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Business Communications Manager
BCM1000
Installation and Maintenance Guide

Released with BCM 3.6

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. 60950 and UL 60950.

Danger: Risk of shock.
Read and follow installation instructions carefully.
Ensure the Business Communications Manager base unit 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 base unit 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 switch located on the back of the housing, on the power supply, is set to the correct input voltage (115 or 230).

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

Caution: Only qualified persons should service the system.
The installation and servicing of this hardware is to be performed only by service personnel having appropriate training and experience necessary to be aware of hazards to which they are exposed in performing a task and of measures to minimize the danger to themselves or other persons.
Electrical shock hazards from the telecommunication network and AC mains are possible with this equipment. To minimize risk to service personnel and users, the Business Communications Manager system must be connected to an outlet with a third-wire ground. Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events near network lines. These leakage currents normally safely flow to Protective Earth ground via the power cord. Therefore, it is mandatory that connection to an earthed outlet is performed first and removed last when cabling to the unit. Specifically, operations requiring the unit to be powered down must have the network connections (central office lines) removed first.

Enhanced 911 Configuration

Caution: Warning
Local, state and federal requirements for Emergency 911 services supported 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 Programming Operations Guide*.

Radio-frequency Interference

Warning: Equipment generates RF energy.

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

Telecommunication registration

Business Communications Manager equipment meets all applicable requirements of both Industry Canada CS-03 and US Federal Commission FCC Part 68 and has been registered under files:

- Industry Canada 332-5980 A
- 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 Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to

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

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

Network Connection

Canada and US

Table 1 Interface harmonized standards

Interface	Harmonized Standard	Description
CTM	Industry Canada CS03, FCC Part 68	Analog terminal device
DTM	Industry Canada CS03, FCC Part 68	T1 and Primary Rate ISDN
BRI	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 will be informed of the right to file a complaint to the FCC.

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

Repairs

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

Canadian Regulations - please read carefully

Notice

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

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

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

Notice

The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on the analog 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 the REN of the interface to which the device is connected.

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

Hearing Aids

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

Programming Emergency Numbers

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

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

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

EMI/EMC (FCC Part 15)

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

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

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

Important Safety Instructions

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

Installation

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

1. Never install telephone wiring during a lightning storm.
2. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
3. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
4. Use caution when installing or modifying telephone lines. The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

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

Use

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

1. Read and understand all instructions.
2. Follow the instructions marked on the product.
3. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
4. Do not use this product near water, for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool.
5. Do not place this product on an unstable cart, stand or table. The product may fall, causing serious damage to the product.
6. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.
7. Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
8. Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.
9. Never spill liquid of any kind on the product.
10. To reduce the risk of electric shock do not disassemble this product, but have it sent to a qualified service person when some service or repair work is required.
11. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    a. When the power supply cord or plug is damaged or frayed.
    b. If the product has been exposed to rain, water or liquid has been spilled on the product, disconnect and allow the product to dry out to see if it still operates; but do not open up the product.
    c. If the product housing has been damaged.
    d. If the product exhibits a distinct change in performance.
12. Avoid using a telephone during an electrical storm. There may be a remote risk of electric shock from lightning.
13. Do not use the telephone to report a gas leak in the vicinity of the leak.
14. **Caution:** To eliminate the possibility of accidental damage to cords, plugs, jacks, and the telephone, do not use sharp instruments during the assembly procedures.
15. **Warning:** Do not insert the plug at the free end of the handset cord directly into a wall or baseboard jack. Such misuse can result in unsafe sound levels or possible damage to the handset.

16 Save these instructions.

International Regulatory Information

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

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

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

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

WARNING

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

Safety

WARNING!

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

Risk of shock.

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

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
- ASM8+: The Nortel Networks ASM8+ I/O ports are designated as OPX. This product does provide Telecommunications Ringing Voltages and can be configured to provide Voltage Message Waiting Indicator (VMWI). Installation of this device and all connections to this device must be performed by Qualified Installation Personnel who are aware of the hazards associated with telecommunications wiring and are aware of the local regulations for treatment of telecommunications wiring for OPX deployment.

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

- BRIM Interface
- TCM extensions
- external music sources (MSCX)
- auxiliary ringer (AUX)
- paging system relay (PAGE)
- serial port
- LAN interface

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

- ATA II

Limited Warranty

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

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

Exclusions

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

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

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

Warranty Repair Services

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

After Warranty Service

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

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

Contents

Figures

Tables

Preface

This guide describes how to install, initialize and maintain the Business Communications Manager 1000 (BCM1000) hardware.

This issue of the document has integrated the addendums released with BCM 3.0, 3.1/3.1.1, 3.5 software, and includes the additional functionality provided with the BCM 3.6 software release. Initial software release versions will be noted for hardware function that is dependant on a software release. For instance, BCM 3.0 introduced the concept of double density on the first five DS30 buses. This section will note this software release, with the implied understanding that all successive releases contain this function, unless otherwise noted.

Network note: The software version you are running has important implications in terms of private networking between Business Communications Managers and other types of systems. Refer to the Private networking sections of the *Programming Operations Guide* and the IP trunking and interoperability sections of the *IP Telephony Configuration Guide* for information about compatibility between software releases within the network.

Upgrade notes:

When you upgrade the software on the BCM1000, ensure that you read the upgrade guide that accompanies the software for any system administration that needs to be performed pre- or post-upgrade.

Warning: Ensure that you make a complete backup of your data before attempting to upgrade your system. Upgrade instructions are delivered with the upgrade firmware.

Information in these chapters explains how to:

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

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

To use this guide, you must:

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

Symbols used in this guide

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

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

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

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

Note: Note Symbol
Alerts you to important information.

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

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

Warning: Disconnect Symbol
Alerts you to remove the BCM1000 and Business Communications Manager expansion unit (BCM1000e) power cords from the AC outlet before performing any maintenance procedure.

Text conventions

This guide uses the following text conventions:

`bold Courier text`	Indicates command names and options and text that you need to enter in a command-line interface. Example: Use the **`dinfo`** command. Example: Enter **`show ip {alerts|routes}.`**
italic text	Indicates file and directory names, new terms, book titles, Web addresses, and variables in command syntax descriptions.
bold text	Indicates command names, screen titles, options and text for a graphical user interface (GUI).
angle brackets (< >)	Indicates a keyboard key press or simultaneous key presses, i.e. <ENTER> or <CTRL j> or when part of a command string, indicates that a variable is to be entered. Example: <IP address>, where the information to be entered at that point is the specific information for the required field, in this case, a specific IP address.

Acronyms

These are the acronyms used in this document.

ANSI	American National Standards Institute
ASM	Analog station module
AWG	American wire gauge
BIOS	Basic input output system
BPS	Bits per second
BRI	Basic rate interface module
CAP	Central answering position
CIR	Committed information rate
CLID	Calling line identification
CSMA/CD	Carrier sense multiple access/collision detect
CSU	Channel service unit
CTM	Calling line trunk module
DECT	Digital enhanced cordless telecommunications
DIMM	Dual in-line memory module
DLCI	Data link connection indentifier

DN	Directory number
DNS	Domain name server
DPNSS	Digital private network signalling system
DRT	Delayed ring transfer to prime
DSM	Digital station module
DTM	Digital Trunk media bay module
DTMF	Dual tone multifrequency.
FDD	Full Double Density
FEM	Fiber expansion module
HTTP	Hypertext transfer protocol
Hz	Hertz
I/C	Intercom
IP	Internet protocol
ISDN	Integrated services digital network
Kbyte	Kilobyte
LAN	Local area network
MCDN	Meridian customer-defined network protocol
MHz	Megahertz
MSC	Media services card
NIC	Network interface card
OPX	Off premises extension
PBX	Private branch exchange
PCI	Peripheral component interconnect
PDD	Partial Double Density
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
RAID	Redundant array of inexpensive disks
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 BCM1000 and related media bay modules, extension equipment, and the applications and software on the system:

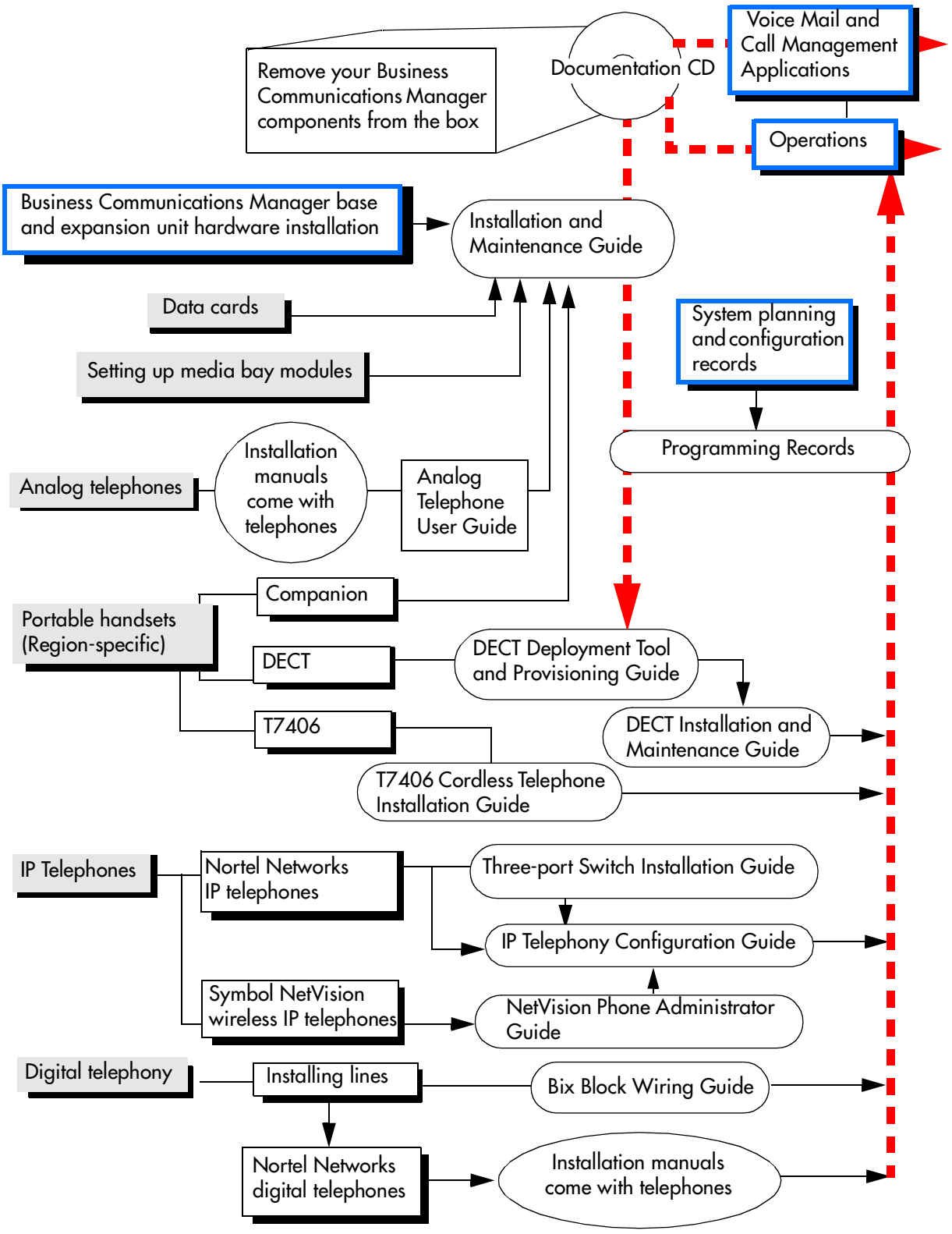
- The *Programming Operations Guide* describes how to program the Business Communications Manager equipment. The *Management User Guide* describes how to use the maintenance and diagnostic tools.
- *Telephone Features Programming Guide* provides feature descriptions and programming for the numerous telephone features available to users through the buttons on the digital telephones supported by the Business Communications Manager.
- If you are not an experienced telephone installer, the *BIX Box Wiring Guide* provides illustrations for correctly wiring internal cable connections to telephones.
- All optional Business Communications Manager applications have installation and user guides specific to that application. For an overview of what these guides contain, refer to "Telephony features and options" on page 26.
  - *Call Center Agent Guide* and *Call Center Supervisor Guide*
  - *Call Center Reporting Set Up and Operation Guide*
  - *Call Center Set Up and Operation Guide*
  - *Call Detail Recording System Administration Guide*
  - *CallPilot Unified Messaging Installation and Maintenance Guide* and *CallPilot Desktop (Unified) Messaging Quick Reference Guide*
  - *CallPilot Fax Set up & Operation Guide* and *CallPilot Fax User Guide*
  - *CallPilot Manager Set Up and Operation Guide* and *CallPilot Programming Record*
  - *CallPilot Message Networking Setup and Operation Guide* and *CallPilot Message Networking User Guide*
  - *CallPilot Reference Guide*
  - *IP Telephony Configuration Guide*
  - *LAN CTE Configuration Guide*
  - *Multimedia Call Center Setup and Operation Guide* and *Multimedia Call Center Web Developers Guide*
  - *Personal Call Manager User Guide*
  - *CallPilot Fax Set Up and Operation Guide*
  - *CallPilot Fax User Guide*
  - Interactive Voice Response Installation and Configuration Guide (IVR)
- From the Business Communications Manager 2.5 3.6 Documentation CD, you can also access a number of telephone and accessory quick reference cards.

- If you operate a multi-site Business Communications Manager network, you can use the Network Configuration Manager to provide centralized configuration and management operations. The documentation for this tool can be found on the Network Configuration Manager CD, which includes the software and the following documentation.
  - — *Network Configuration Manager Installation Guide*
  - — *Network Configuration Manager Administration Guide*
  - — *Network Configuration Manager Client Software User Guide*
  - — *Network Configuration Manager Reference Guide*

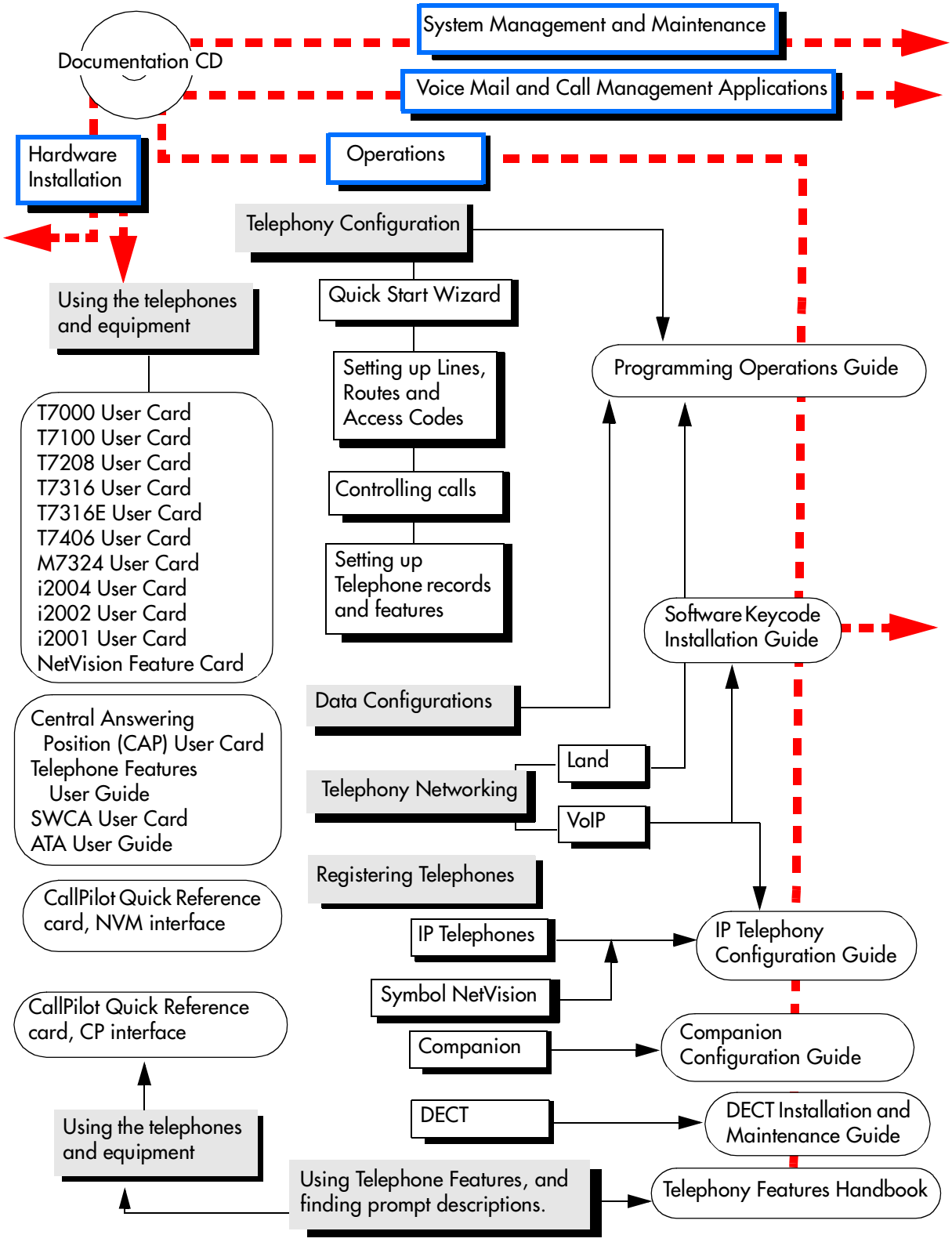
System documentation map

The following four pages provide a map of the Business Communications Manager documentation CD. The map shows the overall task process of the system, and indicates which documentation deals with each section. All the documents describes are included on the documentation CD that came with your system.

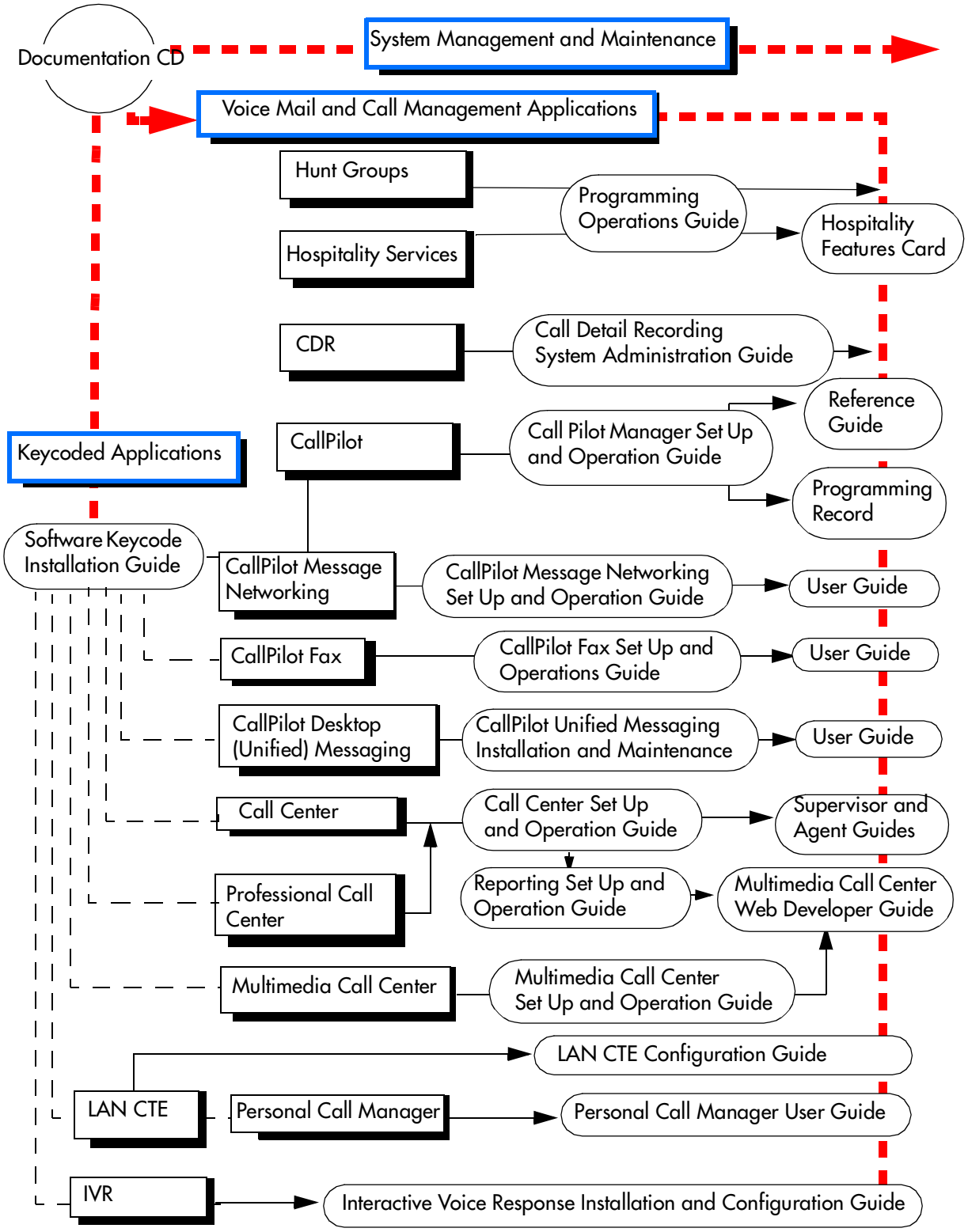
Installation documentation



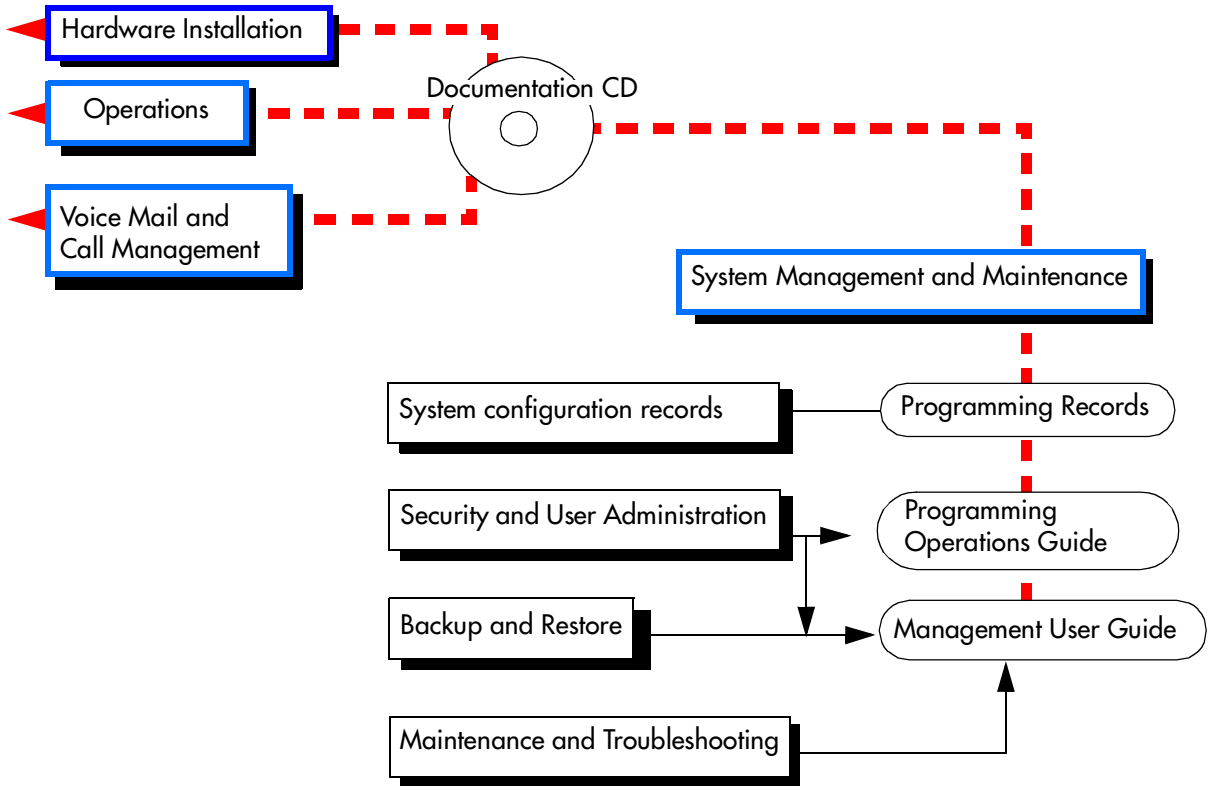
Operations documentation



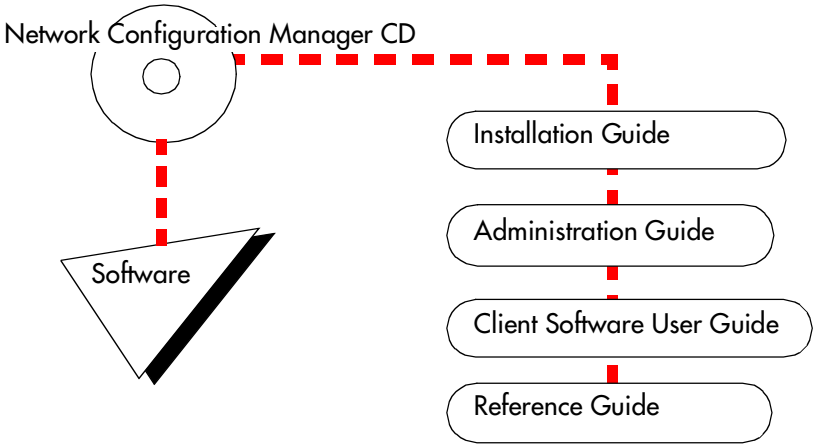
Call Management documentation



Unified Manager and hardware maintenance documentation



Multi-site Administration: Network Configuration Manager



How to get help

USA and Canada

Authorized Distributors - ITAS Technical Support

Telephone:
1-800-4NORTEL (1-800-466-7835)
If you already have a PIN Code, you can enter Express Routing Code (ERC) 196#.
If you do not yet have a PIN Code, or for general questions and first line support, you can enter ERC 338#.

Website:
http://www.nortelnetworks.com/support

Presales Support (CSAN)

Telephone:
1-800-4NORTEL (1-800-466-7835)
Use Express Routing Code (ERC) 1063#

EMEA (Europe, Middle East, Africa)

Technical Support - CTAS

Telephone:

* European Freephone	00800 800 89009
European Alternative/	
United Kingdom	+44 (0)870-907-9009
Africa	+27-11-808-4000
Israel	800-945-9779

* Note: Calls are not free from all countries in Europe, Middle East or Africa

Fax:
44-191-555-7980

email:
emeahelp@nortelnetworks.com

CALA (Caribbean & Latin America)

Technical Support - CTAS

Telephone: 1-954-858-7777

email: csrmgmt@nortelnetworks.com

APAC (Asia Pacific)

Technical Support - CTAS

Telephone: +61 388664627

Fax: +61 388664644

email: asia_support@nortelnetworks.com

Chapter 1
Introducing the Business Communications Manager

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

The Business Communications Manager system provides private network and telephony management to small to medium-sized businesses. With this system, you can create a telephony system that suits your special business requirements. This compact system allows you to set up access to the public network. As well, you can create private networks between remote sites which also have Business Communications Systems or Meridian 1 equipment. Private networks can be created using dedicated central office (CO) lines or through a LAN or WAN internet connection using voice over IP (VoIP) trunks. You control your own system from your desktop using the Unified Manager and CallPilot applications.

The system supports a variety of Nortel Networks telephones which support many user and call features. These features can be programmed by the system manager during the initial installation of the telephone. Some features can also be programmed by the users through their telephones.

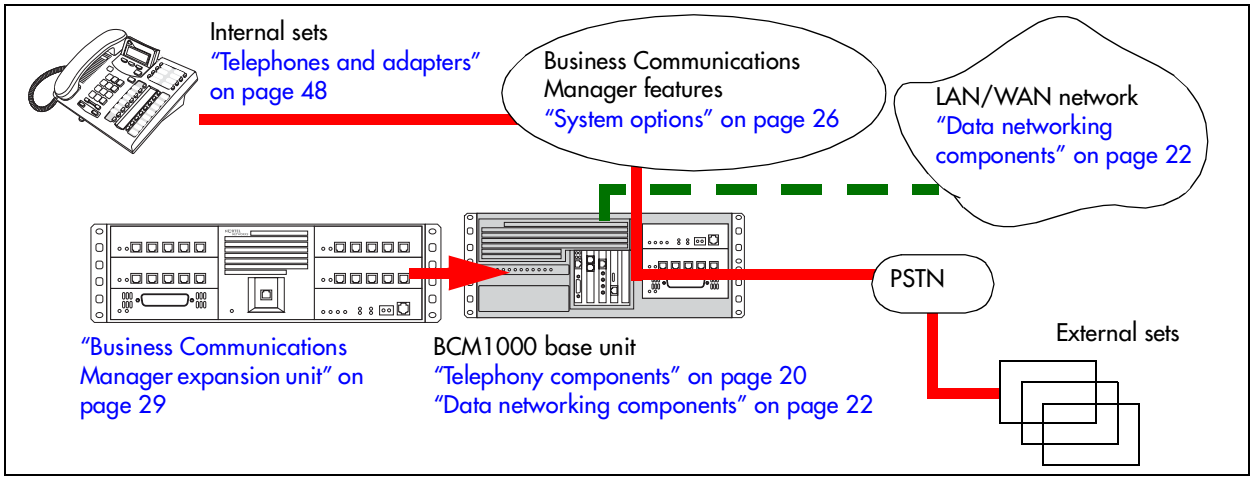
CallPilot voice mail and Auto Attendant applications are part of the basic Business Communications Manager system. If you require more extensive coverage, such as more voice mail boxes or the call center application, additional features are easily activated using software keycodes.

Business Communications Manager system components

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

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

Figure 1 Business Communications Manager core system components



Note: Some of the components described in this document are not available in all countries. Ask your Business Communications Manager sales agent for information about availability.

Computer components

The BCM1000 computing functions are supported by the following hardware:

- memory: 256 MB SDRAM; 128 MB SDRAM added for 2.0 upgrades.
- hard disk: 20 GB hard disk (2.5 hardware); 8.4 GB hard disk (2.0 hardware)

  Software version note: Systems running software more recent than BCM 2.5.1 require a 20 GB hard disk with specific partitioning. Refer to the upgrade guide accompanying any software upgrade for specific system requirements.
- four PCI slots containing one MSC and four possible combinations of WAN, LAN, and/or modem cards
- four PEC slots on the MSC, each of which can contain one Processor expansion card (PEC) I or PEC III (2.5) (basic 2.5 systems are delivered with two PEC III cards)

  IP telephony note: The IP telephony feature requires PEC IIIs.

Hardware components

The main component of the Business Communications Manager system is the BCM1000. This hardware controls all data and telephony tasks, such as call processing, voice messaging, and data routing.

Figure 2 shows the functional hardware as seen from the front of the BCM1000.

Figure 2 External functional hardware, BCM1000

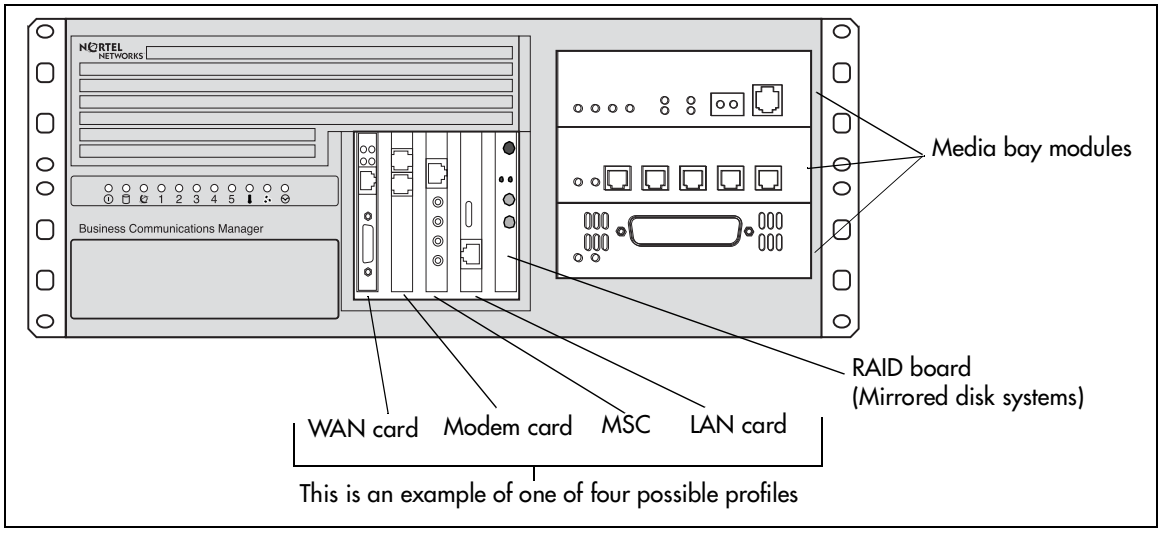


Table 1 provides a table of weights and measurements of the base unit.

Table 1 Basic BCM1000 base unit specifications

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

Figure 3 shows the location of the hardware components in the BCM1000 2.0 versions. Nortel Networks recommends that you know the location of the different components before working with the system.

Figure 4 on page 18 and Figure 5 on page 18 show two possible configurations of the BCM1000 hardware.

Figure 3 BCM1000 interior components for standard system (pre-2.5)

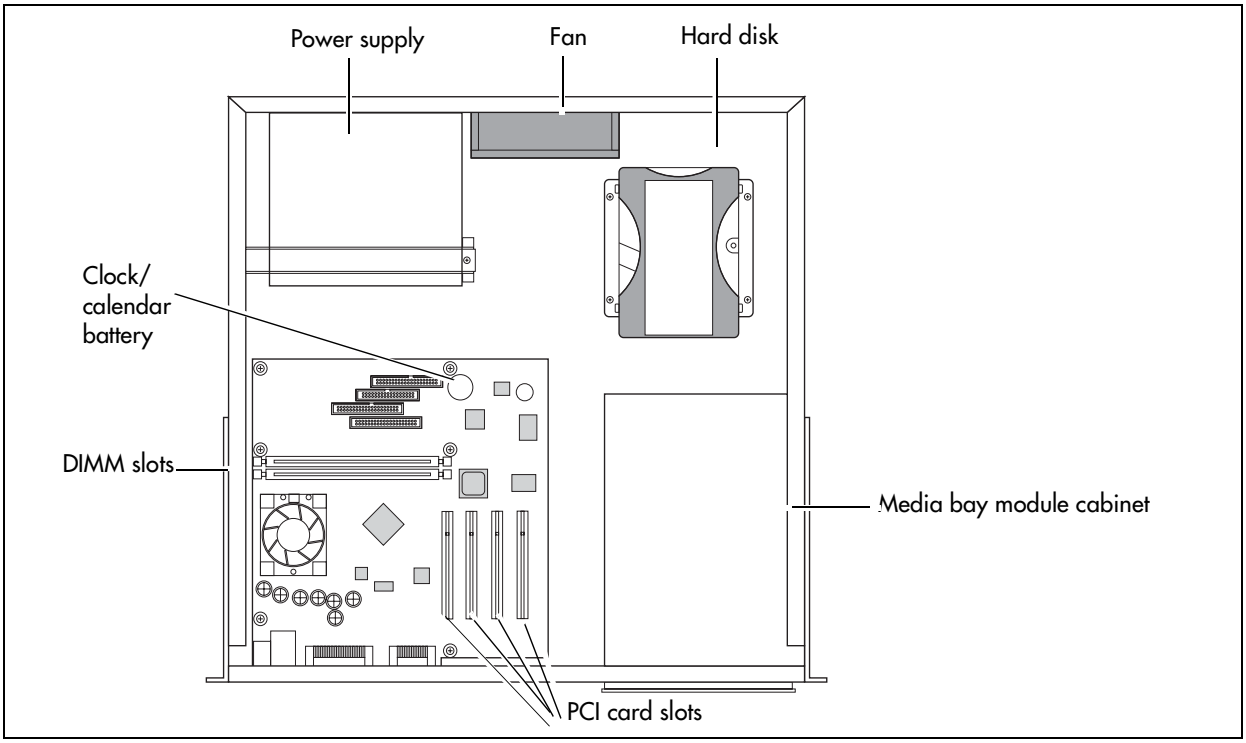


Figure 4 BCM1000 interior components with a standard power supply system (2.5)

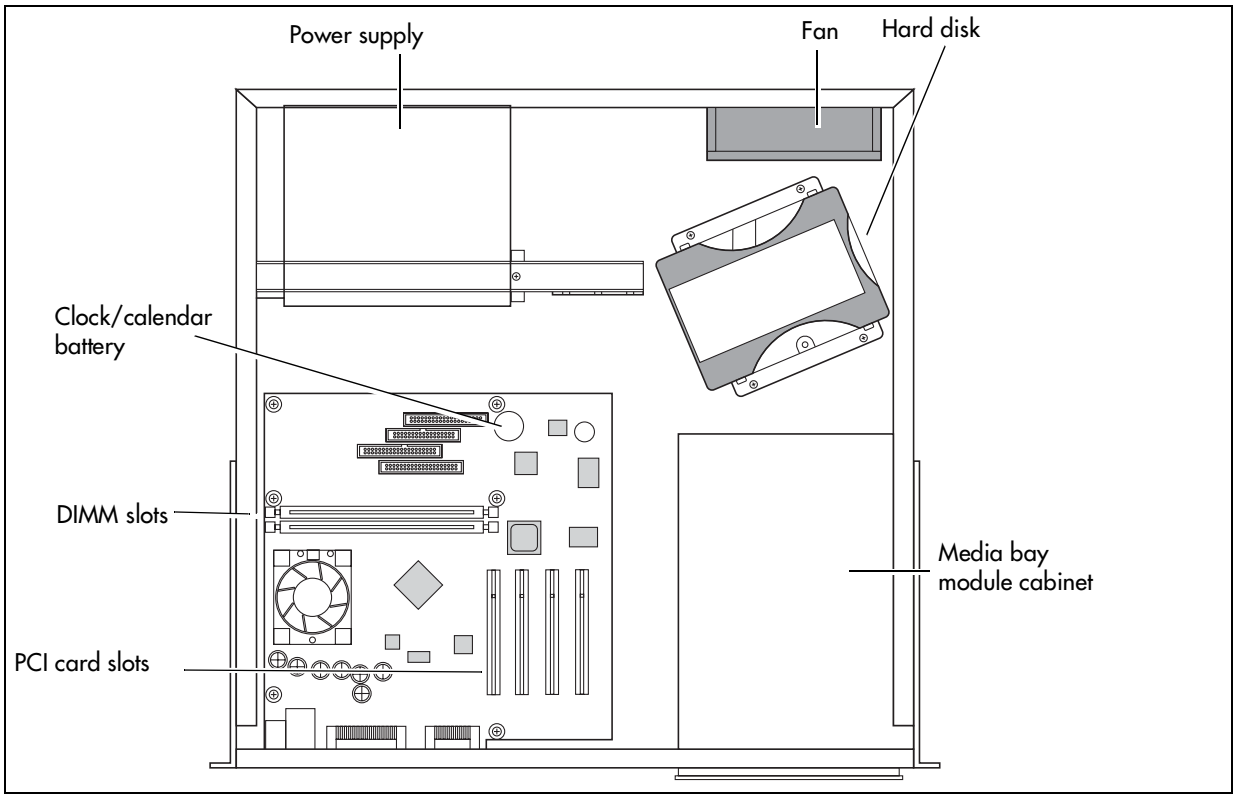
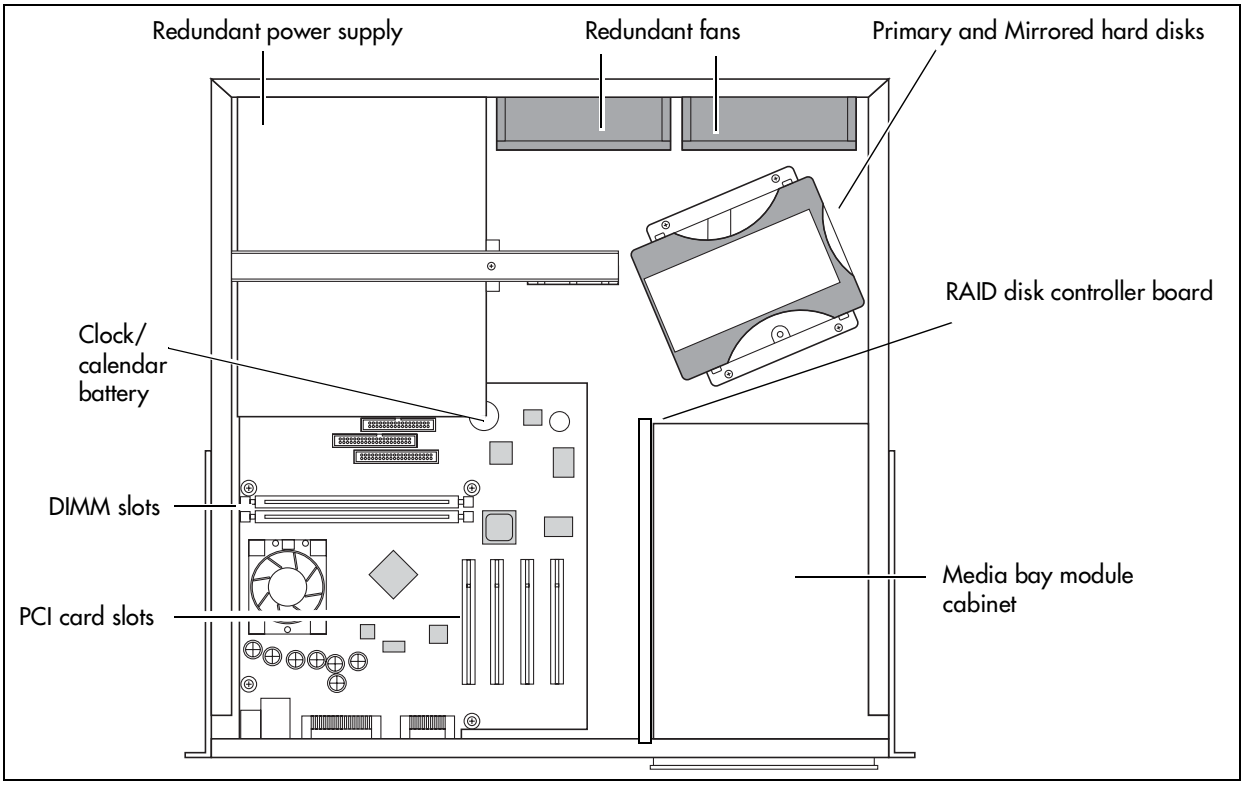


Figure 5 BCM1000 interior components, redundant system with mirrored hard disks (2.5)



Power supply — The BCM1000 can have a single (standard) power supply module or a redundant power supply module. Single power supply Business Communications Manager equipment can also be upgraded to redundant Business Communications Manager system by installing a redundant power supply in place of the standard power supply.

Note: Power supplies for the BCM1000 are auto-switching power supplies.

The power supply on an original 2.0 system has a voltage switch that must be set to the correct voltage.

Cooling fan — The BCM1000 can have a single cooling fan or a redundant set of fans. Units with redundant power supplies always have two cooling fans.

- BCM1000 systems upgraded from 2.0 hardware to redundant power supply systems use a piggy-back fan configuration.
- The BCM1000 2.5 hardware has side-by-side fan ports.

Hard disk — The BCM1000 can have either a single hard disk or a mirrored disk configuration (RAID 1). Units delivered with the mirrored disk configuration can also have redundant power supply and fan assemblies installed, although redundant power supplies and fans are not a requirement for running disk mirroring.

The Business Communications Manager supports the RAID 1 disk mirroring protocol. This protocol creates an exact data duplicate of the system hard disk on a second, co-located hard disk within the BCM1000. If one of the hard disks becomes inoperable, the system continues with normal operation on the remaining disk. You can then schedule disk replacement during normal maintenance periods. This process does not replace your BRU backup disks, which should still be run on a regular schedule and should be kept offsite. The data backup and recovery process (BRU) are discussed in the *Business Communications Manager Programming Operations Guide*.

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 BCM100 MSC contains two PEC IIIs that provide voice channel processing for the MSC. You can upgrade your system with two additional PEC IIIs. Refer to "Media Services Card" on page 22.

Note: You can upgrade the PEC Is on your 2.0 BCM1000 to PEC IIIs. You cannot mix PEC Is with PEC IIIs. You must be running Business Communications Manager 2.5 software or greater to allow this.

- CTM (North American systems only) — The Calling line identification (CLID) Trunk media bay module (CTM) connects to four analog CLID PSTN lines.
- CTM 8 (North American systems only) — This CLID Trunk media bay module (CTM) connects to eight analog CLID PSTN lines.
- GATM4 (global markets) — Replaces the CTM. Provides an option for automatically downloading new firmware from the main system for selected country profiles.
- GATM8 (global markets) — Replaces the CTM8. Provides an option for automatically downloading new firmware from the main system for selected country profiles.
- 4X16 (North American systems only) — This module combines a four-line CLID Trunk media bay module (CTM) with a 16-line Digital Station media bay module.
- DTM — The Digital Trunk media bay module (DTM) connects to standard digital PSTN T1, E1 or PRI lines.
- BRI — The Basic Rate Interface media bay module (BRI) connects to four BRI S/T ISDN lines. (NT1 required. S interface for European profiles; T interface for North American-based profiles)
- ASM 8 (North American systems only) — The Analog Station media bay module (ASM 8) connects to eight analog telephones or other analog equipment such as fax machines.
- ASM 8+ (Global) — This enhanced Analog Station media bay module has the same functionality as the ASM 8, plus it supports CLID, message waiting indicators, disconnect supervision and automatic firmware downloads. This module can also be programmed for any of the four offsets on a Full Double Density DS30 bus.
- DSM 16 — The 16-port Digital Station media bay module (DSM 16) connects to a maximum of 16 digital telephones.
- DSM 16+ — This Digital Station media bay module provides the same functionality as the DSM 16. This module can be set to single or double density. Double density settings allow the module to support 16 telephones on one offset, allowing two modules per DS30 bus.

- DSM 32 — The 32-port Digital Station media bay module (DSM 32) connects to a maximum of 32 digital telephones.
- DSM 32+ — This Digital Station media bay module provides the same functionality as the DSM 32. This module can be set to single or double density. Double density settings allow the module to support 32 telephones on one DS30 bus.
- DECT — This module allows radio-based wireless handsets to access systems that are configured to accept the Digital Enhanced Cordless Telecommunications (DECT) profile. The module connects to radio base stations, which receive and transmit signals to the handsets. Refer to "Mobility services by region" on page 237 to determine the profiles that can use the DECT protocol. DECT base station installation information is provided in a separate document, the *DECT Installation and Operations Guide*.
- FEM — The Fiber Expansion Media Bay Module (FEM) provides an easy upgrade from a Norstar system to a Business Communications Manager system by connecting a maximum of six Norstar expansion modules to a FEM installed in the BCM1000.
- 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 (Channel Service Unit) CSU or (Data Service Unit) DSU functionality to support connections to data terminal equipment (DTE), such as a router or a bridge
  - — connects to network devices that supportV.35 interfaces
  - — provides end-to-end transparent bit service
  - — supports loopbacks between the Enterprise Edge and the internal Business Communications Manager components, and between the Enterprise Edge and digital terminal equipment
- BCM1000e — a separate cabinet with six additional bays for media bay modules. It connects to the BCM1000 through an DS256 RJ45 connector. A Business Communications Manager five-meter DS256 cable is included with the BCM1000e (expansion cabinet).
- Telephones and adapters — Business telephones and adapters connect to the media bay modules installed in the BCM1000. Business Communications Manager supports Norstar and Business Series Terminal telephones, as well as IP-based Nortel Networks telephones.

  The Nortel Networks 20XX IP telephones have separate installation and operations documentation. Refer to the main index on your system CD.

  The system also supports three types of wireless telephone systems, including Companion, DECT, and the Symbol NetVision/NetVision Data telephones, plus the cordless Business Series Terminals T7406. Installation documentation for these systems is provided in separate documentation for each system. Refer to "Telephones and adapters" on page 48 for information about the handsets and the hardware they use to connect to the system.

Data networking components

The data networking components connect the Business Communications Manager system to the local area network (LAN) and/or the wide area network (WAN). These components are installed at the factory.

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

  This connection can be used to:

  — manage the Business Communications Manager system from a different location

  — provide dialup backup for a WAN card

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

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

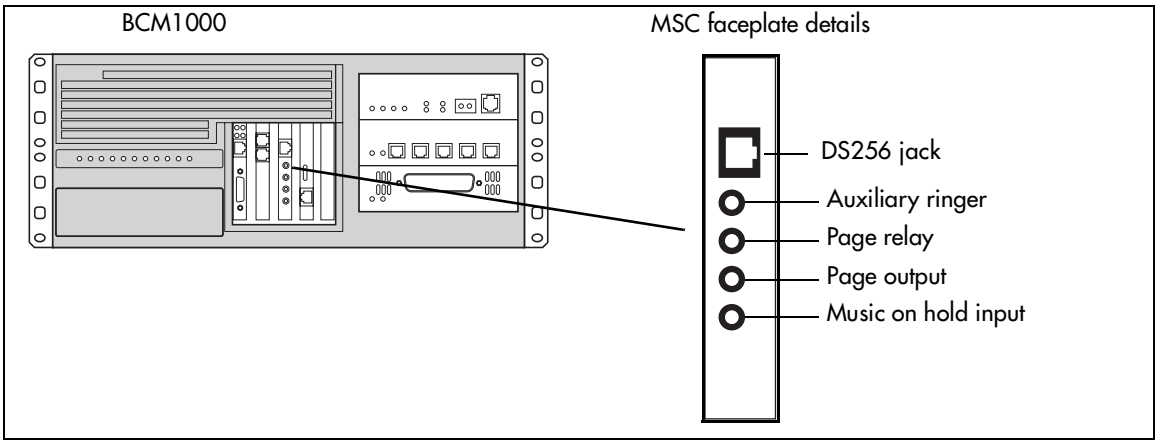
  The WAN card connects to a T1 PSTN line with an integrated T1 DSU/CSUs (North American). The WAN card can also connect to a T1 PSTN line with an X.21 or V.35 interface (Europe, Middle East, Africa (EMEA)).

Media Services Card

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

Figure 6 shows the location of the MSC on the BCM1000.

Figure 6 MSC optional equipment ports



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

The MSC faceplate offers the following optional connections.

- **DS256 connector**— The BCM1000e connects to the BCM1000 base unit through the DS256 jack on the MSC faceplate.

  The DS256 cable to make this connection is provided with the purchase of a Business Communications Manager e1000.

- **Auxiliary ringer jack** — The BCM1000 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 BCM1000 uses this jack to control the external paging amplifier.

- **Page output jack** — The BCM1000 uses the page output to connect an internally-generated voice paging signal to an external paging amplifier (customer supplied).

- **Music on hold jack** — The BCM1000 uses the Music on hold input to connect an external music source that supplies a signal to held lines (music on hold) or telephone speakers (background music). The input source can be any available radio or music source approved for connection to the network.

For directions on setting up these features, refer to Chapter 13, “Installing optional telephony equipment,” on page 157. For regulatory information about hooking up an external music source, refer to “Use of a Music Source” on page 6.

MSC IP call processing hardware

If your system requires a high volume of IP telephones and/or more VoIP trunks you can adjust your system to accommodate them. You have the option to switch DS30 bus 07 on the MSC. By switching the bus from servicing a media bay module (the default), the system provides the increased digital processing service to support your IP requirements.

- DS30 buses are internal communication paths controlled by the MSC. Each DS30 bus provides a possible 32 signaling channels (B1 and B2) and 32 media channels. In BCM 3.0 software, the B2 channels were reconfigured as B1 channels for station modules. As a result, DS30 02 to 05 were configured to support 32 telephones on each bus configured with DSM16+, DSM32+ modules set to double density. The ASM 8 module could also be supported on all four offsets as of that software release. DS30 06 and 07 were not configured for double density, so that they could continue to support Companion equipment. However, these two buses could be converted to double density, if required by setting the system from Partial Double Density (PDD) to Full Double Density (FDD).

— Two DS30 buses are exclusively dedicated to MSC resources. Five paths within these buses have hard-coded applications. The other paths can be assigned to various applications such as voice mail, dialup ISDN WAN, VoIP trunks, or IP telephony.

— Five DS30 buses 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 bus by your choice of using either a 2/6 or 3/5 DS30 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 split configuration you want for your system, refer to "Determining module DS30 bus requirements" on page 64 and to the chapter on configuring MSC Resources in the *Business Communications Manager Programming Operations Guide*.

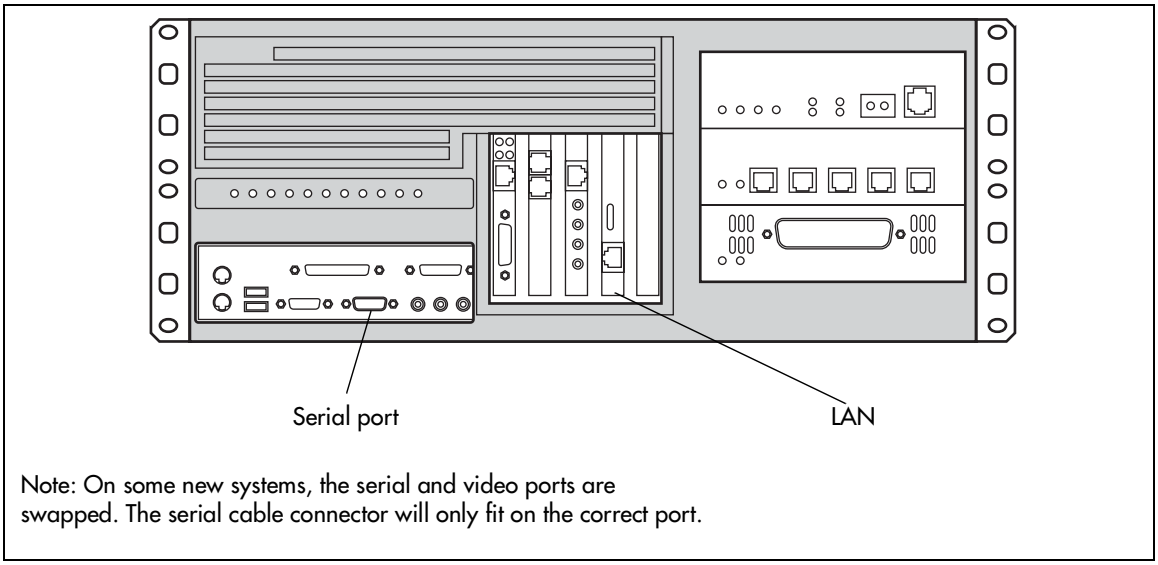
- PEC IIIs — The BCM1000 uses PEC IIIs to deliver increased capacity for digital signal processing for voice mail, call center, FAX, VoIP trunks, IP telephony, and dialup ISDN WAN. The basic system comes with two PEC IIIs. Two more can be added to accommodate increased requirements for media processing. Refer to the chapter on configuring MSC Resources in the *Business Communications Manager Programming Operations Guide*.

Connection ports

You can connect to the BCM1000 through your computer via the serial port or a LAN card connection to perform setup and maintenance procedures. Refer to Figure 7. This guide leads you through the process of making either of these connections. Refer to "Using a null modem serial cable" on page 125 and "Connecting the Ethernet crossover cable" on page 129.

Programming procedures using the Unified Manager, are explained in the *Programming Operations Guide*.

Figure 7 BCM1000 external points of connection

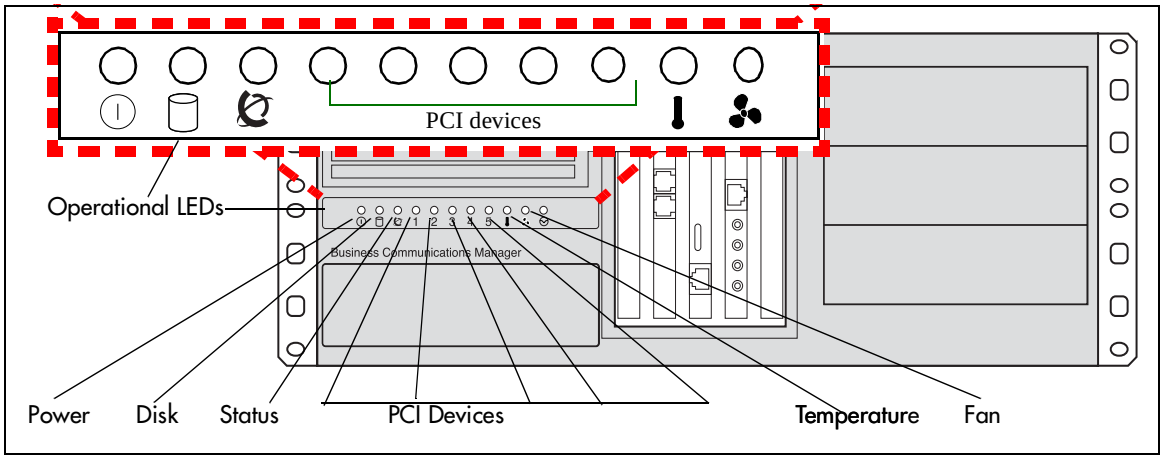


Note: On some new systems, the serial and video ports are swapped. The serial cable connector will only fit on the correct port.

BCM1000 LEDs

A line of 10 operational LEDs display on the face of the BCM1000. Refer to Figure 8. These LEDs show the current state of various hardware components.

Figure 8 BCM1000 operational LEDs



These LEDs monitor:

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

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

- temperature ( )
- fans ( )

The LED states are described in Table 28 on page 117.

The Unified Manager contains a monitoring tool, that allows you to determine the current condition of the LEDs from your computer. Refer to "Using the System Status Monitor to monitor LEDs" on page 162.

System options

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

Some of these applications work immediately after you install the BCM1000, this is considered core software. Other applications are enabled when you enter software keycodes, which you generate when you buy one of these applications. Refer to the *Business Communications Manager Software Keycode Installation Guide* for specific directions about 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 Telephony Features Handbook*

  These guides provide programming for core telephony features and user features.

- *Management User Guide*

  This guide was introduced with the BCM 3.5. It provides information about the maintenance tools provided through the Unified Manager. The book also describes and interprets the services and event logs listings for the system.

- *IP Telephony Configuration Guide*

  Nortel IP telephony services require keycodes to activate both telephony and trunking. Each keycode allows a set number of telephones or trunks.

  — Nortel IP telephones (20XX) and the Symbol NetVision telephones require a combination of data and telephony settings. These telephones make or receive calls through either VoIP or PBX lines.

  — Nortel Networks i2050 Software Phone turns your PC into a telephone interface providing standard telephony operating features. This i2050 requires Windows 2000, a full duplex sound card, and a computer-telephony headset. The *i2050 Software Phone Installation Guide* provides installation information.

  — VoIP Gateway (requires keycode) converts the voice in a call into a packet format and sends the call using an intranet trunk.

- *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.

- *Call Center Agent Guide and Call Center Supervisor 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 how to use the CallPilot application.

- *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 Installation and Maintenance Guide* and *CallPilot Desktop (Unified) Messaging Quick Reference 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 for CallPilot voice, fax, and text messages, as well as e-mail messages.
• *LAN CTE Configuration Guide*	— LAN CTE (introduced in BCM 2.5 to replace TSP) (requires keycode) provides an interface between a Personal Computer (PC), a telephone, and the Business Communications Manager server that allows third-party software to function on PCs on the same network as the Business Communications 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 attendant to show the client screen captures.
• *Personal Call Manager User Guide*	Personal Call Manager, a TAPI-based application, provides a graphical interface that allows you to use your computer to manage your calls and address book, while still using your telephone for voice communication. Note: This application also requires a LAN CTE client licence.

Data features

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

- Integrated QoS Routing controls the router interface between the BCM1000 and the local area network, wide area network, and internet.
- **DHCP (Dynamic Host Configuration Protocol)** — Business Communications Manager 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)** — BCM1000 functions 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 Communciations Manager software supports the following IP routing protocols:
  - static routing
  - RIP (Routing Information Protocol)
  - OSPF (Open Shortest Path First)
- **IPX Routing** — Business Communications Manager 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 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 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 uses the PPTP (point to point tunneling protocol) and IPSec (IP security) tunneling protocols to create secure extranets. These secure extranets provide safe transport of data to and from the Business Communications Manager using the public data network (PDN).

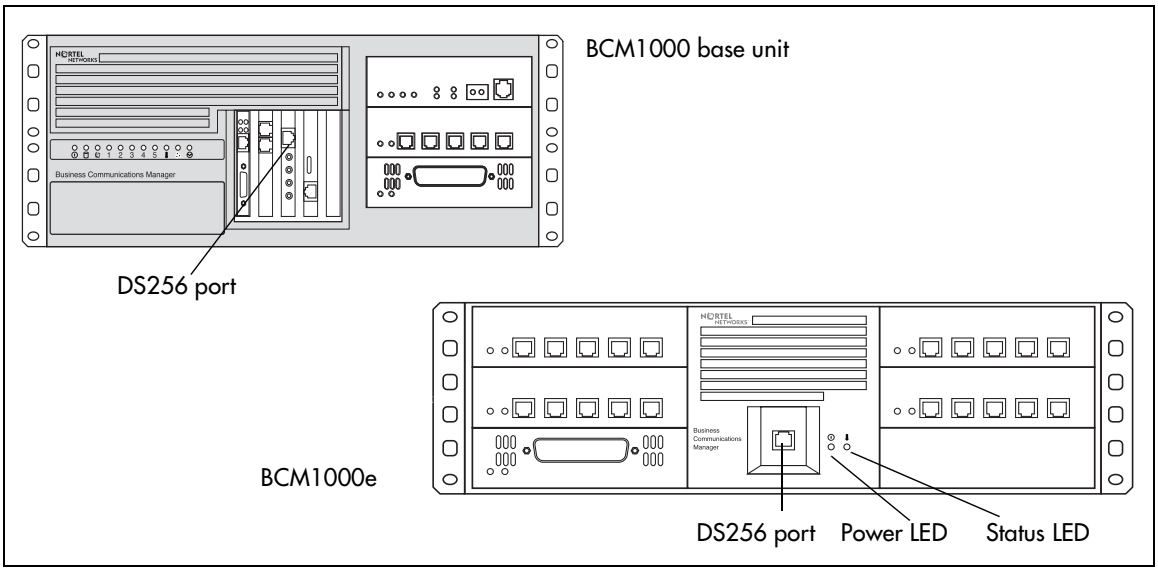
Business Communications Manager expansion unit

The BCM1000e houses a maximum of six additional media bay modules. The cable that comes with the expansion unit connects into a DS256 port on the MSC of the BCM1000, and into a DS256 port on the center panel of the BCM1000e. Refer to Figure 9.

This cable, called a Category 5, DS256 or RJ45 cable, must be 5 m (16 ft.) long.

Note: The number of modules that actually can be installed is determined by the number of DS30 channels required by the modules and the number of channels available. Refer to Chapter 5, “Installing the BCM1000,” on page 67.

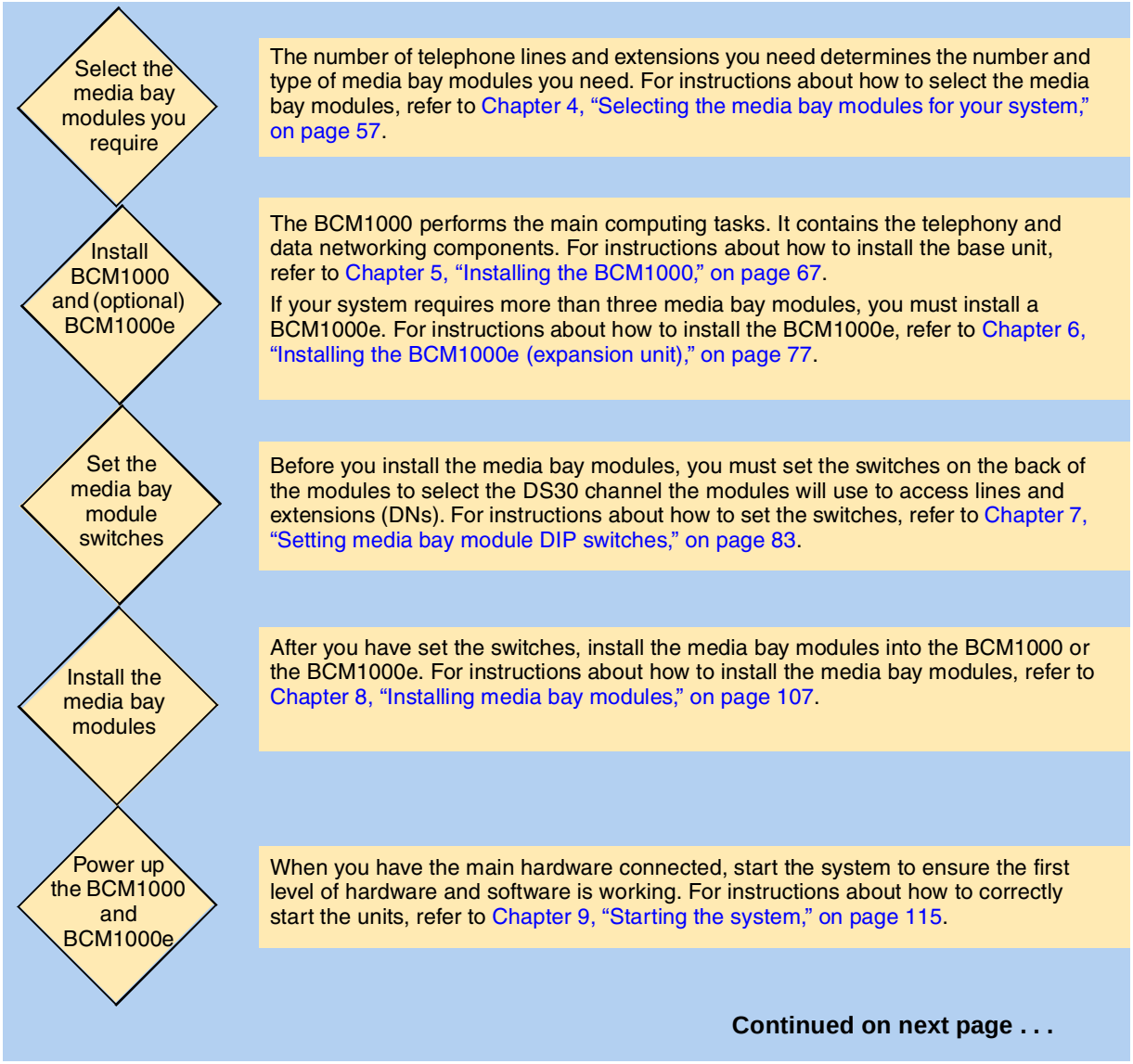
Figure 9 DS256 connector on a BCM1000 and a BCM1000e



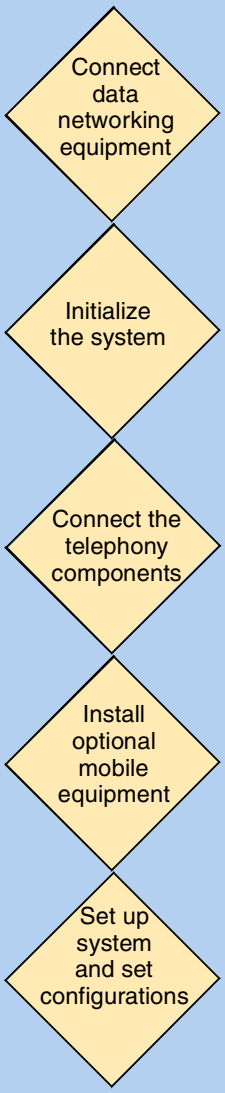
Installation process overview

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

Figure 10 Installation and initialization overview



Installation overview, continued . . .



The data networking components of the BCM1000 provide network connection to your local area network (LAN) and/or your wide area network (WAN). For instructions about how to install the data networking components, refer to "Connecting the data networking hardware" on page 119.

Systems are shipped with a default IP and subnet mask. You must change these settings to suit your system. Refer to "Setting initial system configurations" on page 124, which also describes how to set up your computer to access the Quick Start Wizard, which you use to perform system configuration. Refer to the *Business Communications Manager Programming Operations Guide* for details about the Quick Start Wizard.

The telephony components of the Business Communications Manager system provide call processing and connection to the public telephone system. For instructions about how to install telephones and components, refer to Chapter 10, "Wiring the modules," on page 131, Chapter 11, "Installing telephones and peripherals," on page 141, and Chapter 12, "Installing Analog Terminal Adapters," on page 149.

The Business Communications Manager supports a number of cordless handset systems, including Companion, DECT, T7406, and Symbol NetVision handsets. Companion and DECT have region-based deployment. Refer to "Mobility services by region" on page 237.
Companion, DECT and T7406 systems have separate installation and maintenance guides. The *IP Telephony Configuration Guide* describes how to register the NetVision handsets to the Business Communications Manager.

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

Refer to the separate application guides to set up optional applications such as CallPilot or VoIP functions.

Chapter 2
Telephony hardware

The BCM1000 is a modular system. You can increase the capacity of your Business Communications Manager by adding more telephony hardware components known as media bay modules.

The BCM1000 accommodates three media bay modules. The BCM1000e accommodates an additional six 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 buses each component occupies. Each Business Communications Manager system has a maximum of six DS30 buses available to media bay modules.

If your system requires many IP lines or trunks, you can reduce the number of DS30 buses that are assigned to modules and increase the number of buses available to IP telephones. This is called a 3/5 DS30 split. In this case, you only have five DS30 buses available to media bay modules. Refer to "Understanding DS30 bus blocks" on page 61 for more information.

Warning: Changing the DS30 split

If you change the DS30 split from 2/6 (default) to 3/5 after the system is initialized, any module set to DS30 07 or requiring the use of DS30 07 becomes inoperable.

If you change the DS30 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.

BCM 3.0 software introduced the concept of Full Double Density (FDD) and Partial Double Density (PDD). On the default system, DS30 02 to 05 were defaulted to FDD, which provides 32 new ports for connecting digital telephones. To use the FDD feature, DSM16+, DSM32+ media bay modules are configured to double density and ASM modules are configured to four offsets instead of two. DS30 06 and 07 default to PDD, but can be configured to FDD. However, Companion telephones can only be supported if 06 and 07 left in the PDD state.

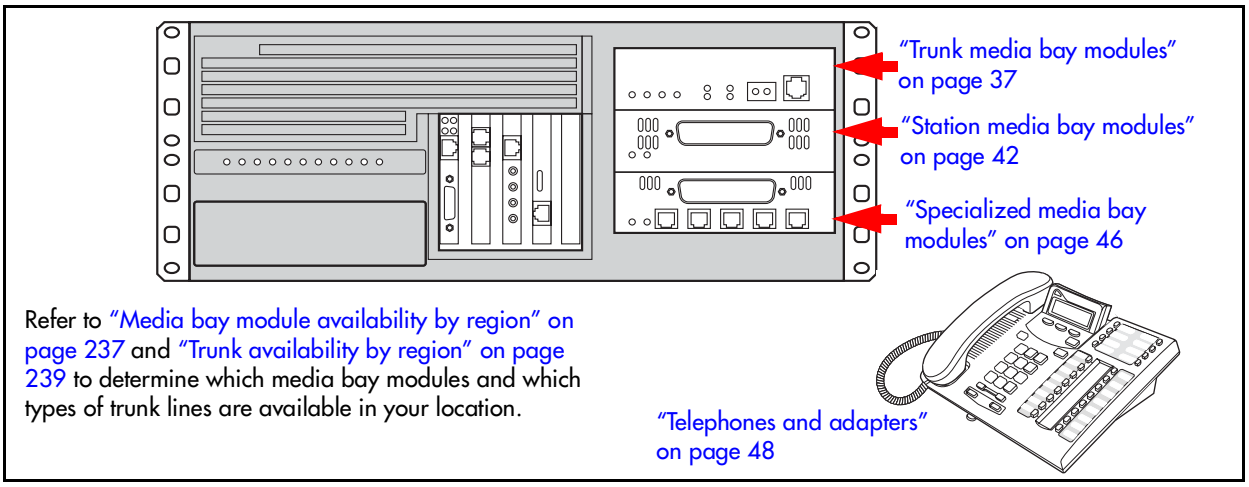
Warning: Changing DS30 06 and 07 to FDD

Once you change DS30 06 and 07 to FDD, Companion telephones can no longer be supported. This change cannot be reversed.

Refer to Chapter 4, "Selecting the media bay modules for your system," on page 57 for details about determining how many media bay modules can be installed in a system.

As well, this chapter describes the various types of telephone equipment that can be used with the Business Communications Manager system. Figure 11 provides pointers to the sections that describe the modules and telephones that can be installed into the BCM1000.

Figure 11 Telephony hardware components.



Media bay module common features

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

LEDs

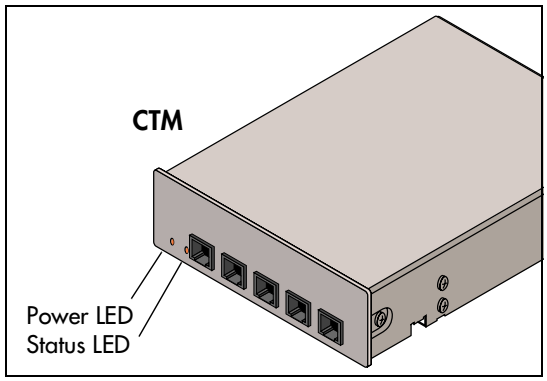
All media bay modules have power and status LEDS.

Figure 12 shows the location of the (Power) and (Status) on a CTM. These LEDs are located in the same place on all modules. Table 2 describes the common LED states.

Table 2 Module Power and Status LED states

LED state	Power	Status
	Indicates state of module power	Indicates condition of module status

Figure 12 Module LED locations

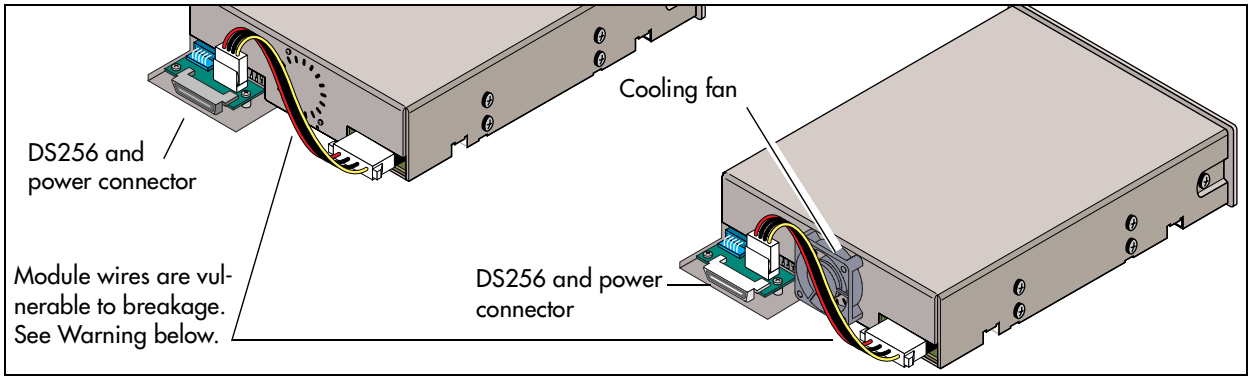


LED state	Power	Status
Green LED		
On	Normal operation	All monitored services are working.
Flashing	N/A	KSU startup (slow flash) or (fast flash) there may be a problem with the DS256 cable or the DS256 clock
Off	Module is not powered	Module not powered (reseat module) OR hardware fault (replace module)
***Red LED**		
On	Power converter failure. Power to telephones may not be within spec. (check base unit LEDs for possible power issue or replace module)	N/A
Flashing	N/A	Loss of DS256 clock, or DS256 cable may be disconnected.
* Not all modules have red LEDs		

Power connections

The back of the modules have a single connector that provides a DS256 connector and power to the module. These connectors plug into the back of the media bay on the BCM1000 or BCM1000e. Some modules also have a cooling fan that runs off the module power source. Figure 13 shows the rear views of the two types of modules.

Figure 13 Rear of modules showing DS256 and power connectors



Warning: Media bay module wire shorts

The wires that connect the media bay module daughter board to the module can become pinched between the module and the BCM1000 media bay if you insert the modules off the straight or with too much force. This will cause a short in the equipment and could stop the Business Communications Manager from restarting.

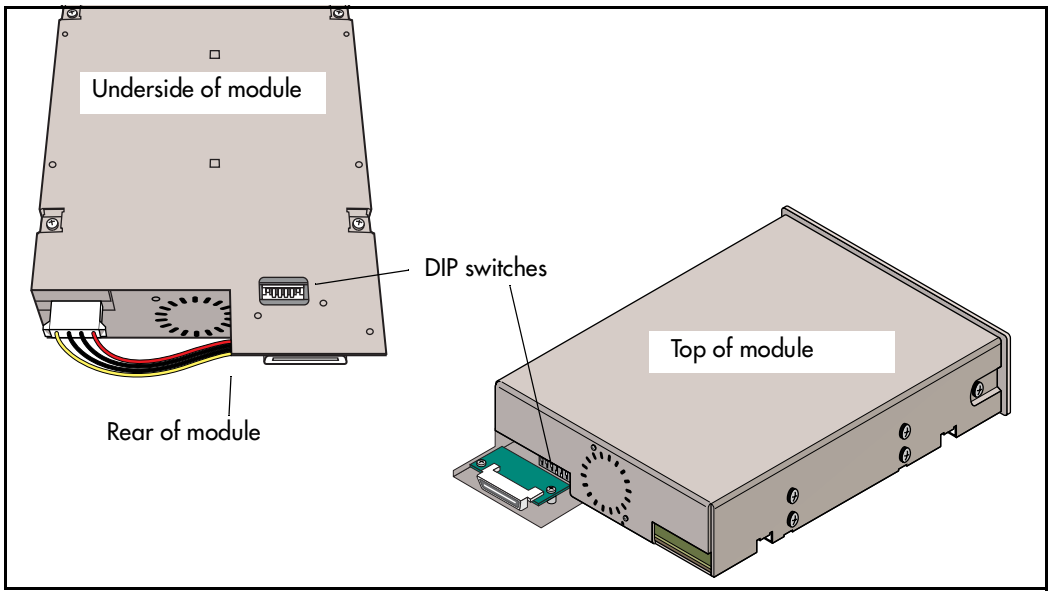
Note: Some of the new modules, such as the DECT module, do not have this wiring configuration. However, inserting the module carefully and correctly is still important to securely connect the power connector on the module to the backplane of the media bay.

DIP switches

The six DIP switches that you use to set the DS30 bus blocks and offsets are found either on the bottom of the module or on the rear, behind the power connector. Figure 14 shows the possible locations of the DIP switches on the modules.

For more information about setting DIP switches, refer to Chapter 8, “Installing media bay modules,” on page 107.

Figure 14 DIP switch positions on the modules



The Global Analog Trunk Module (GATM), introduced in BCM 3.5, and the (Global) Analog Station Module (ASM8+), introduced with BCM 3.6, have a second set of DIP switches that can be set to a specific country setting to set to allow automatic firmware upgrades to the module, based on the country profile chosen for the system during startup.

Trunk media bay modules

You install the trunk media bay modules in the BCM1000 or the BCM1000e. Trunk media bay modules connect telecommunications lines to the Business Communications Manager hardware.

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

Table 3 Trunk media bay modules

Module type	What it does	Special notes
DTM "Digital Trunk media bay module"	Connects digital public switched telephone lines to the Business Communications Manager system.	Can connect to four types of lines: TI, NA PRI, ETSI (in UK only), and Euro PRI.
CTM "Caller ID Trunk media bay module" CTM8 "Caller ID Trunk media bay module"	Connects a maximum of four analog public switched telephone lines to the Business Communications Manager system. Connects a maximum of eight analog public switched telephone lines to the Business Communications Manager system.	Only available for North American systems. See also "4X16 media bay module" on page 44.
BRI "Basic Rate Interface media bay module"	Connects a maximum of four ISDN BRI interfaces	**Note:** The DECT module contains the equivalent of a BRI module and does not require a separate module for trunk line functions.
GATM (Global Analog Trunk Module (introduced with BCM 3.5 software, but is backward compatible)	Connects either four (GATM4) or eight (GATM8) analog public switched telephone lines to the Business Communications Manager system.	Only North America, Taiwan, UK and Australia are supported. Modules installed in BCM 3.5 and newer systems can be set to automatically download firmware from the Business Communications Manager. This allows for firmware updates, as required.

Digital Trunk media bay module

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

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

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

Figure 15 DTM module LEDs and connectors, front view

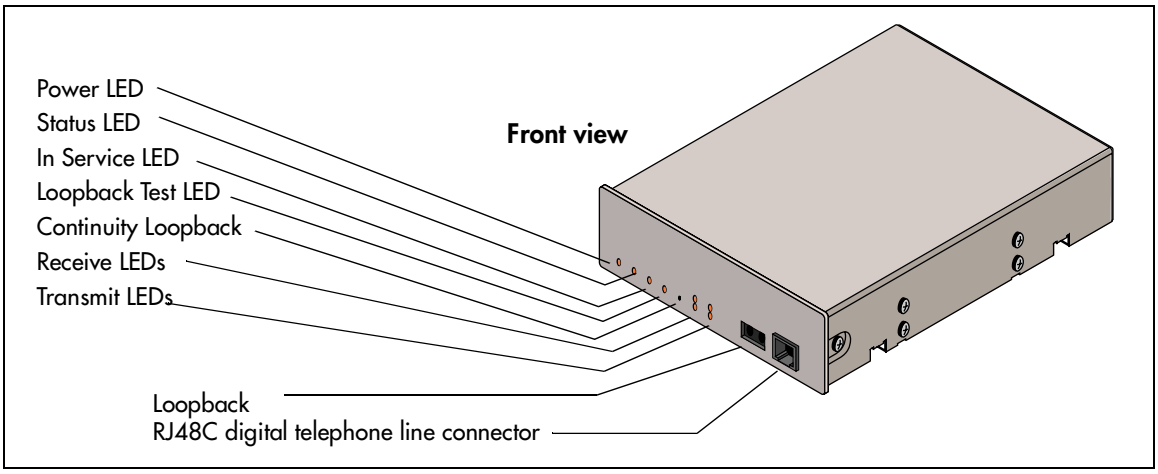


Table 4 provides a description of the function for each DTM LEDs.

Table 4 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.

Table 4 DTM LED functions (Continued)

LED label	Function
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 DTMs in the BCM1000 system, depending on the available bus blocks.

These modules must be installed in the BCM1000. If you already have three modules installed in the BCM1000, move one of those modules to the expansion unit to provide space for the DTM

Global Analog Trunk Module (GATM)

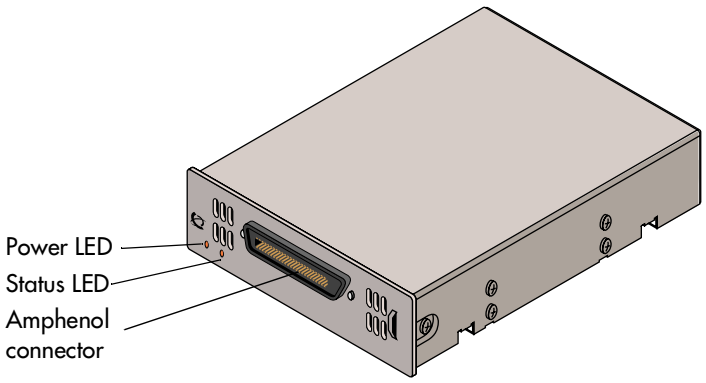
The GATM was introduced with the BCM 3.0 software load. This module provides an interface to the telephone company analog lines for the Business Communication Manager. The module supports both pulse and tone dialing, Caller ID, and Supervision Disconnect in various markets.

In North America, this module supersedes the Caller ID Trunk module (CTM).

UK profile configuration note: The GATM does not support Earth Calling even though the option appears in the Unified Manager Lines record. Only a FEM connected to a Norstar analog trunk module supports this feature.

The figure below shows the front of the GATM module. Note that both the GATM4 and the GATM8 have only one amphenol connector. The firmware differentiates how many lines the connector supports.

Figure 16 GATM4/GATM8 module faceplate



There are two firmware versions of the GATM:

GATM4: The GATM4 provides connections for four analog calling line identification (CLID) or Supervision Disconnect PSTN lines. Each voice line uses one line in the DS30 bus offset. Since each DS30 bus has four lines per offset, you can assign a maximum of four GATM4s to a single DS30 bus by making the offset switch settings different for each module.

GATM8: The GATM8 provides connections for eight analog calling line identification (CLID) or Supervision Disconnect PSTN lines. Each line uses one line in the DS30 bus offset. Since each DS30 bus has four lines per offset, you require two offsets for each GATM8. You can assign a maximum of two GATM8s to a DS30 bus, by making the offset switch settings different for each module. You can also combine a GATM 8 with a 4X16 module on the same DS30 number. When you choose an offset number for the GATM 8, the system automatically adds the next offset number. You cannot assign offset 3 to the GATM 8 module, because this does not allow the module to assign the second set of lines.

Caller ID Trunk media bay module
(North American systems only)

The CTM and CTM 8 have the same functions.

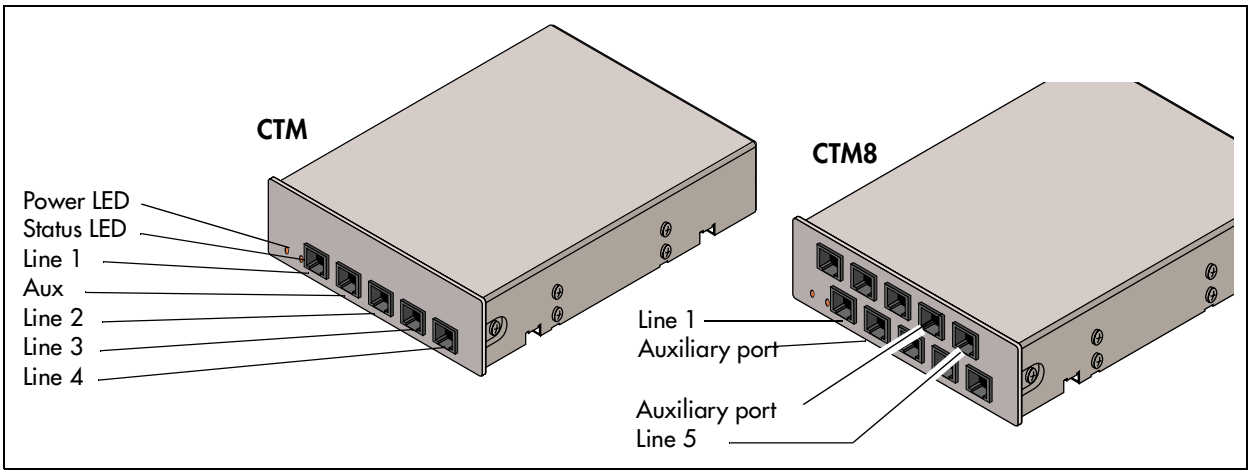
- The Caller ID Trunk media bay module (CTM) connects a maximum of four analog calling line ID (CLID) interfaces to the Business Communications Manager system via four RJ11 jacks on the module face. These jacks are labeled: Line 1, Auxiliary, Line 2, Line 3, and Line 4. The auxiliary jack connects to Line 1.
- The CTM8 provides eight analog CLID interfaces to the Business Communications Manager via eight RJ11 jacks on the module face. Each jacks also supports disconnect supervision. There are two auxiliary jacks on this module which connect to Line 1 and Line 5. Note that the top line of jacks is numbered in reverse order.

The auxiliary ports permit you to connect 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 17 provides a view of the front of the CTM and CTM8.

Figure 17 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 loops (eight lines) to the Business Communications Manager system.

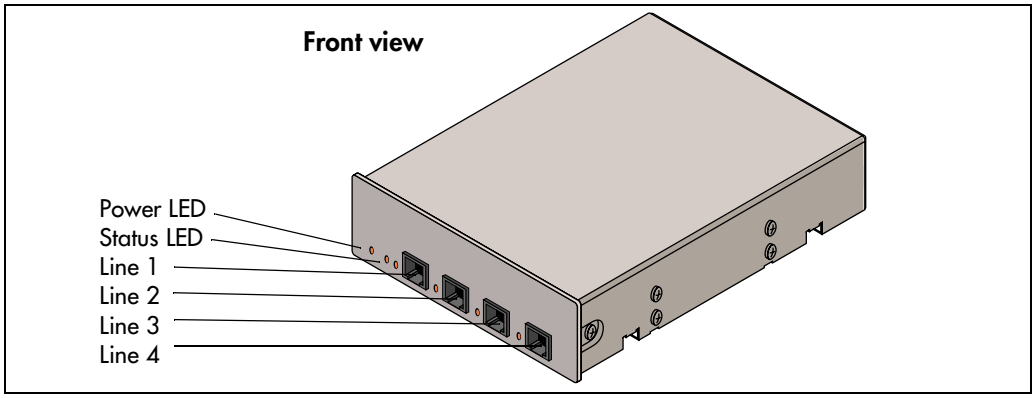
European systems use straight connects to ISDN devices (S interface) or to ISDN trunks from a service provider (T interface). North American-based systems require an external NTI module between the service provider trunk (T-interface) or between the BRI module and the ISDN devices (S interface).

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

Figure 18 shows a front view of the BRI.

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

Figure 18 BRI LEDs and jacks



Station media bay modules

You install the station media bay modules in the BCM1000 or the BCM1000e. Station media bay modules connect telephones and analog telecommunication devices to the Business Communications Manager system.

Table 5 provides a list of the station modules that can be used on the Business Communications Manager system:

Table 5 Station modules

Module type	What it does	Availability
DSM 16 "Digital Station media bay module" DSM 32 "Digital Station media bay module"	Connects a maximum of 16 digital telephones Connects a maximum of 32 digital telephones to the Business Communications Manager system.	
4X16 Combination 4-line CTM and DSM16 (4x16) Media Bay Module "4X16 media bay module"	Connects a maximum of four CLID lines for a maximum of 16 digital telephones	Only available for North American systems. This module can be combined with CTMs on the same DS30 bus. Also refer to "Caller ID Trunk media bay module" on page 40.
ASM8 "Analog Station media bay module" on page 44 ASM8+ (introduced with BCM 3.6 software)	Connects a maximum of eight analog devices to the Business Communications Manager system. Connects a maximum of eight analog devices, providing caller ID pass through, message waiting indication, and disconnect supervision at the telephone. Module also provides ability to download new firmware.	Only available for North American systems. You can add a maximum of two ASMs to your system. North American and UK systems.

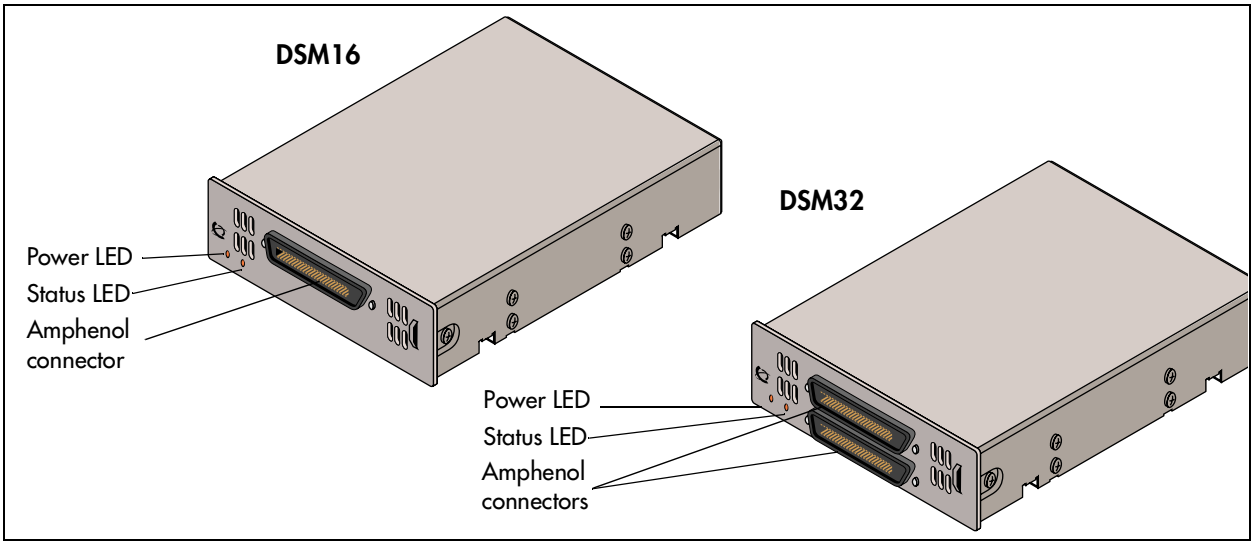
Digital Station media bay module

Three types of media bay modules support digital telephones on the Business Communications Manager. Each module has a minimum of one amphenol connector on the faceplate.

This section describes the two DSM modules. Refer to Figure 19.

- Digital Station media bay modules (DSM 16/DSM 16+) support 16 digital telephones. The DSM16+ supports single or double-density settings.
- Digital Station media bay modules (DSM 32/DSM 32+) support 32 digital telephones through two amphenol connectors. The DSM 32+ supports single or double-density settings.
- 4X16 supports 16 digital telephones and does not require a separate trunk module. Refer to "4X16 media bay module" on page 44.

Figure 19 Faceplates of DSM 16/DSM 16+ and DSM 32/DSM32+



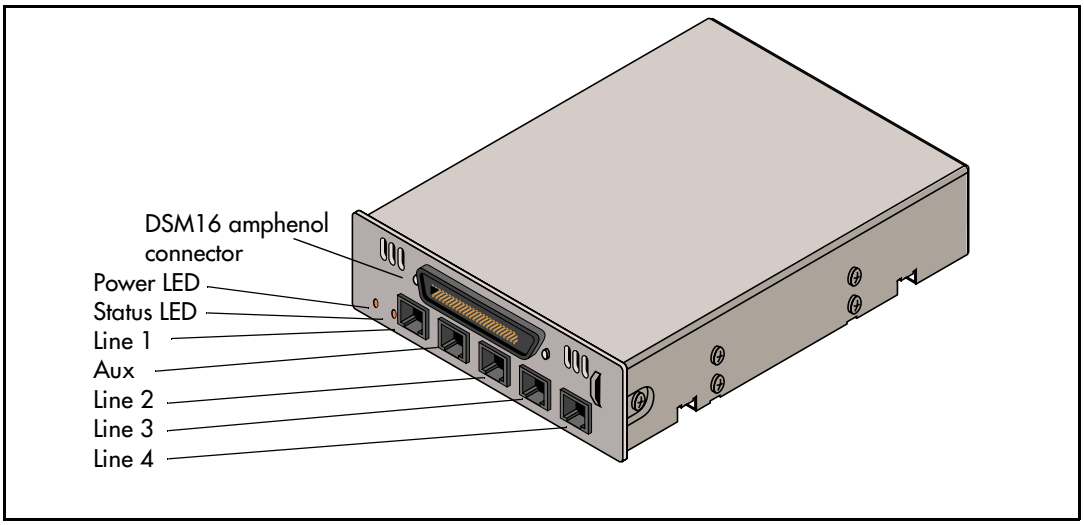
4X16 media bay module

(North American systems only)

The 4X16 provides both analog trunk connections and connections to digital telephones. The module is a combination of a CTM media bay module, with four analog lines, and a DSM 16-digital telephone media bay module. Each of the four ports supports Caller ID and disconnect supervision. An auxiliary port beside Line 1 allows you to use an analog telephony device, such as a modem, fax or telephone, to share the trunk. Figure 20 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 12, “Installing Analog Terminal Adapters,” on page 149.

Figure 20 Faceplate of 4X16 module LEDS, connectors, and jacks



Analog Station media bay module

(North American systems only)

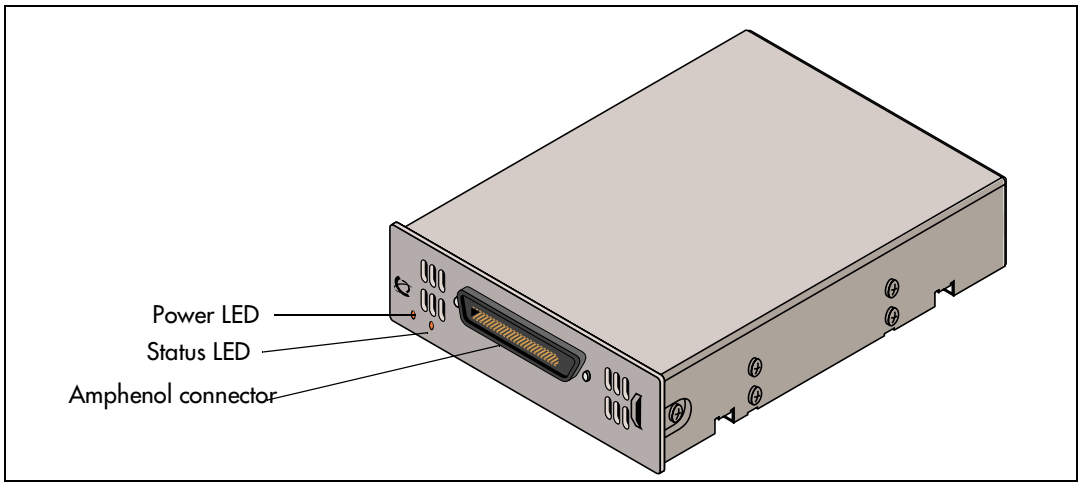
The Analog Station media bay module (ASM 8) connects to eight analog telecommunication devices. These devices can be standard analog telephones, cordless telephones, FAX machines, answering machines, or modems. The maximum speed for a modem connection is 28.8 kbit/s. Figure 21 shows a diagram of the ASM 8.

The ASM 8 has one amphenol connector on the faceplate. For details about wiring the ASM 8, refer to Chapter 12, “Installing Analog Terminal Adapters,” on page 149.

Ringer Equivalency (REN) for each module is 1 (one).

NOTE: The termination on the analog 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 the REN of the interface to which the device is connected.

Figure 21 ASM 8 front view



(Global) Analog Station media bay module (ASM8+)

The (Global) Analog Station media bay module (ASM8+) provides the same functionality as the ASM8 with the addition of the following features:

- support for calling line identification pass-through
- the option to activate disconnect supervision at the device
- the ability to pass a voice mail message indicator signal to activate a message waiting lamp on the telephone, if it has one
- support for an Off Premise Extension (OPX).

For this release, this module is supported in the North American and UK profiles, only.

The ASM8+ has one amphenol connector on the faceplate. For details about wiring the ASM8+, refer to Chapter 10, “Wiring the modules,” on page 131.

Ringer Equivalency (REN) for each module is 2 (two).

NOTE: The termination on the analog 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 the REN of the interface to which the device is connected. The ringer equivalency number, per port, for this module, is 1 (one).

The back of the ASM8+ has two sets of DIP switches. The first set defines the DS30 bus and offset. The second set determines if the module allows an automatic firmware download from the system (BCM 3.6 software) or which country firmware the module will use. Refer to Chapter 7, “Setting media bay module DIP switches,” on page 83.

Specialized media bay modules

This section describes the modules that perform a specific job outside of the trunk and station description. Refer to Table 6.

- 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 6 Specialized modules

Module type	What it does	Special notes
DECT "DECT media bay module"	connects a maximum of eight radio base stations which receives transmissions from registered cordless handsets (a maximum of 32).	Only available for some profiles. Refer to "Mobility services by region" on page 237. The DECT module contains the equivalent of one BRI module, therefore, it does not require a separate trunk module on the system.
FEM "Fiber Expansion media bay module"	connects a maximum of six Norstar expansion modules	The switches on the FEM are used to turn fiber ports on and off. The FEM does not work correctly if you set these switches using the rules used for other media bay modules.

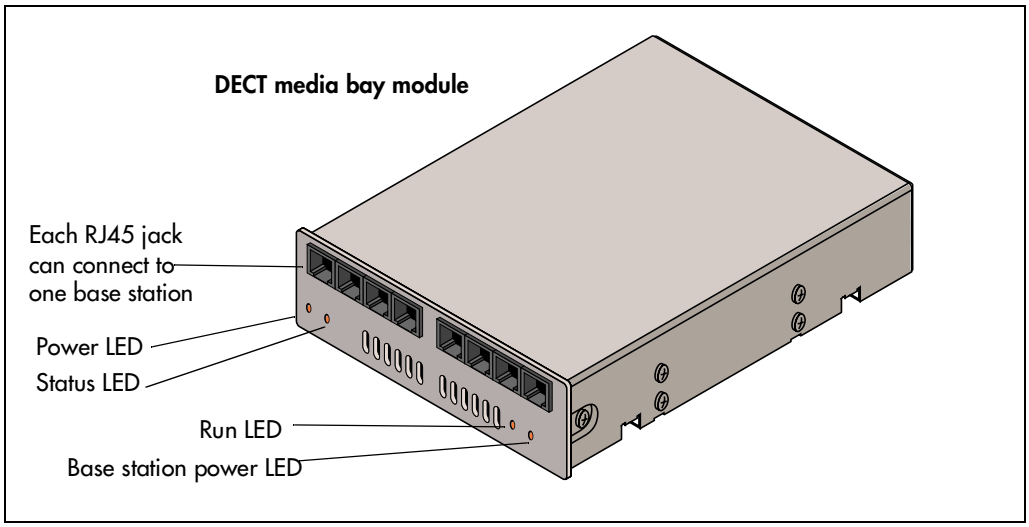
DECT media bay module

(region-specific application)

Like the 4X16 module, the DECT module is both a trunk and station module. The DECT media bay module has eight RJ45 jacks that connect to base stations deployed around the coverage area. It also supports four ISDN lines, which allow a maximum of eight simultaneous call paths. This module has a wizard that sets up the module programming to match with the Business Communications Manager programming for the handsets. Refer to the *DECT Installation and Maintenance Guide* for specific procedures to install the base stations, to set up the DECT module firmware, and to subscribe the handsets to the Business Communications Manager.

Figure 22 shows a front view of the module. As well as a Power and Status LED, the DECT module has LEDs that indicate the Run state and base station power state.

Figure 22 DECT faceplate with eight RJ45 connectors



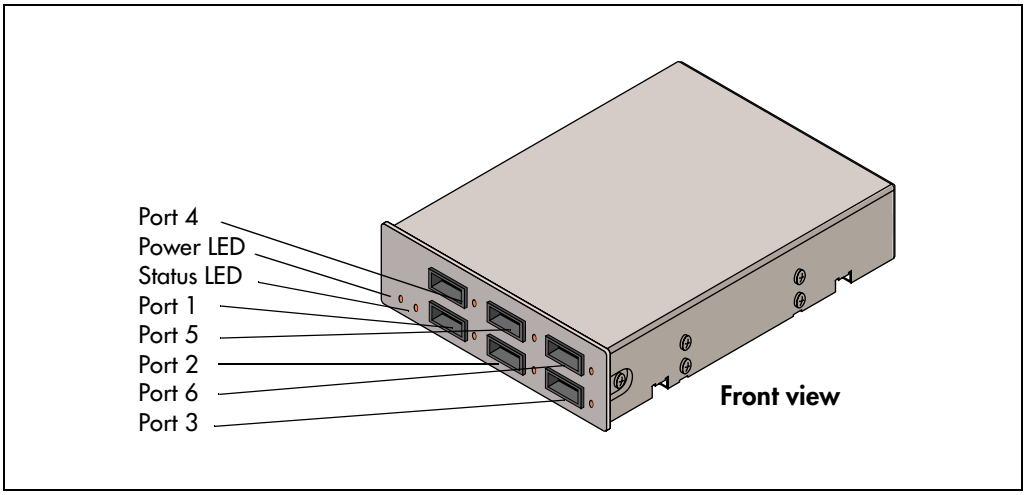
Fiber Expansion media bay module

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

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

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

Figure 23 FEM LEDs



Telephones and adapters

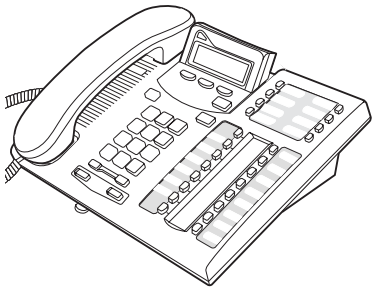
The following telephones and devices can be used with the Business Communications Manager system.

Business Series Terminals

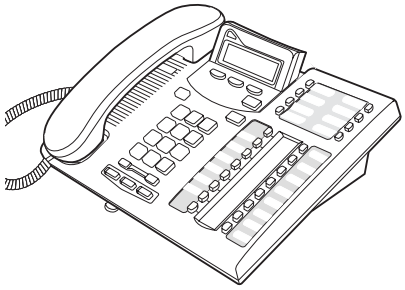
7100 — one-line display, one memory button without indicator.

7000 (not shown) (International only) — four memory buttons, no display or indicators.

Business Series Terminal 7208 — one-line display, eight memory buttons with indicators



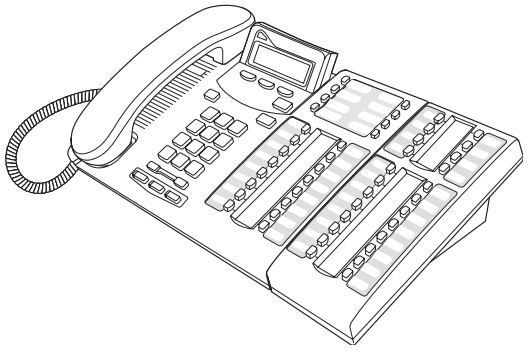
7316 — two-line display, three display buttons, 16 memory buttons with indicators, eight memory buttons without indicators.



7316E — two-line display, three display buttons, 16 memory buttons with indicators, eight memory buttons without indicators.

This telephone performs as a T7316 telephone on systems prior to BCM 3.5. On systems running BCM 3.5 and newer software, the button numbering changes, the mute button under the dial pad is active, and the telephone can support one or more Key Indicator Modules (KIMs) to create a Central Answer Position (CAP).

7316E+KIM (Key Indicator Module) — Each KIM has 24 programmable buttons with displays. On an Ordinary Kim (OKIM), the buttons can be programmed as memory buttons, with internal and external autodial numbers and feature codes. If the T7316E is configured in the system as an enhanced CAP (eCAP), the KIM becomes an enhanced KIM (eKIM) and can support line assignments, multiples of the same target line, and hunt group designators, as well as memory key functions.



Nortel IP telephones (20XX)

Nortel IP telephones connect to the Business Communications Manager through the internet. Once it connects with the system, the telephone uses either PSTN or VoIP trunks for calls. These telephones provide multi-line displays, programmable memory buttons, and a features to provide quick access to system features.

(Not shown: i2050 Software Phone, which runs on Windows 2000)

2001 — Three programmable buttons. Feature button and three display buttons. No mute, handsfree or headset functions.

2004 — Twelve programmable buttons, including six with indicator displays. Feature button and three display buttons. Mute, handsfree, and headset functionality.

2002 — Nine programmable buttons; four with indicator displays. Feature button and three display buttons. Mute, handsfree, and headset functionality

Mobility options

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*.

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 BCM1000 or BCM1000e. Depending on your system configuration, you can have up to 64 sets assigned to your system. For installation instructions, refer to the *Companion Installation and Configuration Guide*. Provides two-line display, but no line, memory or display buttons. The handset accesses a restricted set of system features.

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.

Business Series Terminal 7406 Cordless Telephone system — provides cordless mobility in a small office environment. Each base station supports three telephones. Function is based on the BST 7316 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*.

Auxiliary equipment

- **BST doorphone —** BCM 3.5 software introduced support for the Business Series Terminal Doorphone, an alerting/page unit that can be installed outside secure doors. The device allows a caller to ring or page an internal telephone. If the door has electronic door opening equipment, the person who answers the page can activate the door unlock.
- **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.

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 hardware 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 12, “Installing Analog Terminal Adapters,” on page 149.

Legacy equipment

- **Norstar M7324** — two-line display with three display buttons, 24 memory buttons with indicators. Options: two CAP modules.
- **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.
- **Norstar M7324N** (UK and Australia only) — same features.
- **Central answering position (CAPN)** (UK and Australia only) — same features, connects to M7324N telephones

Note: There is no Business Series Terminal equivalent to the M7324 telephones.

- **Norstar M7100** — one-line display, one memory button, without indicator.
- **Norstar M7100N** (UK and Australia only) — same features
- **Norstar M7208** — one-line display, eight memory buttons with indicators.
- **Norstar M7208N** (UK and Australia only) same features
- **Norstar M7310** — two-line display with three display buttons, 10 memory buttons with indicators, 12 dual memory buttons without indicators.
- **Norstar M7310N** (UK/Australia only) — same features

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 hardware 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 Installation and Configuration Guide*.

- **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. The C3060 handset is also supported.
- **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 DECT Installation and Maintenance Guide*.

BST 7406 system components

The 7406 cordless 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 BST 7316 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 communications connects to the internet. 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.

Chapter 3
Auxiliary requirements

You require a personal computer to run the Business Communications Manager Unified Manager application. You use Unified Manager to configure and manage the Business Communications Manager system through an internet link between your computer and the Business Communications Manager. To work with the Unified Manager, you require an internet connection with the correct browser setup.

This chapter describes the computer and internet specifications. The *Programming Operations Guide* describes in detail how to log on to the Unified Manager and how to configure the system using Unified Manager.

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, Windows XP

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 BCM1000 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.

Security changes

Business Communications Manager 3.5 introduced a number of security enhancements with the addition of a security layer to the programing. One change that particularly affects maintenance procedures is the shift from the Telnet interface to using a secure interface (SSH-based) to access the text-based Unified Manager menus from a computer connecting to the Business Communications Manager over a LAN, for instance when you want to initialize a new hard disk. Connecting to the BCM1000 through a serial or crossover cable configuration is not affected by this change.

If your company wishes to continue using Telnet over the LAN or if you have DECT equipment, the Telnet service can be manually enabled through the Unified Manager, under **Services**. If you have DECT equipment, Telnet is required to run the DECT programming.

The client SSH application is called PuTTY. A link to download this application to your desktop can be found under the **Install Clients** button on the first page of the Unified Manager. The application installs on your computer, not on the Business Communications Manager. Therefore, if you want to use a LAN to connect to the Business Communications Manager hardware during maintenance procedures, you must install PuTTY on your computer before beginning any procedures that require you to access the text-based interface.

As well, the connection to the Unified Manager is now through an https// link rather than http//. To log on to the Unified Manager you enter: https//<*BCM IP address*> on your browser. Any existing bookmarks will automatically convert to https// during the connection process.

Browser requirements

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

- Java Virtual Machine (JVM) 5.0 (build 5.00.3805 or greater),
  or Sun Java JRE 1.4.1_02 or greater (for Windows versions that do not have JVM installed)
- Microsoft Internet Explorer 5.X (excluding 5.00) or 6.X,
  or Netscape Communicator 4.8, 6.X or 7.X.

  Note: Browser restrictions and limitations:

  — BRU and upgrades: Only Internet Explorer will work when using the backup/restore utility (BRU) or when performing an upgrade procedure.

  — The Business Communications Manager upgrade wizard will not work with IE 5.00.

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.

Using an HTTP Proxy server

Unified Manager does not work properly if you use an HTTP Proxy server to connect to the Internet. If you use an HTTP Proxy server, you must change your web browser settings so you can bypass the Proxy Server when connecting to Business Communications Manager. Proxy information is located under the internet options/preferences area of your browser.

Note: If the Business Communications Manager system is located outside of your network, or you have to use a *proxy* as a gateway proxy to communicate with Business Communications Manager, this process may not work. To bypass the proxy through the browser, the gateway proxy must be able to understand and pass distributed component object model (DCOM) calls between Business Communications Manager and the computer you are using to access Unified Manager.

Chapter 4
Selecting the media bay modules for your system

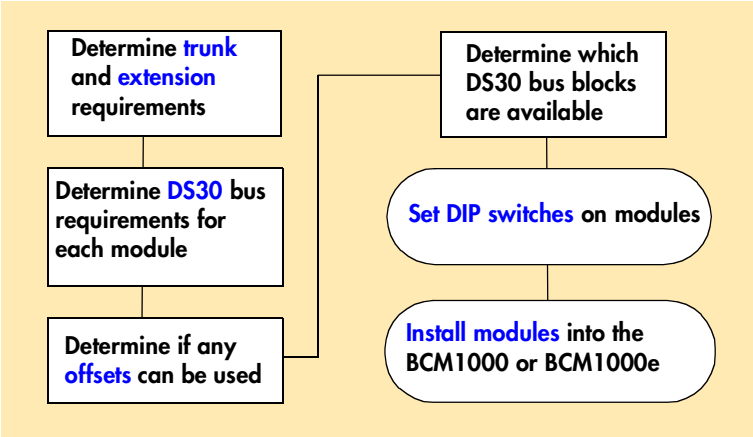
The media bay modules are the devices in the Business Communications Manager system that permit you to connect your extensions and the public switched telephone network (PSTN) lines to the call processing capabilities of the Business Communications Manager system.

A special media bay module called a Fiber expansion module (FEM) allows you to update from a Norstar system to a BCM1000 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 BCM1000 or the BCM1000e. This configuration allows you to select the number and type of media bay modules that best meet your requirements.

If you have a large Business Communications Manager system, there are some configuration restrictions that can apply to your system. For information about these restrictions, refer to "Rules for assigning DS30 bus blocks and offsets" on page 83.

Figure 24 Process for determining modules



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

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

Selecting the trunk media bay modules

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

If you are setting up an entirely new system, a site survey must be done to determine your current and future needs. We recommend that you do the survey before you order any modules.

Note: If you 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 7.

   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 7 Determining trunk module requirements

Type of lines	Number of lines	Type of media bay module	Number of lines per module	Number of modules required
T1 digital lines		DTM	24	_____ DTM
PRI digital lines (NA) (required for Companion wireless)		DTM	23	_____ DTM
E1 digital lines		DTM	30	_____ DTM
PRI digital lines (EMEA)		DTM	30	_____ DTM
Analog lines		CTM (North American systems only)	4	_____ CTM
Analog lines		GATM4	4	_____ CTM
Analog lines		CTM8 (North American systems only)	8	_____ CTM
Analog lines		GATM8	8	_____ CTM
Analog lines		4X16 combination module (North American system only)	4 (also requires a full DS30 bus for the DNs)	_____ CTM

Table 7 Determining trunk module requirements (Continued)

Type of lines	Number of lines	Type of media bay module	Number of lines per module	Number of modules required
BRI ISDN lines		BRI	4 ISDN loops (8 lines)	_____ BRI
Cordless handsets (DECT) (selected profiles only)		DECT	4 ISDN loops (requires a full DS30 bus)	_____ DECT

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 to your Business Communications Manager system, and only on the BCM1000.

Tip: The BCM1000 can hold three media bay modules. If you require more than three modules, a BCM1000e can be connected to support an additional six additional modules.

Selecting the station media bay modules

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

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

1 In Table 8, 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 8 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/DSM16+	16	_____ DSM 16/ DSM16+
Digital extensions		DSM 32/DSM32+	32	_____ DSM 32/ DSM32+
Digital extensions		4X16	16	_____ DSM 16
Analog extensions		ASM 8/ASM8+	8	_____ ASM 8/ ASM8+

Digital extensions are digital or IP telephones. For a list of the telephones that can be used with the Business Communications Manager system, refer to "Telephones and adapters" on page 48.

Analog extensions include single line telephones, fax machines, and modems.

Double density: On systems running BCM 3.0 and newer software the DSM16+ and the DSM32+ can be configured to access the lower level of DNs on each DS30 offset. The ASM8 and ASM8+ can also access these DNs.

An example for North America:

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

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

Upgrading from an existing Norstar system

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

The FEM allows you to connect a maximum of six Norstar expansion modules to a BCM1000. Each expansion module connection requires one DS30 bus, therefore, the BCM1000 used for this purpose can only support one FEM module (and no BCM1000e) if you are converting a fully-configured Norstar system.

Determining system capacity

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

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

Understanding DS30 bus blocks

A DS30 bus is a block of virtual pathways on the media services card (MSC).

On a default system, six DS30 bus blocks can be assigned to media bay modules. The block to which the module is assigned 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 first and last DS30 blocks are permanently routed to the PEC DSPs to support internal Business Communications Manager functions such as voice mail, VoIP trunks, and IP telephony functions. This configuration is called a 2/6 DS30 split.

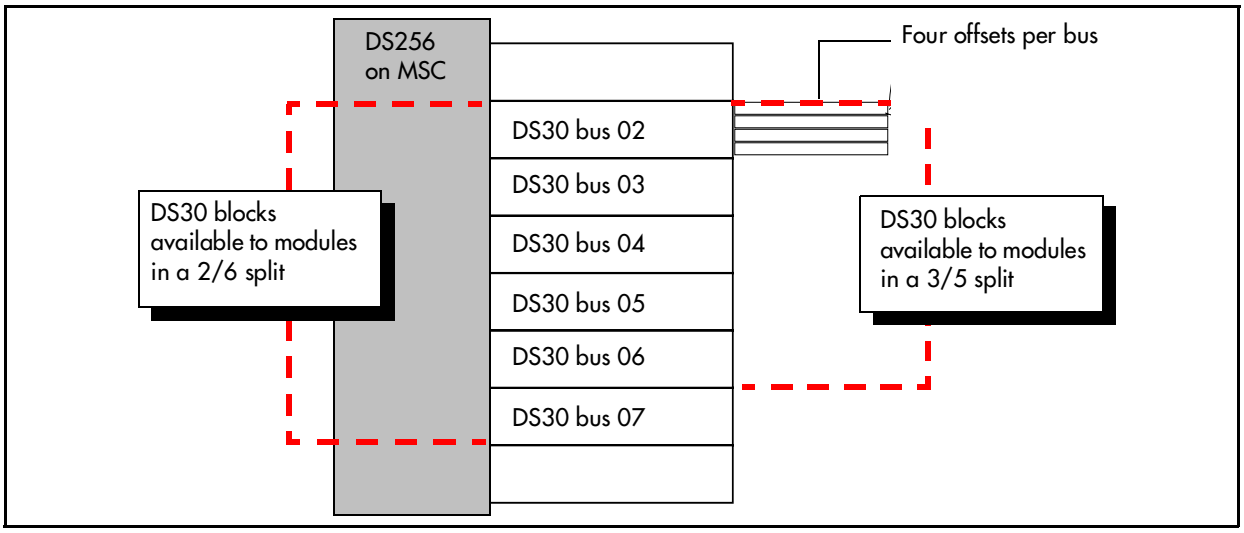
Changing the DS30 split

You can change the DS30 bus allocation to a 3/5 split to accommodate increased IP telephony or VoIP trunk requirements. You do this by assigning DS30 07 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.

Figure 25 shows a model of how the DS30 bus blocks are a subgroup of the DS256 bus on the MSC. The diagram also shows offsets, which are a subgroup of the DS30 blocks.

Warning: If you change the DS30 split from 3/5 to 2/6 after your system is configured, you will lose all the data and optional application connections.

Figure 25 DS30 bus model



DS30 bus 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 DS30 bus.

Explaining Double Density

BCM 3.0 software introduced the concept of single and double density for DS30 buses supporting station modules. On these buses the B2 bus blocks are reconfigured as B1 bus blocks, thereby, doubling telephone capacity. However, only DSM16+, DSM32+ and ASM/ASM8+ modules can support the second set of DNs. The DSM16+ and DSM32+ modules can be configured for either single density, which access only the top 16 DNs, or double density, which accesses all 32 DNs.

Default BCM 3.0 and newer systems are configured as Partial Double Density (PDD) systems, in that they maintain DS30 06 and 07 in the original configuration of 16 DNs per bus. This accommodates those systems which use Companion. The system can be set to Full Double Density (FDD) at system startup or once the system is setup. When the system is set to FDD, DS30 06 and 07 allow access to the second set of DNs, and they are no longer available for Companion operation.

Note: Devices that share a DS30 bus must be identical. Use two DSM 16+ modules set to double density on a single DS30 bus.

A DSM 32+ set to double density requires a full DS30 bus.

Setting Offsets

Each offset is one-quarter of a DS30 bus. Each DS30 bus, supports 16 lines (32 time slots) for most trunk modules.

Exceptions:

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

For station modules, each bus supports 16 telephones or telephony devices for station modules that support single density, or which are set to single density, in the case of the DSM16+ and DSM32+, or on DS30 06 and 07 if the system remains set to Partial Double Density (PDD). On each bus that supports double density, DSM16+ and DSM32+ modules set to double density have access to eight telephones per offset, for a total of 32 telephones per DS30 bus if the offsets are fully loaded.

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

Modules that can have offsets assigned include CTM, CTM8, GATM4, GATM8, BRI, and ASM 8/ ASM8+. For example, two CTM 8s can be assigned to the same DS30 bus number, with different offset numbers. However, you cannot assign a CTM8 and an BRI module to the same DS30 bus.

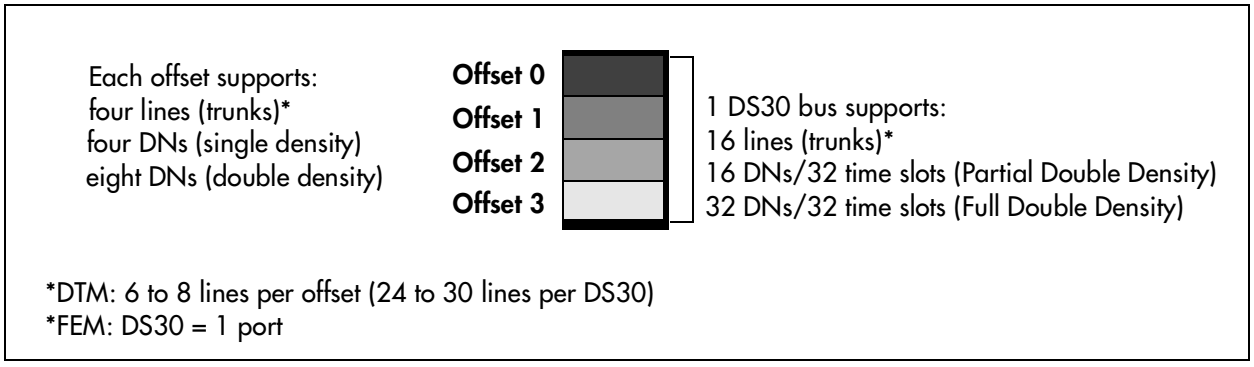
ASM8/ASM8+ modules can only be installed on two offsets on a DS30 set to PPD. However, on a DS30 in FDD, ASM8/ASM8+ modules can be supported on all four offsets. Note that there is no double-density dip switch setting for these modules.

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

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

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

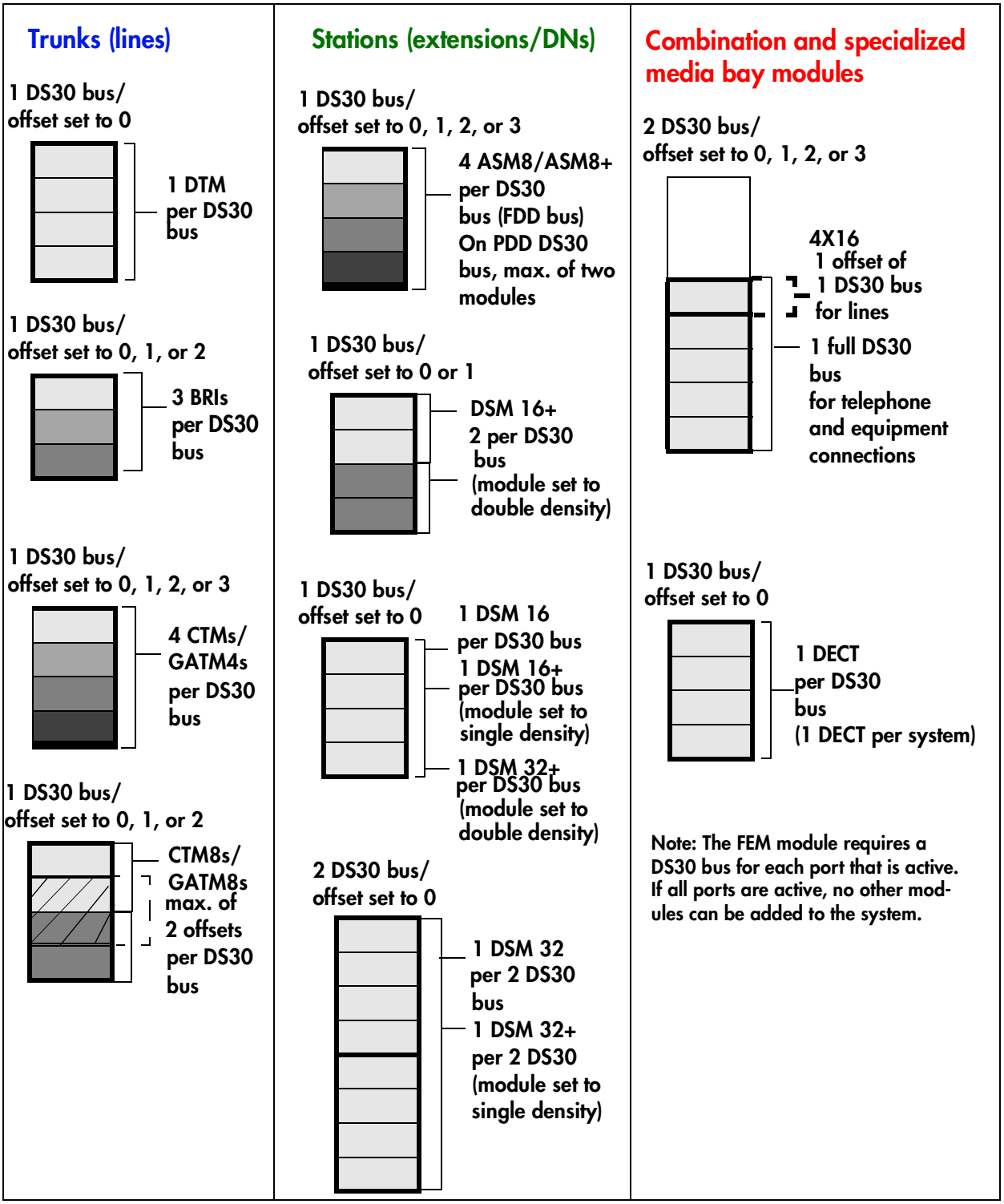
Figure 26 Offsets are part of DS30 line/DN groups



Determining module DS30 bus requirements

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

Figure 27 DS30 bus space requirements for 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/GATM switch settings" on page 93 and "4X16 switch settings" on page 97 for details

1 Make a list of modules and the space requirements for each module you chose. Refer to Table 9.

Table 9 Matching modules to DS30 bus capacity

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

2 Set the bus numbers and offsets on the DIP switches of the module. Refer to Chapter 7, "Setting media bay module DIP switches," on page 83. Note that you assign trunk modules starting from the bottom DS30 bus, and you assign station modules starting from the top DS30 bus.

3 Install the modules into the BCM1000 or BCM1000e. Refer to Chapter 8, "Installing media bay modules," on page 107.

Chapter 5
Installing the BCM1000

This chapter describes how to install the BCM1000.

Preparation checklist

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

- Determine the location for the BCM1000, 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 67 and the "Electrical requirements" on page 68.
- Order the required trunks from the central office.
- Ensure that you have all the equipment and supplies you require to install the system. Refer to "System equipment and supplies" on page 69.
- If you want to install the media bay modules into the BCM1000 before you install it, ensure that the DIP switches are set correctly. Refer to Chapter 4, "Selecting the media bay modules for your system," on page 57 and Chapter 8, "Installing media bay modules," on page 107.

Environment checklist

The installation area must be:

- minimum of 4 m (13 ft) from equipment such as photocopiers, electrical motors and other equipment that produces electromagnetic, radio frequency and electrostatic interference
- within 1.5 m (5 ft.) of a three-wire grounded electrical outlet
- clean, free of traffic and excess dust, dry and well ventilated
- within the temperature ranges of 0°C and 40°C (32°F and 95°F)
- between 20% and 80% non-condensing relative humidity
- enough space and strength to support the BCM1000
- 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 BCM1000.
- 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 BCM1000 power cord is 1.5 m (5 ft) long. You can connect the server to a power bar with a maximum length of 2 m (6.5 ft), including power bar. You must use a power bar approved by an appropriate National Test Body, with a third wire ground. Do not use an extension cord between the server and the power bar, or between the power bar and the electrical outlet.

The cable between the BCM1000e and the BCM1000 is supplied with the expansion unit. Do not use any other cables or connectors.

Internal wiring requirements

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

Digital loop

The following parameters must be met for a digital loop:

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

Analog loop

The following parameters must be met for an analog loop.

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

System equipment and supplies

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

Basic hardware

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

- BCM1000
- BCM1000e
- media bay modules
- telephones and other communication devices such as fax machines
- cabling for connections between hardware units

You can place a maximum of three media bay modules in the BCM1000. You must install an BCM1000e if you require more than three media bay modules.

Optional equipment

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

- Station auxiliary power supply (SAPS)
- Central answering position (CAP or CAPN) module to as many as five M7324/M7324N 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

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.

Equipment for Installing the BCM1000

For the installation, you need the following equipment:

- mounting hardware: rack mounting bracket (included), rubber feet for table mounting, or wall mounting brackets (separately orderable)
- Phillips screwdriver #2
- flat blade screwdriver
- pliers
- antistatic grounding strap
- connecting tool
- surge protector (recommended)
- cables, 25-pair cable with amphenol connectors

Installing the BCM1000 in a rack

The BCM1000 fits into a standard 19-inch equipment rack. You can install the base unit in the same rack as your other networking and telecommunications equipment.

Caution: When installing the BCM1000 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 67 for acceptable environmental conditions before selecting a location for the BCM1000.

Attaching the rack mounting brackets

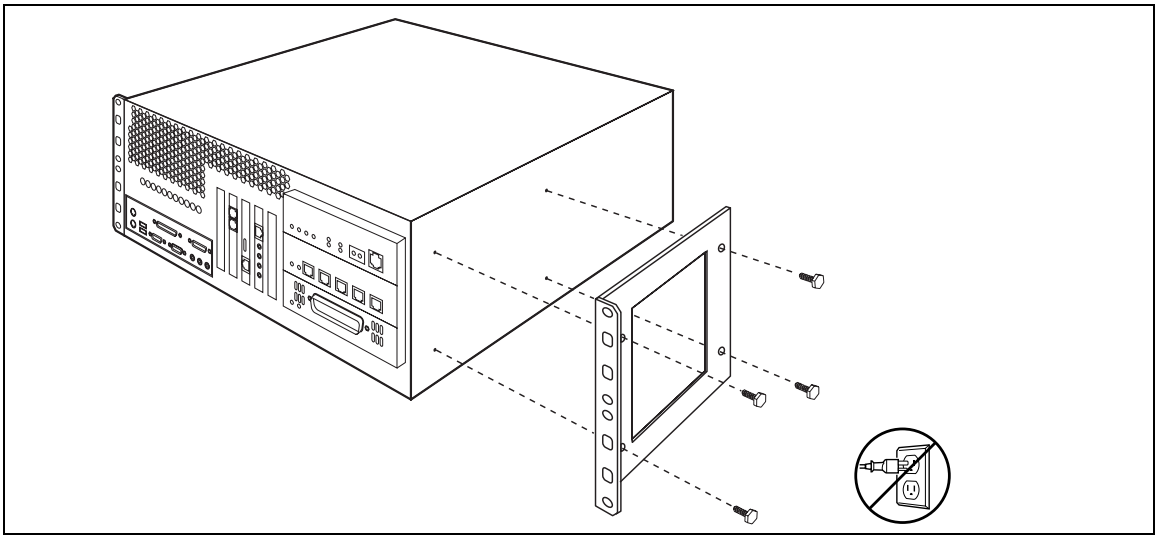
Follow these steps to attach the rack mounting brackets to the base unit:

1. Place the BCM1000 on a table.
2. Align the screw holes between the base unit and the right rack mounting bracket.
3. Fasten the bracket to the base unit using the four supplied screws.

Caution: Only use the screws supplied with the rack mounting bracket. Do not replace screws. Other screws can damage the BCM1000.

4. Align the screw holes between the base unit and the left rack mounting bracket.
5. Fasten the bracket to the base unit using the four supplied screws. Refer to Figure 28.

Figure 28 Attaching the rack mounting bracket to the BCM1000



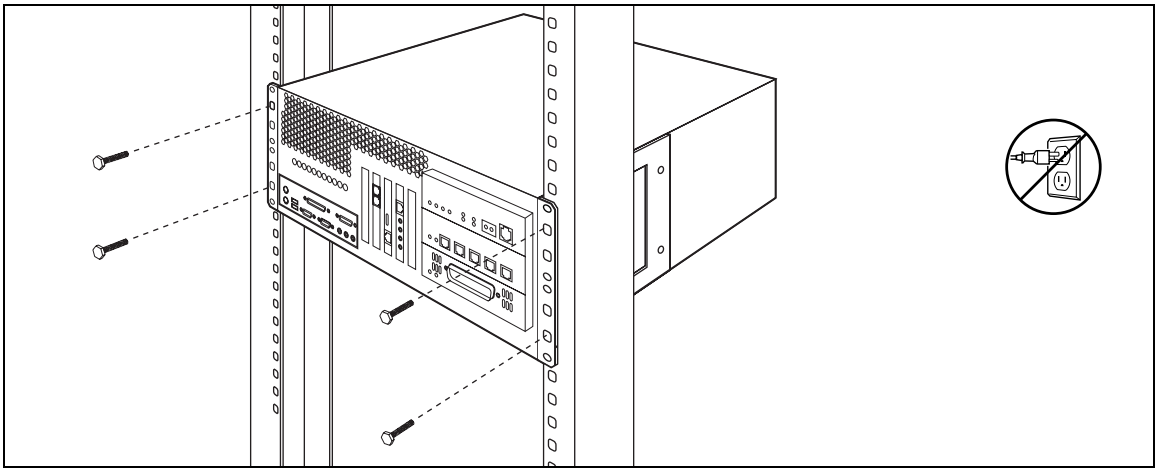
Installing the BCM1000 into the rack

After the brackets are installed, perform the following steps to install the BCM1000 in the equipment rack:

1. Determine the location in the rack you want to install the base unit.
2. Position the base unit in the rack.
3. Align the holes in the rack mounting bracket with the holes in the equipment rack rails.
4. Fasten the rack mounting brackets to the rack using four screws (not supplied).

   Refer to Figure 29.

Figure 29 Fasten the BCM1000 to the equipment rack



Installing the BCM1000 on the wall

To mount the BCM1000 on the wall, you need:

- two rack mounting brackets or a wall-mount bracket kit
- four #10 x 2.5 cm (#10 x 1 in.) round head wood screws
- a plywood backboard 2 cm (3/4 in.) thick

Caution: Refer to "Environment checklist" on page 67 for acceptable environmental conditions before selecting a location for the BCM1000.

Follow these steps to install the bracket:

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

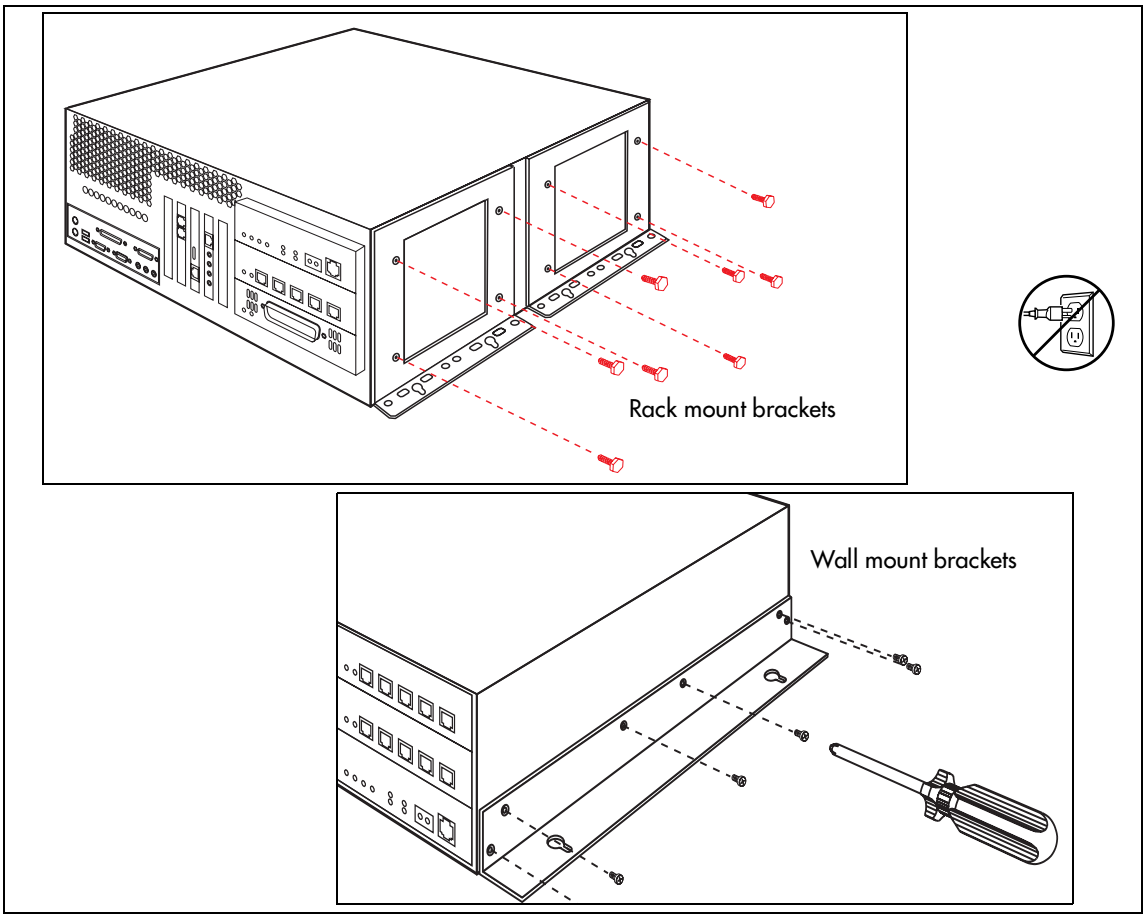
1 Align the screw holes on one side of the base unit with both rack mounting brackets or with one of the wall mounting brackets.

Note: The brackets suspend the BCM1000 on the wall. Consider the direction you want the media bay modules to face, left or right, when you choose the side to install the rack mounting brackets on.

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

Caution: Use only the screws supplied with the rack mounting brackets. Do not replace screws. Other screws can damage the BCM1000.

Figure 30 Attaching the mounting brackets to the BCM1000



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

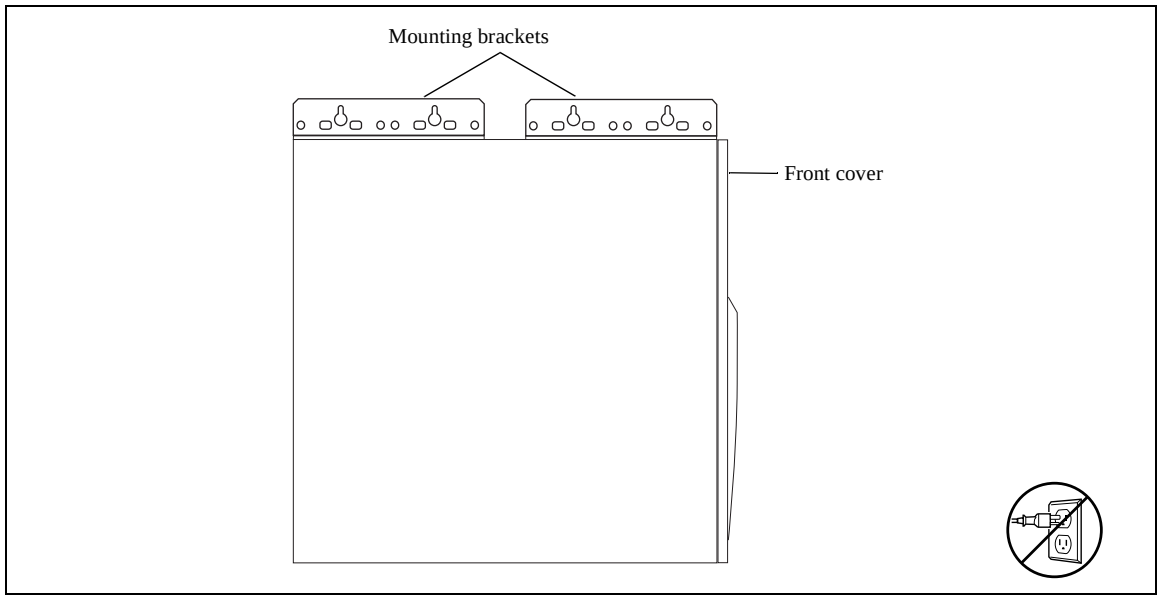
4 Insert two #10 x 2.5 cm (#10 x 1 in.) round-head wood screws in the backboard. The screws must be 34.5 cm (13.5 in.) apart and level.
Do not tighten the screws heads against the backboard. Leave approximately 0.5 cm (0.25 in.) of the screw out of the backboard.

Note: Position the screws to leave enough space beside the BCM1000 (23 cm or 9 in.) to insert and remove the media bay modules.

5 Hang the base unit on the two screws, using the outer slotted holes.

Make sure the base unit is level, the mounting brackets are against the wall, and the front cover is facing left or right. Refer to Figure 31.

Figure 31 Mount the BCM1000 on the wall



6 Insert two #10 x 2.5 cm (#10 x 1 in.) round-head wood screws in the other two slotted holes.

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

8 Tighten all five screws.

Installing the BCM1000 on a flat surface

You can install the BCM1000 on any flat surface that can support the weight of the unit.

Caution: Refer to "Environment checklist" on page 67 for acceptable environmental conditions before selecting a location for the BCM1000.

To install the BCM1000 on a table or shelf:

1. Attach four rubber feet to the corners on the bottom of the base unit.
2. Position the BCM1000 on the table or shelf. Make sure you leave enough space around the unit for ventilation and for access to the power and system cables and to the media bay modules.

Replacing your BCM1000 hardware

If you need to replace your BCM1000, which would be the case if the motherboard or MSC became inoperable, you will need to regenerate all your keycodes to reflect the new system identification, and enter them again after you perform your system data restore. Refer to the *Business Communications Manager Programming Operations Guide* for a description of performing a data restore from your BRU backup disks.

Chapter 6
Installing the BCM1000e (expansion unit)

This chapter describes how to install the BCM1000e.

The BCM1000e must be installed close enough to the BCM1000 that the 5 m (16 ft.) cable between the two units can be connected to the BCM1000 without stress on the cable. The BCM1000e has the same environmental and electrical requirements as the BCM1000. For more information about these requirements, refer to “Preparation checklist” on page 67.

Installing the BCM1000e into a rack

The BCM1000e fits into a standard 19-inch equipment rack. You must install the unit in the same rack as the BCM1000.

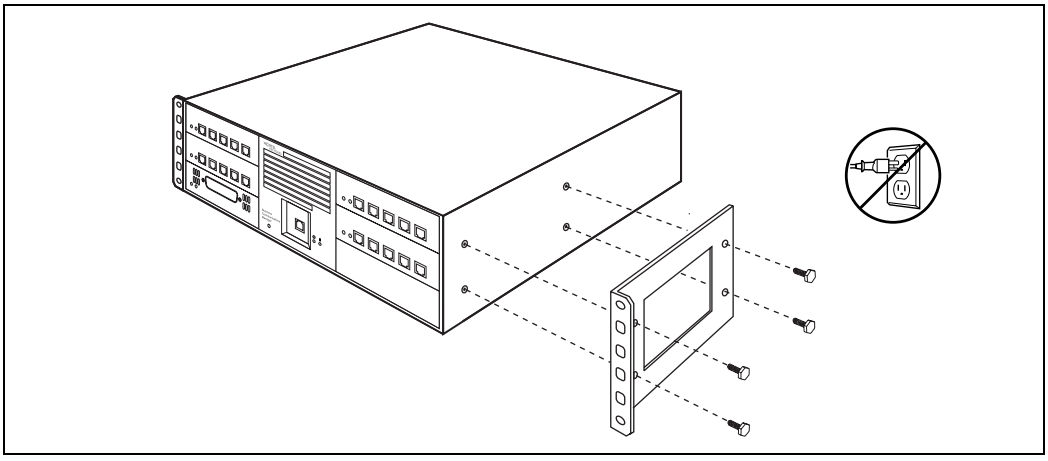
Caution: When installing the BCM1000e in a rack, do not stack units directly on top of one another. Fasten each unit to the rack with the separate mounting brackets.

Attaching the mounting brackets

You must install two rack brackets on the BCM1000e to allow you to install the unit into the equipment rack. These brackets are supplied with the unit.

1. Place the BCM1000e on a table.
2. Align the screw holes between the unit and the right rack mounting bracket. Refer to Figure 32.

Figure 32 Attach the rack mounting bracket to the BCM1000e



3 Fasten the bracket to the BCM1000e using the four supplied screws.

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

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

Note: Rack mount bracket

The BCM1000e rack mount bracket has an additional set of holes that allows you to install the brackets so that the unit sits flush with the BCM1000 in an equipment rack where space is limited.

Attaching the BCM1000e to the rack

The mounting brackets you attached to the BCM1000e correspond with mounting holes located on the equipment rack.

Note: You must supply your own screws to attach the BCM1000e to the rack.

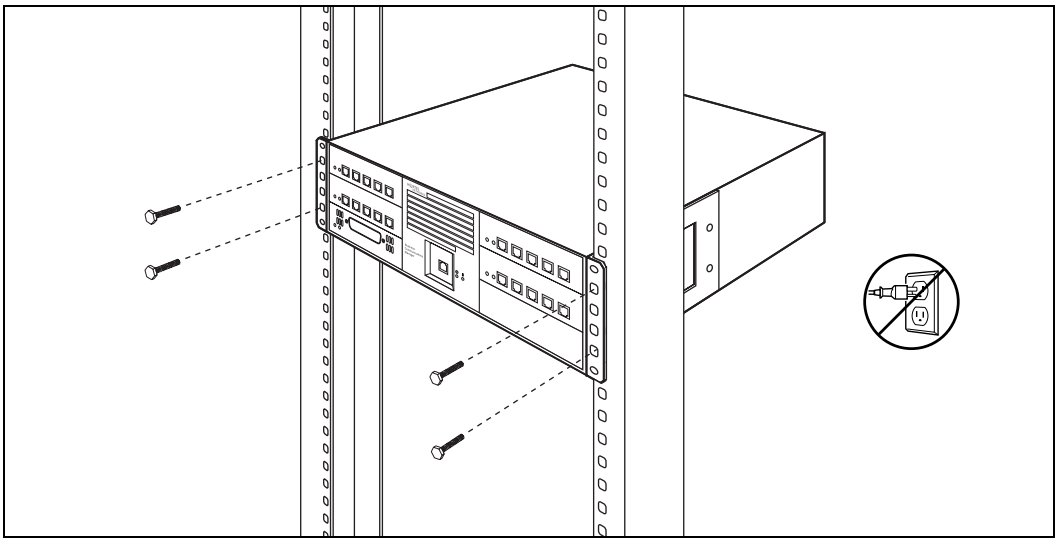
1 Determine the location in the rack you want to install the BCM1000e.

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

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

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

Figure 33 Fasten the BCM1000e to the equipment rack



Installing the BCM1000e on the wall

The BCM1000e must be installed close enough to the BCM1000 that the 5 m (16 ft.) cable between the unit and the BCM1000 can be connected without stress on the cable.

Caution: Refer to "Environment checklist" on page 67 for acceptable environmental conditions before selecting a location for the BCM1000e.

Required equipment:

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

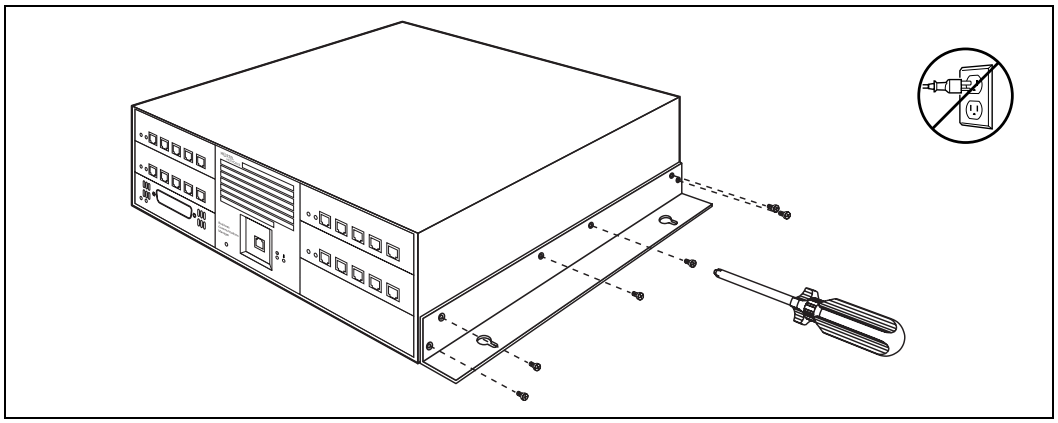
Follow these steps to mount the BCM1000e on wall:

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

Note: If the backboard for the BCM1000 has enough room for the BCM1000e, you do not require a second backboard.

2. Choose a location on the backboard that is level and leaves enough space on the sides (23 cm or 9 in.) to insert and remove the media bay modules.
3. Use the slotted holes on the wall mounting bracket to mark the location for the two mounting screws.
4. Screw two #10 x 2.5 cm (#10 x 1 in.) screws into the backboard, leaving 6 mm (1/4 in.) of the two screws showing.
5. Align the screw holes between the unit and the wall mounting bracket.
6. Fasten the wall mounting bracket using four screws. Refer to Figure 34.

Figure 34 Attaching the wall mounting bracket to the BCM1000e



Caution: Use only the screws supplied with the wall mounting bracket. Do not replace screws. Other screws can damage the BCM1000e.

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

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

9 Tighten the two screws to the wall mounting bracket.

Installing the BCM1000e on a flat surface

You can install the BCM1000e on any flat surface that can support the weight of the unit, and which is within 5 m (16 ft.) of the BCM1000.

1 Attach the supplied rubber feet to the corners of the bottom of the BCM1000e.

2 Position the unit on the table or shelf.

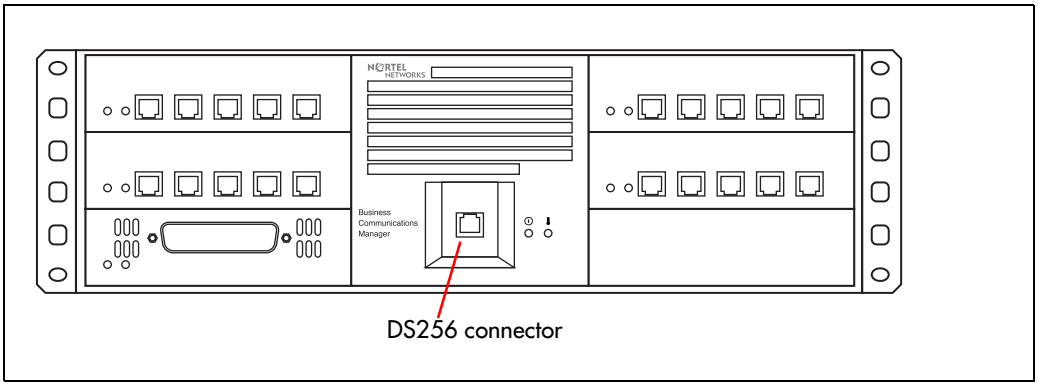
3 Ensure that you leave enough space around the unit for ventilation and access to the cables and media bay modules.

Connecting the BCM1000e to the BCM1000

After the BCM1000e has been installed in the desired location, use the supplied DS256 cable to connect it to the BCM1000.

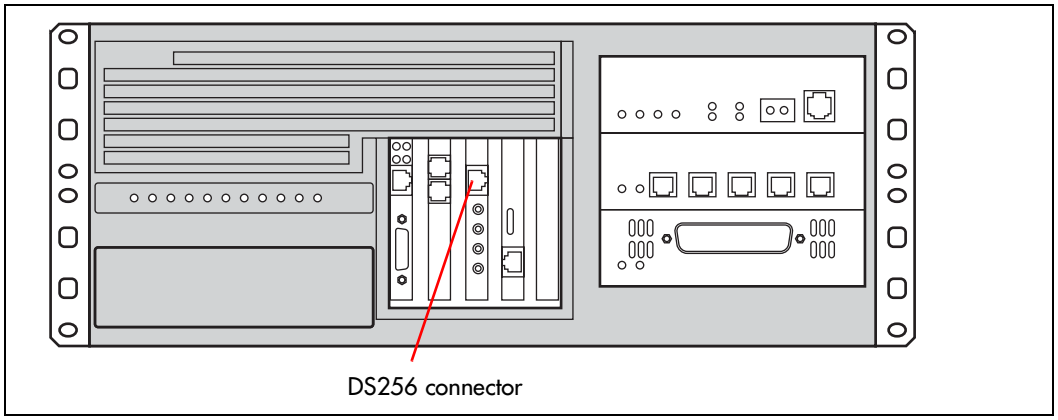
1 Plug one end of the cable into the DS256 connector on the BCM1000e. Refer to Figure 35.

Figure 35 DS256 connector on the BCM1000e



2 Plug the other end of the cable into the DS256 connector on the faceplate of the MSC in the BCM1000. Refer to Figure 36.

Figure 36 BCM1000 DS258 connector



Warning: The timing in the Business Communications Manager system is designed for a 5 m (16 ft.) Category 5 patch cable. The system cannot work properly if you connect the BCM1000e using a cable that is any other length.

Chapter 7
Setting 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.

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 106.

Start from the list of modules you chose in Chapter 4, "Selecting the media bay modules for your system," on page 57.

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

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

Rules for assigning DS30 bus blocks and offsets

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

Notes about assigning modules

The following are some general notes about assigning modules:

- If you chose a 3/5 DS30 split for your system, DS30 07 cannot be used by any module. For modules that require two DS30 buses, this means that you cannot set the DIP switches to DS30 06 for those modules, because the second level of lines would fall into 07, and would not be accessible. Refer to Figure 37 on page 85.

  Refer to "Understanding DS30 bus blocks" on page 61 for more information about 2/6 and 3/5 DS30 splits.

- DSM 32 modules require two DS30 bus numbers. When you assign the first DS30 bus number to a DSM 32, the module automatically adds the next DS30 bus. For example, if you assign DS30 02 to a DSM 32, it uses DS30 02 and 03. However, you cannot choose DS30 07 for the

DSM32 module, because the second level of DSM lines would not be accessible. The same applies to assigning a DSM32 to DSM30 06 if your system is set to a 3/5 DSM30 split. Refer to DSM switch settings on page 101.

- The DIP switches on the 4X16 module are used to set the DS30 bus number and offset for the CTM part of the module. The module automatically assigns an additional DS30 bus for the 16 DSM lines. However, you cannot choose DS30 07 for the 4X16 module, because the DSM lines would not be accessible. The same applies to DS30 06 if your system is set to a 3/5 DS30 split. Refer to 4X16 switch settings on page 97.
- Companion: configure the DSM or DSMs handling Business Communications Manager Companion to DS30 06 or 07. You must change the module number of any trunk media bay modules configured to DS30 06 or 07 to an unassigned module number to prevent conflicts with Companion.

Note: Companion DS30 split restrictions:

If you choose a 3/5 DS30 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 on DS30 06. You cannot assign a DSM 32.

- The CTM8 module 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 bus, you cannot select offset 3. Refer to CTM/GATM switch settings on page 93.
- Not all modules are available to all systems. Refer to Chapter 2, “Telephony hardware,” on page 33 for specifics about each module.

Note: Remember, if you have chosen a 3/5 DS30 split for your system, DS30 07 is no longer available for media bay modules.

Choosing the assigned order for modules

Assign the media bay modules and DS30 bus numbers in the order shown in Figure 37.

Station modules are assigned starting with DS30 02. 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 06 (DSM32) or DS30 06 and 07 (two DSM 16s or one DSM32). If your system is set to a 3/5 DS30 split, you can only assign a DSM16 to DS30 06 for Companion.

Trunk modules are assigned starting at DS30 07, in a system with a 2/6 DS30 split, and at DS30 06 in a system with a 3/5 DS30 split. The exception to this is the 4X16 module, which requires two DS30 blocks, so it must be set to a DS30 bus that has the next bus open.

Figure 37 Assigning the modules to the DS30 bus hierarchy

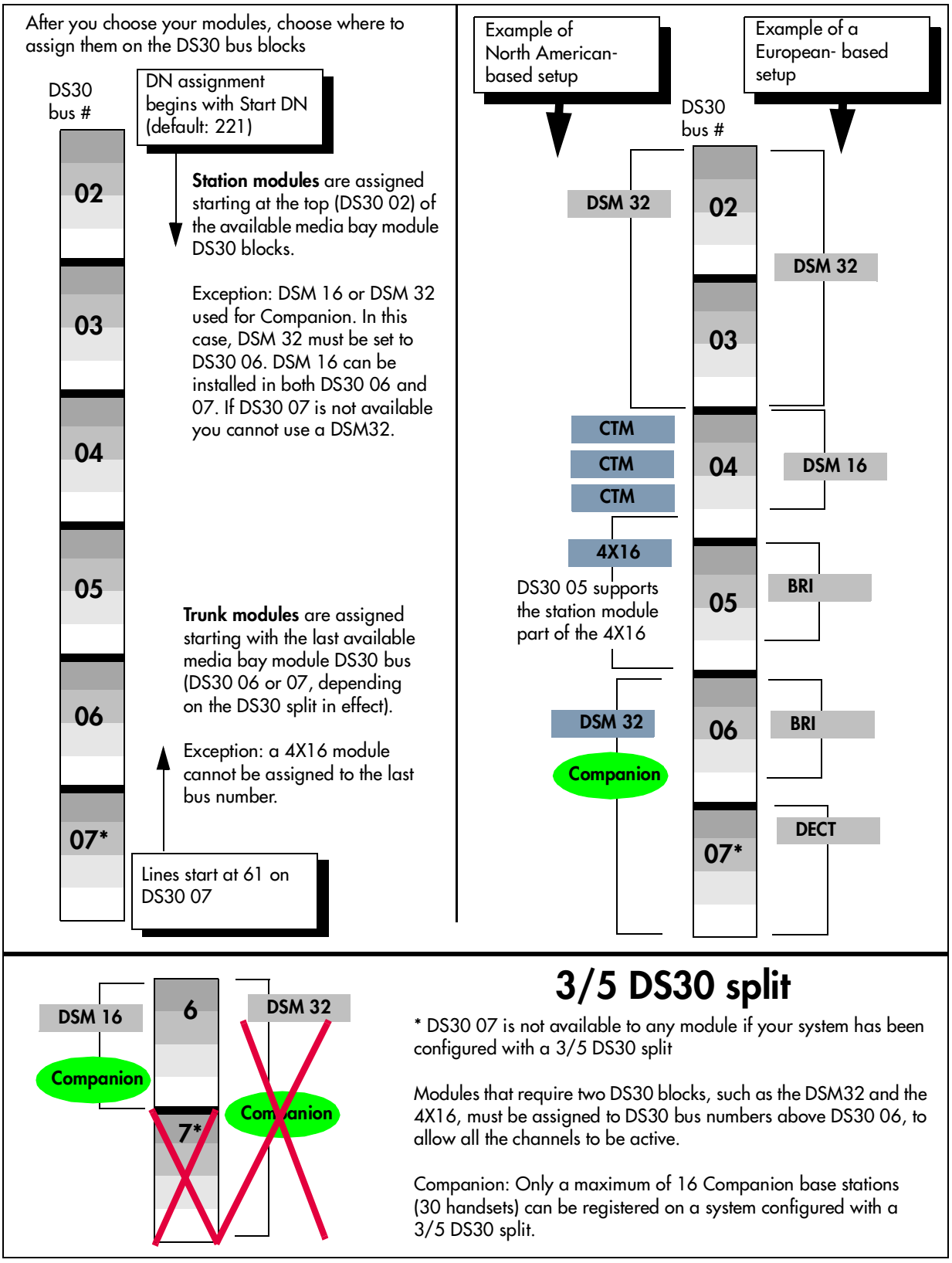


Figure 38 Assigning double density modules to the DS30 bus hierarchy

Double-density example

(system configured as PDD)

Partial Double Density

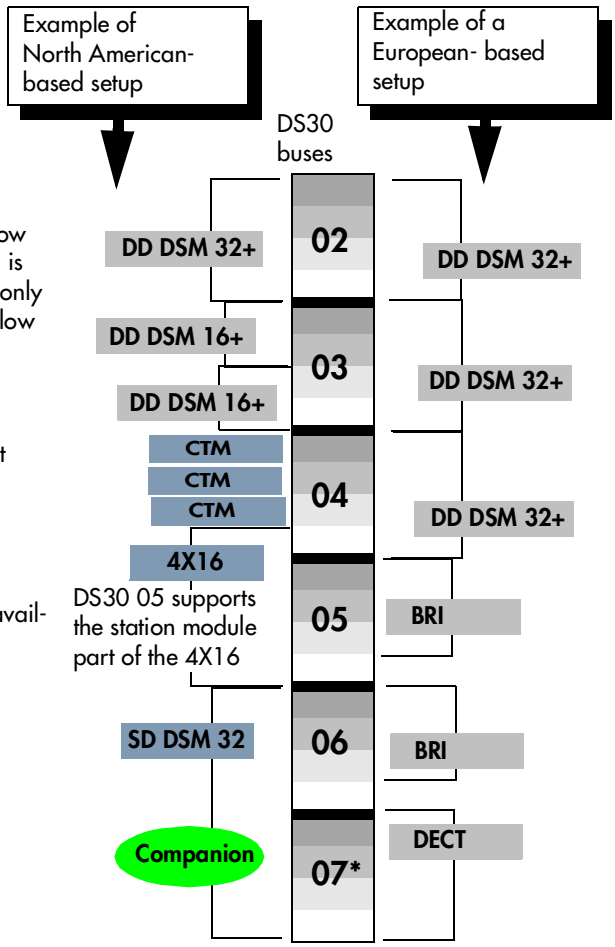
Systems configured with Partial Double Density (PDD), allow Companion telephones on DS30 06 and 07 (if the system is set to a 2/6 split). In this configuration, DS30 06 and 07 only allow single-density modules. DS30 02 to 05 are set to allow double density modules.

Full Double Density

Systems configured with Full Double Density (FDD), do not allow Companion telephones. All DS30s are set to allow double density modules.

3/5 DS30 split

If your system is set to a 3/5 DS30 split, DS30 07 is not available to any media bay modules.



Determining module DIP switch settings

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

1 Use Table 11 on page 88 to determine a switch setting for all modules except the DECT and FEM modules. Figure 39 shows an example of the table and how to do the following steps:

Step 1: On Table 11 circle the module names.

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

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

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 91 for line and DN listings.

Figure 39 How to use the configuration map

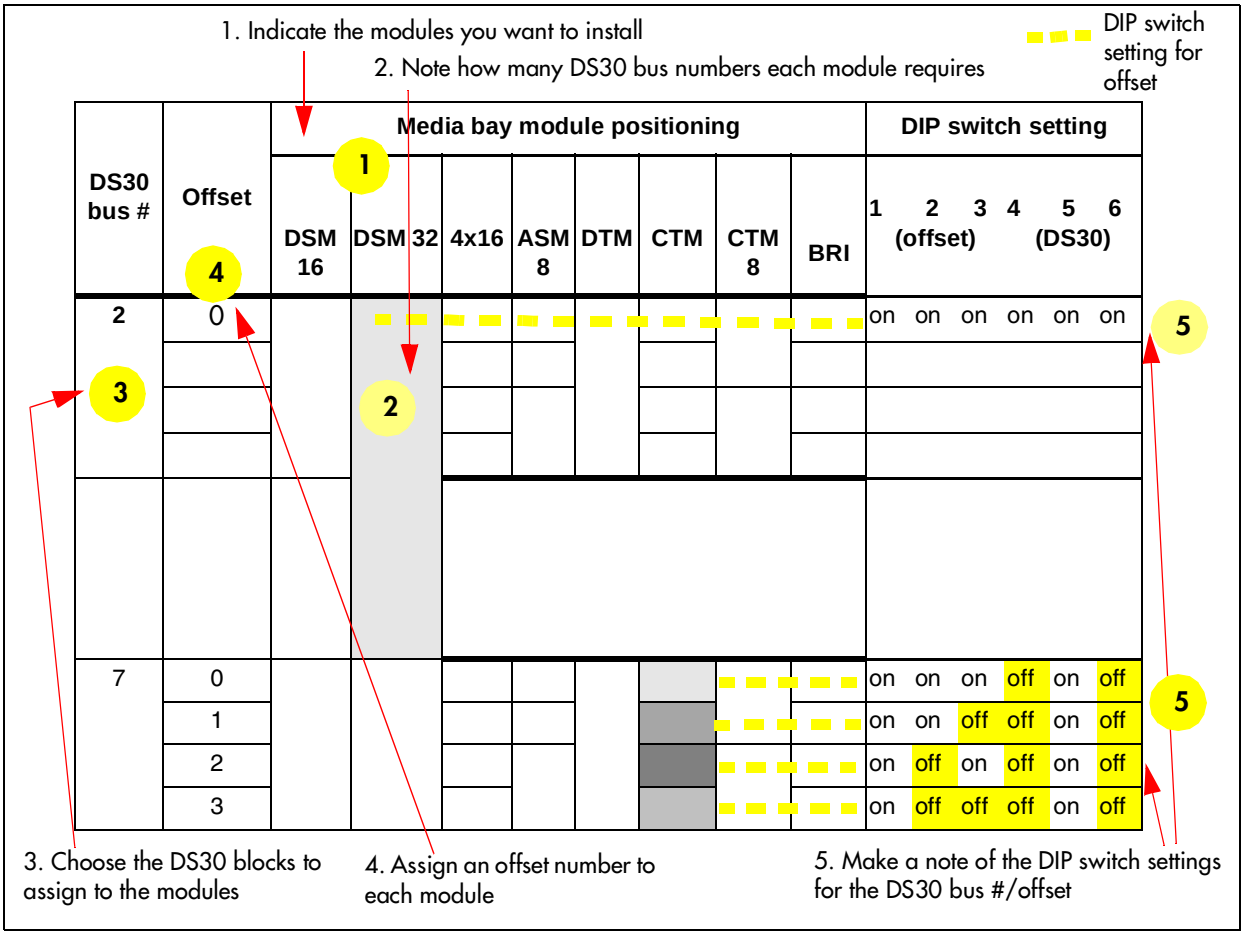


Table 11 shows possible DS30 bus numbers and offset configurations for each type of module, and the corresponding switch settings for modules that only allow single density, or which are set to single density, as may be the case for a DSM16+ or DSM32+.

The ASM/ASM8 settings are the same for either single or double density, except that you can only use offset 0 and 1 on a DS30 bus that is not set for double density, such as for DS30 06 and 07 on a PDD system.

For DECT and FEM settings, refer to "DECT switch settings" on page 105 and "FEM switch settings" on page 106.

Example: Position your DSM 16 module (step 1), which requires one full DS30 bus (step 2), in DS30 02 (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 11 Possible media bay module DIP switch settings, single density

DS30 bus #	Offsets	Media bay module positioning									DIP switch settings						
		DSM 16/ 16+ Offsets 0	DSM 32/ 32+ Offsets 0		4x16 Offsets 0,1, 2, 3 Line	Exten.	ASM 8/ ASM8+ Offsets 0, 1, 2	DTM Offsets 0	CTM/ GATM4 Offsets 0, 1, 2, 3	CTM 8/ GATM8 Offsets 0, 1, 2		BRI Offsets 0, 1, 2, 3	1 (offset)	2 (offset)	3 (offset)	4 (DS30)	5 (DS30)	6 (DS30)
2	0	0	0		0	Picks up ch. #3	0	0	0	0		0	on	on	on	on	on	on
	1				1				1		1	1	on	on	off	on	on	on
	2				2		1		2	2		2	on	off	on	on	on	on
	3				3				3				on	off	off	on	on	on
3	0	0		0	0	Picks up ch. #4	0	0	0	0		0	on	on	on	on	on	off
	1				1				1		1	1	on	on	off	on	on	off
	2				2		1		2	2		2	on	off	on	on	on	off
	3				3				3				on	off	off	on	on	off
4	0	0	0		0	Picks up ch. #5	0	0	0	0		0	on	on	on	on	off	on
	1				1				1		1	1	on	on	off	on	off	on
	2				2		1		2	2		2	on	off	on	on	off	on
	3				3				3				on	off	off	on	off	on
5	0	0		0	0	Picks up ch. #6	0	0	0	0		0	on	on	on	on	off	off
	1				1				1		1	1	on	on	off	on	off	off
	2				2		1		2	2		2	on	off	on	on	off	off
	3				3				3				on	off	off	on	off	off
6	0	0	0		0	Picks up ch. #7	0	0	0	0		0	on	on	on	off	on	on
	1				1				1		1	1	on	on	off	off	on	on
	2				2		1		2	2		2	on	off	on	off	on	on
	3				3				3				on	off	off	off	on	on
7***	0	0			Not supported		0	0	0	0		0	on	on	on	off	on	off
	1								1		1	1	on	on	off	off	on	off
	2						1		2	2		2	on	off	on	off	on	off
	3								3				on	off	off	off	on	off

Module set to offset 0 Module set to offset 1 Module set to offset 2 Module set to offset 3

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

***If your system is configured with a 3/5 DS30 split, DS30 07 is not available to media bay modules.

Table 12 Possible media bay module DIP switch settings for double density

DS30 bus #	Media bay module positioning		DIP switch settings						Offsets		DIP switch settings					
	DSM16+ Offsets 0, 1	DSM32+ Offset 0	1 (offset)	2 (offset)	3 (offset)	4 (DS30)	5 (DS30)	6 (DS30)		ASM8/ASM8+ Offsets 0, 1, 2, 3	1 (offset)	2 (offset)	3 (offset)	4 (DS30)	5 (DS30)	6 (DS30)
02	0	0	off	on	on	on	on	on	0	0	on	on	on	on	on	on
			off	on	off	on	on	on	1	1	on	on	off	on	on	on
	1								2	2	on	off	on	on	on	on
									3	3	on	off	off	on	on	on
03	0	0	off	on	on	on	on	off	0	0	on	on	on	on	on	off
			off	on	off	on	on	off	1	1	on	on	off	on	on	off
	1								2	2	on	off	on	on	on	off
									3	3	on	off	off	on	on	off
04	0	0	off	on	on	on	off	on	0	0	on	on	on	on	off	on
			off	on	off	on	off	on	1	1	on	on	off	on	off	on
	1								2	2	on	off	on	on	off	on
									3	3	on	off	off	on	off	on
05	0	0	off	on	on	on	off	off	0	0	on	on	on	on	off	off
			off	on	off	on	off	off	1	1	on	on	off	on	off	off
	1								2	2	on	off	on	on	off	off
									3	3	on	off	off	on	off	off
06	0	0	off	on	on	off	on	on	0	0	on	on	on	off	on	on
			off	on	off	off	on	on	1	1	on	on	off	off	on	on
	1								2	2	on	off	on	off	on	on
									3	3	on	off	off	off	on	on
07***	0	0	off	on	on	off	on	off	0	0	on	on	on	off	on	off
			off	on	off	off	on	off	1	1	on	on	off	off	on	off
	1								2	2	on	off	on	off	on	off
									3	3	on	off	off	off	on	off

Module set to offset 0 Module set to offset 1 Module set to offset 2 Module set to offset 3

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

***If your system is configured with a 3/5 DS30 split, DS30 07 is not available to media bay modules.

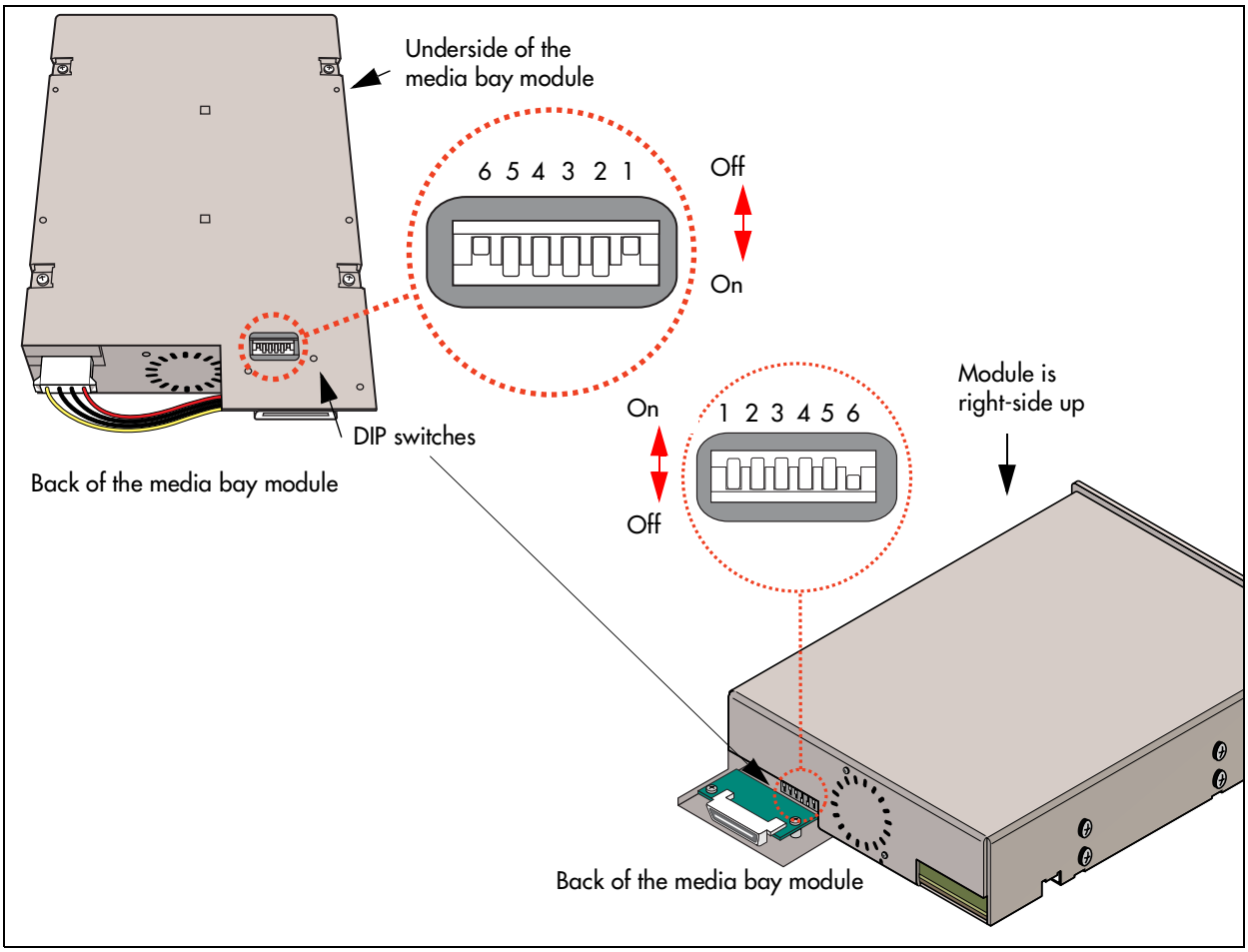
Setting the DIP switches on the modules

Before you install the media bay modules into the BCM1000 or BCM1000e housing, you need to set the DIP switches. Make a note of these settings either on the chart shown in Table 11 on page 88 or in the Programming Record forms.

Follow these steps to set the DIP switches:

1 Locate the DIP switches on the module.

Figure 40 Switches on the media bay module



2 Set the switches to correspond with the settings you chose "Determining module DIP switch settings" on page 87.

3 Repeat for each media bay module you want to install.

GATM and ASM8+ modules: Set the country settings to either be off, if the country profile and software version for your system allows firmware downloads, or set the dip switches to activate the appropriate country settings. Refer to "GATM switch settings" on page 94.

4 You are now ready to install the modules into the BCM1000 or BCM1000e units. Refer to Chapter 9, "Starting the system," on page 115 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.

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 bus numbers, switch settings, and the line/extension numbers for each type of module. The DS30 bus and switch settings correspond with Table 11 on page 88.

DTM switch settings

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

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

Table 13 DTM switch settings (T1)

Select DS30 bus #	Enter these switch settings						To assign these lines	Select DS30 bus #	Enter these switch settings						To assign these lines
	1	2	3	4	5	6			1	2	3	4	5	6	
02	on	on	on	on	on	on	211-234	05	on	on	on	on	off	off	121-144
03	on	on	on	on	on	off	181-204	06	on	on	on	off	on	on	91-114
04	on	on	on	on	off	on	151-174	07[1]	on	on	on	off	on	off	61-84

[1] If your system is configured with a 3/5 DS30 split, DS30 07 is not available.

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

Table 14 DTM switch settings (North American PRI)

Select DS30 bus #	Enter these switch settings						To assign these lines	Select DS30 bus #	Enter these switch settings						To assign these lines
	1	2	3	4	5	6			1	2	3	4	5	6	
02	on	on	on	on	on	on	211-233	05	on	on	on	on	off	off	121-143
03	on	on	on	on	on	off	181-203	06	on	on	on	off	on	on	91-113
04	on	on	on	on	off	on	151-173	07[1]	on	on	on	off	on	off	61-83

[1] If your system is configured with a 3/5 DS30 split, DS30 07 is not available.

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

Table 15 DTM switch settings (E1 and UK PRI)

Select DS30 bus #	Enter these switch settings 1	2	3	4	5	6	To assign these lines
02	on	on	on	on	on	on	211-240
03	on	on	on	on	on	off	181-210
04	on	on	on	on	off	on	151-180
05	on	on	on	on	off	off	121-150
06	on	on	on	off	on	on	91-120
07[1]	on	on	on	off	on	off	61-90

[1]If your system is configured with a 3/5 DS30 split, DS30 07 is not available.

BRI switch settings

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

Table 16 BRIM S/T switch settings

Select DS30 bus #	Select offset	Enter these switch settings 1	2	3	4	5	6	To assign these lines
02	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
03	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
04	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
05	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
06	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
07[1]	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

[1] If your system is configured with a 3/5 DS30 split, DS30 07 is not available.

CTM/GATM switch settings

There are two models of CTMs/GATMs.

- CTMs/GATM4s have four lines, therefore, you can add a maximum of four CTMs/GATM4s per DS30 bus.
- CTM8s/GATM8s have eight lines. This module uses two offset settings per module. Therefore, you can add a maximum of two CTM8/GATM8s per DS30 bus.
- You can mix two modules on the same DS30 bus. 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 bus 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.

GATM4: The GATM4 provides connections for four analog calling line identification (CLID) or Supervision Disconnect PSTN lines. Each voice line uses one line in the DS30 bus offset. Since each DS30 bus has four lines per offset, you can assign a maximum of four GATM4s to a single DS30 bus by making the offset switch settings different for each module.

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 bus.
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.

GATM8: The GATM8 provides connections for eight analog calling line identification (CLID) or Supervision Disconnect PSTN lines. Each line uses one line in the DS30 bus offset. Since each DS30 bus has four lines per offset, you require two offsets for each GATM8. You can assign a maximum of two GATM8s to a DS30 bus, by making the offset switch settings different for each module. You can also combine a GATM8 with a 4X16 module on the same DS30 number. When you choose an offset number for the GATM8, the system automatically adds the next offset number. You cannot assign offset 3 to the GATM8 module, because this does not allow the module to assign the second set of lines.

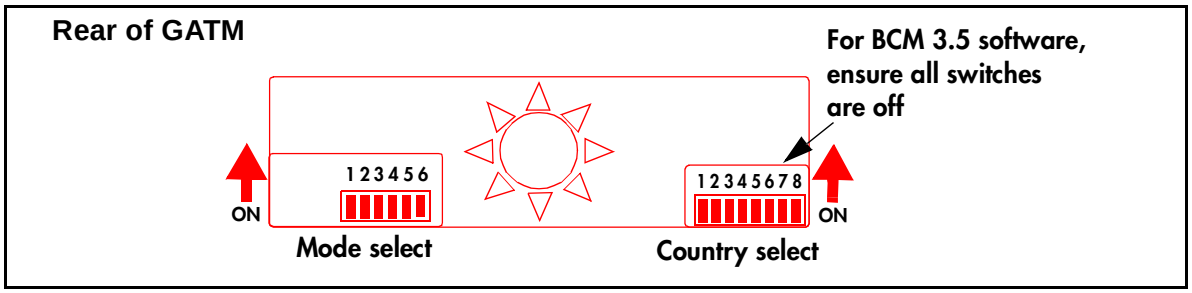
GATM switch settings

There are two sets of DIP switches located on the rear of the GATM module.

The left set of switches allows you to determine the DS30 bus and offset for the module. Refer to Table 17.

The right set of switches allows you to manually configure a country profile operation, which is required for earlier versions of software. However, BCM 3.5 software supports downloadable firmware for the module for the North America, Taiwan, UK and Australia telephone profiles. To allow the GATM to download the parameters for these countries and to allow for firmware upgrades, set all the country DIP switches to 0 (zero/off) (factory default). The MSC telephony profile you choose must support the appropriate country setting to ensure that the correct firmware installs. Refer to Table 18.

Figure 41 Rear of GATM module, showing DIP switch locations



CTM/GATM DIP switch settings

Table 17 shows the switch settings for each DS30 bus, and the resulting line assignments for CTMs/GATM4s and CTM8s/GATM8s.

Table 17 CTM/GATM4 and CTM8/GATM8 DS30 and offset switch settings

Select DS30 bus #	Select offset	Enter these switch settings						To assign these lines CTM/GATM4	To assign these lines. CTM8/GATM8	
		1	2	3	4	5	6		Lower (Lines 1-4)	Upper (lines 5-8)
02	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
03	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
04	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
05	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
06	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

Table 17 CTM/GATM4 and CTM8/GATM8 DS30 and offset switch settings (Continued)

Select DS30 bus #	Select offset	Enter these switch settings						To assign these lines CTM/GATM4	To assign these lines. CTM8/GATM8	
		1	2	3	4	5	6		Lower (Lines 1-4)	Upper (lines 5-8)
07[1]	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

[1] If your system is configured with a 3/5 DS30 split, DS30 07 is not available.

The table below lists the possible DIP switch settings for the Mode and Country DIP switches for the GATM4 and GATM8.

Table 18 Global Analog Trunk Module DIP switch settings

Country select DIP switch settings								
1	2	3	4	5	6	7	8	Switch Function
								Reserved
								Reserved
								Reserved
								Reserved
								Reserved
								Country 3
								Country 2
								Country 1

Setting for automatic downloads (all countries)								
off	off	off	off	off	off	off	off	Download based on profile
Manual settings (pre-BCM 3.5 systems)								
off	off	off	off	off	off	off	on	North America (600 ohms)
off	off	off	off	off	off	on	off	Taiwan
off	off	off	off	off	off	on	on	Australia
off	off	off	off	off	on	off	off	United Kingdom
off	off	off	off	off	on	off	on	North America (900 ohms)

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 bus number and all the assigned DNs.

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

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

Table 19 4X16 switch settings

Select DS30 bus #	Select offset	Enter these switch settings 1	2	3	4	5	6	To assign these lines	And this DS30 bus and DNs	[2] Custom DN range
02	0	on	on	on	on	on	on	211-214	DS30 bus 03 237-252 (2.5 upgrade) 253-268 (3.0 new)	
	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		
03	0	on	on	on	on	on	off	181-184	DS30 bus 04 253-268 (2.5 upgrade) 285-292 (3.0 new)	
	1	on	on	off	on	on	off	189-192		
	2	on	off	on	on	on	off	197-200		
	3	on	off	off	on	on	off	205-208		
04	0	on	on	on	on	off	on	151-154	DS30 bus 05 269-284 (2.5 upgrade) 317-332 (3.0 new)	
	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		
05	0	on	on	on	on	off	off	121-124	DS30 bus 06 285-300 (2.5 upgrade) 349-364 (3.0 new)	
	1	on	on	off	on	off	off	129-132		
	2	on	off	on	on	off	off	137-140		
	3	on	off	off	on	off	off	145-148		

Table 19 4X16 switch settings (Continued)

Select DS30 bus #	Select offset	Enter these switch settings						To assign these lines	And this DS30 bus and DNs	[2] Custom DN range
		1	2	3	4	5	6			
06	0	on	on	on	off	on	on	91-94	DS30 bus 07[1]	
	1	on	on	off	off	on	on	99-102	301-316 (2.5 upgrade)	
	2	on	off	on	off	on	on	107-110		
	3	on	off	off	off	on	on	115-118	381-396 (3.0 new)	
07[1]								Not supported		

[1] If your system is configured with a 3/5 DS30 split, you cannot configure this module for DS30 06 since DS30 07 is not available for the second level.

[2] 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.

ASM 8/ASM8+ switch settings

For systems running software prior to BCM 3.0, only two ASM units can share a DS30 bus, using offset 0, 1 or 2. BCM 3.0 software introduced the concept of double density, which allows you to install an ASM8/ASM8+ on all four offsets on DS30 02 to 05. DS30 06 and 07 remain in single density mode for the default Partial Double Density (PDD) system. This means that only two ASM8/ASM8+ modules would be supported on these DS30 blocks unless the system is changed to Full Double Density (FDD). ASM8+ modules can also support firmware download on systems running BCM 3.6 and newer software. Refer to "ASM8+ country switch settings" on page 100.

DN numbering sequence: A DS30 bus set to double density has a total of 32 lines available for telephones. On systems upgraded from BCM 2.5/2.5.1, the first 16 lines on the bus do not number consecutively with the second 16 lines on the bus. On systems that were new for BCM 3.0, the 32 lines on the bus do number consecutively.

Table 20 shows the switch settings for each DS30 bus and the dialing numbers (DNs) assigned to each DS30 bus. The table shows settings for a system in FDD. For PDD systems, where DS30 06 and 07 are single density, only two modules can be installed on either bus.

Table 20 ASM8 settings for upgraded 2.5 systems and new 3.0 systems

Select bus#	Select offset	Enter these switch settings						To assign these DNs		[2] Custom DN range
		1	2	3	4	5	6	2.5 system upgraded to 3.0	New 3.0 system	
02	0	on	on	on	on	on	on	221-228	221-228	
	1	on	on	off	on	on	on	228-236	228-236	
	2	on	off	on	on	on	on	377-384	237-244	
	3	on	off	off	on	on	on	385-392	245-252	
03	0	on	on	on	on	on	off	237-244	253-260	
	1	on	on	off	on	on	off	245-252	261-268	
	2	on	off	on	on	on	off	393-400	269-275	
	3	on	off	off	on	on	off	401-408	276-284	
04	0	on	on	on	on	off	on	253-260	285-292	
	1	on	on	off	on	off	on	261-268	293-300	
	2	on	off	on	on	off	on	409-416	301-308	
	3	on	off	off	on	off	on	417-424	309-316	

Table 20 ASM8 settings for upgraded 2.5 systems and new 3.0 systems (Continued)

Select bus#	Select offset	Enter these switch settings						To assign these DNs		[2] Custom DN range
		1	2	3	4	5	6	2.5 system upgraded to 3.0	New 3.0 system	
05	0	on	on	on	on	off	off	269-276	317-324	
	1	on	on	off	on	off	off	277-284	325-332	
	2	on	off	on	on	off	off	425-432	333-340	
	3	on	off	off	on	off	off	433-440	341-348	
06	0	on	on	on	off	on	on	285-292	349-356	
	1	on	on	off	off	on	on	293-300	357-364	
	2[3]	on	off	on	off	on	on	441-448	365-372	
	3[3]	on	off	off	off	on	on	449-456	373-380	
07[1]	0	on	on	on	off	on	off	301-308	381-388	
	1	on	on	off	off	on	off	309-316	389-396	
	2[4]	on	off	on	off	on	off	457-454	397-404	
	3[4]	on	off	off	off	on	off	455-472	405-412	

[1] If your system is configured with a 3/5 split, DS30 07 is not available.

[2] 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.

[3] Available only on systems set to FDD.

[4] Available only on systems set to FDD, with a 2/6 DS30 split.

ASM8+ country switch settings

The ASM8+ has a second set of eight dip switches on the right side, at the rear of the module, that allow you to choose a country setting and three modes of function.

- Switch 1: firmware download capability
  - — off= no firmware downloads (for systems running BCM 3.5 and previous software
  - — on = allow firmware downloads (for systems running BCM 3.6 and newer software)
- Switch 2: when to download firmware:
  - — off = download firmware based on version
  - — on = download firmware at cold start

- Switch 3: echo cancellation
  - — off=echo cancellation enabled (default)
  - — on=echo cancellation disabled
- Switch 4-8: country settings

Refer to Table 21 for detailed switch settings.

Table 21 ASM8+ country select dip switch settings

Manual settings (pre-BCM 3.6 systems)								Country profile	Manual settings (BCM 3.6 and newer systems)							
1	2	3	4	5	6	7	8		1	2	3	4	5	6	7	8
off	off	off	off	off	off	off	off	North America	on	off	off	off	off	off	off	off
off	off	off	off	off	off	off	on	United Kingdom	on	off	off	off	off	off	off	on

DSM switch settings

The DSMs support 16 internal lines. The DSM16 and DSM32 are legacy modules only support single density on a bus. Therefore, you can only install one DSM16 per DS30 bus, and one DSM32 for two DS30 bus blocks. For this configuration, the offset is always 0.

Warning: Ensure that switches 1, 2, and 3 are always set to On, otherwise your module will not function.

The DSM16+ and DSM32+ were introduced in conjunction with BCM 3.0 software. These modules can be configured in either single density or double density mode. In double density mode, you can install two DSM16+ modules (offset 0 and 1) or one DS32+ (offset is still 0) on one DS30, providing 32 DN lines per bus.

Table 22 shows the switch settings for each DS30 bus, and the dialing numbers (DNs) assigned to each bus for systems that have been upgraded from BCM 2.5 software to BCM 3.0 or newer software. Note that Companion sets can only be assigned on DS30 06 and 07, and the handsets have a different set of default DNs than the digital sets.

Table 23 shows the switch settings for each DS30 bus and the DNs assigned to each bus for systems that were new with BCM 3.0 or newer software.

On these two tables, note that the modules only use the top 16 DNs for each DS30 bus occupied. In a single-density configuration, it does not matter if the bus is FDD or PDD, only the top 16 lines can be accessed.

Table 22 DSM single density settings for BCM 2.5 systems upgraded to BCM 3.0 or newer software

Select DS30 bus #	Enter these switch settings						[2] 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	[2] Custom DN range
	1	2	3	4	5	6				

Table 22 DSM single density settings for BCM 2.5 systems upgraded to BCM 3.0 or newer software

02	on	on	on	on	on	on	221-236	221-252 (DS30 02 and 03)	N/A	
03	on	on	on	on	on	off	237-252	237-268 (DS30 03 and 04)		
04	on	on	on	on	off	on	253-268	253-284) (DS30 04 and 05)		
05	on	on	on	on	off	off	269-284	269-300 (DS30 05 and 06)		
06	on	on	on	off	on	on	285-300	285-316 (DS30 06 and 07)	565-580[3] **(PDD only)**	
07[1]	on	on	on	off	on	off	301-316	N/A	581-596[3] **(PDD only)**	

[1] If your system is configured with a 3/5 DS30 split, you cannot use DS30 07 for the DSM 16 module. You cannot configure the DSM 32 module for DS30 06 because the second set of DNs cannot be accessed.

[2] 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.

[3] If you need more DNs for Companion sets, use the range that starts at 597 (ISDN or DECT) and change the DN type to Companion. If you system is set to Full Double Density (FDD), Companion telephones are not supported.

Companion can only be deployed on systems that remain at Part Double Density (PDD), the default condition of BCM 3.0 and newer systems.

Table 23 DSM single density switch settings for new BCM 3.0 (or newer) systems

Select DS30 bus #	Enter these switch settings						[2] 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	[2] Custom DN range
	1	2	3	4	5	6		Top	Bottom		
02	on	on	on	on	on	on	221-236	253-268	221-236	N/A	
03	on	on	on	on	on	off	253-268	285-300	253-268		
04	on	on	on	on	off	on	285-300	317-332	285-300		
05	on	on	on	on	off	off	317-332	349-364	317-332		
06	on	on	on	off	on	on	349-364	381-396	349-364	565-580[3] **(PDD only)**	
07[1]	on	on	on	off	on	off	381-396	N/A		581-596[3] **(PDD only)**	

[1] If your system is configured with a 3/5 split, you cannot use DS30 07 for the DSM 16 module. You cannot configure the DSM32 module for DS30 06 because the second set of DNs cannot be accessed.

[2] 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.

[3] If you need more DNs for Companion sets, use the range that starts at 597 (ISDN or DECT) and change the DN type to Companion. If you system is set to Full Double Density (FDD), Companion telephones are not supported.

Companion has not be included in this table because you cannot use modules set to double density to deploy Companion.

Table 24 DSM 16+ and DSM32+ double density switch settings for 2.5 systems upgraded to BCM 3.0 or newer software

Select DS30 bus #	Enter these switch settings							[2] To assign these DNs to DSM 16+: (A=DSM1, B=DSM2)		To assign these DNs to DSM 32+ (connectors: A=top, B=bottom)		[2] Custom DN range
	1	2	3	4	5	6						
02	off	on	on	on	on	on	A	221-236	A	377-392		
	on	off	off	on	on	on	B	377-392	B		221-236	
03	off	on	on	on	on	off	A	237-252	A	393-408		
	on	off	off	on	on	off	B	393-408	B		237-252	
04	off	on	on	on	off	on	A	253-268	A	409-424		
	on	off	off	on	off	on	B	409-424	B		253-268	
05	off	on	on	on	off	off	A	269-284	A	425-440		
	on	off	off	on	off	off	B	425-440	B		269-284	
06	off	on	on	off	on	on	A	285-300	A	441-456[3]		
	on	off	off	off	on	on	B	441-456[3]	B		285-300	
07[1]	off	on	on	off	on	off	A	301-316	A	457-472[4]		
	on	off	off	off	on	off	B	457-472[4]	B		301-316[4]	

[1] If your system is configured with a 3/5 split, you cannot use DS30 07 for the DSM 16 module.

[2] 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.

[3] 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.

[4] 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.

Companion has not be included in this table because you cannot use double density modules to deploy Companion.

Table 25 DSM 16+ and DSM32+ double density switch settings for new systems with BCM 3.0 or newer software

Select DS30 bus #	Enter these switch settings 1	2	3	4	5	6		To assign these DNs to DSM 16+: A= DSM1, B=DSM2		To assign these DNs to DSM 32+ (connectors: A=top, B = bottom)		[2] Custom DN range
02	off	on	on	on	on	on	A	221-236	A	237-252		
	off	on	off	on	on	on	B	237-252	B		221-236	
03	off	on	on	on	on	off	A	253-268	A	269-284		
	off	on	off	on	on	off	B	269-284	B		253-268	
04	off	on	on	on	off	on	A	285-300	A	301-316		
	off	on	off	on	off	on	B	301-316	B		285-300	
05	off	on	on	on	off	off	A	317-332	A	333-348		
	off	on	off	on	off	off	B	333-348	B		317-332	
06	off	on	on	off	on	on	A	349-364	A	365-380[3]		
	off	on	off	off	on	on	B	365-380[3]	B		349-364	
07[1]	off	on	on	off	on	off	A	381-396	A	397-412[4]		
	off	on	off	off	on	off	B	397-412[4]	B		381-396	

[2] 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.

[1] If your system is configured with a 3/5 split, you cannot use DS30 07.

[3] 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.

[4] 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.

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

Table 26 shows the settings for each DS30 bus, and the assigned dialing numbers (DNs).

Table 26 DECT module settings

Select DS30 bus #	Select offset	Set the switches						Use these DNs on 2.5 and newer systems	Use these DNs on updated 2.0 system	[2] Custom DN range
		Offset			DS30					
		1	2	3	4	5	6			
02	0	on	on	on	on	on	on	597-624[3]	501-532[3]	
03	0	on	on	on	on	on	off	597-624[3]	501-532[3]	
04	0	on	on	on	on	off	on	597-624[3]	501-532[3]	
05	0	on	on	on	on	off	off	597-624[3]	501-532[3]	
06	0	on	on	on	off	on	on	597-624[3]	501-532[3]	
07[1]	0	on	on	on	off	on	off	597-624[3]	501-532[3]	

[1] If your system is configured with a 3/5 DS30 split, DS30 07 is not available.

[2] 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.

[3] 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.

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 BCM1000. Each port also occupies one full DS30 bus. 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 BCM1000.

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 27.

For example, if you want to use fiber port 2, turn on DIP switch 2 (DS30 03). After the module is installed, an LED lights beside each active fiber port.

Table 27 shows the switch for each fiber port.

Table 27 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						02
2		ON					03
3			ON				04
4				ON			05
5					ON		06
6						ON	07[1]

[1] If your system is configured with a 3/5 DS30 split, DS30 07 is not available.

Note: If you turn on all six switches, you are using all the DS30 bus blocks. In this case, the BCM1000 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 BCM1000. Doing this results in unpredictable behavior with both modules.

Chapter 8
Installing media bay modules

After you set the switches on the media bay modules, you can install them in the BCM1000 or the BCM1000e.

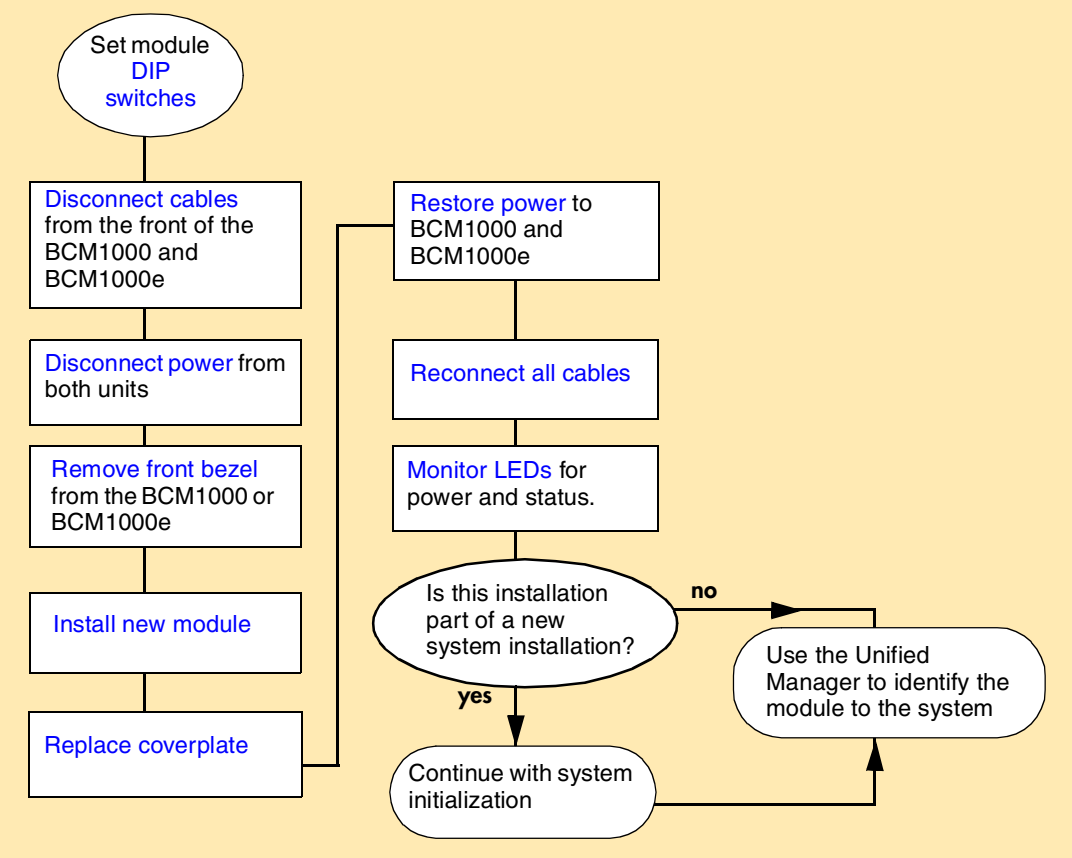
The BCM1000 accommodates a maximum of three media bay modules. If your system requires more than three media bay modules, you need to connect a BCM1000e to the BCM1000.

Figure 42 provides an overview of the process for installing media bay modules.

Note: The number of media bay modules you can add varies, depending on the DS30 resources that are available. Refer to Figure 27 on page 64.

Danger: The BCM1000 and BCM1000e must be correctly powered down before you install or remove media bay modules.

Figure 42 Process map: Installing a media bay module



Shutting down the system

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

Warning: If you are installing a new system, or new BCM1000 or BCM1000e, refer to Chapter 11, “Installing telephones and peripherals,” on page 141 for instructions about installing a new system before you connect the system to the ac power outlet.

Warning: DO NOT continue with module installation until you ensure the BCM1000 and BCM1000e are set to the correct voltages (version 2.0 systems with standard power supply).

Warning: Failure to follow procedures to properly disconnect the BCM1000 and BCM1000e, can result in module or system damage.

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

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

1. If you are adding or replacing a module in an active system, follow these steps first:
   - **a** Choose **System**.
   - **b** Click the **Logoff** menu and then click **Shutdown**.
   - **c** Click the **Yes** button.
   - **d** Wait until the Status changes to **Complete! It is safe to turn off the system**.
   - **e** Click the **Done** button.
   - **f** Exit the Unified Manager.
2. Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
3. Ensure the cables connected to the front of the base unit and the expansion unit are clearly marked.
4. Remove the cables from all the media bay modules and the MSC on the BCM1000 front panel and the BCM1000e, if there is one.
5. Disconnect the BCM1000 and BCM1000e power cords from the ac outlet.

Installing a media bay module

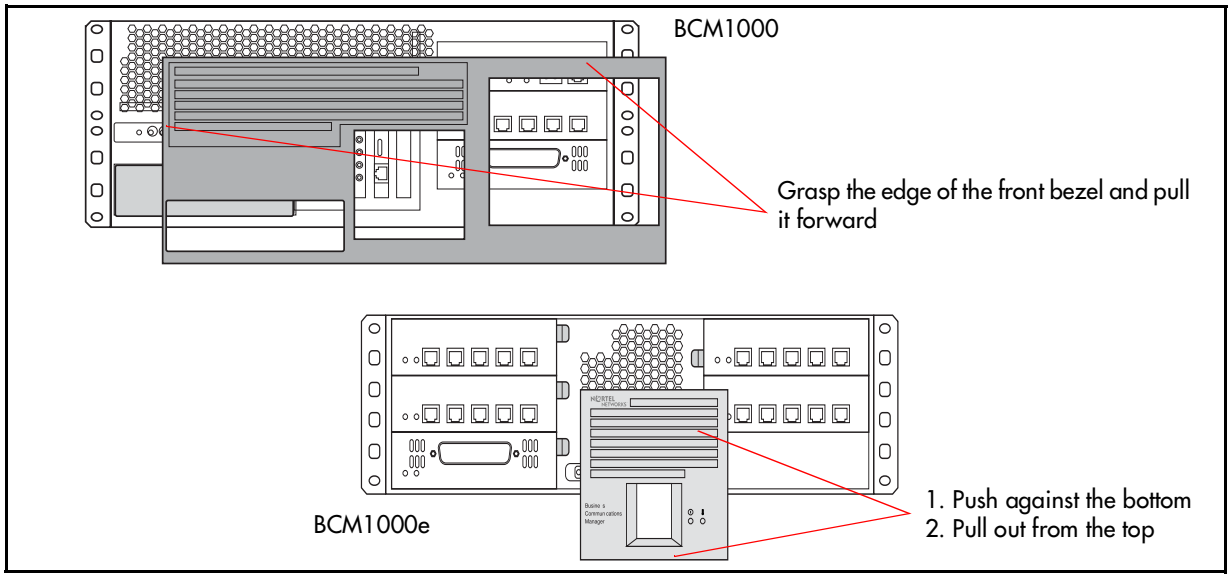
After the system is powered down, you can install and remove media bay modules, as required. Follow these procedures to install a media bay module. Reverse the procedure to remove modules.

1 Ensure that the switches on the media bay module are set correctly. For information about how to set the switches, refer to Chapter 7, "Setting media bay module DIP switches," on page 83.

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 106.

2 Remove the front bezel from the unit where you want to install or remove the module by grasping the edges and pulling forward. Refer to Figure 43.

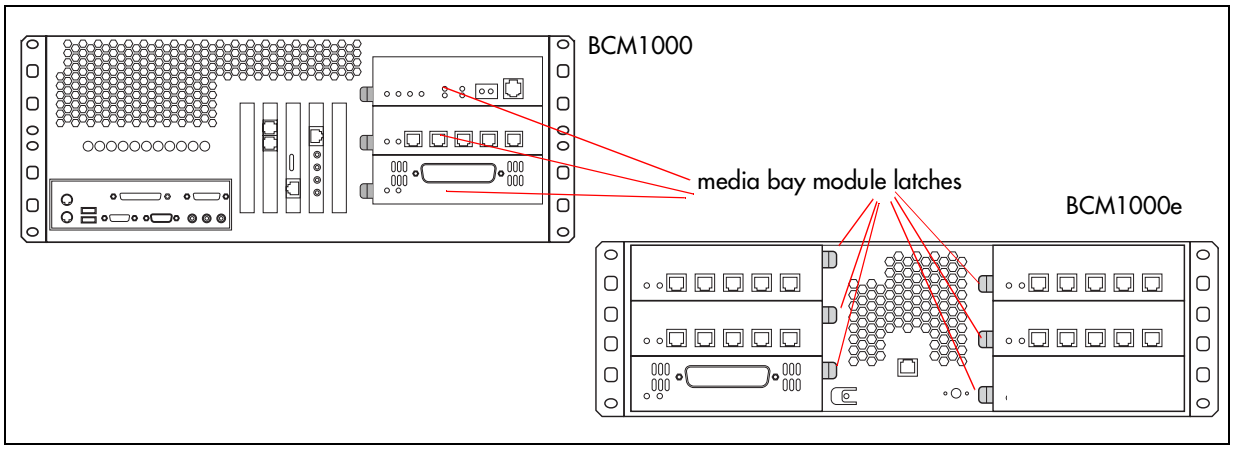
Figure 43 Removing the front bezel



3 Select an open media bay.

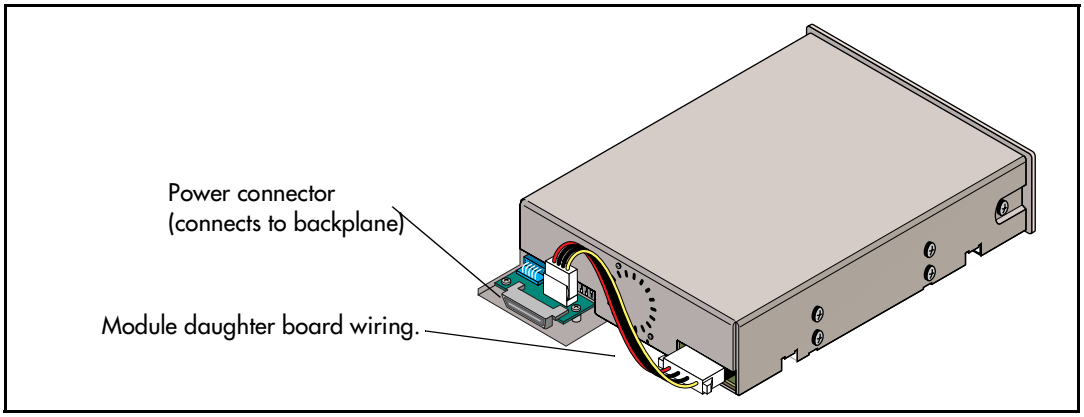
4 Pull the latch beside the selected bay to release the media bay bezel. Refer to Figure 44.

Figure 44 Identifying the media bay module latches



5 On the back of the module, if it has a wired connector between the daughter board and the back of the module, ensure that the wires are intact and sitting as closely as possible against the back of the media bay module. See warning below.

Figure 45 Warning of possible shorting issue on media bay modules



6 With the face of the module towards yourself, insert the media bay module into the open bay, ensuring that the sides of the module are parallel with the sides of the bay.

7 Gently push the media bay module straight back into the unit.

Warning: If you feel any resistance as you slide the module into the housing, carefully remove the module and check the wiring at the rear of the module again. (Refer to step 5.)

If you insert the modules off the straight or with too much force, the wires that connect the media bay module daughter board to the module can become pinched between the module and the BCM1000 media bay. This will cause a short in the equipment which would prevent the Business Communications Manager from restarting.

Note: Some modules, such as the DECT module, do not have this wiring configuration. However, it is still important that you insert modules carefully and squarely into the housing to ensure that the power connector on the module correctly and securely connects to the backplane of the media bay.

You will hear a click when the module is firmly seated in the media bay. The module sits slightly forward from the face of the BCM1000. When the front bezel is replaced, the module face is flush with the surface of the unit.

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

9 Replace the front bezel on the BCM1000 or BCM1000e.

Reconnecting the equipment

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

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

1 Plug the power cords for the BCM1000 and the BCM1000e, 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
If you have a DECT module on your system: Plug the base station RJ45 cables into the DECT module one at a time. Ensure each base station begins the startup sequence before plugging in the next module.

3 Check that the LEDs on the modules are on and static. Refer to "Checking system power and status" on page 117 for a detailed description of the LED states.

4 Test existing functions to confirm their operation.

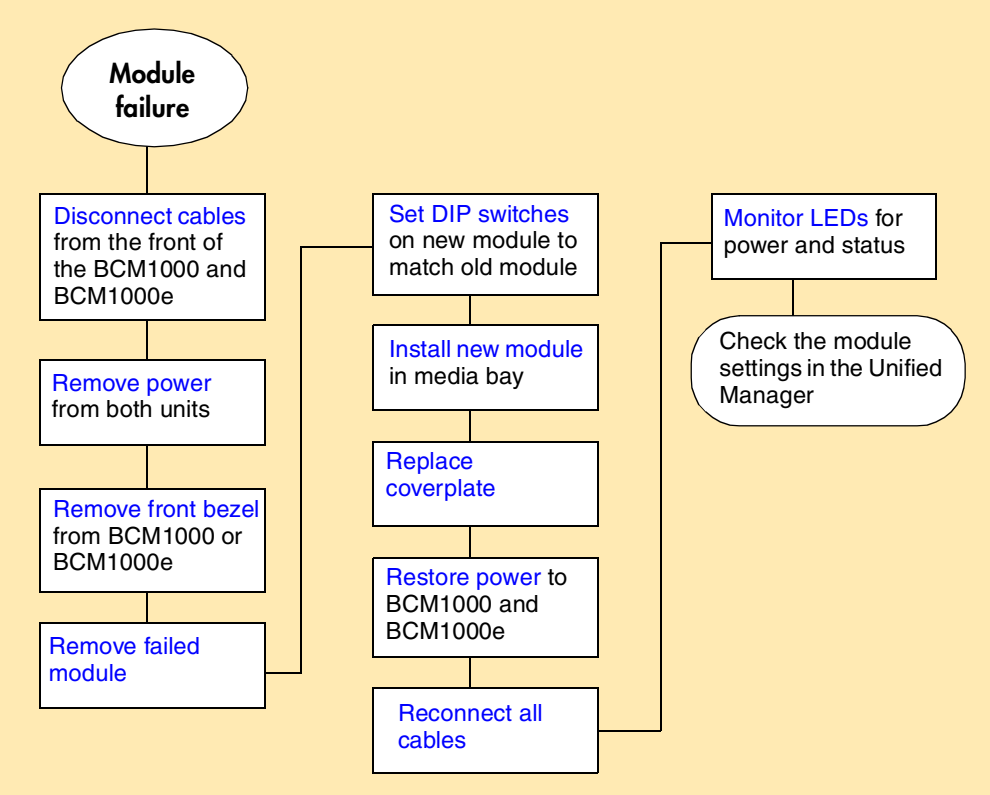
5 Configure the module. Refer to the *Business Communications Manager Programming Operations Guide* for details.

Replacing media bay modules

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

Warning: This section describes replacing a module with the same type of module. If you want to replace a module with a different type of module, you must treat it as a new installation. Refer to Chapter 7, "Setting media bay module DIP switches," on page 83 and review Figure 40 on page 90 to ensure the new module does not overrun any lines already assigned to other modules.

Figure 46 Process map: Replacing a media bay module



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

1. Follow the steps in "Shutting down the system" on page 108 to ensure the system shuts down correctly.
2. Remove the front bezel from the unit where the module resides.
3. Pull the latch beside the module to be replaced to release the module. Refer to Figure 44 on page 109.
4. Slide the module out of the bay where it is installed.
5. Record the switch settings from the old module.

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

7 Install the module into the media bay. Refer to “Installing a media bay module” on page 109, if you needed detailed instructions.

Warning: If you feel any resistance as you slide the module into the housing, carefully remove the module and check the wiring at the rear of the module again. (Refer to step 5.)

The wires that connect the media bay module daughter board to the module can become pinched between the module and the BCM1000 media bay if you insert the modules off the straight or with too much force. This will cause a short in the equipment and could prevent the Business Communications Manager from restarting. Refer to step 5.

Note: Some modules, such as the DECT module, do not have this wiring configuration. However, it is still important that you insert modules carefully and squarely into the housing to ensure that the power connector on the module correctly and securely connects to the backplane of the media bay.

8 Refer to “Reconnecting the equipment” on page 111 to restore the system to operation.

Installation/replacement troubleshooting

The Business Communications Manager media bay modules are working when both the ⏻ (Power) and (Status) LEDs on the modules are on solid.

- If the ⏻ (Power) LED does not light, refer to “Shutting down the system” on page 108. After the BCM1000 is correctly shut down, remove the module and check the connectors at the back of the module for dirt or loose connections.

  After you reinstall the module, if the LED still does not light, install a different module into that bay to check for a possible fault in the backplate. If the second module works, assume that the first module is defective and replace it with a new module.
- If the ⏻ (Power) LED lights, but the (Status) light does not light, or continues to blink, wait 10 minutes to allow for information download. If the light continues to blink, power down the system and check the DIP switch settings on the module. This might also indicate a loose cable at the back of the media bay module housing.
- 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 BCM1000, refer to Table 28 on page 117.

Chapter 9
Starting the system

The BCM1000 and BCM1000e are each powered through an ac outlet. The voltage required depends on the geographical location of the units.

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

Note: Newer standard power supplies (BCM 2.5 hardware), and all redundant power supplies can auto-select voltage. Ensure you are aware of what type of power supply your system has.

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 BCM1000 and BCM1000e, if there is one, 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, MSC and network cables from the front of the units before disconnecting the power cord from an earthed.

System startup: You must reconnect the power cords to an earthed outlet before reconnecting the media bay, MSC and network cables to the front of the unit.

Checking power and wiring

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

- 2.0 BCM1000 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 BCM1000 hardware has a 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 BCM1000 units.

Warning: Connecting power

Always connect power to the BCM1000 and BCM1000e, if there is one, before you reconnect the cabling to the front of the units.

2 Connect the BCM1000 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.

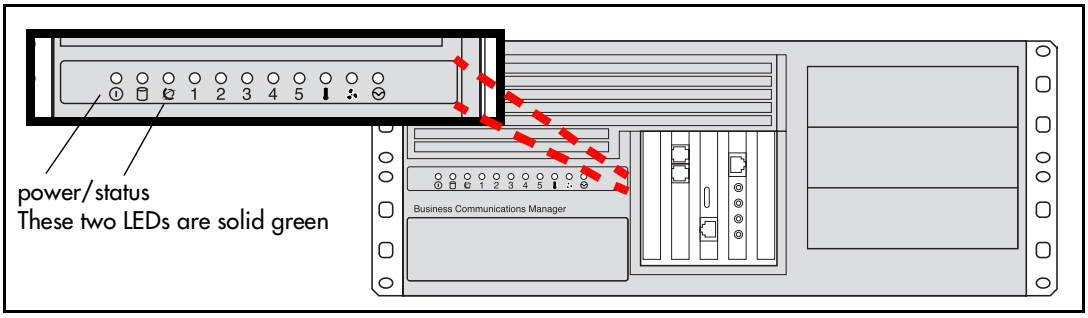
3 Connect the BCM1000e power cord to an electrical outlet that is a non-switchable, third wire ground ac outlet.

Danger: Do not fasten power supply cords.
Do not fasten the BCM1000 or BCM1000e power supply cords to any building surface.

Checking system power and status

After you connect power to the BCM1000, the Power LED on the front of the base unit and expansion unit lights. Refer to Figure 47. Once the system services have reactivated, the Status LED turns solid green.

Figure 47 LEDs confirm that BCM1000 is active



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 28 describes the possible operating states of the LEDs on the front of the BCM1000. The BCM1000e has both a power and a status LED, which provide the same indicators as for the base unit.

Table 28 BCM1000 LED states

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

Table 28 BCM1000 LED states (Continued)

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

1 If the Power LED does not light:

   a Disconnect the power cords.

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

   c Reconnect the power cords.

Note: You can monitor the state of the BCM1000 LEDs from your computer. Refer to "Using the System Status Monitor to monitor LEDs" on page 162.

2 When the system power is on, and the system has successfully booted, the power and status LEDs on the faceplates of the media bay modules are lit and remain constant. Refer to the media bay module sections in Chapter 2, "Telephony hardware," on page 33 for a description of media bay module LED states.

3 You are now ready to connect the hardware to the network.

Connecting the data networking hardware

This section describes how to connect network cards to the BCM1000.

Warning: Check with your network administrator before you connect the BCM1000 base unit to the network to ensure there are no IP address conflicts.
The default address for the BCM1000 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 BCM1000 before you connect any network connections.
To change the IP address outside of a network, you can use one of the following:

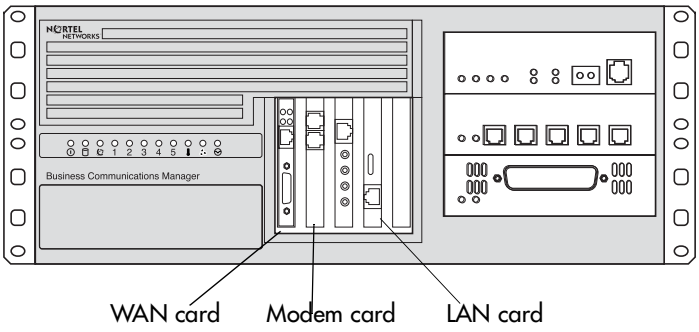
- a terminal and a null modem cable
- a computer and an ethernet crossover cable

Refer to "Using a null modem serial cable" on page 125 or "Using an Ethernet crossover cable" on page 128 for detailed instructions about connecting to the base unit.

Connecting the cards

The data networking hardware is installed in the BCM1000 at the factory. All systems that use remote data management have one LAN card. Some systems have a LAN and a WAN card. Some systems can have two LAN cards. Some systems also have a modem card. Figure 48 shows one of four profiles available.

Figure 48 Locating the data cards on the BCM1000



Note: This illustration shows a profile 1 data card setup. Your system may not have all the cards indicated.

Warning: Do not plug these cables into the system unless it is running.

For maintenance shutdowns, ALWAYS follow this process:

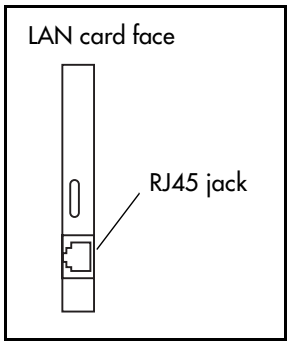
a Shut down the software through the Unified Manager, if possible.

b Remove all cable connects from the front of the BCM1000 and BCM1000e.

c Remove power from the BCM1000 and the BCM1000e

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

Connecting wiring to the LAN card

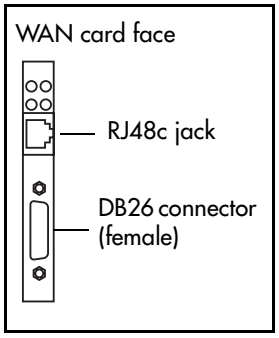


Warning: Ensure the system is powered up before connecting this cable.

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

For information about the location of the LAN card, refer to Figure 48 on page 119.

Connect wiring to the WAN card



Warning: 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 48 on page 119.

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 BCM1000 supplier.

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

Table 29 shows the wire connections for a DB25 adapter cable.

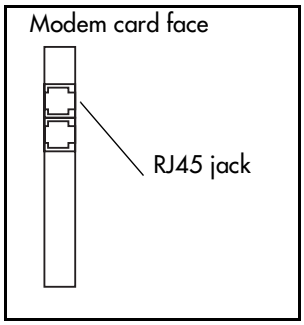
Table 29 DB25 adapter cable

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 card

(North American Systems only)



Warning: Ensure the system is powered up before connecting this cable.

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

For information about the location of the modem card, refer to Figure 48 on page 119.

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

Table 30 shows the wire connections for a RS-422/EIA 530 modem adapter cable

Table 30 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 31 shows the wire connections for a V.35 adapter cable.

Table 31 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 32 shows the wire connections for a DB15 X.21 adapter cable.

Table 32 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		

Replacing the cards

Refer to Chapter 19, “Replacing data cards and processing hardware,” on page 217 for instructions about removing and installing these cards.

Setting initial system configurations

After starting the BCM1000, 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 Programming Operations Guide*, and the other user guides for each optional application you choose to add to your system.

Required data parameters

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

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

Note: The initialization chapter of the *Programming Operations Guide* describes the information required by the Quick Start Wizard, which includes this information.

Default IP settings

All BCM1000s 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 BCM1000 to the LAN, as described in “Connecting wiring to the LAN card” on page 120. This allows you to configure to the BCM1000 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 BCM1000 through one of these connections:

- a terminal and a null modem cable. Refer to "Using a null modem serial cable" on page 125.
- a computer and an Ethernet crossover cable. Refer to "Using an Ethernet crossover cable" on page 128.

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 BCM1000 using the Unified Manager, refer to the *Business Communications Manager Programming Operations Guide*

Using a null modem serial cable

You must use a null modem cable connection to the BCM1000 if the default IP address is not compatible with your LAN or WAN network.

Required equipment:

- null modem cable
- VT100-compatible terminal or a computer that has a terminal program such as Hyperterminal

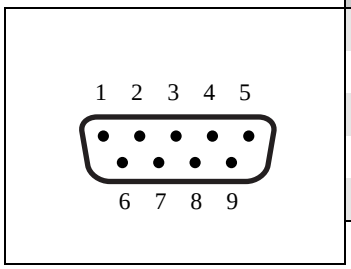
Warning: Your terminal must be VT100-compatible and must support the VT100 National Character set. If the terminal does not support the National Character set, the text displays incorrectly.

Setting up the null modem cable

Table 33 shows the correct wiring for the BCM1000 serial port of the null modem cable.

Table 33 Serial port pinout

Figure 49 Serial pinout



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

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

* required connections

Transmission parameters:

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

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

Finding the configuration menus

To carry out this procedure, the BCM1000 must be correctly powered up, as described in Chapter 9, “Starting the system,” on page 115.

1 Attach the null modem cable to the serial port on the BCM1000.

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

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

3 Ensure that the BCM1000 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>.

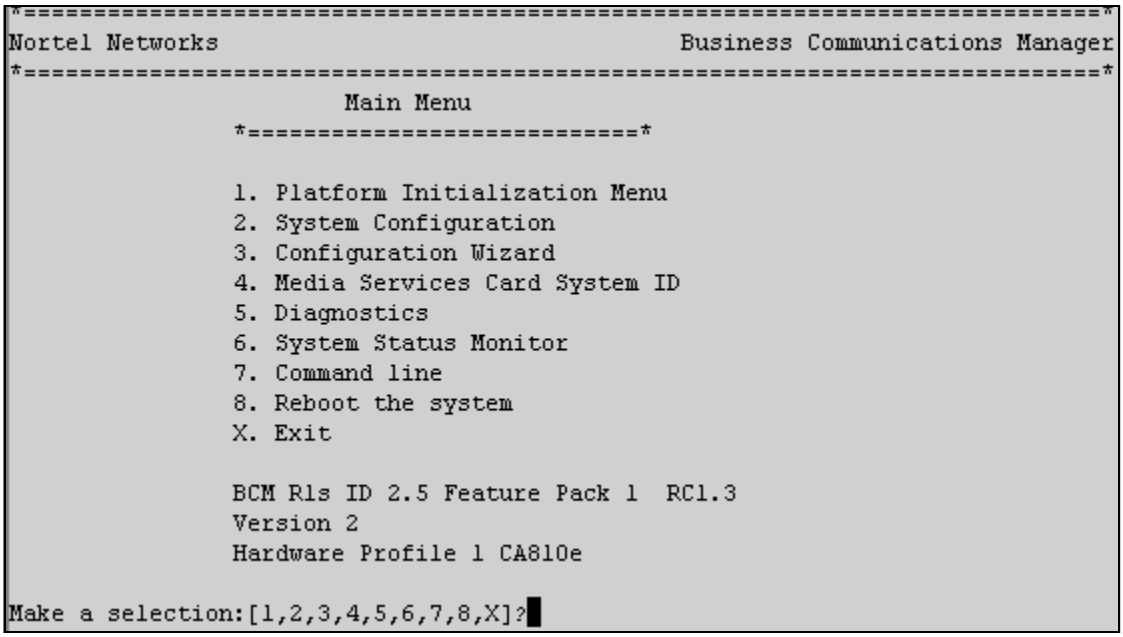
8 When prompted for a **Password**, type: `eedge` <ENTER>

The Main Menu screen appears. Refer to Figure 50.

Note: If the Initialization Menu screen appears instead of the Main Menu screen shown below, your BCM1000 system is not initialized correctly. Systems normally are initialized at the factory, so this will seldom occur. If you see this on system startup, consult with your account representative for correct procedure before attempting to initialize your system. Initializing the system sets such parameters as the hardware profile, which must match your actual installed hardware configuration.

When you replace a hard drive in a single-disk system, you also will use the initialization menu to initialize the hard disk to your system. Refer to “Initializing the hard disk (single-disk system, BCM 2.5/2.5.1)” on page 179.

Figure 50 Main Menu



9 What information you want to configure, will determine your next steps:

- If you only want to change the IP addressing, enter 2 (System Configuration) and follow the prompts.
- 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 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 BCM1000 and BCM1000e, if there is one.

Using an Ethernet crossover cable

You use an ethernet crossover cable connected to a computer with a network card to connect your computer to the LAN card in the BCM1000. With this connection, you can run Business Communications Manager Unified Manager to configure the Business Communications Manager system without a network connection.

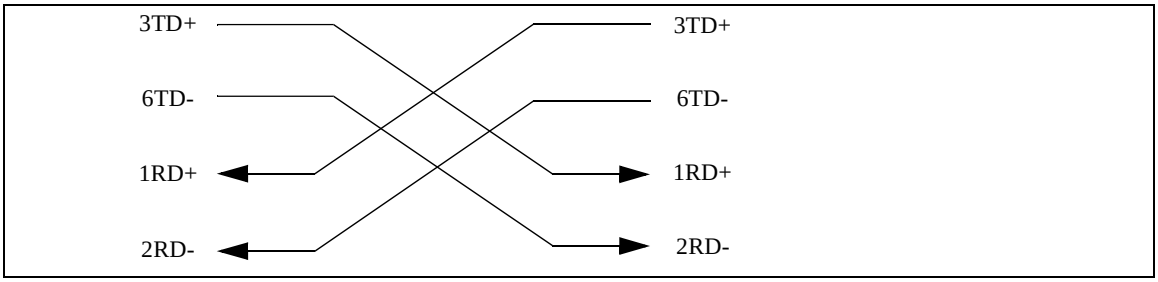
You use this type of connection in these situations:

- 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 BCM1000 before you connect it to the network

Setting the crossover connections

To connect to the Business Communications Manager using an Ethernet crossover cable, you need a computer equipped with a 10/100 Base T network interface card and TCP/IP protocol. Figure 51 shows the connections required.

Figure 51 Ethernet crossover cable



Configuring your computer

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

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

1. Click **Start, Settings, Control Panel**.
2. Double click the **Network** icon.
3. Select your TCP/IP adapter, and then click the **Properties** button.
4. Click the **IP Address** tab.
5. Click the **Specify an IP address** option.

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

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

8 Click **OK**.

9 Click **OK**.

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

Connecting the Ethernet crossover cable

After you configure the computer, connect the computer to the BCM1000 in the following manner:

1 Shut down the computer.

2 Attach one end of the Ethernet crossover cable to the LAN card on the BCM1000.

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

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

Entering the software keycodes

If you have purchased any of the optional Business Communications Manager applications that require keycode activation, refer to *Business Communications Manager Software Keycode Installation Guide* for information about how 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 keys after system replacement

If you need to replace your BCM1000, which would be the case if the motherboard or MSC became inoperable, you will need to regenerate all your keycodes to reflect the new system identification, and enter them again after you perform your system data restore.

Chapter 10
Wiring the modules

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

- Station modules require 25-pair wired cables to connect the modules to the equipment in the telephone room where your telco demarcation point is located. Use a qualified technical professional to ensure the cable wiring and your interior telephone wiring are correct.
- Trunk modules, DECT base stations, and FEM cables are connected using RJ-type jacks. These cables can be supplied by qualified technical personnel to ensure the correct pin-out.

Warning: Use only qualified persons to service the system.

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

Warning: Leakage currents

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

System shutdown: You must disconnect the media bay module cables, network connections, and MSC auxiliary equipment connections from the system before disconnecting the power cord from an earthed outlet.

System startup: You must reconnect the power cords to an earthed outlet before reconnecting the cables to the media bay modules, network cards, or MSC card.

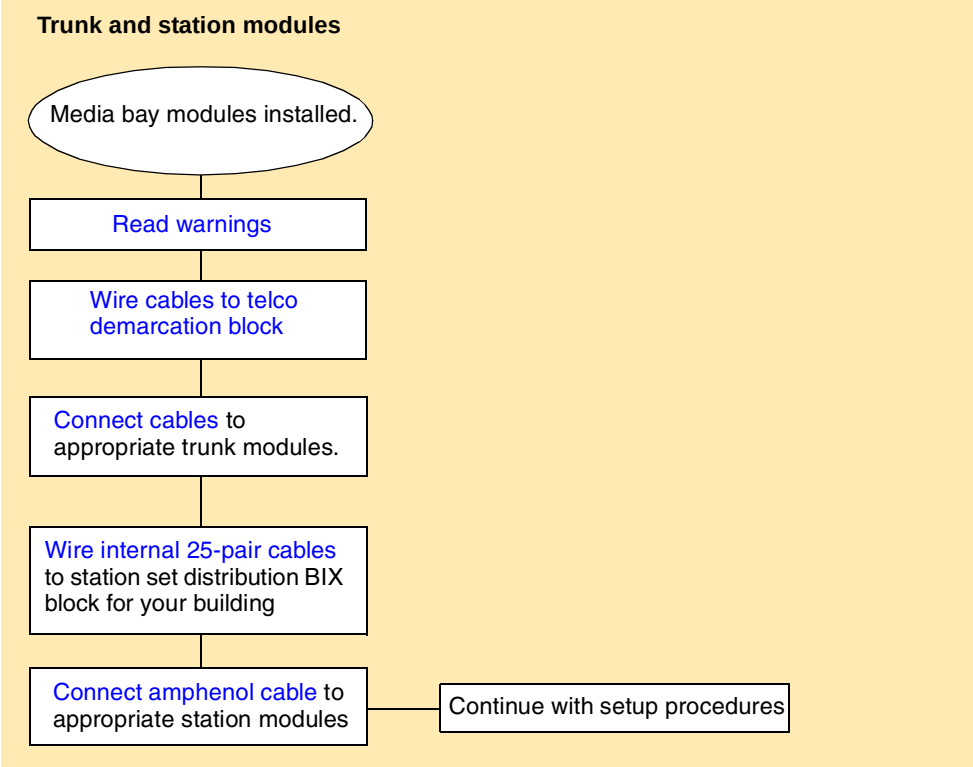
Danger: Electrical shock hazards

Electrical shock hazards from the telecommunications network and ac mains are possible with this equipment. To minimize risk to service personnel and users, the BCM1000 and the BCM1000e, if there is one, 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 52 provides an overview of the process for connecting trunk and station wiring to the Business Communications Manager media bay modules.

Figure 52 Process map: Trunk and station wiring process map



Module wiring warnings

Warning: Electrical shock warning.

The Business Communications Manager media bay modules have been Safety approved for installation into BCM1000 and BCM1000e. 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 BCM1000 or BCM1000e ensure that the cables are unplugged from the front of the unit, and the unit is disconnected from the ac power source.

Station modules: The ports on these modules are meant to be connected only to approved digital telephones and peripherals with the proper cables on a protected internal system.

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

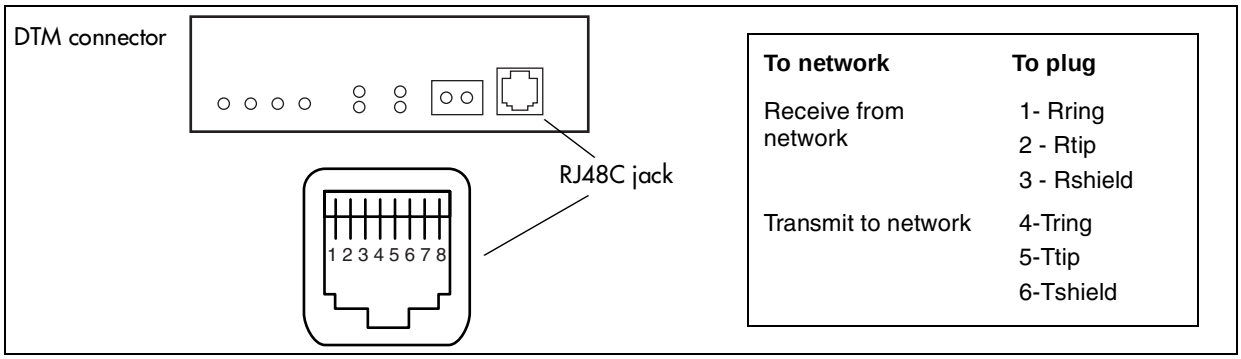
Read and follow the installation instructions carefully.

Connecting media bay modules to Service Providers

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

1. On the front of the module, locate the RJ48C socket (DTM), RJ45 sockets (BRI), or the RJ11 sockets (CTM and 4X16 modules).
2. Wire one end of the cable to the telco demarcation blocks of the building.
   - Figure 53 shows the wiring pinouts for a DTM to connect to a service provider.

Figure 53 DTM RJ48C wiring array

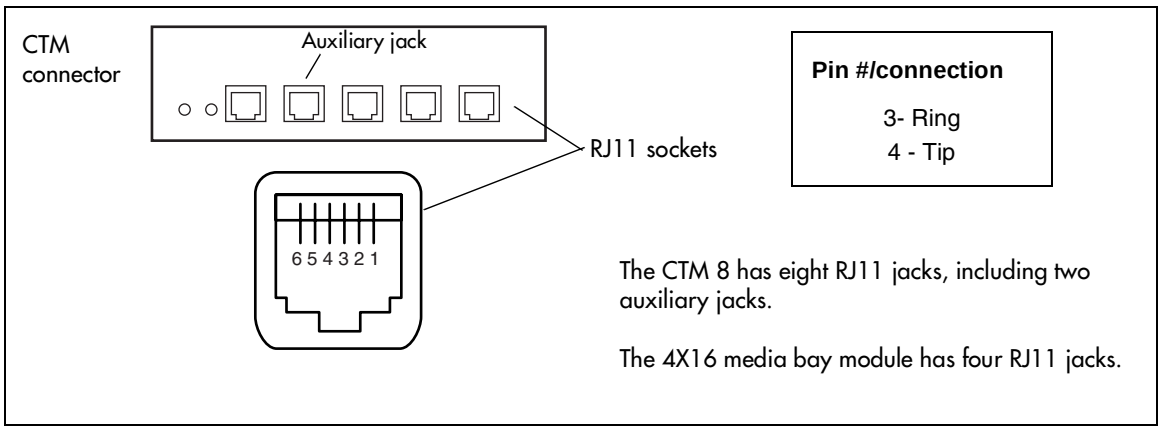


Warning: If you are using a service provider bus service unit (CSU), you must disable the Business Communications Manager system internal CSU using Business Communications Manager Unified Manager. For more information, refer to the *Business Communications Manager Programming Operations Guide*.

- Figure 54 shows the wiring pinout 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 54 CTM RJ11 wiring array



- The GATM uses an amphenol connector instead of an RJ-type connector, therefore, the wiring for this module differs from the ASM. The cables used by this module should be supplied by qualified technical personnel to ensure the correct pin-out.

  To connect the Global analog trunk module (GATM) to the network, follow these steps:

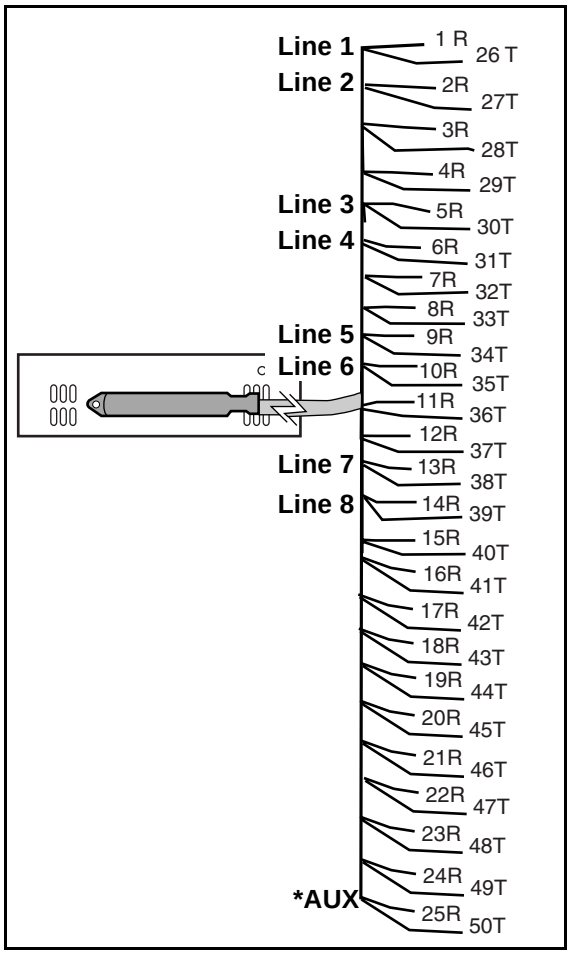
  1 On the front of the module, locate the amphenol connector.

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

  3 Wire the other end of the cable to the analog lines.

  The following figure and table show the wiring pin outs for a GATM to connect to a service provider.

Figure 55 GATM cable wiring diagram

Connector pinout	Line	Pin	Wire color	GATM module
	1	26	White-Blue	Both
		1	Blue-White	
	2	27	White-Orange	Both
		2	Orange-White	
	No connection	28/3 29/4		
	3	30	White-Slate	Both
		5	Slate-White	
	4	31	Red-Blue	Both
		6	Blue-Red	
	No connection	32/7 33/8		
	5	34	Red-Brown	GATM8
		9	Brown-Red	
	6	35	Red-Slate	GATM8
		10	Slate-Red	
	No connection	36/11 37/12		
	7	38	Black-Green	GATM8
		13	Green-Black	
	8	39	Black-Brown	GATM8
		14	Brown-Black	
	No connection	40/15 to 49/24		
	Aux	50	Violet-Slate	Both
		25	Slate-Violet	

* Auxiliary port function: In download mode, the auxiliary port function for all profiles operates as a true Auxiliary port. This means that when the power comes back on, and if the Aux Port is in-use, that line will show on the system telephones as being in-use (LCD indicator lit) until the Aux Call is cleared.

In dip switch mode, the North American and Taiwan auxiliary ports also act as true auxiliary ports.

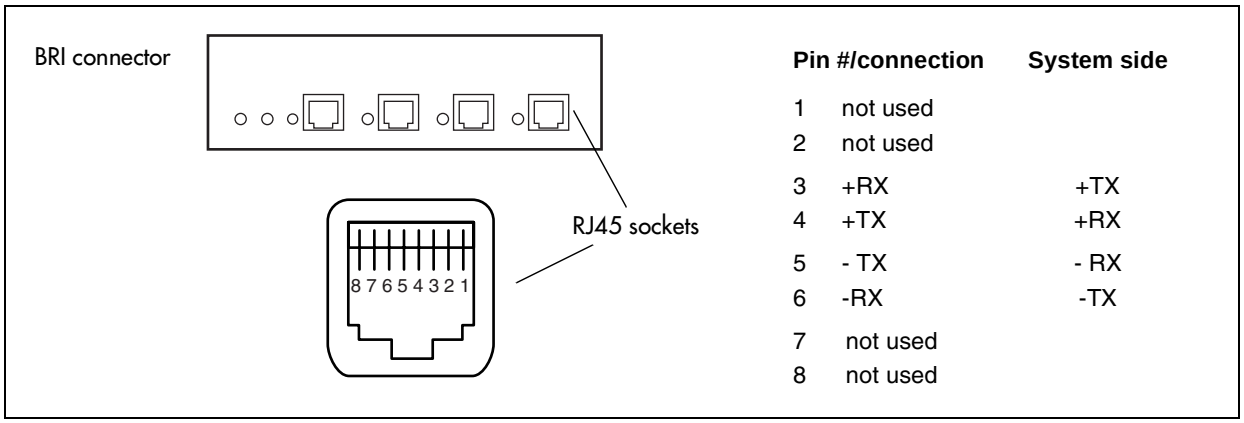
However, the UK and Australia profile auxiliary port function is different. In these profiles, when the power is restored, the Aux Port call is terminated and the line is available to system telephones.

- Figure 56 shows the wiring pin-out for a BRI to the service provider (BRI loop set to T)

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

This diagram also applies to an S-Loop BRI, allowing connection to such S-Loop devices as video phones, terminal adapters, and Grp 3 Fax machines. Note: the S-loop does not supply supplementary power, such as required by video devices. Supplementary power must be supplied by a separate power supply.

Figure 56 BRI RJ45 wiring array



3 Insert the connector into the jack on the module.

4 You can now use the Unified Manager to configure the lines or sets associated with the module.

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

Wiring media bay modules to internal connections

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

All station module wiring uses 25-pair cable with a female amphenol connector at the media bay 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, ASM8+, or 4X16 modules:

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

Use Table 34 and Figure 57 on page 137.

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

Note: If you are connecting an DSM 16, 4X16, or DSM 32, use Table 34 on page 137. If you are connecting an ASM 8 or ASM8+, use the Table 35 on page 138.

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

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

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

b Install the telephones. Each telephone comes with hardware installation instructions.

Refer also to Chapter 13, “Installing optional telephony equipment,” on page 157.

Note: You can configure most types of telephones before they are installed. Refer to the *Programming Operations Guide* for specific instructions about telephone settings and using the New Users Wizard to set up telephones.

c To connect analog equipment to a digit line, refer to Chapter 12, “Installing Analog Terminal Adapters,” on page 149.

Table 34 and Figure 57 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 bus setting on the station module.

Figure 57 Wiring for DSM 16, 4X16, and DSM 32

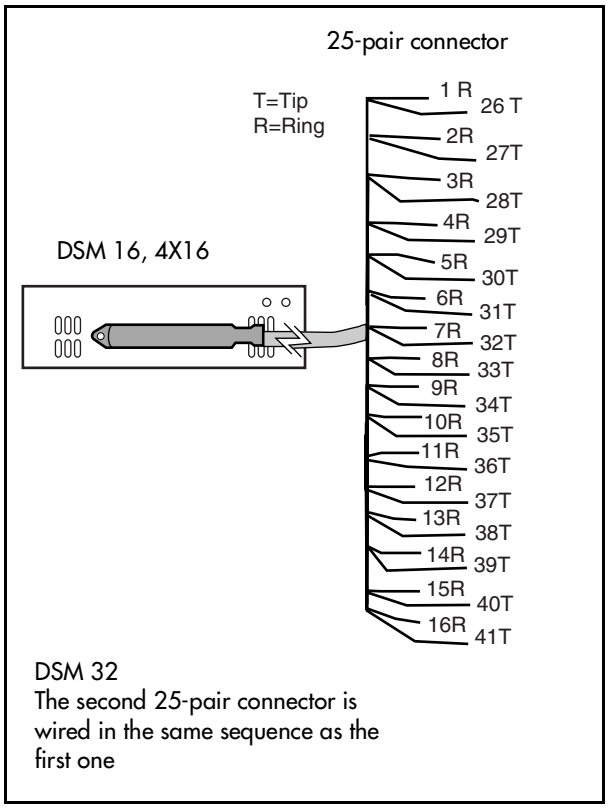


Table 34 DSM wiring chart

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 35 and Figure 58 provide the wiring scheme for the eight pairs that connect to an ASM.

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

Figure 58 Wiring for an ASM 8 or ASM8+

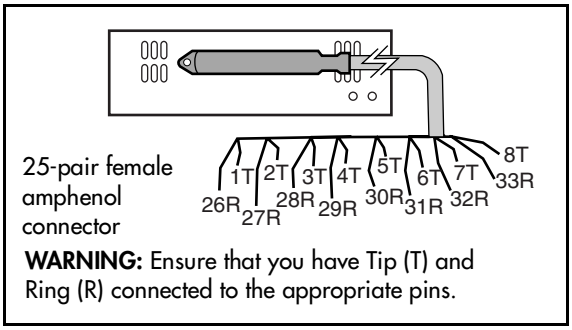


Table 35 ASM wiring chart

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 91 to see the relationship between the DS30 bus number and the DNs. Configuration information is included in the chapters on setting up modules and DNs in the *Business Communications Manager Programming Operations Guide*.

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 hardware. In the case of the NetVision wireless system, ensure that the access point is correctly set up to connect to the BCM1000 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*

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 installed on a BCM1000, using the same fiber cable that connected them to the Norstar main housing.

Warning: Handling optical fiber cables:

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

Note: If you enable all six jacks of the FEM module, the FEM module is the only module you can install on the BCM1000, because each port requires one DS30 bus. Refer to "FEM switch settings" on page 106.

Connecting the fiber cables

Follow these steps to connect your Norstar expansion modules to a FEM module installed into a BCM1000.

1. Ensure the BCM1000 is properly powered and rebooted.
2. Connect the fiber cables from the Norstar expansion modules to the jacks on the FEM module.

Note: Which DIP switch settings you chose will determine which FEM ports are available. Refer to "FEM switch settings" on page 106.

   a. Connect the Norstar Line Modules to the FEM beginning at fiber port 1.
   b. Connect Norstar Extension Modules to the FEM beginning at fiber port 6.

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

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

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

Table 36 compares the designated extension numbers on the Norstar and on the Business Communications Manager.

Table 36 Extension comparison chart

Ports	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DS30 bus 02, FEM port 1																
Norstar	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236
BCM	225	226	227	228	221	222	223	224	233	234	235	236	229	230	231	232
DS30 bus 03, FEM port 2																
Norstar	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252
BCM	241	242	243	244	237	238	239	240	249	250	251	252	245	246	247	248
DS30 bus 04, FEM port 3																
Norstar	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268
BCM	257	258	259	260	253	254	255	256	265	266	267	268	261	262	263	264
DS30 bus 05, FEM port 4																
Norstar	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284
BCM	273	274	275	276	269	270	271	272	281	282	283	284	277	278	279	280
DS30 bus 06, FEM port 5																
Norstar	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
BCM	289	290	291	292	285	286	287	288	297	298	299	300	293	294	295	296
DS30 bus 07, FEM port 6																
Norstar	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316
BCM	305	306	307	308	301	302	303	304	313	314	315	316	309	310	311	312

Chapter 11
Installing telephones and peripherals

You can add telephones and peripherals before or after you initialize your system.

Telephone configurations are determined by which station module you are using, and what DS30 bus settings you chose for the module. Refer to Chapter 2, “Telephony hardware,” on page 33, Chapter 4, “Selecting the media bay modules for your system,” on page 57, and Chapter 7, “Setting media bay module DIP switches,” on page 83.

The system creates default settings for the telephone DN records when it is first initialized. The settings are based on which telephony profile you choose when you run the Quick Start Wizard. To change these settings, use the Unified Manager application, System DNs headings. Specific instructions for configuring telephone operation through the Unified Manager are contained in the *Business Communications Manager 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 48 for a description of these telephones.

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: Off-premises extensions (OPX) are only supported on an ASM8+. Digital and all other 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 a media bay module on the BCM1000.

Refer to the installation instructions that come with the module for proper installation. Also refer to the *ATA Installation and Configuration Guide* and the *Analog Telephone User Guide*.

Central Answering Position (CAP/eCAP)

Create a Central Answering Position (CAP) that provides additional auto dial positions or additional line appearances.

The legacy CAP consists of an M7324 telephone with one or two CAP modules. This configuration requires a Supplementary Power Supply (SAPS) to support the additional modules. Each CAP module provides 48 programmable keys with indicators. If the telephone is configured as an extended CAP (eCAP) in system programming, the module supports line appearances as well as any memory key functions.

The Business Series Terminal version of the CAP consists of a T7316E telephone and from one to nine Key Indicator Modules (KIMs). Each module provides 24 programmable keys with indicators. If the telephone is configured as an eCAP, a maximum of four modules can be added (eKIMs). A T7316E+eKIM can support line appearances, multiple appearances of a target line, and Hunt group designators in additional to memory key programming on the eKIMs. A T7316E/KIM configuration that is not configured as an eCAP can support up to nine ordinary KIMs (OKIMs). In this configuration, only memory button programming is supported. A Supplementary Power Supply is required after the fifth module is added. **Programming note:** The T7316E+eKIM does not support auto dial keys programmed with Hunt group DNs.

For detailed configuration information, refer to the *Programming Operations Guide*. Also refer to the CAP user card for instructions about using a CAP.

Telephone port and DN cross-reference

The media bay module that analog and digital telephones connect to dictates DNs and port numbers. Use Table 37 to identify which port connects to each telephone. For future reference, put a checkmark beside the ports where there are telephones 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 repeat of the first digit for each additional DN length unit. i.e. 221 becomes 2221.
Appendix B, “Media bay module combinations,” on page 247 contains a blank table to use if you changed the start DN on your system.

Double density: If a DS30 bus is set to double density, a second level of DNs and ports become available, allowing 32 digital or analog telephones on a DS30 bus. On a default system, bus 06 and 07 are set to Partial Double Density (PDD), and only the first level is available to digital telephones. The second level remains designated as B2 channels, which allows Companion to still be used on these two bus blocks. When the system is set to Full Double Density, then all DS30 bus blocks have 32 B1 channels. In a FDD system, Companion is not support.

Also, note on the tables below that DN numbering differs between systems that were upgraded from BCM 2.5 software and systems that were new with BCM 3.0 or newer software.

Table 37 Cross referencing ports and DNs on a 2.5 system upgraded to 3.0 or newer software

Pins	Port*	DS 30 bus 02 DNs	DS 30 bus 03 DNs	DS 30 bus 04 DNs	DS 30 bus 05 DNs	DS 30 bus 06 DNs	DS 30 bus 07 DNs
26/1	X01	221	237	253	269	285	301
27/2	X02	222	238	254	270	286	302
28/3	X03	223	239	255	271	287	303
29/4	X04	224	240	256	272	288	304
30/5	X05	225	241	257	273	289	305
31/6	X06	226	242	258	274	290	306
32/7	X07	227	243	259	275	291	307
33/8	X08	228	244	260	276	292	308
34/9	X09	229	245	261	277	293	309
35/10	X10	230	246	262	278	294	310
36/11	X11	231	247	263	279	295	311
37/12	X12	232	248	264	280	296	312
38/13	X13	233	249	265	281	297	313
39/14	X14	234	250	266	282	298	314
40/15	X15	235	251	267	283	299	315
41/16	X16	236	252	268	284	300	316
Second-level DNs (DS 30 bus set to Full Double Density)							
Pins	**Port***	**DS 30 bus 02 DNs**	**DS 30 bus 03 DNs**	**DS 30 bus 04 DNs**	**DS 30 bus 05 DNs**	**DS 30 bus 06 DNs****	**DS 30 bus 07 DNs****
26/1	X17	377	393	409	425	441	457
27/2	X18	378	394	410	426	442	458
28/3	X19	379	395	411	427	443	459
29/4	X20	380	396	412	428	444	460
30/5	X21	381	397	413	429	445	461
31/6	X22	382	398	414	430	446	462
32/7	X23	383	399	415	431	447	463
33/8	X24	384	400	416	432	448	464
34/9	X25	385	401	417	433	449	465
35/10	X26	386	402	418	434	450	466
36/11	X27	387	403	419	435	451	467
37/12	X28	388	404	420	436	452	468
38/13	X29	389	405	421	437	453	469
39/14	X30	390	406	422	438	454	470
40/15	X31	391	407	423	439	455	471
41/16	X32	392	408	424	440	456	472

* For each port, substitute the X for the DS30 bus number. Example: Port X01 on DS30 bus 02 is port 0201.
** On default systems, these two DS30 bus blocks are set to Partial Double Density (PDD), which means that the second level of DNs are not available.

Table 38 Cross referencing ports and DNs on a new version 3.0 or newer system

Pins	Port*	DS 30 bus 02 DNs	DS 30 bus 03 DNs	DS 30 bus 04 DNs	DS 30 bus 05 DNs	DS 30 bus 06 DNs	DS 30 bus 07 DNs
26/1	X01	221	253	285	317	349	381
27/2	X02	222	254	286	318	350	382
28/3	X03	223	255	287	319	351	383
29/4	X04	224	256	288	320	352	384
30/5	X05	225	257	289	321	353	385
31/6	X06	226	258	290	322	354	386
32/7	X07	227	259	291	323	355	387
33/8	X08	228	260	292	324	356	388
34/9	X09	229	261	293	325	357	389
35/10	X10	230	262	294	326	358	390
36/11	X11	231	263	295	327	359	391
37/12	X12	232	264	296	328	360	392
38/13	X13	233	265	297	329	361	393
39/14	X14	234	266	298	330	362	394
40/15	X15	235	267	299	331	363	395
41/16	X16	236	268	300	332	364	396
Second-level DNs (DS 30 bus set to Full Double Density)							
Pins	**Port***	**DS 30 bus 02 DNs**	**DS 30 bus 03 DNs**	**DS 30 bus 04 DNs**	**DS 30 bus 05 DNs**	**DS 30 bus 06 DNs****	**DS 30 bus 07 DNs****
26/1	X17	237	269	301	333	365	397
27/2	X18	238	270	302	334	366	398
28/3	X19	239	271	303	335	367	399
29/4	X20	240	272	304	336	368	400
30/5	X21	241	273	305	337	369	401
31/6	X22	242	274	306	338	370	402
32/7	X23	243	275	307	339	371	403
33/8	X24	244	276	308	340	372	404
34/9	X25	245	277	309	341	373	405
35/10	X26	246	278	310	342	374	406
36/11	X27	247	279	311	343	375	407
37/12	X28	248	280	312	344	376	408
38/13	X29	249	281	313	345	377	409
39/14	X30	250	282	314	346	378	410
40/15	X31	251	283	315	347	379	411
41/16	X32	252	284	316	348	380	412

* For each port, substitute the X for the DS30 bus number. Example: Port X01 on DS30 bus 02 is port 0201.
** On default systems, these two DS30 bus blocks are set to Partial Double Density (PDD), which means that the second level of DNs are not available.

Installing an emergency telephone

You can use the emergency telephone to make calls when there is no power to the Business Communications Manager hardware.

To install an emergency telephone on the Business Communications Manager system, connect a single line analog telephone to the auxiliary port on the CTM. When you make a call from the emergency telephone, the auxiliary port uses the telephone line connected to the Line 1 port of the CTM.

TIP: You can connect an emergency telephone to every CTM installed on your Business Communications Manager system.

Use the following steps to install the emergency telephone.

1. Connect a single line analog telephone to the auxiliary port on the CTM.
2. Connect an analog PSTN line cable to the Line 1 port of the CTM.

Installing IP telephones

The Business Communications Manager emobility strategy includes support for the Nortel Networks 20XX 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 unused DNs in the digital range. However, port numbers are assigned from DS30 01 (Ports 0101-0132), first; then from DS30 08, if there are ports available, and DS30 07 if the system is running a 3/5 DS30 split. If no ports are available on those DS30 blocks, the system may assign digital set port numbers. Also ensure that you do not assign DNs that are assigned to Call Center mail boxes (CDNs).

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. **Programming notes:** If the system is running DHCP, ensure that a static list of IP addresses has been assigned. In this case, the IP addresses must be assigned manually to each NetVision record.

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

Installing 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 (legacy hardware)

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 communicate through base stations that are connected to DSMs on the BCM1000. You can install a maximum of 32 handsets per DSM, since the handsets can use either of the B bus blocks.

Exceptions: If the system is set to a 3/5 DS30 split, DS30 bus 07 is not available to Companion. If the system has been configured into Full Double Density (FDD) (BCM 3.0 and newer versions), then Companion cannot be supported on the system, since there are no B2 bus blocks on this type of system.

"Mobility services by region" on page 237 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.
- The *Companion Installation and Configuration Guide* provides detailed instructions for installing the base stations, and registering the handsets to the Business Communications Manager.
- The handset vendors provide a user guide with each set that describes the handset features.

DECT systems (region specific)

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 a specific 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 Installation and Configuration Guide* 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 237 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 DECT Installation and Maintenance Guide*, also on the CD, describes the installation of the module and radio base station, and how to register the handsets 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 DSM, 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 DNs 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

Chapter 12
Installing Analog Terminal Adapters

This chapter provides installation instructions for the Analog Terminal Adapter 2 (ATA 2).

The ATA 2 connects a standard analog voice device or data communication device to the Business Communications Manager system through a digital station module. Examples of analog voice devices are analog telephones or answering machines. Examples of data communication devices are modems and fax machines.

The ATA 2 provides on-premise service only (unexposed plant only).

Understanding pre-installation requirements

Before you attempt to install an ATA 2 device, ensure that your system and environment meet the requirements listed in this section.

Environmental requirements

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 ATA2

Operating requirements

Ringing signal (North America):	20 Hz ± 1 Hz
Frequency Voltage:	80 V rms ± 10%
Ringing signal (Europe):	25 Hz ± 1 Hz
Frequency voltage:	75 V rms ± 10%
Ringer equivalence number	3
Battery feed voltage	- 48 V dc ± 10%
Loop current	20 mA minimum
FIC code	OL13ABC
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)

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	ATA 2 to Business Communications Manager system loss 3.0 dB ± 0.5 dB
Insertion loss on an external call	ATA 2 to Business Communications Manager system loss 2.2 dB ± 1.0 dB Business Communications Manager system to ATA 2 loss 0.5 dB ± 1.0 dB

To test insertion loss once the analog device is attached to the system, refer to "Testing insertion loss measurement" on page 154.

Note: The termination on the analog 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 the REN of the interface the device is connect to.

Data device transmission requirements using an ATA 2

The 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.

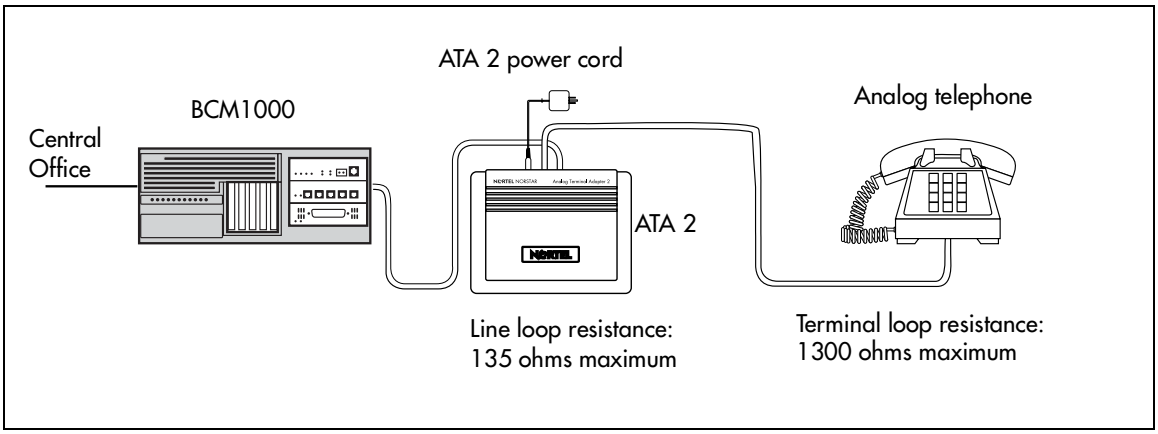
CAUTION: Nortel Networks cannot guarantee the maximum data transmission rate because the maximum rate is subject to the quality of the end-to-end channel.

analog loop resistance	less than 200 ohms (for example: 730 m of 0.4 mm wire or 2,400 ft. of 26 AWG wire.)
external line to 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.

Connecting an analog telephone

Figure 59 shows the hardware configuration for connecting an analog device through an ATA 2 to the Business Communications Manager.

Figure 59 Analog telephone installation overview

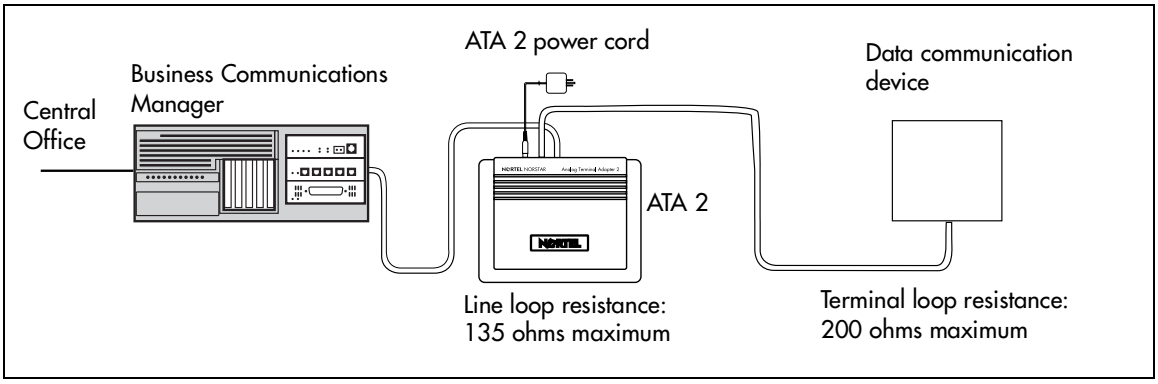


Connecting a data device

The 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.

Figure 60 shows the hardware configuration for connecting a data communication device through an ATA 2 to the Business Communications Manager.

Figure 60 Data communication device installation overview



Connecting the ATA 2

After the correct environment has been set up, connect the Business Communications Manager and the analog device to the ATA 2, then connect the module power. Refer to Figure 61.

Figure 61 ATA 2 top view

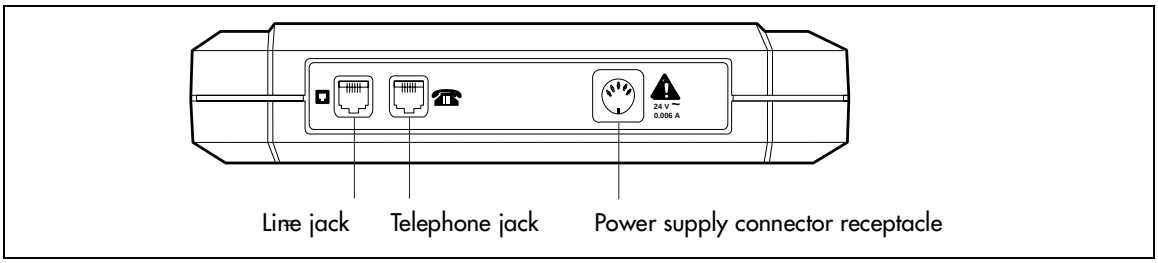
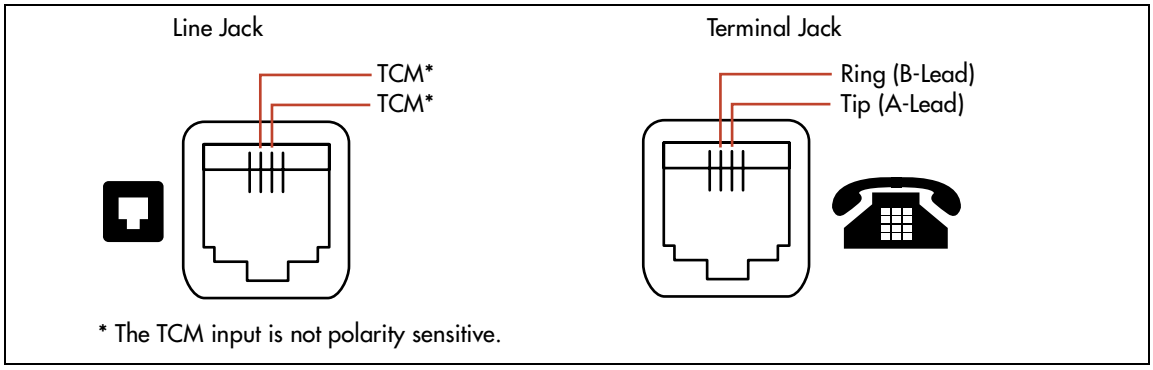


Figure 62 shows the pinouts for the connection cables.

Figure 62 ATA 2 pin outs



1. Connect one end of a line cord to the ATA2 Terminal jack.
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 BCM1000 or BCM1000e.
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.

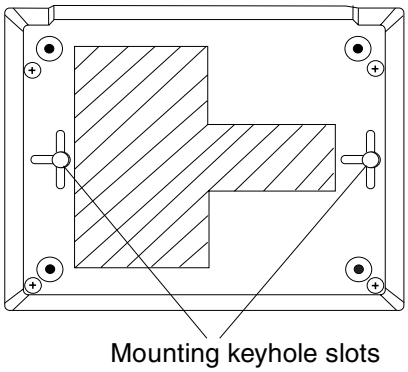
Caution: In North America, the ATA 2 must be powered from a Class 2 power source that is UL and CSA approved.
In Europe, the ATA 2 must be powered from a Class II power source that is CE marked.

Mounting the ATA 2

After the ATA 2 is correctly connected, you can mount the unit on a wall, as described in this section.

1. When using 0.5 mm wire (24 AWG), select a location within 800 m (2,600 ft.) of the BCM1000.
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 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 ATA 2. Refer to Figure 63.

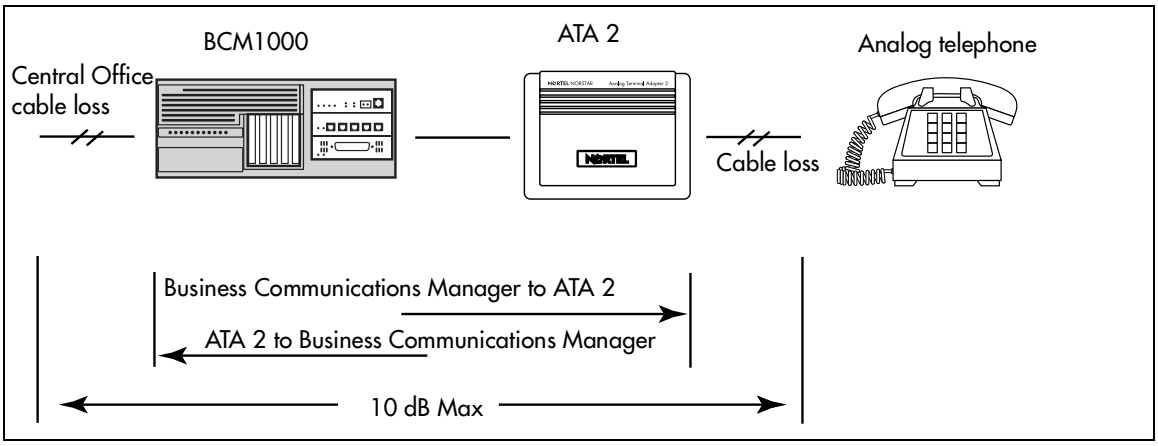
Figure 63 ATA 2 back view



Testing insertion loss measurement

The maximum loss for ATA 2 to Central Office (CO) configuration, shown in Figure 64, must not exceed 10 dB.

Figure 64 Insertion loss from the CO to the analog telephone



Longitudinal balance to ground	50 dB 60 to 4,000 Hz With IEEE 455-1976 test
Overload level	3 dB

Measure the total insertion loss between the CO and analog device by using standard dial up test lines with a transmission test set. For example, Hewlett-Packard 4935A Transmission Test Set.

For CO to analog device measurement

Use this procedure to measure the insertion loss from the CO to the analog device:

1. Establish a connection to the 1 mW, 1 kHz, CO service line with an analog telephone attached to the ATA 2.
2. Ensure that the analog port terminates correctly in 600 ohms:
   - **a** Replace the analog 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 analog 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 analog device connects.)

Note: The tone must be greater than - 10 dB (for example: - 9 dB is acceptable).

For analog device to CO measurement

Use this procedure to measure the insertion loss from the analog device to the CO:

1. Establish a connection to a silent termination on the CO service line with an analog telephone attached to the ATA 2.
2. Make sure the analog port terminates correctly in 600 ohms by:
   - replacing the analog 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 analog telephone or the line drops.
4. Remove the analog 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).

Configuring the ATA 2

Configure the ATA 2 using the Business Communications Manager Unified Manager. For detailed configuration information refer to the *Analog Devices Configuration Guide*.

Chapter 13
Installing optional telephony equipment

This chapter tells you how to connect the optional ringer, page, and music telephony equipment to the media services card (MSC) connectors on the front of the BCM1000.

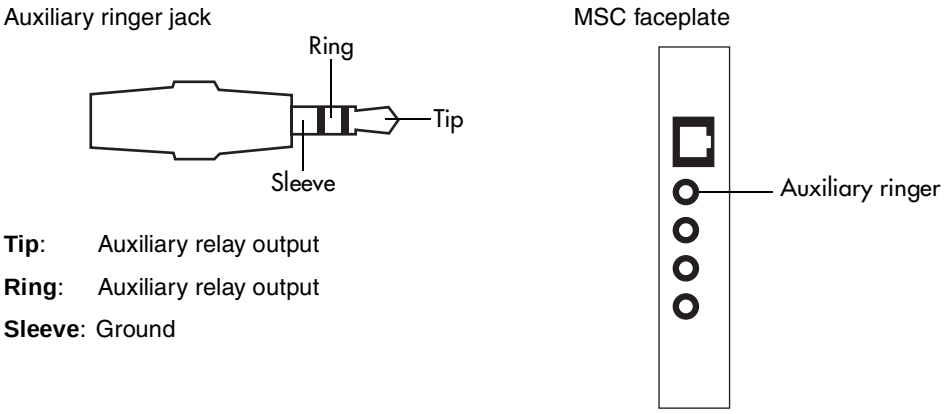
Auxiliary ringer
(customer supplied)

An auxiliary ringer is a customer-supplied piece of hardware that provides external ringing capability to telephones connected to the Business Communications Manager system, if the telephones are set to allow it.

To install this equipment, follow these steps:

1. Use the installation instructions that came with the ringer hardware to install the auxiliary ringer.
2. Connect the ringer generator miniature jack to the auxiliary ringer output on the MSC. Refer to Figure 65.

Figure 65 Auxiliary ringer jack



Tip: Auxiliary relay output

Ring: Auxiliary relay output

Sleeve: Ground

Warning: The auxiliary ringer must not be connected to exposed plant. The ringer must not draw more than 50 mA from a 40 V DC source.

Auxiliary ringer programming

You can activate the auxiliary ringer by setting auxiliary ring for specific external lines and Business Communications Manager telephones. Refer to the *Business Communications Manager Programming Operations Guide* for programming details.

External paging system
(customer supplied)

You can connect an external paging system to provide paging over external loudspeakers.

Ensure the paging system follows these guidelines:

- The paging output from the MSC is 100 mV rms across an input impedance of 600 Ω.
- The output level is 0 dBm with reference to 600 Ω, for a PCM encoded signal at 0 dBm. There is no dc voltage across the page output terminals.
- The page output uses the tip and ring terminals of the jack. The sleeve terminal of the jack connects to ground. You must use a stereo plug to connect the page signal output.

When you use the page signal output jack to connect an external paging amplifier, you also use the page relay jack which contains a floating relay contact pair. The system uses this jack to control the external paging amplifier.

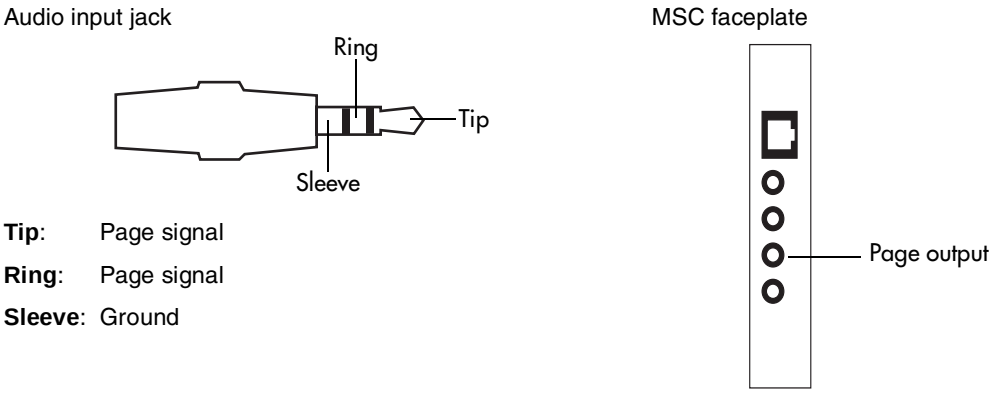
- The contact pair has a switch capacity of 50 mA (non-inductive) at 40 V (maximum). You must remove any inductive load on the output.
- The page relay contacts connect to the tip and ring terminals of the jack. The sleeve terminal of the jack connects to ground. You must use a stereo plug to connect the page relay.

Connecting the paging system

Install the external paging system using the installation instructions that came with the paging system.

1 Connect the paging system audio input to the Page output on the MSC. Refer to Figure 66.

Figure 66 Audio input jack



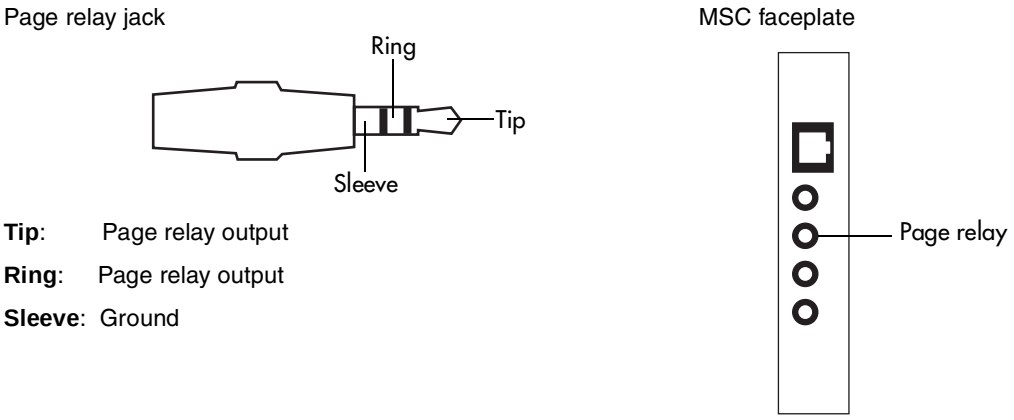
Tip: Page signal

Ring: Page signal

Sleeve: Ground

2 Connect the paging system relay to the Page relay output on the MSC. Refer to Figure 67.

Figure 67 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.

External music source
(customer supplied)

You can use any approved low-power device as a music source. This would include equipment such as a radio with a high impedance earphone jack, as a music source.

Music on hold specifications

Ensure that the music source follows these guidelines.

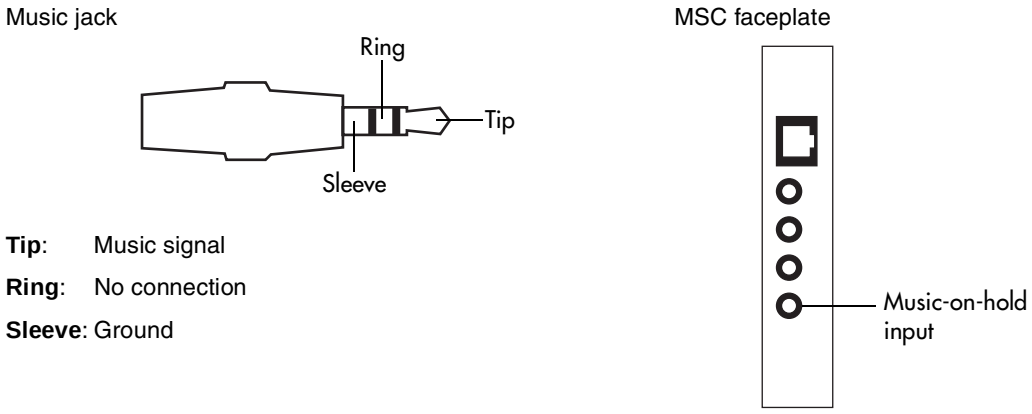
- Nominal input impedance is 3.3 kilohms.
- Nominal sensitivity of this interface returned to digital encoded PCM is -22 dBm0 for a 0.25 V rms input signal.
- The input is limited so that the encoded analog content at the digital interface to the network does not exceed -12 dBm when averaged over any three-second interval.
- The maximum non-clipped input level is 1 V rms.
- The interface is protected against ringing cross.

Connecting the external music source

Follow these steps to connect the external music source to the BCM1000 jack.

1 Connect the miniature jack of the music source output to the music-on-hold input on the MSC. Refer to Figure 68.

Figure 68 Music-on-hold jack



Tip: Music signal
Ring: No connection
Sleeve: Ground

2 Adjust the volume of the music source to a comfortable level by activating Background Music and adjusting the volume at the music source.

TIP: You can adjust the Background Music volume at every telephone.

External music source programming

You must enable Music for callers on Hold and for Background Music through programming. Refer to the *Business Communications Manager Programming Operations Guide* for more details.

Chapter 14
Troubleshooting

This chapter describes some hardware troubleshooting options for determining the cause of malfunctions or failure of the Business Communications Manager hardware.

The Business Communications Manager technical support group also provides tips and troubleshooting information under the **Maintenance** button, located on the Unified Manager front page.

When analyzing Business Communications Manager problem, you can use the information in this section to determine if the problem is hardware-related. If your hardware is stable, you can refer to the *Programming Operations Guide* and to the technical tips in the Unified Manager to determine operational issues.

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 telephone cables and network cables, and then disconnect the ac power cord, before opening the computer. Read and follow installation instructions carefully.

Hardware problems can appear as any of the following:

- The operational LEDs on the BCM1000 or on the media bay modules are not reacting as expected
- The Business Communications Manager system does not function at all.
- The emergency telephone does not function.
- ATA 2 does not function.

Using the System Status Monitor to monitor LEDs

The LEDs on the BCM1000 are part of the System Status Monitor (SSM) board.

Figure 69 shows what the board looks like from inside the BCM1000. When installing new equipment that connects to this board, ensure that the connector for that LED is properly seated.

Figure 69 SSM board connections

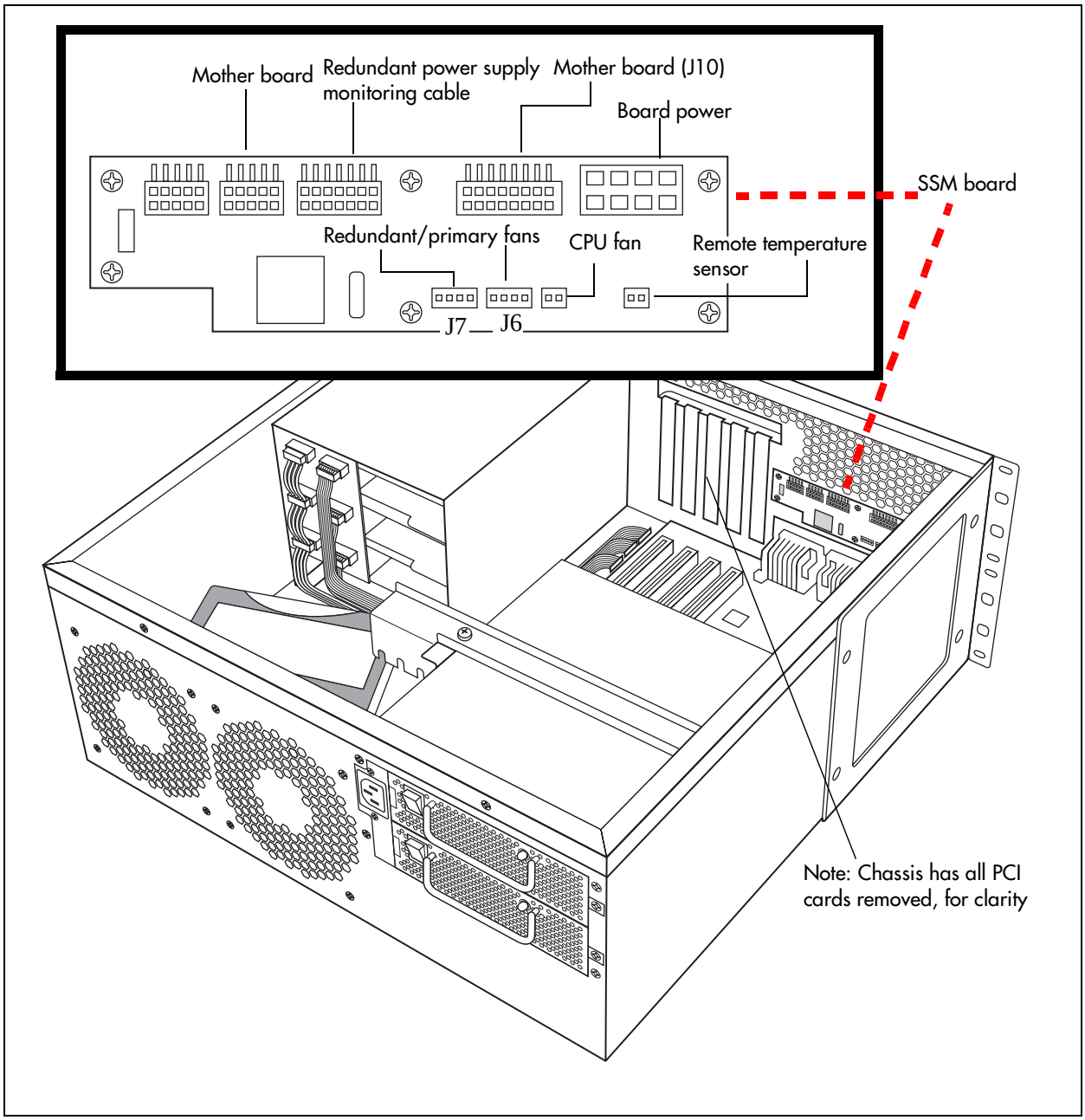
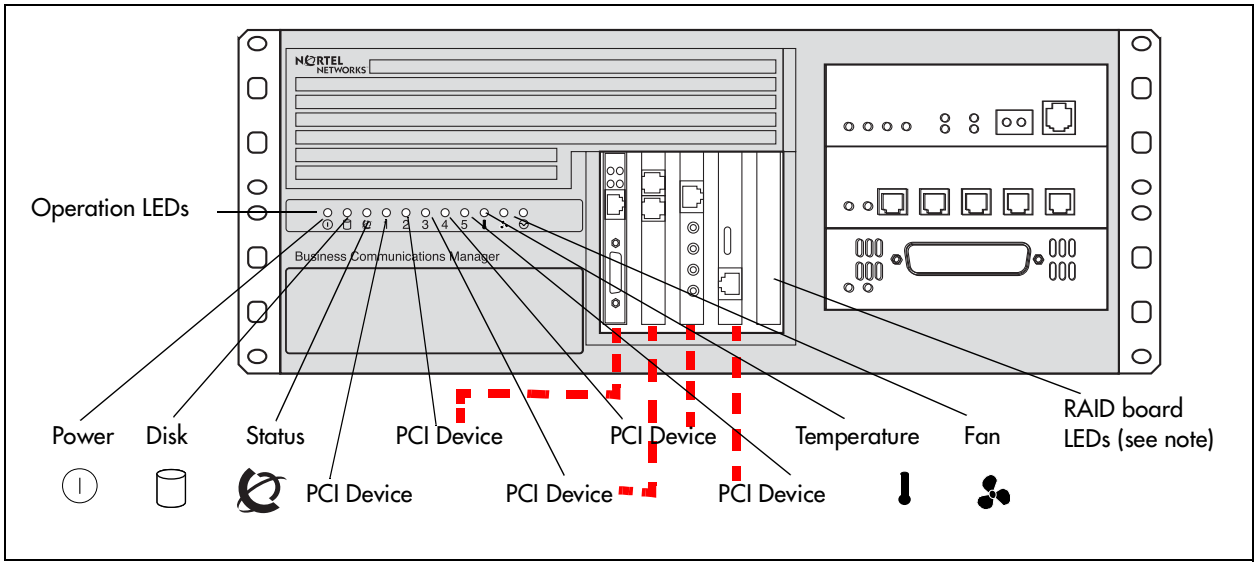


Figure 70 shows what the LEDs look like on the outside of the BCM1000. The labels in the illustration indicate which part of the hardware each LED supports.

Figure 70 LED locations on the face of the BCM1000



Note: RAID board LED status monitoring is done through a separate Diagnostics screen. Refer to "Controlling and monitoring mirroring operations" on page 196.

Media Bay Module LEDs are discussed in "Media bay module common features" on page 34.

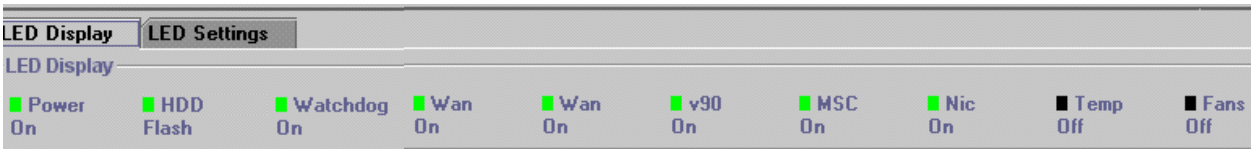
The Business Communications Manager System Status Monitor allows you to view the status of the system LEDs on your PC. This allows you to make preliminary decisions regarding the type of intervention required without necessarily having to view the BCM1000 hardware.

You can enter the System Status Monitor through the Unified Manager:

1. Open the Unified Manager.
2. Under **Diagnostics**, click on **System Status Monitor**.

   The LED Display screen appears. Refer to Figure 71. This screen displays the current status of the operational LEDS.

Figure 71 System Status Monitor LED Display screen



3 To set the parameters for the System Status Sanity check, click the LED Settings tab.

The LED Settings record appears.

Figure 72 System Status Monitor LED Settings record

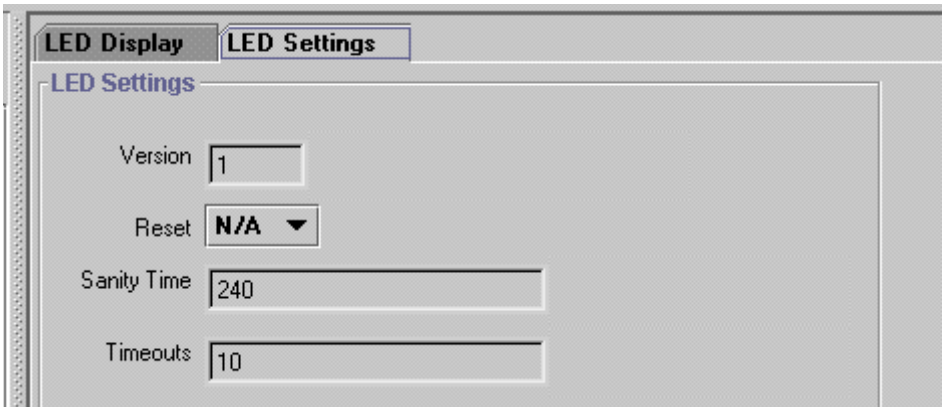


Table 39 lists the values on the LED Settings screen.

Table 39 LED Display screen settings

Attribute	Values	Description
Version	Read only.	The current version of the LED monitoring application.
Reset	Yes, No, N/A	Use Yes to allow the system status monitor board to reset the computing platform in the event that the sanity check fails the user set parameters.
Sanity Time	60-255 Default: 240	The time in seconds between sanity checks.
Timeouts	0-254 Default: 10	The number of sanity checks that must fail before the system status monitor sends a reset signal to the computing platform.

Emergency telephone does not function

If the emergency telephone is connected to the system, use the following procedure:

1 Check the power LED on the ASM 8 to check that the ASM 8 is receiving power.

2 Check that the emergency telephone has dial tone.

3 Check the external line and emergency telephone connections.

4 To avoid damage to the emergency telephone, connect the telephone directly to the external line and check for dial tone.

5 Replace the MSC.

If the emergency telephone is connected to the CTM, use the following procedure:

1. Check that the system has a CTM installed.
2. Check that there is no dial tone at the emergency telephone.
3. Replace the CTM.

ATA 2 does not function

If the Business Communications Manager ATA 2 does not function. Follow these steps to troubleshoot the problem.

1. Make sure there is ac power connected to the ATA 2 unit.
2. Make sure that ATA 2 is in the Tones OFF mode. (For Data Applications only.)
3. Correctly configure the ATA 2 telephone port for data communication.
4. Allow sufficient start up time.
5. Assign the prime line.
6. Assign a ringing line if required, for example, auto-answer modems, FAX).

Checking the wiring

Check the following connections:

- 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.

- Business Communications Manager hardware 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 hardware and Business Communications Manager ATA 2.

- External line to the Business Communications Manager system.

  Ensure the external line is correctly connected to the BCM1000 and make sure there is dial tone.

Checking for dial tone at the ATA 2

Check to ensure there is dial tone from the set and from the ATA 2 module.

1. If there is no dial tone, replace a single-line telephone for the data communication device.
2. If there is no dial tone at the ATA 2 unit:
   a. Disconnect the line side of ATA 2. Connect an Business Communications Manager telephone to the ATA 2 port.
   b. Check that the connection from ATA 2 to the Business Communications Manager hardware is functioning correctly (the telephone has dial tone).

Checking for trunk line dial tone to the ATA 2

Use the following steps to check for trunk line dial tone to the ATA 2.

1. Disconnect ATA 2 external line from the Business Communications Manager hardware and connect the data device directly to this external line.
2. Make a call.
3. If the problem continues, the device or the external line is possibly at fault.
4. Plug the device into a different line.
5. If the problem continues, the device is possibly at fault.

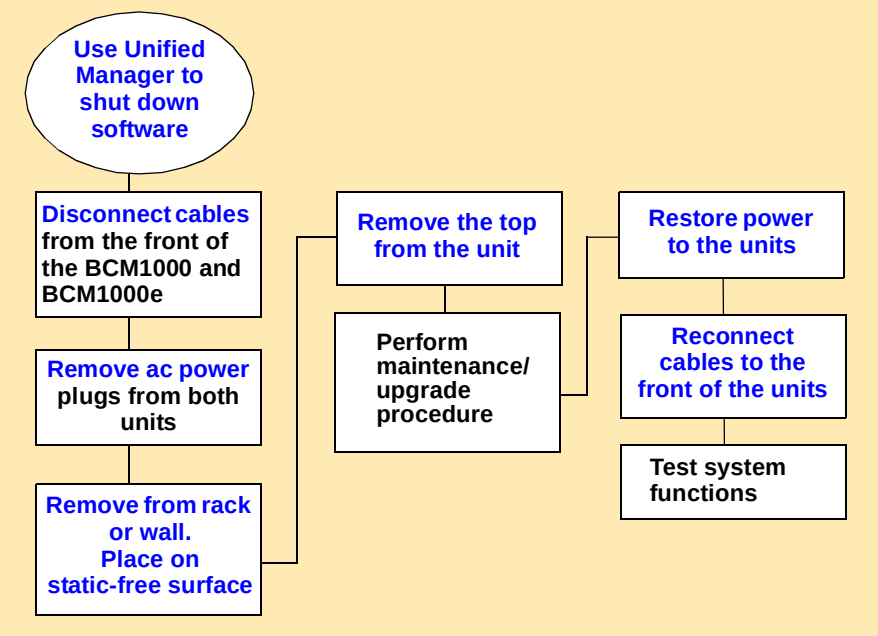
For more information about ATA 2, contact your customer service representative.

Chapter 15
Preparing hardware for maintenance or upgrades

When you need to replace or update a piece of hardware on the Business Communications system, you must ensure the system is safely disconnected from the trunk lines and all electrical connections are disconnected. To replace interior components on these units, you can remove the top to access the inside of the units. Also, if you are replacing any of the PCI cards (base unit only) or any of the media bay modules, you may need to remove the front bezel of the unit.

Figure 73 provides an overview of the process for preparing the Business Communications Manager hardware for maintenance or upgrade procedures.

Figure 73 Process Map: Preparing the units for maintenance



Special tools

Before you replace the components, ensure you have the following equipment:

- Phillips screwdriver #2, with a blade 3.5 in. long
- 3/16 inch slot screwdriver
- antistatic grounding strap

Caution: You must wear an antistatic grounding strap at all times when handling electronic components. Failure to do so can result in damage to the equipment.

Shutting down the system software

The Business Communications Manager system requires a controlled shutdown to guarantee the integrity of the file system. Sometimes this may not be possible, for instance if a hard drive fails. However, as long as you have access to the Unified Manager, perform the following procedures before removing power from the system:

1. Start a web browser on a computer with a LAN connection to the Business Communications Manager system.
2. Enter the IP address of the Business Communications Manager system and the port number for Business Communications Manager Unified Manager (:6800).
   For example: **http://10.10.10.1:6800**.
3. Click the **Configure** button.
4. Type your user name in the **Login** box. The default user name is `supervisor`.
5. Type your password in the **Password** box. The default password is `visor`.
6. Choose **System**.
7. Click the **Logoff** menu and then click **Shutdown**.
8. Click the **Yes** button.
9. Wait until the Status changes to **Complete! It is safe to turn off the system**.
10. Click the **Done** button.
11. Quit the web browser.

Shutting down the system hardware

After the system has gracefully exited from the software, you can shut down the hardware.

Warning: You must remove all of the connections to the Business Communications Manager hardware before you power the system down. Failure to disconnect lines before power down can cause damage to the system.

Follow these steps to ensure a safe shutdown of the system.

1. Remove the cables from the front of the BCM1000 and BCM1000e, if there is one. This includes the data connections on the media services card (MSC).

   Mark the cables so you can ensure they get reconnected correctly.

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

Warning: You must disconnect power from the BCM1000 after you have performed a Unified Manager shutdown. The base unit cannot start operating again until after power has been disconnected and then reconnected.

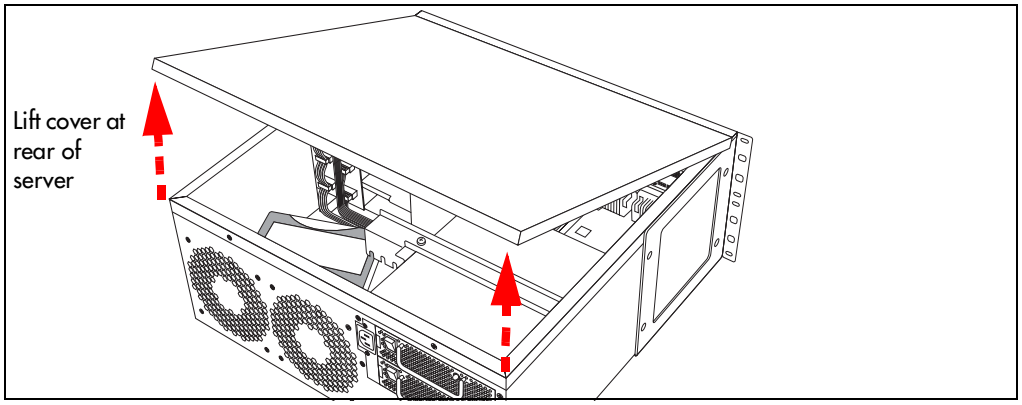
3. Ensure you have room to access the part you are working on. Remove the base unit from the rack, if necessary.

Removing the top cover from the unit

You must remove the top cover to access any of the internal components of the BCM1000.

1. Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
2. Remove the two screws from the cover, at the back of the unit.
3. Lift the back of the cover and slide it back and up. Refer to Figure 74.

Figure 74 Remove the top cover



Removing the front bezel

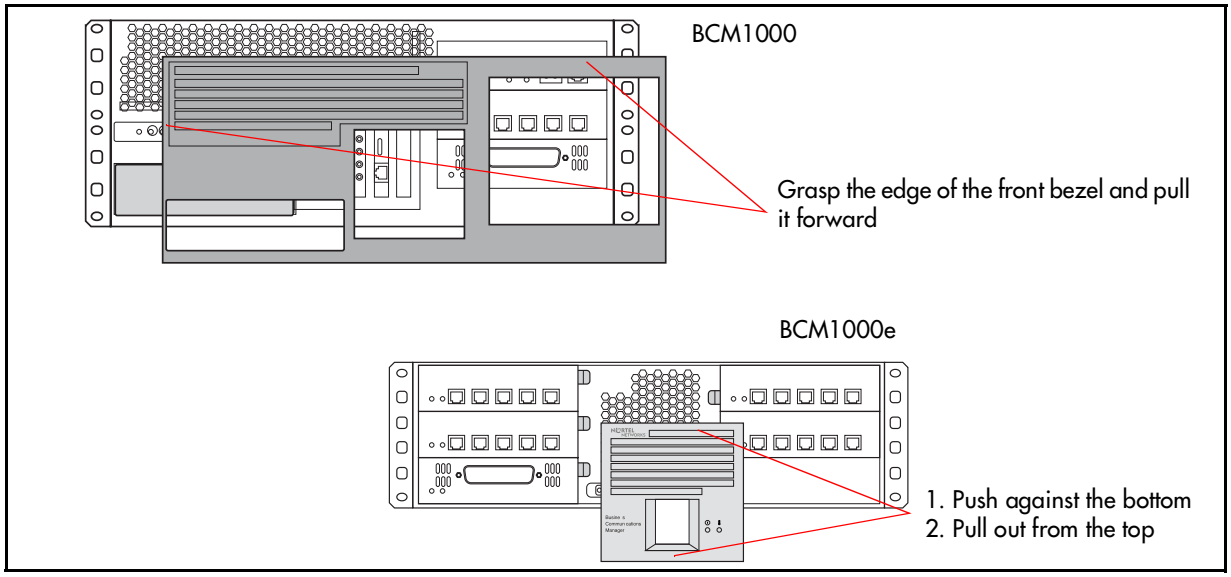
The front bezel is a plastic cover installed on the front of the BCM1000. You must remove the bezel to add or remove the cards or the media bay modules. Refer to Figure 75.

1 To remove the front bezels:

Base unit: Grasp the edge of the front bezel and pull it forward.

Expansion unit: Push against the bottom of the bezel, and then pull the bezel out from the top.

Figure 75 Removing the front bezel



Restarting the system

When you finish your maintenance procedures, restart the Business Communications Manager hardware in the order described in this section.

Restoring the system to operation

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

1 Ensure that all cables inside the housing are connected snugly to the correct boards and excess cable is bundled neatly, out of the way.

2 Put the bezel back on the BCM1000 or BCM1000e, if you removed it.

3 Put the lid back on the unit and replace the screws.

4 If you removed the unit from the rack or wall, replace it.

5 Plug the BCM1000e, if there is one, back into the ac power source.

6 Plug the BCM1000 back into the ac power source.

The Business Communications Manager automatically starts booting.

Warning: When you restart the system, all IP clients/voice mail and VoIP ports are not available until the system services restart.

If you have a mirrored disk system, once the services have been restarted, the system automatically ensures that the mirrored disk is updated.

7 Replace all the connectors to the front of the units.

The reboot can take up to 10 minutes.

Software restart

If you did not shut the system power down, restart the software

1 Refer to "Shutting down the system software" until you get to step 7.

2 At this point, select **Reboot** on the **Logoff** menu.

The system reboots.

Warning: When you restart the system, all IP clients/voice mail and VoIP ports are not available until the system services restart.

If you have a mirrored disk system, once the services have been restarted, the system will automatically ensure the mirrored disk is updated.

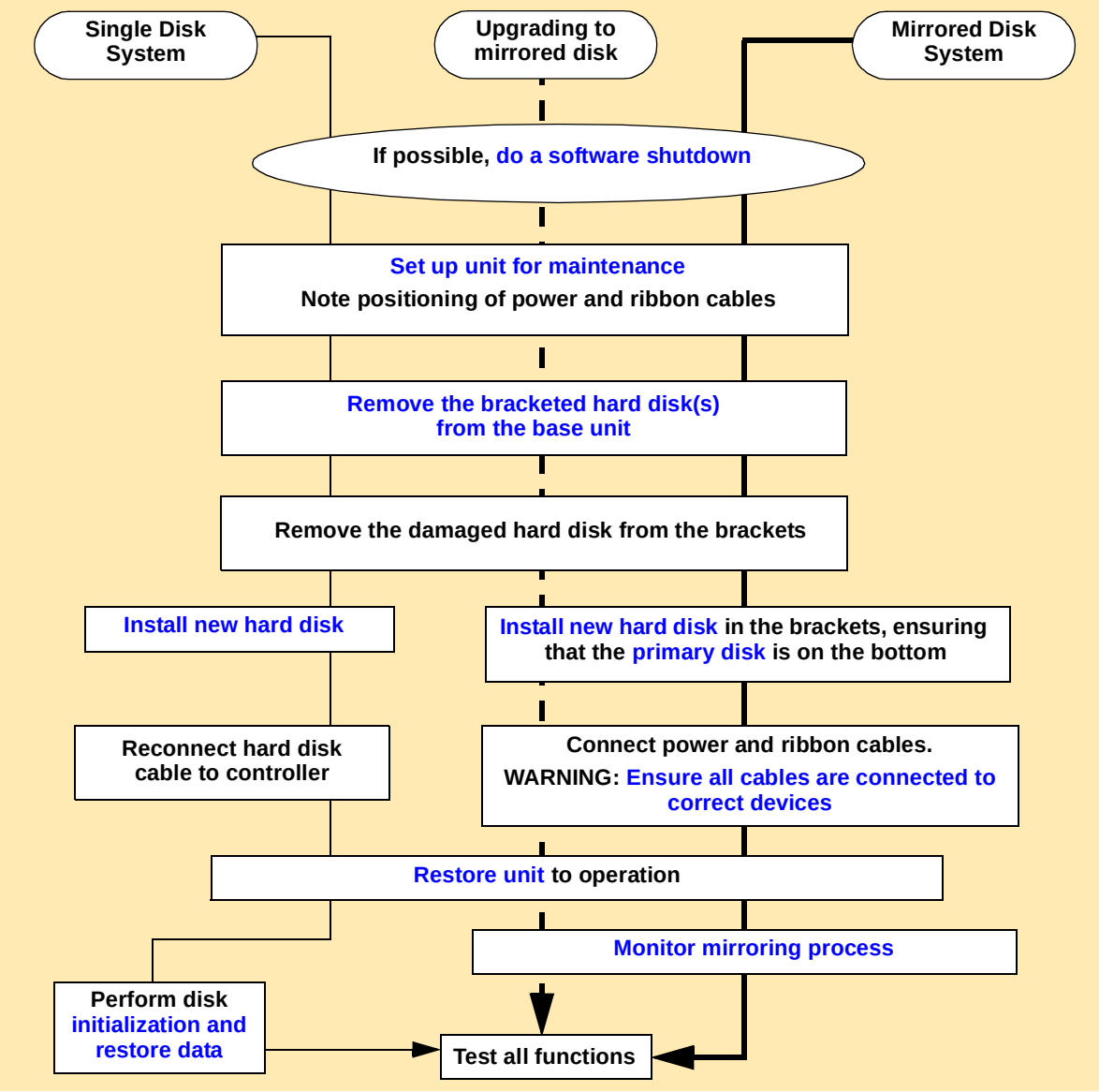
Chapter 16
Replacing the hard disk

The BCM1000 includes either one or two factory-installed hard disks. You also can install a second hard disk to a single-disk base unit. (Not available to BCM1000 hardware manufactured for the BCM 2.0 release).

This chapter explains how to change a hard disk, and how to upgrade a single-disk system to a mirrored system by adding a RAID board and a second hard disk.

Figure 76 provides an overview of the hard disk replacement process.

Figure 76 Process map: Hard disk replacement



Warning: Maintain a current backup of your system.
When you replace the hard disk in a single disk system, you must restore the Business Communications Manager system programming from the backup.
Warning: Mirrored disk systems do not replace the need to have current BRU backups that you store in a secure remote location.

Caution: Use only a Nortel Networks approved upgrade or replacement kits.

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

Danger: Electrical shock warning
Disconnect the telephone and network cables, and then the power cord before opening the base unit.

Read and follow all instructions carefully.

Caution: Do not use an electric screwdriver near the hard disk. You can lose the information stored on the disk.
Shock can damage the hard disk. Do not drop or hit the hard disk drive.

Removing the hard disk

The hard disk brackets are attached to the hard disk and the floor of the BCM1000. When you want to replace a hard disk, you remove both the brackets and the disk, or disks, as one unit, so they are easier to work with.

Warning: Ensure that you put all equipment on a static-free surface when you are working with it. Boards that you need to remove to access parts of the interior must be put into a static-free bag until you are ready to replace them in the unit.

The following steps describe that process for removing the bracket and hard disk unit.

1. If you still have access to the Unified Manager, shut down the system by following the instructions in “Shutting down the system software” on page 168. Otherwise, skip to step 2.
2. Set up the BCM1000 for maintenance, as described in “Shutting down the system hardware” on page 169.
3. Inside the BCM1000, disconnect the hard disk power cables and ribbon cables.

4 Remove the four screws holding the hard disk bracket to the BCM1000. Refer to Figure 77 and Figure 78.

Note: If you are upgrading to a mirrored disk system, remove the power cables from the media bay module housing, as well.

Figure 77 Hard disk wiring (single disk) and screw locations (2.0 hardware)

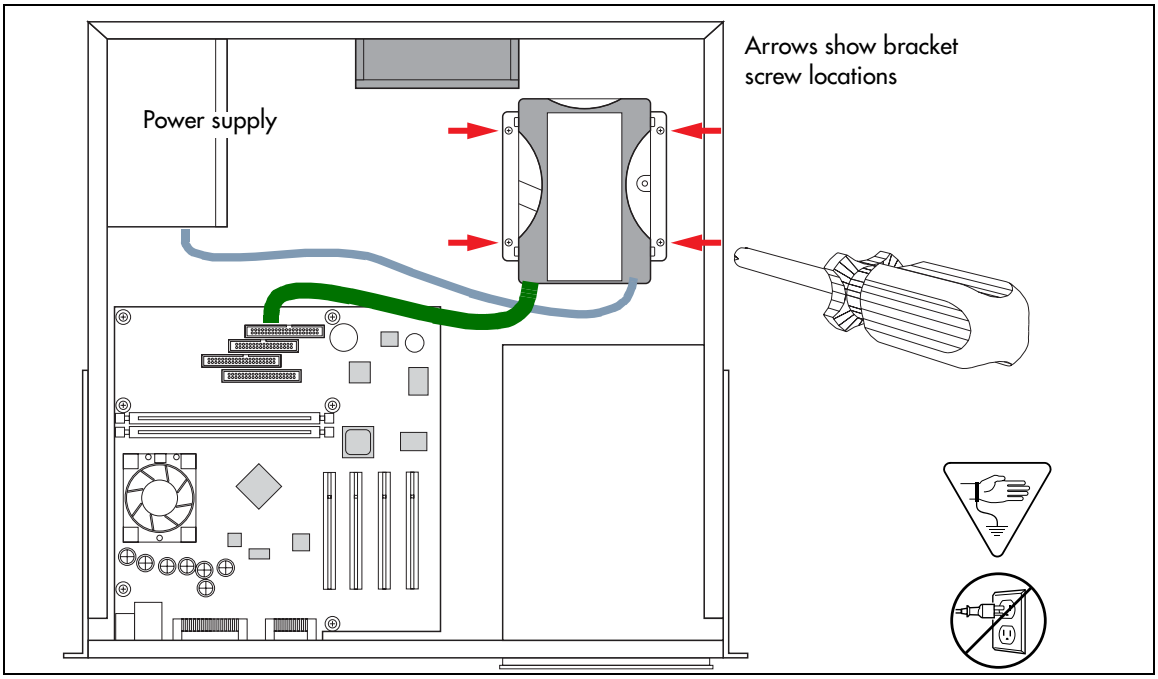
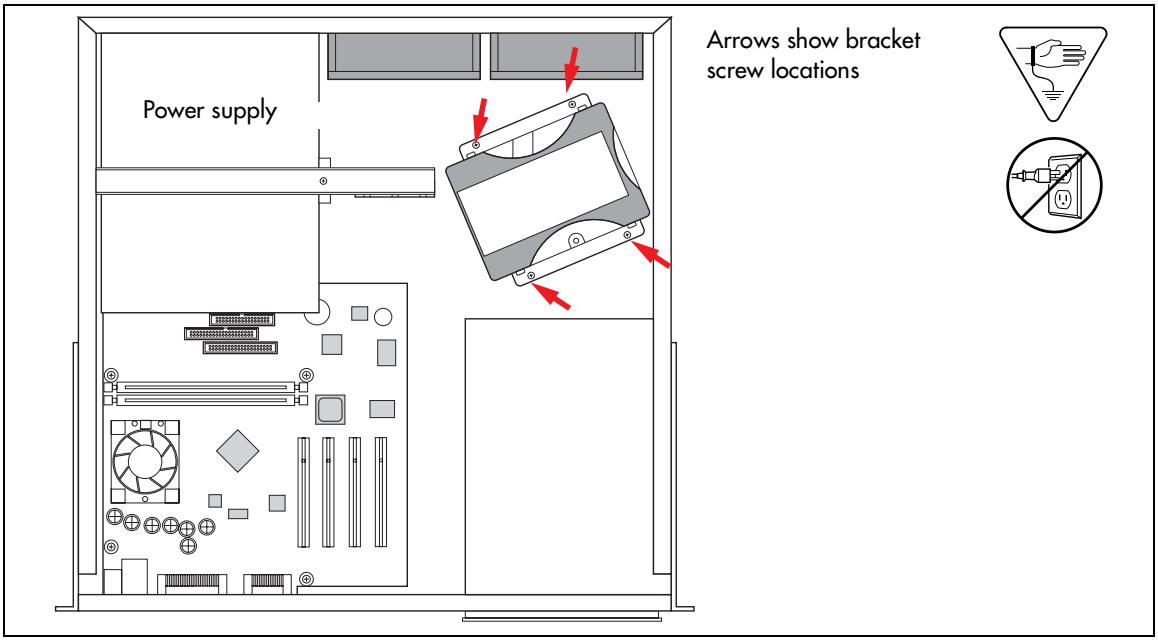


Figure 78 Hard disk and screw locations (2.5 version hardware)



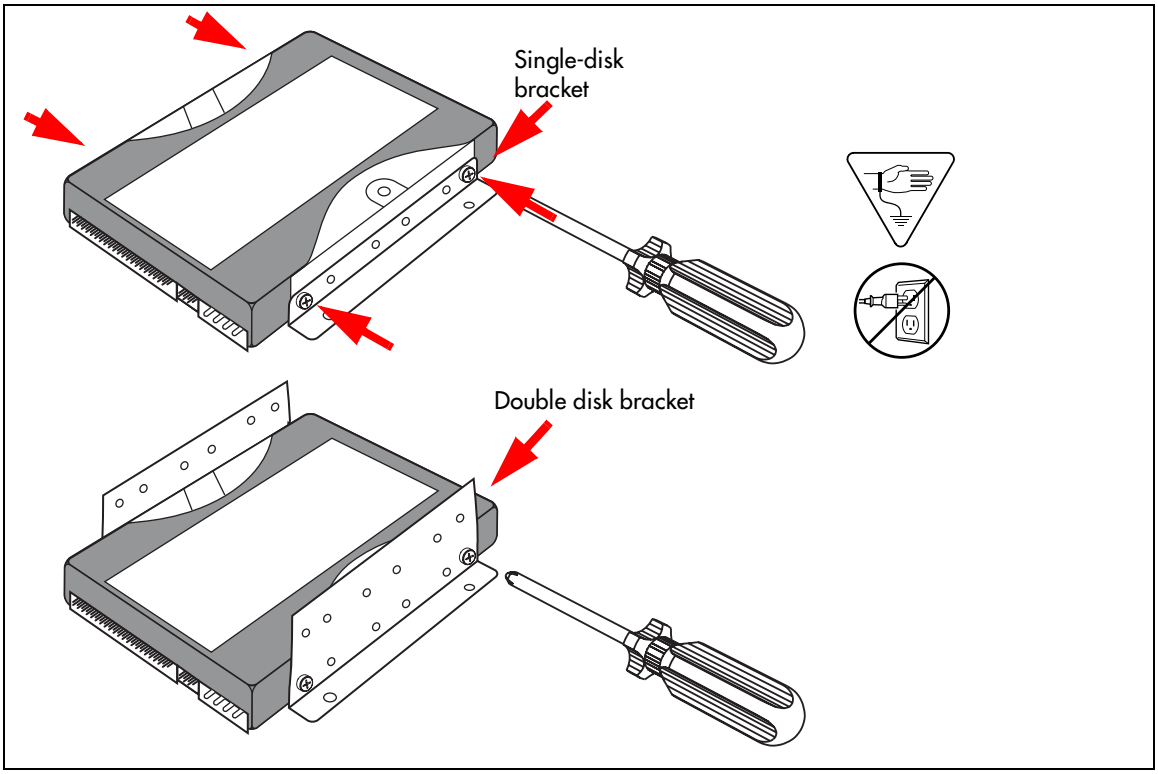
5 Lift the bracketed hard disk(s) out of the unit.

6 Remove the screws that fasten the brackets to the hard disk. Refer to Figure 79.

Note: Mirrored disks

If you are upgrading to a mirrored system by adding a second hard drive, you can skip step 6. However, if you are replacing a primary hard drive in a mirrored disk system, you may find it easier to remove both drives from the brackets.

Figure 79 Remove the brackets from the hard disk



Note: If you are returning the hard disk to a Nortel Networks repair facility, package it carefully in the replacement hard disk box. If you do not have the original box, package the drive in another box with shock absorbing material.

Installing a new hard disk

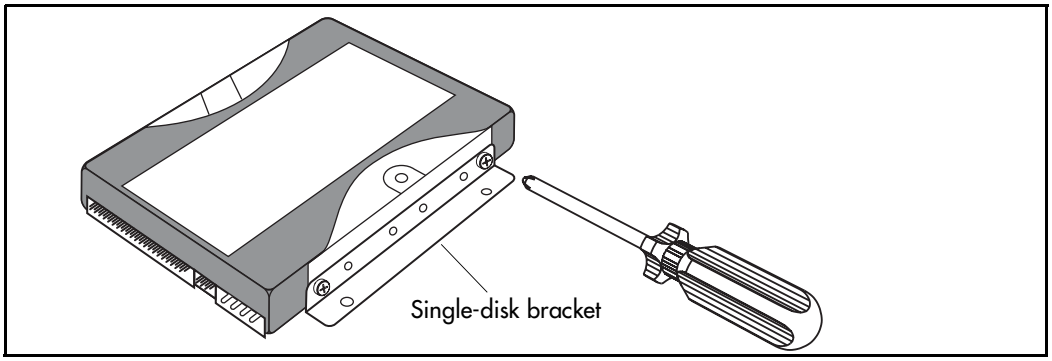
This section describes what you need to do to install a new hard disk into the BCM1000.

Follow these steps to replace hard disks into the brackets, and then, back into the base unit housing.

1 Ensure you have followed the directions in "Removing the hard disk" on page 174.

2 Attach the new hard disk to the brackets, positioning the hard drive so the exposed electronic components face down. Refer to Figure 80.

Figure 80 Connect the brackets to the hard disk (single-disk system)



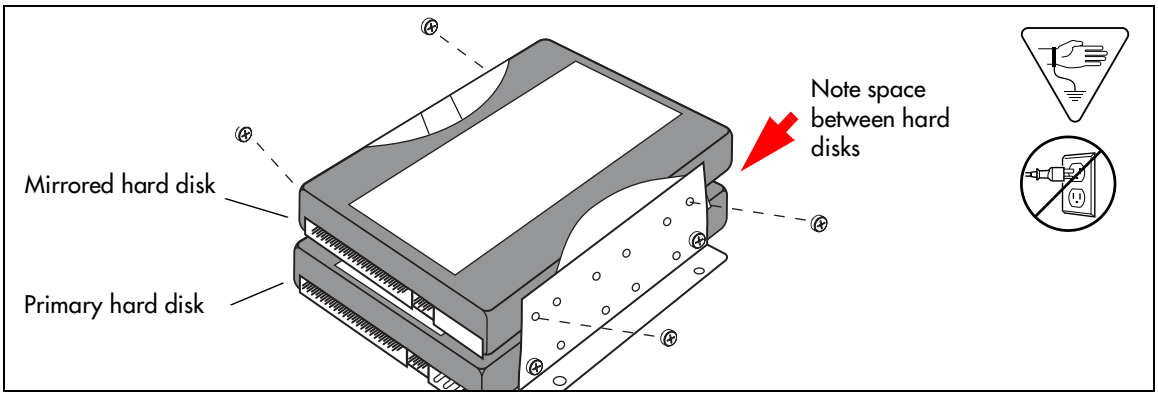
Note: Mirrored disk note

In a mirrored disk system, the Primary system disk is always installed in the bottom level of the brackets.

If you are upgrading to a mirrored disk system, position the new hard disk (Mirror Primary) over the existing hard disk, between the tall brackets. There will be a space between the hard disks. Refer to Figure 81 on page 177.

Note: If you are replacing a failed disk on a mirrored disk system, ensure the new disk is replaced in the same position in the bracket that the failed disk was removed from.

Figure 81 Installing two hard disks for a mirrored disk system



3 Place the hard disk assembly back into the BCM1000.

a Align the holes in the brackets with the holes in the bottom of the inside of the BCM1000.

b Fasten the hard disk bracket to the housing.

4 Reconnect the drive(s) to the system:

Note: All connectors have a notch that allow you to align the connectors correctly. If you cannot push a connector in easily, do not force it.

- **Single hard disk:** Connect the power supply to the hard disk connector, and the ribbon (IDE) cable from the controller to the hard disk.
- **Mirrored hard disks:**

a Reconnect the power cables as described below.

Warning: Ensure that you connect the hard disk cables to the same hard disk from which they were disconnected. Failure to do so may prevent the system from booting.

b Connect the Primary ribbon cable from the RAID board to the disk you removed it from.

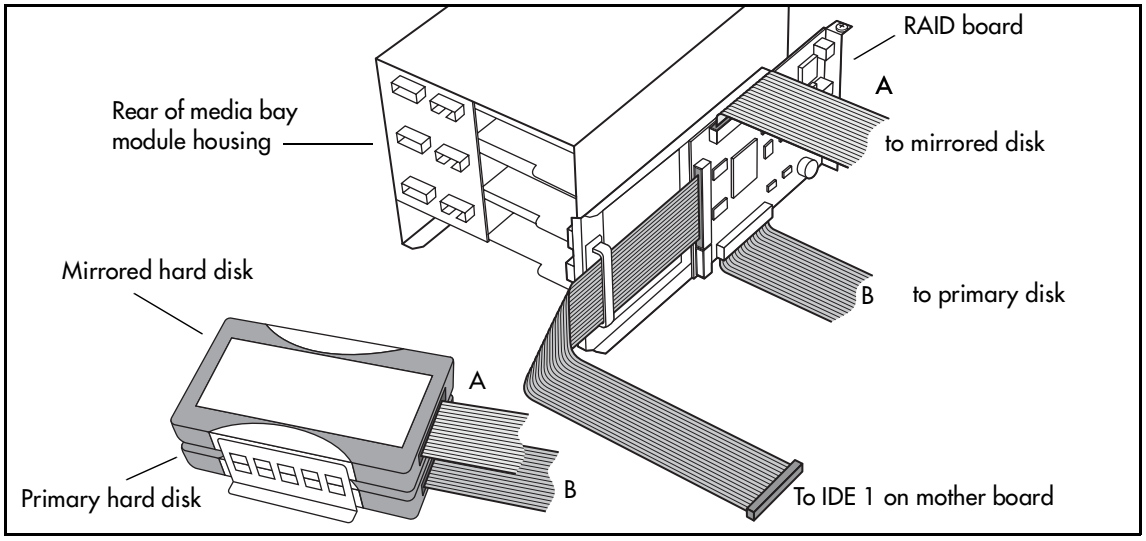
If you are upgrading from a single-disk system to a mirrored system, this will be the disk on the bottom.

c Connect the Mirror ribbon cable from the RAID board to the disk you removed it from.

If you are upgrading from a single-disk system to a mirrored system, this will be the disk on top.

d Ensure that the third ribbon cable from the RAID board is connected to the IDE 1 connector on the controller (mother)board.

Figure 82 Cabling the RAID board to the hard disks



For information about installing the RAID board, refer to "Installing the RAID board" on page 190.

5 Replace the cover on the BCM1000.

6 Restore the units to operation. Refer to "Restarting the system" on page 170.

7 Perform the procedure appropriate for the type of hard disk system you have:

- **Single disk**: Initialize the hard disk. Refer to "Initializing the hard disk (single-disk system, BCM 2.5/2.5.1)" on page 179.

  After the disk is initialized, restore your data from your backups. If you did not backup your keycodes, re-enter them.

- **Mirrored disks**: The system automatically starts the mirroring process. Monitor the progress of the mirroring task using the Mirroring diagnostics tool in the Unified Manager (refer to "Controlling and monitoring mirroring operations" on page 196) or by using Telnet.

  The LEDs on the front of the RAID board indicate the current status of the board and the hard disks. For more information, refer to "RAID board LEDs" on page 195.

Initializing the hard disk (single-disk system, BCM 2.5/2.5.1)

The BCM1000 is normally initialized at the factory. However, if you have to replace the hard drive in a single-disk BCM1000, 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:

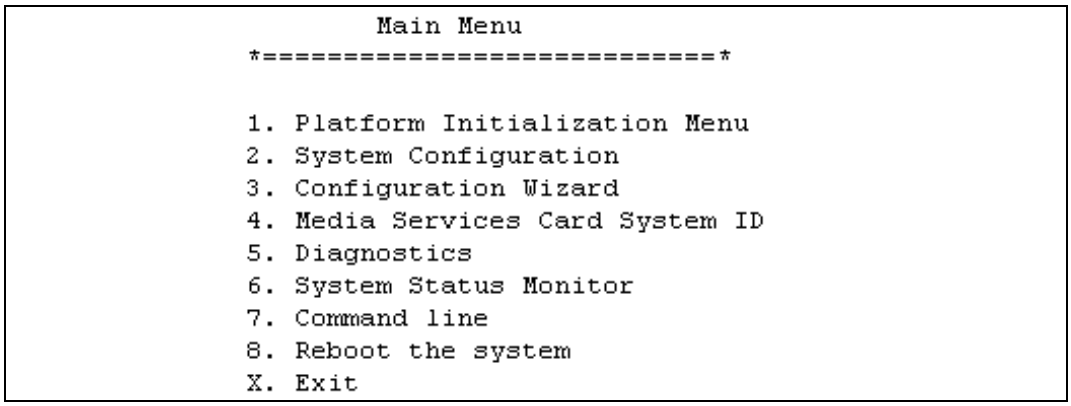
1 Make sure the **Status** LED on the BCM1000 is lit. This LED indicates that the Business Communications Manager is operating correctly.

2 Attach the base unit and a computer through the serial port, as described in "Setting up the null modem cable" on page 125.

3 Enter the terminal emulation program, as described in "Finding the configuration menus" on page 126,

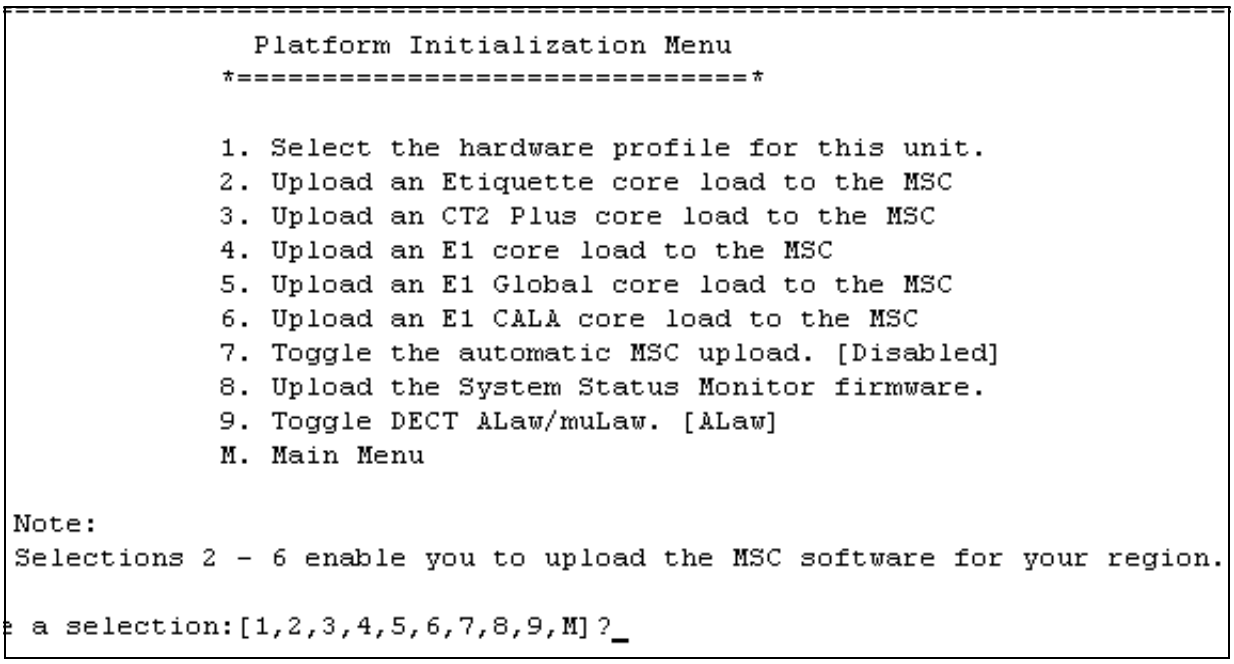
- If the hard disk does not require initialization, the main menu appears. Refer to Figure 83.

Figure 83 Main Menu screen



- If the hard disk requires initialization, the Platform Initialization Menu appears. Refer to Figure 84.

Figure 84 Platform Initialization Menu screen (BCM 2.5/2.5.1 systems)



a Enter the number beside the upload for the software you want to install. If you do not know which software to upload, refer to "Core software and regions" on page 233.

Warning: If you have a DECT system and your system requires a muLAW companding law protocol, ensure that the entry in the brackets in entry 9 says `[muLaw]`. If it does not, refer to the *DECT Installation and Maintenance Guide* for directions about how to change this.

b Next you need to ensure the correct MSC configuration has been entered.
Enter 1 (Select the hardware profile for this unit). The screen shown in Figure 85 appears.

Figure 85 Profile screen

```
 ================================================================================
Nortel Networks                              Business Communications Manager
 ================================================================================
                                                                  Default
                                                                  MSC
                          Slot 1   Slot 2  Slot 3  Slot 4  Image
                        ============================================
   **  1. -BCM-WVMN-CONFIG   WAN    V.90     MSC     NIC     ETQ
       2. -BCM=NVMN-CONFIG   NIC    V.90     MSC     NIC     ETQ
       3. =BCM-INMN-CONFIG   IWAN   NIC      MSC     NIC     E1
       4. -BCM-N_MN-CONFIG   NIC             MSC     NIC     E1
   *   5. -Base Platform     n/a    n/a      MSC     NIC     n/a

       6. Select an alternate MSC image to load.
       M. Return to the Main Menu.

                  BCM Rls ID 2.5 RC 10
                  Version 7.1.8
                  Hardware Profile 2 CORE UPLOAD
Notes:
** Indicates the hardware profile detected on this system.
* Indicates the hardware profile configured on this system.
PRESS a NUMBER (1, 2, 3, 4, 5, 6, M) ?
```

c The current MSC configuration is indicated with two asterisks (**) Note the Image column.

If you want to change this, select 6 (Select an alternate MSC image to load). The system checks to see if a core upload is required. This takes about 45 minutes.

If you do not want to change the MSC load, enter the number of the selection with the asterisks.

Note: You can only change the profile once. After the profile is changed, the menu options for the profile no longer display.

4 The system automatically reboots as part of the initialization process. When the process is complete, the telnet session disconnects.

5 Do one of the following:

- Run the Quick Start Wizard to create the system parameters and defaults. Then restore your system data from your backup disk.
- Restore system and data information from your backup disk.

Note: The detailed processes for performing steps 4 and 5 are contained in the *Business Communications Manager Programming Operations Guide*.

6 Test your system for correct operations.

Initializing the hard disk (single-disk system, BCM 3.0)

The BCM1000 is normally initialized at the factory. However, if you have to replace the hard drive in a single-disk BCM1000, 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 Enter the terminal emulation program, as described in "Finding the configuration menus" on page 126.

The Platform Initialization Menu appears. Refer to Figure 84.

Figure 86 Platform Initialization Menu screen

```
                Platform Initialization Menu
               *============================*

               1. Initialize Menu
               2. Upload an Etiquette core load to the MSC
               3. Upload an CT2 Plus core load to the MSC
               4. Upload an E1 core load to the MSC
               5. Upload an E1 Global core load to the MSC
               6. Upload an E1 CALA core load to the MSC
               7. Toggle the automatic MSC upload. [Enabled]
               8. Selection not available: no SSM firmware on BCM400
               M. Main Menu
-------------------------------------------------------------------------------+
 Product Version: BCM400 | Release: 3.0 | Version: RC 2.0 | Issue: 1
-------------------------------------------------------------------------------+
 Initialization: Complete | Configuration: Valid   | Service startup: Auto
-------------------------------------------------------------------------------+
Motherboard: TBD| PCI Cards: MSC Empty Modem LAN LAN | MSCVersion:
-------------------------------------------------------------------------------+
            Make a selection:[1,2,3,4,5,6,7,8,M]?
```

2 Enter `1` (Initialize Menu) and press <ENTER>.

The Initialize Menu appears. Refer to Figure 87.

Figure 87 Platform Initialization Menu screen

```
================================================================================*
                    Initialize Menu
                *============================*

                1.- Initialize Universal Profile
                2.  Set service startup to Auto
                3.  Set service startup to Manual
                4.- Clear all event logs
                5.- Display active partition information
                6.- Display inactive partition information
                7.- Display Manufacturing Release Note
                8.- Platform Initialization Menu
                M.- Return to Main Menu
--------------------------------------------------------------------------------+
 Product Version: BCM400  | Release: 3.0 | Version: RC 2.0 | Issue: 1
--------------------------------------------------------------------------------+
 Initialization: Complete | Configuration: Valid   | Service startup: Auto
--------------------------------------------------------------------------------+
Motherboard: SH815 | PCI Cards: MSC WAN Empty LAN LAN | MSCVersion: 30CJB19
--------------------------------------------------------------------------------+
              Make a selection:[1,2,3,4,5,6,7,8,M]?
```

3 Enter `1` (Initialize Universal Profile) and press <ENTER>.

The MSC Initialization menu screen appears after about a minute. Refer to Figure 88.

Figure 88 MSC Initialization Menu screen

```
                    MSC Initialization Menu
                *==============================*

                1. Select Etiquette MSC load
                2. Select CT2Plus MSC load
                3. Select E1 MSC load
                4. Select E1 Global MSC load
                5. Select E1 CALA load
                6. Do not select any load
                7.- Platform Initialization Menu
                M.- Return to Main Menu
--------------------------------------------------------------------------------+
 Product Version: BCM400  | Release: 3.0 | Version: RC 2.2 | Issue: 4
--------------------------------------------------------------------------------+
 Initialization: InProgress | Configuration: Valid   | Service startup: Manual
--------------------------------------------------------------------------------+
Motherboard: SH815 | PCI Cards: MSC WAN Empty LAN LAN | MSCVersion: 30CKC06
--------------------------------------------------------------------------------+
              Make a selection:[1,2,3,4,5,6,7,M]?
```

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 233.

5 The system automatically reboots as part of the initialization process. When the system reboots, the telnet session disconnects.

Note: If there is a modem, the system reboots four times. If there is no modem, the system only reboots twice.

6 Do one of the following:

- Run the Quick Start Wizard to create the system parameters and defaults. Then restore your system data from your backup disk.
- Restore system and data information from your backup disk.

7 Test your system for correct operations.

Initializing the hard disk (single-disk system BCM 3.0.1 and newer systems)

The BCM1000 is normally initialized at the factory. However, if you have to replace the hard drive in a single-disk BCM1000 running BCM version 3.0.1 (3.0 maintenance release) or newer releases, 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 Ensure the **Status** LED on the Business Communications Manager is lit. The **Status** LED indicates that all services have started and the Business Communications Manager is operating correctly.

2 Attach a configuration computer to the base function tray serial port (recommended method). Continue to the next step in this procedure when complete.

Note: When you replace a hard disk, IP configuration data is lost. The Business Communications Manager IP address defaults to: 10.10.10.1

You can access the Business Communications Manager through your local area network, using the IP address 10.10.10.1. However, if another network terminal uses this IP address, conflicts and network problems can arise.

3 Access the Business Communications Manager from the configuration terminal using the terminal emulation program. Use the Business Communications Manager default IP address (10.10.10.1).

4 Enter the terminal emulation program, as described in “Finding the configuration menus” on page 126. The Main Menu should display (Figure 89).

Figure 89 Main Menu screen

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

              1. Platform Initialization Menu
              2. System Configuration
              3. Configuration Wizard
              4. Media Services Card System ID
              5. Diagnostics
              6. System Status Monitor
              7. Command line
              8. Restart the system
              X. Exit
-------------------------------------------------------------------------------+
 Product Version: BCM1000 | Release: 3.0 | Version: RC 2.0 | Issue: 1
-------------------------------------------------------------------------------+
 Initialization: Pending   | Configuration: Valid   | Service startup: Manual
-------------------------------------------------------------------------------+
Motherboard: TBD| PCI Cards: MSC Empty Modem LAN LAN | MSCVersion:
-------------------------------------------------------------------------------+
            Make a selection:[1,2,3,4,5,6,7,8,X]?
```

5 Select **1** (Platform Initialization Menu) and press <ENTER>.

The screen shown in Figure 84 appears.

Figure 90 Platform Initialization Menu screen

```
              Platform Initialization Menu
              *============================*

              1. Initialize Menu
              2. Upload an Etiquette core load to the MSC
              3. Upload an CT2 Plus core load to the MSC
              4. Upload an E1 core load to the MSC
              5. Upload an E1 Global core load to the MSC
              6. Upload an E1 CALA core load to the MSC
              7. Toggle the automatic MSC upload. [Enabled]
              8. Selection not available: no SSM firmware on BCM400
              M. Main Menu
-------------------------------------------------------------------------------+
 Product Version: BCM1000 | Release: 3.0 | Version: RC 2.0 | Issue: 1
-------------------------------------------------------------------------------+
 Initialization: Complete | Configuration: Valid   | Service startup: Auto
-------------------------------------------------------------------------------+
Motherboard: TBD| PCI Cards: MSC Empty Modem LAN LAN | MSCVersion:
-------------------------------------------------------------------------------+
            Make a selection:[1,2,3,4,5,6,7,8,M]?
```

6 Select **1** (Initialize Menu) and press <ENTER>.

The Initialize Menu appears. Refer to Figure 87.

Figure 91 Initialization Menu screen

```
===============================================================================*
                       Initialize Menu
               *==============================*

               1.- Initialize Universal Profile
               2.  Set service startup to Auto
               3.  Set service startup to Manual
               4.- Clear all event logs
               5.- Display active partition information
               6.- Display inactive partition information
               7.- Display Manufacturing Release Note
               8.- Platform Initialization Menu
               M.- Return to Main Menu
-------------------------------------------------------------------------------+
 Product Version: BCM1000 | Release: 3.0 | Version: RC 2.0 | Issue: 1
-------------------------------------------------------------------------------+
 Initialization: Complete | Configuration: Valid   | Service startup: Auto
-------------------------------------------------------------------------------+
Motherboard: SH815 | PCI Cards: MSC WAN Empty LAN LAN | MSCVersion: 30CJB19
-------------------------------------------------------------------------------+
              Make a selection:[1,2,3,4,5,6,7,8,M]?
```

7 Select **1** (Initialize Universal Profile) and press <ENTER>.

> **Note:** If the initialization process detects a core software load mismatch between the MSC and the hard disk, the system displays a menu screen that prompts you to enter the most appropriate core load (Figure 88). The load on the MSC is the most recent load (if you replaced the hard disk). Select menu option 6 "Do not select any load" to by-pass the core upload and continue with the initialization process.

Figure 92 MSC Initialization Menu screen

```
===============================================================================*
                   MSC Initialization Menu
               *================================*

               1. Select Etiquette MSC load
               2. Select CT2Plus MSC load
               3. Select E1 MSC load
               4. Select E1 Global MSC load
               5. Select E1 CALA load
               6. Do not select any load
               7.- Platform Initialization Menu
               M.- Return to Main Menu
-------------------------------------------------------------------------------+
 Product Version: BCM1000 | Release: 3.0 | Version: RC 2.2 | Issue: 4
-------------------------------------------------------------------------------+
 Initialization: InProgress | Configuration: Valid   | Service startup: Manual
-------------------------------------------------------------------------------+
Motherboard: SH815 | PCI Cards: MSC WAN Empty LAN LAN | MSCVersion: 30CKC06
-------------------------------------------------------------------------------+
              Make a selection:[1,2,3,4,5,6,7,M]?
```

Note: The initialization process is automatic and takes approximately 40 minutes. The system automatically reboots a number of times as part of the initialization process. When the first reboot occurs, the telnet session disconnects.

8 When the initialization process is complete, restart a telnet session with the Business Communications Manager.

9 At the main menu, select **2** (System configuration) and press <ENTER>.

The System Configuration login prompt appears.

10 Enter the default login **UserID** and **password**.

The System Configuration Start Page screen appears (see Figure 93).

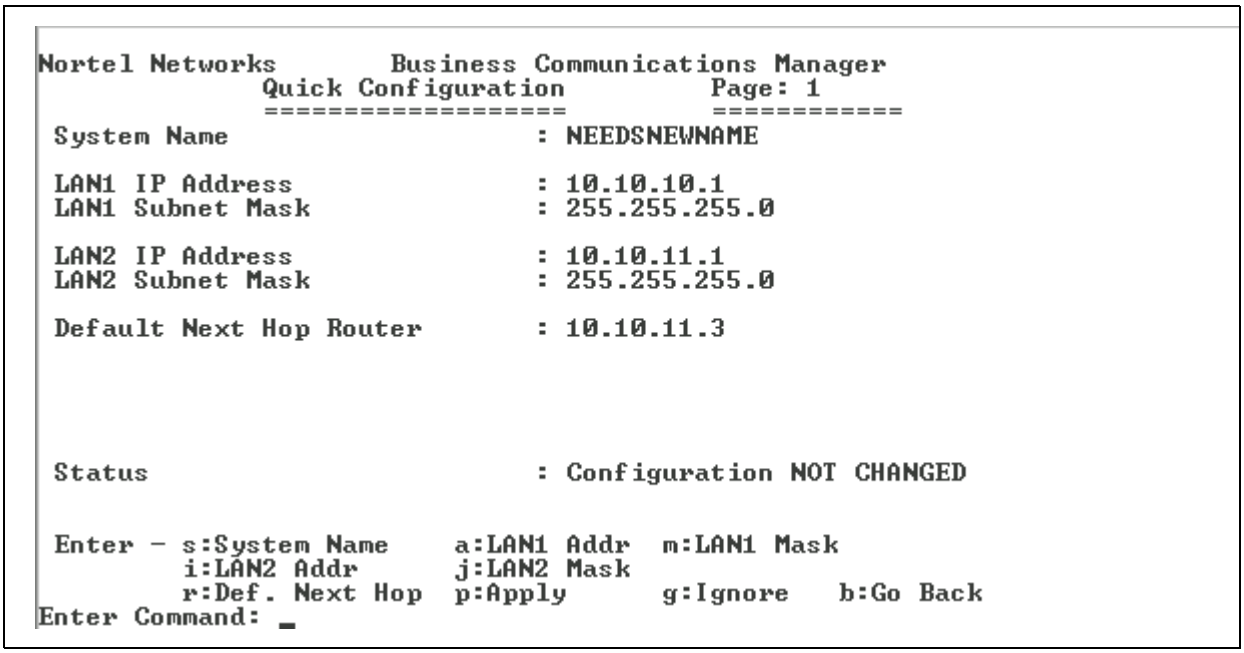
Figure 93 System configuration start page

```
Nortel Networks       Business Communications Manager

              S T A R T    M E N U
              ====================
   Business Communications Manager UM-111302-BCM30-RC2.2. Compiled:Wed Nov 13
:09:21 2002

   Status                        : Configuration NOT CHANGED




  Enter - q:Quick Start Page 1       m:Main Menu

          a:Apply Changes            n:Ignore Changes
          r:Reboot                   x:Logout

Enter Command:
```

11 Enter **q** (Quick Start Page 1) and press <ENTER>.

The Quick Start Page screen appears (Figure 94)

Figure 94 Quick start page



12 Enter the correct information for **LAN1 (a)**, **LAN2 (i)**, **Subnet masks (m and j)**, **Default next hop router (r)** and **System name (s)**, as required. Enter **p** after each change to apply it.

13 Enter **b** (go back) to return to the System Configuration Start Page screen after all network IP addresses are configured.

14 Enter **r** to reboot the system and to apply the network IP address changes

15 Do one of the following:

- Run the Quick Start Wizard and manually reconfigure your system.
- Run the Quick Start Wizard to create the system parameters and defaults. Then restore your system data from your backup disk.
- Restore system and data information from your backup disk.

Warning: You can only perform a restore from a current backup disk that was backed up from the same software version as your system is currently running. If you do not have a current backup run on this version of software, you need to manually reenter your data.

16 Test your system for correct operations.

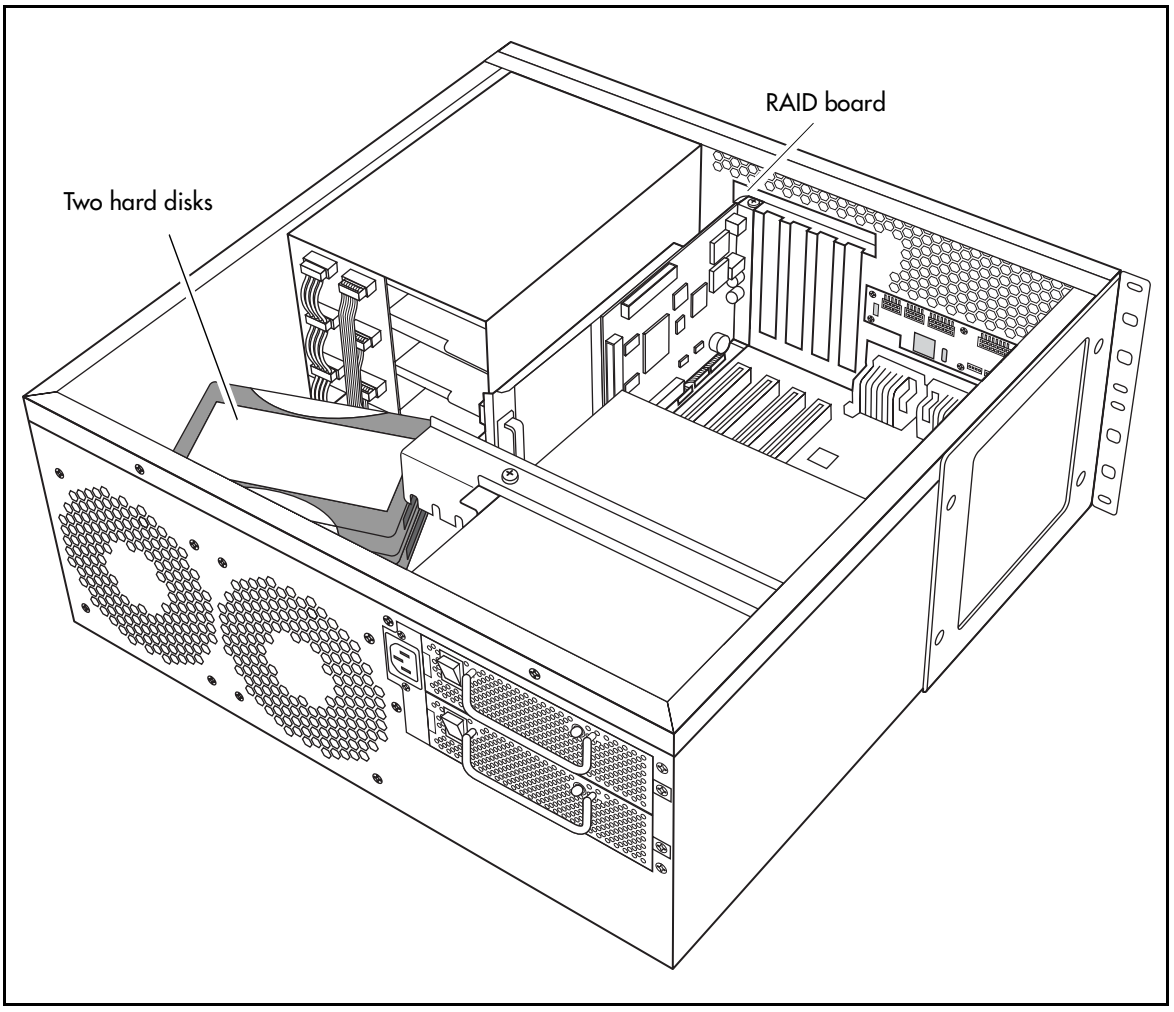
Installing the mirrored disk controller

If you upgrade your system from a single-disk system to a mirrored disk system, you will need to install the RAID board as well as a second hard disk.

The RAID board is installed beside the media bay module housing in the BCM1000. Refer to Figure 95.

You can upgrade both 2.5 and 2.0 hardware to have mirrored capability. You do not require a redundant power supply and redundant fans to support this feature. If you are upgrading either system, you must be running 2.5 FP1 software or higher and have at least 256 RAM of memory installed. If you need to install more memory, refer to "Replacing memory" on page 223.

Figure 95 Base unit with RAID board, plus redundant power and fans

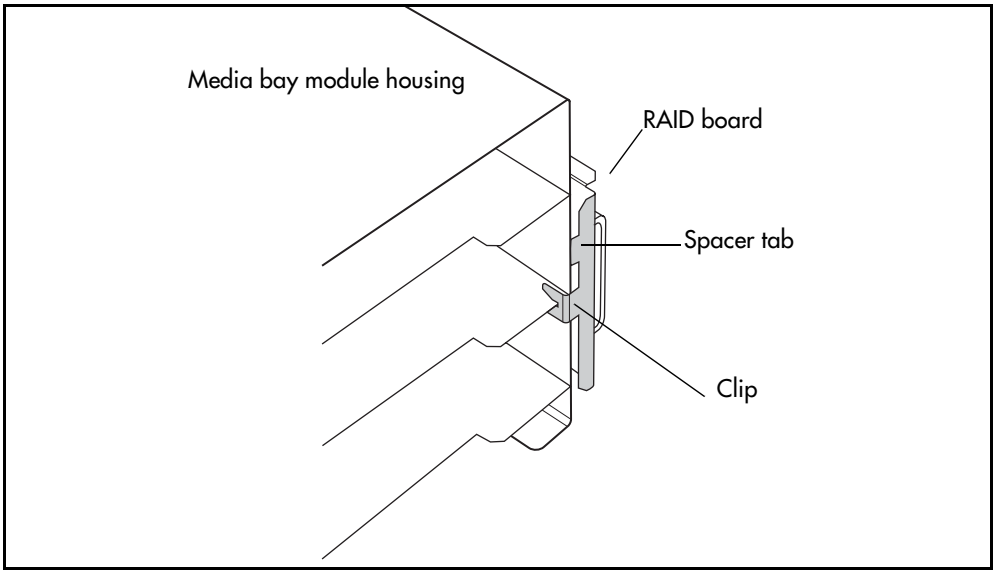


Installing the RAID board

The following steps describe how to install the RAID board. The steps are the same for both the 2.0 and 2.5 versions of BCM1000 hardware, except for the power connections, which are described in “Routing power for mirrored systems” on page 193.

1. Prepare the base unit for maintenance. Refer to “Shutting down the system software” on page 168 and “Shutting down the system hardware” on page 169, if necessary.
2. Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
3. Disconnect all power and ribbon cable connections from the hard disk and the media bay module back plane.
4. Remove the front cover.
5. Remove the blank slot cover.
6. Insert the RAID board into the slot in the housing so that the end with the LEDs fits through the open card slot.
   Ensure that you insert the board, so that the bottom tab fits into the open slit at the bottom of the card slot.
7. Clip the back end of the RAID board to the middle shelf of the media bay module housing. Refer to Figure 96.

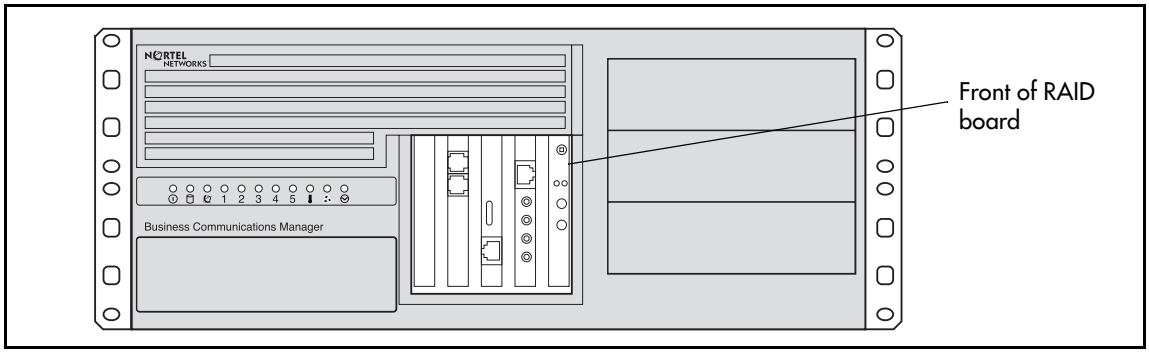
Figure 96 Clip the RAID board onto the media bay module housing



Note: This clip holds the board to the media bay module housing. If the clip is not engaged, you risk breaking the RAID board. The spacer tab, located above the clip, must rest against the outside of the media bay module housing to provide support for the board.

8 When the board is seated correctly, return to the board face inserted in the slot in the front of the unit. With the screw you removed from the blank cover, secure the header plate of the RAID board in place in the slot. Refer to Figure 97.

Figure 97 RAID board LEDs on face of base unit



9 Replace the front bezel.

10 Refer to the next section to complete the mirrored disk upgrade.

Connecting the RAID board

After you install the RAID board, you need to install a second hard disk and then wire the RAID board to the hard disks and to the BCM1000.

1 Install the second hard drive as described in “Installing a new hard disk” on page 177.

2 Connect the ribbon cables, as described in “Connecting RAID board ribbon cables” on page 192.

3 Connect the power cables to the hard disks, the RAID board, and the media bay module housing as described in “Routing power for mirrored systems” on page 193.

4 Restore the system to operation. Refer to “Restoring the system to operation” on page 170.

The RAID board automatically starts the mirroring process within 45 seconds after the system comes back online. This occurs after the service up window closes, about six minutes into the power-up sequence.

Your computer will display a status bar as the initialization continues.

Note: Initialization times: 20G HDD: approximately three hours
8.4G HDD: approximately 80 minutes

The event log will state when the initialization is complete: `HDD Rebuild Complete, System Status Monitor Result.`

In the mirrored disk configuration, the RAID controller board automatically writes the same data from the primary hard disk to the secondary/mirrored disk. Once this is complete, the board ensures that the disks remain identical. With this configuration, if one disk fails, the second disk has an exact copy of the current information and the system continues to function. This minimizes recovery time after disk failure.

Note: Backup and restore data

Remember to continue to do data backups that get stored off-site, as part of your recovery strategy.

Connecting RAID board ribbon cables

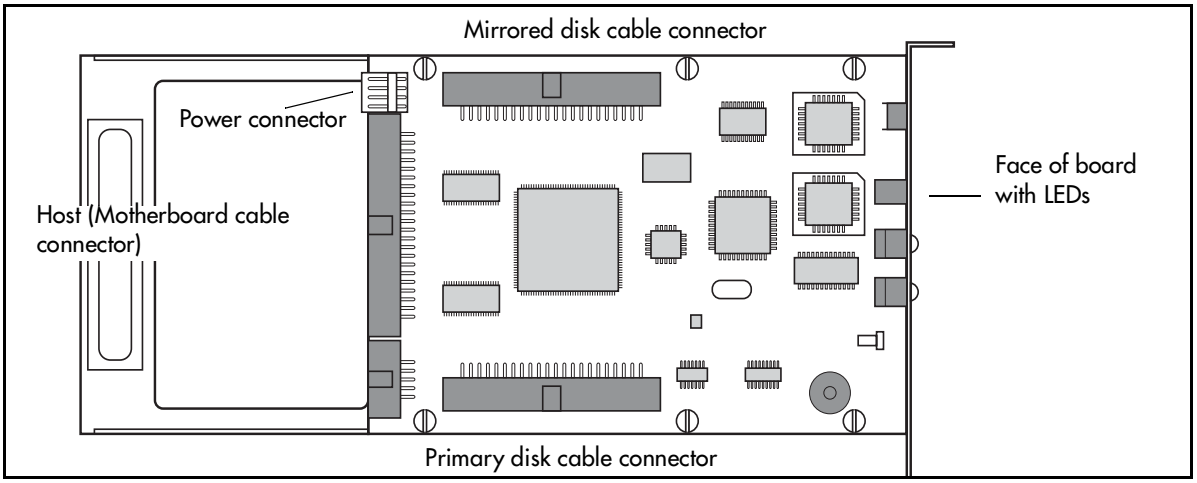
The RAID board has three labelled ribbon connectors, which connect to the following:

- **Host** connects to the IDE 1 connector on the control board (motherboard)
- **Mirrored** connects to the secondary (mirroring) hard disk
- **Primary** connects to the primary hard disk

Danger: The RAID board connectors are NOT hot-swappable. Ensure that the system is powered down before you attempt to connect or disconnect any of the cables.

Figure 98 shows the location of these connectors on the RAID board.

Figure 98 RAID Board



Warning: Reconnecting Mirrored and Primary cables

After maintenance, the Mirrored and Primary cables must always be attached to the same hard disk positions from which they were removed.

This means that if the Primary disk fails, the Primary cable gets connected to the new blank disk. Mirroring then occurs from the Mirrored disk to the blank Primary disk. Once mirroring has completed, the Mirroring disk hands over control to the new Primary disk.

Routing power for mirrored systems

There are specific power cable configurations for the mirrored disks, depending on what system you are using.

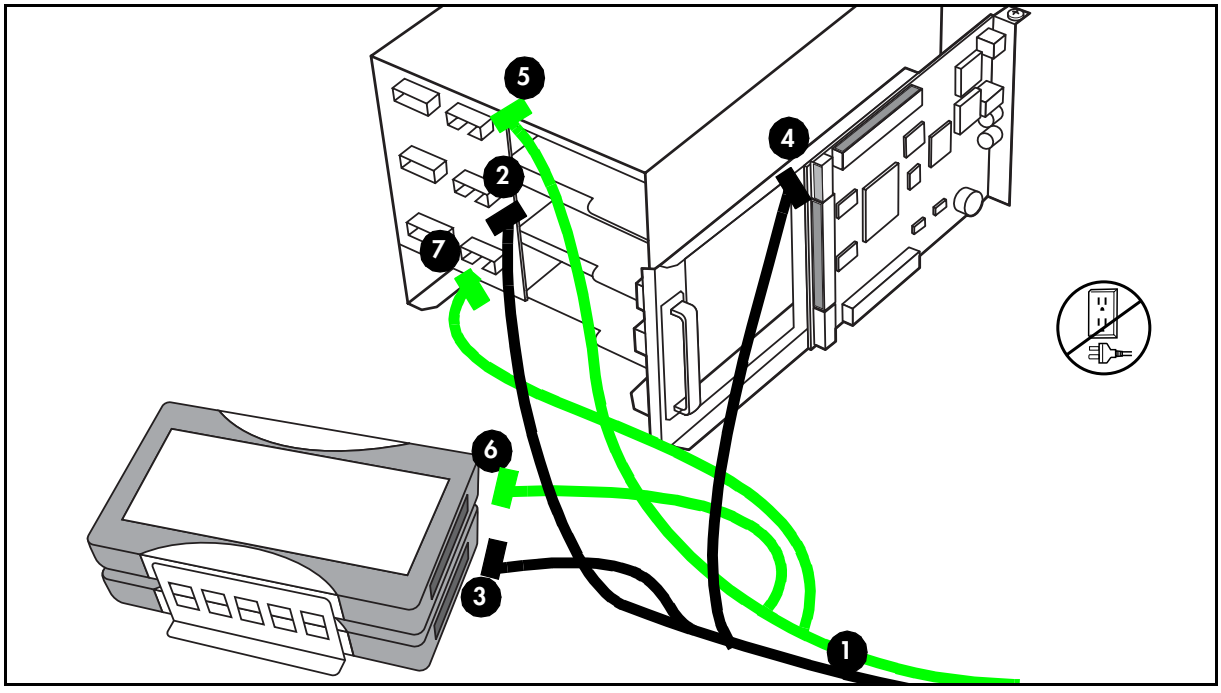
Warning: Ensure that the cables on the front of the unit have been removed, and that the ac power is off when you connect or disconnect power cables to this equipment.

Power routing for 2.5 hardware

Follow these steps to connect power to the hard disks, the media bay module housing, and to the RAID board. Refer to Figure 99. **Each step number in the following procedure corresponds to an item in the diagram.**

1. Select two power cables that have three Molex female connectors and route them under the power supply and media services card (MSC), along the bottom of the chassis.
2. Connect the end connector of the first cable to the middle of the media bay module back plane.
3. Connect the next connector of the first cable to the Primary hard disk (bottom disk).
4. Connect the last connector of the first cable to the RAID card.
5. Connect the end connector of the second cable to the top of the media bay module back plane.
6. Connect the next connector of the second cable to the secondary hard disk (top disk).
7. Connect the last connector of the second cable to the bottom of the media bay module back plane.

Figure 99 Connecting the power cables for mirrored disks, 2.5 version of BCM1000



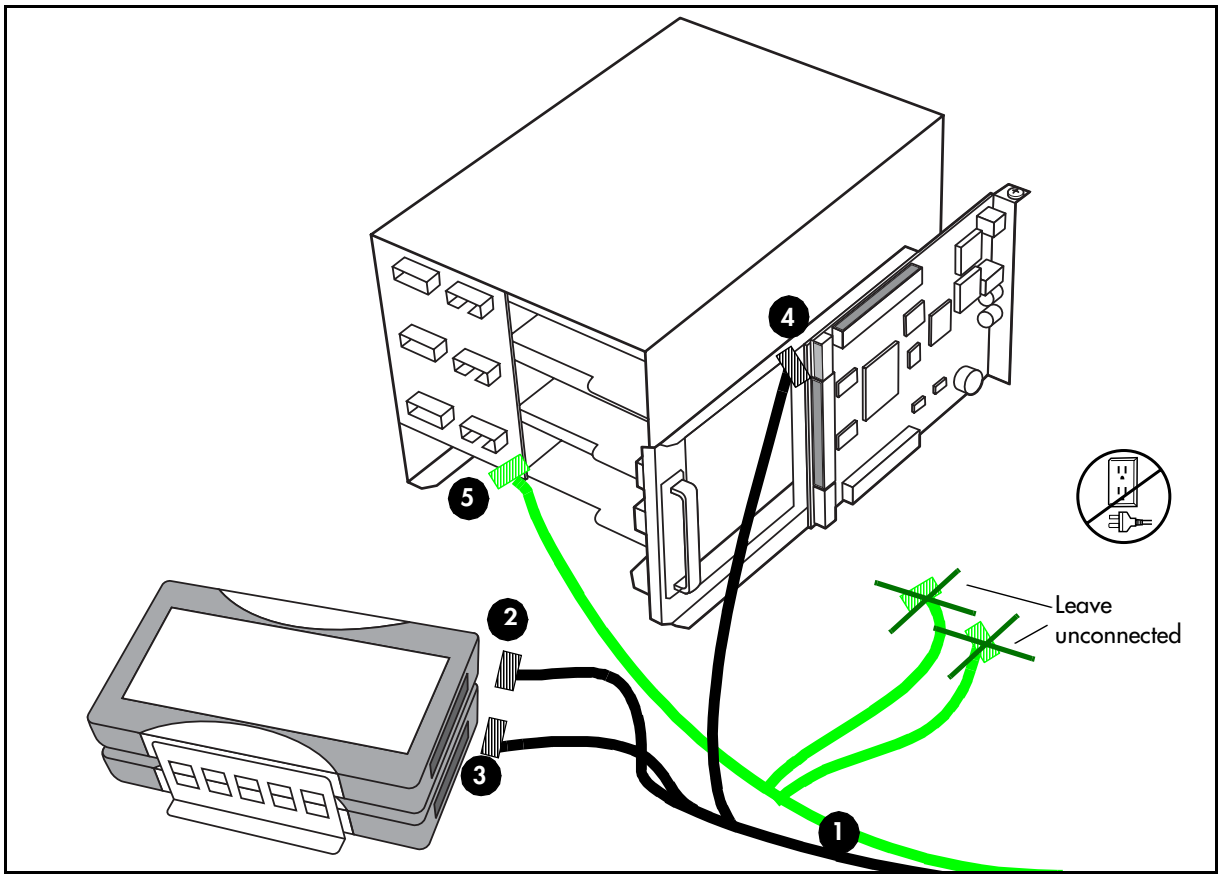
Power routing for 2.0 hardware

Follow these steps to connect power to the hard disks, the media bay module housing, and to the RAID board. Refer to Figure 100. **Each step number in the following procedure corresponds to an item in the diagram.**

1. Select two power cables that have three Molex female connectors and route them under the power supply and media services card (MSC), along the bottom of the chassis.
2. Connect the end connector of the first cable to the secondary hard disk (top disk).
3. Connect the next connector of the first cable to the Primary hard disk (bottom disk).
4. Connect the last connector of the first cable to the RAID card.
5. Connect the end connector of the second cable to the bottom of the media bay module back plane

   Do not attempt to connect any other component to the second and third connectors on this cable.

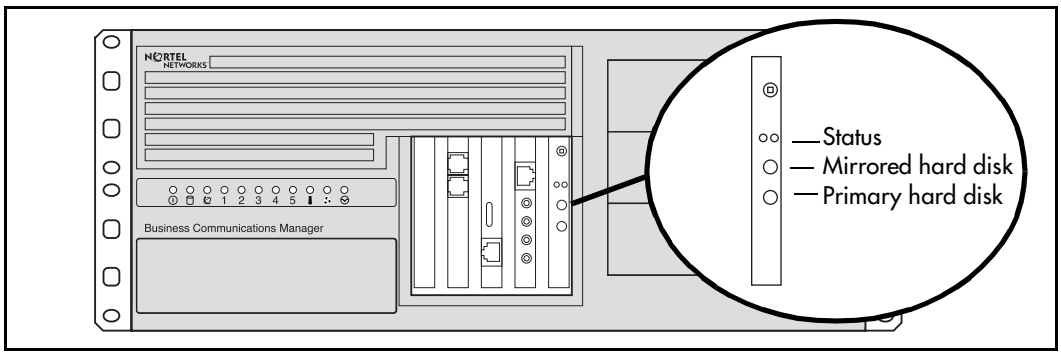
Figure 100 Connecting the power cables for mirrored disks, 2.0 version of BCM1000



RAID board LEDs

The front end of the board fits into the card slot that is closest to the media bay modules on the BCM1000. The front panel of the board contains a number of LEDs that indicate the status of the RAID board and the current connection with the hard drives. Refer to Figure 101 and Table 40.

Figure 101 RAID board LEDs



Note: The BCM1000 does not use the Slave channel on the RAID board, therefore, the Slave Status LED will always remain solid red.

Table 40 RAID board LED states

LED state	Primary and Mirror LEDs	Status LEDs
Solid Green	Drive installed on the current channel.	Drives are in mirror mode, data is identical.
Flashing Green	N/A	Drives may not be identical.
Solid Red	Drive not installed.	Drives are not in mirror mode.
Flashing Red	The channel is marked as bad.	Copy/Compare in progress.
Solid Orange	Channel activity (read/write).	Copy/Compare in progress (under windows).
Flashing Orange	Scanning the channel for drives.	N/A

Controlling and monitoring mirroring operations

You can monitor and control disk mirroring through a control screen in the Unified Manager.

Under **Diagnostics, Diskmirroring** you can access a screen that allows you to control the mirroring operation from your desktop, as well as display the status of the hard disks. Refer to Table 41 for a list of the fields and a description of their function:

Table 41 HDD Mirror Settings

Tab	Field	Functions	Description
Settings	**Version**	Read-only field	Shows the current version of mirroring firmware.
	Operation Mode	Primary Master	Mirror mode is disabled. The Primary disk is the operating disk.
		Mirror Master	Mirror mode is disabled. The Mirrored disk is now the operating disk.
		Mirror Mode	The system is in Mirror mode.
	Ultra UDMA	Auto	The interface speed to the hard disk is set automatically. This is the default.
		Mode 0_16, Mode 1_24, etc.	The interface speed to the hard disk is set to a specific timing. Note: Changing the speed from auto could significantly affect system performance.
	Beep Timing	Disable	The failure tone is disabled.
		Continuous	The an audible tone will beep continuously if a failure occurs.
		XX seconds/minutes Default: BEEP_30Seconds.	The audible tone will beep for the period chosen if a failure occurs.
Status	**DuplWin Dll version**	<current version number> N/A	Shows the version or **N/A** if no version is found.
	Primary Master Status	Good, Bad, or N/A	Indicates the current status of the primary hard disk.
	Mirror Master Status	Good, Bad, or N/A	Indicates the current status of the secondary hard disk.
	Initialization Status	Started, Finished, Failed, Shutdown, or N/A	Indicates current status of the initialization process.
Configuration menu item		Set Buzzer ON Set Buzzer OFF	If turned ON, you can control the module buzzer remotely. If turned OFF, the module buzzer can only be controlled from the front of the controller.
Report menu item		Status Screen	Launches a new browser window that displays mirroring summary. The summary shows which hard disks are installed, where they are placed, and which is the active hard disk.
		Drive Status	Displays status bar to indicate process of mirroring.
View		Refresh	Use this to update status screen.

Chapter 17
Adding or replacing a cooling fan

Cooling fans circulate air through the chassis of the BCM1000 and expansion unit to prevent the components from overheating.

This chapter describes how to replace a cooling fan. It also describes how to add a redundant fan to two versions of the base unit.

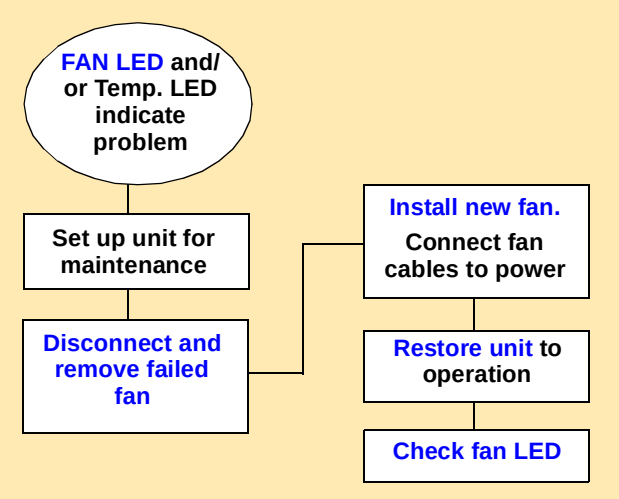
Note: A redundant cooling fan is included in the kit when you add a redundant power supply to the server.

Figure 102 provides an overview of the fan replacement process.

Note: BCM1000, version 2.5 hardware

The cooling fan connections on the BCM1000 version 2.5 hardware connect to the system status module (SSM). Ensure that you follow the directions provided for this version of the hardware when reconnecting new fans.

Figure 102 Process Map: Replacing a cooling fan



Troubleshooting fan operation

There are two LEDs on the front of the BCM1000 and one on the front of the expansion cabinet that can be used to assess fan function. Refer to Figure 103.

Figure 103 Business Communications Manager operational LEDs

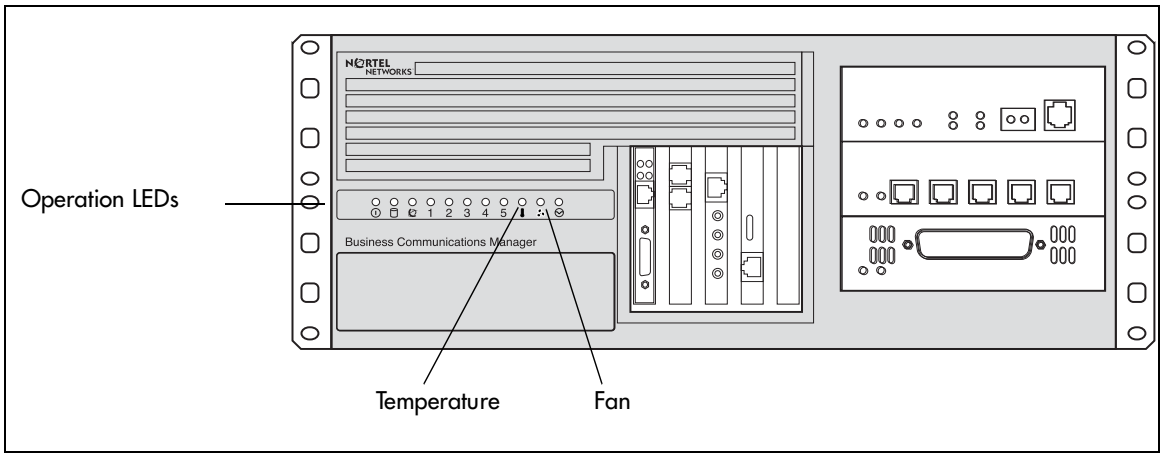


Table 42 describes the possible states of the fan and temperature LEDs.

Table 42 Fan and temperature LEDs on the server

LED Label	Description	Green LED On	Red LED On (Only)
	Temperature	Temperature is below threshold.	Temperature is in alarm status. One of the problems could be that one of the fans has failed.
	Fans	All installed fans are working	There is a problem with a minimum of one fan.

Removing a fan from the BCM1000

The BCM1000 can have one or two fans.

If the BCM1000 has two fans, before you shut down the system, determine which fan has failed.

1. If you still have access to the Unified Manager, shut down the system using the **Shutdown** command. For details refer to "Shutting down the system software" on page 168. Otherwise, skip to step 2.
2. Set up the BCM1000 for maintenance, as described in "Shutting down the system hardware" on page 169.
3. Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.

4 Remove the fan cable from wherever it is connected. Refer to Figure 104 and Figure 105.

Figure 104 Remove the fan cable from motherboard (pre-2.5 chassis)

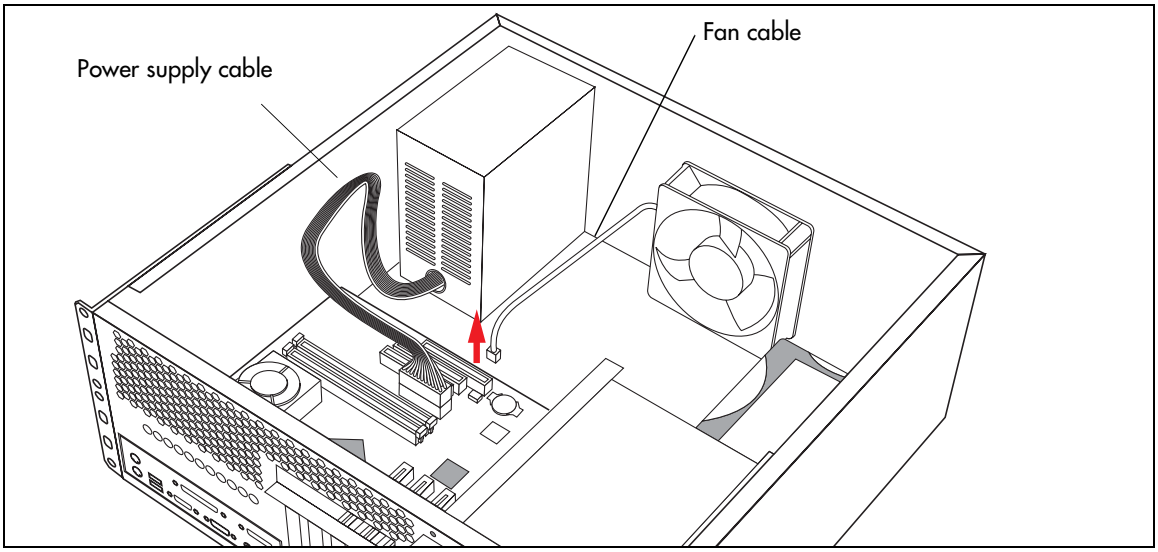
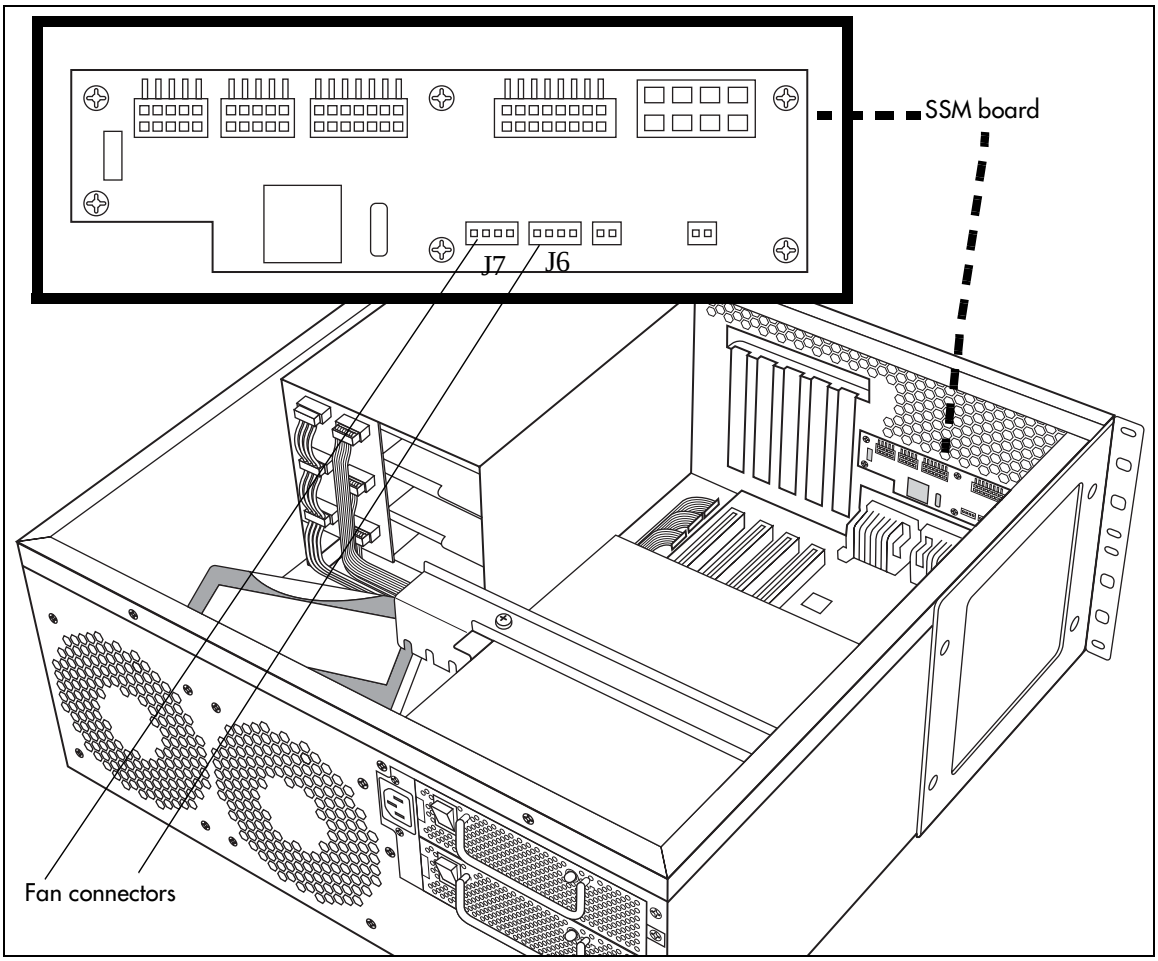


Figure 105 Remove the fan cables from SSM board (2.5 models)



Note: Redundant fans

If the fans are piggy-backed, the back fan connects directly to a power supply connector through a patch connector.

If the fans are side by side, then both fans are connected on the SSM board. Fan wires run under the power supply and are connected to J7 or J6 on the SSM board, as shown in Figure 105.

5 Remove the snap rivets that hold the fan to the BCM1000. Refer to Figure 106 and Figure 107.

6 Lift the old fan out of the BCM1000.

Figure 106 Removing the fan (BCM1000 version 2.5 single-fan model)

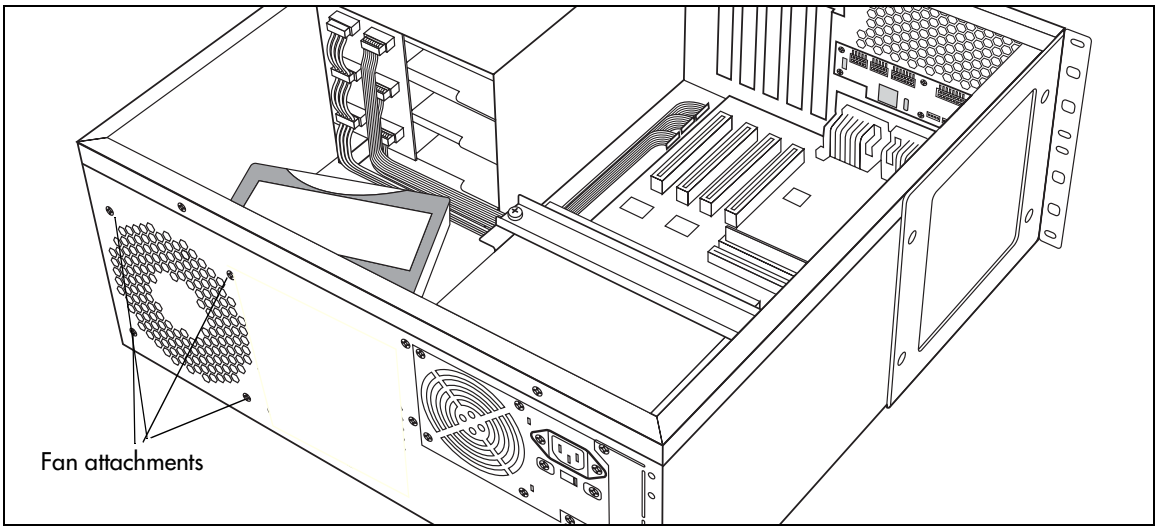
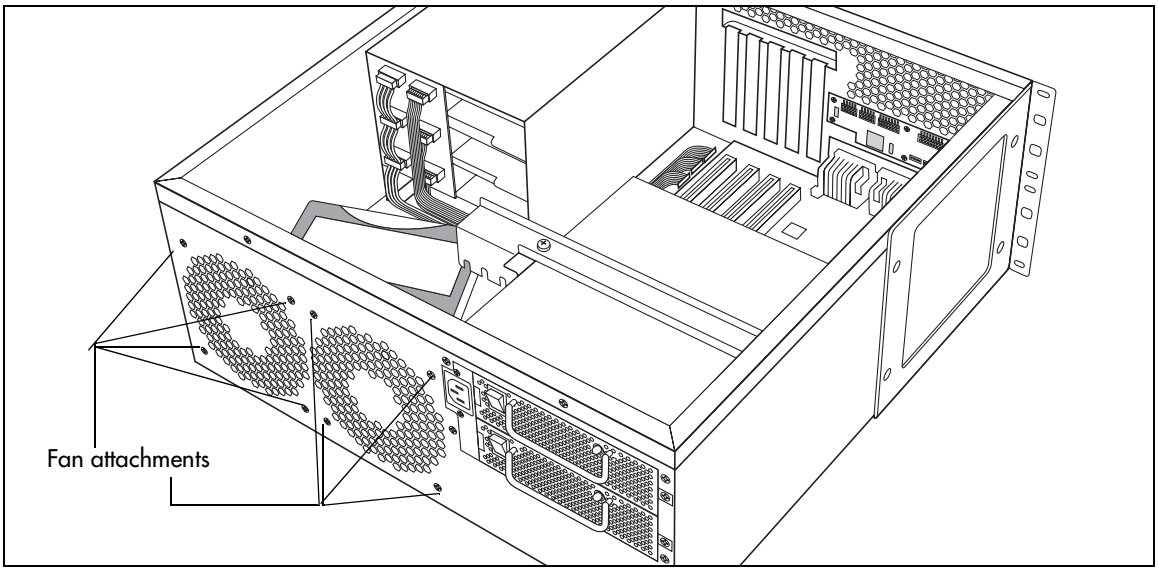


Figure 107 Screw attachments beside fan holes (BCM1000 version 2.5 redundant model)



Replacing the cooling fan

To replace the fan in the BCM1000, follow these steps:

1 Place the new fan in the BCM1000 in the position from which you removed the failed fan.

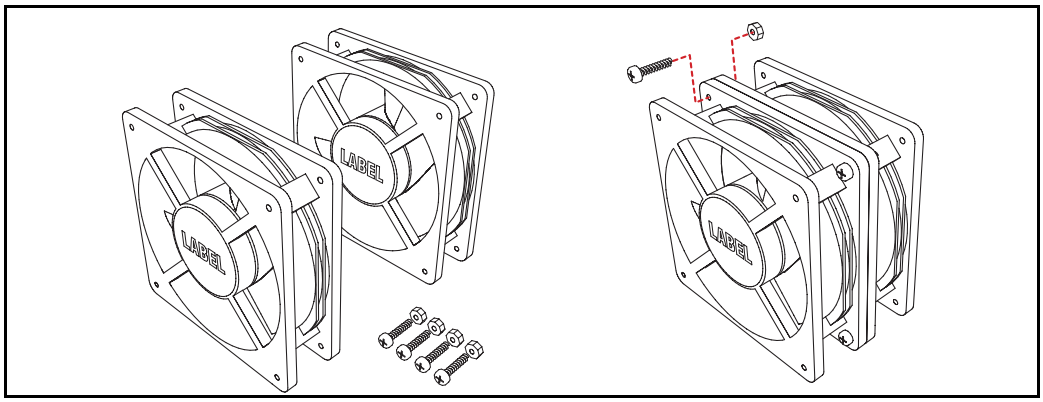
Note: Ensure the label of the new fan faces the back wall of the BCM1000.

Note: Piggy-backed redundant fan

If you are installing or replacing a piggy-back redundant fan in a version 2.0 BCM1000 that has been updated with a redundant power supply, place the redundant fan against the existing fan. Ensure that the blades are positioned in the same direction as the existing fan (fan labels both face in the same direction).

Use the four screws and nuts that are supplied with the redundant fan to attach the redundant fan to the existing fan.

Figure 108 Installing piggy-backed fans



2 Align the screw holes in the fan with the screw holes on the BCM1000.

Note: Side-by-side redundant fan

If you are installing a second fan in a 2.5-model BCM1000, you must remove the cover label on the back of the server to expose the fan air holes and mounting holes.

3 Attach the fan to the BCM1000 using the four screws (2.0 hardware) or plastic rivets (2.5 hardware). Refer to Figure 107 on page 200.

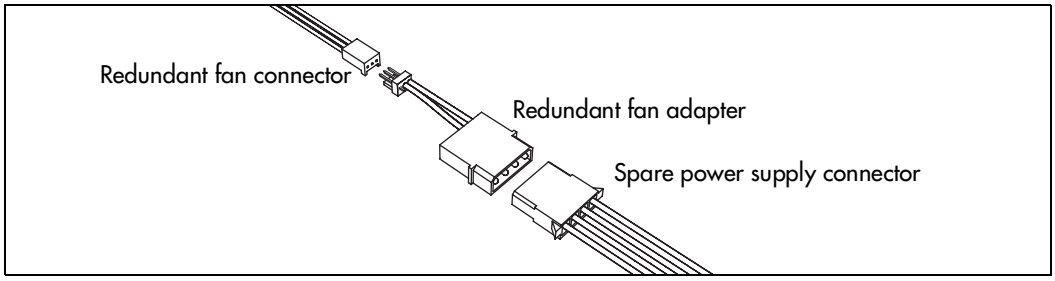
4 Connect the power supply cables for each fan to the SSM board. Refer to Figure 105 on page 199.

Note: Piggy-backed redundant fan

Connect the redundant power supply cable to the power cable adapter. Refer to Figure 109.

Then connect the power cable adapter to an available power supply cable.

Figure 109 Connect the redundant fan cable to the adapter



5 Replace the cover.

6 Restore the unit to operation. For details, refer to "Restarting the system" on page 170.

The Business Communications Manager system starts up when you connect the ac power cord. This takes several minutes to complete.

Removing a fan from the BCM1000e

The BCM1000e comes either with one fan or a redundant fan set. The single-fan unit is not upgradeable.

Follow these steps to remove a malfunctioning fan:

1 Shut down the system following the directions in "Removing a fan from the BCM1000" on page 198.

2 Disconnect the fan power cable from the hub card.

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

3 Locate the screws that fasten the fan casing to the unit back wall and remove them. Refer to Figure 110.

4 Remove the four screws that hold the fan to the BCM1000e.

5 Lift the failed fan out of the unit.

Figure 110 Fan screws location in BCM1000e, 2.0 models.

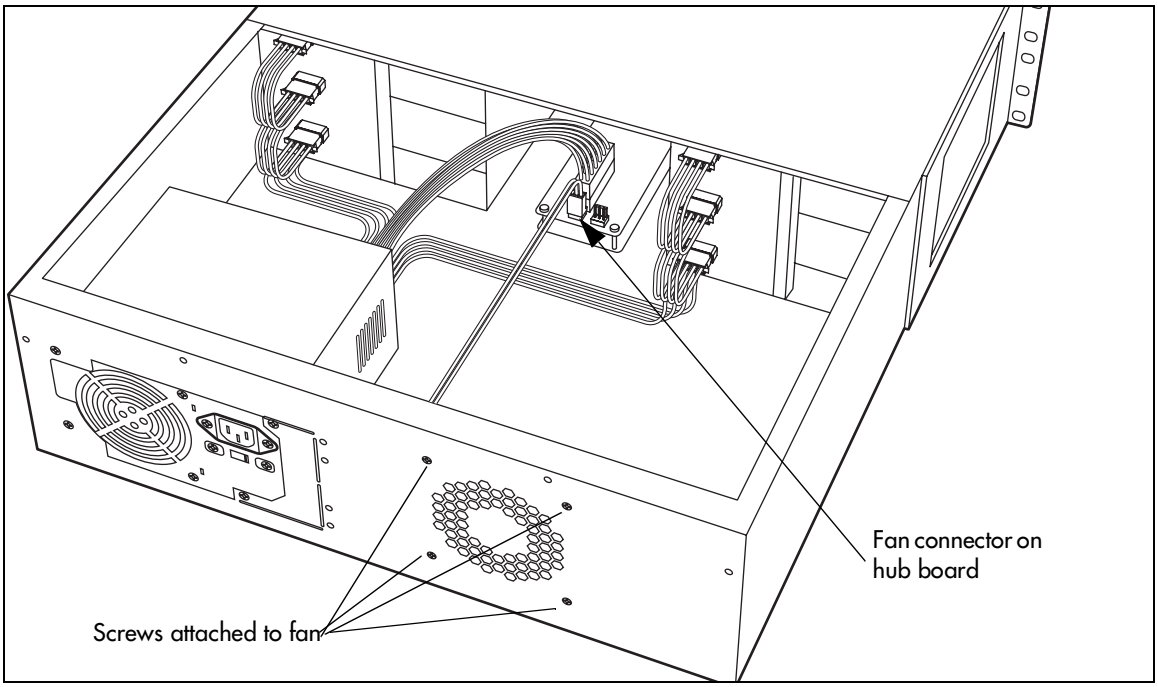
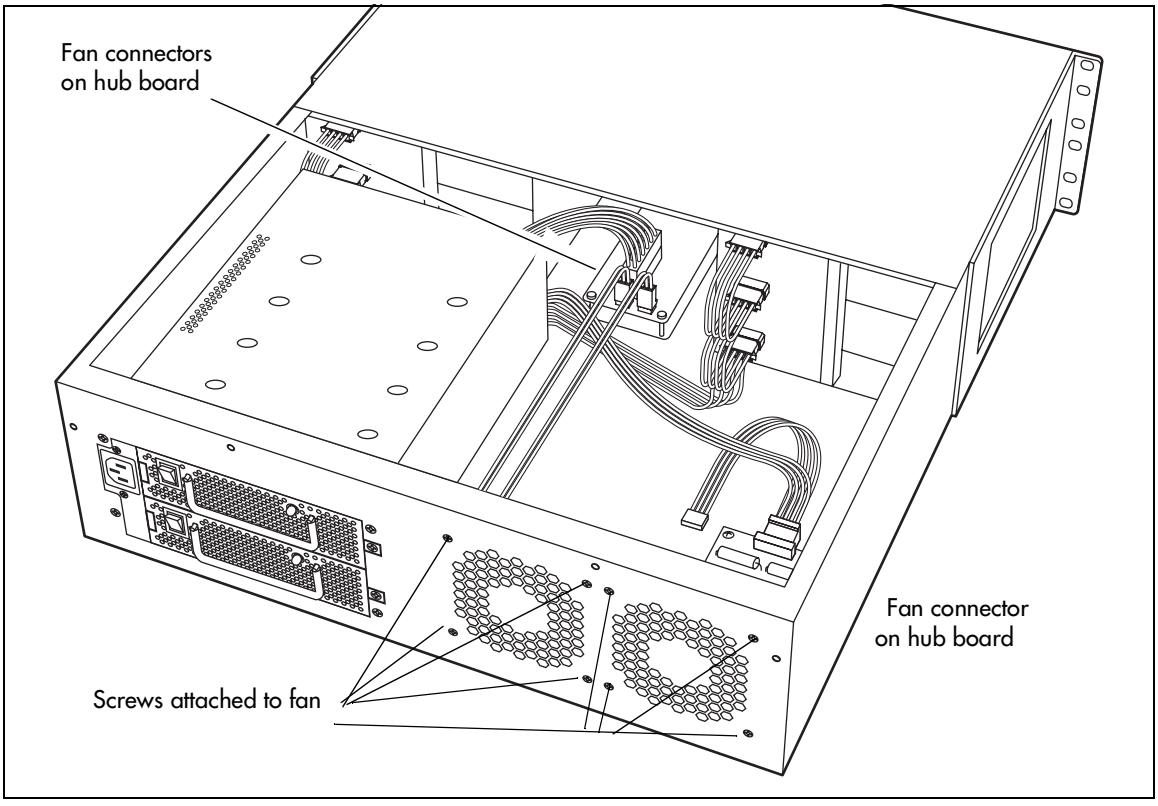


Figure 111 Fan screws location in BCM1000e, 2.5 redundancy models.



Replacing a fan into the BCM1000e

Follow these steps to replace the fan in the BCM1000e.

1. Place the fan in the BCM1000e 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 BCM1000e and attach the fan.
3. Connect the fan power supply cable to the hub board.
4. Replace the cover.
5. Restore the unit to operation. For details, refer to “Restarting the system” on page 170.

The Business Communications Manager system starts up when you connect the ac power cord. This takes several minutes to complete.

Chapter 18
Replacing a power supply

BCM1000s and BCM1000es can have standard or redundant power supplies.

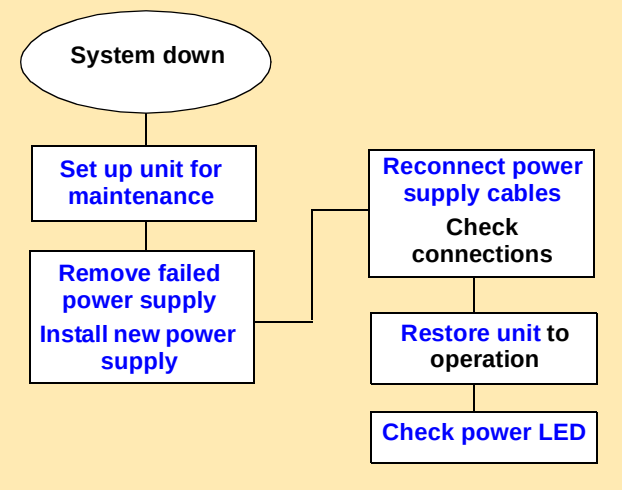
This chapter describes:

- how to replace a standard power supply
- how to upgrade from a standard power supply to a redundant power supply (BCM1000, 2.0 or 2.5 hardware, or BCM1000e, 2.0 hardware.)
- how to replace the power supply module in a redundant power supply system

Replacing a standard power supply

If the BCM1000 or BCM1000e has a standard power supply that fails, then all activity on the system ceases. Figure 112 provides an overview of the process for replacing a standard power supply.

Figure 112 Process Map: Replacing a standard power supply



Removing the standard power supply

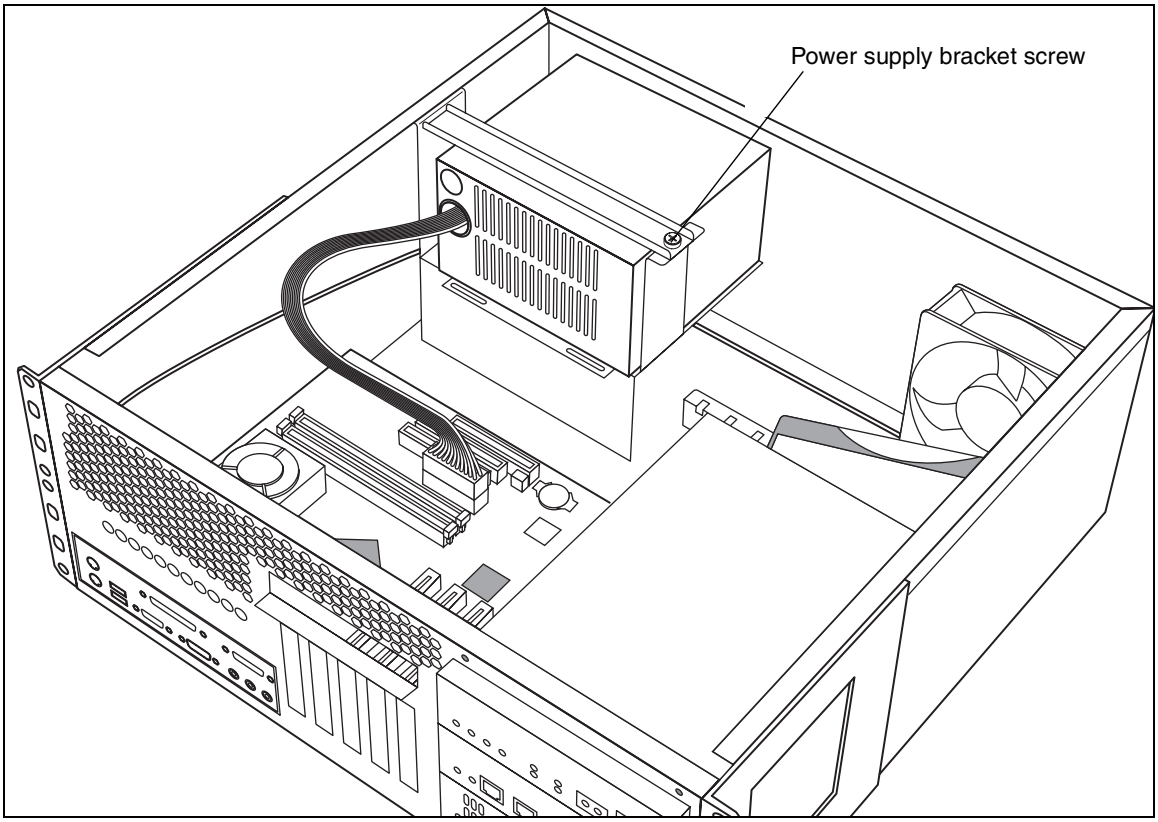
If the standard power supply fails, the system will be down. Follow these steps to remove the power supply.

1. Set up the server for maintenance by removing all the cables from the front of the BCM1000, then disconnect the BCM1000 and the BCM1000e, if there is one, from the ac power connection.
2. Remove the cover from the base unit.
3. Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
4. Remove the power supply cables from the motherboard, media bays, and hard disk.

Note: If you have an updated system with a piggy-back fan arrangement, the rear fan will be connected to a power supply cable.

5. Cut the cable ties that hold the power cables to the BCM1000.
6. Remove the power supply bracket screw. Refer to Figure 113.

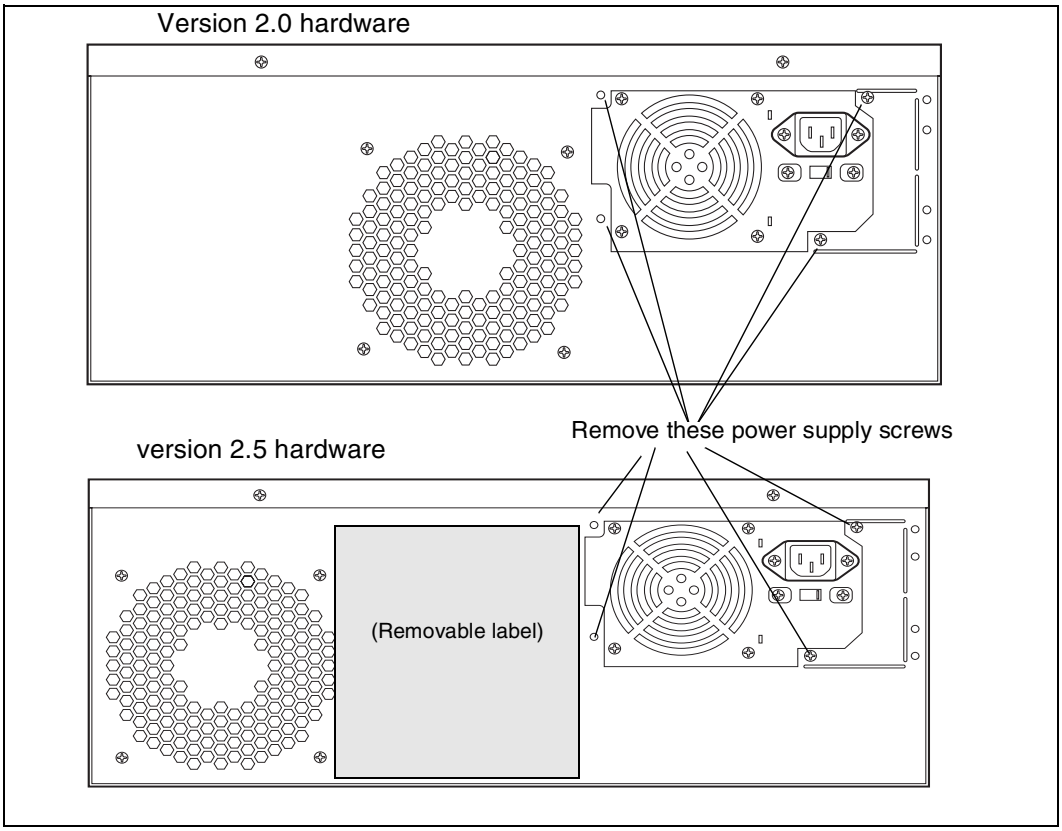
Figure 113 Removing power supply bracket (single-power supply models)



7. Remove the power supply bracket.

8 Remove the four power supply screws from the back of the BCM1000. Refer to Figure 114.

Figure 114 Remove the power supply screws



9 Remove the power supply from the chassis.

Installing a standard power supply

Follow these steps to install a standard power supply.

1 Check to see if the new power supply is an auto-adjust power supply. This means the power supply does not have voltage switch. Otherwise, set the switch to the same ac voltage as the power supply you removed.

2 Place the new power supply into the BCM1000.

3 Align the screw holes in the housing with the screw holes in the base unit.

4 Secure the housing with screws.

5 Inside the unit, reconnect the power supply cables.

6 Replace the cover.

7 Restore the unit to operation. For details, refer to "Restarting the system" on page 170.

8 Monitor the power LED. Refer to Table 43.

Table 43 Power supply LED

LED Label	Description	Green LED On	Green LED Flash	Red LED On (Only)	Green LED Off
⏻	Indicates state of system power.	OK	N/A	at least one power supply requires attention*	N/A
				*Older models may not have a Red LED	

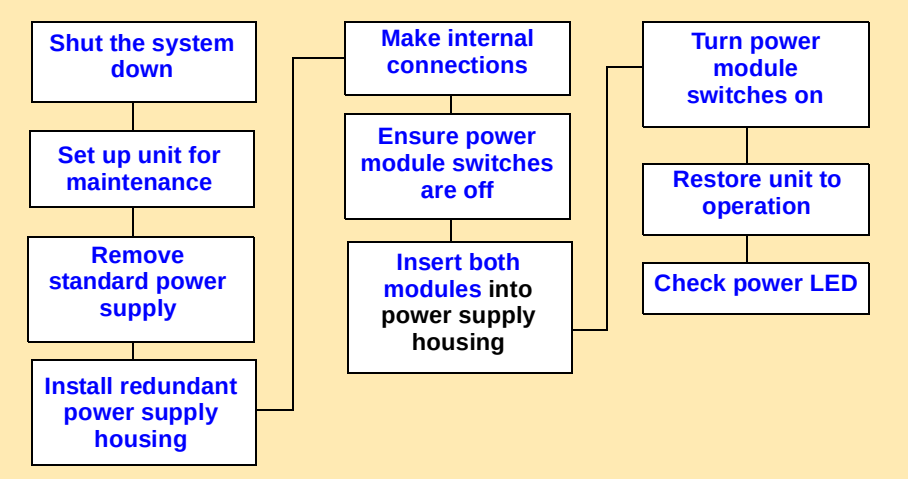
The Business Communications Manager system starts up when you connect the ac power cord. This takes several minutes to complete.

Upgrading to a redundant power supply

The redundant power supply allows you to change a failed power supply without turning off the system. You can add a redundant power supply to a BCM1000 currently equipped with a standard power supply.

Figure 115 provides an overview of the steps required to upgrade your system from a standard power supply to a redundant power supply module.

Figure 115 Process Map: Upgrading to a redundant power supply



Setting up the base unit

This section describes the steps for replacing a standard power supply with a redundant power supply. After the redundant power supply is installed, insert the two power supply modules. Redundant power supply modules can be changed while the system is running, as long as one of the modules remains active.

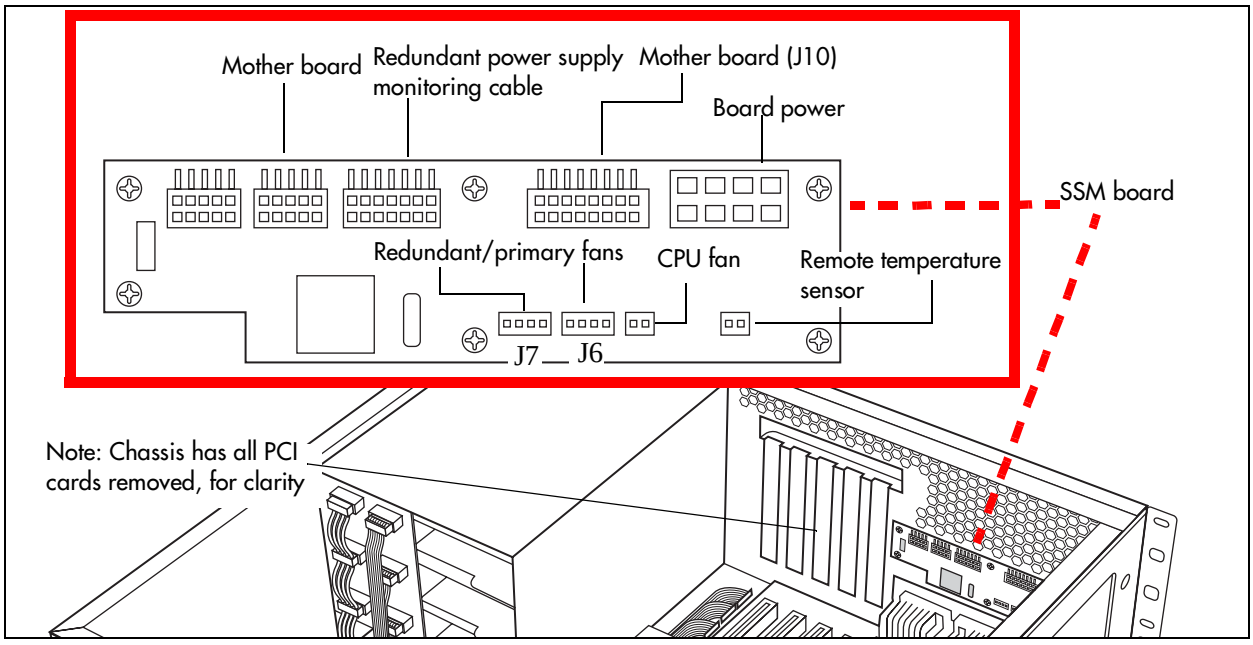
Note: When you upgrade to a redundant power supply, you must also put in a redundant fan. Refer to "Adding or replacing a cooling fan" on page 197.

1. If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to "Shutting down the system software" on page 168. Otherwise, skip to step 2.
2. Set up the BCM1000 for maintenance, as described in "Shutting down the system hardware" on page 169.
3. Disconnect the power supply from the internal connections.
4. Cut the cable ties that hold the power cables to the base unit.
5. Remove the standard power supply and set aside.

   Refer to "Removing the standard power supply" on page 206.
6. Remove the jumper from the connectors on the System Status Module. Refer to the following diagram to locate the SSM board.

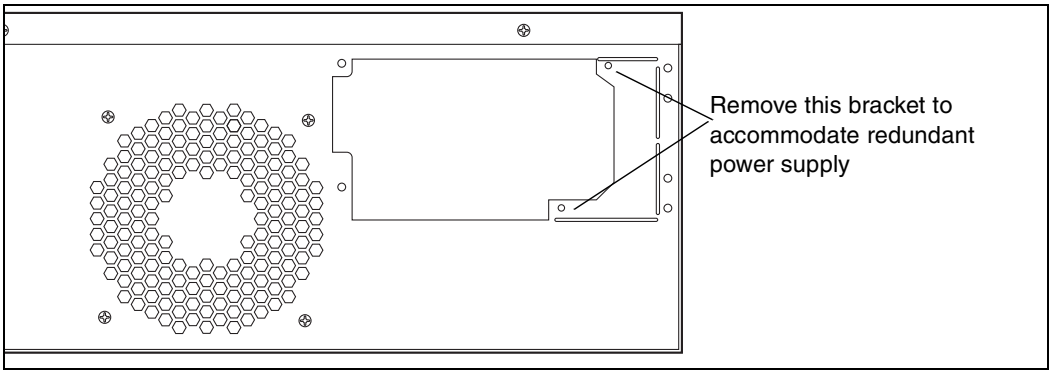
   The diagram below notes the location of the connectors for the redundant power supply and for the redundant fan.

Figure 116 System Status Monitor internal connectors



7 Remove the knockout plate from the back of the BCM1000. Refer to Figure 117.

Figure 117 Remove the knockout



Installing the redundant power supply

After you have prepared the BCM1000 to accommodate the redundant power supply, follow these steps to insert the redundant power supply housing.

1 Remove the power supply modules from the redundant power supply housing.

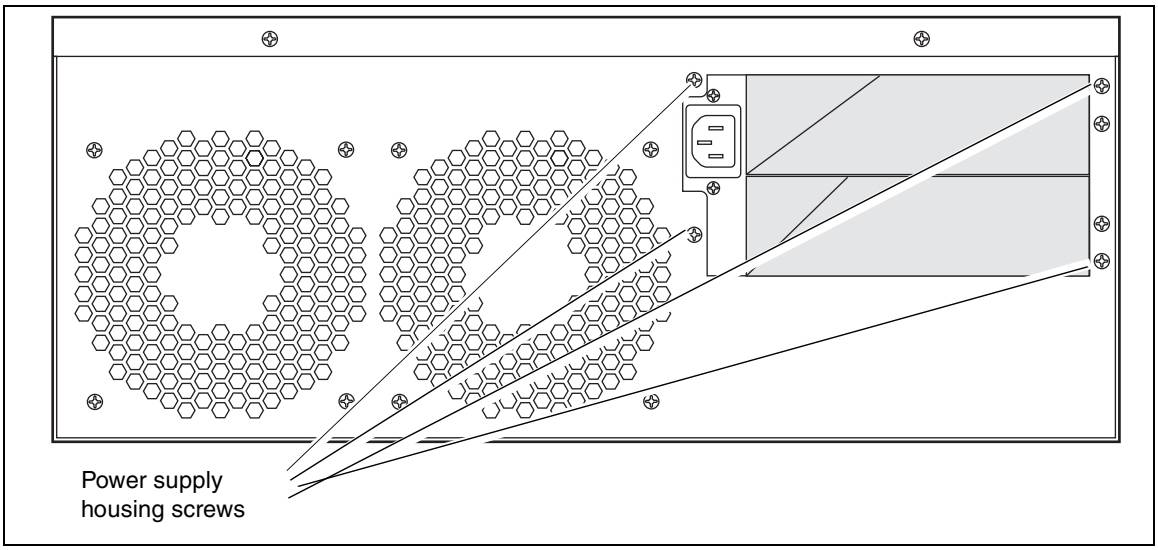
- **a** Check the rocker switch on the left side of the module and ensure that it is in the off position.
- **b** Grasp the handle and pull the tab beside the rocker switch towards the handle.
- **c** Pull the module out of the housing.

2 Position the redundant power supply housing in the BCM1000.

3 Align the screw holes in the redundant power supply with the screw holes in the base unit.

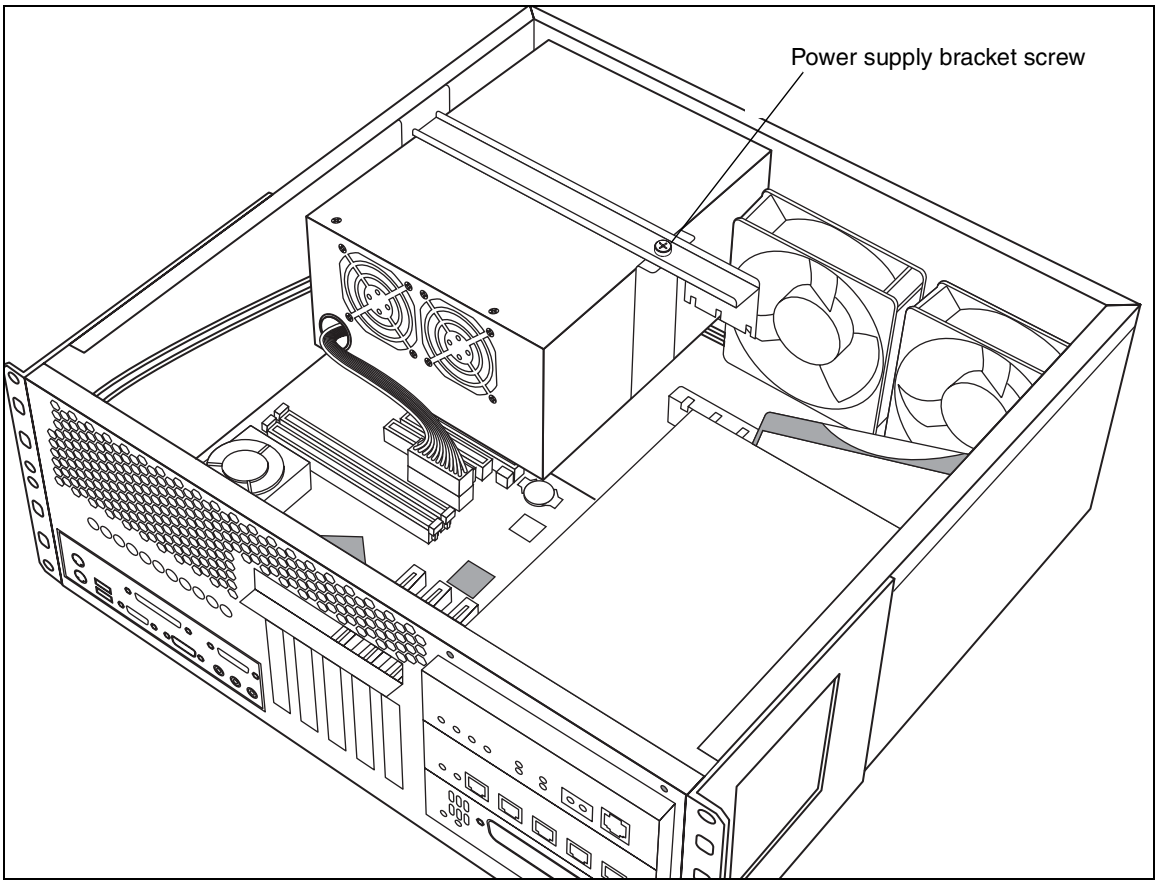
4 Attach the redundant power supply housing to the base unit using the four screws inserted into the top and bottom holes. Refer to Figure 118.

Figure 118 Attach the redundant power supply housing



5 Insert the power supply bracket and secure it with a screw. Refer to Figure 119.

Figure 119 Securing the power supply bracket



6 If you have not already done so, install a redundant fan into the unit. Refer to "Adding or replacing a cooling fan" on page 197.

7 Inside the cabinet, reconnect the power supply and fan cables.

8 Reconnect the power supply and fan cables.

9 Replace the cover.

10 Ensure that you position the power modules correctly before inserting them into the power supply housing.

   a The green LED sits at the top of the unit.

   b Check the rocker switch on the left side of the module and ensure that it is in the OFF position.

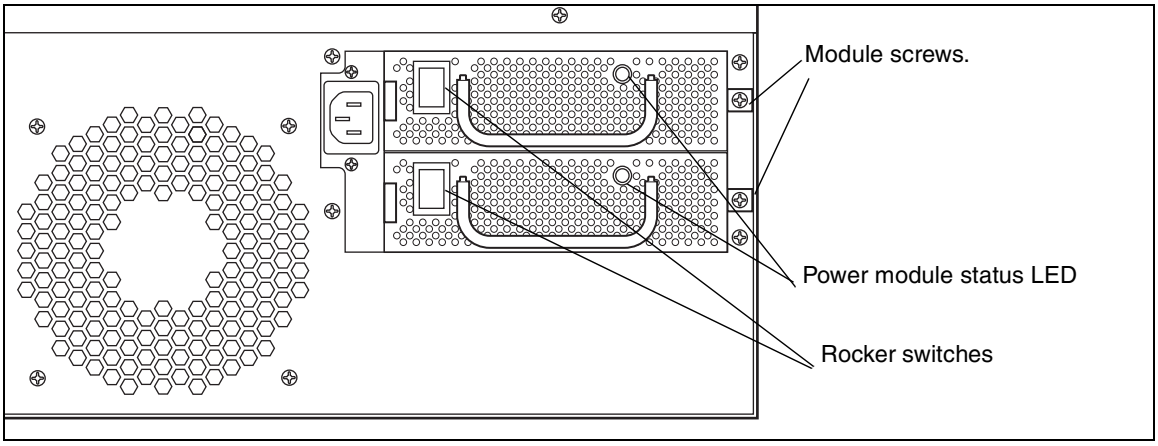
11 Insert the power modules into the redundant power supply housing at the back of the server.

   a The face of the module is flush with the casing. You hear a click when it is properly seated.

   b Secure each module with a screw through the tab on the right side of the module.

   These holes align with the middle two holes on the right of the power supply housing. Refer to Figure 120.

Figure 120 Insert and attach the modules



12 Turn on the switches for both power modules.

13 Restore the units to operation as described in "Restarting the system" on page 170.

   The Business Communications Manager system starts up when you connect the ac power cord. System recovery takes several minutes to complete.

   The LEDs on the power supply are on when the ac power is connected.

Replacing a redundant power supply module

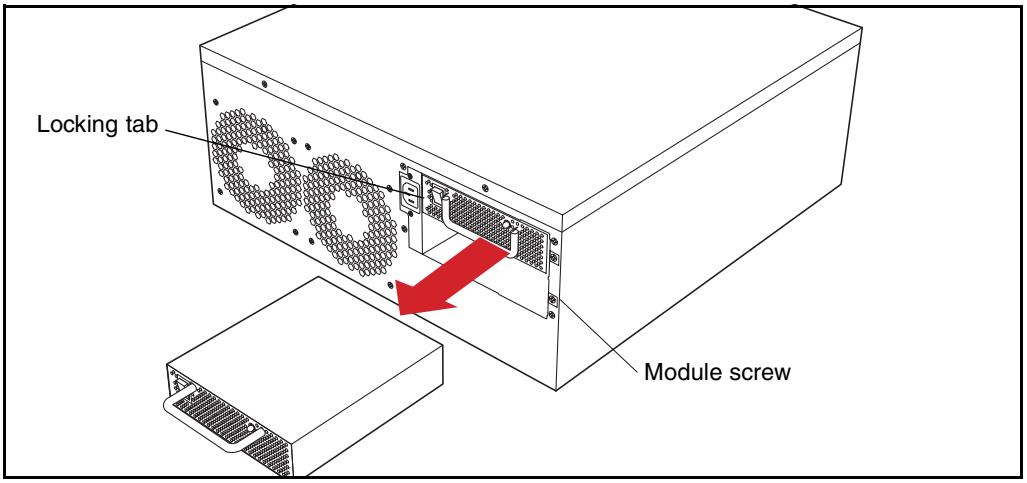
If the green LED for the power supply is not lit, but the power switch on the module is on, it indicates that the module has failed.

Note: It is not necessary to remove power from the BCM1000 or BCM1000e to replace a redundant power supply module.

Follow these steps to replace the redundant power supply module.

1. Turn the module switch to OFF.
2. Remove the screw from right-hand tab.
3. Grasp the handle on the module and, at the same time, pull the locking tab on the left of the module towards the handle of the module.
4. Pull the module straight forward and out of the housing. Refer to Figure 121.

Figure 121 Removing the power module



5. Ensure the switch on the replacement module is off.
6. Insert the replace module into the empty slot in the power supply housing.

   You will hear a click when it is seated properly.
7. Secure with a screw in the tab located on the right side of the module.
8. Turn the module switch to the on position.

   The LEDs on the power supply are on when the ac power is connected.

Replacing a power supply in an BCM1000e

The power supply in the BCM1000e is exactly the same type of power supply as that in the BCM1000. The only difference is that 2.5 version BCM1000es come with either a standard power supply or redundant power supply. In this case the standard power supply cannot be updated to a redundant power supply. You must upgrade the entire unit.

Note: Version 2.0 conversion

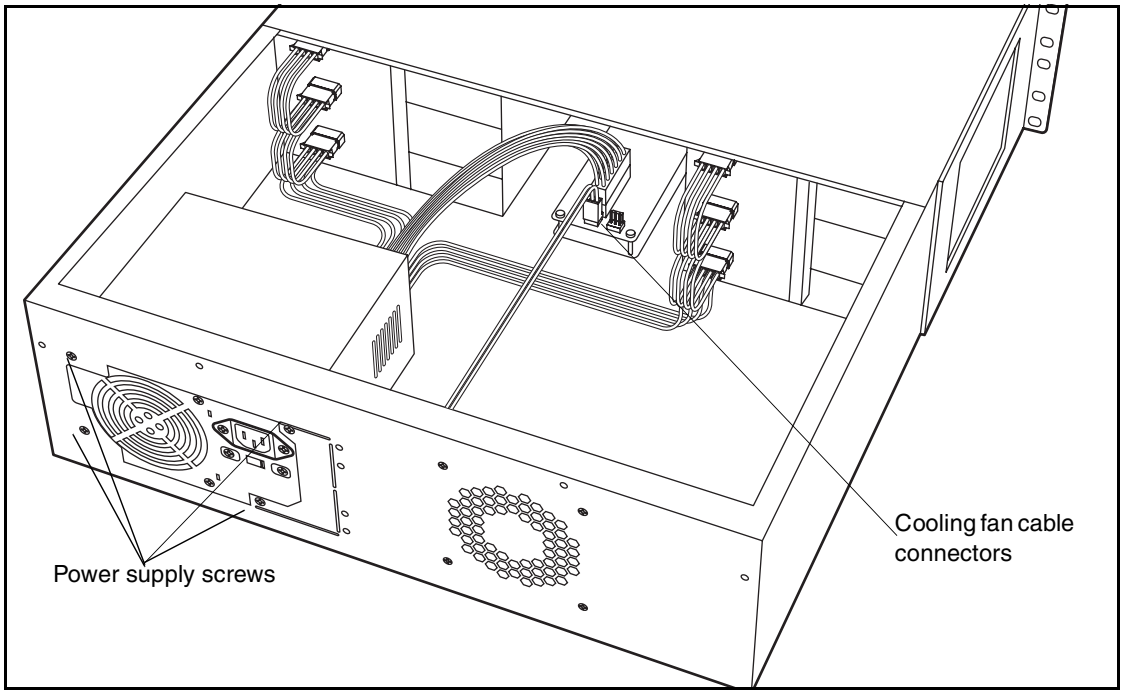
If you still have a version 2.0 BCM1000e, which is larger than the 2.5 versions, you can upgrade to a redundant power supply. To perform this upgrade, follow the instructions for updating the BCM1000 power supply, "Upgrading to a redundant power supply" on page 208.

In this configuration, the redundant fan would be installed as a piggy-back unit. The plug for the redundant fan plugs in beside the first fan. Refer to Figure 123 on page 215. Note that the version 2.0 cabinets only have one set of fan perforations, as shown in Figure 122.

To replace a standard or redundant power supply in a version 2.5 BCM1000e unit, you can follow the instructions given in the sections noted below.

- Standard supply, BCM1000e: "Replacing a standard power supply" on page 205. Refer to Figure 122.

Figure 122 BCM1000e, standard power supply interior connections



- Redundant power supply: “Replacing a redundant power supply module” on page 213. Refer to Figure 123 and Figure 124.

Figure 123 BCM1000e, redundant power supply interior connections

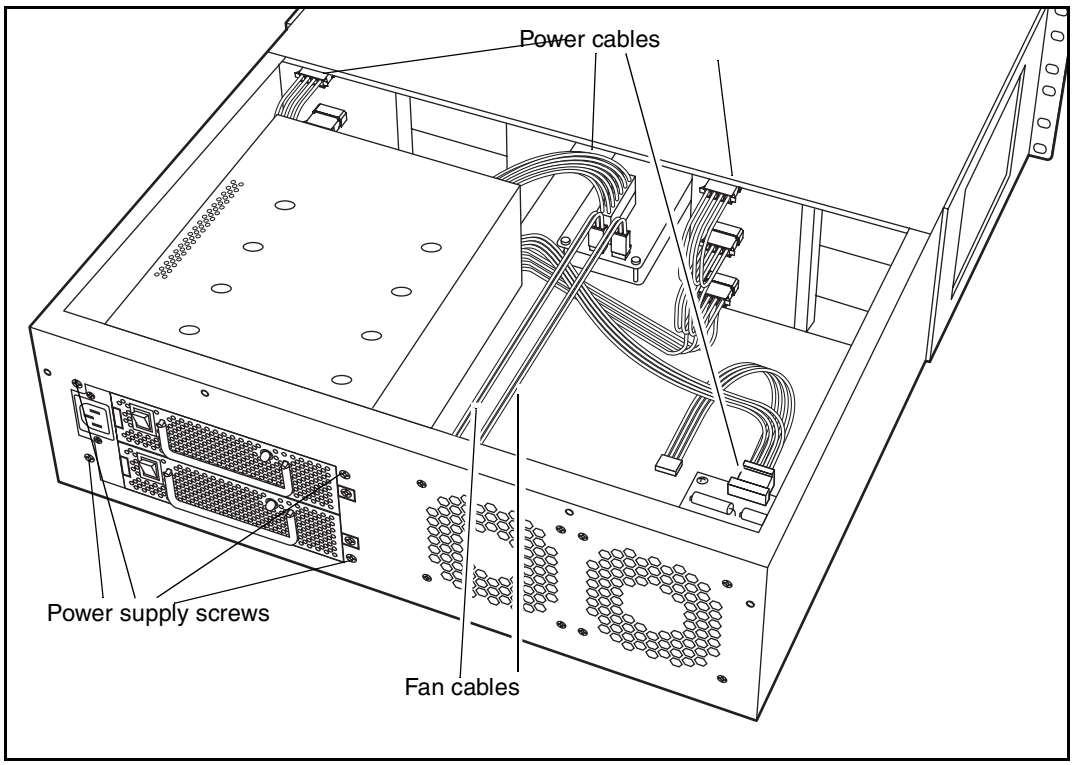
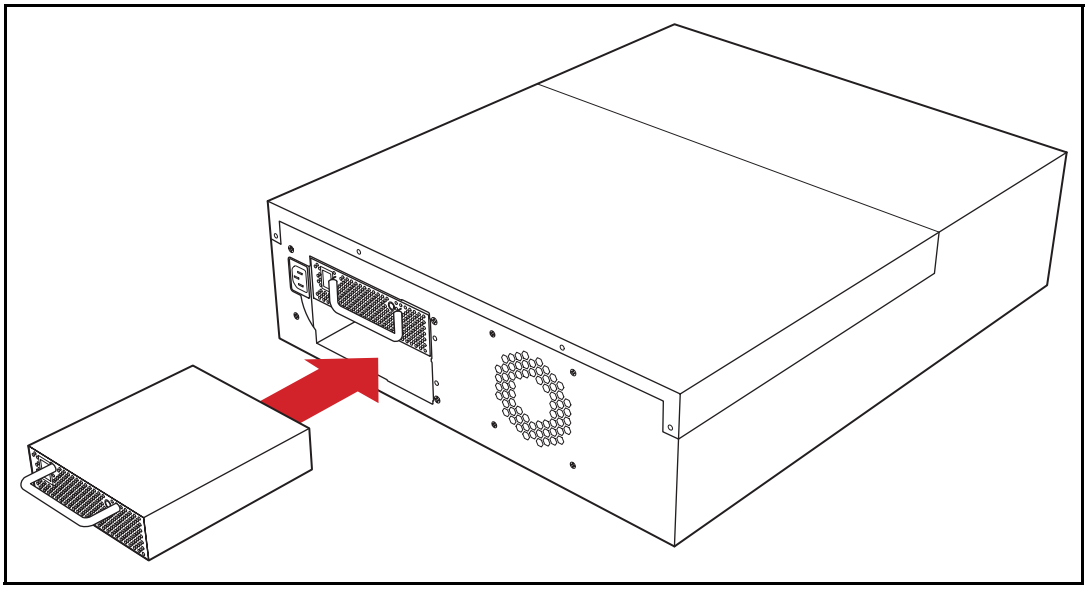


Figure 124 Installing the power module in a redundant BCM1000e



Chapter 19
Replacing data cards and processing hardware

Besides the hard disk, power supply, and cooling fans, a number of components the BCM1000 uses for data functions can be replaced.

These components can be replaced:

- WAN cards
- LAN cards
- modem cards
- computer memory
- PEC cards
- motherboard battery

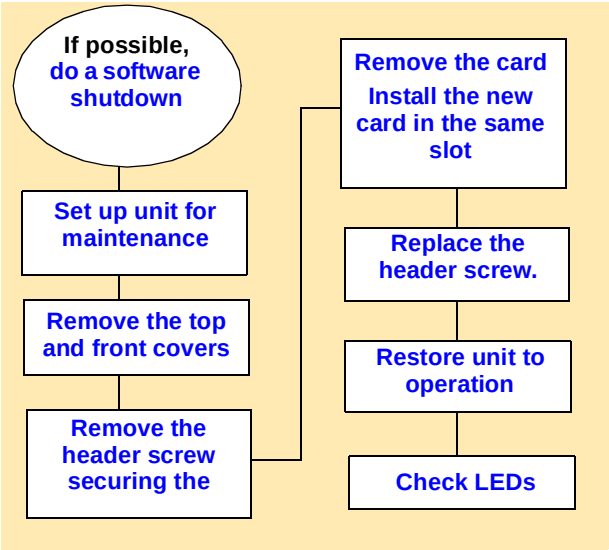
Replacing data cards

Depending on your location, you can have various configurations of data cards that can include WAN card, LAN, and modem cards (North America, only). All three types of cards are removed and replaced in the same manner, the only difference being which PCI slot they are inserted into.

For a description of the function of each type of card on the BCM1000, refer to "Data networking components" on page 22.

Figure 125 provides a general procedure for card replacement in the PCI slots of the BCM1000.

Figure 125 Process Map: Data card replacement



Removing a data card

Five LEDs on the front of the BCM1000 indicate PCI card status. LAN cards can be inserted any of the first three PCI slots. Refer to Figure 126. Table 44 lists the various LED states.

Note: There are four possible profiles for data card placement in the BCM1000. Figure 126 shows the configuration for profile 1. Note that the WAN card is connected to the first two PCI LEDs.

If the data card placement on your base unit differs, ensure that you replace the cards in the same slots they were removed from. Not all systems can support all cards.

Figure 126 BCM1000 LAN card LEDs

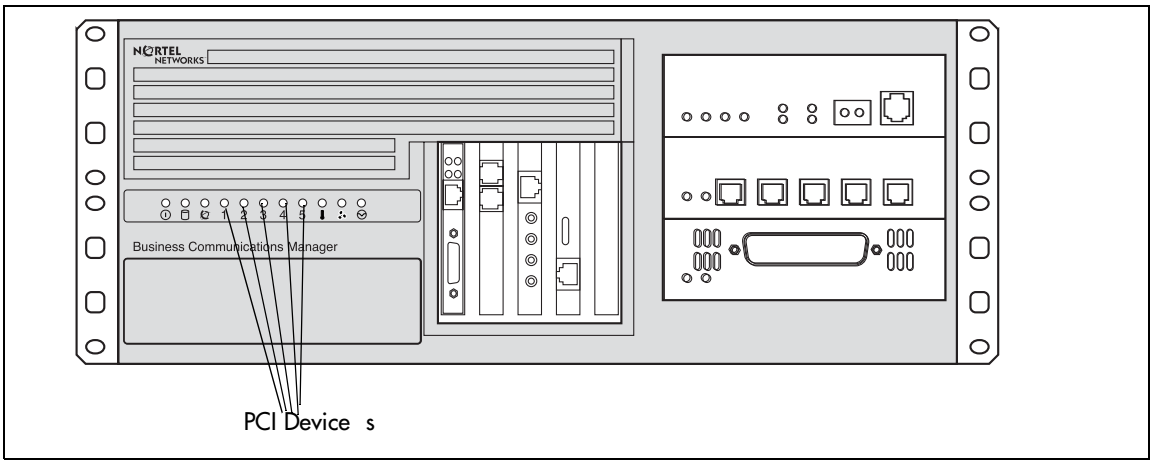


Table 44 BCM1000 PCI LED states

LED Label	Description	Green LED On	Green LED Flash	Green LED Off
1	PCI Device/ WAN Port #1	Device is present. Driver is active	Driver is not running	Device is not present.
2	PCI Device/ WAN Port #2	Device is present. Driver is active	Driver is not running	Device is not present.
3	PCI Device	Device is present. Driver is active	Driver is not running	Device is not present.
4	PCI Device	Device is present. Driver is active	Driver is not running	Device is not present.
5	PCI Device	Device is present. Driver is active	Driver is not running	Device is not present.
Note: The MSC is not field-replaceable				

Follow these steps to remove the LAN, WAN or modem cards:

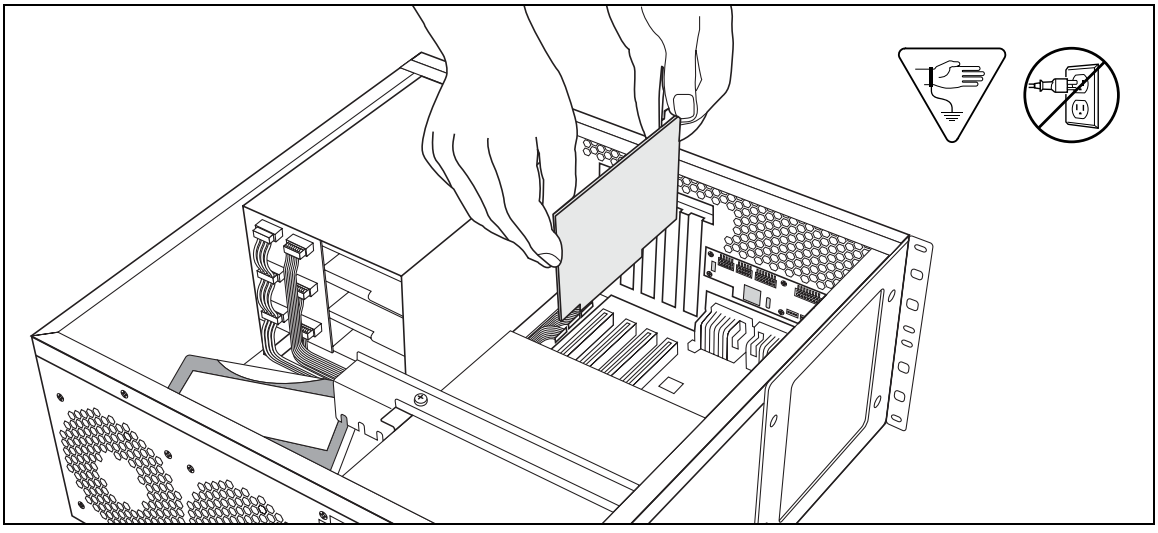
1. If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to "Shutting down the system software" on page 168. Otherwise, skip to step 2.
2. Set up the BCM1000 for maintenance, as described in "Shutting down the system hardware" on page 169.
3. Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
4. Remove the front cover.
5. Remove the screw that secures the header of the card to the BCM1000 housing.
6. Use both hands to carefully hold the card along the top and lift the card straight up and out of the unit.

Installing the card

Follow these steps to replace the LAN, WAN, or modem cards:

1. Insert the new card in the same PCI slot from which you removed the damaged card. Refer to Figure 127.
2. Fit the bottom tab of the board header into the opening below the card slot as you push the card down until it sits firmly in the connector on the motherboard.
3. Fasten the board to the housing with the header screw.
4. Replace the front cover.
5. Replace the top cover.
6. Restore the BCM1000 to operation. For details, refer to "Restarting the system" on page 170.

Figure 127 Install the LAN card



Replacing PECs

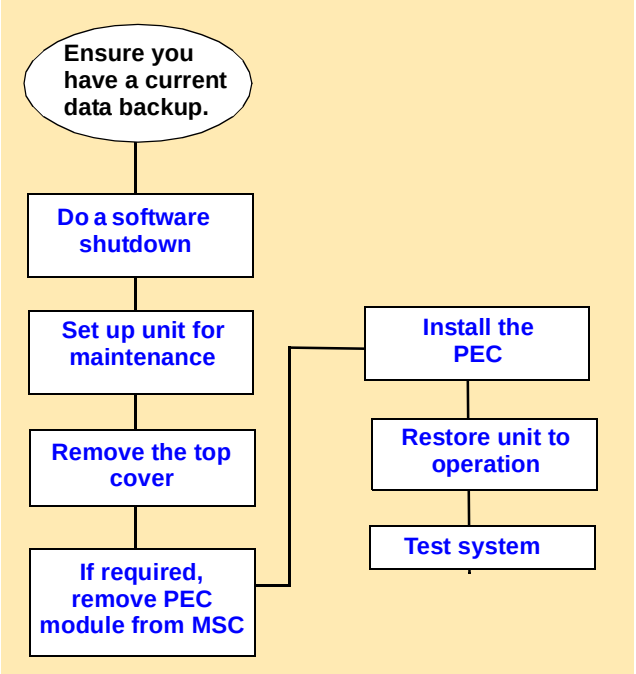
The 2.5 BCM1000 comes equipped with two processor expansion cards (PEC IIIs) mounted on the media services card (MSC). These modules provide signal processing capabilities for such applications as voice mail and IP telephony applications. If you plan to run a lot of IP telephones, you may need to upgrade to four PEC IIIs.

The 2.0 version of the BCM1000 contains four PEC Is. If you want to start using IP telephony resources, you need to upgrade to PEC IIIs.

This chapter describes the processes for removing and replacing a PEC module.

Figure 128 provides an overview of the process for replacing the PEC.

Figure 128 Process Map: PEC replacement



Warning:

Incorrect handling of the PEC during installation could result in loss of telephony programming.

Do not touch the MSC housing at any point with the PEC module when you are inserting it into the card slot.

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

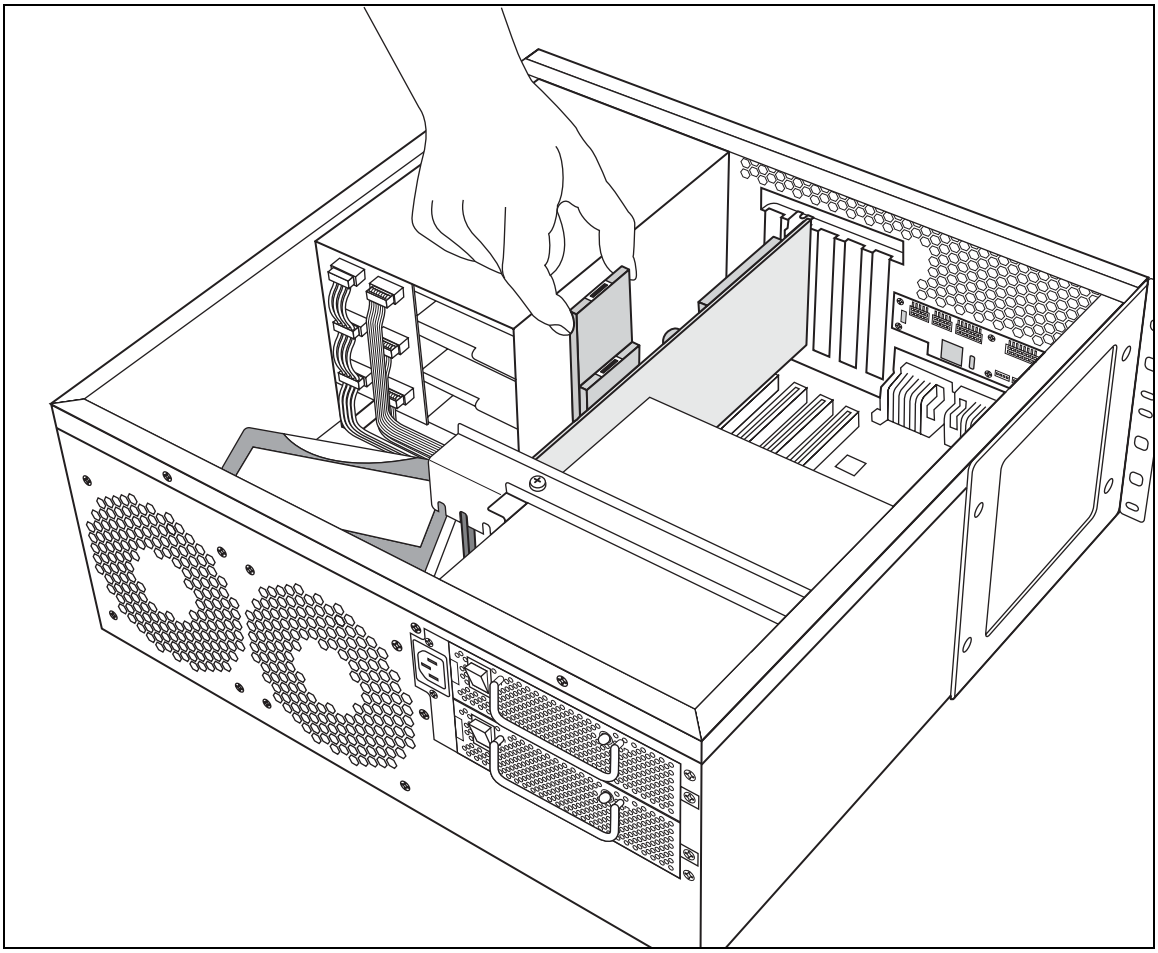
Caution: Use only a Nortel Networks approved replacement. Contact your account representative for the current list of approved replacement parts.

Removing PECs

The following steps describe the process for removing PECs from a BCM1000 MSC.

1. Ensure you have a current data backup of your system.
2. Shut down the system using the Shutdown command. For details refer to "Shutting down the system software" on page 168. Otherwise, skip to step 2.
3. Set up the BCM1000 for maintenance, as described in "Shutting down the system hardware" on page 169.
4. Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
5. Grasp the top edge of the PEC you want to remove and pull upward. Refer to Figure 129.

Figure 129 Removing or replacing a PEC



Installing a PEC

When you replace or add PECs, ensure you have followed the directions for shutting down the system from the previous section. Also ensure you have a current data backup of your system.

Warning: Possible data loss

Ensure that you do not touch the PEC casing to any of the components on the MSC as you are sliding it into position. This may cause shorting to occur, which can erase memory or cause a loss of telephony programming.

If this occurs, complete the installation of the PEC, and then restore the data from your backup medium.

Follow these steps to correctly install a PEC.

1. Decide which slot you are going to install the PEC into on the MSC board.
2. Line the card up between the rails of the slot. Refer to Figure 129 on page 221.
3. Carefully push the PEC down into the slot until it is firmly seated.

Note: Do not force the card into its slot. If the PEC does not slide in easily, check the alignment.

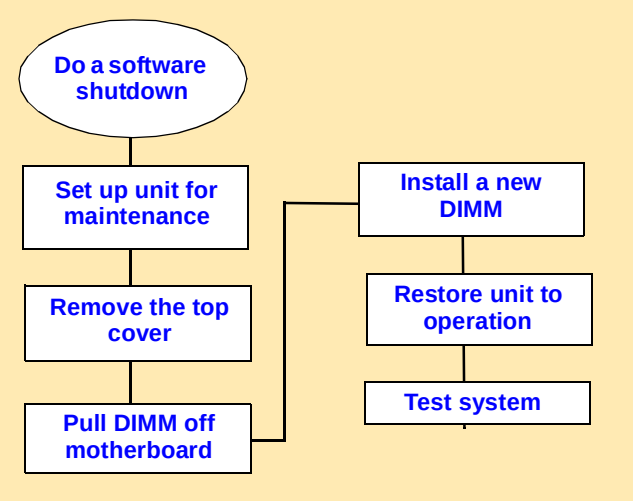
4. Replace the cover.
5. Restore the unit to operation. Refer to “Restarting the system” on page 170.

Replacing memory

The version 2.5 BCM1000 comes equipped with 256 MB of Random Access Memory (RAM). The previous version 2.0 release of the hardware contains 128 MB of RAM. In both cases, the memory resides on a Dual In-line Memory Module (DIMM) in center of the main printed-circuit board (motherboard). This board contains space to add a second DIMM, or you can upgrade the existing DIMM.

Figure 130 provides an overview of the process for replacing or adding memory chips.

Figure 130 Process Map: Memory replacement



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

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

Replacing memory DIMM chips

You replace a DIMM when the DIMMs fails or when you want to increase the amount of RAM in the Business Communications Manager.

Note: There must be at least one DIMM installed in the BCM1000 in order for the system to function.

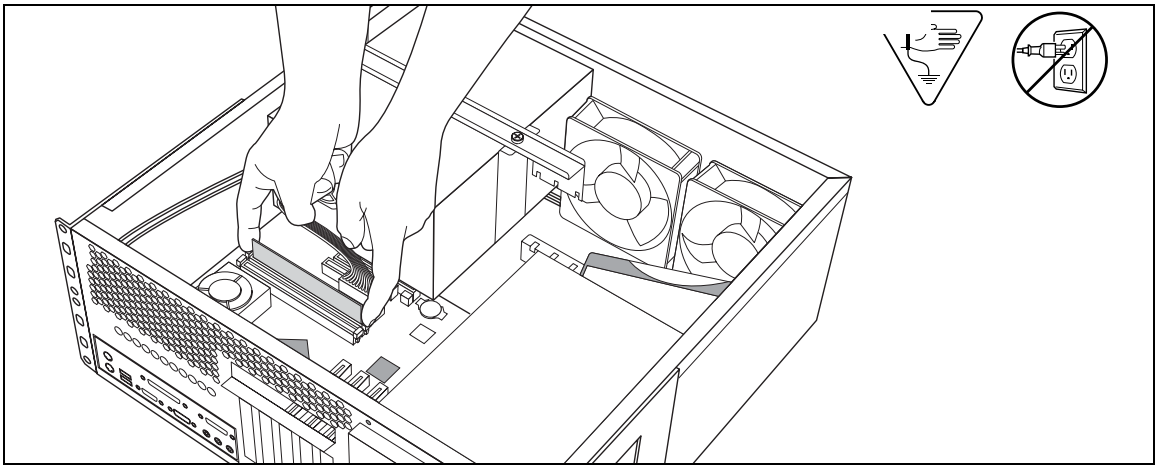
1. If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to "Shutting down the system software" on page 168. Otherwise, skip to step 2.
2. Set up the BCM1000 for maintenance, as described in "Shutting down the system hardware" on page 169.
3. Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
4. Ensure access to the memory chips is clear of cables and other parts.
   - If you have a version 2.5 BCM1000, which has a System Status Monitor board attached to the front of the housing, you may need to disconnect some of the cables to get at the memory slots.
   - If you have a WAN card in the first PCI slot, you may need to remove it to get adequate access. Refer to "Removing a data card" on page 218.

Note: If you are adding a new DIMM to the second DIMM slot, go to step 6.

5. 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.
6. Remove the DIMM from the slot by grasping either end, as shown in Figure 129.

Figure 131 Removing and replacing the DIMMs



7 Slide the new DIMM, edge connectors first, into the slot.

Note: The DIMM has two notches on the edge connector. Position the DIMM so that one of the notches is on the side of the slot nearest to the Business Communications Manager cards.

8 Carefully push the DIMM down until the fastening tabs clip to the side of the DIMM.

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

9 Replace any boards or cables that you removed to insert the memory chips.

10 Replace the cover.

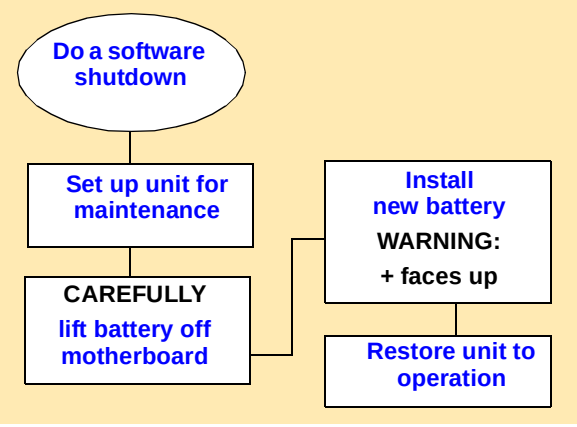
11 Restore the unit to operation. Refer to "Restarting the system" on page 170 for details.

Replacing the clock/calendar battery

The clock/calendar battery supplies the power required to keep the BIOS information current if there is a power failure. Figure 132 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 BCM1000 hardware and possibly cause a fire or explosion.

Figure 132 Process Map: Battery replacement overview



Danger: Disconnect the telephone cables and network cables and then the ac power before opening the computer. Read and follow installation instructions carefully.

Removing the clock/calendar battery

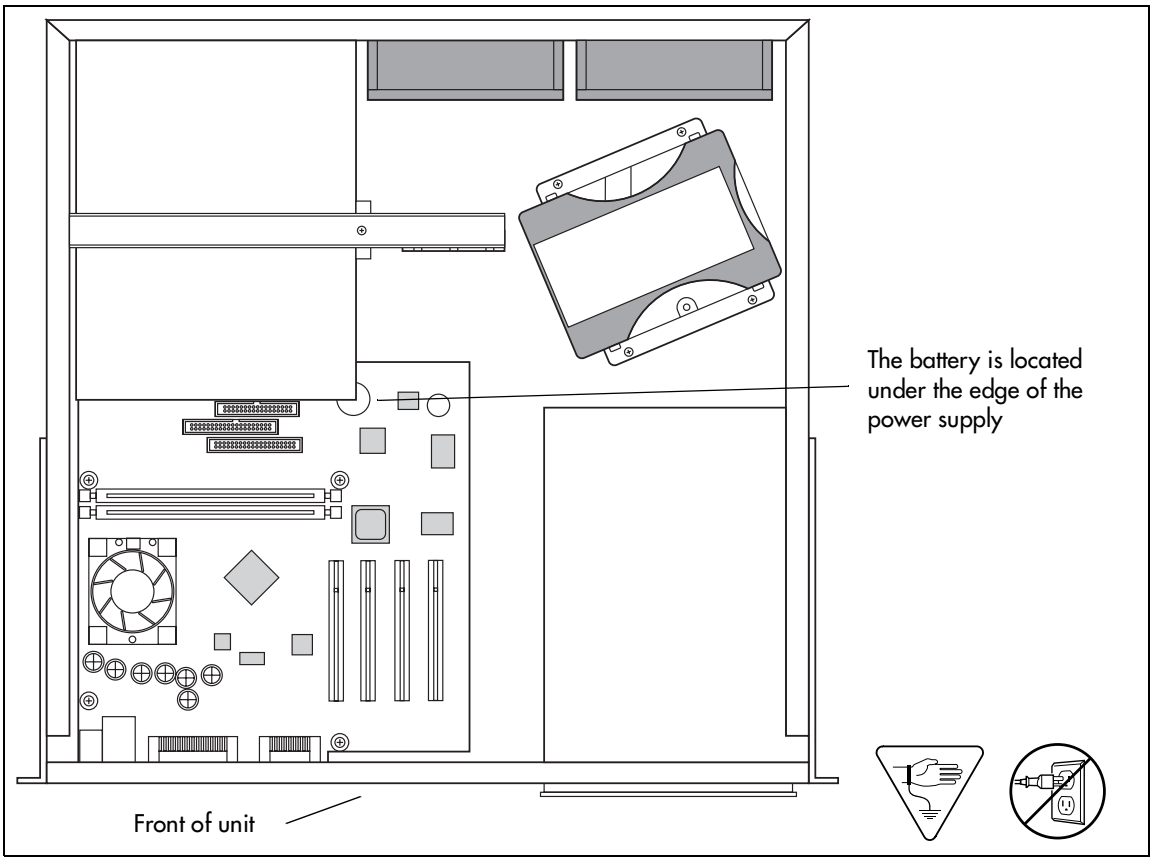
This section explains how to correctly remove the clock/calendar battery.

1. If you still have access to the Unified Manager, shut down the system using the Shutdown command. For details refer to "Shutting down the system software" on page 168. Otherwise, skip to step 2.
2. Set up the BCM1000 for maintenance, as described in "Shutting down the system hardware" on page 169.
3. Attach one end of the grounding strap to your wrist and the other end to a grounded metal surface.
4. If the system has a redundant power supply, you may need to remove this before removing the battery. Refer to Chapter 18, "Replacing a power supply," on page 205.
5. Use your finger to carefully lift the battery out of the socket.

   For the location of the battery socket, refer to Figure 133.

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

Figure 133 Removing the clock/calendar battery



Installing the new battery

This section describes how to replace the clock/calendar battery into the base unit.

Warning: There is a danger of explosion if you do not replace the battery correctly.
You must replace the battery with a CR2032, 3v Maxell coin cell battery.
The positive side of the battery must face up.
The battery must sit securely in the battery socket.

1. Ensure you have the positive side of the battery facing up when you position it in the socket.
2. Push down until the battery snaps into the socket.
3. Replace the power supply, if you removed it.
4. Replace the cover.
5. Restore the unit to operation. Refer to "Restarting the system" on page 170.

Chapter 20
Moving and replacing telephones

When the Business Communications Manager system is on, you can replace a telephone with a new one and the new set will pick up the current programming, if it is the same model as the set that was removed. A new telephone is one that was not previously in service within the system.

For a description of the telephones that can be used on the Business Communications Manager system, refer to "Telephones and adapters" on page 48.

For information on installing and replacing the 20XX IP telephones, refer to the *IP Telephone Configuration Guide*.

Determining the status of a telephone

To discover the system status of a telephone, you must know the DN of the set and which port on the Business Communications Manager the set is connected to. If the tables in Chapter 13, "Installing optional telephony equipment," on page 157 were filled out when the telephone were installed, refer to them to determine the port each set is attached to.

To find out the status of a set:

1. Open the Unified Manager.
2. Click on the keys beside **Resources, Media Bay Modules.**
3. Click on the bus number (DS30 bus) assigned to the media bay modules supporting the telephone line.

Note: IP telephones are listed under DS30 01. Ports for IP telephones are automatically assigned as the telephones are registered to the system.

4. Click **Port #**.

   Port # is the port connected to the telephone.
5. Click **Channels**.
6. Click on **B1** or **B2** to view the appropriate DN number.
7. State indicates the state the set is in.

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** in system programming under Feature programming. 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 features, the **Keep DN Alive** setting for the telephone programming must be set to Yes in system programming on the Capabilities screen in the DN record for the telephone.

Replacing telephones with different models

If you disconnect a digital or analog telephone and connect a new telephone of a different type into the same jack, for example, replacing an T7310 telephone with a T7316E, the new telephone keeps the old extension number but does not retain the user parameters. The new telephone receives a default profile for a telephone of its type. Refer to the *Business Communications Manager Programming Operations Guide* for telephone configuration information.

If the new telephone has fewer lines than the old one, automatic outgoing line selection cannot work with the Handsfree/Mute feature. You must select a line manually.

Note: If you replace a digital telephone with an IP telephone, or vice versa, programming is lost because the connection method is different. You can assign the same DN, but this causes programming issues by making the DN numbers incongruous for the DN range supported by the module to which the digital telephone was wired. This is only an issue if you rewire that module port to another location and install a digital telephone at the new location. There is a potential DN conflict between the IP telephone and the new digital telephone in these circumstances.

Refer to the *IP Telephony Configuration Guide* for directions about installing an IP telephone.

Status of the replaced telephone

The replaced telephone loses its programming and internal number. If the telephone is plugged in again at another jack, the Business Communications Manager considers the replaced telephone a new telephone.

Appendix A
System region attributes

This appendix provides a number of tables that show the relationship of system programming to the region or software that you select at system startup.

Each region is designed using a set of system defaults that provide specific functionality for the region in which the system is deployed. This can include specific languages, and a specific order in which the languages are set as default (language 1); whether Companion or DECT mobility will be allowed; and what type of trunks can be used.

Core software and regions

Each Region setting requires a specific core software to perform correctly. Table 134 shows the core software available.

Table 134 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	Brazil Caribbean Hong Kong North American Taiwan	Caribbean Hong Kong North American Taiwan	Denmark France Germany Holland Italy Norway Spain Sweden Switzerland United Kingdom	Australia CALA Global PRC	Australia CALA Global PRC
South American and Central American countries are assigned to regions in the following way: • Caribbean includes Antigua, Bahamas, Barbados, Bermuda, Cayman Islands, Dominican Republic, Jamaica, USVI, Puerto Rico, and Trinidad • CALA refers to all other Caribbean and Latin American countries with European-based standards.					

Languages

Table 135 lists the languages available for each region and a specific order in which the languages are set as default.

Table 135 Telephony region Languages

Region	Language
CALA Caribbean Hong Kong North American PRC Taiwan	NA English, NA French, NA Spanish
Australia United Kingdom	UK English
Brazil	Portuguese
Denmark	Danish, Norwegian, Swedish, NA English

Region	Language
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, Portuguese
Sweden	Swedish, Norwegian, Danish, NA English
Switzerland	German, Euro French, Italian, NA English
France	Euro French, NA English

Table 136 shows a breakdown of the language support for South American and Central American countries.

Table 136 South/Central America language breakout

Language	Spanish		English		French	Portuguese
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	Brazil

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 137 shows the companding law used for each region.

Table 137 Companding law

Companding Law	
mu-law	**A-law**
Caribbean Hong Kong North American Taiwan	Australia Brazil CALA Denmark France Germany Global Holland Italy Norway PRC Spain Sweden Switzerland United Kingdom

ISDN line services

Table 138 shows the ISDN private network services that are supported by the Business Communications Manager. Table 139 shows the network-based ISDN supplementary services and the features available for each.

Table 138 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)	
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 139 ISDN services, by Protocol

Protocol	Available ISDN services
NI (Caribbean. North America)	Basic Call DID Name display Number display ONN blocking
ETSI Euro (Australia. CALA, Denmark, France, Germany, Global, Holland, Hong Kong, Italy, Norway, PRC, Spain, Sweden, Switzerland, Taiwan, United Kingdom)	Basic Call DDI subaddressing (on S-loop) ETSI Call Diversion (partial rerouting) AOC-E (specific changes for Holland and Italy) MCID CLIP COLP CLIR

Mobility services by region

Table 140 shows the Mobility services that are supported by the Business Communications Manager, and the regions that can use each type.

Table 140 Mobility services, by region

Available Mobility service	Companion (CT2-Plus, Etiquette)	Companion (CT2-Plus)	Companion (CT2-Plus, Etiquette), DECT	DECT
Region	Caribbean Hong Kong North American PRC	CALA Brazil	Taiwan	Australia Denmark France Germany Global Holland Italy Norway Spain Sweden Switzerland United Kingdom

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 141 lists a cross-reference between regions and the type of modules that can be used within the related area.

Table 141 Module availability, by profile

Region	DSM	ASM	CTM	4X16	GATM	BRI	DTM	DECT
Australia	X				X	X	X	X
Brazil	X		X	X	X	X	X	
Caribbean	X		X	X		X	X	
CALA	X		X	X		X	X	
Denmark	X					X	X	X
France	X					X	X	X
Germany	X					X	X	X
Global	X		X	X		X	X	X
Holland	X					X	X	X
Hong Kong	X		X	X		X	X	X
Italy	X					X	X	X
North American	X	X	X	X	X	X	X	
Norway	X					X	X	X
PRC	X		X	X		X	X	
Spain	X					X	X	X
Sweden	X					X	X	X
Switzerland	X					X	X	X
Taiwan	X		X	X	X	X	X	X
United Kingdom	X				X	X	X	X

PRI line protocol support, by region

Table 142 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	
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	

Trunk availability by region

Different countries have different available trunk types. Table 141 provides a cross-reference between regions and available trunks types.

Table 143 Trunk availability, by region

Region	BRI S/T 2/4	BRI U2/4	PRI ETSI = 30 channels NA = 23 channels	Analog DID	E&M	CLASS	Country-specific analog trunk card
Australia	✓		✓				✓
CALA	✓	✓	✓	✓	✓	✓	
Caribbean	✓	✓	✓	✓	✓	✓	
Denmark	✓		✓				
France	✓		✓				✓
Germany	✓		✓				✓
Global	✓		✓		✓	✓	
Holland	✓		✓				✓
Hong Kong	✓		✓	✓	✓	✓	
Italy	✓		✓				
North American	✓	✓	✓	✓	✓	✓	
Norway	✓		✓				
PRC	✓		✓		✓	✓	
Spain	✓		✓				
Sweden	✓		✓				
Switzerland	✓		✓				
Taiwan	✓		✓	✓	✓	✓	
United Kingdom	✓		✓				✓

Table 144 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	
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 145 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 145 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.
PRI	ISDN interface with 23 B-channels and one D-channel at 1.544 MBps (in Europe: 30 B-channels and two D-channels at 2.048 Mbps) This is the module that controls system timing. These lines give you incoming and outgoing access to an ISDN network and are auto-answer trunks, by default. These lines provide a fast, accurate and reliable means of sending and receiving data, images, text and voice information. using PRI lines allows for faster transmission speeds and the addition of a variety of powerful business applications, including remote LAN access, video conferencing, file transfer and internet access.
BRI	ISDN loop that provides both T, S and U2 and U4 (region-specific) reference point loops. These loops can support both network (T and S loops) and terminal equipment (S loop) connections. This type of line provides incoming and outgoing access to an ISDN network. ETSI ISDN BRI is the European Telecommunications Standards Institute specification for BRI ISDN service. BRI provides two bearer B-channels operating at 64 kbits/s and a data D-channel which operates at 16 kbits/s. The D-channel is used primarily to carry call information. Like loop start trunks, BRI lines can be configured as manual-answer or auto-answer.
DASS2	(British) Trunk provides multi-line IDA interconnection to the British Telecom network.

Table 145 BRI and PRI line types (DTM and BRI modules) (Continued)

Digital trunk types	Description
DPNSS	(international term: Q.Sig or Q.931) a digital private network signaling system which allows phone systems from different manufacturers to be tied together over E1 lines, offering significant enhancements to Business Communications Manager 2.5 networking capabilities. DPNSS makes it easier to support centralized network functionality within private networks, for operators and attendants dealing with large numbers of calls. Its routing capabilities provide more of the larger-network capabilities without the expense of installing a new system, re-configuring all the nodes and worrying about a lot of downtime. Most functionality over DPNSS lines is transparent once the DPNSS is programmed into the system. DPNSS allows a local node, acting as a terminating node, to communicate with other PBXs over the network using E1 lines. For example, corporate offices separated geographically can be linked over DPNSS lines to other Business Communications Manager 2.5 systems, bypassing the restrictions of the PSTNs to which they may be connected. This allows connected Business Communications Manager 2.5 systems to function like a private network.
Analog trunk types	
Public	Provides potential access for any set on the system.
Private	Provides potential access for a specific set.

Defining time zones by country and language

Time zones are based on the actual time zone where the Business Communications Manager is located. The Time Zone drop down 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 146 provides a list of formats based on language or country.

Table 146 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 Brazil	1 Ene 13:57
German	1 Jan 13:57
Italian	1 Gen 13:57

Language/Country	Time/Date format
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 147 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 147 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

Table 147 Region defaults (Continued)

Functionality	Attribute	North American	Global	United Kingdom
	Service 5	start 00:00 end 00:00	start 00:00 end 00:00	start 00:00 end 00:00
	Service 6	start 00:00 end 00:00	start 00:00 end 00:00	start 00:00 end 00:00
Call Forward Delay	Show in second	disabled	disabled	disabled
	Default	4 ring cycles	4 ring cycles	2 ring cycles
	Options	• 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles • 10 ring cycles	• 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles • 10 ring cycles	• 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles • 10 ring cycles
DRT Delay	Show in second	disabled	disabled	disabled
	Default	4 ring cycles	4 ring cycles	4 ring cycles
	Options	• 1 ring cycles • 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles • 10 ring cycles	• 1 ring cycles • 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles • 10 ring cycles	• 1 ring cycles • 2 ring cycles • 3 ring cycles • 4 ring cycles • 6 ring cycles
Handsfree		none	none	none
Pickup Group		none	none	none
Remind Delay		60 secs	60 secs	60 secs
Allow SLR		disabled	disabled	disabled
Transfer Callback	Show in second	disabled	disabled	disabled
	Default	4 ring cycles	4 ring cycles	4 ring cycles
	Options	• 3 ring cycles • 4 ring cycles • 5 ring cycles • 6 ring cycles • 12 ring cycles	• 3 ring cycles • 4 ring cycles • 5 ring cycles • 6 ring cycles • 12 ring cycles	• 3 ring cycles • 4 ring cycles • 5 ring cycles • 6 ring cycles • 12 ring cycles
Dialling Plan		market dependent (defined in application but controlled by market profile ID)	market dependent (defined in application but controlled by market profile ID)	market dependent (defined in application but controlled by market profile ID)
ONN Blocking	VSC for analog tone	n/a	n/a	141
	VSC for analog pulse	n/a	n/a	141
	VSC for BRI	n/a	n/a	141
	VSC for PRI	n/a	n/a	141
	State for BRI/PRI	n/a	n/a	send feature code

Table 147 Region defaults (Continued)

Functionality	Attribute	North American	Global	United Kingdom
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
Tandem alerting		disabled	disabled	disabled
TON/NPI		national/E.164	national/E.164	unknown/unknown
National number length		10	10	0
national number prepend		n/a	n/a	0
Provide tone on PRI		enabled	n/a	disabled

Appendix B
Media bay module combinations

This section describes some combinations of trunk and station modules to demonstrate how to fit the modules into the DS30 bus 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/GATMs and 4X16s

The 4X16 combination media bay module is a combination of a CTM or GATM and a DSM. A maximum of four CTMs/GATMs can fit into a DS30 bus, when each is given a different offset. Therefore, you can combine a maximum of three GATMs with a 4X16 combination module. This configuration would occupy two full DS30 bus blocks.

Which means, you can install a maximum of three of these combinations in a Business Communications Manager box with an extension box added to it. Table 1 demonstrates this configuration of CTMs/GATMs and 4X16 modules, including the switch settings for each module.

Table 1 CTMs/GATMs combined with 4X16 modules

Each heavily-outlined and shaded square represents one module.				Switch setting					
DS30 bus #	**2 4x16s Offset 3**	**4 CTMs/GATM4s Offset 0, 1 and 2**	**1 CTM8/GATM8 Offset 2**	**1**	**2**	**3**	**4**	**5**	**6**
2		0	CTM/GATM 4settings:	on	on	on	on	on	on
		1	CTM/GATM4 settings:	on	on	off	on	on	on
		2	CTM/GATM4 settings:	on	off	on	on	on	on
	3	Switch settings for 4X16:		on	off	off	on	on	on
3									
4		0	CTM/GATM4 settings:	on	on	on	on	off	on
			2 (CTM8/GATM8)	on	on	off	on	off	on
				on	off	on	on	off	on
	3	Switch settings for 4X16:		on	off	off	on	off	on
5									

Fully-loaded setup

This section describes a system containing one DSM 32, one DSM 16, two ASM 8s, and two DTMs. This configuration uses all the DS30 bus blocks, with the exception of two offsets.

Table 2 demonstrates this combination, including the switch settings for each module.

Table 2 DSM combined with 2 DTMs and 2 ASMs

DS30 bus #	Each heavily-outlined and shaded square represents one module.				Switch setting					
	1 DSM 32 Offset 0	1 DSM 16 Offset 0	2 ASM 8s Offset 0 and 1	2 DTMs Offset 0	1	2	3	4	5	6
2	0	DSM 32 settings:			on	on	on	on	on	on
3										
4		0	DSM 16 settings:		on	on	on	on	off	on
5			0	ASM8 settings:	on	on	on	on	off	off
			1	ASM8 settings:	on	on	off	on	off	off
6				0	on	on	on	off	on	on
7				0	on	on	on	off	on	off

Table 3 demonstrates this combination using modules set to double density, including the switch settings for each module.

Warning: Do not install more than two ASM8+ modules on the BCM1000 base unit.

Table 3 Fully loaded system using modules set to double density

DS30 bus #	Each heavily-outlined and shaded square represents one module.				Switch setting					
	2 DSM32+ set to DD Offset 0	2 DSM16+ set to DD Offset 0	4 ASM8+s Offset 0, 1, 2, 3	2 DTMs Offset 0	1	2	3	4	5	6
2	0 (32 ports)	DSM settings			off	on	on	on	on	on
3	0 (32 ports)	DSM settings			off	on	on	on	on	off
4		0 (16 ports)	DSM settings		off	on	on	on	off	on
		1 (16 ports)	DSM settings		off	on	off	on	off	on
5			0	ASM8 settings:	on	on	on	on	off	off
			1	ASM8 settings:	on	on	off	on	off	off
			2	ASM8 settings:	on	off	on	on	off	off
			3	ASM8 settings:	on	off	off	on	off	off
6				0	on	on	on	off	on	on
7				0	on	on	on	off	on	off

DECT combinations

This section describes a system containing a DECT module, three BRI modules and two DSM 32s. This configuration uses all the DS30 bus blocks, with the exception of one offset.

Note: DECT systems are not available for all profiles. Refer to "Mobility services by region" on page 237.

Table 4 demonstrates this combination, including the switch settings for each module.

Table 4 Three BRI modules, two DSM 32s and 1 DECT module

DS30 bus #	Each heavily-outlined and shaded square represents one module.			Switch setting						
	1 DECT Offset 0	3 BRI Offset 0, 1 and 2	2 DSM 32s Offset 0	1	2	3	4	5	6	
2			0	on	on	on	on	on	on	
3										
4			0	on	on	on	on	off	on	
5										
6	0	DECT switch settings:		on	on	off	on	on	on	
7		0	BRI settings	on	on	on	off	on	off	
		1	BRI settings	on	on	off	off	on	off	
		2	BRI settings	on	off	on	off	on	off	

Table 5 demonstrates a double density combination, including the switch settings for each module.

Table 5 Double density system with DECT module

DS30 bus #	Each heavily-outlined and shaded square represents one module.					Switch setting					
	1 DECT Offset 0	3 BRI Offset 0, 1 and 2	1 DTM 16 set to PRI Offset 0	2 DSM 32+ set to DD Offset 0	1 DSM16+ set to DD Offset 0	1	2	3	4	5	6
2				0 (32 ports)		off	on	on	on	on	on
3				0 (32 ports)		off	on	on	on	on	off
4					0 (16 ports)	off	on	on	on	off	on
5			0	DTM switch settings		on	on	on	on	on	on
6	0	DECT switch settings:				on	on	off	on	on	on
7		0	BRI settings			on	on	on	off	on	off
		1	BRI settings			on	on	off	off	on	off
		2	BRI settings			on	off	on	off	on	off

Changing configurations

Here are some points to consider when changing modules in existing or in new Business Communications Manager systems:

- Trunk and analog station modules cannot share a DS30 bus.
- Modules that require more than one DS30 bus automatically assign the next bus in chronological order.
  Therefore, if an existing, installed module uses either of the required DS30 bus blocks, 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 hardware, the station wiring needs to be adjusted. Refer to "FEM wiring" on page 139.

System setup

Use the following table to make a note of your basic system setup. Post this page near the BCM1000 for future reference.

	DS30 bus 02	DS30 bus 03	DS30 bus 04
Media bay module			
DIP switch setting			
Line/set type			
Line/Loop/DN range			

	DS30 bus 05	DS30 bus 06	DS30 bus 07
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 6 to identify the DNs and ports for your sets. If you are using the default start DN (211), a completed chart is provided under Table 37 on page 143 and Table 38 on page 144.

Table 6 Cross referencing ports and DNs

Pins	Port*	DS 30 bus 02 DNs	DS 30 bus 03 DNs	DS 30 bus 04 DNs	DS 30 bus 05 DNs	DS 30 bus 06 DNs	DS 30 bus 07 DNs
26/1	X01						
27/2	X02						
28/3	X03						
29/4	X04						
30/5	X05						
31/6	X06						
32/7	X07						
33/8	X08						
34/9	X09						
35/10	X10						
36/11	X11						
37/12	X12						
38/13	X13						
39/14	X14						
40/15	X15						
41/16	X16						
Second-level DNs (DS 30 bus set to Full Double Density)							
Pins	**Port***	**DS 30 bus 02 DNs**	**DS 30 bus 03 DNs**	**DS 30 bus 04 DNs**	**DS 30 bus 05 DNs**	**DS 30 bus 06 DNs****	**DS 30 bus 07 DNs****
26/1	X17						
27/2	X18						
28/3	X19						
29/4	X20						
30/5	X21						
31/6	X22						
32/7	X23						
33/8	X24						
34/9	X25						
35/10	X26						
36/11	X27						
37/12	X28						
38/13	X29						
39/14	X30						
40/15	X31						
41/16	X32						

Table 6 Cross referencing ports and DNs (Continued)

Pins	Port*	DS 30 bus 02 DNs	DS 30 bus 03 DNs	DS 30 bus 04 DNs	DS 30 bus 05 DNs	DS 30 bus 06 DNs	DS 30 bus 07 DNs

* For each port, substitute the X for the DS30 bus number. Example: Port X01 on DS30 bus 02 is port 0201.
** On default systems, these two DS30 bus blocks are set to Partial Double Density (PDD), which means that the second level of DNs are not available.

Glossary

access code

A unique digit or digits entered by the user to access some telephony features such as Line pools, Call park, external lines, Direct-Dial telephone, and Auto DN.

address

A unique identifier assigned to networks and stations that allows each device to receive and reply to messages.

Analog terminal adapter (ATA)

A device that connects analog telecommunication devices, such as fax machines, answering machines, and single line telephones to the Business Communications Manager system through a Digital station module.

Application program interface (API)

An application program uses this interface to make requests of the operating system or another application. The API is an interface to an operating system or a program.

asynchronous

A method of transmission where the time intervals between characters are not required to be equal and signals are sourced from independent clocks with different frequencies and phase relationships. Start and stop bits may be added to coordinate character transfer.

autodial button

A memory button that provides one-touch dialing out.

automatic daylight savings time

A feature that switches the system to standard or daylight savings time at programmed times. Assigns automatic daylight savings time under **Daylight time** in System programming.

automatic telephone relocation

A feature that maintains personal and system programing for a telephone keep when the telephone gets moved to a different modular jack. Enable Automatic Telephone Relocation under Set relocation in System programming.

auxiliary ringer

An external telephone ringer or bell which rings when a line or a telephone rings. Enables the auxiliary ringer under **Capabilities** under System DNs programming. Program an auxiliary ringer in **Services** programming.

B-channel (bearer channel):

An ISDN standard transmission channel used for voice or data transmission. Also known as a media channel.

background music

A feature that plays music from the speaker of your telephone. Background Music is available when you attach a music source to the system and enable the feature under Feature settings in System programming.

base station

This is the radio/telephony unit that allows communication between wireless handsets, such as Companion or DECT, to the Business Communications Manager system.

basic rate interface (BRI)

An ISDN interface that uses two B-channels and a D-channel (2B+D). ETSI BRI is the European Telecommunications Standards Institute specification for BRI ISDN service

baud rate

A unit of measurement of data transmission speed. Baud rate is approximately equivalent to Bits Per Second (BPS). Typical baud rates are 300, 1200, 2400, 4800, and 9600.

BIOS (basic input output system)

A program contained in Read Only Memory (ROM) that acts as the interface between software programs and the computer hardware.

bit

A bit is the smallest unit of information identified by the computer. A bit has one of two values, 0 or 1, to indicate off or on.

Bus

A collection of communication lines that carry electronic signals between components in the system.

Call Forward

A feature that forwards all the calls arriving at a telephone to another telephone in the system. To have calls forwarded outside the system, use Line Redirection.

Call Forward No Answer

A feature that forwards all calls arriving at a telephone to another selected telephone in the system. The system transfers the calls after a specific number of rings. Assign Call Forward No Answer under **Capabilities** in System DNs programming.

Call Forward On Busy

A feature that forwards all calls at a telephone to another selected telephone if the original telephone is busy. Assign this feature under **Capabilities** in System DNs programming.

Call Forward Override

An automatic system feature that allows the user to call another user and ask that user to stop forwarding calls to their set.

call log

An incoming call log accessed through the set that displays the following information for every call:

- sequence number within the Call Log
- name and number of caller
- long distance indication
- call answered indication
- time and date of the call
- number of repeated calls from the same source
- name of the line that received the call

Camp-on

A feature that allows the user to reroute a call to a telephone when all the lines on that telephone are busy. To answer a camped call, use Call Queuing or select a line if the camped call appears on the set. Queued calls get priority over camped calls.

camp timeout

The length of a delay before a camped call returns to the telephone that camped the call. Set the length of delay under Feature settings in System programming.

central answering position (CAP)

An M7324 telephone that provides backup answering and set monitoring. Assign a CAP under CAP assignment in System programming.

channel service unit (CSU)

A device on the Digital Trunk Interface that is the termination point of the T1 lines from the T1 service provider. The CSU collects statistics on the quality of the T1 signal. The CSU ensures network compliance with FCC rules and protects the network from harmful signals or voltages.

client

A client is a computer system or process that requests a service of another computer system or process. For example, a workstation requesting the contents of a file from a file server is a client of the file server.

cold start

A cold start occurs when you lose all system programming, such as after a power failure, or if the system was down for maintenance and you want to start it up again.

Companion portable telephone

Hand held wireless telephones that allow complete mobility within the reach of Companion base stations or an external antenna. Portable telephones provide many but not all standard system features. They also share some of the same programming as desk telephones.

Companion Wireless

The name for the communication systems which use radio technology to transmit and receive signals between its components and the Business Communications Manager.

Conference

A feature that allows the user to establish a three-way call.

D-channel (Data channel)

An ISDN standard transmission channel which is packet-switched. The channel is used for call setup, signaling, and data transmission.

data link connection indentifier (DLCI)

The DLCI is used to identify a PVC in frame relay networks.

DECT cordless telephone system

Hand held wireless telephones that allow complete mobility within the reach of DECT base stations. Portable telephones provide many but not all standard system features. They also share some of the same programming as desk telephones.

Delayed Ring Transfer (DRT) to prime

This feature allows the system to transfer unanswered calls on external line to the prime telephone related to the called set. The number of rings can be adjusted. Activate this feature under Feature settings in System programming.

dial-up connection

A dial-up connection is a temporary connection between computers. This connection is established over an analog or digital telephone line.

dialing restriction

Restrictions are numbers you cannot dial when the dialing filter with those numbers is in effect.

Digital Private Network Signaling System (DPNSS)

DPNSS is a networking protocol that provides operators with access to Enterprise Edge features over multiple combined networks. Corporate offices, separated geographically, can be linked over DPNSS to other Enterprise Edge systems, bypassing the restrictions of the PSTNs to which they may be connected. This allows connected Enterprise Edge systems to function like a private network. DPNSS is available for International systems only.

directory number (DN)

A unique number that the Business Communications Manager system assigns to every telephone or data terminal.

disconnect supervision

A feature that enables the system to detect if an external caller hangs up. Enable Disconnect Supervision under Trunk/Line data in Lines programming.

disk mirroring

The Business Communications Manager supports the RAID 1 disk mirroring protocol, which creates an exact data duplicate of the system hard disk on a second, co-located hard disk within the BCM1000. If one of the hard disks becomes inoperable, the system halts the mirroring process and boots from the unaffected hard disk. You can then schedule disk replacement during normal maintenance periods. This does not replace your BRU backup disks, which should still be run on a regular schedule and be kept off-site.

Do Not Disturb

A feature that stops calls from ringing at a telephone. Only Priority Calls ring at the telephone when this feature is set. A line button flashes when a call is received, but the set does not ring.

domain name

The domain name is used to translate Internet IP addresses into common language to allow for easier user access.

Domain Name Server (DNS)

The domain name system or server is the system that maps names of objects into IP numbers or other resource record values.

dual tone multifrequency (DTMF)

Two distinct telephone signaling tones used for dialing.

dynamic IP address

This feature is provided by an IP address server which assigns an IP address to a computer every time it logs on to the network.

Emergency 911 dialing

The ability to access a public emergency response system by dialing the digits 9-1-1.

emergency telephone

A single-line telephone that becomes active when there is no power to the Business Communications Manager. This telephone is also referred to as a 500/2500 telephone.

Ethernet

A local area network that networks computers with coaxial cable or twisted pair wiring. This protocol makes use of Carrier Sense Multiple Access/Collision Detect (CSMA/CD) LAN to allow computers, such as the Business Communications Manager to listen for pauses before they communicate.

event message

These are messages generated by the system to record activity. The messages are written to the system log.

external call

A call to or from a destination outside the Business Communications Manager system.

external line

A line assigned to a telephone that allows calls to the PSTN.

external paging

A feature that allows voice announcements over an externally-installed loudspeaker connected to the Business Communications Manager. The external speaker is not an Business Communications Manager component.

FAX

FAX works with Business Communications Manager Voice Messaging. FAX allows a caller to send a fax document to a voice mailbox.

feature code

A unique code used to access Business Communications Manager features and options on the telephones.

filtering

Filtering is the process of examining a data packet on the network to determine the destination of the data and whether the packet gets passed along on the local LAN, copied to another LAN, or dropped.

frame relay

A frame relay is a high-speed, packet switching WAN protocol designed to provide efficient, high-speed frame or packet transmission with minimum delay. Frame relay uses minimal error detection and relies on higher level protocols for error control.

gateway

A system that links two different types of networks and enables them to communicate with each other. The Business Communications Manager can provide the gateway to an intranet or internet.

ground start trunk

Ground start trunks provide the same features as loop start trunks. Use this type of trunk when the local service provider does not support disconnect supervision for the digital loop start trunks. By configuring lines as ground start, the system can identify when a caller hangs up the telephone at the far end. Ground start trunks are available only on a Digital Trunk Interface (DTI).

Handsfree

A feature used to make calls without using the telephone receiver. Activate Full Handsfree under **Capabilities** in System DNs programming. When activated, the Business Communications Manager assigns a Handsfree/Mute button to the telephone.

Handsfree (HF) Answerback

This feature automatically turns on the microphone at a telephone that receives a Voice Call so that the person receiving the call can respond without lifting the receiver. Activate Handsfree Answerback under **Capabilities** in System DNs programming.

Held (Line) Reminder

A telephone rings and displays the message `On hold: LINENAM` when you place an external call on hold for programmed period of time.

host name

The name that identifies a computer, on a network that provides services to other computers in the domain, such as databases or other Business Communications Manager systems.

Hotline

This feature automatically calls a pre-assigned number when the user lifts the telephone receiver or presses the Handsfree/Mute button. Assign Hotline under **Capabilities** in System DNs programming.

Hypertext Transfer Protocol (HTTP)

The set of rules used for exchanging text, graphic images, sound, video, and other multimedia files on the world wide web.

Hz (hertz)

A unit of measure for indicating frequency in cycles per second.

Integrated Services Digital Network (ISDN)

A digital telephone service that allows for a combination voice and data transfer over a single, high-speed connection over the same copper twisted-pair telephone line as analog telephone service.

intercom button

A button that provides access to internal lines used for calls within a Business Communications Manager system. These buttons also provide access to external lines through a line pool or external code. Assign intercom buttons under Line access in System DNs programming.

internal line

A line on your telephone dedicated to making calls to destinations inside your system. An internal line can connect you with an external caller if you use it to access a line pool.

Also, you can answer an external caller using the call handling features such as Call Park or Call Pickup Directed.

Internet Protocol (IP)

The protocol that supports data being sent from one computer to another through an interconnection (internet) of networks. IP is a connectionless protocol, which means that there is no established connection between the end points that are communicating.

IP address

The internally-assigned address that identifies a destination and transmitting computer over a internet. See also static IP address and dynamic IP address.

IP address server

The IP address server manages the assignment of IP addresses to the devices that access the system. The server assigns an IP address to the device whenever it logs on to the network.

ISDN DN

A directory number (DN) used by ISDN terminal equipment connected to the system. The Business Communications Manager system uses a maximum of 30 ISDN DNs. The DECT cordless handsets use this type of DN.

kbyte

The abbreviation for kilobyte. A kilobyte is equal to 1024 bytes.

keycode

These numerical codes, generated for specific applications and for individual sites, allow access to additional features on the Business Communications Manager system. Refer to the Software Keycode Installation guide for details.

line

The complete path of a voice or data connection between one telephone, or other device, and another.

line number

A number that identifies an external line. The total number of lines depends on the number and type of trunk media bay modules installed.

line pool

Lines grouped in a common pool that assigned telephones can access to make external calls. Assign a line to be part of a line pool under Trunk/Line data in Lines programming.

Line Redirection

A feature that allows you to redirect all calls on an incoming line to a destination outside the system. You can set up the system to ring briefly when a call comes in on a redirected line, under **Capabilities** in System DNs programming.

This feature is different from Call Forward in two ways. Line redirection redirects only external calls, and redirects calls to destinations outside the system. Call forward redirects calls only to destinations within the system.

Link

If the Business Communications Manager system is connected to a Private Branch Exchange (PBX), the Link signal is used to access special features. The Link signal can be included as part of a longer stored sequence on an External Autodial button or in a Speed Dial code. The Link symbol uses two of the 24 spaces in a dialing sequence.

Local Area Network (LAN)

A network of interconnected computers, such as the Business Communications Manager, sharing the resources of a single processor or server within a relatively small geographic area.

mailbox

A storage place for voice messages on Business Communications Manager Voice Messaging.

Meridian 1 ISDN Primary Rate Interface

This is the MCDN protocol which is used between members of the Nortel Networks Meridian family of Private Telecommunication Network Exchanges. The signalling information is carried via time slot 16 of a 2.048 Mbit/s digital transmission system.

MHz

A unit of measure indicating frequency in millions of cycles per second.

microprocessor

The Central Processing Unit (CPU) component that controls all activity inside the Business Communications Manager.

mirrored disks

In terms of the Business Communications Manager, this refers to the BCM1000 configuration that consists of two hard disks and a RAID board. The RAID board ensures that both disks contain exact copies of each other. If one disk fails, the other disk assumes control. Thus, you can time the replacement of the disabled disk to suit your maintenance schedule. This system does not replace the need for current BRU copies.

modem

A communications device that allows computers to exchange data over telephone lines.

music source

You can connect a radio or other source of music to the system to provide music for the Music on Hold and Background Music features. A music source is not part of the Business Communications Manager system components.

Network Basic Input/Output System (NetBIOS)

An interface and upper-level protocol developed by IBM for use with a proprietary adapter for its PC network product. NetBIOS provides a standard interface to the lower networking layers. The protocol provides higher-level programs with access to the network.

network

Two or more computers linked electronically to share programs and exchange data.

network device

A network device is a hardware entity characterized by its use as a communications component within a network.

network DN

A number supplied by the ISDN network service provider for ISDN terminal equipment.

network interface card (NIC)

This card is installed inside a computer so the computer can be physically connected to a network device such as the Business Communications Manager server.

On hold

A setting that controls what external callers hear: music, tones, or silence, when you place the call on hold. Program On hold under Feature settings in System programming.

overflow

A setting in Routing Service that allows users to decide which path an outgoing call takes if all the lines used in a selected route are in use.

packet

A packet is a unit of data that is routed between an origin and a destination. Each packet is separately numbered and includes the Internet address of the destination.

Packet and *datagram* are similar in meaning. A protocol similar to TCP, the User Datagram Protocol (UDP) uses the term datagram.

page

A feature you can use to make announcements over the Business Communications Manager system using the telephone speakers and/or external speakers.

Page Time out

A setting that controls how long a Page Announcement can last. Assign the Page Time out under Feature settings in System programming.

Page zone

An area in the office that receives internal page announcements that other areas of the office do not hear. Assign telephones to page zones under Capabilities in System DNs programming.

Parallel port

A port that transfers data through multiple wires. Parallel ports normally use a 25-pin interface that transmits and receives data using a separate data line for every bit.

Peripheral Component Interconnect (PCI) Slot

Socket on the Business Communications Manager main printed-circuit board that connects to the Business Communications Manager cards.

Personal Speed Dial

Two-digit codes (71-94) that can be programmed on the set to dial external telephone numbers. You can access Personal Speed dial numbers only at the telephone on which they are programmed.

Pin-1

An indicator on the first pin on an electronic component. You use this indicator to help you correctly align the component when attaching or installing it.

Port

A connector on the Business Communications Manager that allows data exchange with other devices, such as a printer or mouse.

portable telephone

Typically a handset containing keypad, receiver and transmitter that communications using a radio link to a base station connected to the Business Communications Manager. Examples: Companion, DECT.

Primary Rate Interface (PRI)

An ISDN interface that uses 23 B-channels and a D-channel (23B+D).

Prime line

The line the system selects for your telephone when you lift the receiver, press the Handsfree/Mute button, or use an external dialing feature. Assign a Prime Line to a telephone under Line access in System DNs programming.

Priority Call

If you get a busy signal when you call a person in your office, you can interrupt that person for an urgent call. Enable this feature for a telephone under Capabilities in System DNs programming.

Private branch exchange (PBX)

A PBX is a telephone system within an enterprise that switches calls between enterprise users on local lines while allowing all users to share a certain number of external telephone lines. The main purpose of a PBX is to save the cost of requiring a line for each user to the telephone company central office since the PBX is owned and operated by the enterprise rather than the telephone company.

protocol

A set of rules and procedures for exchanging data between computers or Business Communications Managers on a network or through the Internet.

proxy

A server that acts on behalf of another.

pulse/tone dialing

Pulse is the traditional method of dialing used by rotary-dial or push-button single-line telephones. Tone dialing allows telephones to communicate with other devices such as answering machines. You require tone dialing to access the features that PBX systems can provide or to use another system remotely.

Redundant systems

In terms of this product, the BCM1000 and BCM1000e units can be installed with redundant power supplies and redundant fans. Redundant power supplies provide two modules. The system runs off of one of the modules. If that module goes down, then the second module takes over. You can then remove the first module and replace it with a new module without turning off the system.

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.

RAID board

This is the board that controls the mirrored disk system. It provides the controls that ensure that both hard disks are identical, as well as the capability to stop the mirroring process.

Random Access Memory (RAM)

Computer memory that stores data temporarily. RAM stores the data used by the microprocessor because it executes instructions. The contents of RAM are erased when you restart or turn off the Business Communications Manager.

Remote access

The ability to dial into an Business Communications Manager system from outside the system and use selected features. The Class of Service determines which lines, features, and dialing capabilities are available.

Restriction filter

Restriction filters prevent selected telephone numbers or feature codes from being dialed. Restriction filters can be applied to lines, sets, specific lines on a set, and to Class of Service passwords.

Read Only Memory (ROM)

Memory that stores data permanently. ROM contains instructions that the Business Communications Manager needs to operate. The instructions stored in ROM are used by the Business Communications Manager each time it is turned on or restarted.

Router

A device that forwards traffic between networks, based on network layer information and routing tables. A router decides which path network traffic follows using routing protocols to gain information about the network and algorithms to choose the best route based on a routing matrix.

Routing

The path a message takes from its origin to its destination on a network or the Internet.

Serial port

A port that sends and receives data one bit at a time.

Software keycode

Refer to Keycode.

static IP address

A static or fixed IP address that is permanently assigned to a computer.

Station Auxiliary Power Supply (SAPS)

A device which provides power to a telephone that is more than 300 m (975 ft.) and less than 1200 m (3900 ft.) from the server, or to a CAP module.

Station media bay module

Physical units installed in a Business Communications Manager that connect the telephone lines to the system.

subnet mask

A value used to route packets on TCP/IP networks. When the IP layer has to deliver a packet through an interface, it uses the destination address contained in the packet, together with the subnet mask of the interface to select an interface, and the next hop in that subnet

synchronous

A synchronous signal is sourced from the same timing reference. A synchronous signal causes the interval between successive bits, characters, or events to remain constant or locked in to a specific clock frequency.

System speed dial code

A two-digit code (01 to 70) that you program to dial a telephone number a maximum of 24 digits long. You can program System speed dial codes for the complete system under the **System Speed** heading.

T1

Digital carrier system or line that carries data at 1.544 Mb/s.

Target lines

Lines used only to answer incoming calls. A target line routes a call according to digits it receives from an incoming trunk. You refer to target lines in the same way as physical lines.

Telephony Application Program Interface (TAPI)

A standard program interface that allows communication over telephones or video phones to people or phone-connected resources elsewhere in the world.

Transfer

A feature that allows you to redirect a call to another telephone in your Business Communications Manager system, over a network, or outside your system.

Transmission Control Protocol/Internet Protocol (TCP/IP)

A language controlling communication between computers on the Internet.

TCP:

- checks packets of information for errors
- sends requests for re-transmission in the event of errors
- returns multiple packets of a message into the original sequence when the message reaches its destination

IP:

- controls how packets are sent out over networks
- has a packet addressing method that allows any computer on the Internet forward a packet to another computer that is a step or more nearer to the recipient

Trunk

The public telephone system or private network connection between the Business Communications Manager system and the outside world.

Trunk media bay module

Physical units installed in a Business Communications Manager that connect the system to the outside world.

User Speed Dial

Two-digit codes (71-94) programmed to dial external telephone numbers. These numbers are available only at the telephone on which they are programmed.

V.90

A data transmission standard used by the modem installed in the Business Communications Manager. This standard allows data to be transmitted to the modem at 56 kbit/s and transmitted from the modem at 33 kbit/s.

Voice Message Center

If you have subscribed to Call Display services, you can receive visual Voice Message Waiting Indication on a display telephone. If you have Voice Message Waiting Indication, you can program the telephone numbers required to access a maximum of five external voice message centers. You can program which of the five centers is to be accessed by each specific line.

Voice over IP (VoIP)

The capability to deliver voice using the Internet Protocol. In general, this means sending voice information in digital form in discrete packets rather than in the traditional circuit-committed protocols of the public switched telephone network (PSTN).

Weighted Fair Queuing (WFQ)

WFQ is a queuing method that allows low volume traffic, such as Telnet, to be given priority. Interactive traffic receives higher priority than batch transfers.

Wide Area Network (WAN)

A collection of computers or Business Communications Managers connected or networked to each other over long distances, normally using common carrier facilities.

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