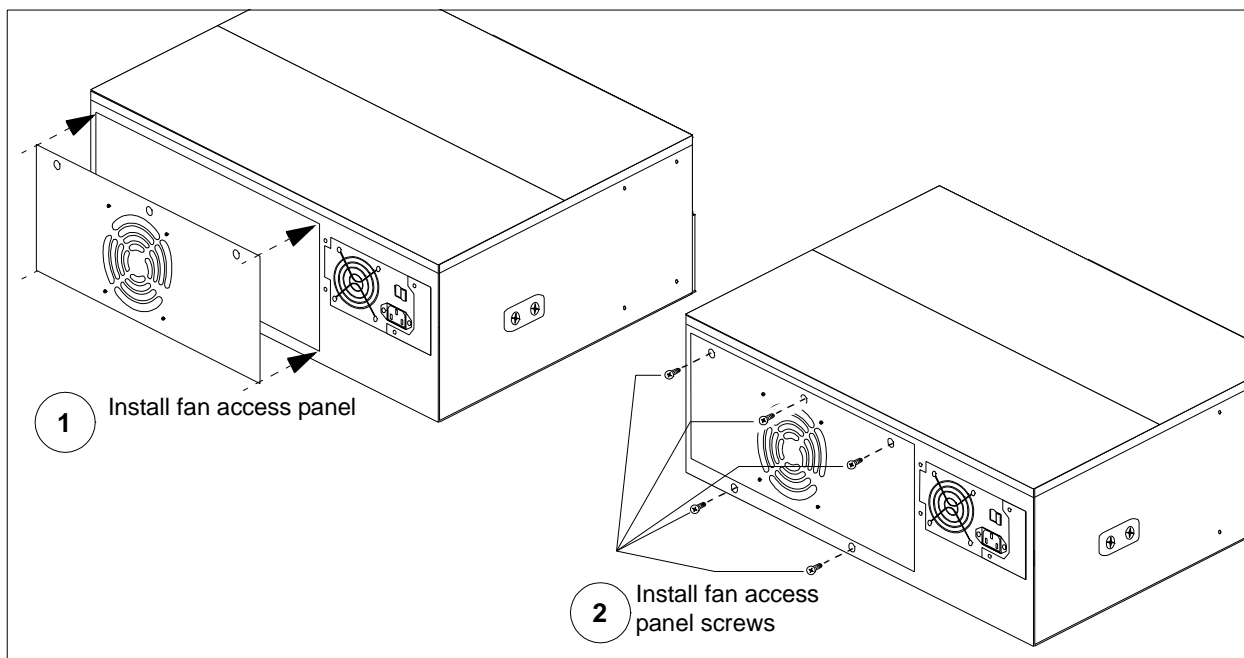
- 3** Connect the power supply cables for each fan to the I/O card (see Figure 110):
  - a** Connect Fan #1 (fan farthest from the power supply) to connector #1 on the I/O card.
  - b** Connect Fan #2 (fan closest to the power supply) to connector #2 on the I/O card.

**Figure 110** Connect the fan cable(s) to the I/O card



- 4** Mount the fan access panel to the platform base chassis (see Figure 111):
  - a** Tip the top of the fan access panel toward you.
  - b** Insert the bottom lip of the fan access panel in the platform base chassis.
  - c** Align the screw holes in the fan access panel with the screw holes on the platform base chassis.
  - d** Install and tighten the fan access panel screws.

**Figure 111** Install the fan access panel to the platform base chassis



- 5 Restore the Business Communications Manager system to operation. For details, refer to “Restart the System after Maintenance” on page 147.

The Business Communications Manager system starts up when you connect the AC power cord. The start-up process takes several minutes to complete.

- 6 Test the direction of the fan exhaust air flow to determine if the fan is correctly installed.
  - a Hold a piece of paper or your hand close to the fan exhaust. A correctly installed fan blows air away from the platform base chassis. If you are testing two fans, cover one fan at a time with your hand.
  - b If the fan exhaust air flow is incorrect, remove the cooling fan (See “Remove a BCM400 cooling fan” on page 180) and re-install the fan in the correct position (this procedure).
- 7 This procedure is complete.

## Remove a BCM200 cooling fan

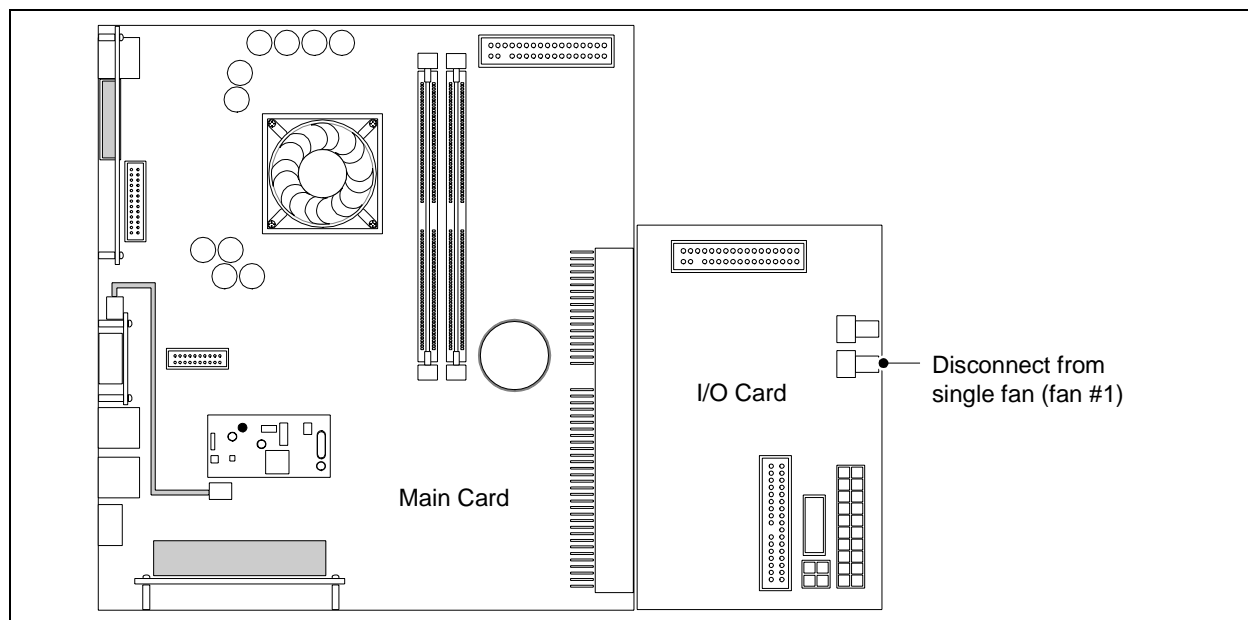
Use this procedure to remove the cooling fan in a BCM200 platform configuration.



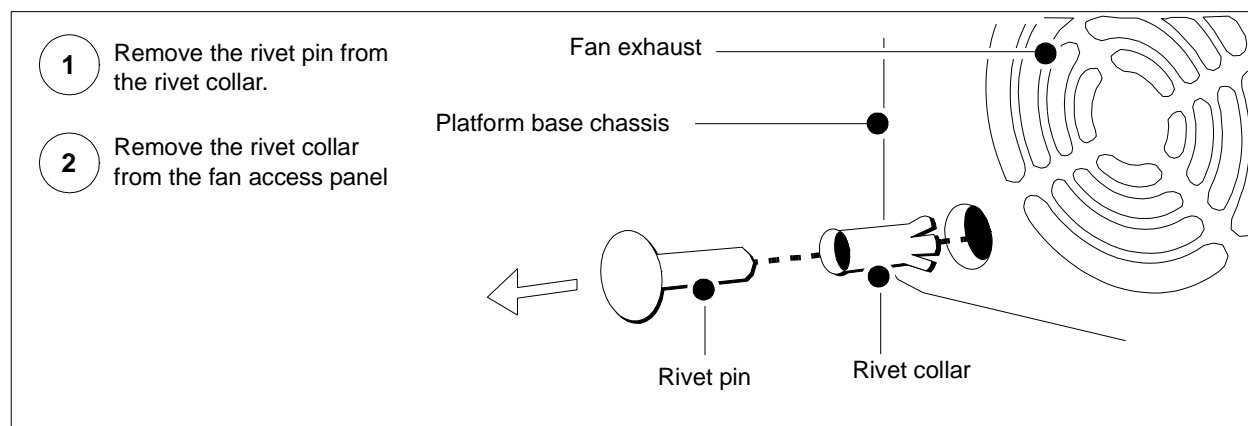
**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

---

- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the server for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the Business Communications Manager system from the AC power outlet.
- 4 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 5 Remove the top cover from the platform base chassis (see “Remove the platform base chassis top cover” on page 161).
- 6 Disconnect the I/O card fan cable connection (see Figure 112).

**Figure 112** Disconnect the BCM200 fan cable from the I/O card**7** Remove the fan at the rear of the platform base chassis:

- a** Remove the snap rivets that hold the fan to the platform base chassis. The snap rivet has two parts; a center pin and a collar. Gently separate the plastic rivet pin with your fingernails from the center of the rivet collar. Remove the rivet pin and the collar from the chassis. Place the rivet pin and collar in a safe location.
- b** Pull the fan away from the platform base chassis (from the interior).
- c** Place the fan in a safe location.

**Figure 113** Remove the snap rivets from the BCM200 platform base chassis**8** This procedure is complete.

## Install the BCM200 cooling fan

Use this procedure to install a cooling fan in a BCM200 platform base chassis.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

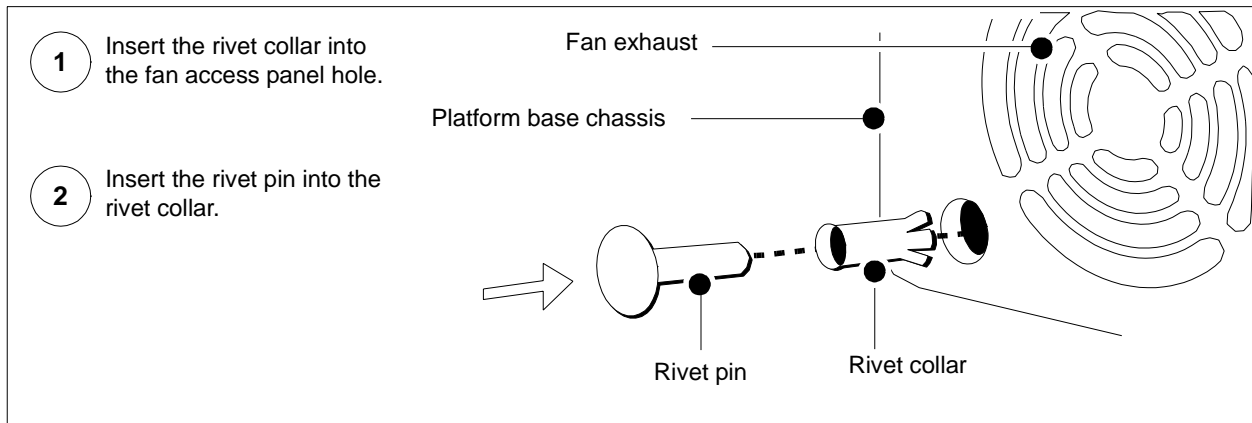
- 1 Place the new fan in proper location in the platform base chassis. Ensure the I/O card connector cable is on the bottom.



**Note:** Ensure the label of the new fan faces the back wall of the Business Communications Manager platform base chassis. Airflow is out of the chassis as indicated by the arrows imprinted on the fan..

- 2 Align the fan chassis mounting holes with the holes on the platform base chassis.
- 3 Attach the fan to the platform base chassis using four snap rivets:
  - a Hold the fan in place and push the rivet collar through the fan access panel and fan chassis mounting holes.
  - b Insert the rivet pin into the rivet collar (see Figure 109).

**Figure 114** Insert the snap rivets into the BCM200 platform base chassis



- 4 Connect the power supply cable to the I/O card. Connect the Fan to connector #1 on the I/O card.
- 5 Replace the platform base chassis top cover. See “Install the platform base chassis top cover” on page 163.
- 6 Restore the Business Communications Manager system to operation. For details, refer to “Restart the System after Maintenance” on page 147.

The Business Communications Manager system starts up when you connect the AC power cord. The start-up process takes several minutes to complete.

- 7 Test the direction of the fan exhaust air flow to determine if the fan is correctly installed.

- a Hold a piece of paper or your hand close to the fan exhaust. A correctly installed fan blows air away from the platform base chassis.
  - b If the fan exhaust air flow is incorrect, remove the cooling fan (See “Remove a BCM200 cooling fan” on page 185) and re-install the fan in the correct orientation (this procedure).
- 8 This procedure is complete.

## Remove an expansion unit fan

Use this procedure to remove a malfunctioning 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.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

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- 1 Shut down the system following the directions in “Shut down the system software” on page 145.
- 2 Disconnect the fan power cable from the hub card.



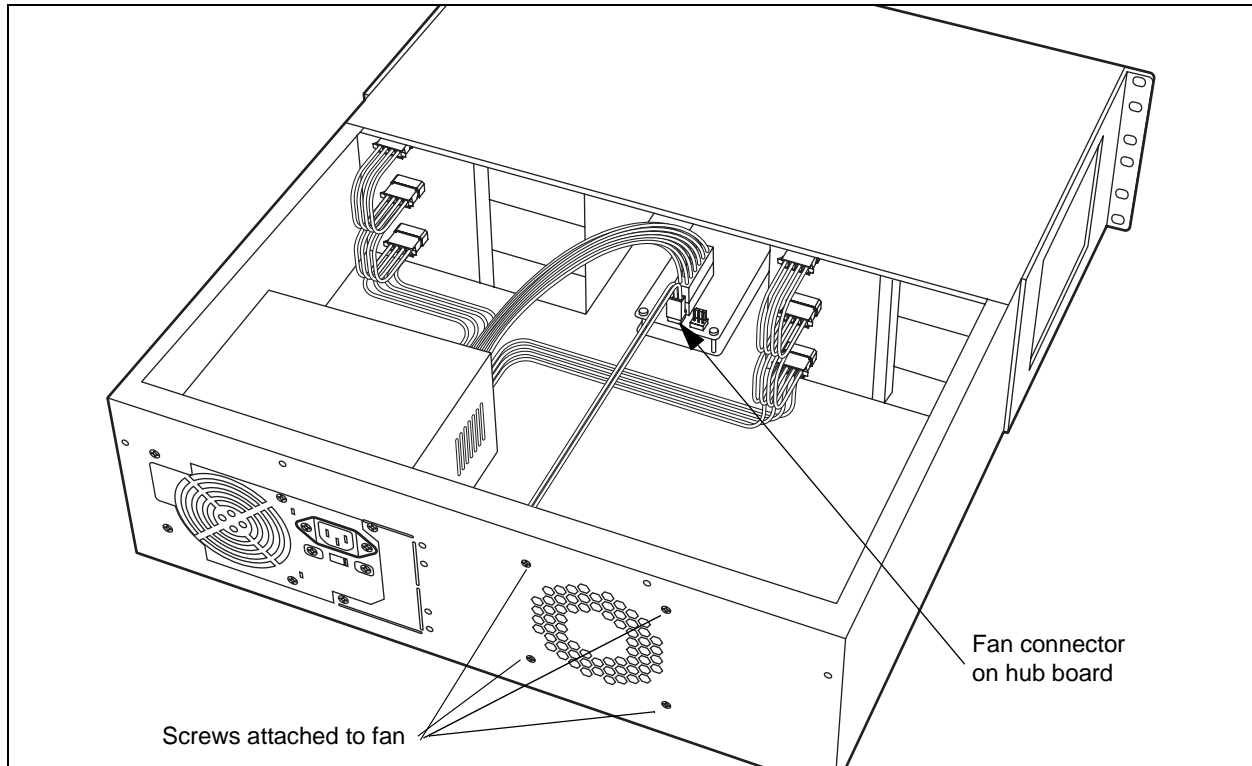
**Note:** If the unit has redundant fans, each fan has a connector on the hub board.

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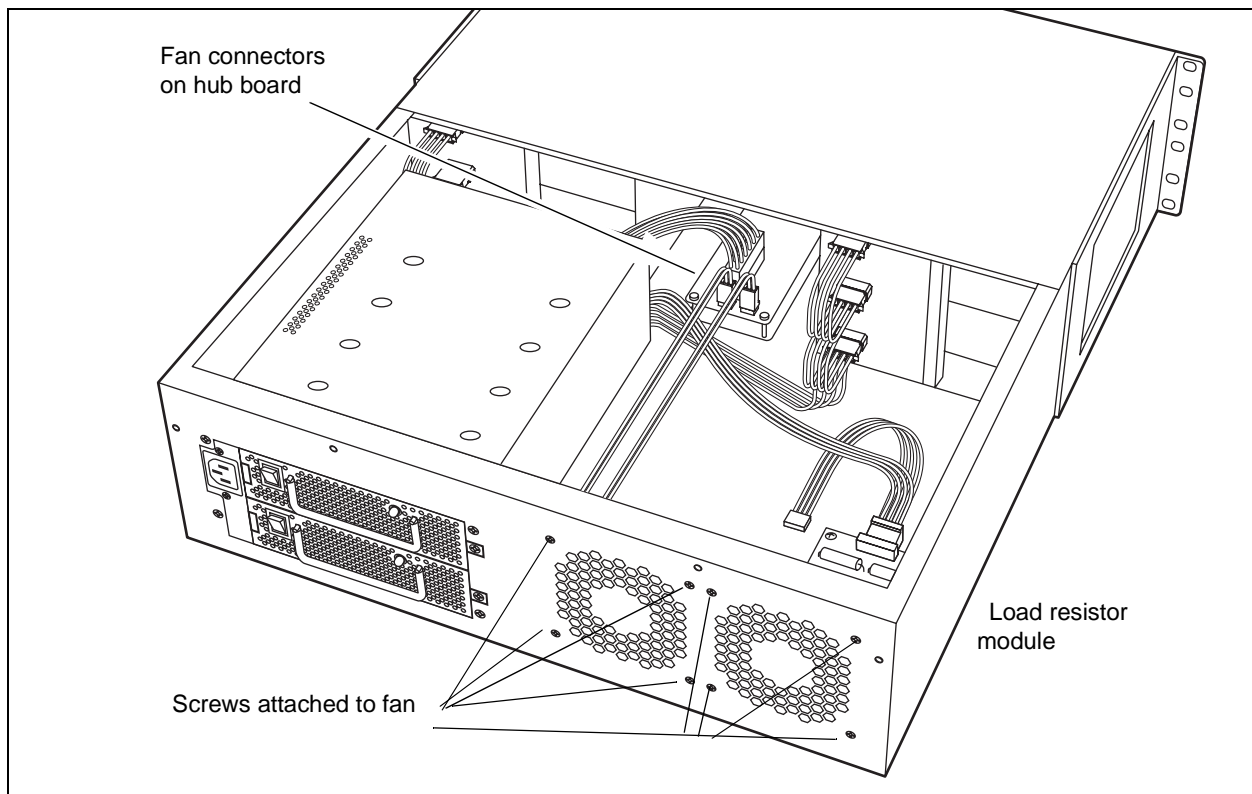
- 3 Locate the screws that fasten the fan casing to the expansion unit back wall and remove them. Refer to Figure 115.
- 4 Remove the four screws (or snap rivets) that hold the fan to the expansion unit.
- 5 Lift the failed fan out of the expansion unit.



**Figure 115** Fan screws location in expansion unit, 2.0 models.



**Figure 116** Fan screws location in expansion unit, 2.5 redundancy models.



## Install an expansion unit fan

Use this procedure to install the fan in the Business Communications Manager expansion unit.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wriststrap before you handle components. Always place the components in static-free container.

---



**Note:** Ensure the label of the new fan faces the back wall of the Business Communications Manager expansion unit chassis. Airflow is out of the chassis as indicated by the arrows imprinted on the fan.

---

- 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 Business Communications Manager system to operation. For details, refer to “Restart the System after Maintenance” on page 147.

The Business Communications Manager system starts up when you connect the AC power cord. The start-up process takes several minutes to complete.

- 6 Test the direction of the fan exhaust air flow to determine if the fan is correctly installed.
  - a Hold a piece of paper or your hand close to the fan exhaust. A correctly installed fan blows air away from the platform base chassis.
  - b If the fan exhaust air flow is incorrect, remove the cooling fan (See “Remove a BCM200 cooling fan” on page 185) and re-install the fan in the correct orientation (this procedure).
- 7 This procedure is complete.

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## Chapter 9

# Replace or Upgrade a Power Supply

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The BCM200 uses a standard power supply. The BCM400 and expansion units use either a standard or redundant power supply.

This chapter describes the following power supply installation and replacement techniques:

- replace a standard power supply
- upgrade from a standard power supply to a redundant power supply (BCM400 only)
- install or replace the power supply modules in a redundant power supply system
- cable routing and management
- how to maintain the power supply



**Note:** For the BCM400 RFO configuration only, a redundant power supply is included. Use a redundant fan with the redundant power supply (see “Install a BCM400 cooling fan” on page 182).

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**Warning:** You must remove all of the connections to the Business Communications Manager before you power the system down.

Failure to disconnect lines before power down can cause damage to the system.

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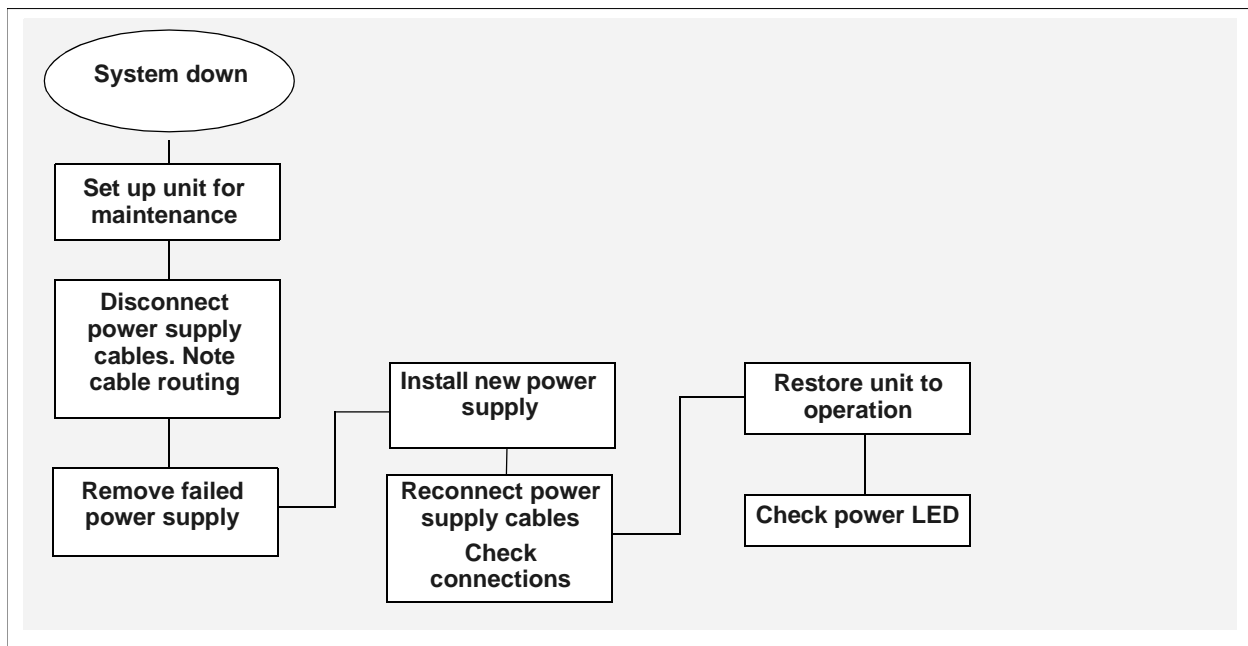
**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

---

## Replace a Standard Power Supply

If the platform base chassis or expansion unit has a standard power supply that fails, then all activity on the system ceases. This procedure describes how to replace a failed standard power supply unit. Figure 117 provides an overview of the process to replace a standard power supply.

**Figure 117** Standard power supply replacement overview



### Remove a BCM200 standard power supply

If the standard power supply fails, the system is down. Use this procedure to remove the standard power supply from a BCM200 platform base chassis.



**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

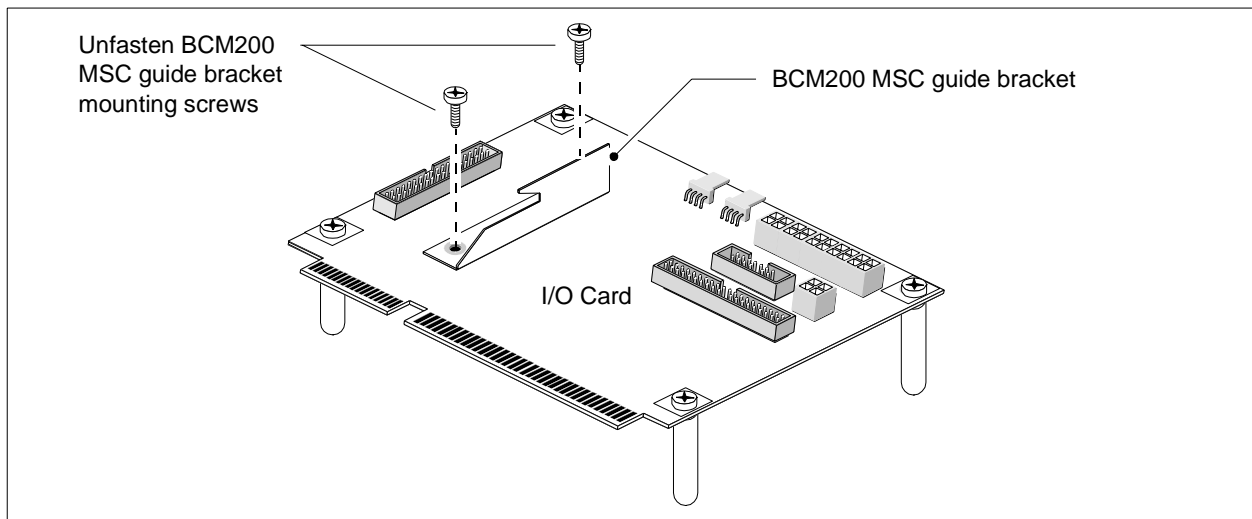


**Warning:** Power supply cable management is critical. Cable damage can result due to loose or incorrectly positioned cables.

- 1 Set up the Business Communications Manager for maintenance (see “Shut down the system hardware” on page 146).
- 2 Disconnect all cables from the front of the base function tray. Disconnect the platform base chassis and the expansion unit (if applicable), from the AC power connection.
- 3 Remove the top cover from the platform base chassis (see “Remove the platform base chassis top cover” on page 161).

- 4 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 5 Locate and disconnect the power supply cables from the I/O card, media bay backplane, and hard disk.
- 6 Disconnect all cables from the I/O card.
- 7 Partially remove the base function tray (see “Remove the base function tray” on page 150). Continue to the next step in this procedure when complete.
- 8 Remove the screws that secure the MSC guide bracket to the I/O card. Place the MSC guide bracket and screws in a safe location (see Figure 118).

**Figure 118** Remove the BCM200 MSC guide bracket

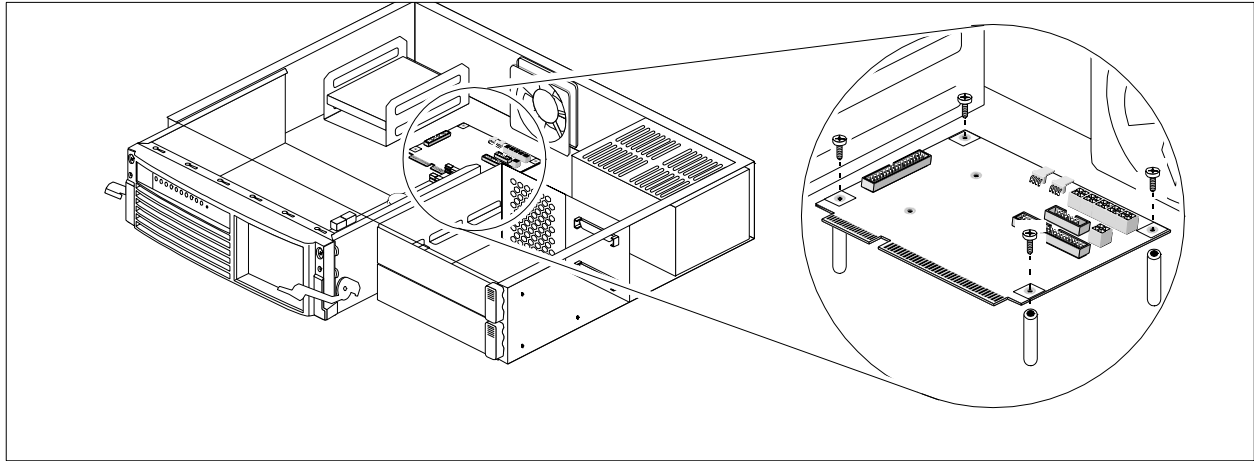


- 9 Remove the screws that secure the I/O card to the platform base chassis (see Figure 119). Place the screws in a safe location.
- 10 Remove the I/O card from the platform base chassis. Place the I/O card in a safe, clean and static-free location.



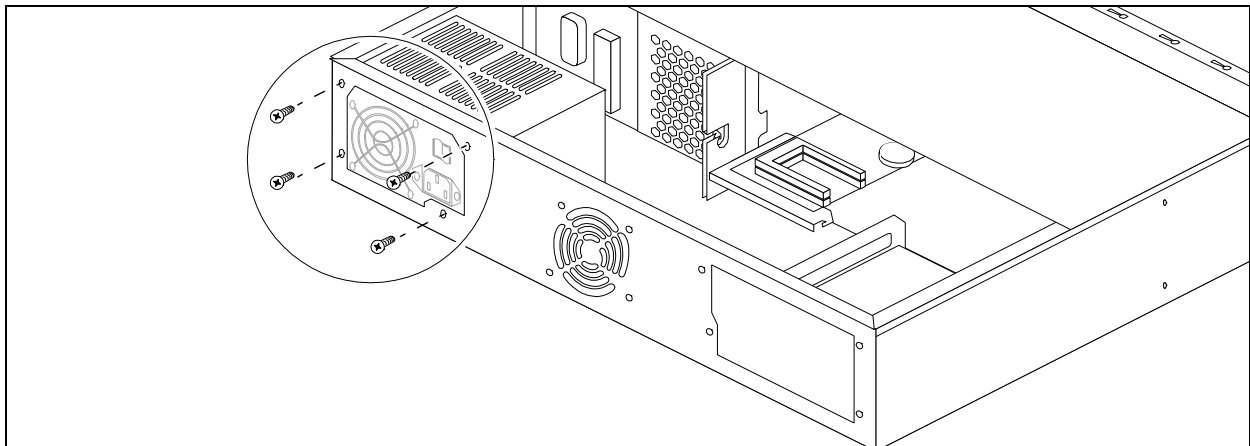
**Note:** Power supply and hard disk cables run underneath the I/O card. Remember the location and position of the power supply and hard disk cables. You will need to route the cables in the same manner when you re-install the power supply.

**Figure 119** Remove the I/O card from the BCM200 platform base chassis



- 11** Remove the four power supply chassis screws from the back of the platform base chassis (see Figure 120). Place the screws in a safe location.

**Figure 120** Remove the BCM200 power supply chassis screws



- 12** Separate the power supply cable from the hard disk cable. Cut the tie-wrap that secures the power supply cable to the hard disk cable (see Figure 122).
- 13** Remove the power supply from the interior of the platform base chassis.



**Note:** Remove the power supply carefully. Ensure the power supply cables are not entangled or connected to any internal components.

---

- 14** This procedure is complete.

## Install a BCM200 standard power supply

Use this procedure to install a functional standard power supply in a BCM200 platform base chassis. The I/O card must be removed from the platform base chassis before you perform this procedure. The base function tray must be partially removed.



**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.



**Warning:** Power supply cable management is critical. Cable damage can result due to loose or incorrectly positioned cables.

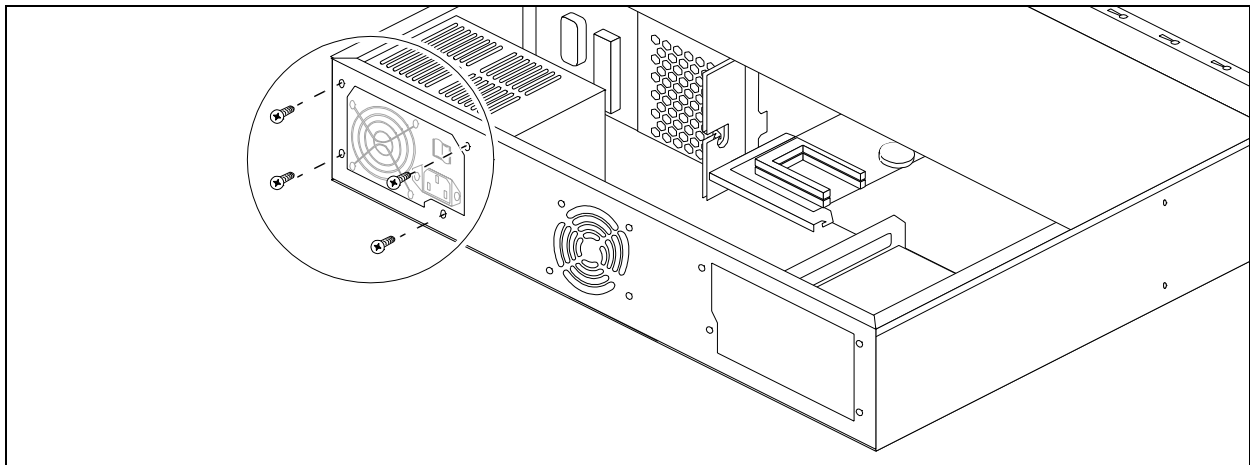
- 1 Obtain and use only the power supply recommended by Nortel Networks.
- 2 Place the new power supply into the platform base chassis.



**Note:** Install the power supply carefully. Ensure the power supply cables are not entangled or crushed against any internal components.

- 3 Secure the power supply to the platform base chassis. Align the power supply mounting holes with the chassis holes. Install the chassis screws at the rear of the platform base chassis. See Figure 121. Do not over-tighten the power supply chassis mounting screws.

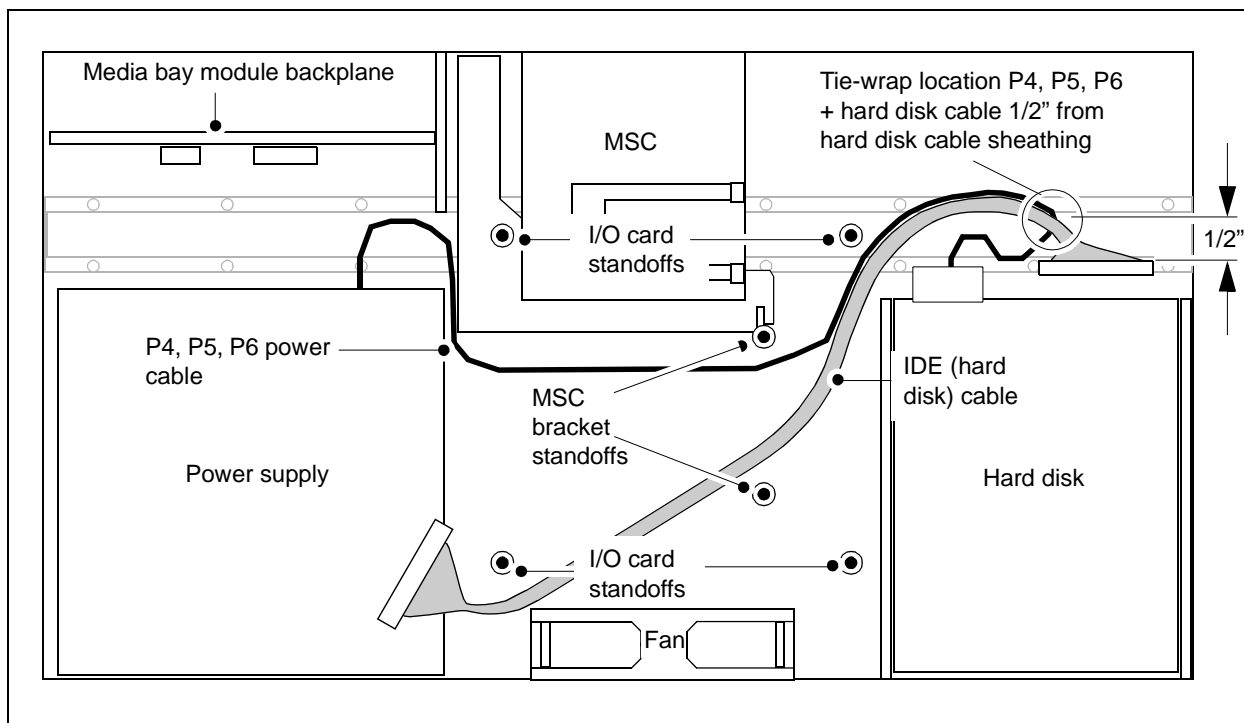
**Figure 121** Install the BCM200 power supply chassis screws



- 4 Run the P4, P5, P6 power supply cable and the IDE cable to the hard disk. The I/O card is not installed in the platform base chassis for this step. Perform the following:
  - a Route the power cable between the I/O card chassis standoffs in the area shown (see Figure 122). Run the IDE cable in the same manner.
  - b Tie-wrap the power cable to the hard disk cable. Position the tie-wrap 1/2 inch from the hard disk cable sheathing.

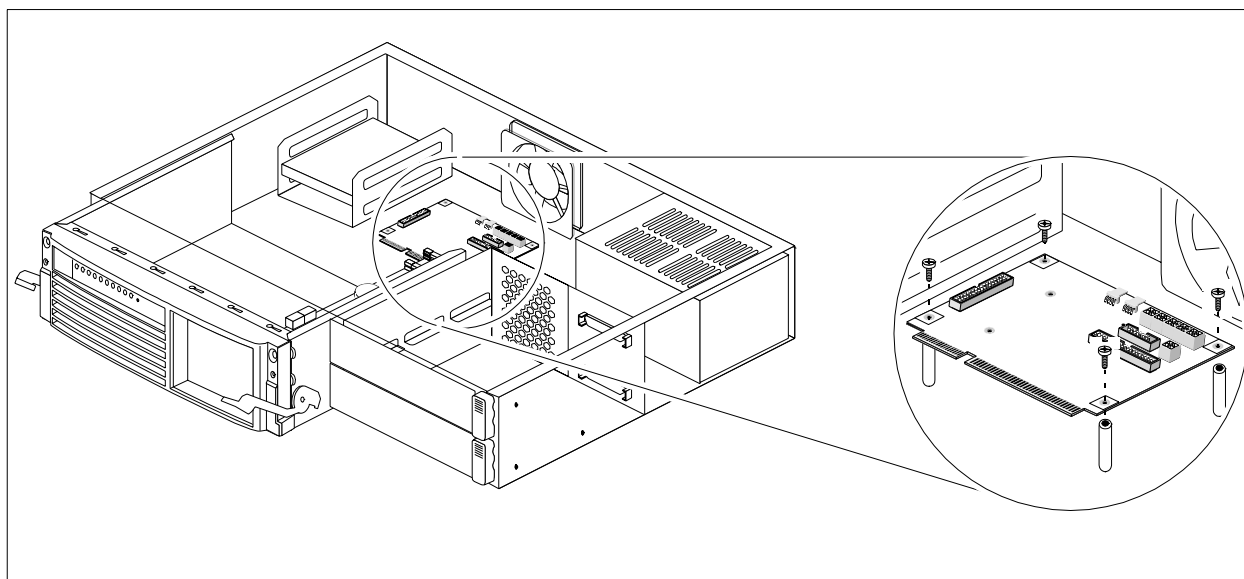
- c Ensure the remainder of the power cable does not interfere with internal components.

**Figure 122** Power and hard disk cable routing



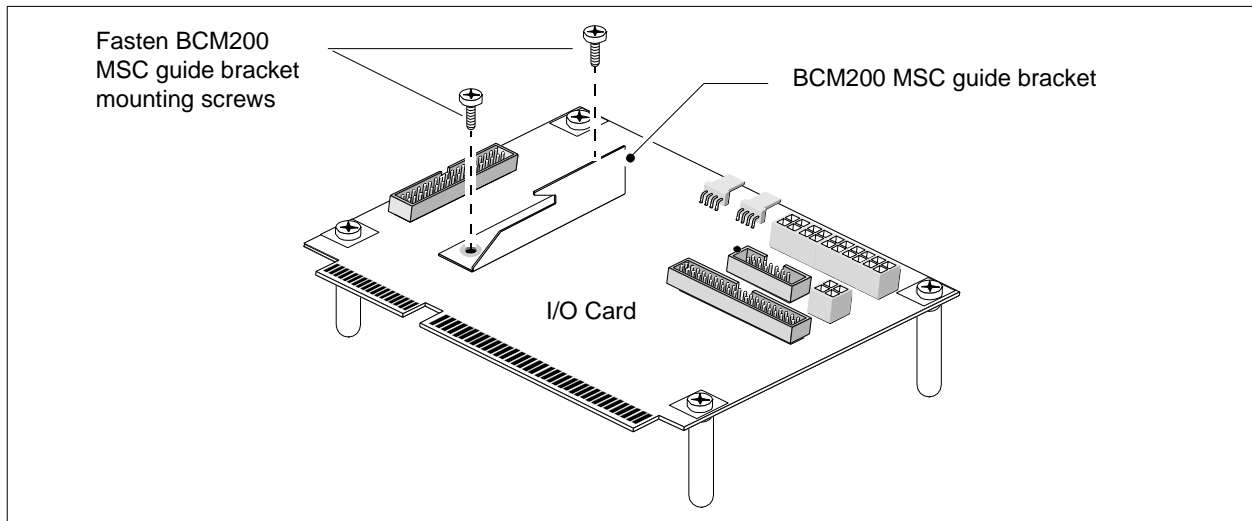
- 5 Install the I/O card. See Figure 123. The I/O card installs on top of the power supply and IDE cables. Ensure the cables maintain their position as shown in the previous step.

**Figure 123** Install the I/O card in the BCM200 platform base chassis

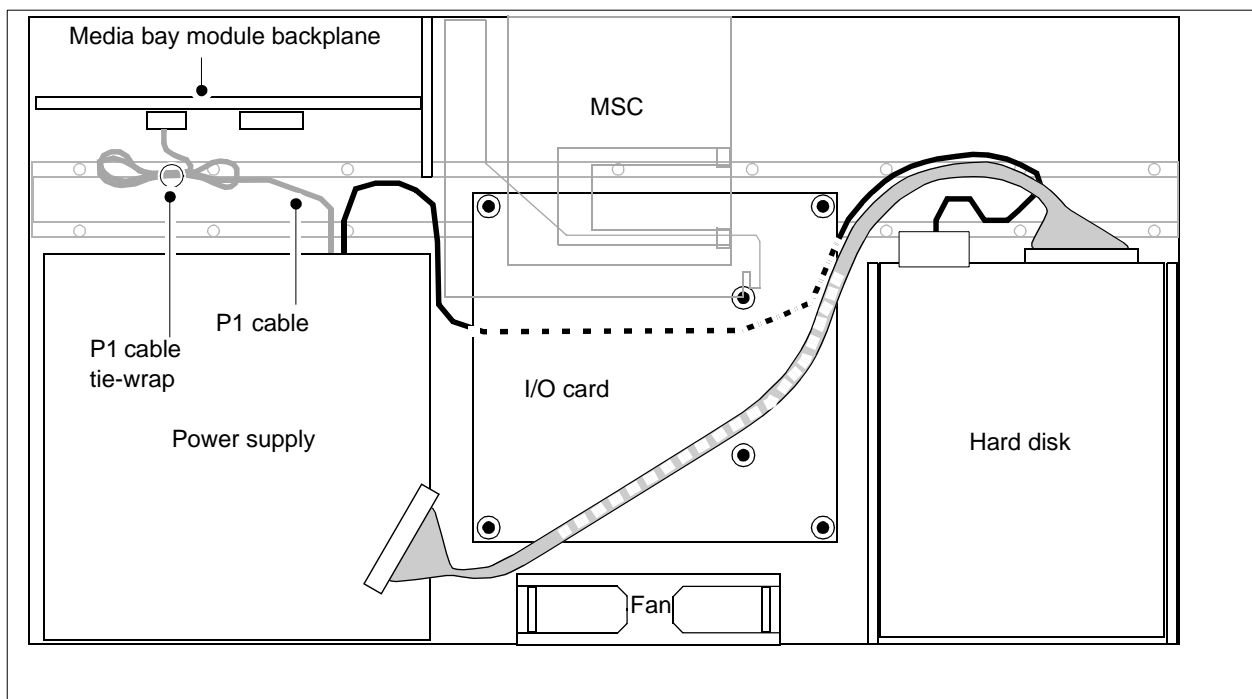


- 6 Install the BCM200 MSC bracket (see Figure 124).



**Figure 124** Install the BCM200 MSC guide bracket

- 7** Install a P1 power cable to the media bay backplane connector. Tie-wrap the excess cable as shown in Figure 125.

**Figure 125** Tie-wrap excess P1 power cable length

- 8** Connect the hard disk cable to the secondary IDE I/O card connection. Connect the hard disk cable to the hard disk connector. Connect the power connector to the hard disk (see Figure 125). Insert extra connectors under the hard disk
- 9** Connect the 20 Pin motherboard power cable (P1) and the +12v power Cable (P9) to the I/O card.

- 10 Loop the cables together and tie wrap to the side of the power supply to remove P1, P9, P3, P7/8 excess cable length. Fold the cables to the rear of the platform base chassis and secure with a tie-wrap. Ensure the cables are tied far enough back so they do not interfere with the insertion of the base function tray.
- 11 Attach the fan plug to the I/O card “Fan #1” connection. Loop excess fan cable length under the I/O card.



**Note:** Verify the power supply cables are connected correctly and do not interfere with any internal components.

- 12 Insert the base function tray fully into the platform base chassis. Ensure the base function tray does not interfere with any cabling.
- 13 Replace the platform base chassis top cover. See “Install the platform base chassis top cover” on page 163.
- 14 Press the power supply switch to the ON position (if applicable). Plug the Business Communications Manager power cord into an AC power outlet.
- 15 Restore the Business Communications Manager to operation. For details, refer to “Restart the System after Maintenance” on page 147. The Business Communications Manager system starts when you connect the AC power cord. Wait for the start-up process to finish.
- 16 Monitor the power LED on the base function tray. Refer to Table 24.

**Table 24** Power supply LED

LED Label	Description	Green LED On	Green LED Flash	Red LED On (Only)	Green LED Off
①	Indicates state of system power.	OK	N/A	a minimum of 1 PS needs attention*	N/A

- a If the Business Communications Manager does not power-up, press the reset button on the base function tray front panel.
  - b If the Power LED is red, and does not respond to a manual reset, this indicates a faulty power condition. Contact your Nortel Networks representative.
  - c If the Power LED indicates green, the system is operating normally. Continue to the next step in this procedure.
- 17 This procedure is complete.

## Remove a BCM400 standard power supply

Use this procedure to remove the standard power supply from a BCM400 platform base chassis.



**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

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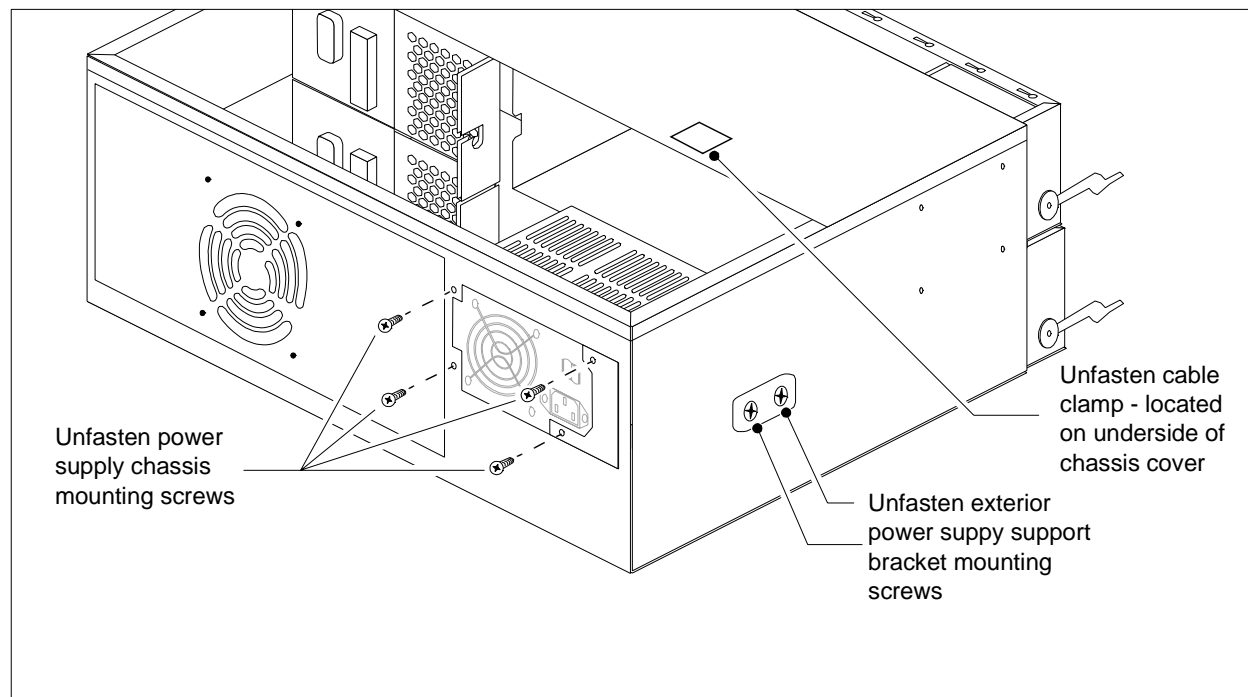


**Warning:** Power supply cable management is critical. Cable damage can result due to loose or incorrectly positioned cables.

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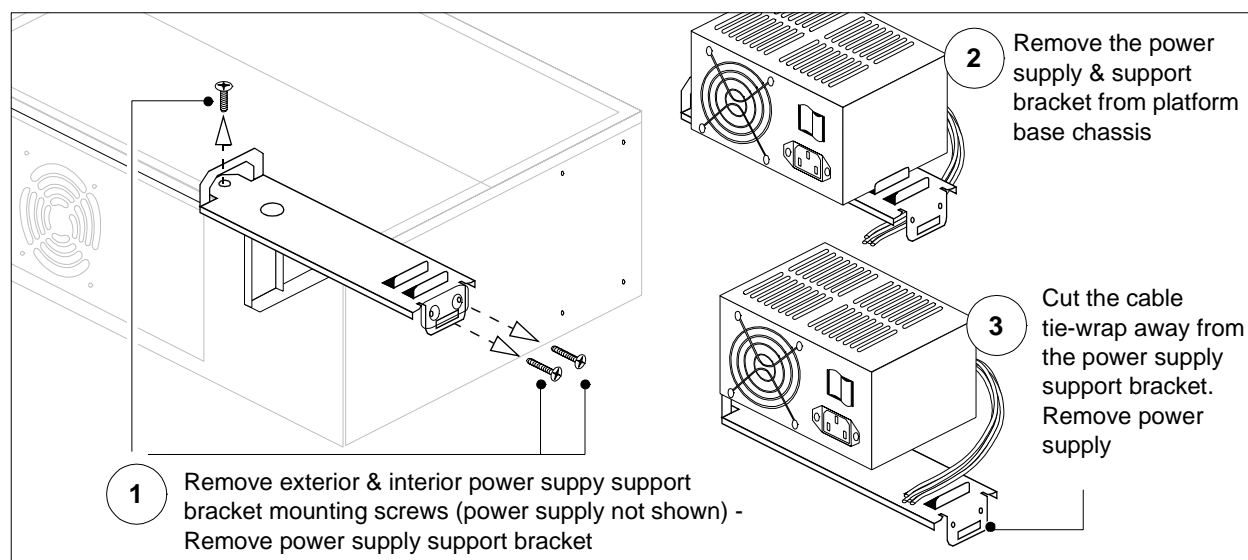
- 1 Set up the Business Communications Manager for maintenance (see “Shut down the system hardware” on page 146).
- 2 Disconnect all cables from the front of the base function tray.
- 3 Disconnect the platform base chassis and the expansion unit (if applicable), from the AC power connection.
- 4 Remove the top cover from the platform base chassis (see “Remove the platform base chassis top cover” on page 161).
- 5 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 6 Disconnect all cables from the I/O card.
- 7 Locate and disconnect the power supply cables from the media bay backplane and hard disk.
- 8 Partially remove the base function tray (see “Remove the base function tray” on page 150). Continue to the next step of this procedure when complete.
- 9 Unfasten the power supply cable clamp located on the underside of the platform base chassis top cover (see Figure 126). Gather the power supply cables away from the interior and toward the rear of the platform base chassis.
- 10 Remove the four power supply chassis screws from the back of the platform base chassis (see Figure 126). Place the screws in a safe location.

**Figure 126** Remove the BCM400 power supply chassis screws



- 11** Unfasten the exterior and interior power supply support bracket mounting screws (see Figure 127). Place the screws in a safe location.
- 12** Remove the power supply and support bracket out and away from the BCM400 platform base chassis.

**Figure 127** Remove the power supply and support bracket



- 13** Remove the tie-wrap from the power supply support bracket. Place the power supply in a safe, static free location.
- 14** This procedure is complete.

## Install a BCM400 standard power supply

Use this procedure to install a functional standard power supply in a BCM400 platform base chassis. The base function and advanced function trays must be partially removed.



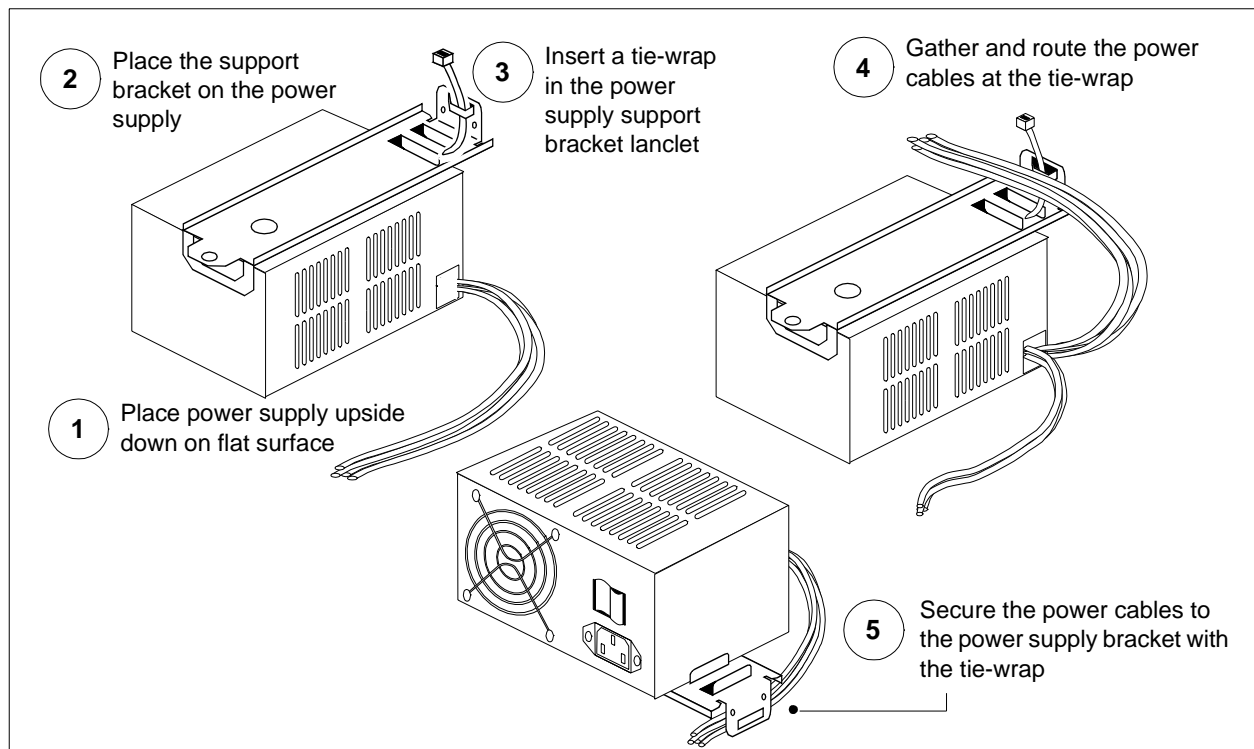
**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.



**Warning:** Power supply cable management is critical. Cable damage can result due to loose or incorrectly positioned cables.

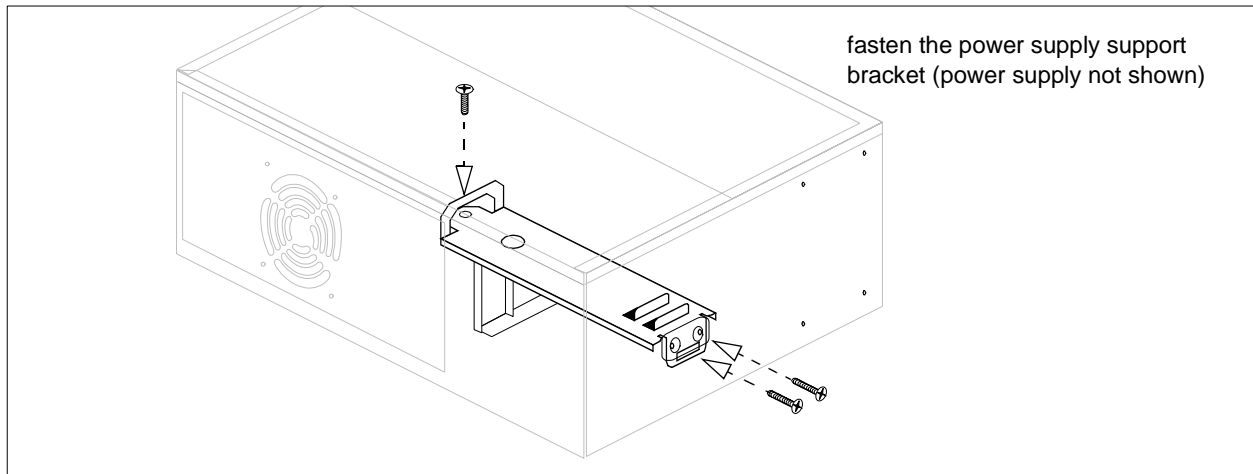
- 1 Ensure the new power supply is an auto-adjust power supply.
- 2 Insert a tie-wrap in the power supply support bracket lanclet.
- 3 Place the standard power supply (top down) on a flat surface. Place the power supply support bracket on the bottom surface of the power supply.
- 4 Gather together and route the main card 20 Pin power cable (P1) and the +12v power cable (P9) at the tie-wrap.
- 5 Secure the the power cables to the power supply support bracket with the tie-wrap (from step 2) - see Figure 128.

**Figure 128** Fasten the power supply support bracket cables



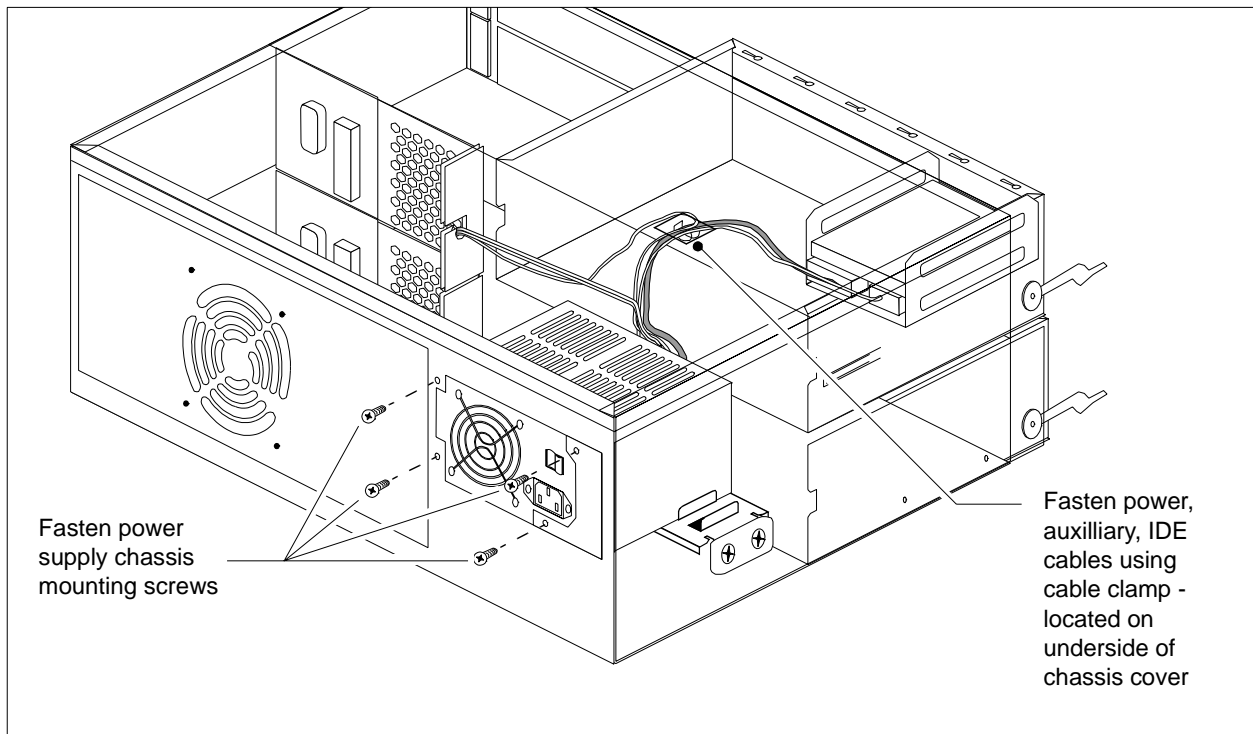
- 6 Insert the standard power supply and support bracket in the platform base chassis. The power supply support bracket rests on the MSC guide bracket on one side, and the chassis wall on the other.
- 7 Ensure the mounting holes in the power supply support bracket align with the holes in the platform base chassis.
- 8 Fasten the power supply support bracket mounting screws (see Figure 129).

**Figure 129** Fasten the power supply support bracket to the platform base chassis



- 9 Align the mounting holes in the power supply with the chassis holes at the rear of the platform base chassis. Fasten the power supply mounting screws to the platform base chassis.

**Figure 130** Fasten the standard power supply to the platform base chassis



- 10 Attach the 20 pin motherboard connector and the +12V power connector into the I/O card.
- 11 Route the power cable, auxilliary and IDE cable to the hard disk cage. Bundle the cables together and fasten to the roof of the platform base chassis using the cable clamp (see Figure 130).
- 12 Connect the power cable and IDE cable to the hard disk.
- 13 Run the auxilliary cable to the chassis cable slot (see next step).
- 14 Connect cable runs P2 and P3 to the media bay backplane as follows.
  - a Connect cable P2 into the bottom media bay module backplane power connector
  - b Connect cable P3 into the top media bay module backplane connector.
  - c Bundle power cables P2 and P3 along with auxiliary cable (P7/8) together with a grommet (see Figure 138).
  - d Insert the P2, P3 and auxiliary cables into the cable slot on the chassis (secured with the grommet).
- 15 This procedure is complete.

## Upgrade to a redundant power supply

Use the procedures in this section to upgrade a BCM400 platform base chassis, currently equipped with a standard power supply, with a redundant power supply. Figure 131 provides an overview of the steps required to upgrade your Business Communications Manager (BCM400) system from a standard power supply to a redundant power supply.



**Note:** A Business Communications Manager expansion unit with a standard power supply cannot be upgraded. You must replace the expansion unit chassis.

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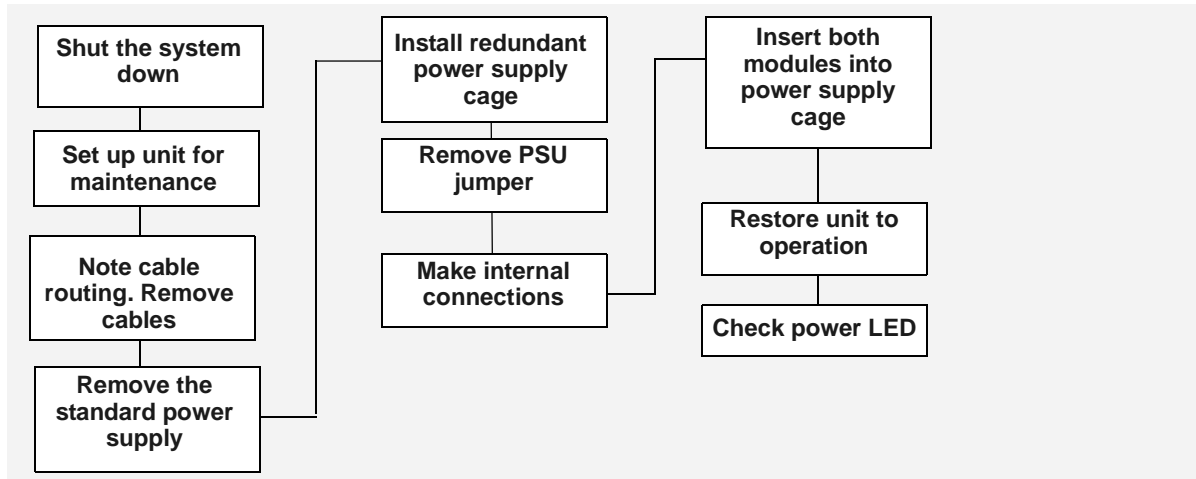
**Note:** When you install a redundant power supply, you must also install a redundant cooling fan included with the redundancy upgrade kit.

---



**Note:** When you install a redundant power supply, you must also remove the jumper installed in the PSU Status connector (RPS output signaling connector) on the I/O card.

---

**Figure 131** Redundant power supply upgrade overview

## Remove the PSU status connector jumper

Use this procedure if you are installing a redundant power supply for the first time. Use this procedure only with the BCM400 platform base chassis.



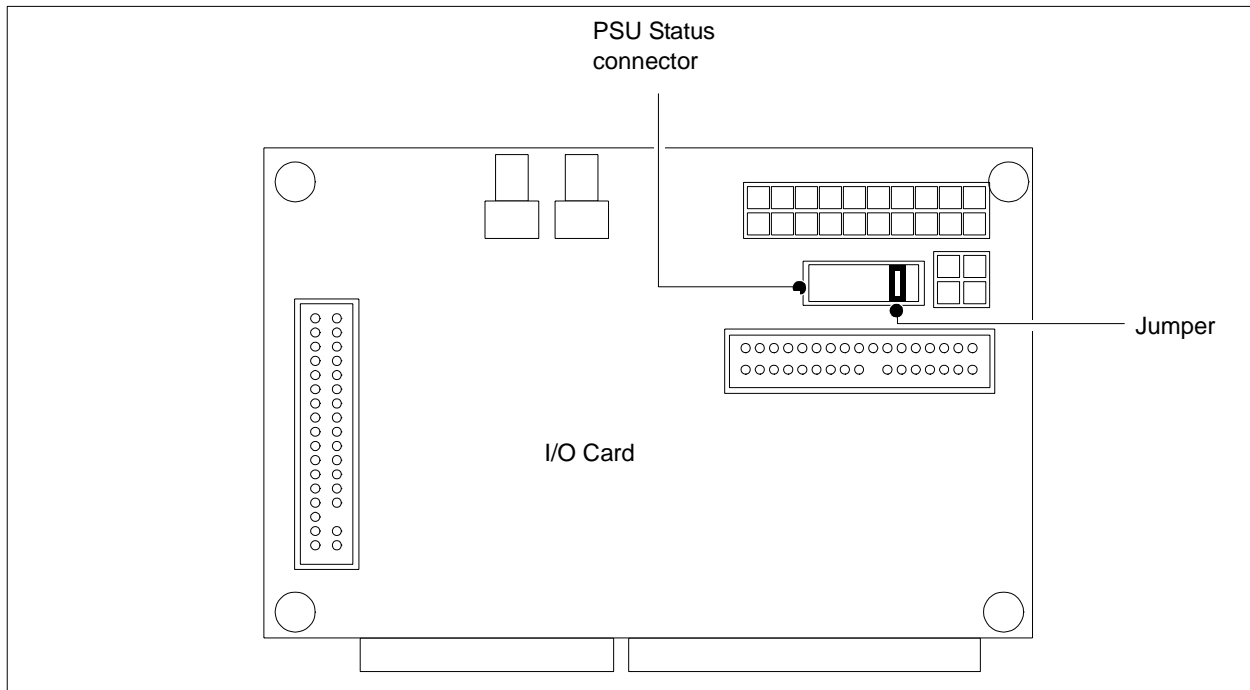
**Note:** When you upgrade to a redundant power supply, you should also install a redundant fan. Refer to “Install a BCM400 cooling fan” on page 182.



**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details, refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the Business Communications Manager for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the BCM400 system from the AC power outlet.
- 4 Remove the platform base chassis top cover. Refer to “Remove the platform base chassis top cover” on page 161. Continue to the next step in this procedure when complete.
- 5 Locate the PSU Status connector on the I/O card (see Figure 132).
- 6 Remove the RPS output signaling connector jumper. Use needle-nose pliers to pull the jumper out and away from the connector. Place the jumper in a safe location.
- 7 Connect the PA cable to the PSU status connector (see Figure 31).



**Figure 132** Remove the PSU status connector jumper

**8** This procedure is complete.

## Install a redundant power supply cage

This procedure describes how to install a redundant power supply cage in the BCM400 platform base chassis. After you install the redundant power supply cage in the platform base chassis, install the two power supply modules (see “Install a power supply module” on page 212).

Use this procedure only with the BCM400 platform base chassis.



**Note:** When you upgrade to a redundant power supply, you should also install a redundant fan. Refer to “Install a BCM400 cooling fan” on page 182.



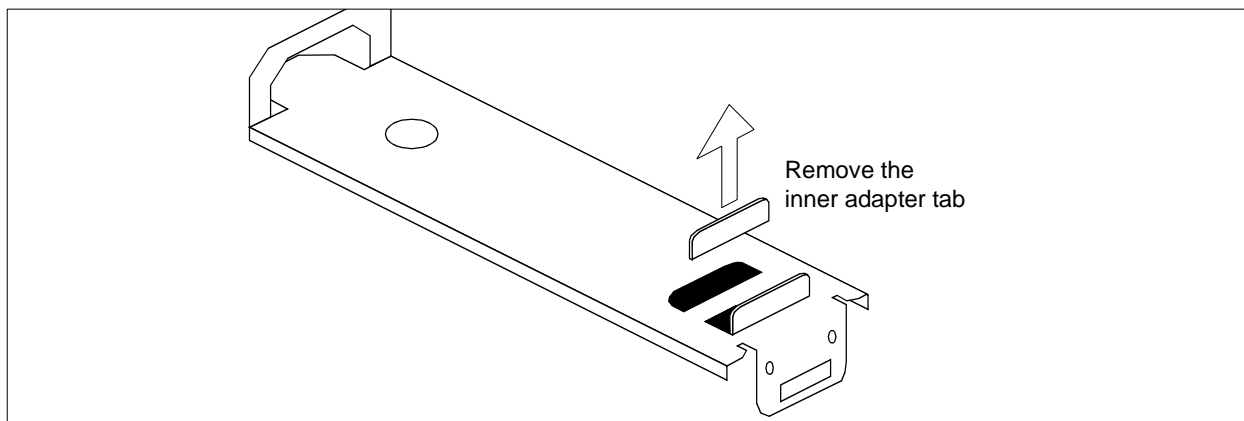
**Note:** When you install a redundant power supply, you must also remove the jumper installed in the PSU Status connector (RPS output signaling connector) on the I/O card. See Remove the PSU status connector jumper on page 204.



**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

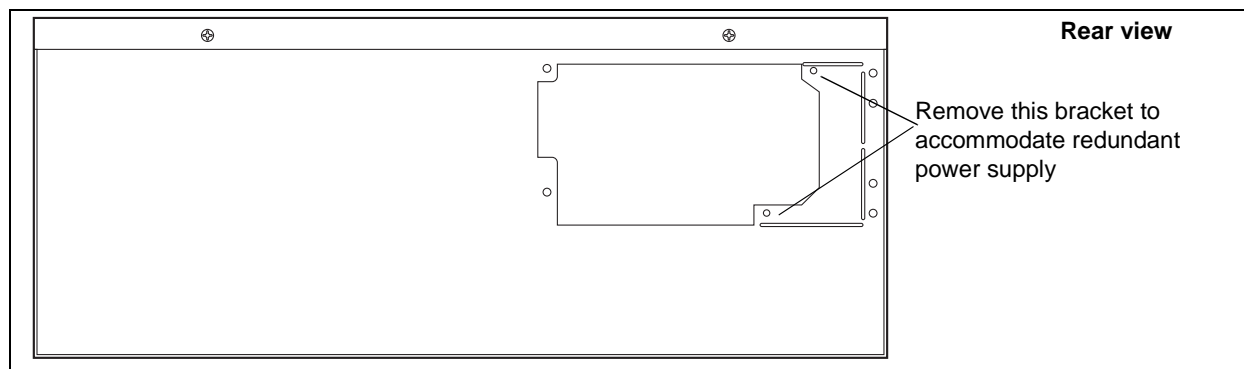
- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details, refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the Business Communications Manager for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the BCM400 system from the AC power outlet.
- 4 Remove the standard power supply from the platform base chassis (see Remove a BCM400 standard power supply on page 199). Continue to the next step in this procedure when complete.
- 5 Remove the power supply support bracket from the platform base chassis (see Remove a BCM400 standard power supply on page 199). Continue to the next step in this procedure when complete.
- 6 Remove the power supply adapter tab from the support bracket (see Figure 133). Use pliers to bend and snap the tab away from the support bracket. Make sure you remove only the inner adapter tab.

**Figure 133** Remove the BCM400 power supply adapter tab from the support bracket



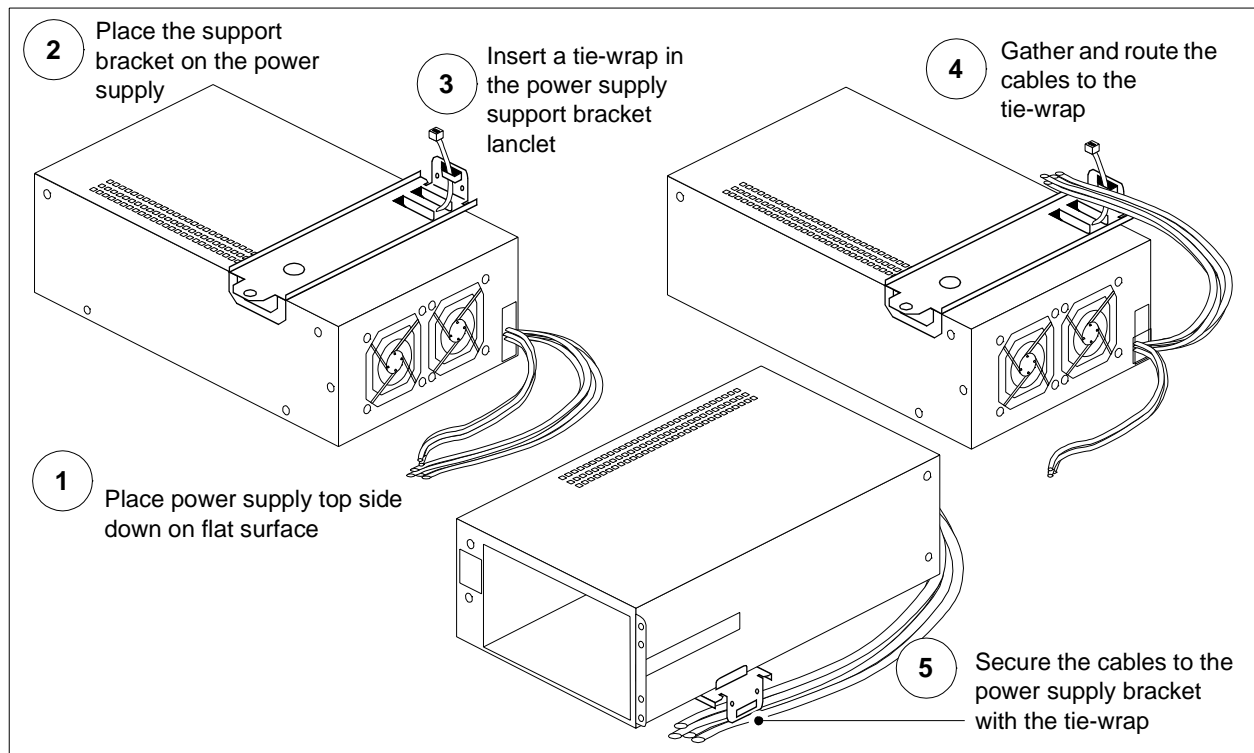
- 7 Remove the knockout plate from the rear of the platform base chassis (see Figure 134).

**Figure 134** Remove the power supply knockout bracket



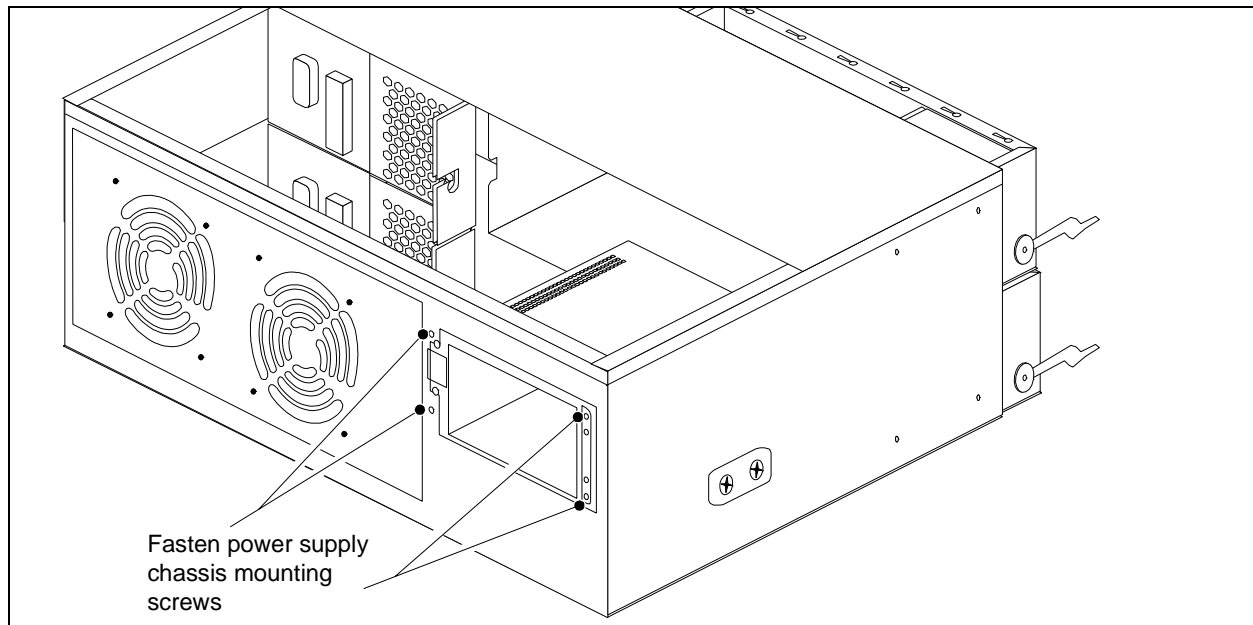
- 8 Remove both power supply modules from the redundant power supply cage before you install the power supply in the platform base chassis (see Remove a power supply module on page 214). Continue to the next step of this procedure when complete.
- 9 Place the redundant power supply (top down) on a flat surface. Place the power supply support bracket on the bottom surface of the power supply.
- 10 Insert a tie-wrap in the power supply support bracket lanclet.
- 11 Gather together and route the Motherboard 20 Pin power cable (P1) the +12v power cable (P9), the 3.3v load cable (PB), and the PS monitor Cable (PA) to the tie-wrap.
- 12 Secure the the cables to the power supply support bracket with a tie-wrap (see Figure 128).

**Figure 135** Fasten the power supply support bracket cables



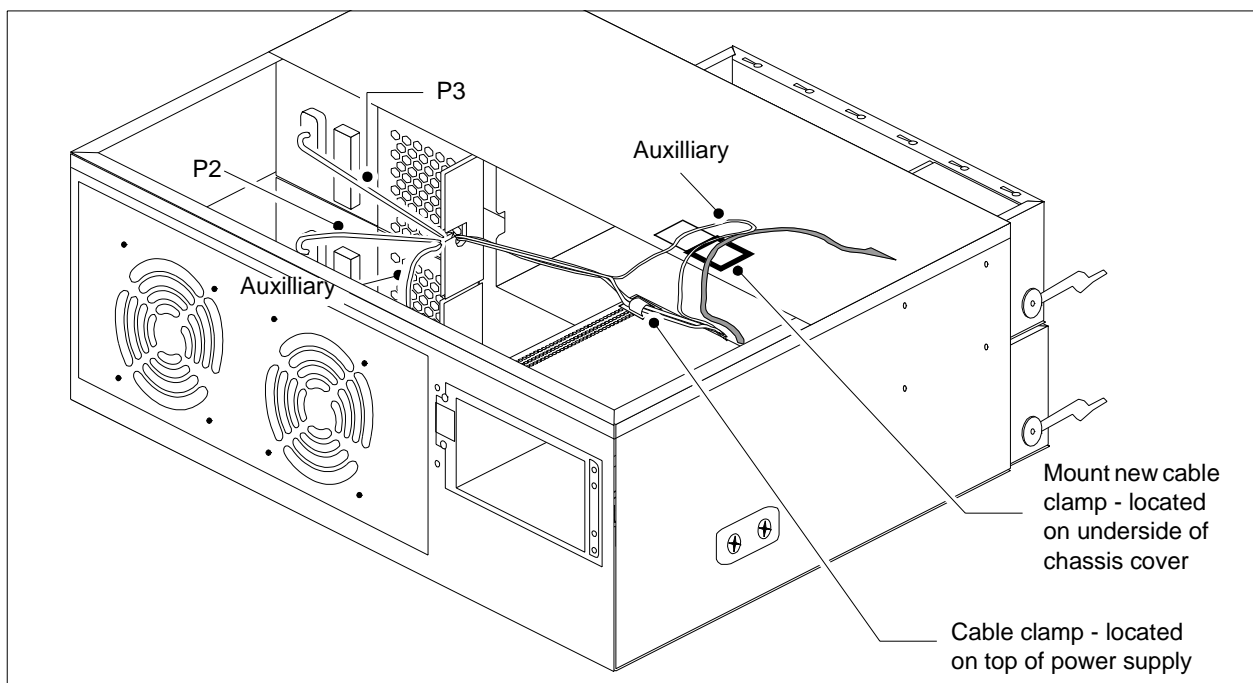
- 13 Install the power supply support bracket in the BCM400 platform base chassis (see Figure 129).
- 14 Position the redundant power supply cage in the base platform chassis. Make sure the power supply module tray opening faces the rear of the platform base chassis.
- 15 Align the mounting holes in the redundant power supply cage with the screw holes in the platform base chassis.
- 16 Attach the redundant power supply cage to the platform base chassis using the four chassis mounting screws. Refer to Figure 136.

**Figure 136** Attach the redundant power supply cage



- 17** If you have not already done so, install a redundant fan into the unit. Refer to “Install a BCM400 cooling fan” on page 182. Continue to the next step of this procedure when complete.
- 18** Install a new cable clamp on the underside of the top cover. Place the new cable clamp beside the existing cable clamp. Use the cable clamp to secure the power, IDE and auxilliary cables to the roof of the platform base chassis.

**Figure 137** Install a new cable clamp



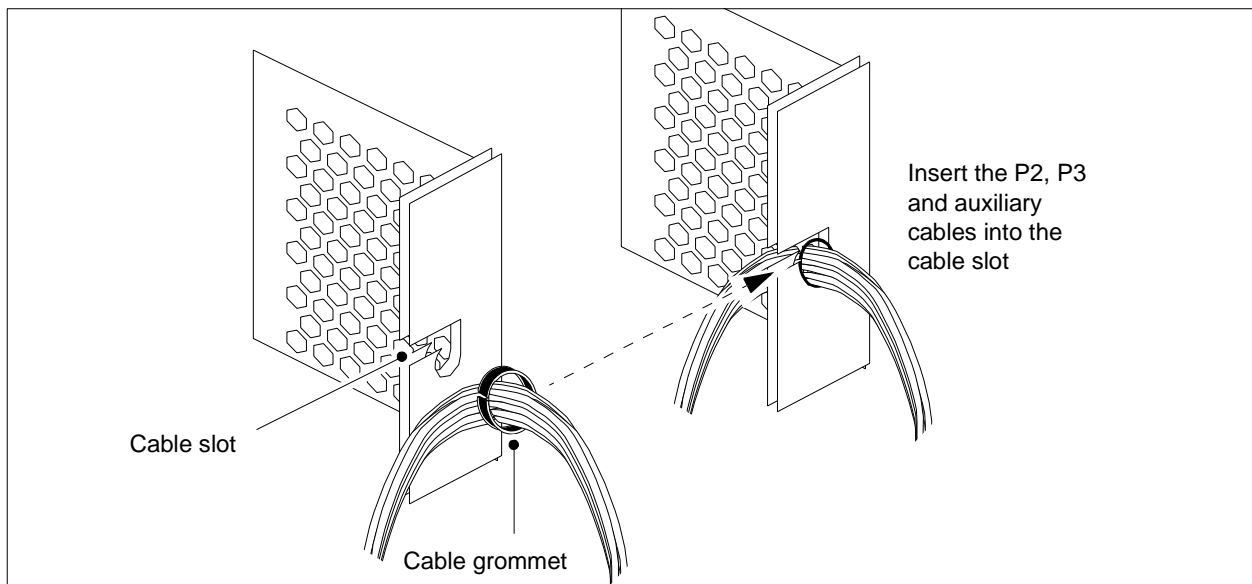
- 19** Run the power supply, auxiliary and IDE cables to the hard disk. Secure these cables in the new cable clamp.



**Note:** Verify the power supply cables are connected correctly, completely and are routed so they do not interfere with any internal components when moved.

- 20** Connect cable runs P2 and P3 to the media bay backplane (see Figure 137) as follows:
- a** Bundle the cables together. Run the cables on the top of the power supply chassis and secure with the cable clamp.
  - b** Connect cable P2 into the bottom media bay module backplane power connector
  - c** Connect cable P3 into the top media bay module backplane connector.
  - d** Bundle power cables P2 and P3 along with auxiliary cable (P7/8) together with a grommet (see Figure 138).
  - e** Insert the P2, P3 and auxiliary cables into the cable slot on the chassis (secured with the grommet).
  - f** Ensure that one power run connects to one MBM backplane connector. Do not connect a single power run to both MBM backplane connectors.

**Figure 138** Install a cable grommet



- 21** Install the platform base chassis top cover. See “Install the platform base chassis top cover” on page 163.
- 22** This procedure is complete.

## Remove a BCM400 redundant power supply cage

Use this procedure to remove an existing redundant power supply cage from the BCM400 platform base chassis.

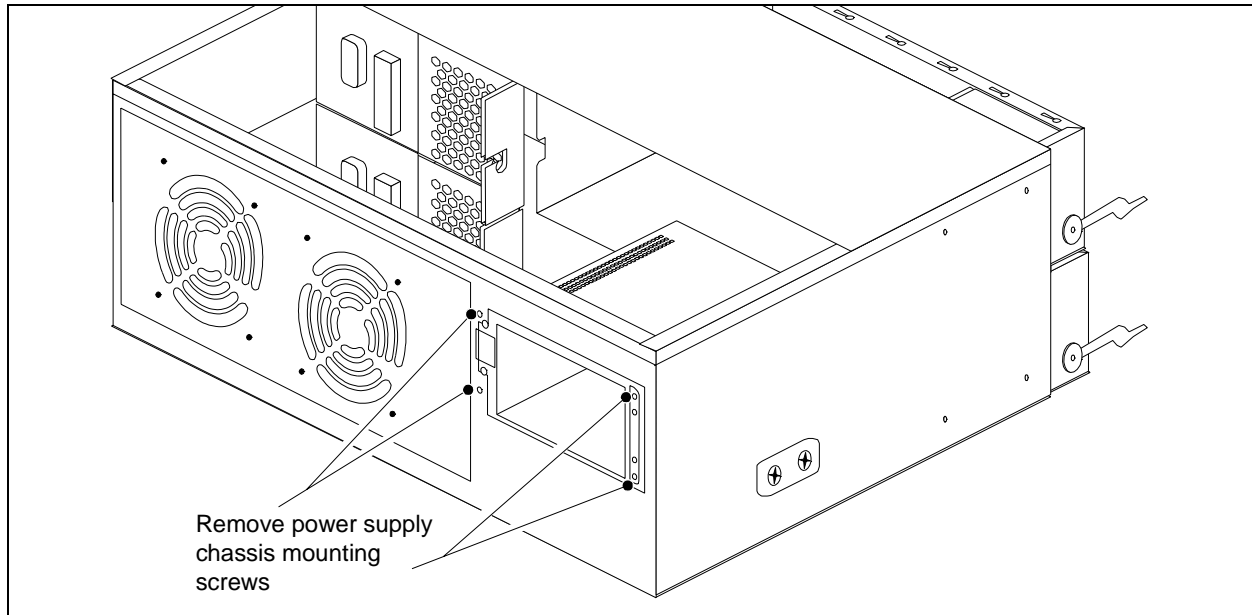


**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.



**Warning:** Risk of shock. Hazardous voltage levels are maintained for several seconds on removable modules. Do not completely remove the module from the power supply cage for several seconds after disengaging the module from the cage.

- 1 Set up the server for maintenance (see “Shut down the system hardware” on page 146). Disconnect all cables from the front of the base function tray.
- 2 Disconnect the platform base chassis and the expansion unit (if applicable), from the AC power connection.
- 3 Remove the top cover from the BCM400 platform base chassis (see “Remove the platform base chassis top cover” on page 161).
- 4 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 5 Remove the power supply modules (see Remove a power supply module on page 214). Continue to the next step in this procedure when complete.  
**Note:** Partially remove the power supply module from the power supply cage. Do not completely remove the power supply module. **IMPORTANT:** When the power is on, wait several seconds before removing the power supply module completely from the power supply cage to ensure complete electrical discharge.
- 6 Disconnect the power supply cables from the I/O card, media bay backplane, and hard disk.
- 7 Unfasten the cable clamp that holds the power and IDE cables in place. The cable clamp is located under the top cover of the platform base chassis.
- 8 Run all cables to the rear, exterior of the platform base chassis.
- 9 Remove the four power supply chassis screws from the rear of the platform base chassis (see Figure 139). Place the screws in a safe location.

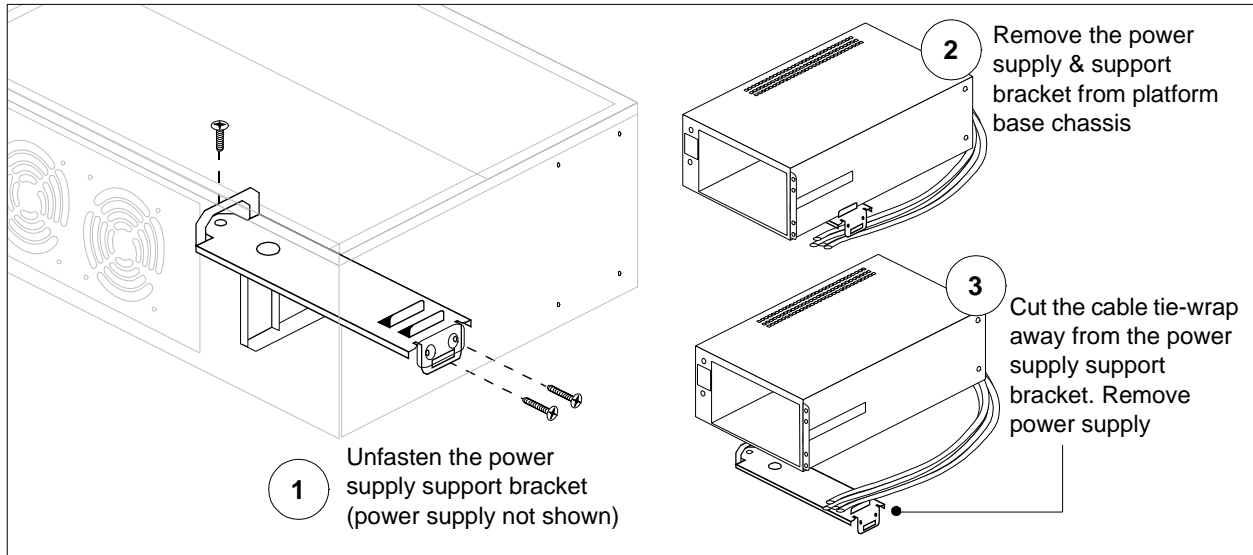
**Figure 139** Remove the BCM400 redundant power supply chassis screws

- 10** Unfasten the exterior and interior power supply support bracket mounting screws (see Figure 127). Place the screws in a safe location.
- 11** Remove the redundant power supply cage and support bracket out and away from the BCM400 platform base chassis (see Figure 140). Place the power supply in a safe, clean and static-free location.



**Note:** Remove the power supply carefully. Ensure the power supply cables are not entangled or connected to any internal components.

- 12** Cut the cable ties that hold the power cables to the power supply support bracket. Be careful not to cut or damage the cable insulation.

**Figure 140** Remove the redundant power supply cage and support bracket

**13** This procedure is complete.

## Install a power supply module

This procedure describes how to install power supply modules in the power supply cage. After you install the redundant power supply cage in the platform base chassis, insert the two power supply modules.

Use this procedure also to replace faulty power supply modules. Redundant power supply modules can be exchanged while the system is running, as long as one of the modules remains active. This section is relevant only with the BCM400 platform base chassis..



**Note:** When you upgrade to a redundant power supply, you should also install a redundant fan. Refer to “Install a BCM400 cooling fan” on page 182.



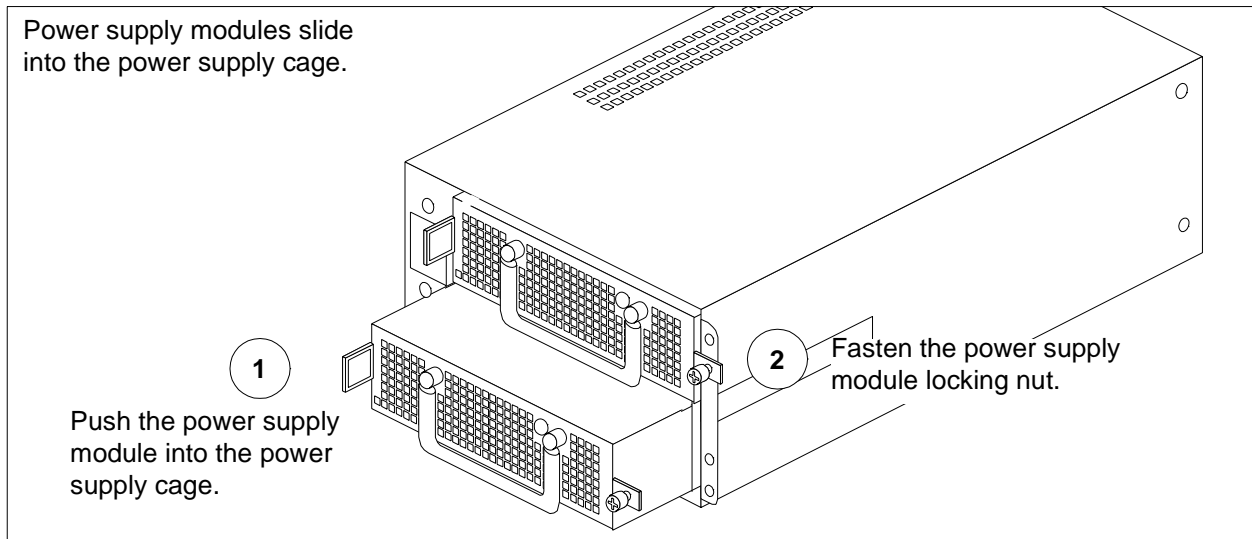
**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

- 1** Ensure you have the correct redundant power supply cage installed in the BCM400 platform base chassis (see Install a redundant power supply cage on page 205).
- 2** Ensure that you position the power supply modules correctly before inserting them into the power supply cage. The green LEDs are located at the top right of the power supply modules.
- 3** Insert the power supply modules into the redundant power supply cage at the rear of the platform base chassis.

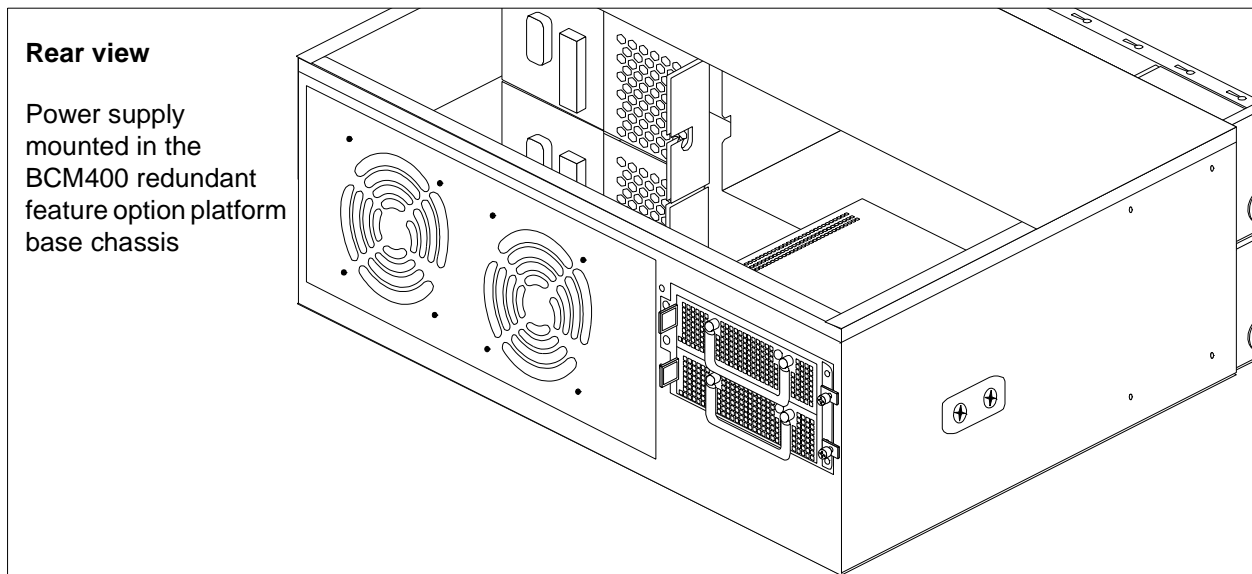


- a Push on the power supply module until the face of the module is flush with the casing. You hear a click when the power supply module is properly seated.
- b Secure each module with the power supply locking nut (located on the right side of the module). Refer to Figure 141.

**Figure 141** Install the power supply modules into the power supply cage



**Figure 142** BCM400 platform redundant power supply (rear view)



- 4 If you are installing the redundant power supply for the first time, restore the Business Communications Manager to operation as described in “Restart the System after Maintenance” on page 147.

The Business Communications Manager system starts up when you connect the AC power cord. If the system does not start and the Red Power LED is on, you may need to press the reset button on the base function tray panel to start the system.

If you are replacing a faulty power supply module, the Business Communications Manager is already in operation. The power supply module powers-up when fully and correctly inserted in the redundant power supply cage.

- 5 Verify the LEDs on the power supply module are lit. Verify all LEDs on the base function tray indicate the system functions correctly.
- 6 This procedure is complete.

## Remove a power supply module

Use this procedure for any of the following conditions:

- Remove a single failed power supply module. A power supply module indicates a failure when the green LED (located on the module) is not lit.
- Remove power supply modules before you install a new power supply cage in the BCM400 platform base chassis (see “Upgrade to a redundant power supply” on page 203).



**Note:** It is not necessary to remove power from the BCM400 platform base or expansion unit to replace a single power supply module.

---



**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

---



**Warning:** Risk of shock. Hazardous voltage levels are maintained for several seconds on removable modules. Do not completely remove the module from the power supply cage for several seconds after disengaging the module from the power supply cage.

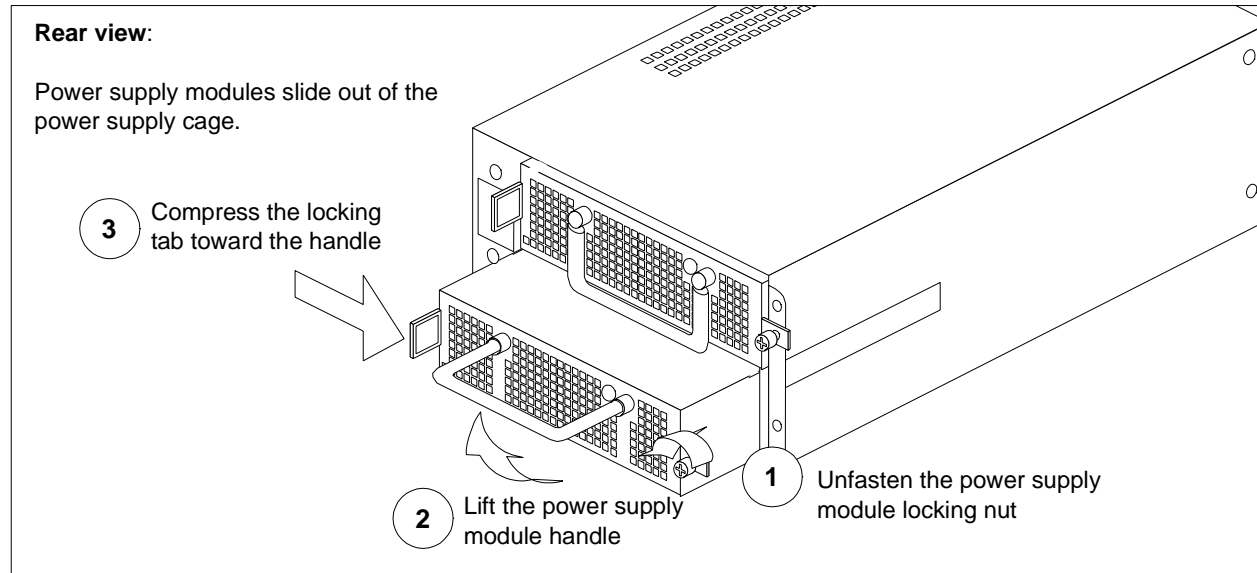
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- 1 Unfasten the power supply module locking nut. When the nut is fully unfastened, the nut should move freely in the screw cage.
- 2 Swing the power supply module handle to a 90 degree angle to the power supply module.
- 3 Grasp the power supply module handle. With your thumb, compress the locking tab toward the handle.
- 4 Pull the power supply module out of the power supply cage (see notes in this step).

**Note:** If you are replacing a faulty power supply module, power-down the power supply module. Partially remove the power supply module from the power supply cage. Do not completely remove the power supply module. **IMPORTANT:** When the power is on, wait several seconds before removing the power supply module completely from the power supply cage to ensure complete electrical discharge.

**Note:** If you are installing the redundant power supply for the first time, remove both power supply modules from the redundant power supply cage. Remove the power supply modules before you install the power supply in the platform base chassis (see Figure 143). Continue to Step 5 of this procedure.

**Figure 143** Remove the power supply module from the power supply cage



- 5 Place the power supply module on a flat, clean, static-free surface.
- 6 Repeat this step for any remaining power supply modules.
- 7 This procedure is complete.



---

## Chapter 10

# Replace Data Cards and Processing Hardware

---

This chapter describes how to replace data card and processing hardware components.



**Warning:** You must remove all of the connections to the Business Communications Manager before you power the system down.

Failure to disconnect lines before power down can cause damage to the system.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

The following are field replaceable units (FRUs) for the BCM200 and BCM400 platforms:

- Base function tray
- Cards (WAN, MSC, Modem)
- Computer memory
- PEC cards
- Main card CMOS battery

## System status LEDs

Ten LEDs on the front of the Business Communications Manager base function tray indicate PCI card and hardware status. Use the LEDs to determine PCI device status as follows:

- **Green LED on:** Device is present and the driver is active
- **Green LED flashing:** Driver is not running
- **Green LED off:** Device is not present

## Card Replacement Procedures

For a description of the function of each type of card on the Business Communications Manager system, refer to “Data networking components” on page 62. The base function tray (BFT) contains all of the cards described by the replacement procedures.

Use the procedures in this section to replace the following cards:

- Wide area network (WAN) card
- Media services card (MSC)
- Modem card

**Danger:** Electrical shock warning.

Disconnect the power cord, telephone cables and network cables before opening the computer.

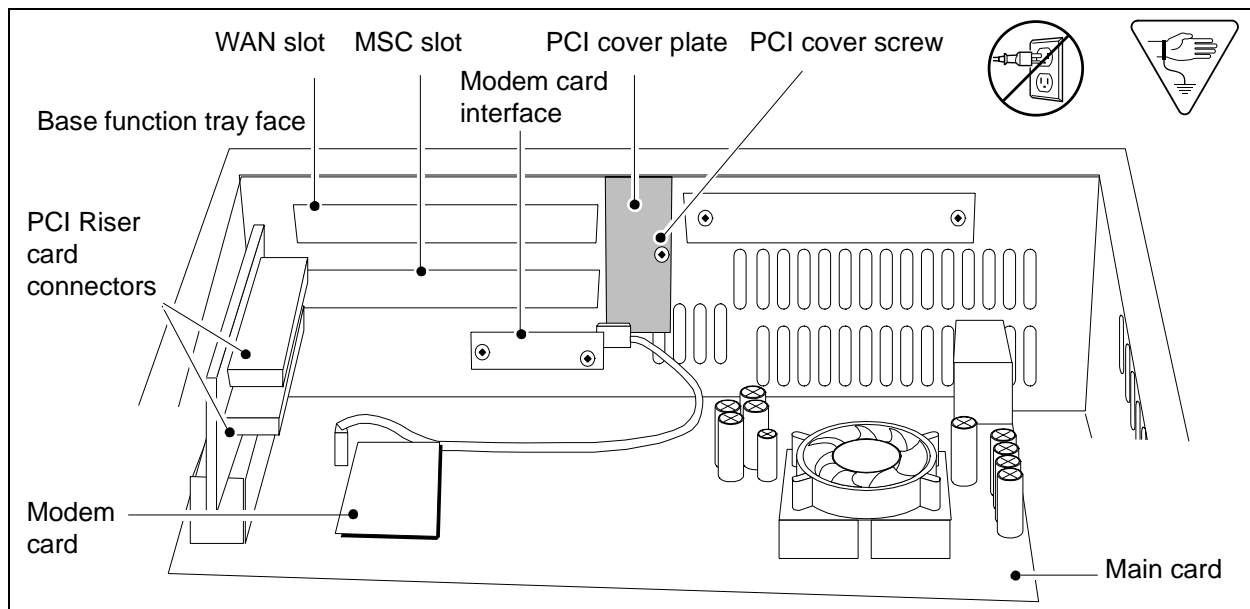
Read and follow installation instructions carefully.

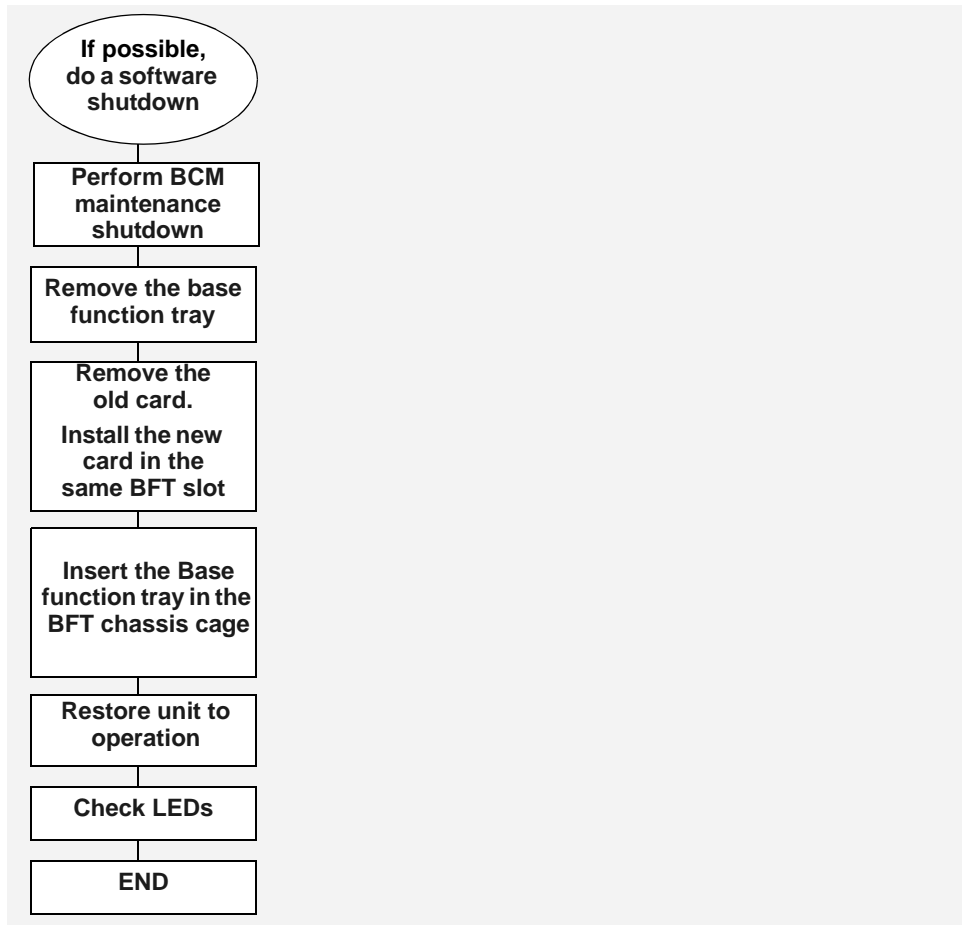


**Caution:** Use only a Nortel Networks approved replacement. Contact your account representative for the current list of approved replacement parts.

Figure 144 shows an interior view of the base function tray (looking forward). The illustration identifies the location of interior components and chassis features. Use the flow chart shown in Figure 145 to replace the cards.

**Figure 144** Base function tray interior components



**Figure 145** Card replacement overview

## Remove the WAN card

Use this procedure to remove the WAN card.

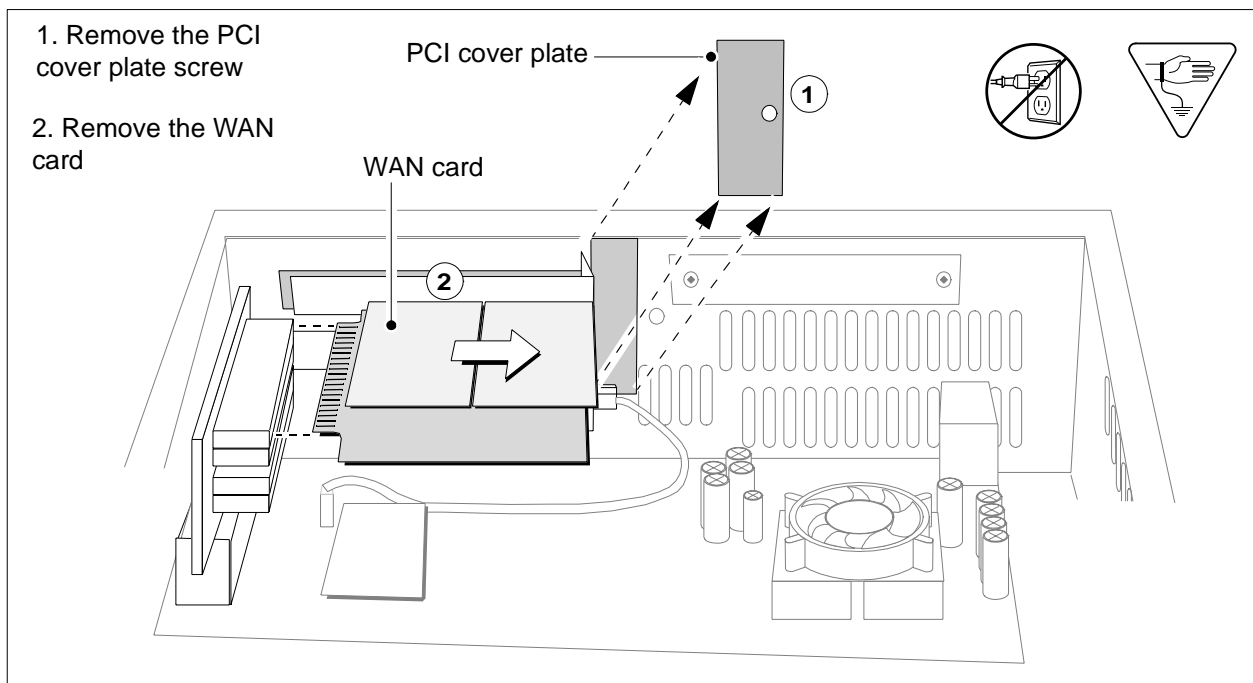


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the server for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the Business Communications Manager from the AC power outlet.
- 4 Disconnect any connectors from the front of the base function tray.

- 5 Remove the platform base chassis top cover. Refer to “Remove the platform base chassis top cover” on page 161.
- 6 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 7 Partially remove the base function tray from the platform base chassis. Ensure you do not pinch, stretch or damage any cables. If required, remove the base function tray completely from the platform base chassis (see “Remove the base function tray” on page 150).
- 8 Remove the base function tray bezel. See “Remove the base function tray bezel” on page 153.
- 9 At the front of the base function tray, loosen and remove the PCI cover plate screw (use a #2 Phillips screwdriver). Figure 146 shows an interior view of the base function tray. Place the screw in a safe location.
- 10 Remove the PCI cover plate from the BFT chassis. Place the PCI cover plate in a safe location.
- 11 Use both hands to carefully hold the WAN card along the side edges. Push the WAN card away from the PCI riser card connector.

**Figure 146** Remove the WAN card and PCI cover plate



- 12 Remove the WAN card from the base function tray. Place the card in a safe, static-free and clean location or container.
- 13 This procedure is complete.



## Install the WAN card

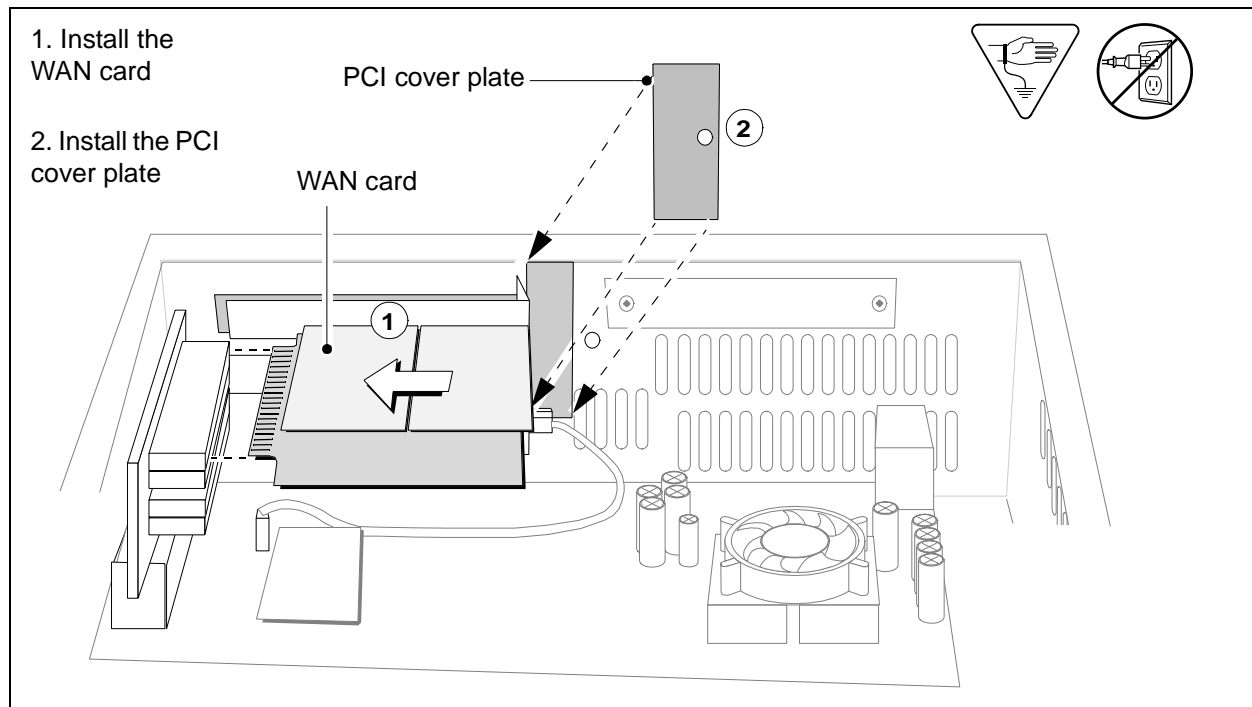
Use this procedure to install a replacement WAN card. If you are installing a new WAN card for the first time, refer to “Initialize a new WAN card” on page 222.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

- 1 Disconnect the Business Communications Manager from the AC power outlet.
- 2 Partially remove the base function tray from the platform base chassis. If required, remove the base function tray completely from the platform base chassis (see “Remove the base function tray” on page 150).
- 3 Remove the base function tray bezel (if applicable).
- 4 Insert the WAN card in the same PCI slot from which you removed the original card. Refer to Figure 147.
- 5 Push firmly on the WAN card until it sits completely in the top PCI riser card connector.
- 6 Position the PCI cover plate on the front of the base function tray such that the base function tray and cover plate screw holes align.
- 7 Position the PCI cover plate locking screw in the PCI cover plate. Tighten the PCI cover plate locking screw until the plate is firmly set in place (see Figure 147).

**Figure 147** Install the WAN card



- 8 Partially insert the base function tray in the platform base chassis (see “Install the base function tray” on page 151). Ensure you do not pinch or damage any cables.
- 9 Install the base function tray bezel. See “Install the base function tray bezel” on page 154.
- 10 Move the base function tray latches to the locked position and install the latch screws.
- 11 Insert all connectors in the correct locations on the base function tray face.
- 12 Restore the unit to operation. For details, refer to “Restart the System after Maintenance” on page 147.
- 13 This procedure is complete.

### Initialize a new WAN card

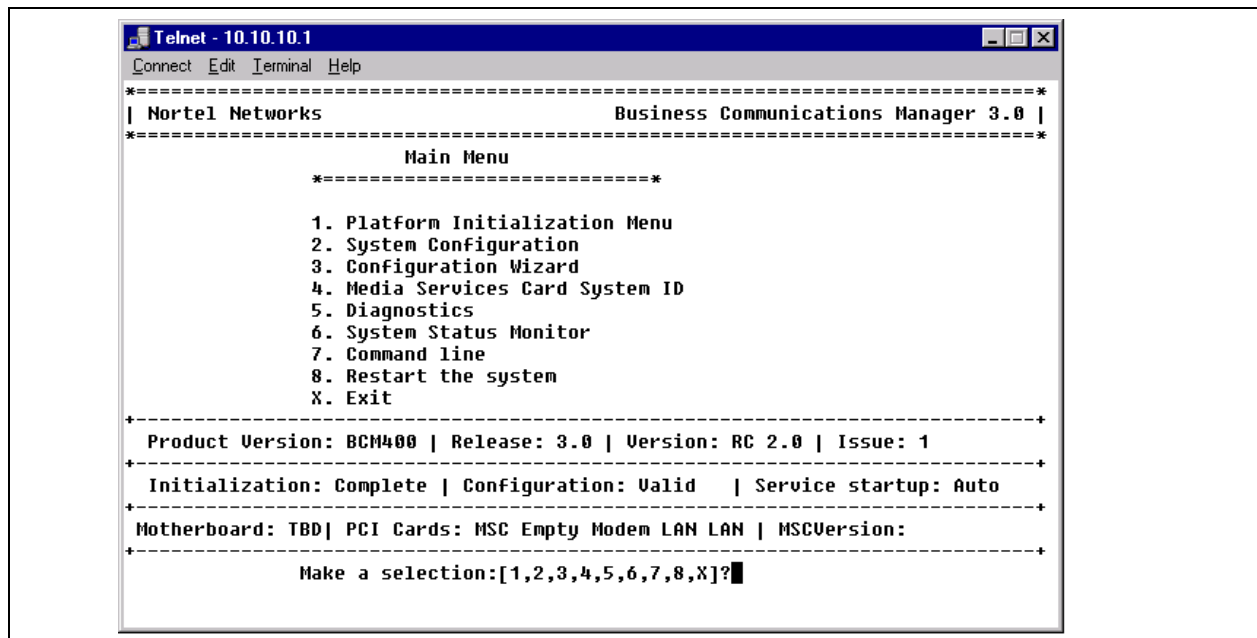
Use this procedure to configure the Business Communications Manager to recognize a new WAN card installation.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

- 1 When the Business Communications Manager system is operational, display the configuration main menu through a telnet session. See “Display the configuration menus” on page 139. Refer to Figure 148

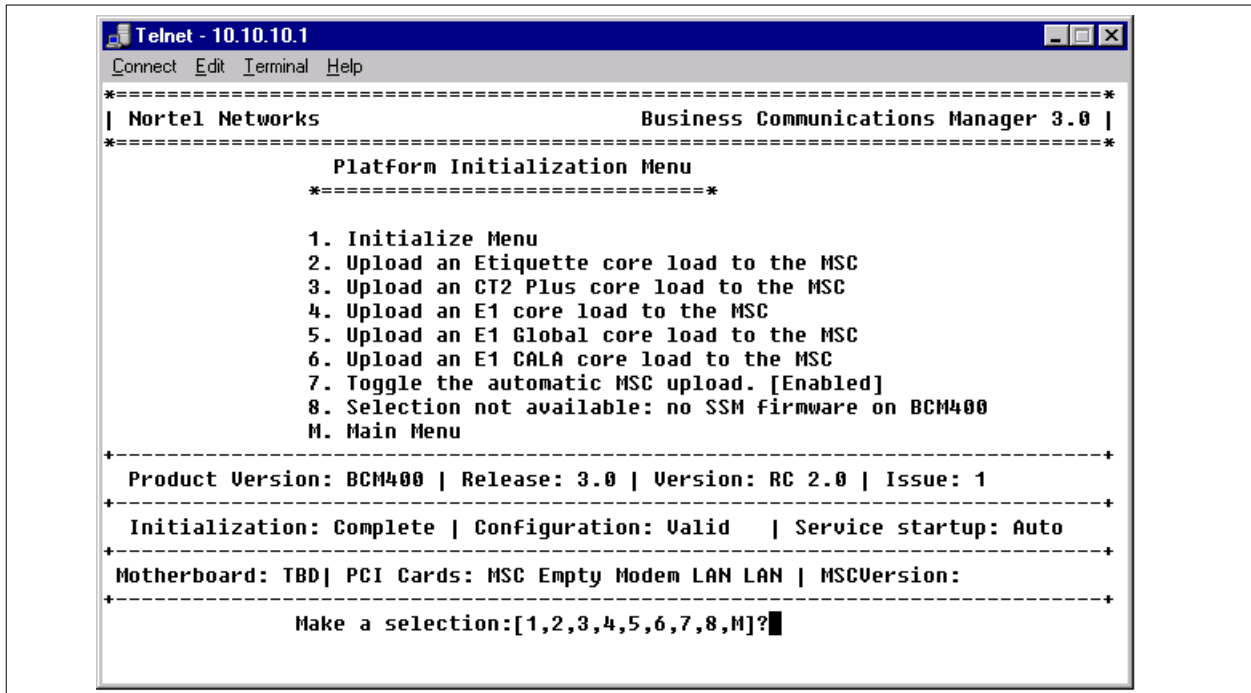
**Figure 148** Configuration main menu display



- 2 Select option 8: Restart the system. Select “R” to confirm a restart.
- 3 Observe the base function tray LEDs. Wait for the system to completely shut down - indicated by flashing LEDs.

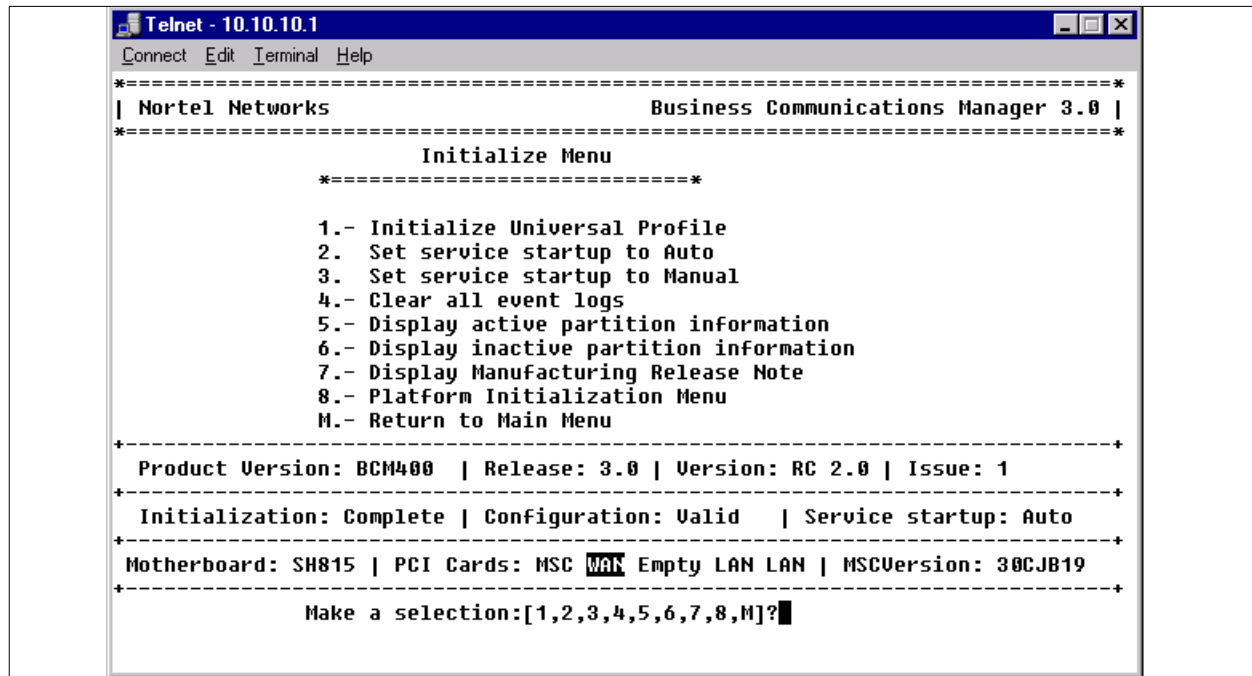
- 4 Perform the WAN card installation as described in the procedure: “Install the WAN card” on page 221. Continue to the next step of this procedure when complete.
- 5 When the system is powered-up, perform the following:
  - a display the configuration menu (see “Configuration main menu display” on page 222).
  - b Select option 1 from the main menu to display the Platform Initialization Menu (see Figure 149).

**Figure 149** Platform initialization menu



- 6 From the Platform Initialization menu, select option 1 to display the Initialize menu (see Figure 150). The WAN card is shown in the PCI card inventory.

Figure 150 Initialize menu



- 7 From the Initialize menu, select option 1 - Initialize Universal Profile. The Business Communications Manager performs a shutdown and reboot to enable the WAN card.
- 8 This procedure is complete.

## Remove the media services card (MSC)

Use this procedure to remove the media services card from the base function tray.

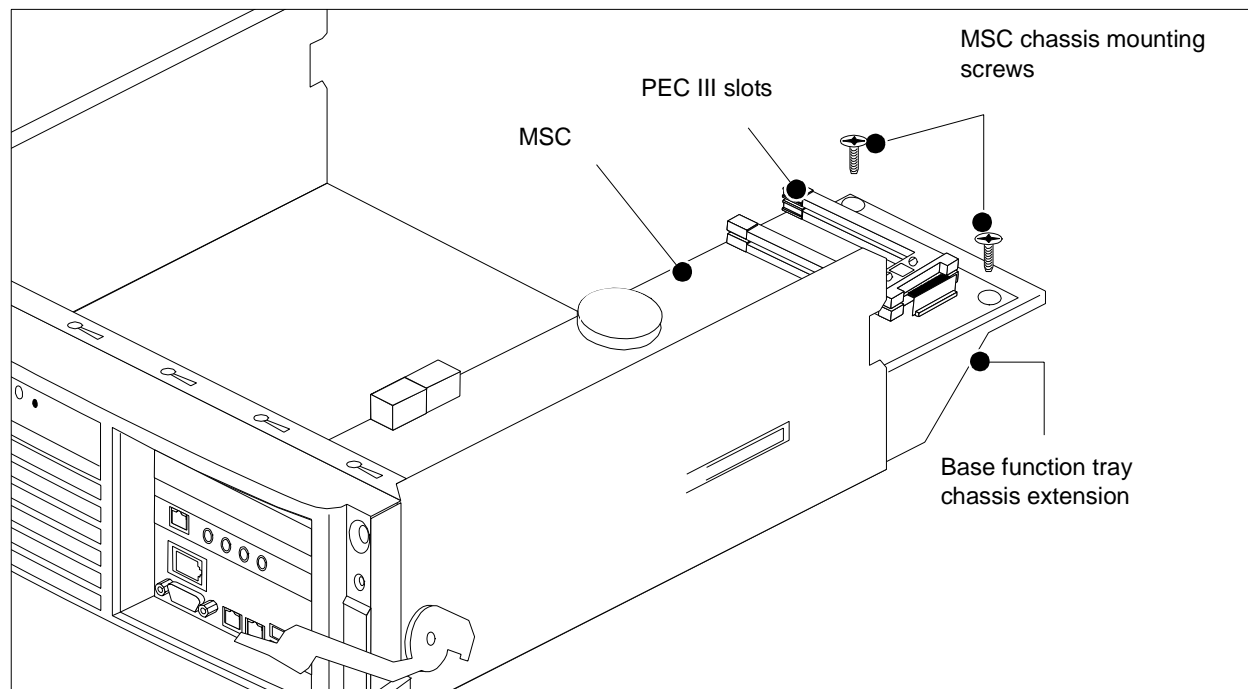


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.



**Note:** If you purchased optional Business Communications Manager applications that require keycode activation, regenerate the keycodes after you re-install the replacement MSC. For further information, see “Regenerating keycodes after system replacement” on page 142 and “Install the media services card (MSC)” on page 226.

- 1 Ensure you have a current data backup of your system.
- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the server for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the Business Communications Manager from the AC power outlet.
- 4 Disconnect any cables from the front of the base function tray.
- 5 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 6 Partially remove the base function tray from the platform base chassis (See “Remove the base function tray” on page 150). Do not exert force on the DS30 cables and connectors.
- 7 Disconnect the DS30 cables.
- 8 Remove the base function tray completely from the platform base chassis. Ensure you do not pinch or damage any cables (see “Remove the base function tray” on page 150). Place the base function tray on a flat, clean and static-free surface. Continue to the next step of this procedure when complete.
- 9 Remove the base function tray bezel. See “Remove the base function tray bezel” on page 153. Continue to the next step of this procedure when complete.
- 10 At the front of the base function tray, loosen and remove the PCI cover plate screw (use a #2 Phillips screwdriver). Figure 146 shows an interior view of the base function tray. Place the screw in a safe location.
- 11 Remove the PCI cover plate from the base function tray chassis. Place the PCI cover plate in a safe location.
- 12 Remove the two chassis mounting screws that secure the MSC to the base function tray chassis extension (at the rear of the MSC) - see Figure 151. Place the screws in a safe location.

**Figure 151** MSC chassis mounting screws

- 13** Use both hands to carefully hold the card along the side edges. Push the card away from the PCI riser card connector to disconnect the MSC.
- 14** Remove the MSC from the base function tray. Place the MSC on a flat, clean and static-free surface.
- 15** This procedure is complete.

## Install the media services card (MSC)

Use this procedure to install the media services card in the base function tray.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.



**Note:** If you purchased optional Business Communications Manager applications that require keycode activation, regenerate the keycodes after you re-install the replacement MSC. For further information, see “Regenerating keycodes after system replacement” on page 142.

- 1** Disconnect the Business Communications Manager from the wall power outlet.
- 2** Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 3** Position the MSC in the correct PCI riser card connector.

- 4 Push the card firmly and fully into the PCI riser card connector.
- 5 Install the two chassis mounting screws at the rear of the MSC (see Figure 151).
- 6 Position the PCI cover plate on the front of the base function tray such that the base function tray and cover plate screw holes align.
- 7 Position the PCI cover plate locking screw in the PCI cover plate. Tighten the PCI cover plate locking screw until the plate is firmly set in place (see Figure 147).
- 8 Install the base function tray bezel. See “Install the base function tray bezel” on page 154. Continue to the next step in this procedure when complete.
- 9 Partially install the base function tray in the platform base chassis.
- 10 Connect the DS30 connectors to the MSC.
- 11 Install the base function tray completely into the chassis. Be careful not to crimp the DS30 cables. (See “Install the base function tray” on page 151. Continue to the next step in this procedure when complete.
- 12 Insert all connectors in the correct locations on the base function tray face.
- 13 Restore the Business Communications Manager to operation. For details, refer to “Restart the System after Maintenance” on page 147. Continue to the next step in this procedure when complete.
- 14 Restore your Business Communication Manager application keycodes if applicable. The step applies only if you installed a new MSC. See “Regenerating keycodes after system replacement” on page 142.
- 15 This procedure is complete.

## Remove the modem card

Use this procedure to remove the modem card from the main card in the base function tray.

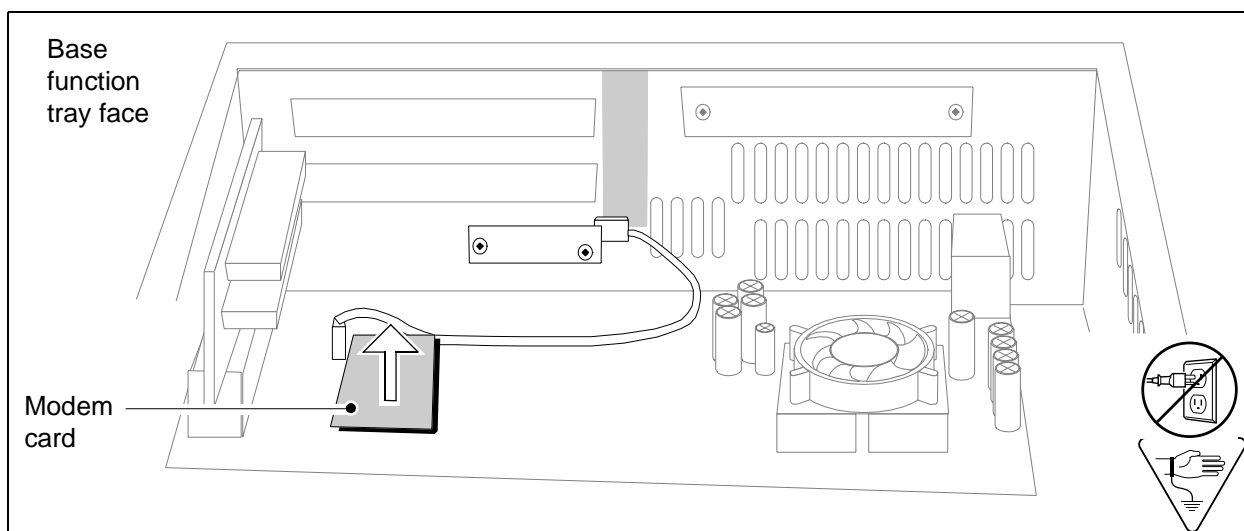


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

---

- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the Business Communications Manager for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the Business Communications Manager from the AC power outlet.
- 4 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 5 Remove the platform base chassis top. Refer to “Remove the platform base chassis top cover” on page 161. Continue to the next step of this procedure when complete.

- 6 Disconnect any connectors from the front of the base function tray.
- 7 Partially remove the base function tray from the platform base chassis (See “Remove the base function tray” on page 150). Do not exert force on the DS30 cables and connectors. Ensure you do not pinch, stretch or damage any cables.
- 8 Remove the WAN card if applicable (see “Remove the WAN card” on page 219). Continue to the next step when complete.
- 9 Disconnect the DS30 cables from the MSC.
- 10 Remove the base function tray completely from the platform base chassis. Ensure you do not pinch, stretch or damage any cables. Refer to “Remove the base function tray” on page 150. Place the base function tray on a flat, clean and static-free surface. Continue to the next step of this procedure when complete.
- 11 Remove the base function tray bezel. See “Remove the base function tray bezel” on page 153. Continue to the next step when complete.
- 12 Loosen and remove the PCI cover plate screw (use a #2 Phillips screwdriver - see Figure 146). Place the PCI cover plate screw in a safe location.
- 13 Remove the PCI cover plate from the base function tray chassis (see Figure 146 on page 220). Place the PCI cover plate in a safe location.
- 14 Remove the MSC. Refer to “Remove the media services card (MSC)” on page 225. Continue to the next step of this procedure when complete.
- 15 Locate the modem card on the main card.
- 16 Carefully grasp the modem card edges with your finger tips. Carefully pull the modem card away from the main card. Place the modem card in a clean, safe and static-free location.

**Figure 152** Modem card

- 17 Carefully grasp the modem card guide pin and remove. Place the pin in a safe location.
- 18 This procedure is complete.



## Install the modem card

Use this procedure to install a modem card in a base function tray. This procedure assumes the base function tray is not installed in the platform base chassis.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

---

- 1 Obtain a correct and functional modem card.
- 2 Disconnect the Business Communications Manager from the AC power outlet.
- 3 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 4 Install the modem card guide pin.
- 5 Carefully grasp the new modem card with your finger tips.
- 6 Install the modem card in the correct location on the main card. Ensure the modem card pins correctly align with the main card modem connectors and modem guide pin.
- 7 Gently push on the modem card with your fingertips until it fully seats in the main card modem connectors.
- 8 If applicable, connect the RJ11 modem card connector to the main card socket.
- 9 Install the MSC in the correct PCI riser card connector. See “Install the media services card (MSC)” on page 226. When complete, continue to the next step of this procedure.
- 10 Install the two chassis mounting screws that secure the MSC to the base function tray chassis extension (at the rear of the MSC). See Figure 151.
- 11 Position the WAN card (if applicable) in the top PCI riser card connector. See “Install the WAN card” on page 221. When complete, continue to the next step of this procedure.
- 12 Partially install the base function tray in the platform base chassis.
- 13 Connect the DS30 connectors to the MSC.
- 14 Position the PCI cover plate on the front of the base function tray such that the base function tray and cover plate screw holes align.
- 15 Position the PCI cover plate locking screw in the PCI cover plate. Tighten the PCI cover plate locking screw until the plate is firmly set in place (see Figure 147).
- 16 Push the base function tray completely into the chassis (see “Install the base function tray” on page 151). Ensure you do not pinch or damage any cables. When complete, continue to the next step of this procedure.
- 17 Restore the Business Communications Manager to operation. For details, refer to “Restart the System after Maintenance” on page 147. When complete, continue to the next step of this procedure.
- 18 This procedure is complete.

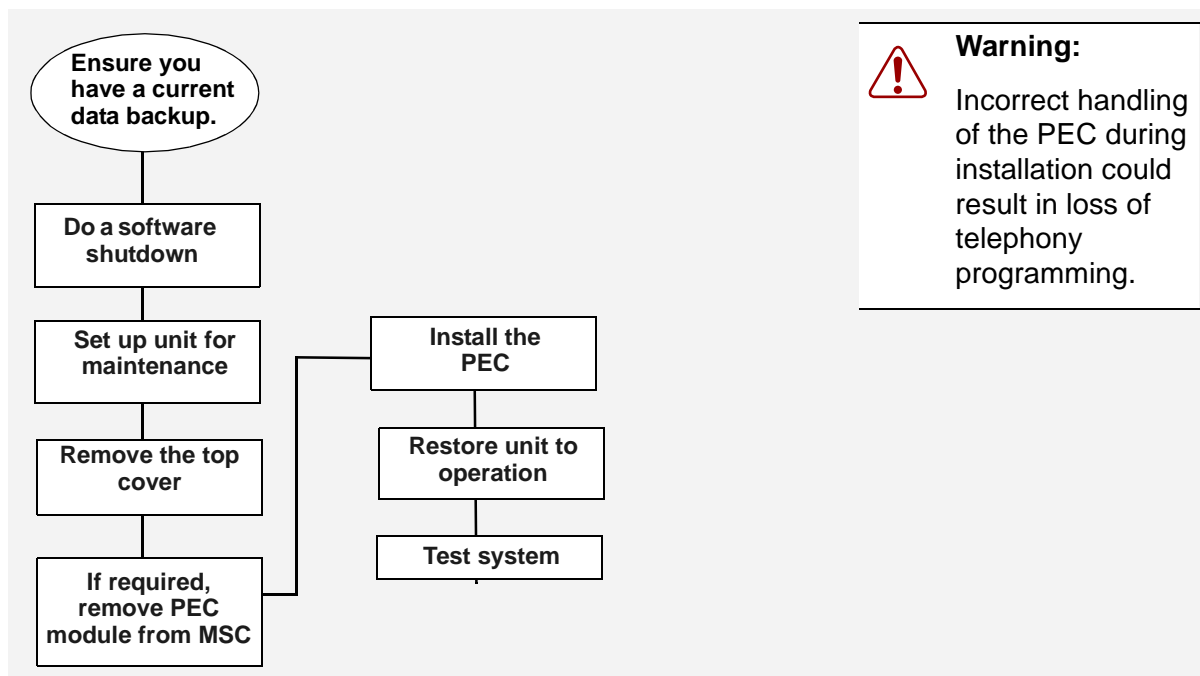
## Replace the Processor Expansion Card (PEC)

The BCM200 is equipped with one Processor expansion card (PEC III) mounted on the Media services card (MSC). The BCM400 is equipped with two Processor expansion cards (PEC III) mounted on the Media services card (MSC). The PECs provide signal processing capabilities for such applications as voice mail and IP telephony applications.

This section describes the processes to remove and replace a PEC module.

Figure 153 provides an overview of the process for replacing the PEC.

**Figure 153** 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.

## Remove the processor expansion card (PEC)

Use this procedure to remove PECs from a Business Communications Manager MSC.



**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, which can erase memory or cause a loss of telephony programming.

If this occurs, complete the removal of the PEC, and then restore the data from your backup medium (upon re-installation - see “Install a processor expansion card (PEC)” on page 233).

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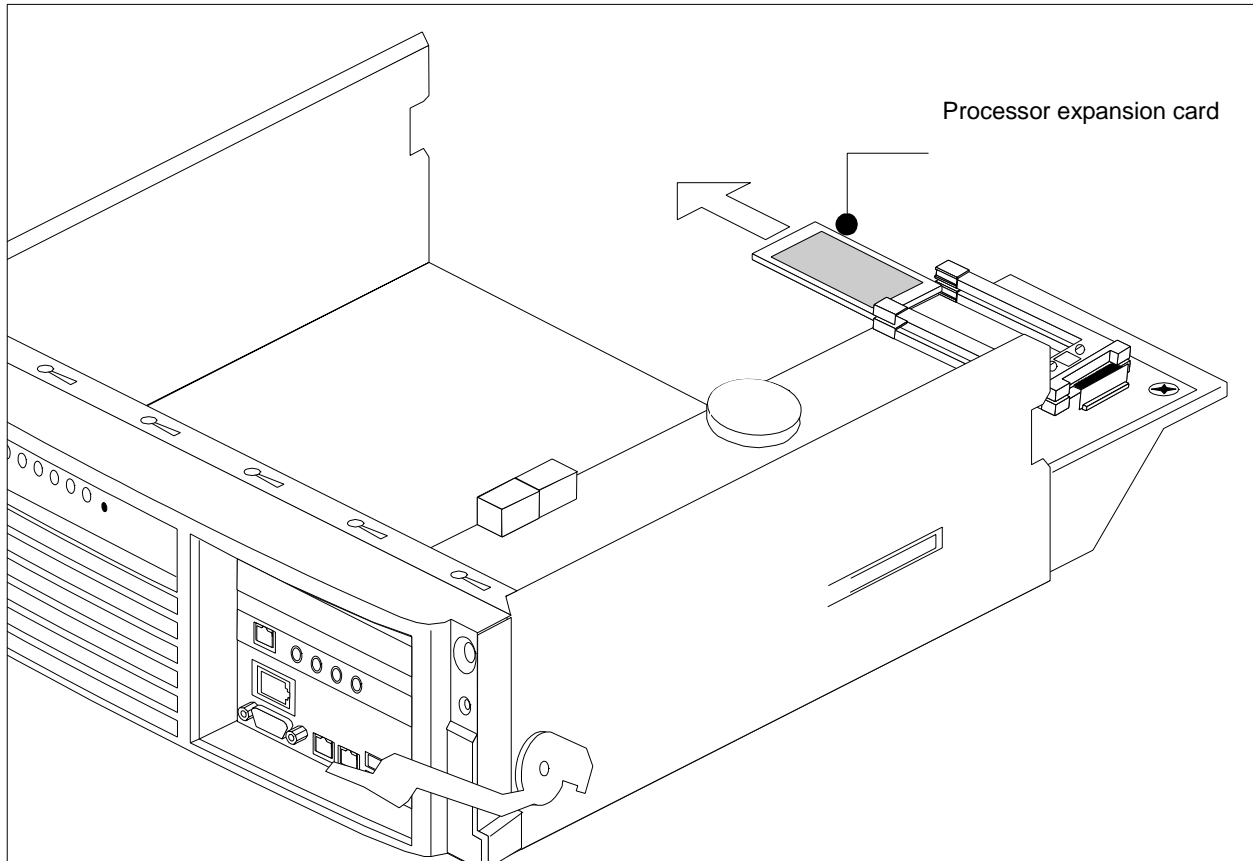


**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

---

- 1 Ensure you have a current data backup of your system.
- 2 Shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. When complete, continue to the next step of this procedure.
- 3 Set up the server for maintenance, as described in “Shut down the system hardware” on page 146. When complete, continue to the next step of this procedure.
- 4 Disconnect the Business Communications Manager from the wall power outlet.
- 5 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 6 Partially remove the base function tray from the platform base chassis. Ensure you do not pinch, stretch or damage any cables.
- 7 Grasp the top edge of the PEC you want to remove and it pull out. Place the PEC in a safe and static-free container. Refer to Figure 154.

**Figure 154** Remove the processor expansion card (PEC III)



**8** This procedure is complete.

## Install a processor expansion card (PEC)

When you replace or add PECs, ensure you follow the directions for shutting down the system. Ensure you have a current data backup of your system. This procedure assumes the base function tray is partially removed from the platform base chassis.



**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, 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.

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**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

---

Use this procedure to correctly install a PEC.

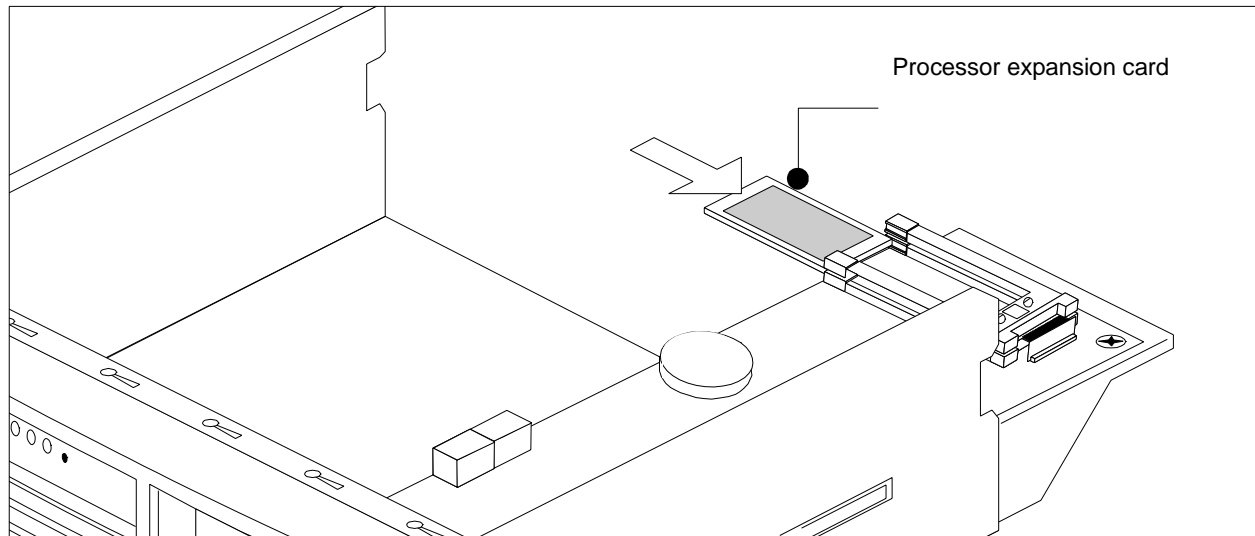
- 1 Disconnect the Business Communications Manager from the wall power outlet.
  - 2 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
  - 3 Decide which slot you are going to install the PEC into on the MSC. If you have more than one card holder (BCM400), populate one card holder completely at a time. Populate the bottom slot first, then insert additional PEC on top.
  - 4 Line the card up between the rails of the slot. Ensure the card label is face-up.
  - 5 Carefully slide the PEC 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.

---

**Figure 155** Insert the processor expansion card (PEC III)



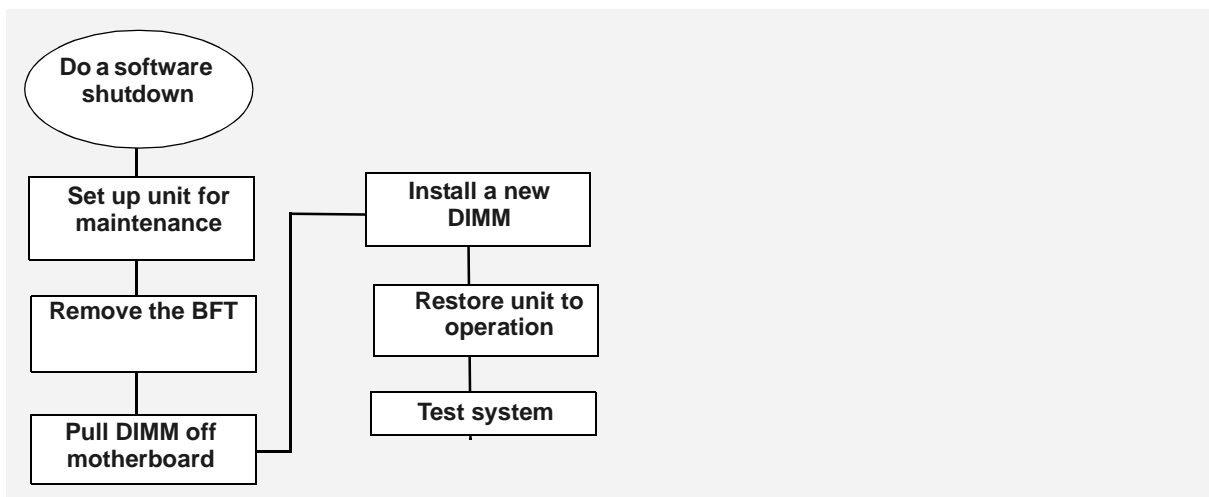
- 6** Completely insert the base function tray into the platform base chassis (see “Install the base function tray” on page 151). Continue to the next step of this procedure when complete.
- 7** Restore the unit to operation. Refer to “Restart the System after Maintenance” on page 147.
- 8** This procedure is complete.

## Replace Memory

The Business communication manager is equipped with 256 MB of Random Access Memory (RAM). The memory resides on a Dual In-line Memory Module (DIMM) on the main card. The main card contains space to add a second DIMM, or you can upgrade the existing DIMM.

Figure 156 provides an overview of the process for replacing or adding memory chips.

**Figure 156** 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

## Remove the dual in-line memory module (DIMM) card

Use this procedure to remove a DIMM when the circuit fails or when you want to increase the amount of RAM in the Business Communications Manager.



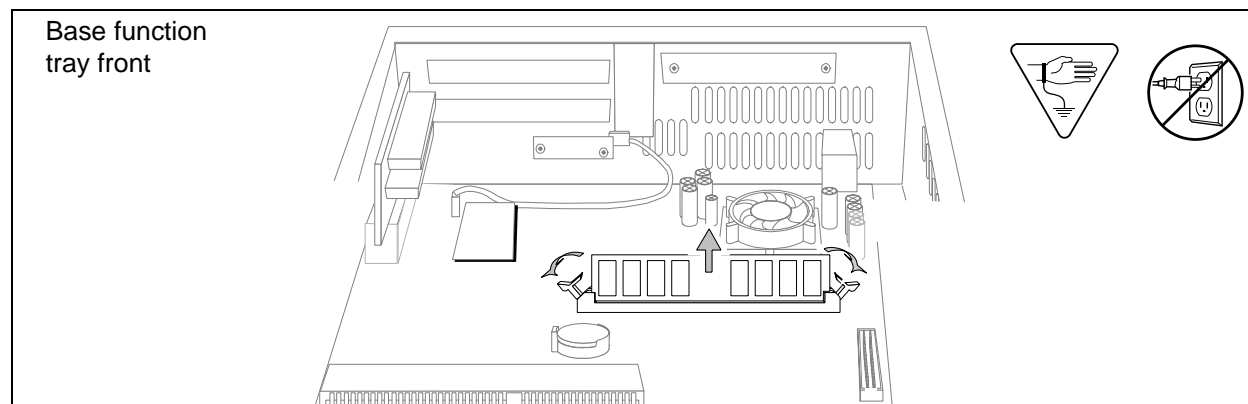
**Note:** There must be at least one DIMM installed in the Business Communications Manager in order for the system to function.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the platform base hardware for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the Business Communications Manager from the AC power outlet.
- 4 Disconnect any connectors from the front of the base function tray.
- 5 Remove the platform base chassis cover. See “Remove the platform base chassis top cover” on page 161. Continue to the next step in this procedure when complete.
- 6 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 7 Partially remove the base function tray from the platform base chassis. Ensure you do not pinch, stretch or damage any cables.
- 8 Remove the base function tray bezel. See “Remove the base function tray bezel” on page 153. Continue to the next step in this procedure when complete.
- 9 Remove the WAN card (if applicable). See “Remove the WAN card” on page 219. Continue to the next step in this procedure when complete.
- 10 Detach the DS30 cable connectors from the MSC.
- 11 Remove the base function tray completely from the platform base chassis. Ensure you do not pinch, stretch or damage any cables. See “Remove the base function tray” on page 150. Continue to the next step of this procedure when complete.
- 12 Remove the media services card (see “Remove the media services card (MSC)” on page 225). Continue to the next step of this procedure when complete.
- 13 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.
- 14 Grasp both ends of the DIMM with your fingertips. Lift the DIMM up and away from the DIMM slot (see Figure 157 on page 236). Place the DIMM in a static-free container.

**Figure 157** Remove and replace the dual in-line memory module



- 15 This procedure is complete.



## Install the dual in-line memory module (DIMM) card

Use this procedure to install a replacement DIMM or when you want to increase the amount of RAM in the Business Communications Manager.



**Note:** There must be at least one DIMM installed in the Business Communications Manager in order for the system to function.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

- 1 Position and correctly align the new DIMM (edge connectors first) into the connector.



**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.

- 2 Carefully and firmly press down on the top of the DIMM card with your thumbs. At the same time, use your index fingers to move the fastening tabs inward toward the card. When the card is completely inserted in the connector, the fastening tabs clip to the side of the DIMM card.



**Note:** Do not force the DIMM into its slot. If the DIMM does not slide in easily, check the alignment of the DIMM.

- 3 Install the media services card (see “Install the media services card (MSC)” on page 226). Continue to the next step of this procedure when complete.
- 4 Partially install the base function tray in the platform base chassis.
- 5 Install the WAN card (if applicable). See “Install the WAN card” on page 221. Continue to the next step of this procedure when complete.
- 6 Connect the DS30 connectors to the MSC.
- 7 Completely install the base function tray in the platform base chassis (see “Install the base function tray” on page 151). Ensure you do not pinch or damage any cables.
- 8 Install the base function tray bezel. See “Install the base function tray bezel” on page 154. Continue to the next step of this procedure when complete.
- 9 Insert all connectors in the correct locations on the base function tray face.
- 10 Restore the Business Communications Manager to operation. Refer to “Restart the System after Maintenance” on page 147 for details. Continue to the next step of this procedure when complete.
- 11 This procedure is complete.

## Replace the Clock/Calendar Battery

The clock/calendar battery supplies the power required to keep the CMOS information current if there is a power failure. Figure 153 provides an overview of the process of replacing this component.

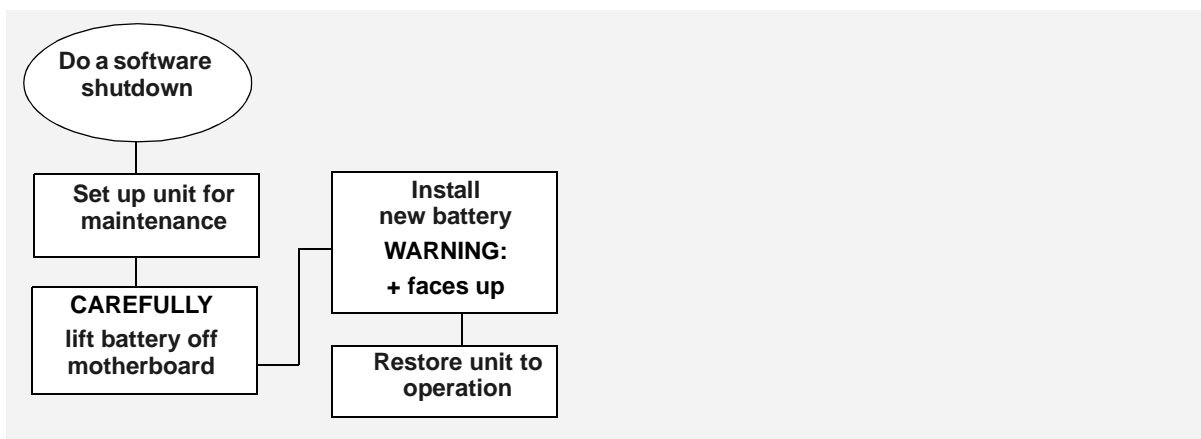


**Warning:** You must replace the battery with a CR2032, 3v Maxell coin cell battery. Do not use any other manufacturer because this may invalidate the safety approval of the Business Communications Manager and possibly cause a fire or explosion.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

**Figure 158** Battery replacement overview



**Danger:** Disconnect the power cord, telephone cables and network cables before opening the computer.  
Read and follow installation instructions carefully.

## Remove the clock/calendar battery

Use this procedure to remove the clock/calendar battery.



**Warning:** Protect the hardware components against damage from electro-static discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

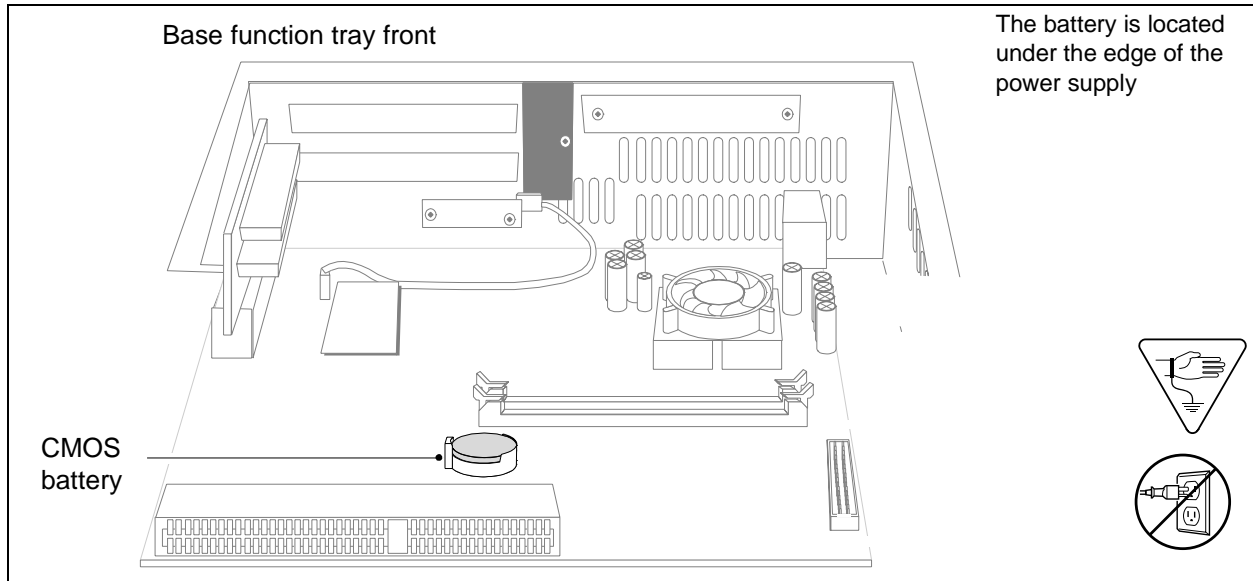
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- 1 If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to “Shut down the system software” on page 145. Otherwise, skip to step 2.
- 2 Set up the server for maintenance, as described in “Shut down the system hardware” on page 146.
- 3 Disconnect the Business Communications Manager from the AC power outlet.
- 4 Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
- 5 Disconnect any connectors from the front of the base function tray.
- 6 Partially remove the base function tray from the platform base chassis. Do not crimp, stretch or damage cables or connectors.
- 7 Remove the base function tray bezel. See “Remove the base function tray bezel” on page 153. Continue to the next step of this procedure when complete.
- 8 Remove the WAN card (if applicable). See “Remove the WAN card” on page 219. Continue to the next step of this procedure when complete.
- 9 Disconnect the DS30 cables from the MSC. Do not crimp, stretch or damage cables or connectors.
- 10 Completely remove the base function tray from the platform base chassis. See “Remove the base function tray” on page 150. Continue to the next step of this procedure when complete.
- 11 Remove the media services card (see “Remove the media services card (MSC)” on page 225). Continue to the next step of this procedure when complete.
- 12 Use your finger to carefully lift the battery out of the socket. For the location of the battery socket, refer to Figure 159.



**Caution:** Do not use any type of tool to remove the battery.

---

**Figure 159** Removing the clock/calendar battery

**13** This procedure is complete.

## Install a new clock/calendar battery

Use this procedure to insert a clock/calendar battery into the base function tray.



**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.



**Warning:** Protect the hardware components against damage from electrostatic discharge. Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

- 1** Remove the old battery. See “Remove the Clock/Calendar battery” on page 239.
- 2** Ensure you have the positive side of the battery facing up when you position it in the socket.
- 3** Push down until the battery snaps into the socket.
- 4** Install the media services card. See “Install the media services card (MSC)” on page 226. Continue to the next step of this procedure when complete.
- 5** Install the WAN card (if applicable). See “Install the WAN card” on page 221. Continue to the next step of this procedure when complete.
- 6** Partially insert the base function tray into the platform base chassis.
- 7** Connect the DS30 connectors to the MSC.

- 8** Position the PCI cover plate on the front of the base function tray such that the base function tray and cover plate screw holes align.
- 9** Position the PCI cover plate locking screw in the PCI cover plate. Tighten the PCI cover plate locking screw until the plate is firmly set in place (see Figure 147).
- 10** Install the base function tray bezel (see “Install the base function tray bezel” on page 154). Continue to the next step in this procedure when complete.
- 11** Completely insert the base function tray into the platform base chassis. See “Install the base function tray” on page 151. Continue to the next step of this procedure when complete.
- 12** Restore the Business Communications Manager to operation. For details, refer to “Restart the System after Maintenance” on page 147. Continue to the next step of this procedure when complete.
- 13** This procedure is complete.



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## Chapter 11

# Install Telephones and Peripherals

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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 13, “Install Analog Terminal Adapters,” on page 277.

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 3.0 Programming Operations Guide*.



---

**Note:** Programming occurs on the set when the Business Communications Manager recognizes the set on the system.

---

## System Telephones

The Business Communications Manager system supports a number of analog, digital, IP telephony and cordless telephones. Refer to “Telephones and adapters” on page 85 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, “Install Analog Terminal Adapters,” on page 277 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 25 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 C, “Media Bay Module Combinations,” on page 345 contains a blank table to use if you changed the start DN on your system.

**Table 25** 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 25** 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

## Emergency Telephone Installation

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.

## Install IP Telephones

The Business Communications Manager mobility strategy includes support for the Nortel Networks i2004 and i2002 IP telephones, the Nortel Networks i2050 Software Phone, and the NetVision and the NetVision Data portable handsets.

The system can be set to automatically assign DNs to the Nortel IP telephones. If you choose to manually assign DNs, choose DNs from the following digital range, if possible:

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.

NetVision DNs are assigned to the handsets through the H.323 section under IP Telephony on the Unified Manager. Use the DNs within the ranges described above. If no DN is specified in the record, the system will automatically assign one when the handset connects to the system.

For details about configuring DN records for the IP telephones and the NetVision telephones, refer to the *IP Telephony Configuration Guide*.

## Install Radio-Based Portable Systems

There are three 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.



**Note:** The Symbol NetVision telephones are wireless telephones, but to the Business Communications Manager they appear as IP telephones.

---

### Companion portable system

In North America, you can provide cordless access throughout your site using the Companion cordless system. This system allows you to provide portable units that are twinned with stationary sets. This allows you to accommodate users who are mobile within the range of the system.

Companion handsets communication through base stations that are connected to DSMs on the Business Communications Manager. You can install a maximum of 32 handsets per DSM, since the handsets can use either of the B channels.

“Mobility Services by Region” on page 303 lists the region profiles that can accommodate the Companion system.

Companion sets default to DNs in the 565 to 596 DN range and use the DN type Companion.

The following documentation is available for this system:

- A site survey is required before you can install this system. When you purchase the Companion system, you are provided with deployment documentation that will assist you in planning base station locations.
- Refer to Chapter 12, “Install Companion or DECT Systems,” on page 249 for installation instructions.
- The handset vendors provide a user guide with each set that describes the handset features.

## DECT Systems

A DECT media bay module provides a pathway for a maximum of 32 cordless handsets to access the Business Communications Manager. The handsets can either be twinned with stationary sets, or they can act as independent sets.

Up to eight base stations can be deployed around a site. Each base station connects to a port on the DECT media bay module, which provides both trunk (BRI) and station module functions. The handsets are registered to the base station, but they can also roam between base stations.

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 Companion 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.

---

“Mobility services by region” on page 269 lists the regions that can accommodate DECT.

The following documentation is available for this system:

- The *Nortel Networks M626x DECT Deployment Tool* guide is available on the Business Communications Manager CD. Use the information in this guide to determine the most effective locations within your site for the base stations.
- Each handset also comes with a user guide that describes the handset features.
- The *Business Communications Manager 3.0 DECT Installation and Maintenance Guide*, also on the CD, describes the installation of the module and radio base station, and how to configure the system to the Business Communications Manager.

## T7406 cordless systems

The T7406 cordless system consists of a base station that connects to three ports on a Business Communications Manager digital station module, providing a radio interface for three cordless handsets. The cordless handsets register to the base station, which transfers the call over the telephone lines connected to the system. The handsets are configured to emulate the T7316/M7310 telephone features. This system is most suited to small to medium office environments set up in an open fashion.

T7406 cordless telephones use the DN's for the ports on the station module that the base station is connected to. They are digital sets and use M7310/T7316 as an operational model.

The *T7406 Cordless Telephone Installation Guide* provides:

- deployment parameters
- a description of the handset features
- instructions for installing the base station
- instructions on how to correctly charge the handset battery
- general operational directions, including describing special operational features of the handset

## Moving Telephones

You can move an Business Communications Manager digital 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.

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.

---

For IP telephones to retain DN-specific features, the **Keep DN Alive** setting for the telephone programming must be set to Yes.

## Chapter 12

# Install 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.

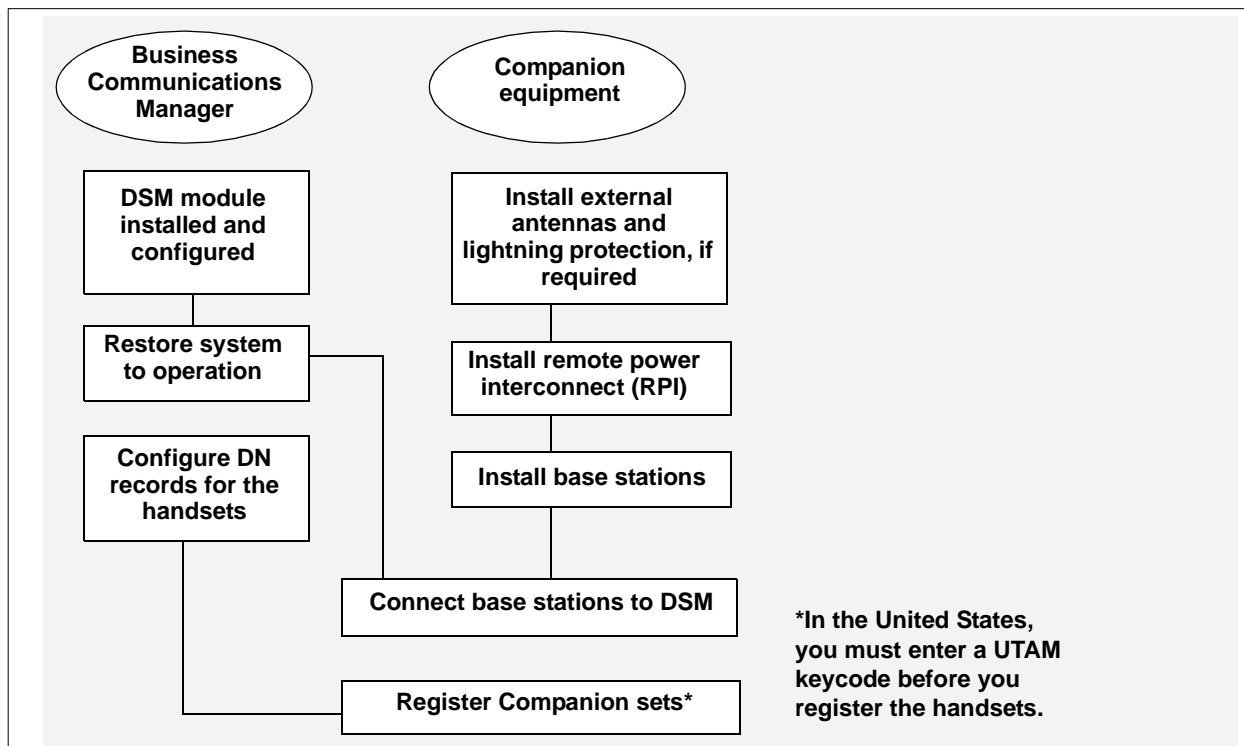
- The Companion requires a DSM module for the base stations to plug into. Refer to “The Companion Wireless System” on page 249.
- DECT provides virtual BRI loops within the DECT module. Refer to “Install DECT systems” on page 275.

## 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 160 provides an overview of the process for installing a Companion wireless system onto the Business Communications Manager system.

**Figure 160** Overview of installing a Companion system





**Note:** Companion wireless availability is region-specific. Refer to “Mobility Services by Region” on page 303. 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 3.0, Programming Operations Guide*.

## Companion Hardware Installation

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 how to install the Companion hardware components.

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 “Install an external antenna and lightning surge protection” on page 265.

### Install the base station remote power interconnect (RPI) unit

The remote power interconnect unit (RPI) provides remote power for base station support. Figure 161 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.

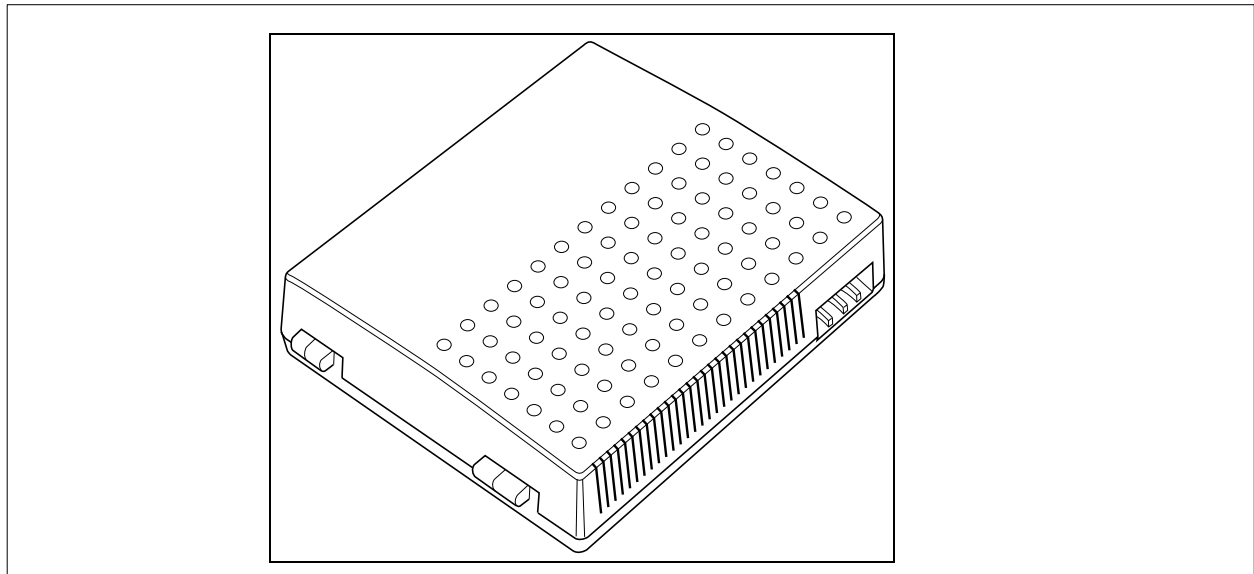


**Warning:** Install the RPI units inside a building.

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 161** 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.

Install a second PSU to the RPI-8 BIX UL to upgrade an RPI-8 BIX UL to an RPI-16 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.

Use Table 26 to determine how many base stations and how many PSUs you need for the number of base stations:

**Table 26** 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

## Mount the RPI unit

Use the following guidelines to mount the RPI unit:

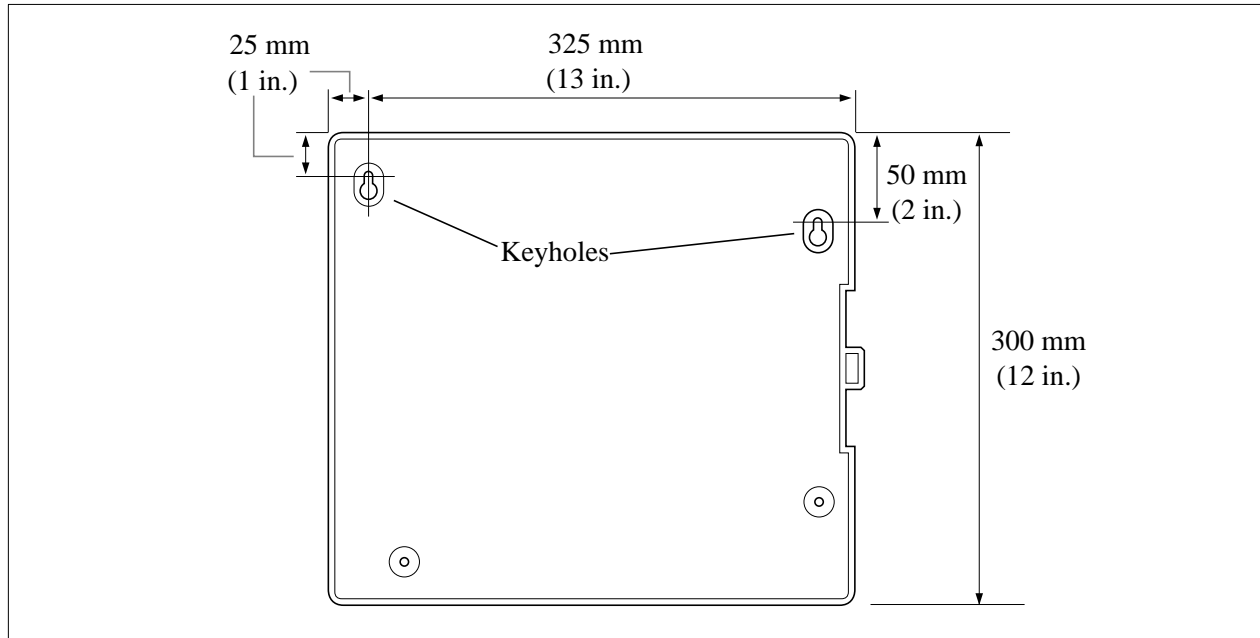
- Provide adequate ventilation to prevent overheating. Leave a clearance of a minimum of 125 mm (5 in.) around the RPI.
- To install two RPIs, one above the other, leave a clearance of a minimum of 300 mm (12 in.) between them to provide acceptable ventilation and to prevent overheating.
- Install RPIs a minimum of 300 mm (12 in.) from the ceiling.



Use this procedure to mount the RPI unit.

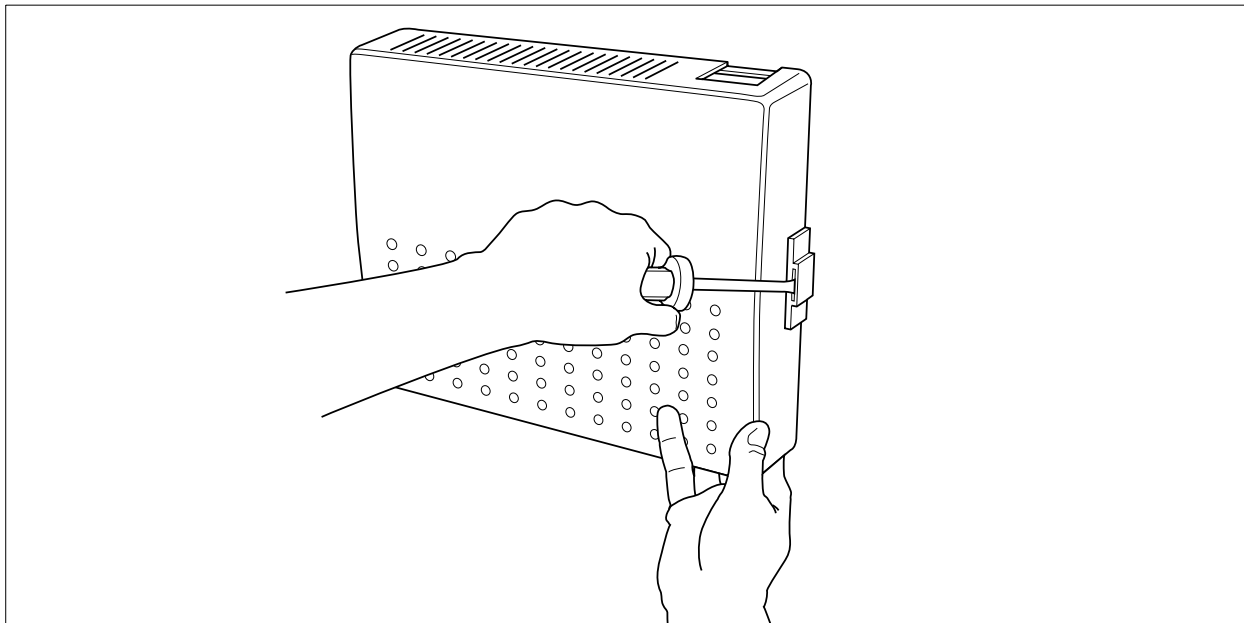
- 1 Partially install two #10 50 mm (2 in.) screws using the dimensions shown in Figure 162.

**Figure 162** RPI mounting holes



- 2 Open the cover with a screwdriver. Push the screwdriver in, and then down, to release the latch on the right side. Remove the cover by lifting it up. Refer to Figure 163.

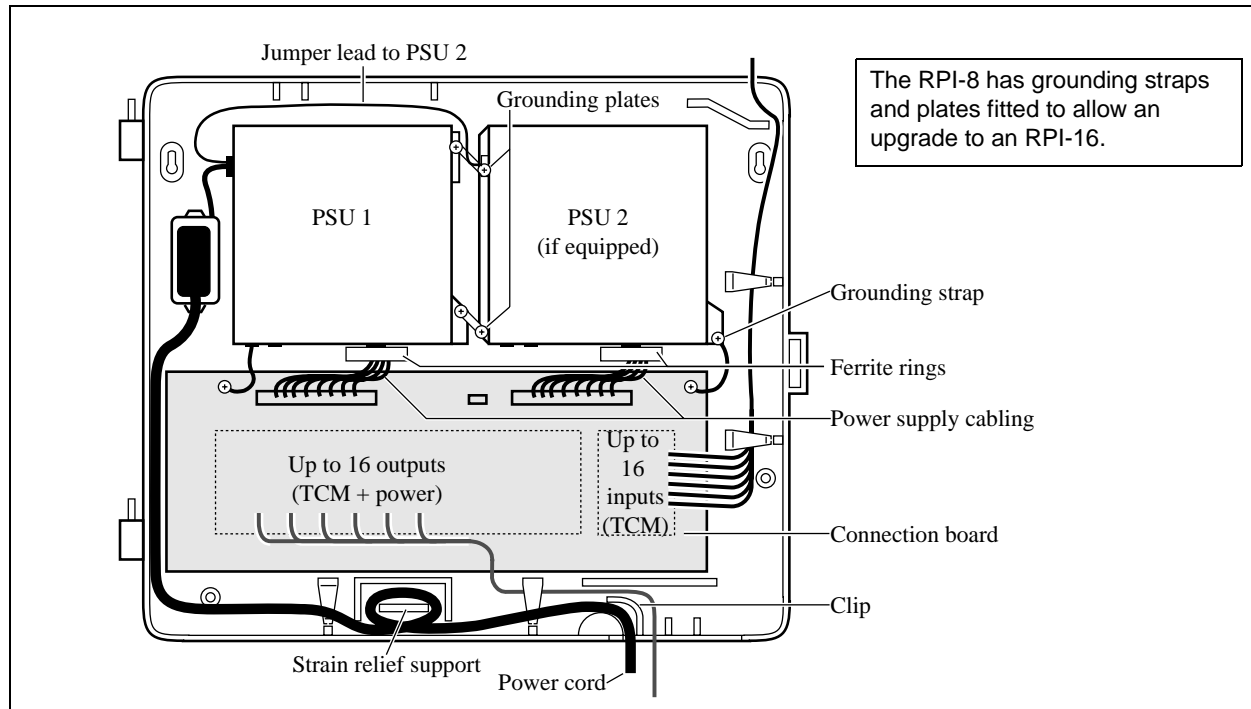
**Figure 163** Open the RPI cover



- 3 Hang the RPI on the two screws. 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 164 shows how to route the power cord.

**Figure 164** 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 section, "RPI wiring and connections".



**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.
- 11 This procedure is complete.

## RPI wiring and connections

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 27.

**Table 27** 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.)

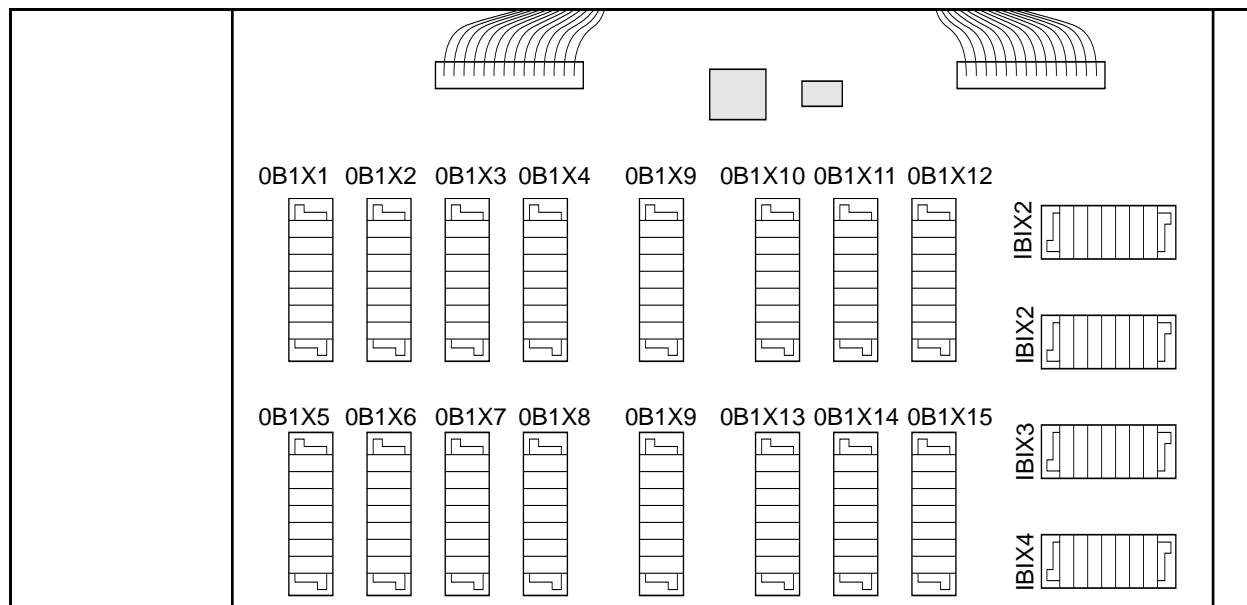


**Caution:** When you use two power pairs, connect both pairs with the same polarity.

### Connect the RPI

Connect the power pairs to the correct connectors. Figure 165 shows the location of the input and output connectors on the RPI connector printed-circuit board.

**Figure 165** 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 166 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).

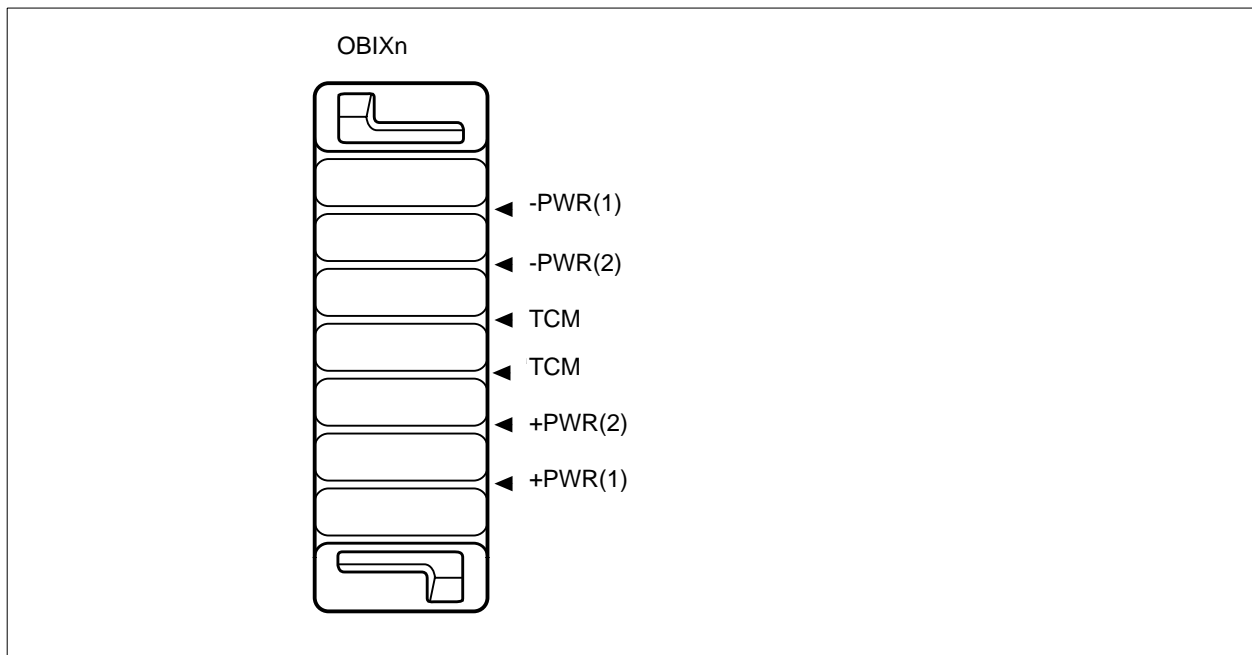


**Caution:** Ensure both pairs have the same polarity.

If you connect two power pairs with opposite polarities, you can damage the base station and RPI.

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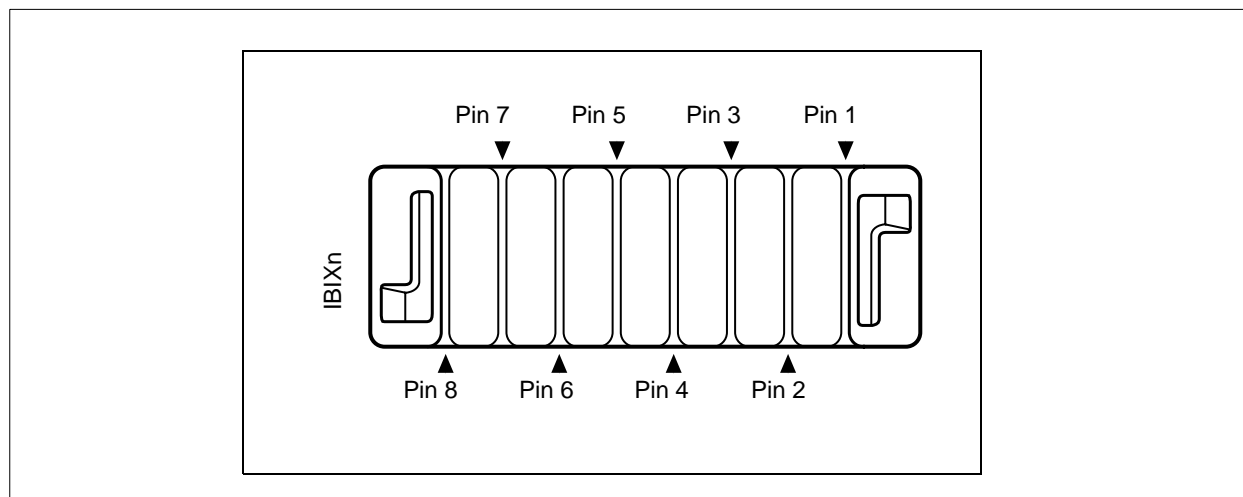
**Figure 166** Output connector pinout



### *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 167 shows how to route the input pairs. The maximum number of input pairs in an RPI installation is 16. Table 28 lists the pinout and signal references.

**Figure 167** Input connector pinout**Table 28** 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 29 lists the wiring chart for the RPI-8 BIX.

**Table 29** RPI-8 BIX wiring chart

Pin	RPI Connector printed-circuit board	Label	Wire color
26 1	OBIX1 BS1	-PWR	White-Blue Blue-White
27 2		TCM	White-Orange Orange-White
28 3		+PWR	White-Green Green-White
29 4	OBIX2 BS2	-PWR	White-Brown Brown-White
30 5		TCM	White-Slate Slate-White
31 6		+PWR	Red-Blue Blue-Red
32 7	OBIX3 BS3	-PWR	Red-Orange Orange-Red
33 8		TCM	Red-Green Green-Red
34 9		+PWR	Red-Brown Brown-Red
35 10	OBIX4 BS4	-PWR	Red-Slate Slate-Red
36 11		TCM	Black-Blue Blue-Black
37 12		+PWR	Black-Orange Orange-Black
38 13	OBIX5 BS5	-PWR	Black-Green Green-Black
39 14		TCM	Black-Brown Brown-Black
40 15		+PWR	Black-Slate Slate-Black

**Table 29** RPI-8 BIX wiring chart (Continued)

Pin	RPI Connector printed-circuit board	Label	Wire color
41 16	OBIX6 BS6	-PWR	Yellow-Blue Blue-Yellow
42 17		TCM	Yellow-Orange Orange-Yellow
43 18		+PWR	Yellow-Green Green-Yellow
44 19	OBIX7 BS7	-PWR	Yellow-Brown Brown-Yellow
45 20		TCM	Yellow-Slate Slate-Yellow
46 21		+PWR	Violet-Blue Blue-Violet
47 22	OBIX8 BS8	-PWR	Violet-Orange Orange-Violet
48 23		TCM	Violet-Green Green-Violet
49 24		+PWR	Violet-Brown Brown-Violet

*RPI-8 BIX wiring chart*

Table 30 lists the wiring chart for the RPI-16 BIX.

**Table 30** RPI-16 BIX wiring chart

Pin	RPI Connector printed-circuit board	Label	Wire color
26 1	OBIX9 BS9	-PWR	White-Blue Blue-White
27 2		TCM	White-Orange Orange-White
28 3		+PWR	White-Green Green-White
29 4	OBIX10 BS10	-PWR	White-Brown Brown-White
30 5		TCM	White-Slate Slate-White
31 6		+PWR	Red-Blue Blue-Red

**Table 30** RPI-16 BIX wiring chart (Continued)

Pin	RPI Connector printed-circuit board	Label	Wire color
32 7	OBIX11 BS11	-PWR	Red-Orange Orange-Red
33 8		TCM	Red-Green Green-Red
34 9		+PWR	Red-Brown Brown-Red
35 10	OBIX12 BS12	-PWR	Red-Slate Slate-Red
36 11		TCM	Black-Blue Blue-Black
37 12		+PWR	Black-Orange Orange-Black
38 13	OBIX13 BS13	-PWR	Black-Green Green-Black
39 14		TCM	Black-Brown Brown-Black
40 15		+PWR	Black-Slate Slate-Black
41 16	OBIX14 BS14	-PWR	Yellow-Blue Blue-Yellow
42 17		TCM	Yellow-Orange Orange-Yellow
43 18		+PWR	Yellow-Green Green-Yellow
44 19	OBIX15 BS15	-PWR	Yellow-Brown Brown-Yellow
45 20		TCM	Yellow-Slate Slate-Yellow
46 21		+PWR	Violet-Blue Blue-Violet
47 22	OBIX16 BS16	-PWR	Violet-Orange Orange-Violet
48 23		TCM	Violet-Green Green-Violet
49 24		+PWR	Violet-Brown Brown-Violet



## Install a Companion base station

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.

## Position the 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 31 on page 262 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 31** 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.)

## Attach a Companion Base Station to a wall or ceiling

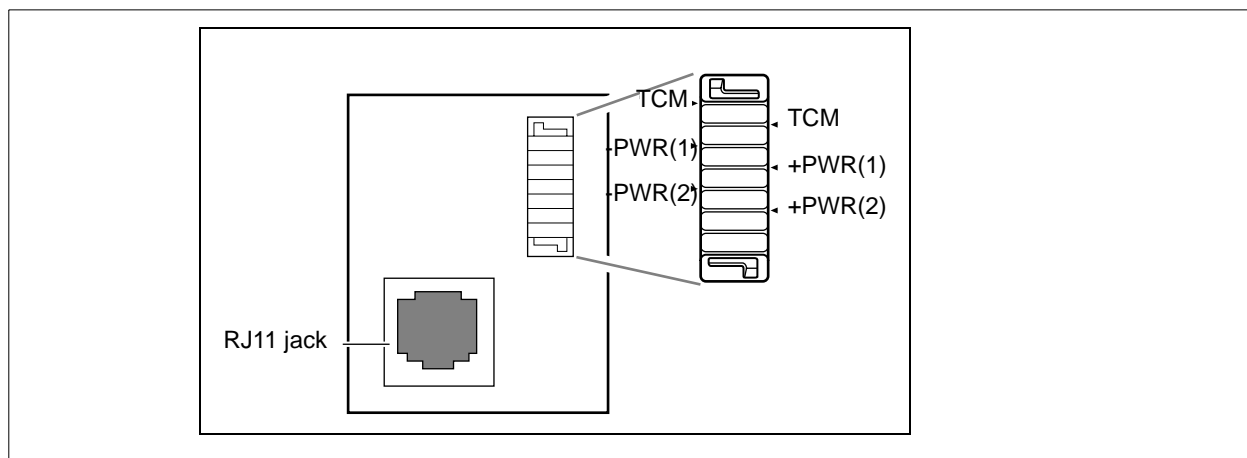
Install base stations on a wall or on a ceiling. When installing base stations on a wall, install them with their covers at the bottom, as shown in Figure 169 on page 263. Allow for clearances around the base station as indicated in Table 32.

**Table 32** 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.

Use this procedure 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 168.

**Figure 168** 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.

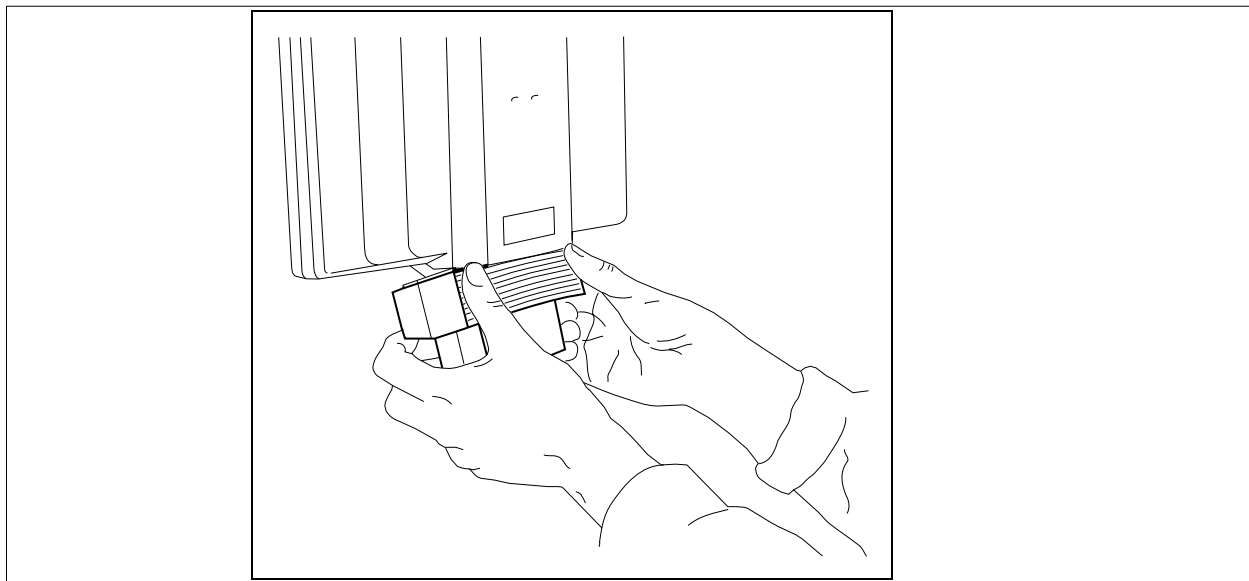
- 5 Install the base station on the bracket. Snap it into position.
- 6 Connect the power RJ-11 jumper lead to the RJ-11 jacks on the termination board and the base station.
- 7 For plug top power supplies only, connect the power supply connector to the base station power connector. Make sure the base 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 169.

**Figure 169** Slide the cover on bracket



- 10 Snap the cover into place.
- 11 This procedure is complete.

## Companion set registration

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 “Install a companion base station” on page 261.

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 3.0, Programming Operations Guide*.

---

## System restart

Use this procedure to perform a system restart.



**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.

---

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 33 after restarting:

**Table 33** 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.

- 3 This procedure is complete.

## Install an external antenna 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

- Install the antenna vertically. For more information, refer to Figure 170 on page 266.
- Use #8, 12 mm to 50 mm ( $\frac{1}{2}$  in. to 2 in.) screws to install the antenna bracket and lightning surge protector bracket to the wall.
- Ensure 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. Cable damage affects 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.
- 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.

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### Antenna installation (United States of America)

The following points cover special information about installations in the United States of America.

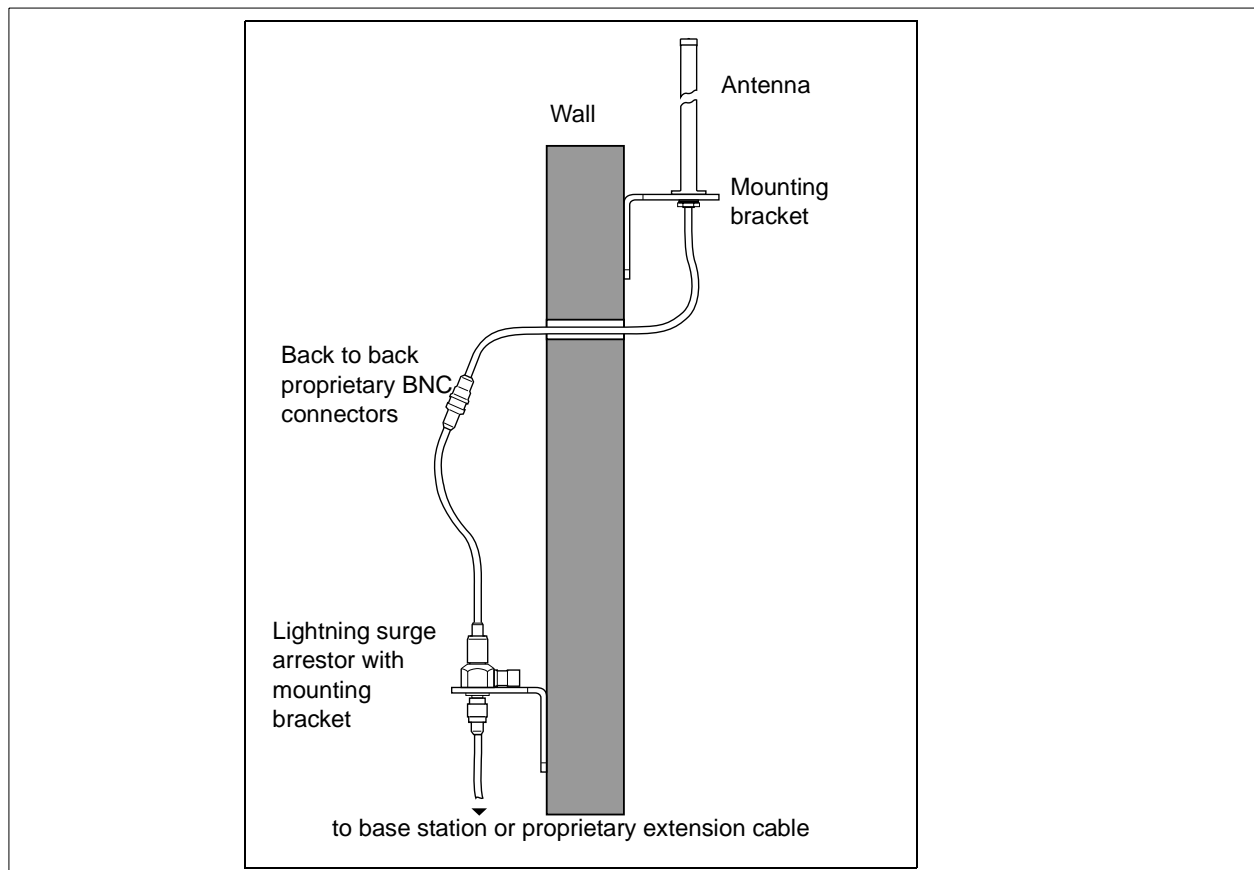
- The outdoor antenna connectors on the base station are special proprietary BNC connectors.
- Antennas are supplied with cables attached and terminated with special proprietary BNC plugs to join with the connector on the base station.
- Cables are not supplied with outdoor antennas.

### *Install an outdoor antenna (USA)*

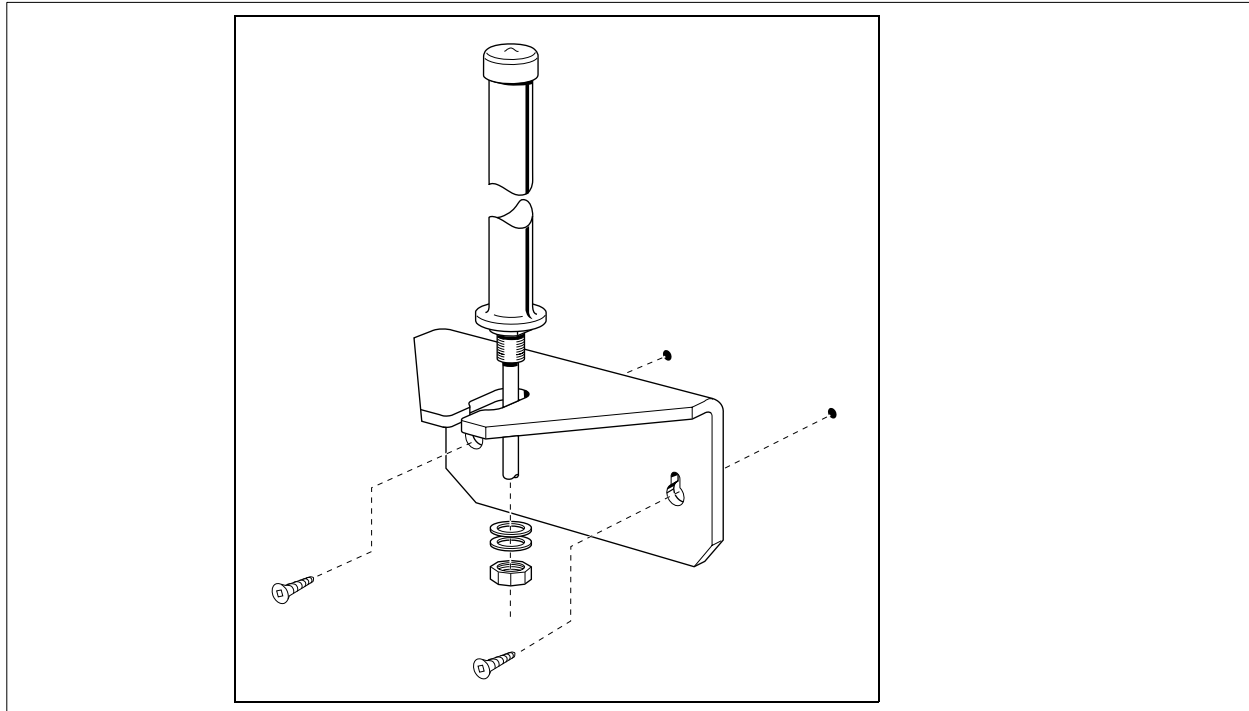
Use the procedure in this section to install an outdoor antenna. Perform the following before you install an outdoor antenna:

- 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 170.

**Figure 170** Installed antenna and lightning surge protectors (USA)



- 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 171.

**Figure 171** Antenna with antenna bracket (USA)

- 6** Feed the coaxial cable through the wall to the lightning surge protector on the interior wall.
- 7** This procedure is complete.

### Install a lightning surge protector (USA)

Use the procedure in this section to install the lightning surge protector. The surge protector prevents damage to the Companion components due to electrical surges caused by lighting.

- 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 172 on page 268.

**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.

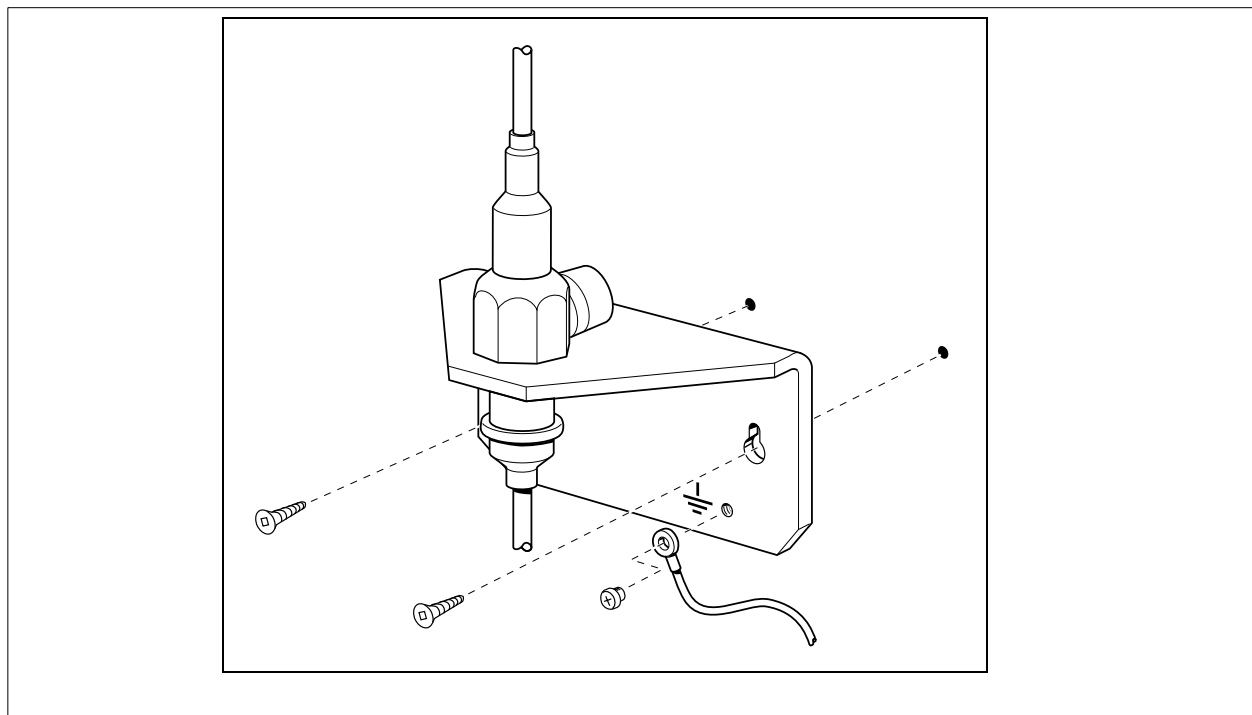
If you cannot connect the ground lead to the building ground, connect the ground lead to the metal frame of the building. The connection must be no more than six to 10 ft.

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 172** Lightning surge protector and bracket (USA)



**4** This procedure is complete.



## Install an antenna (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.

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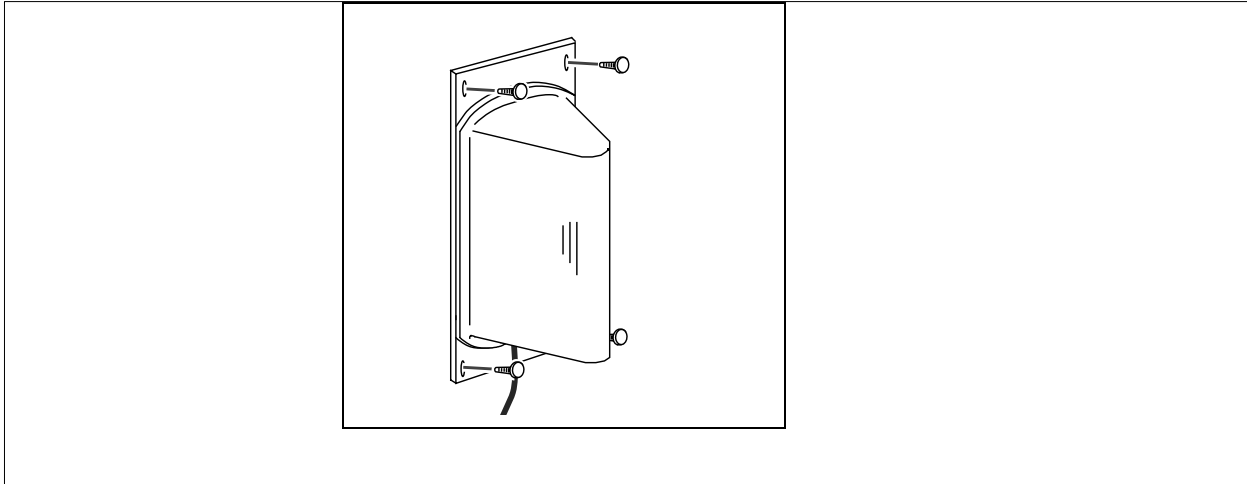
### *Installing an Indoor Directional Antenna*

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 173.

**Figure 173** Indoor directional external antenna (Canada)



- 2 Fasten the cable to the mounting surface to prevent stress on the coaxial cable.
- 3 Connect the antenna to the appropriate base station radio.



**Note:** The coaxial cable length must not exceed 10 m (33 ft.).

---

- 4 This procedure is complete.

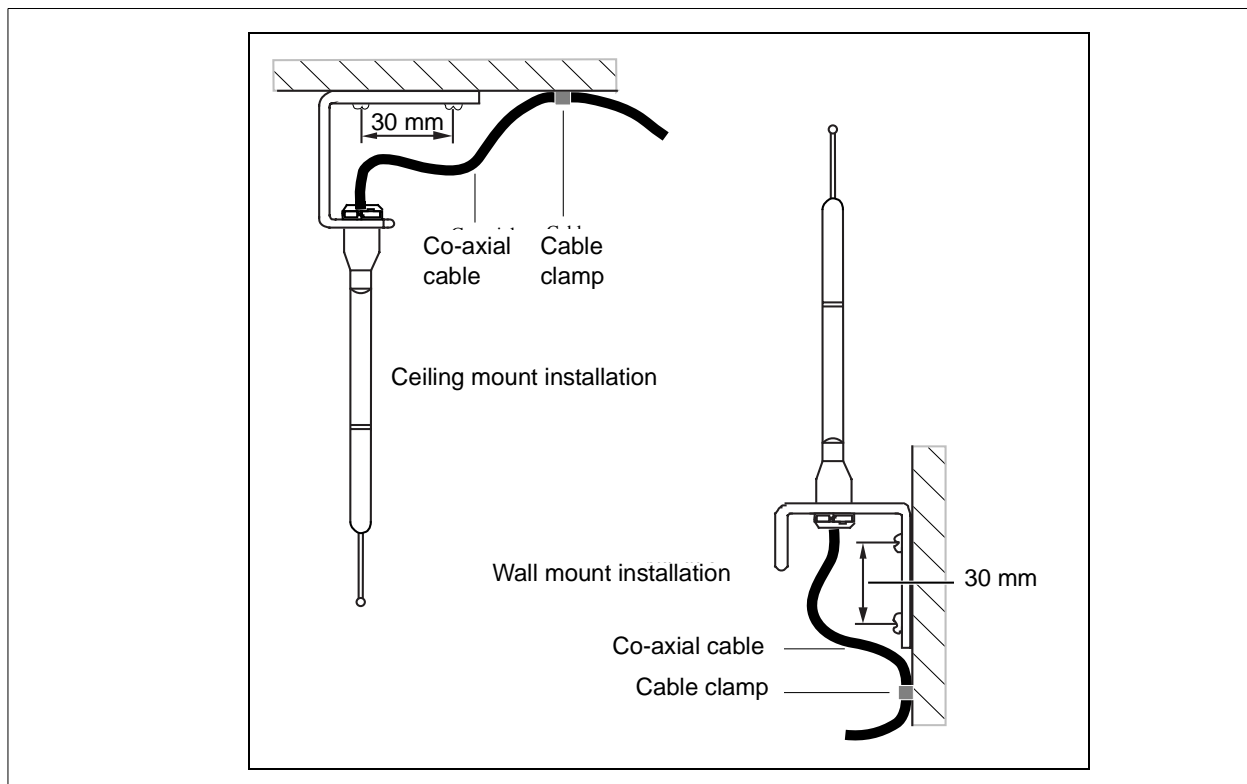
### *Install an indoor omnidirectional antenna (Canada)*

Use the procedure in this section to install an indoor, omnidirectional antenna (Canada only). Use the following guidelines to install an indoor omnidirectional antenna:

- 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 174 shows the two methods of installing the indoor omnidirectional external antenna.

**Figure 174** 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 Clamp the cable to the mounting surface to prevent cable stress on the coaxial cable.
- 4 Connect the external antenna to the appropriate base station.



**Note:** The length of the coaxial cable must not exceed 10 m (33 ft.).

- 5 This procedure is complete.

### *Install an outdoor omnidirectional antenna (Canada)*

Use the procedure in this section to install an outdoor, omnidirectional antenna (Canada only). Use the following guidelines to install an outdoor omnidirectional antenna:

- 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.

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**Caution:** Fit lightning protection to the antenna if appropriate.  
See “Install a lightning surge protector (Canada)” on page 274 for more information.

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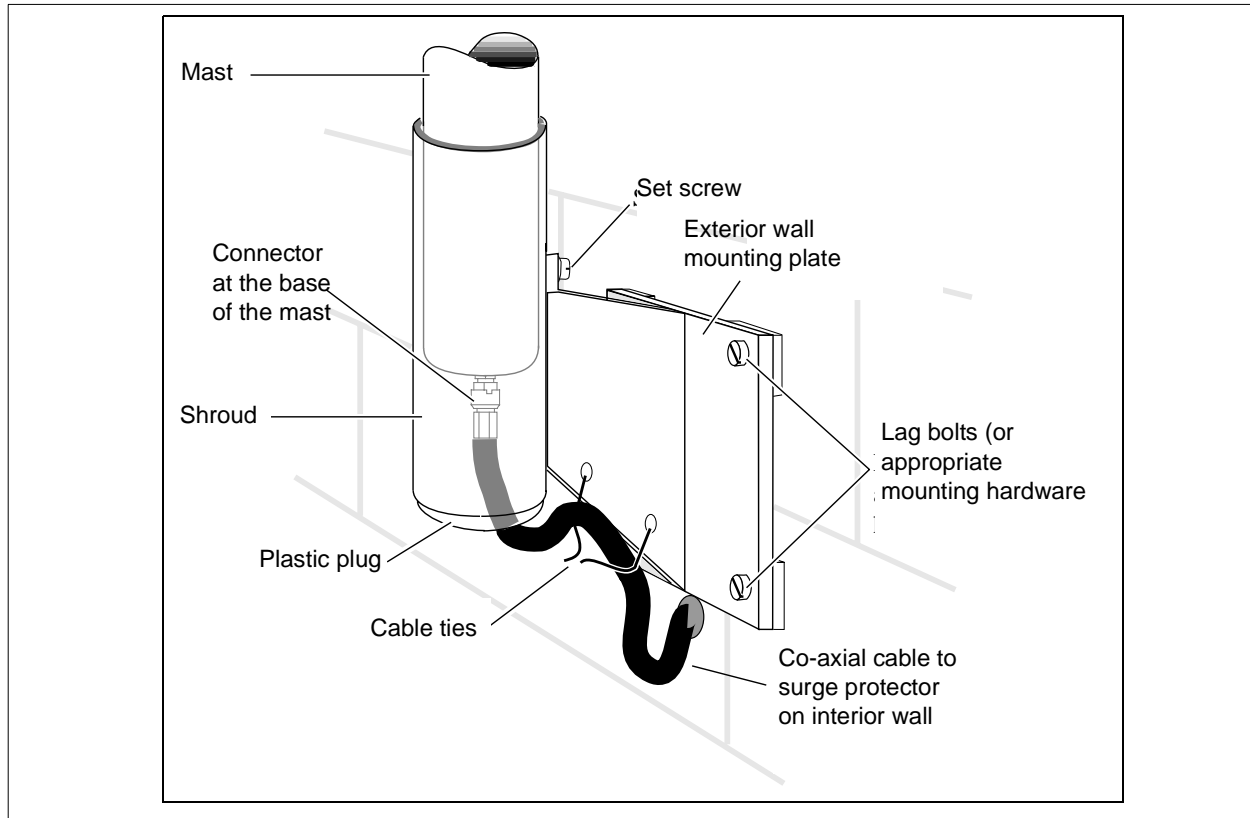


Important points to remember:

- 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.
-

- 1 Screw the antenna mounting plate vertically to the exterior wall of the building with lag bolts or other appropriate hardware. Figure 175 shows how to fasten the mounting plate.

**Figure 175** 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.
- 9 This procedure is complete.

### *Install a lightning surge protector (Canada)*

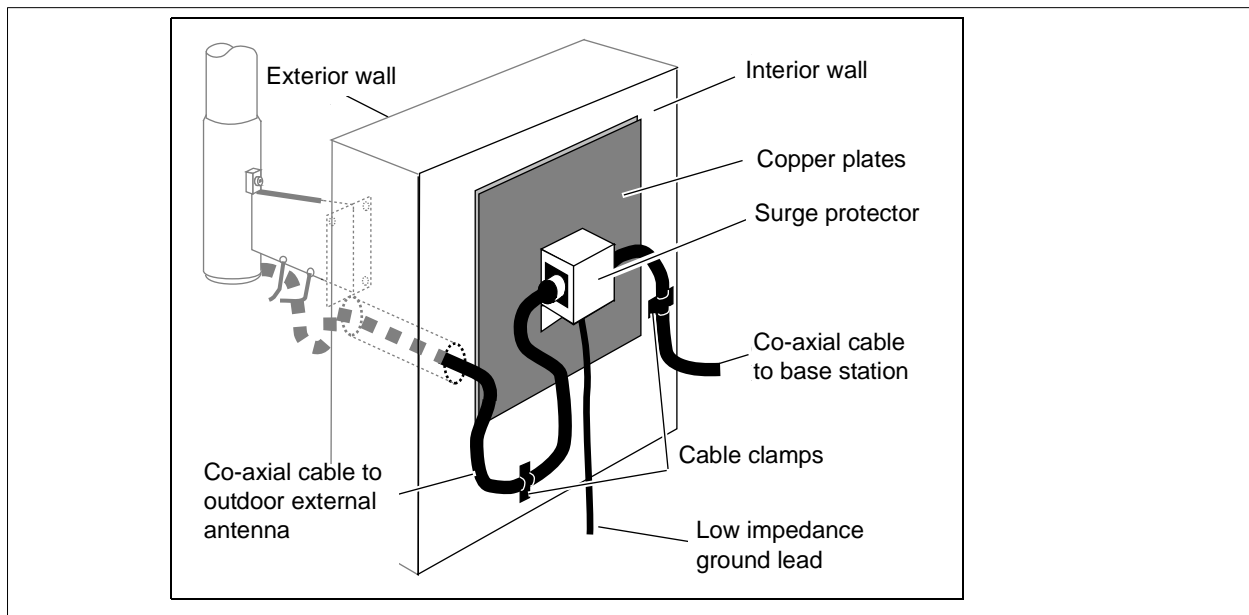
Use the procedure in this section to install a lightning surge protector (Canada only).

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 176 shows where to locate the surge protector. Follow the installation instructions provided with the surge protector.

**Figure 176** 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.).

---

- 5 This procedure is complete.

## Install 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 3.0 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,.

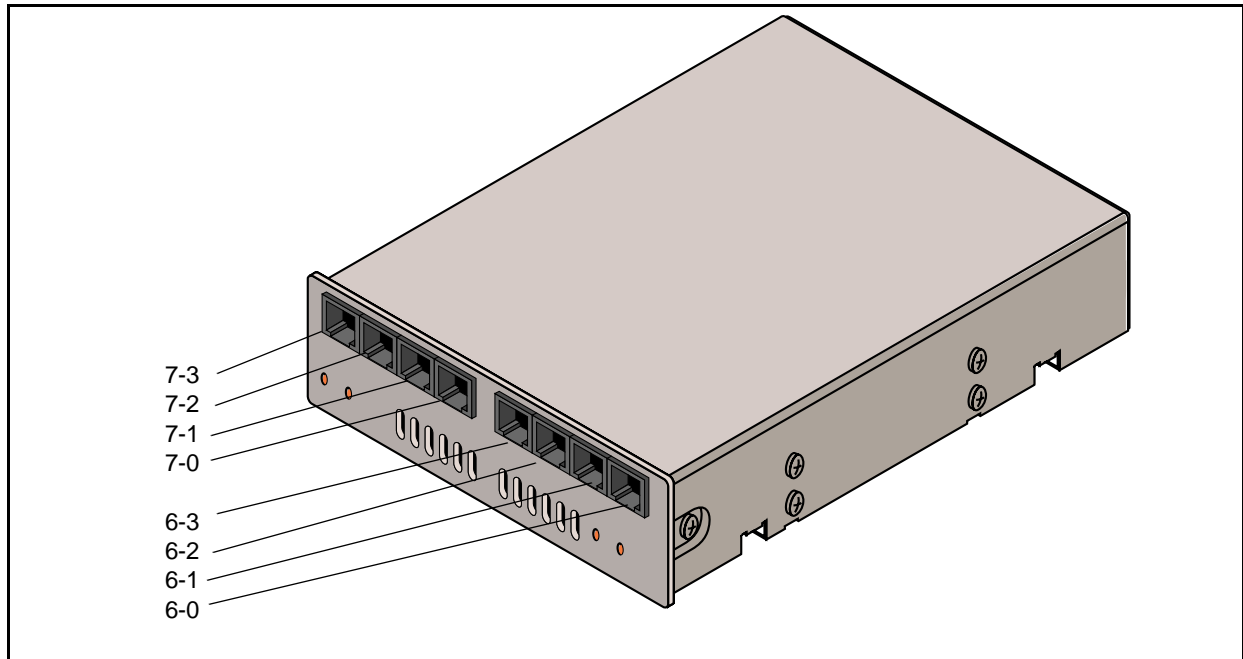


**Warning:** Plug each base station in sequentially. Ensure that each base station starts to perform the startup sequence before plugging in the next base station. You can check base station states through the DECT module interface.

**Warning:** For detailed information, refer to the *DECT Installation and Maintenance Guide*. Figure 177 demonstrates these connections.

---

**Figure 177** R451 connectors on the DECT media bay module





## Chapter 13

# Install Analog Terminal Adapters

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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:

Ringling signal (North America):	20 Hz $\pm$ 1 Hz
Frequency Voltage:	80 V rms $\pm$ 10%
Ringling signal (Europe):	25 Hz $\pm$ 1 Hz
Frequency voltage:	75 V rms $\pm$ 10%
Ringer equivalence number	3
Battery feed voltage	- 48 V dc $\pm$ 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)

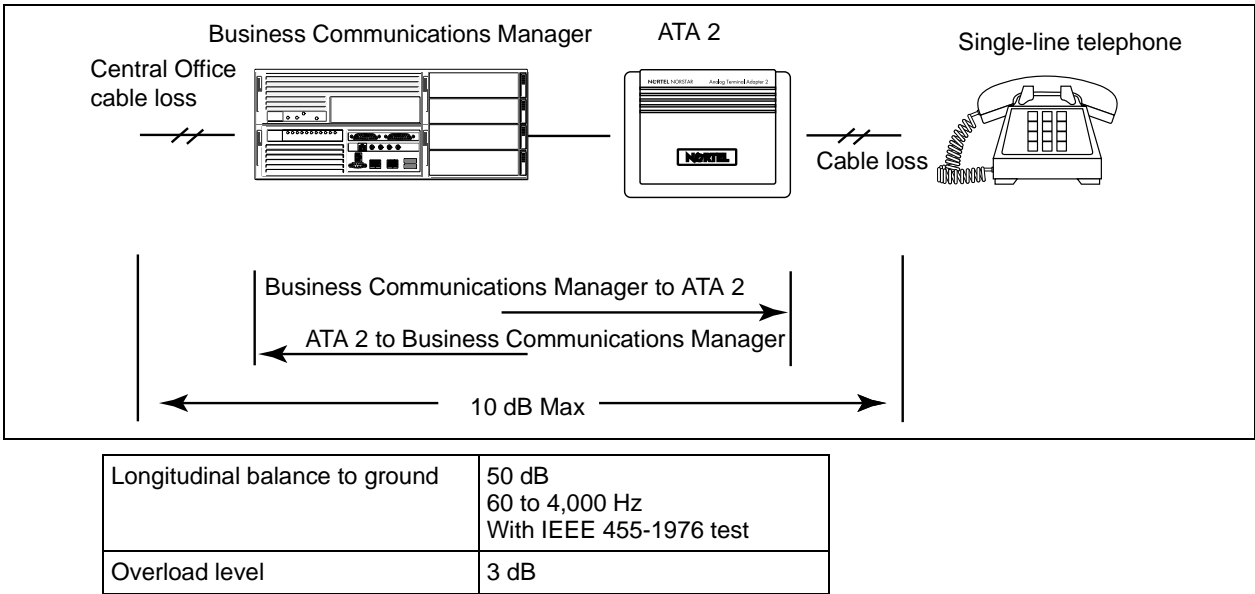
**Analog transmission parameters**  
(North American systems only)

The following are the required analog parameters for an ATA2:

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 $\pm$ 0.5 dB
Insertion loss on an external call	Business Communications Manager ATA 2 to Business Communications Manager system loss 2.2 dB $\pm$ 1.0 dB Business Communications Manager system to Business Communications Manager ATA 2 loss 0.5 dB $\pm$ 1.0 dB

The maximum loss for Business Communications Manager ATA 2 to Central Office (CO) configuration, shown in Figure 178, must not exceed 10 dB.

**Figure 178** Insertion Loss from the CO to the single-line telephone



### *Measure insertion loss*

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.

### *Measure insertion loss between the Central office and analog device*

Use this procedure 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).

---

- 6 This procedure is complete.

### *Measure insertion loss from the analog device to Central Office*

Use this procedure 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).

- 6 This procedure is complete.

## Connect the Business Communications Manager ATA 2

After you have determined that the proper environment exists, connect the ATA 2 to the line and set. Refer to Figure 179.

**Figure 179** Single line telephone installation overview

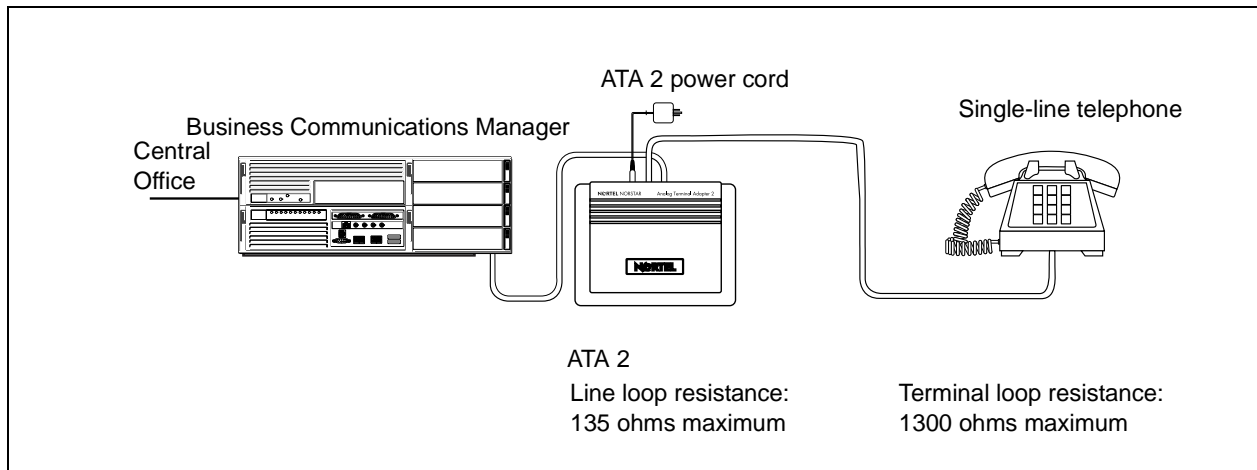
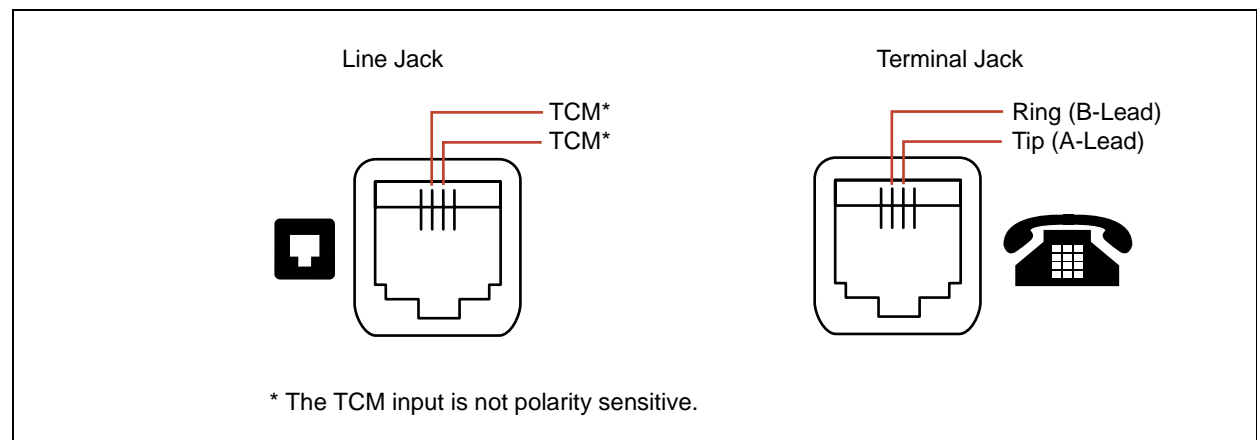


Figure 180 shows the pinouts for the connection cables.

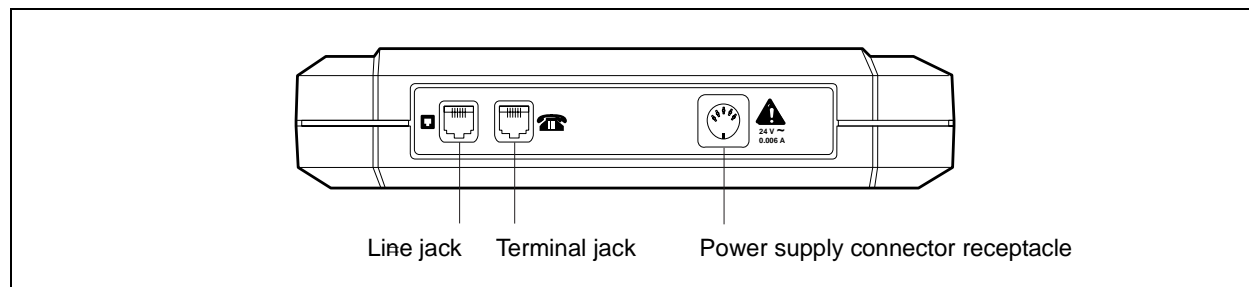
**Figure 180** ATA 2 pin outs



Use this procedure to connect the cable.

- 1 Connect one end of a line cord to the ATA2 Terminal jack. Refer to Figure 181.

**Figure 181** ATA 2 top view



- 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.



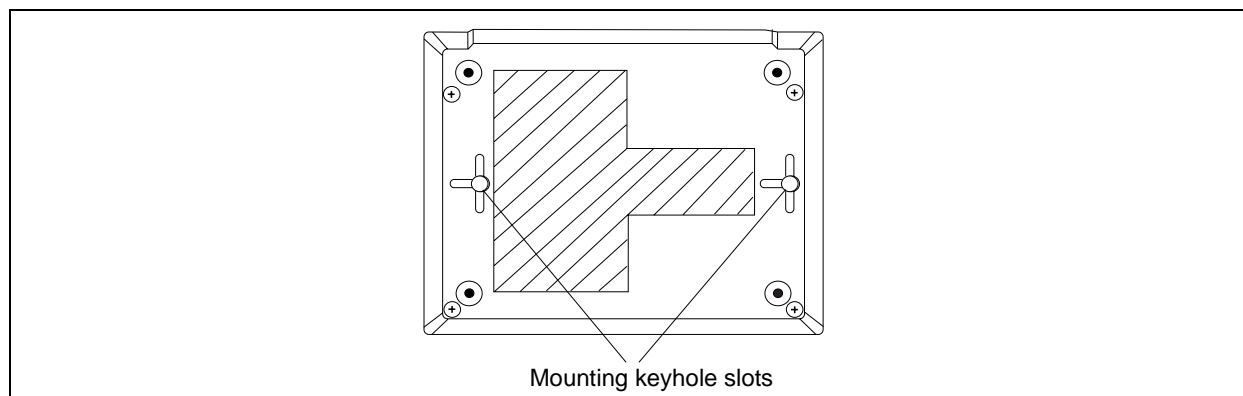
**Caution:** In North America, the Business Communications Manager ATA 2 must be powered from a Class 2 power source that is UL and CSA approved.  
In Europe, the Business Communications Manager ATA 2 must be powered from a Class II power source that is CE marked.

- 6 This procedure is complete.

## Mount the Business Communications Manager ATA 2

Use this procedure to mount the unit on a wall after the ATA 2 is correctly connected.

- 1 When using 0.5 mm wire (24 AWG), 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 182 on page 282.

**Figure 182** ATA 2 back view

- 5 This procedure is complete.

## Determine the ATA 2 extension number

Use this procedure to determine the extension number for every Business Communications Manager ATA 2. Perform this procedure before performing 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 ° to access an intercom line.



**Note:** ° appears as ċ on some telephones. If you are using a telephone without a ° or ċ button, refer to the *ATA 2 User Guide* for details.

Some phones have a Flash button, which is the equivalent to ° or ċ.

- 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.

- 7 This procedure is complete.

## Configure the ATA 2

Use this procedure to configure the Business Communications Manager ATA 2 using the Business Communications Manager Unified Manager. For detailed information about using Unified Manager, refer to the *Business Communications Manager 3.0, 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.
- 6 This procedure is complete.

## Test 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 a 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.

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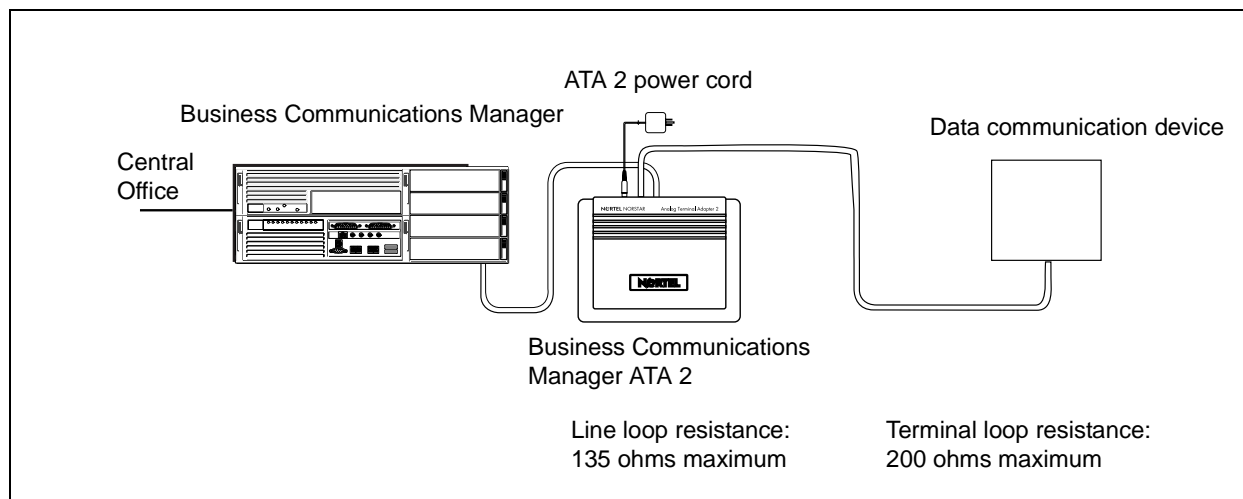


## Install a Data Communication Device

Use this procedure to install an ATA 2 to a data communication device.

Figure 183 shows the hardware configuration for connecting a data communication device through an ATA 2 to the Business Communications Manager.

**Figure 183** Data communication device installation overview



- 1 Connect a single-line telephone to the Business Communications Manager ATA 2.
- 2 Check that the Business Communications Manager ATA 2 is in the Tones OFF mode, lift the handset and press: °/°.



**Note:** ° appears as  $\zeta$  on some telephones. If you are using a telephone without a ° or  $\zeta$  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.
- 6 This procedure is complete.



## Chapter 14

# Install Optional Telephony Equipment

Use the procedures described in this chapter to connect the optional ringer, page, and music telephony equipment to the media services card (MSC) connectors. Locate the MSC connectors on the front of the Business Communications Manager base function tray. Refer to “Media services card (MSC)” on page 57.

## Media Service Card Connections

The MSC faceplate provides the following connections for optional telephony equipment:

- Auxiliary ringer
- Page relay
- Page output
- Music on hold

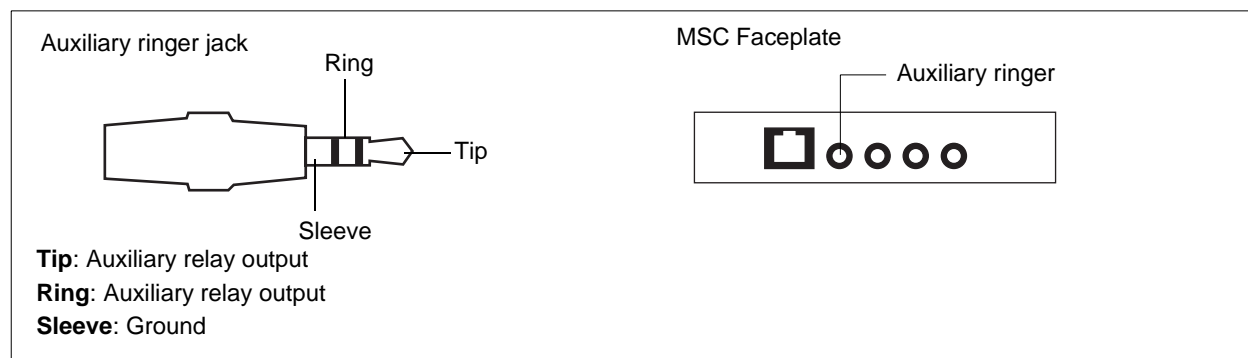
### Install an auxiliary ringer

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.

Use this procedure to install an auxiliary ringer.

- 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 184.

**Figure 184** Auxiliary ringer jack



**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.

## Activate 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 3.0, Programming Operations Guide* for programming details.

## Connect the external paging system

You can connect a customer-supplied 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  $\Omega$
- 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.

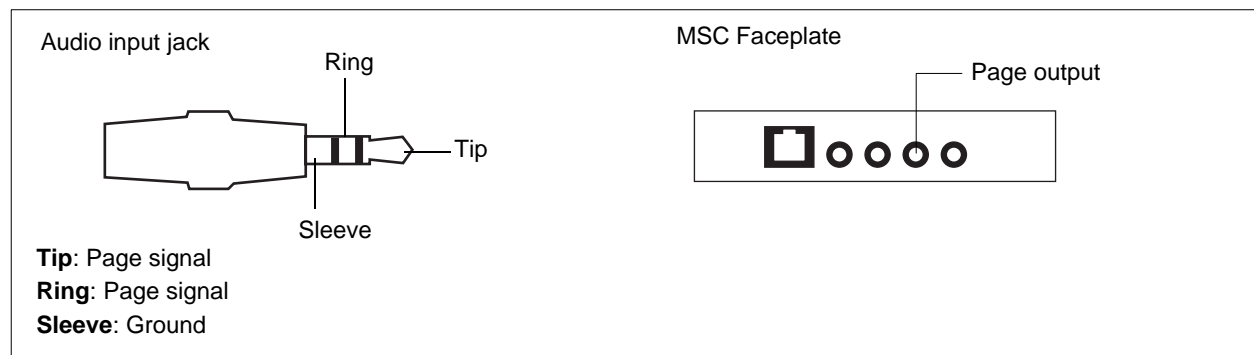
When you use the page signal output jack to connect an external paging amplifier, you also use the page relay jack which contains a floating relay contact pair. The system uses this jack to control the external paging amplifier.

- 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.

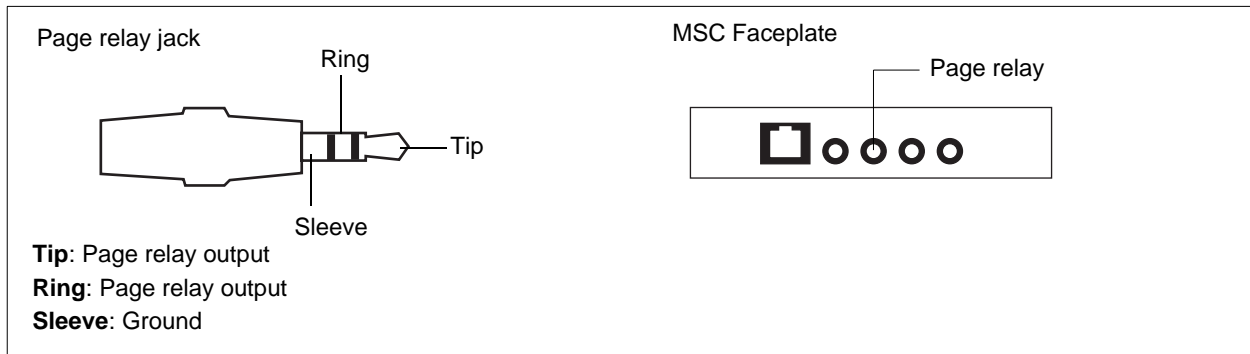
Use this procedure to install the external paging system using the installation instructions that came with the paging system.

- 1 Connect the paging system audio input to the Page output on the MSC. Refer to Figure 185.

**Figure 185** Audio input jack



- 2 Connect the paging system relay to the Page relay output on the MSC. Refer to Figure 186.

**Figure 186** Page relay jack

**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.

**3** This procedure is complete.

## Connect an external music source

Use this procedure to connect the external music source to the Business Communications Manager jack. You can use any customer-supplied approved low power device as a music source. A music source includes equipment such as a radio with a high impedance earphone jack, as a music source.

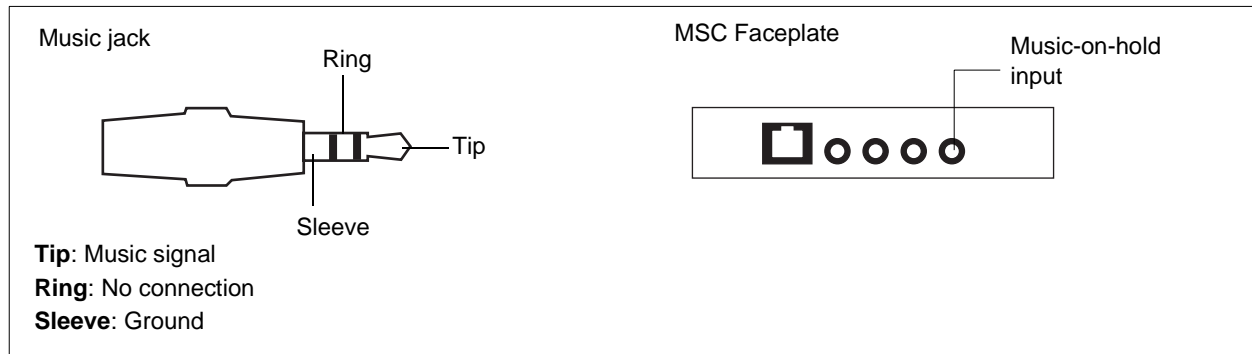
### Music on hold specifications

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.

- 1 Connect the miniature jack of the music source output to the music-on-hold input on the MSC. Refer to Figure 187.

**Figure 187** Music on hold jack



- 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.

- 3 Enable Music for callers on Hold and for Background Music through programming. Refer to the *Business Communications Manager 3.0, Programming Operations Guide* for more details.
- 4 This procedure is complete.

---

## Chapter 15

# Troubleshooting

---

This chapter describes troubleshooting options to determine the cause of malfunctions 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.

---



**Warning:** Protect the hardware components against damage from electrostatic discharge.

Always wear a ground wrist strap before you handle components. Always place the components in static-free container.

---

Hardware problems appear as any of the following:

- The operational LEDs on the Business Communications Manager base function tray, advanced function tray (RAID upgrade) or the media bay modules do not display normal operational status.
- Business Communications Manager system does not function at all.
- The emergency telephone does not function.
- ATA 2 does not function.

## Access the System Status Monitor to Monitor LEDs

The LEDs on the Business Communications Manager base function tray are part of the System Status Display (SSD) board.

Figure 188 shows what the board looks like from inside the base function tray.

**Figure 188** SSD board connections

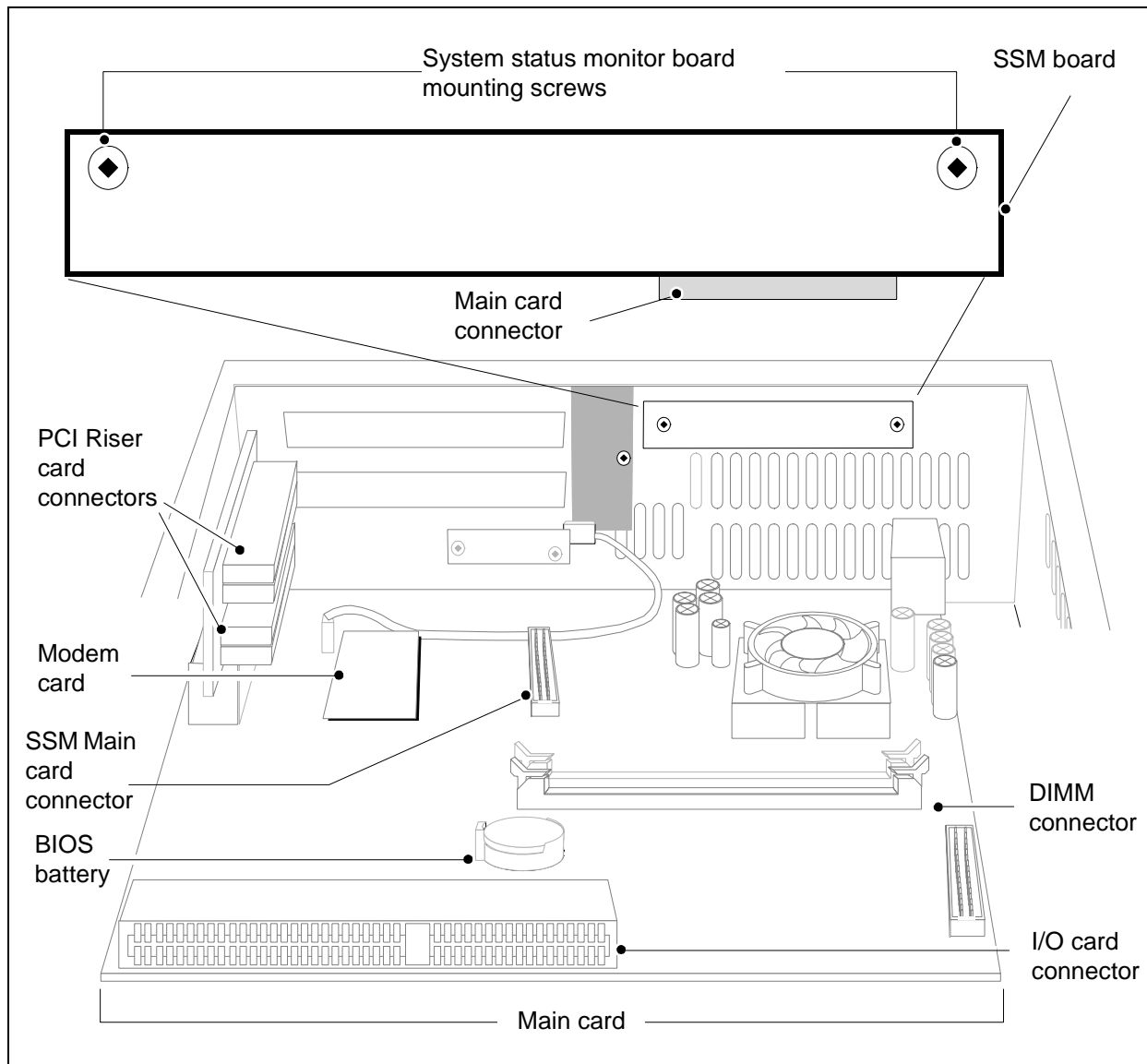
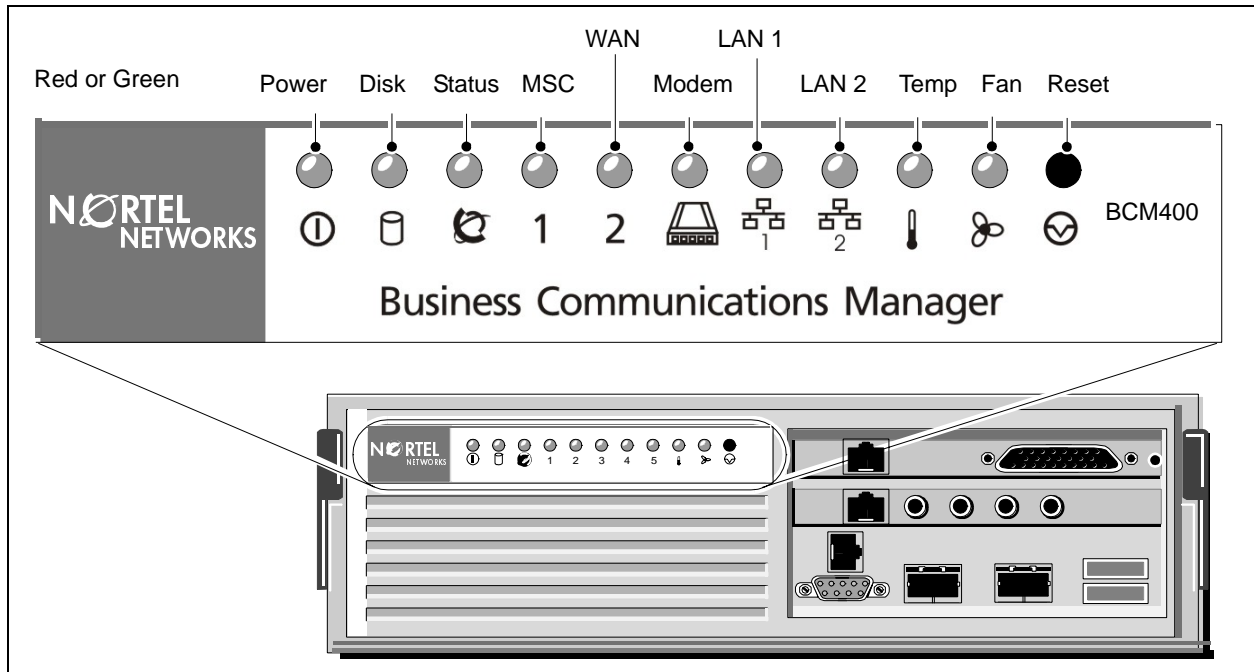


Figure 189 shows what the LEDs look like on the outside of the base function tray. The labels in the illustration indicate which part of the hardware each LED supports.



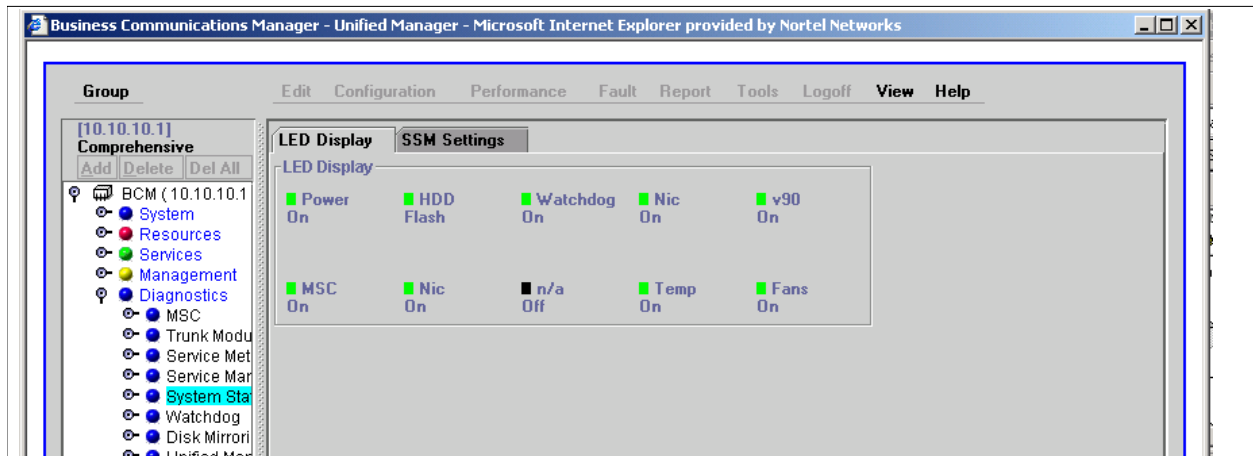
**Figure 189** LED locations on the face of the base function tray

The Business Communications Manager System Status Monitor allows you to view the status of the system LEDs on your PC. This status display allows you to make preliminary decisions regarding the type of intervention required without necessarily having to inspect the Business Communications Manager hardware.

Use this procedure to access 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 190** 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.

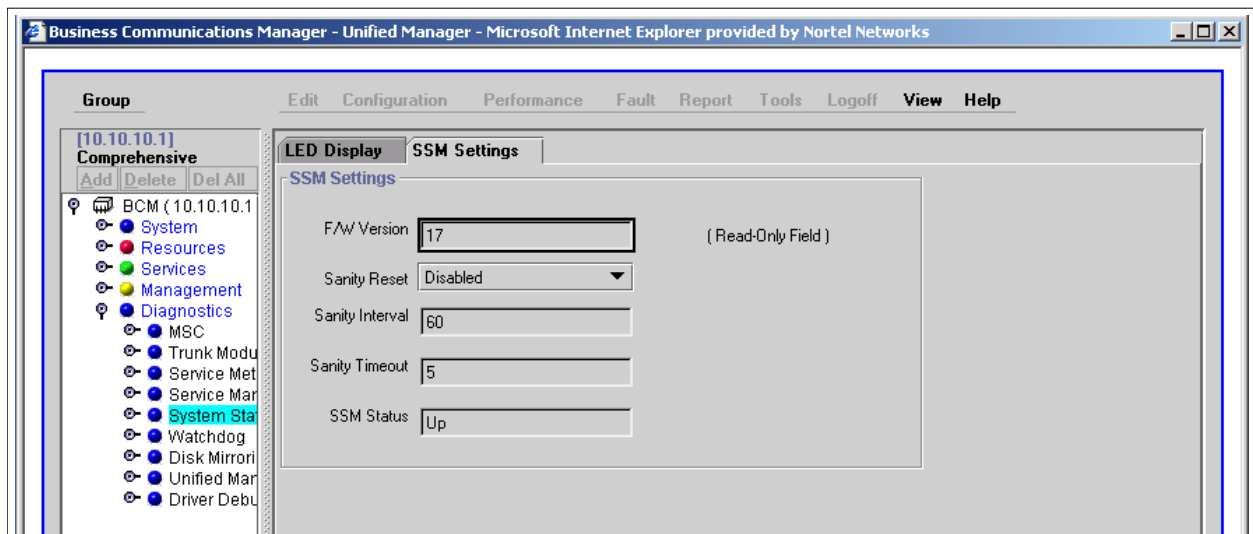
**Figure 191** System Status Monitor LED Settings record

Table 34 lists the values on the LED Settings screen.

**Table 34** 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.

**Table 34** LED Display screen settings (Continued)

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.

**4** This procedure is complete.

## Business Communications Manager does not Function

The Business Communications Manager can experience a complete failure for any of the following reasons:

- Power supply failure
- Incorrect power supply connections
- AC power failure

## 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.
- 6 This procedure is complete.

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.
- 4 This procedure is complete.

## 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.
- 7 This procedure is complete.

## Check the ATA 2 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.
- 4** This procedure is complete.

## Check 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).
- 3** This procedure is complete.

## Check 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.
- 6** This procedure is complete.

For more information about ATA 2, contact your customer service representative.



## 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 35 shows the core software available.

**Table 35** 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: <ul style="list-style-type: none"> <li>Caribbean includes Antigua, Bahamas, Barbados, Bermuda, Cayman Islands, Dominican Republic, Grenada, Jamaica, USVI, Puerto Rico, and Trinidad</li> <li>CALA refers to all other Caribbean and Latin American countries with European-based standards.</li> </ul>					

## Language Availability

Table 36 lists the languages available for each region and a specific order in which the languages are set as default.

**Table 36** 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 37 shows a breakdown of the language support for South American and Central American countries.

**Table 37** 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 38 shows the companding law used for each region.

**Table 38** Companding law

Companding Law	
μ-law	A-law
Caribbean	Australia
Hong Kong	CALA
North American	Denmark
Taiwan	France
	Germany
	Global
	Holland
	Italy
	Norway
	PRC
	Spain
	Sweden
	Switzerland
	United Kingdom

## ISDN Line Services

Table 39 shows the ISDN private network services that are supported by the Business Communications Manager. Table 40 shows the network-based ISDN supplementary services and the features available for each.

**Table 39** 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 39** ISDN line services (Continued)

<b>MCDN over PRI (SL-1)</b>	<b>DPNSS</b>	<b>DASS2</b>	<b>ETSI QSIG</b>
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 40** ISDN services, by Protocol

<b>Protocol</b>	<b>Available ISDN services</b>
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 sub addressing (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 41 shows the Mobility services that are supported by the Business Communications Manager, and the regions that can use each type.

**Table 41** 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 42 lists a cross-reference between regions and the type of modules that can be used within the related area.

**Table 42** Module availability, by profile

Region	DSM16+/ DSM32+	ASM	CTM/ CTM8	4X16	BRI	DTM	DECT	DDIM
Australia	✓	✓			✓	✓	✓	
Caribbean	✓	✓	✓	✓	✓	✓		
CALA	✓	✓	✓	✓	✓	✓		
Denmark	✓	✓			✓	✓	✓	
France	✓	✓			✓	✓	✓	
Germany	✓	✓			✓	✓	✓	
Global	✓	✓	✓	✓	✓	✓	✓	
Holland	✓	✓			✓	✓	✓	

**Table 42** Module availability, by profile (Continued)

Region	DSM16+/ DSM32+	ASM	CTM/ CTM8	4X16	BRI	DTM	DECT	DDIM
Hong Kong	✓	✓	✓	✓	✓	✓	✓	
Italy	✓	✓			✓	✓	✓	
North American	✓	✓	✓	✓	✓	✓		✓
Norway	✓	✓			✓	✓	✓	
PRC	✓	✓	✓	✓	✓	✓		
Spain	✓	✓			✓	✓	✓	
Sweden	✓	✓			✓	✓	✓	
Switzerland	✓	✓			✓	✓	✓	
Taiwan	✓	✓	✓	✓	✓	✓	✓	
United Kingdom	✓	✓			✓	✓	✓	

## Trunk Availability by Region

Different countries have different available trunk types. Table 42 provides a cross-reference between regions and available trunks types.

**Table 43** 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	✓		✓				

**Table 43** 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
PRC	✓		✓		✓	✓	
Spain	✓		✓				
Sweden	✓		✓				
Switzerland	✓		✓				
Taiwan	✓		✓	✓	✓	✓	
United Kingdom	✓		✓				✓

**Table 44** 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 44** 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 45 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 45** 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 45** BRI and PRI line types (DTM and BRI modules) (Continued)

Digital trunk types	Description
PRI	<p>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)</p> <p>This is the module that controls system timing.</p> <p>These lines give you incoming and outgoing access to an ISDN network and are auto-answer trunks, by default.</p> <p>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.</p>
BRI	<p>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.</p> <p>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.</p>
DASS2	(British) Trunk provides multi-line IDA interconnection to the British Telecom network.
DPNSS	<p>(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.</p> <p>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.</p> <p>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.</p>
Analog trunk types	
Public	Provides potential access for any set on the system.
Private	Provides potential access for a specific set.

## Define Time Zones by Country and Language

Time zones are based on the actual time zone where the Business Communications Manager system 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 46 provides a list of formats based on language or country.

**Table 46** 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 47 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 47** 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	<ul style="list-style-type: none"> <li>• 2 ring cycles</li> <li>• 3 ring cycles</li> <li>• 4 ring cycles</li> <li>• 6 ring cycles</li> <li>• 10 ring cycles</li> </ul>	<ul style="list-style-type: none"> <li>• 2 ring cycles</li> <li>• 3 ring cycles</li> <li>• 4 ring cycles</li> <li>• 6 ring cycles</li> <li>• 10 ring cycles</li> </ul>	<ul style="list-style-type: none"> <li>• 2 ring cycles</li> <li>• 3 ring cycles</li> <li>• 4 ring cycles</li> <li>• 6 ring cycles</li> <li>• 10 ring cycles</li> </ul>

**Table 47** 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	<ul style="list-style-type: none"> <li>• 1 ring cycles</li> <li>• 2 ring cycles</li> <li>• 3 ring cycles</li> <li>• 4 ring cycles</li> <li>• 6 ring cycles</li> <li>• 10 ring cycles</li> </ul>	<ul style="list-style-type: none"> <li>• 1 ring cycles</li> <li>• 2 ring cycles</li> <li>• 3 ring cycles</li> <li>• 4 ring cycles</li> <li>• 6 ring cycles</li> <li>• 10 ring cycles</li> </ul>	<ul style="list-style-type: none"> <li>• 1 ring cycles</li> <li>• 2 ring cycles</li> <li>• 3 ring cycles</li> <li>• 4 ring cycles</li> <li>• 6 ring cycles</li> </ul>
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	<ul style="list-style-type: none"> <li>• 3 ring cycles</li> <li>• 4 ring cycles</li> <li>• 5 ring cycles</li> <li>• 6 ring cycles</li> <li>• 12 ring cycles</li> </ul>	<ul style="list-style-type: none"> <li>• 3 ring cycles</li> <li>• 4 ring cycles</li> <li>• 5 ring cycles</li> <li>• 6 ring cycles</li> <li>• 12 ring cycles</li> </ul>	<ul style="list-style-type: none"> <li>• 3 ring cycles</li> <li>• 4 ring cycles</li> <li>• 5 ring cycles</li> <li>• 6 ring cycles</li> <li>• 12 ring cycles</li> </ul>
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 47** 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

# Telephony Hardware Selection and Settings

### Media Bay Module System Selection

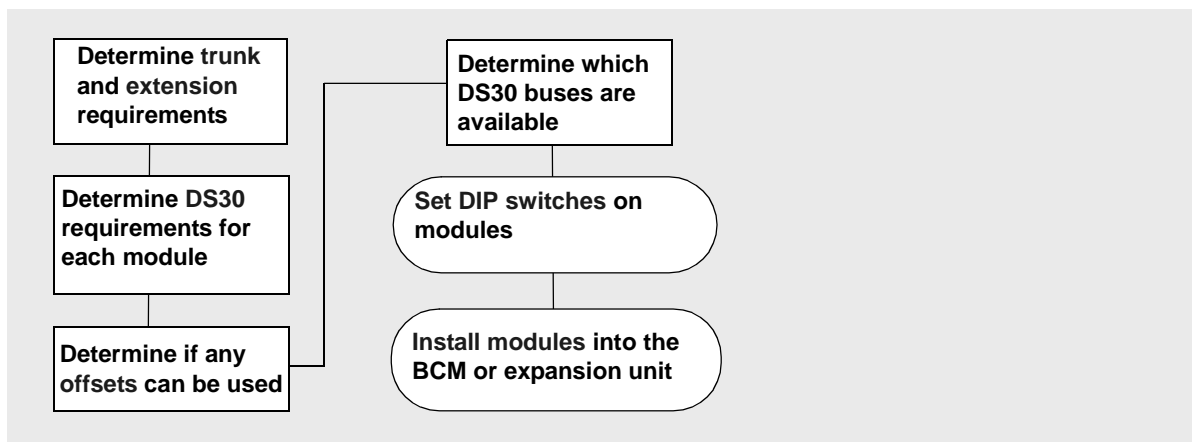
The media bay modules are the devices in the Business Communications Manager system that permit you to connect your extensions and the public switched telephone network (PSTN) lines to the call processing capabilities of the Business Communications Manager system.

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 platform chassis or Business Communications Manager expansion unit. You are able to select the number and type of media bay modules that best suit your business 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 resources” on page 322.

**Figure 192** Process for determining modules



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

After you determine the modules types required, calculate how they use the available system resources. These sections describe how the modules work within the available channels on the Media Services Card (MSC) in the Business Communications Manager.

## Trunk media bay module selection

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.

If you are setting up an entirely new system, a site survey must be done to determine your current and future needs. Nortel Networks recommend that you do the survey before you order any modules.



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

To select the trunk media bay modules:

- 1 Record the number of each type of line you have in Table 48. If you do not know the number or type of lines you have, contact your service provider.
- 2 Use the number of lines and the number of lines per module to determine how many modules you need.

**Table 48** 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
Universal T1 MUX digital lines		DDIM	24 (also requires a full DS30 channel for the Data Module)	_____ DDIM
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

\* A Universal T1 MUX is a type of T1 digital line that contains a combination of digital telephone lines and data lines.

*An example:*

- If you require 24 T1 digital lines, you need one DTM because a single DTM can handle 24 T1 lines (North America).
- 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 or DDIMs to your Business Communications Manager system.



**Tip:** The BCM400 platform base chassis holds a maximum of four media bay modules. If you require more modules the Business Communications expansion unit supports a maximum of six additional modules.

- 3 This procedure is complete.

## Station media bay module selection

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



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

- 1 In Table 49, record the number of each type of extension you have.
- 2 Use the number of extensions and the number of extensions per module to determine how many modules you need.

**Table 49** 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/DSM 16+	16	_____ DSM 16
Digital extensions		DSM 32/DSM 32+	32	_____ DSM 32
Digital extensions		4X16	16	_____ DSM 16
Analog extensions		ASM 8	8	_____ ASM 8

**Table 49** 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
Cordless handsets (DECT) (selected profiles only)		DECT	32	_____ DECT
Digital extensions are digital or IP telephones. You do not need to include IP telephones when calculating the number of required DSM modules. For a list of the telephones that can be used with the Business Communications Manager system, refer to "Telephones and adapters" on page 85. Analog extensions include single line telephones, fax machines, and modems.				

An example for North America:

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



**Note:** If you require only a few analog extensions, you can use an 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 BCM400 can hold a maximum of four media bay modules. If you require more, you also need an Business Communications Manager expansion unit.

**3** This procedure is complete.

## Upgrade 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. 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.

## Determine 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 line requirements of each module.



The following sections describe the MSC DS30 buses, which manage the DS30 channels, and how you fit your modules into the overall system planning.

## Understand DS30 numbers

A DS30 bus is a block of virtual pathways on the media services card (MSC).

On a default system, six buses of 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 digital signal processors (DSPs) to support internal Business Communications Manager functions such as voice mail, VoIP trunks, IVR, and IP telephony functions. This configuration is called a 2/6 channel split.

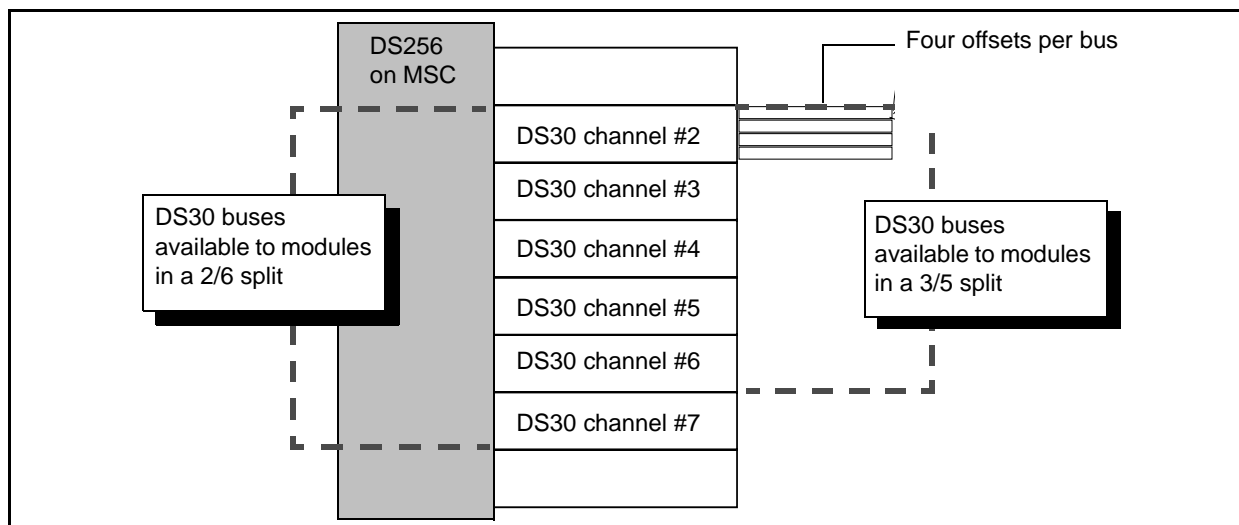
You can change the DS30 allocation to a 3/5 split to accommodate increased IP telephony or VoIP trunk requirements. You do this by assigning bus 7 to the voice data sector. This choice should be made at system startup, but a default system can be changed through the Unified Manager to a 3/5 split after startup if IP requirements increase. At startup, you indicate the split you want when you run the Quick Start Wizard. Refer to the Programming Operations Guide for details.



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

Figure 193 shows a model of how the MSC DS30 buses are a subgroup of the DS256 bus on the MSC. The diagram also shows the offset channels, which are a subgroup of the buses.

**Figure 193** DS30 model



DS30 numbers are set using the number 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 bus.

## Setting offsets

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



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**Note: Double Density**

The 32 time slots are important when you are working with station media bay modules. The DSM 16+, DSM 32+, and ASM 8 modules can be configured, using the offset dip switches, to use each of these time slots as separate telephone lines. This, essentially, doubles your system telephone capacity. On a default 3.0 system, this feature, called Partial Double Density (PDD), is available on DS30 2, 3, 4, and 5. DS30 6 and 7 maintain the current two time slots per line configuration, which supports the Companion application. For systems where Companion is not required, you can use the Unified Manager to change all six DS30 buses to FDD.

Exception: If your system has a 3/5 channel split, only DS30 6 becomes double density and is available to media bay modules when the system is changed to FDD. However, 16 more channels on DS30 7 are also made available for IP telephones.

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Exceptions:

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

Offsets are numbered 0, 1, 2, and 3. Modules that require less than a full bus can be assigned a DS30 number and an offset number. This allows more than one module to be assigned the same DS30 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 number, with different offset numbers. However, you cannot assign a CTM8 and an BRI module to the same DS30.

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

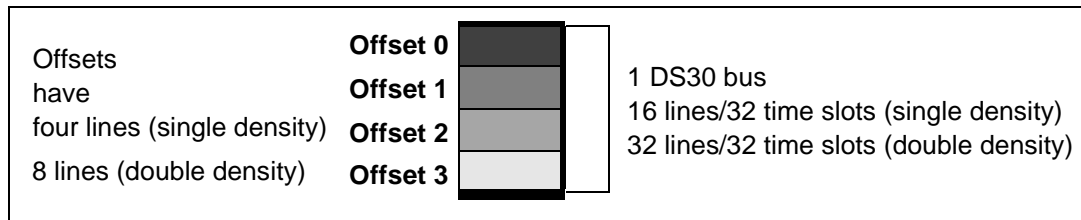


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**Note:** Media bay modules that do not or cannot share DS30 buses always assign the offset as 0 (zero). As well, if the module requires more than one bus, such as the 4x16 module or the DDIM, only the first DS30 is set on the DIP switches. The next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

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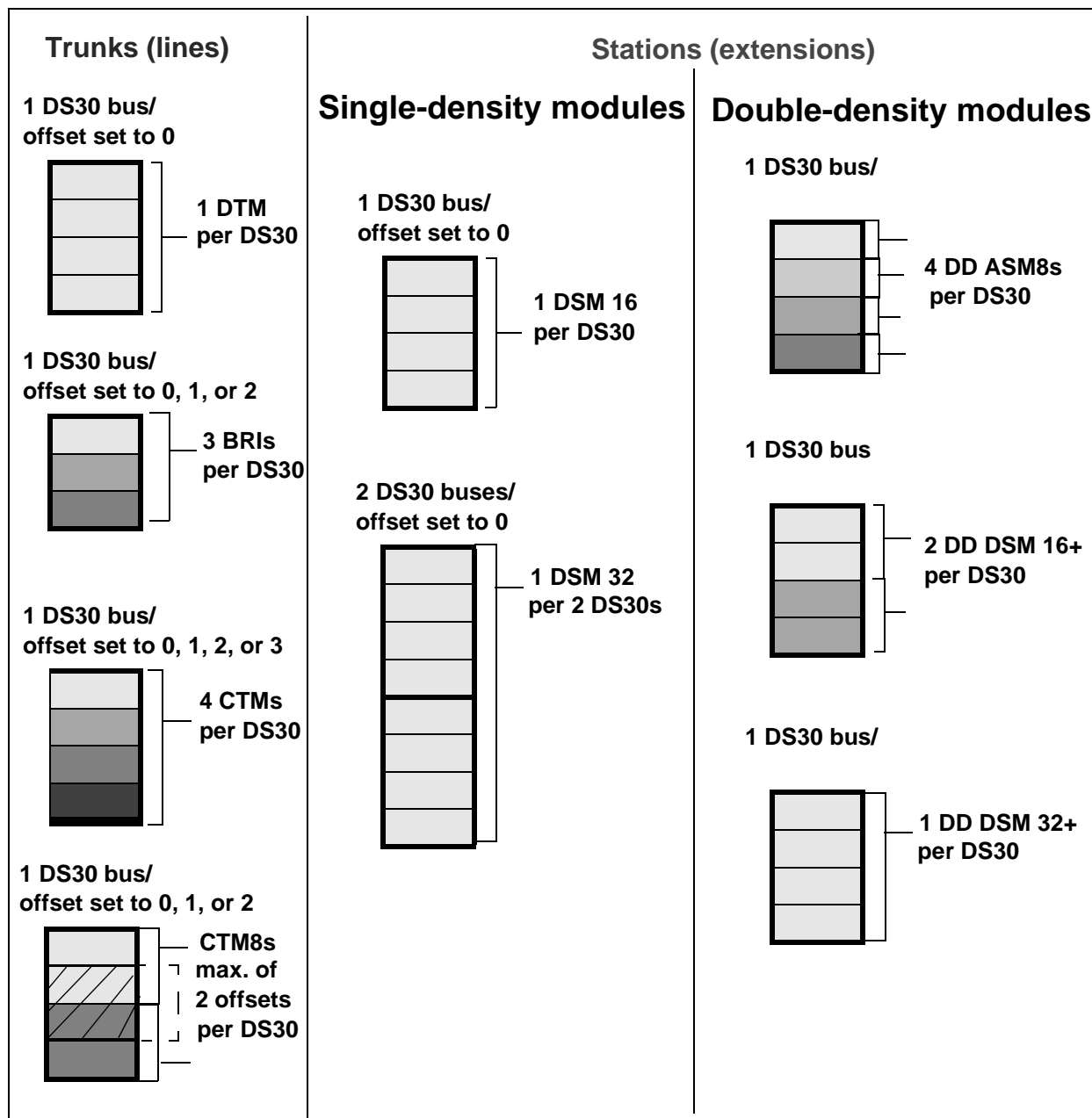
Figure 194 shows a DS30 broken down into four offset groups of four (single density) or eight (double density) lines each. Once again, note that when you enable a station module for double density, the line numbers double.

**Figure 194** Offsets are part of DS30 channel line groups

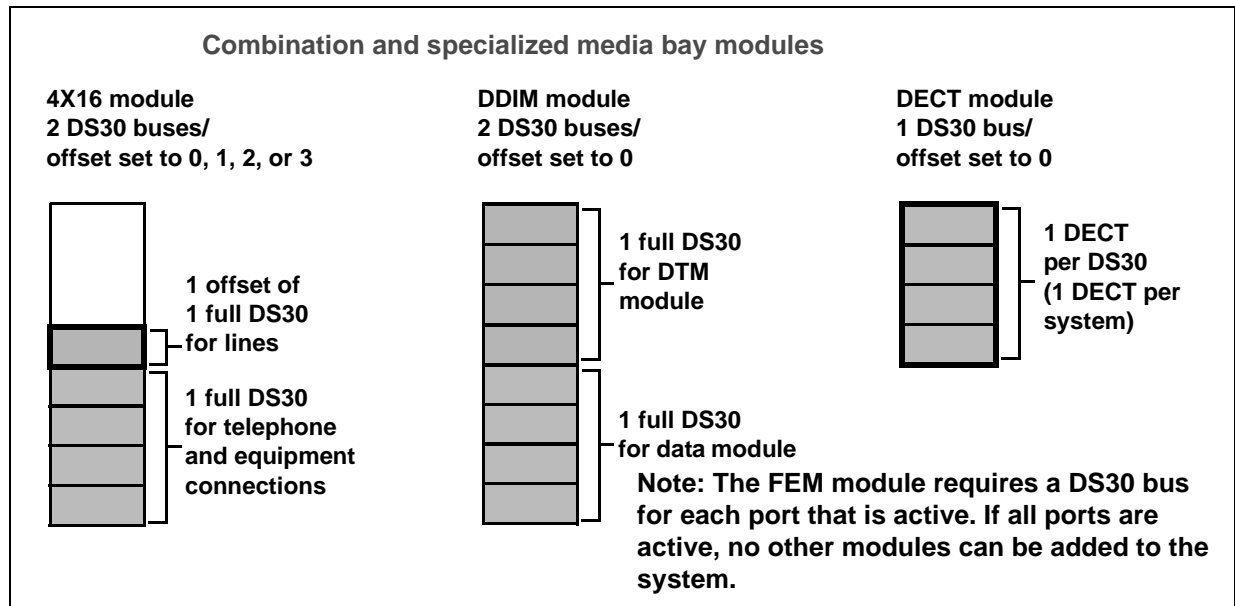
## Determining module channel requirements

Figure 196 shows how much of a DS30 channel each module requires. Note the differences between modules set to single density and modules set to double density.

**Figure 195** Space requirements for media bay modules, on a per-DS30 configuration



**Note:** If you choose a CTM8, DDIM 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 334 and “4X16 switch settings” on page 336 for details

**Figure 196** Space requirements for special media bay modules

**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 334 and “4X16 switch settings” on page 336 for details

- 1 Make a list of modules and the space requirements for each module you chose. Refer to Table 50.

**Table 50** Matching modules to DS30 channel capacity

DS30 split	2/6 (default) _____	3/5 (extra IP lines) _____
Type of module	Number required	DS30s/offsets required

- 2 Set the bus numbers and offsets on the DIP switches of the module. Refer to Chapter 4, “Install, remove or replace the Media Bay Modules,” on page 109. Note that you assign trunk modules starting from the bottom DS30, and you assign station modules starting from the top DS30.
- 3 Install the modules into the Business Communications Manager or expansion unit. Refer to Chapter 4, “Install, remove or replace the Media Bay Modules,” on page 109.
- 4 This procedure is complete.

## Set Media Bay Module Dip Switches

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.



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**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 344.

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Start from the list of modules you chose in Chapter 4, “Install, remove or replace the Media Bay Modules,” on page 109.

After you determine which DS30 buses you want to use, and how much DS30 capacity each module requires, 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 Resources

Media bay modules are assigned to DS30 buses 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:

- The DIP switches on the DDIM module are used to set the DS30 designation for the DTM part of the module. The module automatically assigns an additional DS30 for the data module part of the DDIM. You cannot choose DS30 7 for the DDIM module, because the data module would not be accessible. The same applies to DS30 6 if your system is set to a 3/5 split. Refer to DDIM switch settings on page DDIM switch settings on page 333.
- If you chose a 3/5 channel split for your system, DS30 7 cannot be used by any module. For modules that require two buses, this means that you cannot set the DIP switches to DS30 6 for those modules, because the second level of lines would fall into DS30 7, which would not be accessible. Refer to Figure 197 on page 325.

Refer to “Understanding DS30 numbers” on page 84 for more information about 2/6 and 3/5 DS30 channel splits.

- DSM 32 modules require two DS30 numbers. When you assign the first DS30 number to a DSM 32, the module automatically adds the next DS30 number. For example, if you assign DS30 2 to an DSM 32, it uses DS30 2 and 3. However, you cannot choose DS30 7 for the DSM32 module, because the second level of DSM lines would not be accessible. The same applies to DS30 6 if your system is set to a 3/5 split. Refer to DSM switch settings on page 338.

DSM 32+ modules can be set to either single or double density. When they are set to double density, the module only requires one DS30 bus.

- The DIP switches on the 4X16 module are used to set the DS30 designation and offset for the CTM part of the module. The module automatically assigns an additional DS30 for the 16 DSM lines. However, you cannot choose DS30 7 for the 4X16 module, because the DSM lines would not be accessible. The same applies to DS30 6 if your system is set to a 3/5 split. Refer to 4X16 switch settings on page 336.
- Companion: configure the DSM or DSMs handling Business Communications Manager Companion to DS30 DS30 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. This means you can only use a DSM 16 on DS30 6. You cannot assign a DSM 32.

If your system is set to full double density (FDD), DS30 6 and/or 7 do not support Companion.

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- The CTM8 module, when set to single density, uses two offsets on a DS30 bus. 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, you cannot select offset 3. Refer to CTM switch settings on page 334.

When the CTM8 is set to double density, you can install four CTM8s per DS30 bus, using all four offsets.

- Not all modules are available to all systems. Refer to “Media Bay Module System Selection” on page 313 for specifics about each module.



**Note:** Remember, if you have chosen a 3/5 channel split for your system, DS30 7 is no longer available for media bay modules.

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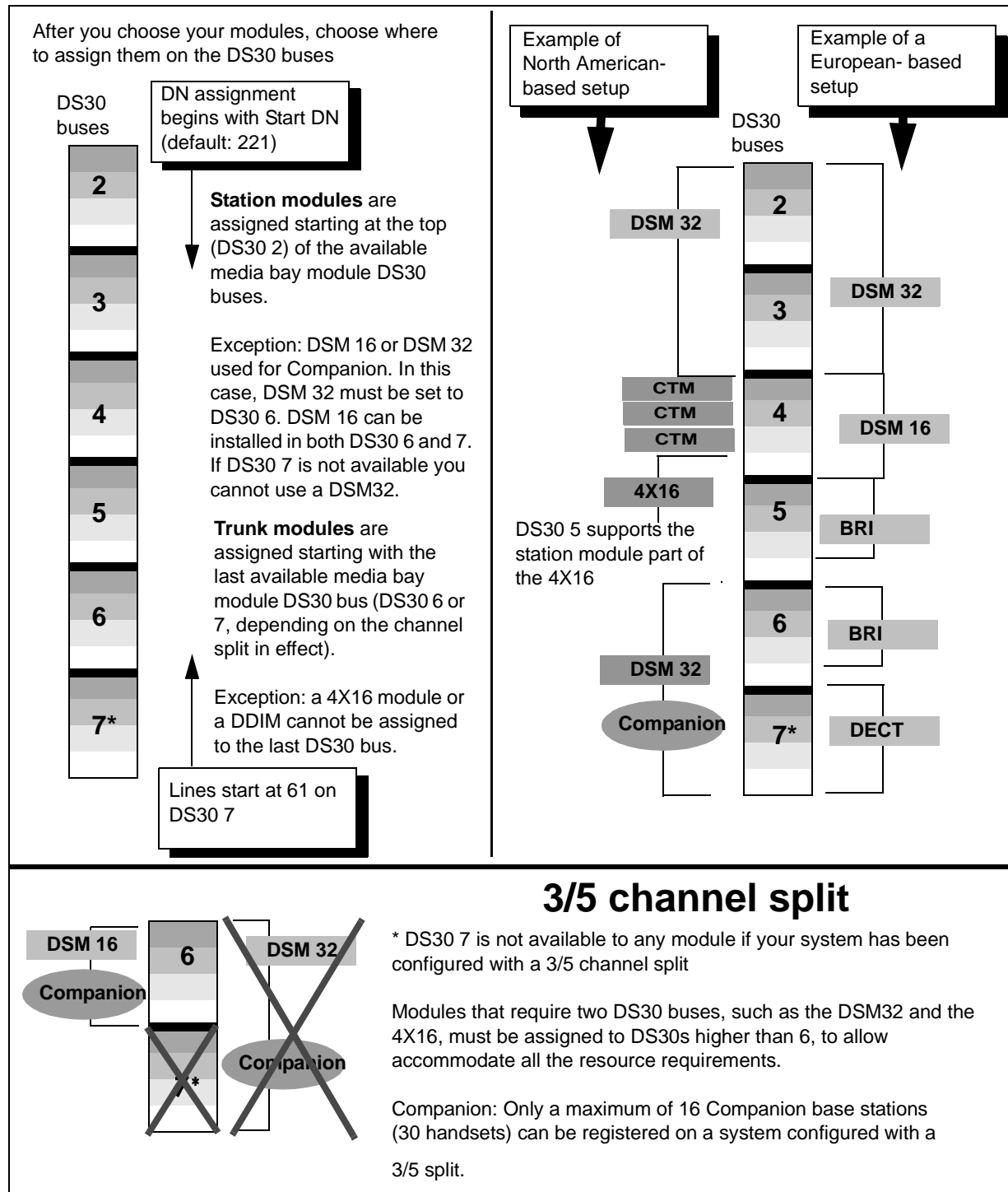
## Choose the assigned order for modules

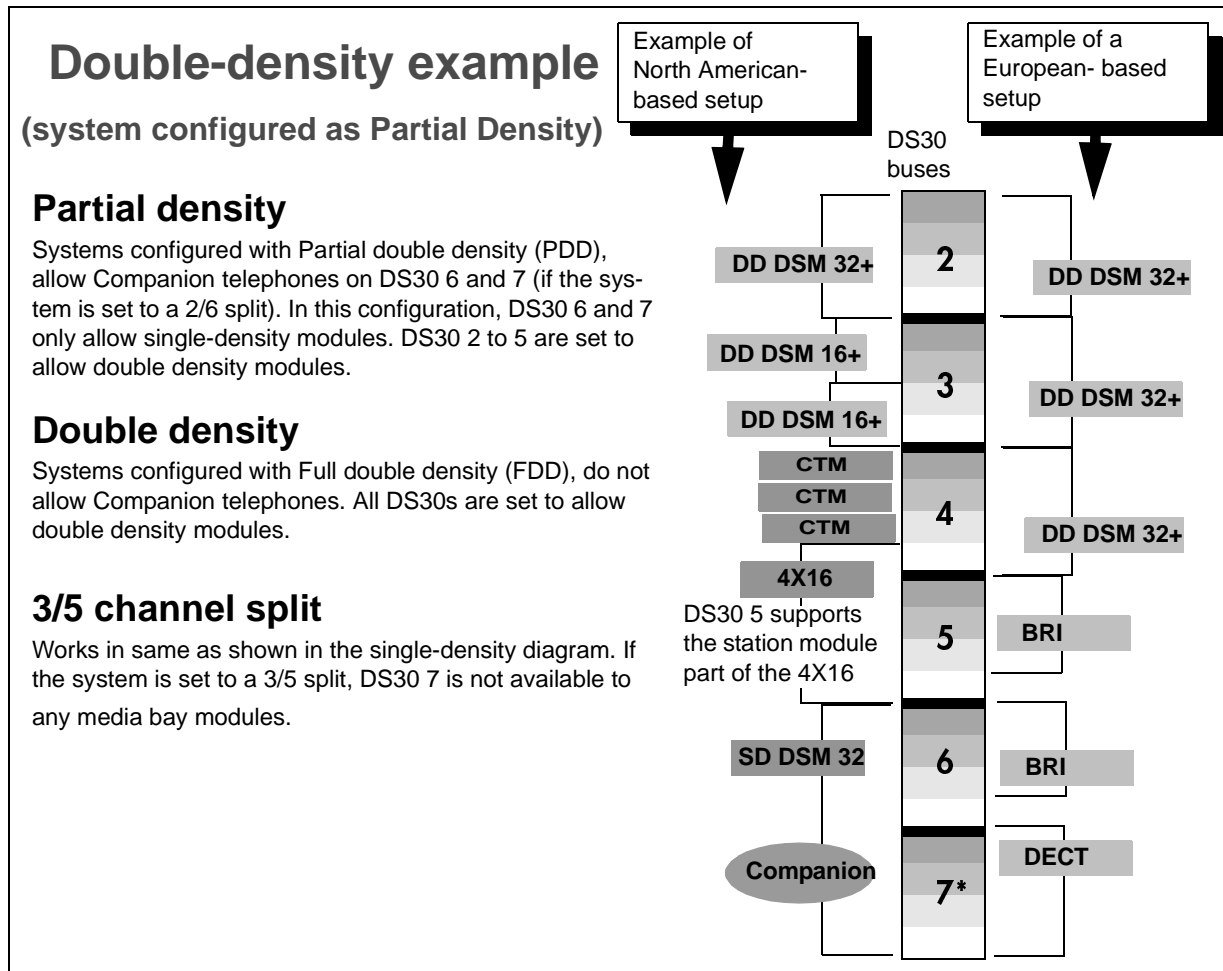
Assign the media bay modules and DS30 channels in the order shown in Figure 197.

Station modules are assigned starting with DS30 2. This allows telephones to start numbering from the system Start DN (Default: 221). The exception to this is a DSM used for Companion, which must be installed on DS30 6 (DSM32) or DS30 6 and 7 (two DSM 16s). If your system is set to a 3/5 split, you can only assign a DSM16 to DS30 6 for Companion.

Trunk modules are assigned starting at DS30 7, in a system with a 2/6 DS30 split, and at DS30 6 in a system with a 3/5 split. The exception to this is the 4X16 module and the DDIM, which require two DS30 buses, so it must be set to a DS30 that has the next channel open.



**Figure 197** Assigning single-density modules to the DS30 channel hierarchy

**Figure 198** Assigning double density modules to the DS30 channel hierarchy

## Determine 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 52 (trunk modules) and Table 53 (station modules) to determine a switch setting for all modules except the DECT and FEM modules. Figure 199 shows an example of the table and how to do the following steps:

**Step 1:** On Table 52 or Table 53 circle the module names.

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

**Step 3:** Determine the number of DS30s each module requires. For some station modules this will depend on whether you choose to set the module to single or double density.

**Step 4:** Circle the DS30 bus and offset numbers.

**Step 5:** Follow the DS30 bus 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 332 for line and DN listings.

**Figure 199** How to use the configuration map

1. Indicate the modules you want to install

2. Note how many DS30 buses each module requires

4. Assign an offset number to each module

DS30 bus #	Media bay module positioning						DIP switch setting						Off-set
	4x16	ASM 8	DTM	CTM	CTM 8	BRI	1 (offset)	2 (offset)	3 (offset)	4 (offset)	5 (DS30 ch)	6 (DS30 ch)	
2							on	on	on	on	on	on	0
7							on	on	on	off	on	off	0
							on	on	off	off	on	off	1
							on	off	on	off	on	off	5
							on	off	off	off	on	off	3

3. Choose the DS30 numbers to assign to the modules

5. Make a note of the DIP switch settings for the DS30/offset numbers

■ ■ ■ DIP switch setting for offset

**Example:** Position your DSM 32 module (step 1), which requires two full DS30 buses (step 2), in DS30 2 and 3 (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 52 shows possible DS30 and offset configurations for each type of trunk module, and the corresponding switch settings. For DECT and FEM settings, refer to “DECT switch settings” on page 343 and “FEM switch settings” on page 344.

**Table 52** Possible trunk media bay module DIP switch settings

DS30 bus #	Media bay module positioning (trunk modules)								DIP switch settings						Offsets	
	4x16 Offsets 0,1, 2, 3		DDIM Offsets 0	DTM Offset s 0	CTM Offsets 0, 1, 2, 3	CTM 8 Offsets 0, 1, 2	BRI Offsets 0, 1, 2, 3	1 2 3 4 5 6 (offset) (DS30 ch)								
	Line	Exten.														
2	0	Picks up ch. #3	0	Picks up ch. #3	0	0		0	on	on	on	on	on	on	0	
	1								on	on	off	on	on	on	1	
	2								on	off	on	on	on	on	2	
	3								on	off	off	on	on	on	3	
3	0	Picks up ch. #4	0	Picks up ch. #4	0	0		0	on	on	on	on	on	off	0	
	1								on	on	off	on	on	off	1	
	2								on	off	on	on	on	off	2	
	3								on	off	off	on	on	off	3	
4	0	Picks up ch. #5	0	Picks up ch. #5	0	0		0	on	on	on	on	off	on	0	
	1								on	on	off	on	off	on	1	
	2								on	off	on	on	off	on	2	
	3								on	off	off	on	off	on	3	
5	0	Picks up ch. #6	0	Picks up ch. #6	0	0		0	on	on	on	on	off	off	0	
	1								on	on	off	on	off	off	1	
	2								on	off	on	on	off	off	2	
	3								on	off	off	on	off	off	3	
6	0	Picks up ch. #7	0	Picks up ch. #7	0	0		0	on	on	on	off	on	on	0	
	1								on	on	off	off	on	on	1	
	2								on	off	on	off	on	on	2	
	3								on	off	off	off	on	on	3	
7***	Not supported		Not supported	0	0	0		0	on	on	on	off	on	off	0	
									1	on	on	off	off	on	off	1
									2	on	off	on	off	on	off	2
									3	on	off	off	off	on	off	3

Module set to offset 0Module set to offset 1Module set to offset 2Module 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 and DS30 channel 6 is not supported for the 4X16 and DDIM modules.

Table 53 shows possible DS30 and offset configurations for each type of station module, and the corresponding switch settings. Note that offset 1 indicates the density mode for DSM 16+ and DSM 32+ modules (SDD = single density, offset 1:on; FDD = Full Double Density, offset 1:off).

**Table 53** Possible station media bay module DIP switch settings

DS30 bus #	Media bay module positioning (station modules)					DIP switch settings (Single density)						DIP switch settings (Double density)						Offsets
	DSM 16+ Offsets 0, 1 SDD FDD		DSM 32+ Offsets 0, 1 SDD FDD		ASM 8 Offsets 0, 1, 2, 3							DSM 16+ and DSM 32+ only***						
						1 2 3 (offset)	4 5 6 (DS30)	1 2 3 (offset)	4 5 6 (DS30)	1 2 3 (offset)	4 5 6 (DS30)							
2	0	0	0		0	0***	on	on	on	on	on	on	off	on	on	on	0	
						1	on	on	off	on	on	on	off	on	on	on	1	
						2	on	off	on	on	on	on	off	on	on	on	2	
						3	on	off	off	on	on	on	off	on	on	on	3	
3	0	0	0	0	0	on	on	on	on	on	off	off	on	on	on	0		
					1	on	on	off	on	on	off	off	on	on	on	1		
					2	on	off	on	on	on	off	off	on	on	on	2		
					3	on	off	off	on	on	off	off	on	on	on	3		
4	0	0	0	0	0	on	on	on	on	off	on	off	on	on	on	0		
					1	on	on	off	on	off	on	off	on	on	on	1		
					2	on	off	on	on	off	on	off	on	on	on	2		
					3	on	off	off	on	off	on	off	on	on	on	3		
5	0	0	0	0	0	on	on	on	on	off	off	off	on	on	on	0		
					1	on	on	off	on	off	off	off	on	on	on	1		
					2	on	off	on	on	off	off	off	on	on	on	2		
					3	on	off	off	on	off	off	off	on	on	on	3		
6*	0	0	0	0	0	on	on	on	off	on	on	off	on	on	on	0		
					1	on	on	off	off	on	on	off	on	on	on	1		
					2****	on	off	on	off	on	on	off	on	on	on	2		
					3***	on	off	off	off	on	on	off	on	on	on	3		
7**	0	0		0	0	on	on	on	off	on	off	off	on	on	on	0		
					1	on	on	off	off	on	off	off	on	on	on	1		
					2****	on	off	on	off	on	off	off	on	on	on	2		
					3***	on	off	off	off	on	off	off	on	on	on	3		

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 bus, and the offset, which the module requires.

\*If your system is configured for Partial double density (PDD), DS30 6 will support only modules set to single density (SDD) and it supports Companion.

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

If your system is configured for PDD and a 2/6 DS30 split, DS30 7 will support only single-density modules, but it will also support Companion. (Note: DSM 32/DSM 32+ (set to single density) modules cannot be deployed on this bus.)

\*\*\*ASM modules always use the single density dip switch settings, with the appropriate offset.

\*\*\*\*If your system is set to PDD, offsets 2 and 3 are not available to ASM8 modules.

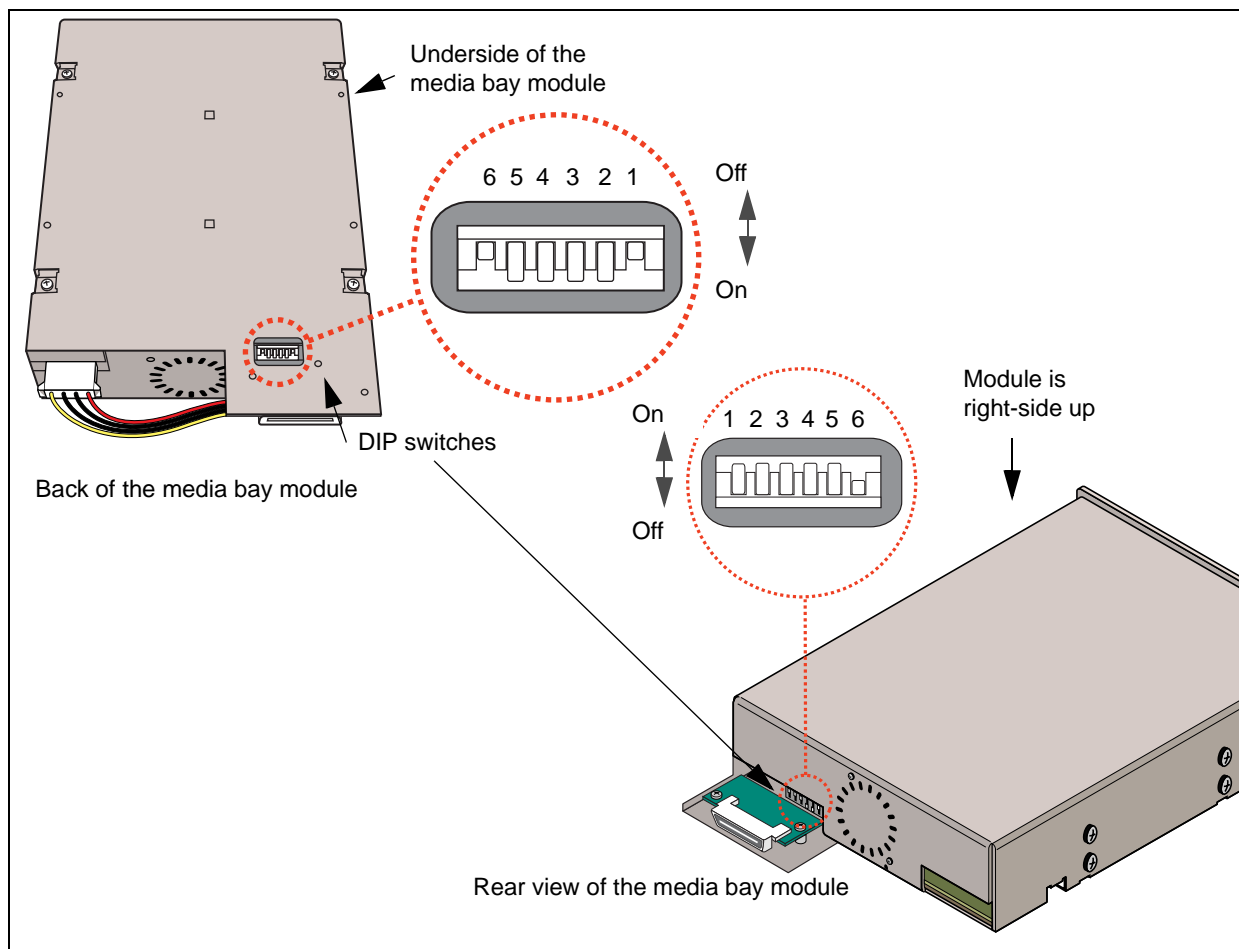
## Set the media bay module DIP switches

Before you install the media bay modules into the Business Communications Manager housing, you need to set the DIP switches. Make a note of these settings either on the chart shown in Table 52 on page 328 or in the Programming Record forms.

Follow these steps to set the DIP switches:

- 1 Locate the DIP switches on the module.

**Figure 200** Switches on the media bay module



- 2 Set the switches to correspond with the settings you chose “Determine module DIP switch settings” on page 326.
- 3 Repeat for each media bay module you want to install.

- 4 You are now ready to install the modules into the Business Communications Manager base or expansion units. Refer to Chapter 14, “Install Optional Telephony Equipment,” on page 287 for details.



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

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- 5 This procedure is complete.

## 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 numbers, switch settings, and the line/extension numbers for each type of module. The DS30 number and switch settings correspond with Table 52 on page 328.

### DTM switch settings

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

Table 54 shows the switch settings for each DS30 bus, and the resulting line assignments.

**Table 54** DTM switch settings (T1)

Select DS30 bus	Enter these switch settings						To assign these lines
	1	2	3	4	5	6	
2	on	on	on	on	on	on	211-234
3	on	on	on	on	on	off	181-204
4	on	on	on	on	off	on	151-174

Select DS30 bus	Enter these switch settings						To assign these lines
	1	2	3	4	5	6	
5	on	on	on	on	off	off	121-144
6	on	on	on	off	on	on	91-114
***7	on	on	on	off	on	off	61-84

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

Table 55 shows the switch settings for each DS30 bus, and the resulting line assignments.

**Table 55** DTM switch settings (North American PRI)

Select DS30 bus	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

Select DS30 bus	Enter these switch settings						To assign these lines
	1	2	3	4	5	6	
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 7 is not available.



Table 56 shows the switch settings for each DS30 bus, and the resulting line assignments.

**Table 56** DTM switch settings (E1 and UK PRI)

Select DS30 bus	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

Select DS30 bus	Enter these switch settings						To assign these lines
	1	2	3	4	5	6	
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.

## DDIM switch settings

The DDIM module combines a DTM and a Data Module. The switch setting you choose determines the DS30 channel assigned to the DTM portion of the DDIM. The Data Module is automatically assigned the next DS30 channel number.

The DS30 channel you assign to the DDIM determines the line numbers of the T1 line connected to the DDIM. Table 54 shows the switch settings for each DS30 channel, and the resulting line assignments.

**Table 57** DDIM switch settings

Select DS30 bus	Enter these switch settings						To assign these lines	Data Module DS30 channel
	1	2	3	4	5	6		
2	on	on	on	on	on	on	211-234	3
3	on	on	on	on	on	off	181-204	4
4	on	on	on	on	off	on	151-174	5

Select DS30 bus	Enter these switch settings						To assign these lines	Data Module DS30 channel
	1	2	3	4	5	6		
5	on	on	on	on	off	off	121-144	6
6	on	on	on	off	on	on	91-114	7*
7								**

\* If your system is configured with a 3/5 DS30 channel split, you cannot use DS30 channel 6 for the DDIM. When you use a 3/5 split, DS30 channel 7 is not available for the data module portion of the DDIM.

\*\* You cannot use DS30 channel 7 for the DDIM. If you assign DS30 channel 7, there is no DS30 channel available for the data module portion of the DDIM.

## BRI switch settings

You can install a maximum of three BRI modules per DS30 bus on the offsets indicated below.

Table 58 shows the switch settings for each DS30 number, and the resulting line assignments.

**Table 58** BRIM S/T switch settings

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

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

You can also combine a CTM8 with a 4X16 module on the same DS30 number. 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 59 shows the switch settings for each DS30 number, and the resulting line assignments for CTMs and CTM8s.

**Table 59** CTM and CTM8 switch settings

Select DS30 bus	Select offset	Enter these switch settings						To assign these lines CTM	To assign these lines. CTM8	
		1	2	3	4	5	6		Lower (Lines 1-4)	Upper (lines 5-8)
2	0	on	on	on	on	on	on	211-214	211-214	219-222
	1	on	on	off	on	on	on	219-222	219-222	227-230
	2	on	off	on	on	on	on	227-230	227-230	235-238
	3	on	off	off	on	on	on	235-238	Not supported	Not supported
3	0	on	on	on	on	on	off	181-184	181-184	189-192
	1	on	on	off	on	on	off	189-192	189-192	197-200
	2	on	off	on	on	on	off	197-200	197-200	205-208
	3	on	off	off	on	on	off	205-208	Not supported	Not supported
4	0	on	on	on	on	off	on	151-154	151-154	159-162
	1	on	on	off	on	off	on	159-162	159-162	167-170
	2	on	off	on	on	off	on	167-170	167-170	175-178
	3	on	off	off	on	off	on	175-178	Not supported	Not supported
5	0	on	on	on	on	off	off	121-124	121-124	129-132
	1	on	on	off	on	off	off	129-132	129-132	137-140
	2	on	off	on	on	off	off	137-140	137-140	145-148
	3	on	off	off	on	off	off	145-148	Not supported	Not supported
6	0	on	on	on	off	on	on	91-94	91-94	99-102
	1	on	on	off	off	on	on	99-102	99-102	107-110
	2	on	off	on	off	on	on	107-110	107-110	115-118
	3	on	off	off	off	on	on	115-118	Not supported	Not supported
***7	0	on	on	on	off	on	off	61-64	61-64	69-72
	1	on	on	off	off	on	off	69-72	69-72	77-80
	2	on	off	on	off	on	off	77-80	77-80	85-88
	3	on	off	off	off	on	off	85-88	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 bus. Therefore, it can be assigned any of the four offsets in a DS30 bus. The DSM module then automatically assigns the next DS30 number and all the assigned DNs.

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

Table 60 shows the switch settings for each DS30 bus, and the assigned lines and dialing numbers (DNs) for each DS30 bus.

**Table 60** 4X16 switch settings

Select DS30 bus	Select offset	Enter these switch settings						To assign these lines	And this DS30 and DNs	**Custom DN range
		1	2	3	4	5	6			
2	0	on	on	on	on	on	on	211-214	DS30 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 4 253-268	
	1	on	on	off	on	on	off	189-192		
	2	on	off	on	on	on	off	197-200		
	3	on	off		on	on	off	205-208		
4	0	on	on	on	on	off	on	151-154	DS30 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 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		
6	0	on	on	on	off	on	on	91-94	DS30 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 6 since DS30 7 is not available for the second level.

## ASM 8 switch settings

In a single density configuration, such as for DS30 6 or 7 when they are set to the default PDD, only offset 1 and 2 are available to ASM8s. In a double-density configuration, you can install four ASM8s per DS30 bus. Table 61 shows the switch settings for each DS30 number and the dialing numbers (DNs) assigned to each DS30 number.

**Table 61** ASM8 settings for upgraded 2.5 systems and new 3.0 systems

Select bus	Select offset	Enter these switch settings						To assign these DNs	Select offset	Enter these switch settings						To assign these DNs	**Custom DN range	
		1	2	3	4	5	6			1	2	3	4	5	6			
2	2.5 system upgraded to 3.0								New 3.0 system									
	0	on	on	on	on	on	on	221-228	0	on	on	on	on	on	on	221-228		
	1	on	on	off	on	on	on	228-236	1	on	on	off	on	on	on	228-236		
	2	on	off	on	on	on	on	377-384	2	on	off	on	on	on	on	237-244		
	3	on	off	off	on	on	on	385-392	3	on	off	off	on	on	on	245-252		
3	0	on	on	on	on	on	off	237-244	0	on	on	on	on	on	off	253-260		
	1	on	on	off	on	on	off	245-252	1	on	on	off	on	on	off	261-268		
	2	on	off	on	on	on	off	393-400	2	on	off	on	on	on	off	269-275		
	3	on	off	off	on	on	off	401-408	3	on	off	off	on	on	off	276-284		
4	0	on	on	on	on	off	on	253-260	0	on	on	on	on	off	on	285-292		
	1	on	on	off	on	off	on	261-268	1	on	on	off	on	off	on	293-300		
	2	on	off	on	on	off	on	409-416	2	on	off	on	on	off	on	301-308		
	3	on	off	off	on	off	on	417-424	3	on	off	off	on	off	on	309-316		
5	0	on	on	on	on	off	off	269-276	0	on	on	on	on	off	off	317-324		
	1	on	on	off	on	off	off	277-284	1	on	on	off	on	off	off	325-332		
	2	on	off	on	on	off	off	425-432	2	on	off	on	on	off	off	333-340		
	3	on	off	off	on	off	off	433-440	3	on	off	off	on	off	off	341-348		
6	0	on	on	on	on	off	on	on	285-292	0	on	on	on	off	on	on		349-356
	1	on	on	off	off	on	on	293-300	1	on	on	off	off	on	on	357-364		
	****2	on	off	on	off	on	on	441-448	****2	on	off	on	off	on	on	365-372		
	****3	on	off	off	off	on	on	449-456	****3	on	off	off	off	on	on	373-380		
7***	0	on	on	on	on	off	on	off	301-308	0	on	on	on	off	on	off		381-388
	1	on	on	off	off	on	off	309-316	1	on	on	off	off	on	off	389-396		
	*****2	on	off	on	off	on	off	457-454	*****2	on	off	on	off	on	off	397-404		
	*****3	on	off	off	off	on	off	455-472	*****3	on	off	off	off	on	off	405-412		

\*\* 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 channel split, DS30 7 is not available.

\*\*\*\* Available only on systems set to FDD.

\*\*\*\*\* Available only on systems set to FDD, with a 2/6 DS30 split.

## DSM switch settings

There are two types of DSMs:

- DSM 16s have one connector which connects to 16 lines (telephones). These modules require a full DS30 number each (single density), or half a bus (double density).
- DSM32s have two connectors, each of which connects to 16 lines (telephones). These modules require two full, consecutive DS30 numbers (single density) or one full bus (double density).

This section includes these charts:

- “DSM16/DSM 32 single density switch settings (upgraded system)” on page 338
- “DSM16+ and DSM 32+ double density switch settings (upgraded system)” on page 340
- “DSM16/DSM 32 single density switch settings (new 3.0 system)” on page 341
- “DSM16+ and DSM 32+ double density switch settings (new 3.0 system)” on page 342

### DSM16/DSM 32 single density switch settings (upgraded system)

The following table shows the switch settings for DSM modules deployed as single density on a system that has been upgraded from 2.5 to 3.0. For single-density modules, you set the first DS30 number on the DIP switches, and the system assigns the next DS30 bus. Note in Table 62 how the DSM32 module spans two DS30 bus numbers and that there are only five possible DS30 settings for the DIP switches.



**Note:** DSM modules deployed with 2.5 systems are all single density and cannot be set to double density. The DSM 16+ and DSM32+ modules can be set to either density.

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Note that Companion sets can only be assigned on DS30 6 and 7, and the handsets have a different set of default DN's than the digital sets. Also, Companion can only be deployed on systems that remain at Part Double Density (PDD), the default condition of 3.0 systems.

**Table 62** DSM 16/DSM 16+ and DSM 32/DSM32+ single density switch settings for 2.5 systems upgraded to 3.0

Select DS30 bus	Enter these switch settings						**To assign these DNs to DSM16 or DSM 16+	To assign these DNs to DSM 32 or DSM 32+	To assign these DNs to Companion
	1	2	3	4	5	6			
2	on	on	on	on	on	on	221-236	221-252 (DS30 2 and 3)	N/A
3	on	on	on	on	on	off	237-252	237-268 (DS30 3 and 4)	
4	on	on	on	on	off	on	253-268	253-284) (DS30 4 and 5)	
5	on	on	on	on	off	off	269-284	269-300 (DS30 5 and 6)	
6	on	on	on	off	on	on	285-300	285-316 (DS30 6 and 7)	565-580**** (PDD only)
***7	on	on	on	off	on	off	301-316	N/A	581-596**** (PDD only)

\*\*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 7 for the DSM 16 module. You cannot configure the DSM 32 module for DS30 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.

\*\*\*\*\*If your system is set to Full Double Density (FDD), Companion telephones are not supported.

### DSM16+ and DSM 32+ double density switch settings (upgraded system)

The following table shows the switch settings for DSM-plus modules deployed as double density on a system that has been upgraded from 2.5 to 3.0.



**Note:** DSM modules deployed with 2.5 systems are all single density and cannot be set to double density. The DSM 16+ and DSM32+ modules can be set to either density.

Companion has not be included in this table because you cannot use modules set to double density to deploy Companion.

**Table 63** DSM 16+ and DSM32+ double density switch settings for 2.5 systems upgraded to 3.0

Select DS30 bus	Enter these switch settings							**To assign these DNs to DSM 16+: (A= DSM1, B=DSM2)		To assign these DNs to DSM 32+ (connectors: A=top, B = bottom)
	1	2	3	4	5	6				
2	off	on	on	on	on	on	A	221-236	A	377-392
	off	on	off	on	on	on	B	377-392	B	221-236
3	off	on	on	on	on	off	A	237-252	A	393-408
	off	on	off	on	on	off	B	393-408	B	237-252
4	off	on	on	on	off	on	A	253-268	A	409-424
	off	on	off	on	off	on	B	409-424	B	253-268
5	off	on	on	on	off	off	A	269-284	A	425-440
	off	on	off	on	off	off	B	425-440	B	269-284
6	off	on	on	off	on	on	A	285-300	A	441-456****
	off	on	off	off	on	on	B	441-456****	B	285-300
***7	off	on	on	off	on	off	A	301-316	A	457-472*****
	off	on	off	off	on	off	B	457-472*****	B	301-316*****

\*\*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 channel split, you cannot use DS30 7 for the DSM 16 module.  
 \*\*\*\*Available only on systems set to FDD. Modules cannot be set to double density on systems set to PDD. Refer to the previous chart for the switch settings for single density and PDD.  
 \*\*\*\*\*Available only on systems set to FDD, with a 2/6 DS30 split. Modules cannot be set to double density on systems set to PDD. Refer to the previous chart for the switch settings for single density and PDD.



### DSM16/DSM 32 single density switch settings (new 3.0 system)

The following table shows the switch settings for DSM modules deployed as single density on a new 3.0 system.



**Note:** DSM modules deployed prior to 3.0 are all single density and cannot be set to double density, but they can still be used on new 3.0 systems. The DSM 16+ and DSM32+ modules can be set to either density.

Note that Companion sets can only be assigned on DS30 6 and 7, and the handsets have a different set of default DN's than the digital sets. Also, Companion can only be deployed on systems that remain at Part Double Density (PDD), the default condition of 3.0 systems.

**Table 64** DSM 16/DSM 16+ and DSM 32/DSM32+ single density switch settings for new 3.0 systems

Select DS30 bus	Enter these switch settings						**To assign these DNs to DSM 16 or DSM 16+	To assign these DNs to DSM 32 or DSM 32+		To assign these DNs to Companion
	1	2	3	4	5	6		Top	Bottom	
2	on	on	on	on	on	on	221-236	253-268	221-236	N/A
3	on	on	on	on	on	off	253-268	285-300	253-268	
4	on	on	on	on	off	on	285-300	317-332	285-300	
5	on	on	on	on	off	off	317-332	349-364	317-332	
6	on	on	on	off	on	on	349-364	381-396	349-364	565-580**** (PDD only)
***7	on	on	on	off	on	off	381-396	N/A		581-596**** (PDD only)

\*\*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 channel split, you cannot use DS30 7 for the DSM 16 module. You cannot configure the DSM32 module for DS30 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.

\*\*\*\*\*If your system is set to Full Double Density (FDD), Companion telephones are not supported.

### DSM16+ and DSM 32+ double density switch settings (new 3.0 system)

The following table shows the switch settings for DSM-plus modules deployed as double density on a new 3.0 system.



**Note:** DSM modules deployed prior to 3.0 are all single density and cannot be set to double density, but they can still be used on new 3.0 systems. The DSM 16+ and DSM32+ modules can be set to either density.

Companion has not be included in this table because you cannot use double density modules to deploy Companion.

**Table 65** DSM 16+ and DSM32+ double density switch settings for new 3.0 systems

Select DS30 bus	Enter these switch settings						To assign these DNs to DSM 16+: A= DSM1, B=DSM2	To assign these DNs to DSM 32+ (connectors: A=top, B = bottom)
	1	2	3	4	5	6		
2	off	on	on	on	on	on	A 221-236	A 237-252
	off	on	off	on	on	on	B 237-252	B 221-236
3	off	on	on	on	on	off	A 253-268	A 269-284
	off	on	off	on	on	off	B 269-284	B 253-268
4	off	on	on	on	off	on	A 285-300	A 301-316
	off	on	off	on	off	on	B 301-316	B 285-300
5	off	on	on	on	off	off	A 317-332	A 333-348
	off	on	off	on	off	off	B 333-348	B 317-332
6	off	on	on	off	on	on	A 349-364	A 365-380****
	off	on	off	off	on	on	B 365-380****	B 349-364
***7	off	on	on	off	on	off	A 381-396	A 397-412*****
	off	on	off	off	on	off	B 397-412*****	B 381-396

\*\*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 channel split, you cannot use DS30 7.

\*\*\*\*Available only on systems set to FDD. Modules cannot be set to double density on systems set to PDD. Refer to the previous chart for the switch settings for single density and PDD.

\*\*\*\*\*Available only on systems set to FDD, with a 2/6 DS30 split. Modules cannot be set to double density on systems set to PDD. Refer to the previous chart for the switch settings for single density and PDD.

## DECT switch settings

The DECT module supports a maximum of eight DECT radio base station connections. This module occupies one full DS30 bus, which can support a maximum of 32 cordless handsets when all eight base stations are deployed. The DECT module should be installed on DS30 6 or 7.

For detailed instructions about using the DECT module, refer to the *Business Communications Manager 3.0 DECT Installation and Maintenance Guide*.

Table 66 shows the settings for DS30 6 and 7, and the assigned dialing numbers (DNs).

**Table 66** DECT module settings

Select DS30 bus	Select offset	Set the switches						Use these DNs on 3.0 system	Use these DNs on updated 2.0 system	**Custom DN range
		Offset			DS30 channel					
		1	2	3	4	5	6			
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 channel split, DS30 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 Business Communications Manager. Each port also occupies one full DS30 channel. Therefore, if you have a fully-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 bus, as shown in Table 67.

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

Table 67 shows the switch for each fiber port.

**Table 67** FEM switch settings

Choose a port to turn on	Set this switch to turn on the port						This DS30 bus 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 channel split, DS30 7 is not available.							



**Note:** If you turn on all six switches, you are using all the DS30 numbers. 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 bus 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.

## Appendix C

### 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.

You can install a maximum of three of the above combinations in a Business Communications Manager system with an extension unit added to it. Table 68 demonstrates this configuration of CTMs and 4X16 modules, including the switch settings for each module.

**Table 68** CTMs combined with 4X16 modules

Each heavily-outlined and shaded square represents one module.				Switch setting					
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 32/32+, one DSM 16/16+, two ASM 8s, and two DTMs. This configuration uses all the DS30 channels, with the exception of two offsets.

Table 69 demonstrates this combination, including the switch settings for each module.

**Table 69** DSM combined with 2 DTMs and 2 ASMs

DS30 channel #	Each heavily-outlined and shaded square represents one module.				Switch setting														
	1 DSM 32/32+ Offset 0	1 DSM 16/16+ 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

Table 70 demonstrates either a full double density system or a partial double density system because DS30 06 and 07 have trunk modules installed. Double density only affects system modules.

**Table 70** All station modules set for double density

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:				off	on	on	on	on
3	0	DSM 32+ settings:				off	on	on	on	off
4		0	DSM 16+ settings:				off	on	on	off
		0	DSM 16+ settings:				off	on	off	on
5			0	ASM8 settings:	on	on	on	on	off	on
			1	ASM8 settings:	on	on	off	on	off	on
			0	ASM8 settings:	on	off	on	on	off	on
			1	ASM8 settings:	on	off	off	on	off	on
6				0	on	on	on	off	on	on
7				0	on	on	on	off	on	off

Table 71 Demonstrates a partial double density system (PDD - the default setting for 3.0), where Companion can be installed on DS30 06 and 07.

**Table 71** Two double density DSMs, plus a single-density DSM for Companion

DS30 channel #	Each heavily-outlined and shaded square represents one module.		Switch setting					
	1 DSM 32+ Offset 0	2 DTMs Offset 0	1	2	3	4	5	6
2	0	DSM 32+ settings:	off	on	on	on	on	on
3	0	DSM 32+ settings:	off	on	on	on	on	off
4		0	on	on	on	on	off	on
5		0	on	on	on	on	off	off
6	0	DSM 32+ set to single density for Companion:	on	on	on	off	on	off
7								



## 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 Region” on page 303.

Table 72 demonstrates this combination, including the switch settings for each module.

**Table 72** 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
3									
4				0	on	on	on	on	off on
5									
6	0	DECT switch settings:			on	on	off	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 124.

## 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 73 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 25 on page 244.

**Table 73** 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	DN	DN	DN	DN	DN
1	Blue-White	Port 201	Port 301	Port 401	Port 501	Port 601	Port 701
27	White-Orange	DN	DN	DN	DN	DN	DN
2	Orange-White	Port 202	Port 302	Port 402	Port 502	Port 602	Port 702
28	White-Green	DN	DN	DN	DN	DN	DN
3	Green-White	Port 203	Port 303	Port 403	Port 503	Port 603	Port 703
29	White-Brown	DN	DN	DN	DN	DN	DN
4	Brown-White	Port 204	Port 304	Port 404	Port 504	Port 604	Port 704
30	White-Slate	DN	DN	DN	DN	DN	DN
5	Slate-White	Port 205	Port 305	Port 405	Port 505	Port 605	Port 705
31	Red-Blue	DN	DN	DN	DN	DN	DN
6	Blue-Red	Port 206	Port 306	Port 406	Port 506	Port 606	Port 706
32	Red-Orange	DN	DN	DN	DN	DN	DN
7	Orange-Red	Port 207	Port 307	Port 407	Port 507	Port 607	Port 707
33	Red-Green	DN	DN	DN	DN	DN	DN
8	Green-Red	Port 208	Port 308	Port 408	Port 508	Port 608	Port 708
34	Red-Brown	DN	DN	DN	DN	DN	DN
9	Brown-Red	Port 209	Port 309	Port 409	Port 509	Port 609	Port 709
35	Red-Slate	DN	DN	DN	DN	DN	DN
10	Slate-Red	Port 210	Port 310	Port 410	Port 510	Port 610	Port 710
36	Black-Blue	DN	DN	DN	DN	DN	DN
11	Blue-Black	Port 211	Port 311	Port 411	Port 511	Port 611	Port 711
37	Black-Orange	DN	DN	DN	DN	DN	DN
12	Orange-Black	Port 212	Port 312	Port 412	Port 512	Port 612	Port 712
38	Black-Green	DN	DN	DN	DN	DN	DN
13	Green-Black	Port 213	Port 313	Port 413	Port 513	Port 613	Port 713
39	Black-Brown	DN	DN	DN	DN	DN	DN
14	Brown-Black	Port 214	Port 314	Port 414	Port 514	Port 614	Port 714
40	Black-Slate	DN	DN	DN	DN	DN	DN
15	Slate-Black	Port 215	Port 315	Port 415	Port 515	Port 615	Port 715
41	Yellow-Blue	DN	DN	DN	DN	DN	DN
16	Blue-Yellow	Port 216	Port 316	Port 416	Port 516	Port 616	Port 716



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## Appendix D

### System Options

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

Some of the telephony 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 purchase one of the 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 or WAN 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 Administration. 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*

- i2002 and i2004 IP telephones and the NetVision and NetVision Data telephones require a combination of data and telephony settings to work with the Business Communications Manager. These telephones can make or receive 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. This application requires Windows 2000, a full duplex sound card, and a computer-telephony headset. This document describes what settings are required to use this application with the Business Communications Manager. The *i2050 Software Phone Installation Guide* provides specific installation information.

- 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 Manager VoIP 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 personal computers on the same network as the Business communication manager. 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 use TAPI 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 agent 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.

- *Interactive Voice Response Installation and Configuration Guide*

Interactive Voice Response is an automated telephony application that prompts callers with a combination of recorded menus and prompts, and real-time data from databases. Users enter digits from their touch-tone key pad that directs the Interactive Voice Response application to access databases and play information back to the caller.

Interactive Voice Response documents include the following:

- *Media Processing Server Series COMMGR Reference Manual* P0988083
- *PeriView Reference Manual* P0988083
- *PeriReporter User's Guide* P0988093
- *BCM-IVR Integration Supplement* P0995957

## Data Features

The Business Communications Manager offers the following data features as described and configured in the *Business Communications Manager 3.0 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).



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# Glossary

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**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 programming 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 DN's 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, 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 identifier (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 DN's 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 communicates 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.

**RAID**

Redundant array of independent disks. A disk subsystem used to increase performance and/or provide fault tolerance. RAID is a set of two or more ordinary hard disks and a specialized disk controller that contains the RAID functionality.

**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.

**SSD**

The SSD (system status display) is a LED interface used to visually monitor the status of system components.

**SSM**

The SSM (system status monitor) is a graphical user interface used to monitor, on-line, the status of Business Communications Manager system components.

**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.

