



3COM

# NBX<sup>®</sup> Installation Guide

V3000 Analog  
V3000 BRI  
V3001R  
V5000  
NBX 100

Release 6.0

Part Number 900-0214-01AB  
December 2006

<http://www.3com.com/>



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5,994,998; 6,140,911; 6,329,906; 6,496,105; 6,535,983; 6,483,203; 6,449,348; 6,212,195

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gethostname.c: minimal substitute for missing gethostname() function

created 2000-Mar-02 jmk

requires SVR4 uname() and -lc

by Jim Knoble <jmknoble@pobox.com>

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zlib.h — Interface of the "zlib" general-purpose compression library, version 1.1.4, March 11th, 2002

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imapproxy

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---

imap daemon

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**INDUSTRY CANADA NOTICE**

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CONDITIONS AND LIMITED WARRANTY**

# ABOUT THIS GUIDE

This guide provides information and instructions for installing the NBX® Networked Telephony Solution. It is intended for authorized installation technicians.



- *If the information in the release notes differs from the information in this guide, follow the instructions in the release notes.*
- *Release notes and all product technical manuals are available on the NBX Resource Pack and the 3Com web site.*
- *For information about monitoring, changing, and maintaining the system, see the NBX Administrator's Guide on the NBX Resource Pack or in the NBX NetSet interface.*
- *For information about using the telephones on an NBX system, see the NBX telephone guides and the NBX Feature Codes Guide on the NBX Resource Pack or in the NBX NetSet interface.*

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## How to Use This Guide

[Table 1](#) shows where to look for specific information in this guide.

**Table 1** Overview of the Guide

Description	Chapter
An overview of NBX components and licensing	<a href="#">Chapter 1</a>
How to install hardware components and telephone lines	<a href="#">Chapter 2</a>
How to install Telephones and Attendant Consoles	<a href="#">Chapter 3</a>
How to install Analog Line Cards	<a href="#">Chapter 4</a>
How to install Analog Terminal Cards and Analog Terminal Adapters	<a href="#">Chapter 5</a>
How to install BRI-ST Digital Line Cards	<a href="#">Chapter 6</a>
How to install E1 ISDN PRI Digital Line Cards	<a href="#">Chapter 7</a>
How to install T1 Digital Line Cards	<a href="#">Chapter 8</a>
How to install 3Com Legacy Link Cards	<a href="#">Chapter 9</a>

**Table 1** Overview of the Guide (continued)

Description	Chapter
How to configure IP telephony	<a href="#">Chapter 10</a>
Troubleshooting information	<a href="#">Chapter 11</a>
System and component specifications	<a href="#">Appendix A</a>
ISDN BRI, ISDN PRI, and T1 circuit provisioning information	<a href="#">Appendix B</a>
Guidelines for connecting remote audio devices	<a href="#">Appendix C</a>
Obtaining Support for Your 3Com Product	<a href="#">Appendix D</a>
References to all topics in this book	<a href="#">Index</a>
FCC, Industry Canada, Software License Agreement, and Warranty information	the last pages in this book

## Conventions

[Table 2](#) lists conventions that are used throughout this guide.

**Table 2** Notice Icons

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

## International Terminology

[Table 3](#) lists the United States and international equivalents of some of the specialized terms used in the NBX documentation.

**Table 3** International Terminology

Term used in U.S.	Term used outside the U.S.
Toll restrictions	Call barring
Pound key (#)	Hash key (#)
CO (central office)	Telephone Exchange
Toll-free	Free-phone
Analog Line Card	Analog Trunk Line Interface Module

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## Your Comments on the Technical Documentation

Your suggestions are important to us. They help us to make the NBX documentation more useful to you.

Send comments about this guide or any of the 3Com NBX documentation and Help systems to:

[Voice\\_TechComm\\_Comments@3com.com](mailto:Voice_TechComm_Comments@3com.com)

Include the following information with your comments:

- Document title
- Document part number (found on the front page)
- Page number
- Your name and organization (optional)

Example:

*NBX Installation Guide*

Part Number 900-0212-01AB

Page 20



*As always, address all questions regarding the NBX hardware and software to your 3Com NBX Voice-Authorized Partner.*



# 1

## INTRODUCTION

This chapter describes the NBX® system in these topics:

- [NBX IP Telephony Platforms](#)
- [NBX Cards and Devices](#)
- [Optional Software](#)
- [NBX Licensing](#)
- [Device Licenses](#)

For information about configuring the Dial Plan and maintaining your NBX system, see the *NBX Administrator's Guide* in the NBX NetSet™ utility, on the *NBX Resource Pack*, or on the 3Com web site.



*For information on enabling SIP and adding messaging support, see the 3com IP Messaging Installation Guide on the NBX Resource Pack disk and the SIP chapter of the NBX Administrator's Guide.*



*The NBX 100 does not support SIP mode operations.*

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### NBX IP Telephony Platforms

The NBX IP Telephony Solution includes these hardware platforms:

- [V3000 Analog](#)
- [V3000 BRI](#)
- [V3001R](#)
- [V5000](#)
- [NBX 100](#)



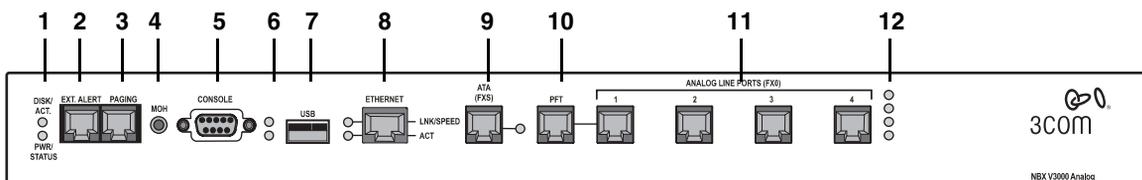
See "[NBX Licensing](#)" on [page 56](#) for information on the numbers of supported devices for each platform and for information about memory upgrades required to support some device counts and feature levels.

**V3000 Analog** The V3000 Analog (Figure 1) houses the Network Call Processor (NCP), which manages call traffic and NBX Messaging, the system disk drive and power supply, and front panel connectors for network and external device connectivity.

**i** V3000 platforms come with 128 MB of memory. You must install an optional memory upgrade to support some features. See Table 13 on page 60 for more information.

**i** The 3C10600A version of the V3000 Analog is no longer available. The system has been updated to 3C10600B. It includes a new front panel and updated internal components. The function and the layout of the front panel connectors and LEDs is the same for both models.

**Figure 1** V3000 Analog Connectors and LEDs



**Table 4** V3000 Analog Connectors and LEDs

<b>1 Status Lights</b>	DISK ACT. — Disk activity. Flashing indicates disk activity. PWR/STATUS: <ul style="list-style-type: none"> <li>■ Blinking green — System is booting.</li> <li>■ Blinking red — System boot has failed.</li> <li>■ Solid green — System is operational.</li> </ul>
<b>2 Ext. Alert</b>	Reserved for future use.
<b>3 Paging</b>	RJ-11 connector for a 600 Ohm analog paging amplifier.
<b>4 MOH</b>	Mini-jack (3.5 mm, mono or stereo) that accepts Music-On-Hold audio (maximum 2V peak to peak) from the line output of a CD player, tape player, or other music source.
<b>5 Console</b>	DB-9 connector that provides an RS-232 (DCE) TTY terminal connection for access to CLI commands and status. See also <a href="#">“Connecting a Computer to a Console Port”</a> on <a href="#">page 196</a> .

**Table 4** V3000 Analog Connectors and LEDs (continued)

<b>6 Status Lights</b>	<p>Status lights S1 (bottom) and S2 (top) show boot status:</p> <ul style="list-style-type: none"> <li>■ S1 and S2 flash alternately — A file system check (FSCK) is running due to previous improper system shutdown. Do not turn off the system until you have run the system shutdown operation, <i>System Maintenance &gt; Reboot/Shutdown</i>.</li> </ul> <p><b>NOTE:</b> File system check capability is not used on systems that are shipped from the factory with NBX 6.0 and utilize a second generation file system FSV2. On FSV2 systems, S1 and S2 are normally off.</p>
<b>7 USB</b>	Reserved for future use.
<b>8 Ethernet</b>	<p>10/100 switched Ethernet connection uplink port.</p> <p>LNK/SPEED:</p> <ul style="list-style-type: none"> <li>■ Yellow — 10Mbit link</li> <li>■ Green — 100Mbit link</li> <li>■ Off — No link</li> </ul> <p>ACT:</p> <ul style="list-style-type: none"> <li>■ Flashing Green — Activity on port</li> <li>■ Off — No activity</li> </ul>
<b>9 ATA (FXS)</b>	<p>Analog Terminal Adapter port, RJ-11 FSX (Foreign Exchange Station) connector for connecting an analog device, such as an analog telephone or a fax machine. The LED associated with the port indicates the state of the port:</p> <p>Initialization:</p> <ul style="list-style-type: none"> <li>■ Fast steady blink — Waiting for software download.</li> <li>■ Solid on — Software has been downloaded. The flash memory on the board is being loaded.</li> <li>■ Slow, non symmetric blinking pattern — Waiting for completion of the binding process to the NCP.</li> </ul> <p>Operation:</p> <ul style="list-style-type: none"> <li>■ Off for 9 to 10 seconds, on briefly — Idle, line is not in use.</li> <li>■ On for 9 to 10 seconds, off briefly — A telephone call is connected on this port.</li> </ul>
<b>10 PFT</b>	<p>Power Fail Transfer port. RJ-11 connector accepts a standard POTS (2500-series compatible) telephone. During a power failure, this port continues to provide dial tone and telephone service.</p>
<b>11 Analog Line Ports (FXO)</b>	<p>Four RJ-11 Foreign Exchange Office (FXO) ports for connecting central office telephone lines.</p>

**Table 4** V3000 Analog Connectors and LEDs (continued)

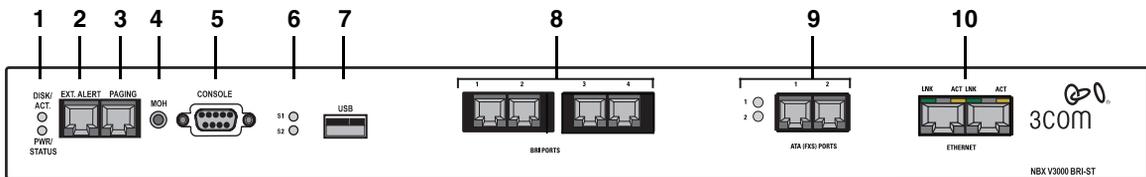
<b>12 Status Lights</b>	<p>A status light for each FXO port indicates the state of port. Initialization:</p> <ul style="list-style-type: none"> <li>■ Fast steady blink — Waiting for software download.</li> <li>■ Solid on — Software has been downloaded. The flash memory on the board is being loaded.</li> <li>■ Slow, non-symmetric blinking pattern — Waiting for the completion of the binding process to the NCP.</li> </ul> <p>Operation:</p> <ul style="list-style-type: none"> <li>■ Off for 9 to 10 seconds, on briefly — Idle.</li> <li>■ On for 9 to 10 seconds, off briefly — Call is connected.</li> </ul>
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**V3000 BRI** The V3000 BRI ([Figure 2](#)) houses the Network Call Processor (NCP), which manages call traffic and NBX Messaging, and the Automated Attendant, the system disk drive and power supply, and front panel connections for 8 BRI channels (4 Ports), 2 ATC channels, and network connectivity. See [“NBX Licensing”](#) on [page 56](#) for more information on the total number of supported devices.



*The first two BRI ports are enabled by default, the second two ports require an optional software license.*

**Figure 2** V3000 BRI Connectors and LEDs



**Table 5** V3000 BRI Connectors and LEDs

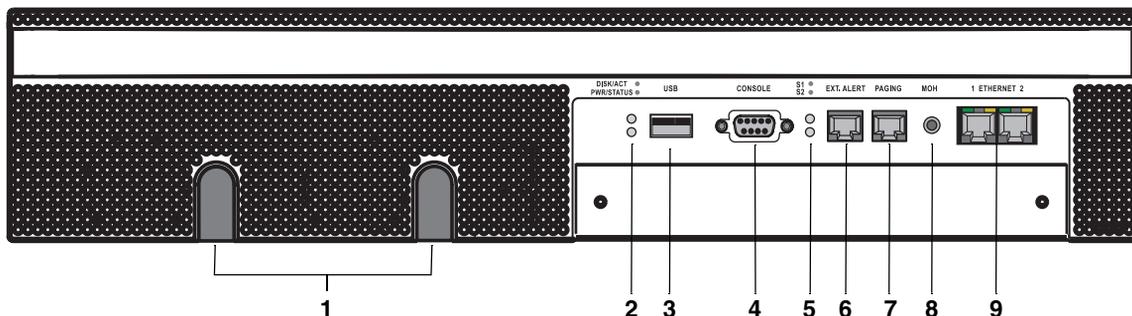
<b>1 Disk Status Lights</b>	<p>DISK ACT. — Flashing indicates disk activity.</p> <p>PWR/STATUS:</p> <ul style="list-style-type: none"> <li>■ Blinking green — System is booting.</li> <li>■ Blinking red — System boot has failed.</li> <li>■ Solid green — System is operational.</li> </ul>
<b>2 Ext. Alert</b>	Reserved for future use.
<b>3 Paging</b>	RJ-11 connector for a 600 Ohm analog paging amplifier.

**Table 5** V3000 BRI Connectors and LEDs (continued)

<b>4 MOH</b>	Mini-jack (mono or stereo) that accepts Music-On-Hold audio (maximum 2V peak to peak) from the line output of a CD player, tape player, or other music source.
<b>5 Console</b>	DB-9 connector that provides an RS-232 (DCE) TTY terminal connection for access to system CLI commands and status messages. For more information, see <a href="#">“Connecting a Computer to a Console Port”</a> on <a href="#">page 196</a> .
<b>6 Status Lights</b>	Status lights S1 and S2 are normally off. They can be used by a support technician for advanced troubleshooting.
<b>7 USB</b>	Reserved for future use.
<b>8 BRI Ports</b>	Four RJ-45 BRI station ports (eight channels). Ports 1 and 2 are enabled by default. Ports 3 and 4 are activated by an optional license.
<b>9 ATA (FXS)</b>	<p>Two Analog Terminal Adapter ports, RJ-11 FSX (Foreign Exchange Station) connector for connecting an analog device, such as an analog telephone or a fax machine. The LED associated with the port indicates the state of the port:</p> <p>Initialization:</p> <ul style="list-style-type: none"> <li>■ Fast steady blink — Waiting for software download.</li> <li>■ Solid on — Software has been downloaded. The flash memory on the board is being loaded.</li> <li>■ Slow, non symmetric blinking pattern — Waiting for completion of the binding process to the NCP.</li> </ul> <p>Operation:</p> <ul style="list-style-type: none"> <li>■ Off for 9 to 10 seconds, on briefly — Idle, line is not in use.</li> <li>■ On for 9 to 10 seconds, off briefly — A telephone call is connected on this port.</li> </ul>
<b>10 Ethernet</b>	<p>10/100 switched Ethernet connection redundant uplink ports. Use Ethernet 1 port to connect to the LAN. Ethernet 2 port is normally inactive and becomes active only port 1 experiences a link failure. Both ports show a positive link status even though only one port at a time is active. Typically, you would connect each port to a different switch and subnet.</p> <p>LNK:</p> <ul style="list-style-type: none"> <li>■ Yellow — 10Mbit link</li> <li>■ Green — 100Mbit link</li> <li>■ Off — No link</li> </ul> <p>ACT:</p> <ul style="list-style-type: none"> <li>■ Flashing Green — Activity on port</li> <li>■ Off — No activity</li> </ul>

**V3001R** The V3001R features two redundant power supplies and an optional disk mirroring system. [Table 6](#) describes the front panel connectors and status lights shown in [Figure 3](#).

**Figure 3** V3001R Connectors and LEDs



**Table 6** V3001R Connectors and LEDs

<b>1 Dual power supply AC connectors</b>	Power supplies are redundant and hot-swappable.
<b>2 Status Light</b>	DISK/ACT — Flashing indicates disk activity. PWR/STATUS <ul style="list-style-type: none"> <li>■ Blinking green — System is booting</li> <li>■ Blinking red — System boot has failed</li> <li>■ Solid green — System is operational</li> </ul>
<b>3 USB</b>	Reserved for future use.
<b>4 Console</b>	DB-9 connector that provides an RS-232 (DCE) TTY terminal connection for access to system CLI commands and status messages. For more information, see <a href="#">“Connecting a Computer to a Console Port”</a> on <a href="#">page 196</a> .
<b>5 Status Lights</b>	S1 and S2 provide a visual indication of system status. See <a href="#">Table 7</a> , for flash pattern information.
<b>6 Ext. Alert</b>	Reserved for future use.
<b>7 Paging</b>	RJ-11 connector for a 600 Ohm analog paging amplifier.
<b>8 MOH</b>	Mini-jack (3.5 mm, mono or stereo) that accepts Music-On-Hold audio (maximum 2V peak to peak) from the line output of a CD player, tape player, or other music source.

**Table 6** V3001R Connectors and LEDs (continued)

<b>9 Ethernet</b>	<p>10/100 switched Ethernet connection redundant uplink ports. Use either Ethernet port to connect to the LAN. If the other port is connected, it becomes active only when the active port experiences a link failure. The ports stay in that state even after the failed port returns to a positive link state. Both ports show a positive link status even though only one port at a time is active. Typically, you would connect each port to a different switch and subnet.</p> <p>LNK/SPEED:</p> <ul style="list-style-type: none"> <li>■ Yellow — 10Mbit link</li> <li>■ Green — 100Mbit link</li> <li>■ Off — No link</li> </ul> <p>ACT:</p> <ul style="list-style-type: none"> <li>■ Flashing Green — Activity on port</li> <li>■ Off — No activity</li> </ul>
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**Table 7** V3001R System Status LEDs - S1 and S2

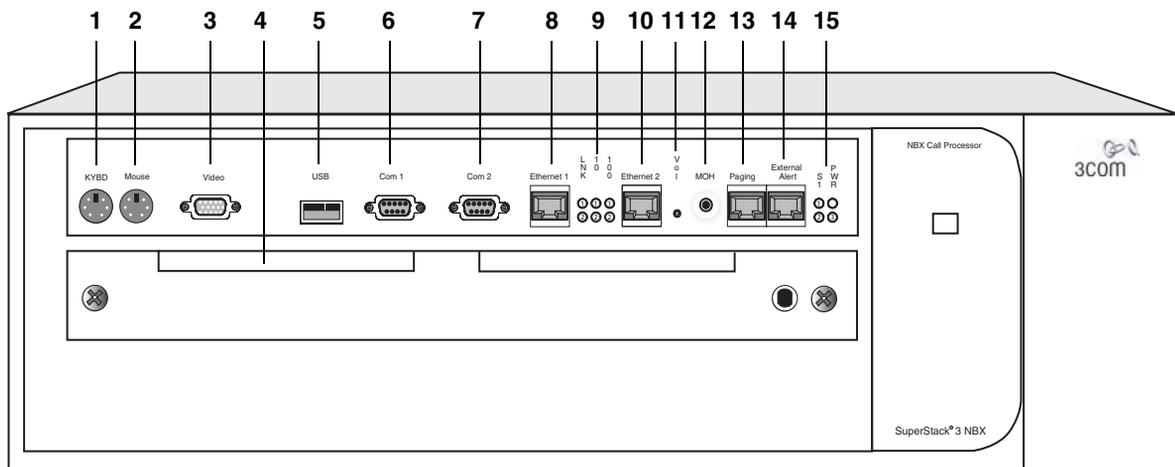
Explanation	S1	S2
Attempting to boot from disk 1 (zero)	Off	Flashing
Attempting to boot from disk 2	Flashing	Off
Flash codes for disk problems:	Unison flashing	
<ul style="list-style-type: none"> <li>■ <b>2 flashes:</b> No valid disk (system is halted).</li> <li>■ <b>3 flashes:</b> Two valid disks, but they are not paired (system is halted).</li> <li>■ <b>4 flashes:</b> Configuration problem (system is halted).</li> <li>■ <b>5 flashes:</b> Two disks present, but no mirroring license installed. System is running but the system is not using the second disk.</li> </ul>		
Using disk 1 only	Off	On
Using disk 2 only	On	Off
Synchronizing — disk 1 is valid, disk 2 is becoming a fully mirrored disk. Flash rate indicates progress.	Flashing	On
If S1 and S2 stop normal flashing and intermittently flash twice, the mirroring process has failed.		
Synchronizing — disk 2 is valid, disk 1 is becoming a fully mirrored disk. Flash rate indicates progress.	On	Flashing
If S1 and S2 stop normal flashing and intermittently flash twice, the mirroring process has failed.		

Explanation	S1	S2
Alternating flash — the two disks are resynchronizing	Flashing	Flashing
Synchronized	On	On

**V5000** The V5000 (Figure 4) (formerly the SuperStack 3 NBX V5000) houses the Network Call Processor (NCP), which manages call traffic, voice mail, and the Automated Attendant; the system disk drive and power supply; and front panel connections for network and external device connectivity. The V5000 supports a redundant power supply configuration. You can also add a second “mirrored” disk drive. See “NBX Licensing” on page 56 for more information on the total number of supported devices.

Figure 4 shows the front panel of the V5000 and Table 8 describes each front panel connector and status light.

**Figure 4** V5000 Connectors and LEDs



**Table 8** V5000 Connectors and LEDs

1	<b>KYBD</b>	Reserved for future use.
2	<b>Mouse</b>	Reserved for future use.
3	<b>Video</b>	Reserved for future use.
4	<b>Disk Drive Tray</b>	Shipped with the primary drive installed on the left.
5	<b>USB</b>	Reserved for future use.

**Table 8** V5000 Connectors and LEDs (continued)

<b>6</b>	<b>COM1</b>	DB-9 connector that provides an RS-232 (DCE) TTY terminal connection for access to system CLI commands and status messages. For information on how to connect to the NBX system using the Console connector, see <a href="#">“Connecting a Computer to a Console Port”</a> on <a href="#">page 196</a> .
<b>7</b>	<b>COM2</b>	Reserved for future use.
<b>8</b>	<b>Ethernet 1</b>	10/100 switched Ethernet connection redundant uplink port. Use Ethernet 1 port to connect to the LAN. Ethernet 2 port is normally inactive and becomes active only port 1 experiences a link failure. Both ports show a positive link status even though only one port at a time is active. Typically, you would connect each port to a different switch and subnet.
<b>9</b>	<b>Network Status LEDs</b>	Three LEDs for each of the 2 Ethernet ports indicate port status: <ul style="list-style-type: none"> <li>■ LNK — Solid on indicates link; Off indicates no link.</li> <li>■ 10 — Blinking indicates network activity at 10 MB; Solid on indicates heavy network activity.</li> <li>■ 100 — Blinking indicates network activity at 10 MB; Solid on indicates heavy network activity.</li> </ul>
<b>10</b>	<b>Ethernet 2</b>	A fail-over port that is active only if the Ethernet 1 port experiences a link failure. The Ethernet ports can operate at 10 Mbps and 100 Mbps; they automatically sense the speed of your LAN. Typically, you would connect the Ethernet 1 and Ethernet 2 ports to a different switches and subnets.
<b>11</b>	<b>VOL</b>	This adjusting screw controls the volume of Music-On-Hold.
<b>12</b>	<b>MOH</b>	Mini-jack (mono or stereo) that accepts Music-On-Hold audio (maximum 2V peak to peak) from the line output of a CD player, tape player, or other music source.
<b>13</b>	<b>Paging</b>	This RJ-11 connector provides an audio output or a dry contact switch connection for use with a public address system.
<b>14</b>	<b>Ext. Alert</b>	Reserved for future use.
<b>15</b>	<b>System Status LEDs</b>	S1, S2, S3 and PWR provide a visual indication of system status. See <a href="#">Table 9</a> , next.

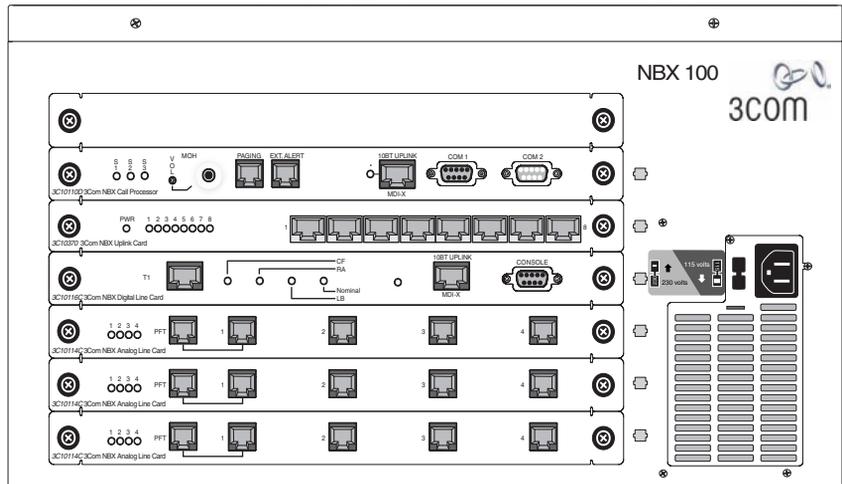
**Table 9** V5000 System Status LEDs

<b>Explanation</b>	<b>S1</b>	<b>S2</b>	<b>S3</b>
Attempting to boot from disk 0 (zero)	Off	On	Off
Attempting to boot from disk 1	Off	Off	On
Boot process completed, system initializing	Flashing	N/A	N/A
System is running	On	N/A	N/A

Explanation	S1	S2	S3
Flash codes for disk problems:	N/A	Flashing	Flashing
<ul style="list-style-type: none"> <li>■ <b>2 flashes:</b> No valid disk (system is halted).</li> <li>■ <b>3 flashes:</b> Two valid disks, but they are not paired (system is halted).</li> <li>■ <b>4 flashes:</b> Configuration problem (system is halted).</li> <li>■ <b>5 flashes:</b> Two disks present, but no mirroring license installed. System is running but the system is not using the second disk.</li> </ul>			
Using disk 0 (zero) only	N/A	On	Off
Using disk 1 only	N/A	Off	On
Synchronizing — disk 0 is valid, disk 1 is becoming a fully mirrored disk. LED 3 flash rate indicates progress. If LED 3 stops normal flashing and intermittently flashes twice, the mirroring process has failed.	N/A	On	Flashing
Synchronizing — disk 1 is valid, disk 0 is becoming a fully mirrored disk. LED 2 flash rate indicates progress. If LED 2 stops normal flashing and intermittently flashes twice, the mirroring process has failed.	N/A	Flashing	On
LED 2 and LED 3 flash alternately: the two disks are resynchronizing	N/A	Flashing	Flashing
Synchronized	N/A	On	On

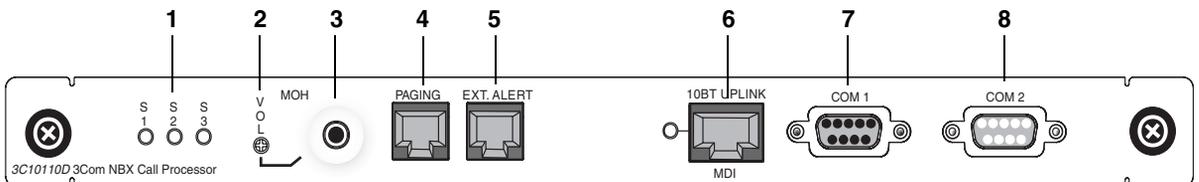
**NBX 100** The NBX 100 6-Slot Chassis (Figure 5) houses the Network Call Processor (NCP), which manages call traffic, voice mail, and the Automated Attendant, and the system disk drive, and the power supply. An NBX 100 system can have one or more chassis, but only one NCP. The top slot has no access to the backplane. Always cover the top slot with a blank faceplate. See “NBX Licensing” on page 56 for more information on the total number of supported devices.

**Figure 5** NBX 100 Chassis with Network Call Processor and Cards



The NBX 100 6-Slot Chassis can be used as an expansion chassis for an NBX system. You must install an NBX Uplink Card to connect the chassis to the network. The top slot of an NBX 100 6-Slot Chassis has no access to the backplane. If you are using an NBX 100 6-Slot chassis as an expansion chassis, always cover the top slot with a blank faceplate.

**Figure 6** NBX 100 Call Processor 3C10110D



**Table 10** NBX 100 NCP Connectors and LEDs

<b>1</b>	<b>Status LEDs</b>	<p><b>S1 and S2</b> — Indicate operating system status.</p> <ul style="list-style-type: none"> <li>■ S1 and S2 both flashing (approximately 2 flashes per second). The hardware is initializing.</li> <li>■ S1 on and S2 off. The operating system has started successfully.</li> <li>■ S1 and S2 are both on. The operating system software has not started successfully.</li> <li>■ S1 and S2 flash in an alternating pattern. A file system check is in progress, possibly due to an improper shutdown. The boot process will take longer than normal.</li> </ul> <p><b>S3</b> — Indicates the status of Music-On-Hold (MOH).</p> <ul style="list-style-type: none"> <li>■ S3 flashing (approximately 2 flashes per second). The MOH processor is initializing. If this flashing continues for more than 2 minutes, the processor has not started successfully.</li> <li>■ S3 solid on. The MOH processor has started successfully.</li> <li>■ S3 flashing slowly (approximately 1 second on and 1 second off). The MOH processor has started successfully, but no music source is connected.</li> </ul>
<b>2</b>	<b>VOL</b>	This adjusting screw controls the volume of Music-On-Hold.
<b>3</b>	<b>MOH</b>	Mini-jack (mono or stereo) that accepts Music-On-Hold audio (maximum 2V peak to peak) from the line output of a CD player, tape player, or other music source.
<b>4</b>	<b>Paging</b>	This RJ-11 connector provides an audio output or a dry contact switch connection for use with a public address system.
<b>5</b>	<b>Ext. Alert</b>	Reserved for future use.
<b>6</b>	<b>10BT Uplink and LINK LED</b>	RJ-45 connector provides means to connect to an external Ethernet switch or hub. Be sure to program the switch or router on the other end for 10 MB operation.
<b>7</b>	<b>COM1</b>	DB-9 connector that provides an RS-232 (DCE) TTY terminal connection for access to system CLI commands and status messages. For information on how to connect to the NCP using the Console connector, see " <a href="#">Connecting a Computer to a Console Port</a> " on <a href="#">page 196</a> .
<b>8</b>	<b>COM2</b>	Reserved for future use.

## NBX Expansion Chassis

To connect extra cards to an NBX system, you can add an NBX expansion chassis to your network. Typically, you add the expansion chassis on the same subnet as the NCP and then use the Auto Discover feature to add new cards to the NBX database.

### V3000 Gateway Chassis

The V3000 Gateway Chassis (3C10605A) contains four card slots so that you can connect optional interface cards to your NBX system. Two redundant uplink ports provide 10/100 Mbps switched Ethernet connections. Use the upper port to connect to the LAN. The lower port is normally inactive and becomes active only if the upper port experiences a link failure. Both ports show a positive link status even though only one port at a time is active.



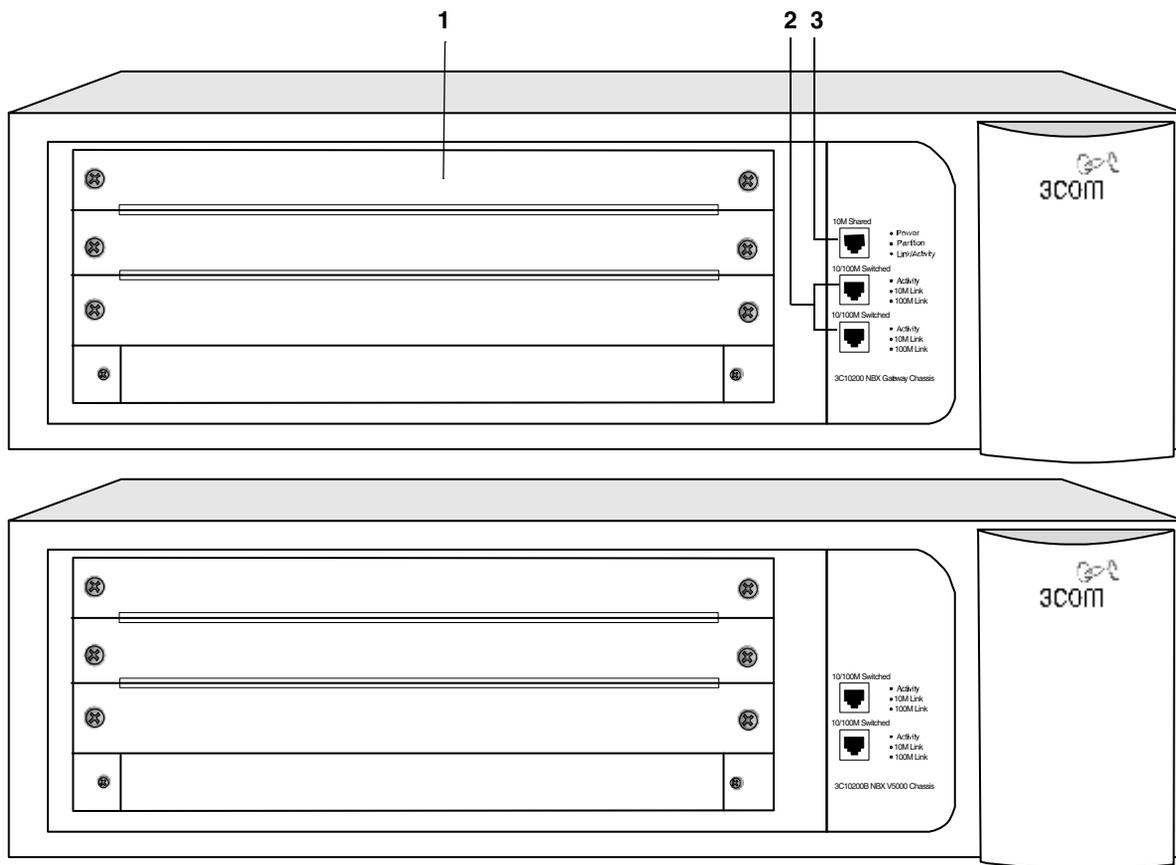
**CAUTION:** *The power cord is the disconnect device. The power outlet must be near to the unit and easily accessible.*

### V5000 Gateway Chassis

The V5000 Gateway Chassis [Figure 7](#), contains four card slots so that you can connect optional interface cards to your system. As shipped from the factory, the top three have faceplates and the fourth is left open. For installation instructions, see [Chapter 2](#).

The 3C10200B is an updated version of the 3C10200, which is no longer available. The update removed one port (**3** in [Figure 7](#)) and improved the switchover performance of the Ethernet ports so that both ports have connectivity prior to switchover.

**Figure 7** V5000 Gateway Chassis 3C10200 (top) and 3C10200B (bottom)



**Table 11** NBX Chassis Connectors

<b>1</b>	<b>4-slot chassis</b>	Removable faceplates installed.
<b>2</b>	<b>10/100 Mbps switched Ethernet connection</b>	Two redundant uplink ports. Use the upper port to connect to the LAN. The lower port is normally inactive and becomes active only if the upper port experiences a link failure. On the 3C10200B, both ports show a positive link status even though only one port at a time is active.
<b>3</b>	<b>10 Mbps shared Ethernet connection</b>	One port (3C10200 only)



*You must use straight-through Ethernet cable connections; you cannot use MDI/MDIX connections.*

**NBX Cards and Devices**

This section lists NBX cards available from 3Com that can you can use with an NBX system.

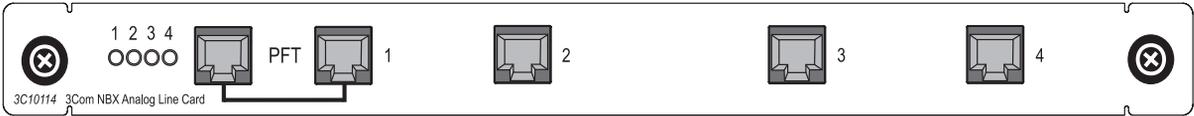


*Before you install any Analog Line Cards or Digital Line Cards, you may want to configure the Dial Prefix settings. For information on this topic, see "Dial Prefix Settings" in Chapter 2 in the NBX Administrator's Guide.*

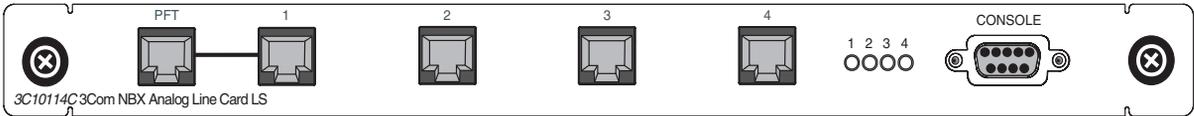
**Analog Line Card**

The NBX Analog Line Card connects up to four analog telephone lines from the Central Office (CO) to the NBX system.

**Figure 8** NBX Analog Line Card (3C10114)



**Figure 9** NBX Analog Line Card (3C10114C)



Functionally, 3C10114 and 3C10114C are identical. However, 3C10114C uses different internal components so that 3C10114C requires NBX software release R4.1 or higher. Each Analog Line Card contains the following lights and connectors:

- **Status Lights (1 through 4)** — Each light shows the status of the associated line.

**Initialization (prior to Release R4.1):**

- **All four lights flash in unison** — Hardware is initializing.
- **A light flashes on twice, off for 2 seconds** — Associated port has been initialized successfully.

**Initialization (Release R4.1 and higher):**

- **Fast steady blink** — Waiting for software download.
- **Solid on** — Software has been downloaded. The flash memory on the board is being loaded.

- **Slow, non symmetric blinking pattern** — Waiting for the completion of the binding process to the NCP.

**Operation:**

- **Off for 9 to 10 seconds, on briefly** — Idle, the line is not in use.
- **On for 9 to 10 seconds, off briefly** — A telephone call is connected on this port.
- **Console Connector** — This DB-9 connector provides an RS-232 (DCE) TTY terminal connection for maintenance access.

**T1 Digital Line Card**

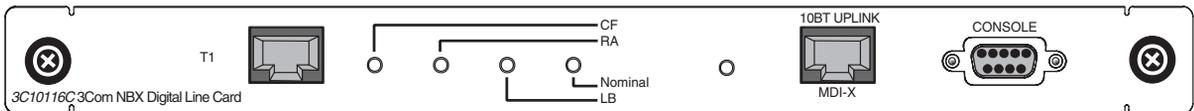
The optional T1 Digital Line Card lets you connect a T1 line to the NBX system. When configured as standard T1 (DS1), the T1 card supports in-band signaling of 24 DS0 (64 Kbps) “voice” channels and a variety of signaling types and protocols. The T1 carries data at a rate of 1.544 Mbps. When configured as ISDN PRI, the T1 card supports 23 voice channels with PRI services such as Direct Inward Dialing (DID).

You must have an external Channel Service Unit (CSU) when you use the 3C10116C T1 Digital Line Card. 3C10116D includes an onboard CSU. The 3C10116D can provide CSU performance statistics, supports loopback testing, and can be configured as a remote device that communicates with its NCP over a routed network.

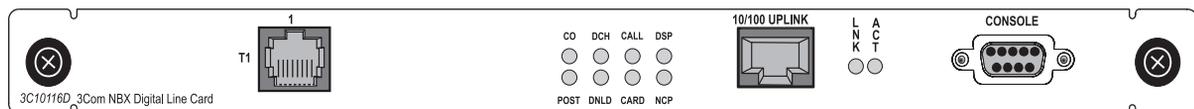


*ISDN PRI services require specific circuit provisioning, which you must obtain before you can use the T1 card in PRI mode. See [Appendix B](#) for more information.*

**Figure 10** T1 Digital Line Card (3C10116C)



**Figure 11** T1 Digital Line Card (3C10116D)



The 3C10116C T1 Digital Line Card has these lights and connectors:

- **T1** — This RJ-48C connector makes a patch cord connection to a T1 interface (CSU/DSU).
- **Status Lights** — These lights indicate the status of the card's signaling, synchronization, and loop back test.
  - **CF** — On indicates a Carrier Failure. The T1 card is not receiving carrier signals from the far end of the T1 line.
  - **RA** — On indicates a Remote Alarm. The far (remote) end of the T1 line is not receiving appropriate signaling from the T1 board.
  - **LB** — On indicates that loop-back testing is in progress.
  - **Nominal** — On indicates ready to send and receive information.
- **10BASE-T Uplink** — This RJ-45 Ethernet connector connects the T1 card to an external LAN hub or switch. You can use this connector to isolate T1 traffic. If the T1 Digital Line Card is used in a V5000 Gateway Chassis, do not use this connector because the chassis has an Ethernet connector to connect the chassis to the LAN.



*If you use the Uplink connector, be sure to program the switch or router on the other end for 10BASE-T 10 MB operation.*

- **Console** — This DB-9 connector provides an RS-232 (DCE) TTY terminal connection for maintenance access.

The 3C10116D T1 Digital Line Card has the following lights and connectors:

- **T1** — This RJ-48C connector makes a patch cord connection to a T1 interface.
- **Status Lights** — These lights indicate the status of the T1 card's signaling, synchronization, and loop back test.
  - **CO** — Central Office:
    - Amber — Alarm condition at the remote end or the CO is not connected or available.
    - Green — No alarm condition.
  - **POST** — Power On Self Test
    - Off — POST test is running. The test runs approximately 5 seconds after you apply power to the board. After 5 seconds, Off indicates the POST test failed.

Green — POST test completed successfully.

- **DCH** — D channel status of an ISDN PRI connection

Off — No T1 or T1 PRI line is attached or the card does not need a D channel, such as when the card is running T1-robbed-bit.

Green — Card is configured for ISDN PRI operation and an active PRI connection has been established.

Amber — The D channel has not yet been established. It can take several seconds after the card has completed its power up tests for the card to establish a connection with the PRI trunk. If the DCH light goes to amber after the connection has been established, it can mean that an active control channel connection through the PRI line has been lost.

- **DNLD** — Download

Flash — The card is downloading software from the NBX Network Call Processor.

Green — The download is complete or the Power-On-Self-Test (POST) is running.

Amber — The download was interrupted before it was completed.

On a LAN, the download process runs quickly. If the download from NCP to digital line card must travel a routed network path, the download can take a few minutes. If the DNLD light remains amber, it can indicate a severely congested network or a hardware problem with the T1 card.

- **CALL** — Call audio traffic

Off — No audio traffic on the T1 link.

Flashing — Audio traffic is present.

- **CARD** — Card Software Status

Green — The card has finished downloading software from the NCP and all software processes have started successfully.

Amber — A problem with one or more of the software processes running on the card. The card automatically reboots itself if it detects a problem with any of its software processes.

- **DSP** — Reserved for future use

- **NCP** — Network Call Processor

Amber — The card is trying to establish contact with an NCP.

Green — The card has established contact with an NCP.

- **LNK** — Ethernet link.

Green — The 10/100 Uplink port is connected to a 10Mb or to a 10/100 Mb hub or switch.

Red — The 10/100 Uplink port is connected to a 100 Mb hub or switch.

Off — There is no connection to the 10/100 Uplink port.

- **ACT**— Ethernet activity.

Rapid blink — Data is passing into or out of the T1 card through the 10/100 Uplink port.

- **10/100 Uplink** — This RJ-45 Ethernet connector connects the T1 card to an external LAN hub or switch. You can use this connector to isolate T1 traffic. If the T1 Digital Line Card is used in a V5000 Gateway Chassis, do not use this connector because the chassis has an Ethernet connector to connect the chassis to the LAN.

- **Console** — This DB-9 connector provides an RS-232 (DCE) TTY terminal connection for maintenance access.



**CAUTION:** *This equipment does not operate when the main power fails.*

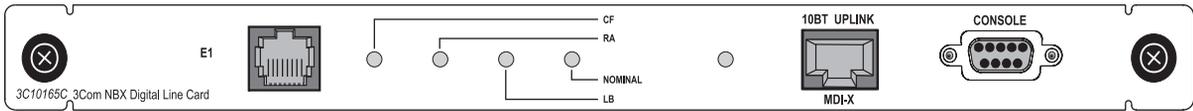
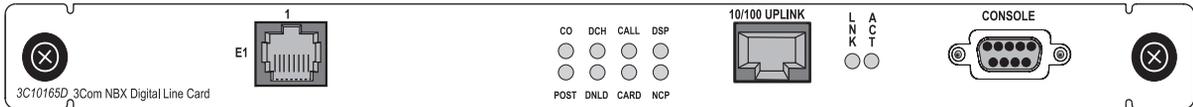
## E1 Digital Line Card

The E1 Digital Line Card provides E1 connectivity using the ISDN PRI protocol. It carries data at a rate of 2.048 Mbps and can carry 32 channels, each with 64 Kbps. Thirty of these channels are available for calls. Like the T1 ISDN PRI Card, the E1 PRI Card supports PRI software features such as DID.

3C10165D includes an onboard CSU. The 3C10165D can provide CSU performance statistics, can be enabled for loopback testing, and can be configured as a remote device that communicates with its NCP over a routed network.



*ISDN PRI services require specific circuit provisioning, which you must obtain before using this card. See [Appendix B](#) for more information.*

**Figure 12** E1 Digital Line Card (3C10165C)**Figure 13** E1 Digital Line Card (3C10165D)

Each 3C10165C E1 card has the following lights and connectors:

- **E1** — This RJ-48C connector makes a connection to an ISDN interface channel service unit/data service unit (CSU/DSU).
- **Status Lights** — These lights indicate the status of the card's signaling, synchronization, and loop back test.
  - **CF** — On indicates a Carrier Failure. The card is not receiving carrier signals from the far end of the E1 line.
  - **RA** — On indicates a Remote Alarm. The far end of the E1 line is not receiving appropriate signaling from the E1 board.
  - **LB** — On indicates that loop-back testing is going on.
  - **Nominal** — On indicates ready to send and receive information.
- **10BASE-T Uplink MDI** — This RJ-45 Ethernet connector connects the card to an external LAN hub or switch. If the E1 Digital Line Card is used in a V5000 Gateway Chassis, do not use this connector because the chassis has an Ethernet connector to connect the chassis to the LAN.



*If you use the Uplink connection, be sure to program the switch or router at the other end for 10BASE-T 10 MB operation.*

- **Console** — This DB-9 connector provides an RS-232 (DCE) TTY terminal connection for maintenance access.

Each 3C10165D E1 Digital Line Card has the following lights and connectors:

- **E1** — This RJ-48C connector makes a patch cord connection to a E1 interface.

- **Status Lights** — These lights indicate the status of the card's signaling, synchronization, and loop back test.
  - **CO** — Central Office:
    - Amber — Alarm condition at the remote end or the CO is not connected or available.
    - Green — No alarm condition.
  - **POST** — Power On Self Test:
    - Off — POST test is running. The test runs approximately 5 seconds after you apply power to the board. After 5 seconds, Off indicates that the POST test failed.
    - Green — POST test completed successfully.
  - **DCH** — D channel status of an ISDN PRI connection
    - Off — No E1 or E1 PRI line is attached.
    - Green — Card is configured for ISDN PRI operation and an active PRI connection has been established.
    - Amber — The D channel has not yet been established. It can take several seconds after the card has completed its power up tests for the card to establish a connection with the PRI trunk. If the DCH light goes to amber after the connection has been established, it can mean that an active control channel connection through the PRI line has been lost.
  - **DNLD** — Download
    - Flash — The card is downloading software from the NCP.
    - Green — The download is complete or the Power-On-Self-Test (POST) is running.
    - Amber — The download was interrupted before it was completed.

On a LAN, the download process is completed quickly. If the download from NCP to digital line card must travel a routed network path, the download may take a few minutes. If the DNLD light remains amber, it can indicate a severely congested network or a hardware problem with the card.
  - **CALL** — Call audio traffic
    - Off — No audio traffic on the T1 link.
    - Flashing — Audio traffic is present.
  - **CARD** — Card Software Status

Green — The card has finished downloading software from the NCP and all software processes have started successfully.

Amber — A problem with one or more of the software processes running on the card. The card automatically reboots itself if it detects a problem with any of its software processes.

- **DSP** — Reserved for future use

- **NCP** — Network Call Processor communications status

Amber — The card is trying to establish contact with an NCP.

Green — The card has established contact with an NCP.

- **LNK** — Ethernet link status

Green — The 10/100 Uplink port is connected to a 10Mb or to a 10/100 Mb hub or switch.

Red — The 10/100 Uplink port is connected to a 100 Mb hub or switch.

Off — There is no connection to the 10/100 Uplink port.

- **ACT** — Ethernet activity

Rapid blink — Data is passing into or out of the card through the 10/100 Uplink port.

- **10/100 Uplink** — This RJ-45 Ethernet connector connects the E1 card to an external LAN hub or switch. You can use this connector to isolate E1 traffic. If the E1 Digital Line Card is used in a V5000 Gateway Chassis, do not use this connector because the chassis has an Ethernet connector to connect the chassis to the LAN.

- **Console** — This DB-9 connector provides an RS-232 (DCE) TTY terminal connection for maintenance access.



*If you require an alternative (bare wire-end) cable to use with the ISDN PRI Digital Line Card, contact your 3Com NBX Voice-Authorized Partner.*



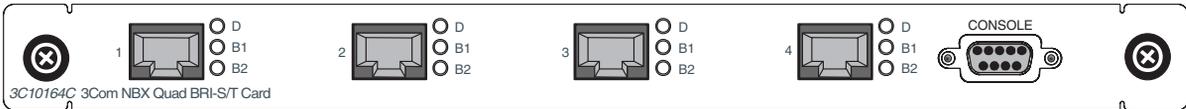
**CAUTION:** *This equipment does not operate when the main power fails.*

**BRI-ST Digital Line Card**

The ISDN BRI-ST (Basic Rate Interface) Digital Line Card (Figure 14) has four separate ports, each of which accommodates two B channels and one D channel. Each B channel carries user data at 64 Kbps and the D channel operates at 16 Kbps. If the two B channels are bonded, the transmission rate is 128 Kbps.

The 3C10164C-ST must reside on the same subnet as the NCP. The 3C10164D can be initialized and communicate with the NCP via IP (layer-3) or Ethernet (layer-2). If the NCP and the 3C10164D card are located on the same Ethernet segment, then layer-2 is used for the control path. If the NCP and the 3C10164D card are located on different IP subnets, then layer-3 is used. The 3C10164D can receive its IP information through a DHCP server. The server must be configured for DHCP option 184 operation to provide the NCP IP address to the card. For more details about configuring a remote card, see the *NBX Administrator's Guide*.

**Figure 14** BRI-ST Digital Line Card (3C10164C-ST)



**Figure 15** BRI-ST Digital Line Card (3C10164D)



**CAUTION:** The BRI-ST Digital Line Cards are not approved for use in the United States or Canada.



**CAUTION:** This equipment does not operate when the main power fails.

Each **3C10164C-ST** card has the following lights and connectors:

- **BRI Port Status Lights** — Each BRI port has these status lights:
  - **D** — On when this signaling channel is active.
  - **B1** — On when this data channel is active (a call is in progress).
  - **B2** — On when this data channel is active (a call is in progress).

During the Auto Discover process:

- Each status light turns amber briefly, starting with span 1 (channels D, B1, and B2) and continuing through span 4 (channels D, B1, and B2). After approximately 30 seconds, the B1 status light on all four spans turns green for approximately 1 minute. All lights turn off when the Auto Discover process is complete.

After you connect an ISDN BRI span to a port:

- The D light turns green if the span is operating properly and turns amber if there is a problem. For a span that is operating properly, when the NBX system initiates or receives a call on a B channel, the corresponding light initially turns amber. When the call is answered, the light turns green.
- **Console** — This DB-9 connector provides an RS-232 (DCE) TTY terminal connection for maintenance access.

Each **3C10164D** (Figure 15) card has the following lights and connectors:

- **BRI Port Status Lights**

- Fast steady Blink — Waiting for download
- Solid On — Downloaded, burning the flash memory

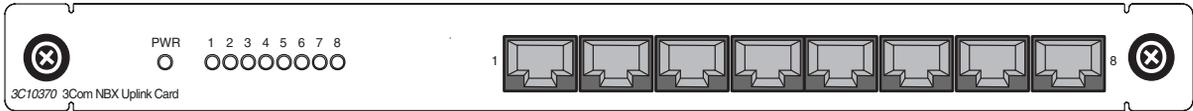


**CAUTION:** Do not disconnect power while the flash memory is being updated. Doing so may corrupt the flash memory and the card might have to be replaced.

- Slow Non-Symmetric Flash Pattern — Downloaded, waiting to bind
- Off for 9-10 seconds, on briefly — Only the D the channel is up
- On for 9-10 seconds, off briefly — On call (one or both B channels)
- Amber — D channel is down
- **10/100 Uplink** — This RJ-45 Ethernet connector connects the card to an external LAN. You can use this connector to isolate traffic or to connect the card to the LAN if the card is placed in a chassis that does not have LAN connectivity, such as an NBX 100 chassis that does not have an NCP or a hub card.
- **Console** — This DB-9 connector provides an RS-232 (DCE) TTY terminal connection for maintenance access. For information on how to connect a computer to the Console port, see [“Connecting a Computer to a Console Port”](#) on [page 196](#).

**10BASE-T Uplink Card** The 10BASE-T Uplink Card provides eight 10BASE-T Ethernet ports to connect 3Com Telephones (or other 10BASE-T devices) to the LAN. The Uplink Card replaces the 10BASE-T Hub Card.

Figure 16 NBX Uplink Card (3C10370)



The NBX 10BASE-T Uplink Card contains these lights and connectors:

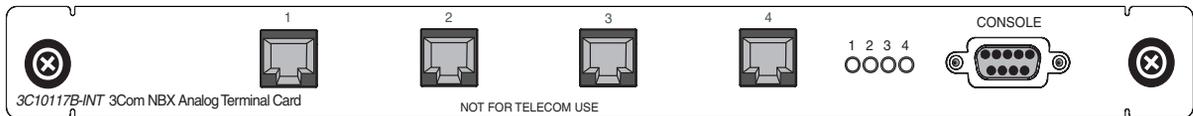
- **Status Lights (PWR and 1 through 8)** — These lights indicate the status of power to the hub and the status of the 10BASE-T ports.
- **Ethernet Hub Ports (8)** — These RJ-45 MDI-X ports connect devices to the LAN.

**Analog Terminal Card** Each Analog Terminal Card allows connections for up to four analog (2500-series compliant) telephones and Group-3 fax machines. When an Analog Terminal Card senses that a port is being used for fax transmission, it switches that port to *reliable* mode. Unlike voice transfers, which drop packets due to congestion, reliable mode transmissions take as much time as needed to ensure that there are no lost packets. However, reliable mode also uses twice the bandwidth.

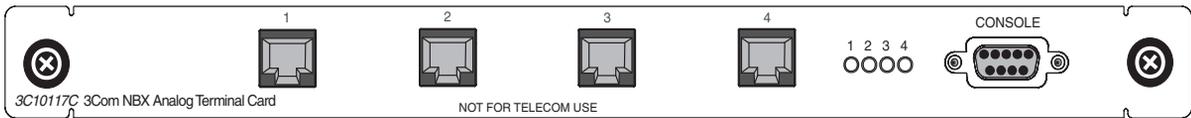


**CAUTION:** *If you are using the 3Com SuperStack ARPS (Advanced Redundant Power Source) as a backup power supply for the V5000 Gateway Chassis, you can have no more than 2 Analog Terminal Cards of Models 3C10117, 3C10117A, or 3C10117B-INT per Gateway Chassis. This restriction does not apply to the 3C10117C Analog Terminal Card.*

Figure 17 NBX Analog Terminal Card (3C10117B-INT)



**Figure 18** NBX Analog Terminal Card (3C10117C)



Each Analog Terminal Card has the following lights and connectors:

- **Analog Connectors (1 through 4)** — Four RJ11 connectors enable you to connect analog devices to the NBX system.
- **Status Lights (1 through 4)** — Each light indicates the status of the associated port.

**Initialization:**

- **Fast steady blink** — Waiting for software download.
- **Solid on** – Software has been downloaded. The flash memory on the board is being loaded.
- **Slow, non-symmetric blinking pattern** — Waiting for the completion of the binding process to the NCP.

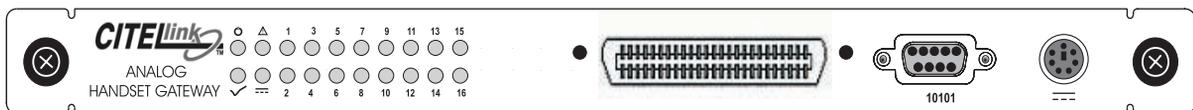
**Operation:**

- **Off for 9 to 10 seconds, on briefly** — Idle, telephone is on hook.
- **On for 9 to 10 seconds, off briefly** — Idle, telephone is off hook.
- **Console Connector** — This DB-9 connector provides an RS-232 (DCE) TTY terminal connection for maintenance access.

**Legacy Link Analog Card**

The 3Com Legacy Link Gateway for Analog Handsets provides NBX protocol mapping for up to 16 analog handsets using existing PBX wiring. It terminates up to 16 analog tip/ring (2500 series compatible) devices, such analog phones, cordless phones, speakerphones, etc. A maximum of eight simultaneous FAX calls can be made on the card. The Legacy Link Analog card requires a license and NBX software R.4.1.6 or higher.

**Figure 19** 3Com Legacy Link Gateway for Analog Handsets (16 Port FXS) (3C10392)



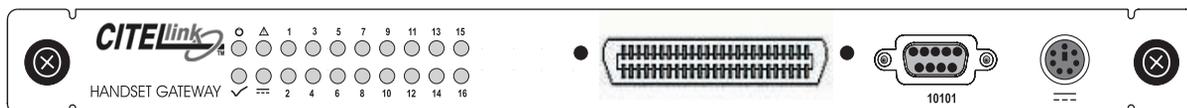
Each Legacy Link Analog Card has the following lights and connectors:

- **Status Lights 1 – 16** — All LEDs flash approximately every 10 seconds.
  - **On** – Handset off-hook (call in progress)
  - **Off** – Handset on-hook or no handset connected
-  — Power indicator
  - **On** – Input power input Ok
  - **Off** – Input power failed
-  System test
  - **Flashing** – Card is functioning correctly
  - **Off** – Card has failed
-  Status
  - **On** – Seek service assistance
  - **Off** – Operating normally
-  — The power connector is a 6-pin, circular, Mini-DIN type. Power from the external 48V D.C. supply is fed into the card via this connector to power the handsets through the RJ21x 50-way line connector.
  - **On** – External power ok
  - **Off** – External power failed
- Channels — Channel LEDs are normally off, and all LEDs flash approximately every 10 seconds
  - **On** – Handset off-hook (for example, a call in progress)
  - **Off** – Handset on-hook
- **10101** — The 9-pin D-type straight-through connector is used to connect to the RS232 Diagnostic Port. This connector allows engineers to perform tests on the card or to upgrade the card software.
- **RJ21x line connector** — The RJ21x 50-way line connector is used to connect the analog telephones to the card through the existing punch block and handset wiring. The pins are paired vertically on the connector, such that line 1 is connected to pins 1 and 26, line 2 is connected to pins 2 and 27, and so on.

### Legacy Link Norstar Card

The 3Com Legacy Link Gateway for Norstar Handsets provides NBX protocol mapping for up to 16 Norstar handsets using existing PBX wiring. A maximum of eight simultaneous FAX calls can be made on the card. The Legacy Link Norstar card requires a license and NBX software R.4.1.6 or higher.

**Figure 20** 3Com Legacy Link Gateway for Norstar Handsets (3C10392)



Each Legacy Link Gateway for Norstar Handsets has the following lights and connectors:

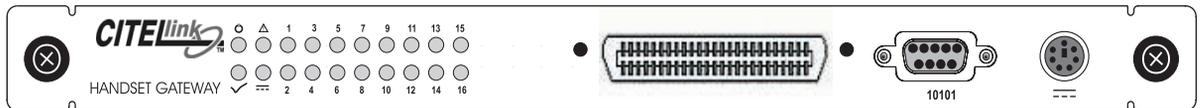
- **Status Lights 1 – 16** — All LEDs flash approximately every 10 seconds.
  - **On** – Handset off-hook (call in progress)
  - **Off** – Handset on-hook or no handset connected
-  — Power indicator
  - **On** – Input power input Ok
  - **Off** – Input power failed
-  System test
  - **Flashing** – Card is functioning correctly
  - **Off** – Card has failed
-  Status
  - **On** – Seek service assistance
  - **Off** – Operating normally
-  — The power connector is a 6-pin, circular, Mini-DIN type. Power from the external 48V D.C. supply is fed into the card via this connector to power the handsets through the RJ21x 50-way line connector.
  - **On** – External power ok
  - **Off** – External power failed
- Channels — Channel LEDs are normally off, and all LEDs flash approximately every 10 seconds

- **On** – Handset off-hook (for example, a call in progress)
- **Off** – Handset on-hook
- **10101** — The 9-pin D-type straight-through connector is used to connect to the RS232 Diagnostic Port. This connector allows engineers to perform tests on the card or to upgrade the card software.
- **RJ21x line connector** — The RJ21x 50-way line connector is used to connect the Norstar handsets to the card through the existing punch block and handset wiring. The pins are paired vertically on the connector, such that line 1 is connected to pins 1 and 26, line 2 is connected to pins 2 and 27, and so on.

### Legacy Link Meridian Card

The 3Com Legacy Link Gateway for Meridian Handsets provides NBX protocol mapping for up to 16 Norstar handsets using existing PBX wiring. A maximum of eight simultaneous FAX calls can be made on the card. The Legacy Link Meridian card requires a license and NBX software R.4.1.6 or higher.

**Figure 21** 3Com Legacy Link Gateway for Meridian Handsets (3C10391)



Each Legacy Link Gateway for Meridian Handsets has the following lights and connectors:

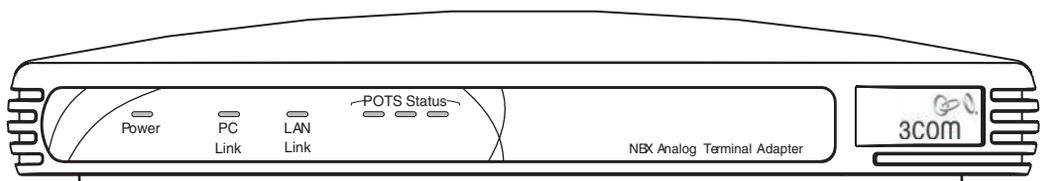
- **Status Lights 1 – 16** — All LEDs flash approximately every 10 seconds.
  - **On** – Handset off-hook (call in progress)
  - **Off** – Handset on-hook or no handset connected
-  — Power indicator
  - **On** – Input power input Ok
  - **Off** – Input power failed
-  System test
  - **Flashing** – Card is functioning correctly
  - **Off** – Card has failed
-  Status

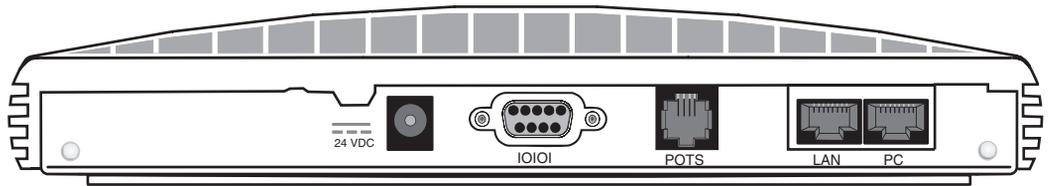
- **On** – Seek service assistance
  - **Off** – Operating normally
- **—** — The power connector is a 6-pin, circular, Mini-DIN type. Power from the external 48V D.C. supply is fed into the card via this connector to power the handsets through the RJ21x 50-way line connector.
  - **On** – External power ok
  - **Off** – External power failed
- **Channels** — Channel LEDs are normally off, and all LEDs flash approximately every 10 seconds
  - **On** – Handset off-hook (for example, a call in progress)
  - **Off** – Handset on-hook
- **10101** — The 9-pin D-type straight-through connector is used to connect to the RS232 Diagnostic Port. This connector allows engineers to perform tests on the card or to upgrade the card software.
- **RJ21x line connector** — The RJ21x 50-way line connector is used to connect the Meridian handsets to the card through the existing punch block and handset wiring. The pins are paired vertically on the connector, such that line 1 is connected to pins 1 and 26, line 2 is connected to pins 2 and 27, and so on.

### Analog Terminal Adapters

The single-port Analog Terminal Adapter (ATA) is a desktop box that connects a single analog telephone or fax machine to an NBX system.

**Figure 22** Analog Terminal Adapter (3C10400 and 3C10400B) — Front View



**Figure 23** Analog Terminal Adapter — Rear View

The ATA is a Class 3 PoE device. It meets the IEEE 802.3af standard for Power over Ethernet. It can also accept power from an AC power adapter plugged into a wall socket.

The ATA has an RS232 DB9 connector that allows a technician to access a command line interface for the device.



*Only qualified 3Com service personnel should use the serial diagnostic port.*

The Analog Terminal Adapter has these lights and connectors:

- **Power Light** — The light below the icon for power indicates that the ATA is receiving power.
- **POTS Status Lights (S1, S2, S3)** — The POTS (Plain Old Telephone Service) status lights indicate the status of the Analog Port. S3 is on when the analog device is in use. S2 blinks briefly every 10 seconds when an analog device is connected to the ATA. If no analog telephone is connected, S2 is always off. S1 is reserved for future use.
- **PC Link Light** — On indicates that there is an external network device connected to the ATA.
- **LAN Link Light** — On indicates that the ATA is connected to the network.
- **10101** — Serial port for diagnostics.
- **POTS** — A connection for an analog telephone or fax machine.
- **PC** — A connection for a network device.
- **LAN** — A connection to the network.

**3Com Telephones**

3Com Telephones provide the familiar features of a business telephone and extra features such as one-touch access to voice mail. [Table 12](#) gives a short summary of each 3Com telephone and lists the NBX system software and the type of license required to support each telephone.

**Table 12** 3Com Telephones

<b>Telephone Model</b>	<b>Part Number</b>	<b>Minimum System Software Required</b>	<b>License Group</b>
<b>3103 Manager's Telephone</b> A Gigabit Ethernet capable phone with a large screen display and a full-duplex speakerphone. The 320 x 120 pixel display can manage up to 12 calls, via the 10 soft keys. Ten preprogrammed buttons offer instant access to frequently used capabilities while an additional 8 feature buttons with lights are provided to allow easy access to bridged line appearances, speed dials and a host of other features.	3C10403A	R5.0	Group 2
	3C10403B	R5.0.20	
<b>3102 Business Telephone</b> Provides the flexibility of 18 programmable buttons with lights and the convenience of 10 fixed-feature buttons, including Speaker, Redial, Conference, Transfer, Hold, Voice Mail, Forward to Mail, Hands-Free, Mute, and two Volume controls.	3C10402A	R4.3	Group 2
	3C10402B	R5.0.20	
<b>3101 Basic Telephone</b> Provides four programmable buttons with LEDs. Simplifies call handling with distinctive Hold and Message buttons. Enables easy interaction with the display via three display soft keys and four-way cursor control.	3C10401A	R4.3	Group 1
	3C10401B	R5.0.20	
<b>3101SP Basic Telephone (with speakerphone)</b> All the same features of the 3101 Basic Telephone plus a half duplex speakerphone.	3C10401SPKRA	R4.3	Group 1
	3C10401SPKRB	R5.0.20	

<b>Telephone Model</b>	<b>Part Number</b>	<b>Minimum System Software Required</b>	<b>License Group</b>
<b>3100 Entry Telephone</b> Provides the convenience of four fixed-feature buttons for one-touch access in an affordable package for basic IP telephone connectivity.	3C10399A	R5.0	Group 0
	3C10399B	R5.0.20	
<b>3106C Cordless Telephone</b> A full-featured, multi-line IP cordless phone that provides in-building mobility to roam up to 1000 feet from the base station. The 3106C handset offers a compact form factor with 4 programmable buttons, 8 fixed feature buttons and a 2-line display.	3C10406A	R5.0	Group 1
<b>3107C Cordless Telephone</b> A full-featured, multi-line IP cordless phone that provides in-building mobility to roam up to 1000 feet from the base station. The handset's larger form factor supports a powerful radio that is better capable of penetrating walls and obstacles. The handset offers 4 programmable buttons with lights, 9 fixed feature buttons and a 2-line display.	3C10407A	R5.0	Group 1
<b>3108 Wireless Telephone</b> A Session Initiation Protocol (SIP)-based wireless VoIP telephone for wireless (IEEE 802.11b) telephone connectivity to an NBX system running in SIP mode.	3C10408A	R6.0	Group 1
<b>3105 Attendant Console</b> Gives workgroup administrators and receptionists a flexible and intuitive tool for handling calls and viewing phone status for up to 100 users.	3C10405A	R4.3	Group 2
	3C10405B	R6.0 R5.0.24 or higher	

Telephone Model	Part Number	Minimum System Software Required	License Group
<b>Analog Terminal Adapter</b>	3C10400A	R4.2	N/A
A standalone device that converts a 10/100 Ethernet connection into an analog station port (FXS) for industry standard analog phones or similar devices.	3C10400B	R6.0 R5.0.24 or higher	

### Notes

- For more information on device licenses, see [“Group Device Licenses” on page 73](#).
- As of July 1, 2006, all 3Com devices put into the market within the European Union meet the requirements of the Reduction of Hazardous Substances Directive, EU Directive 2002/95/EG, (RoHS).
- The 3100 Entry Telephone does not include a switch port.
- The 3100 Entry Telephone does not support external TAPI applications.
- NBX systems also support legacy 3Com telephones: 2101 Basic Telephones, 1102, 2102 and 2102-IR Business Telephones, and 1105 Attendant Consoles. The 1102, 2102 & 2102 B and PE models are supported on a SIP mode NBX system.
- The 3108 Wireless Telephone is supported only on NBX systems running in SIP mode.



**CAUTION:** To avoid damage to the 3Com telephone, do not connect a 3Com telephone or Attendant Console directly to a standard telephone line. Although the RJ-11 connector for a traditional telephone fits into the 3Com telephone’s RJ-45 jack, the electrical interfaces are not compatible and the telephone will not work.

### Third-party Devices and Applications

3Com works with third-party suppliers to provide a range of devices and software applications that are compatible with NBX systems. For more information on third-party offerings, see your 3Com NBX Voice-Authorized Partner.

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## Optional Software

3Com offers these optional software components:

- **NBX Complement Attendant Software (CAS)** runs on a PC and provides the functions of an Attendant Console. You must purchase a license and use the NBX NetSet utility to install it before you can use CAS.
- **pcXset™ Soft Telephone** runs on a PC and provides most of the features of a 3Com Business Telephone. The NBX system comes with one pcXset license. To use more than one pcXset client with an NBX system, you must purchase additional licenses and use the NBX NetSet utility to install them. You add a pcXset client as a telephone in the NBX NetSet utility and specify the host PC's MAC address as the device identifier.



*To fully support the pcXset Soft Telephone, 3Com recommends a PC with a processor speed of at least 1.8 GHz. When it is installed on a PC with a processor speed of 800 MHz or lower, calls that use the G.729 codec can have unacceptable audio quality.*

- **3Com Telephone Local Configuration Application** is a PC-based utility that enables you to manually configure the basic settings for the 3100 Entry Telephone.
- **NBX Call Reports** enables you to retrieve the call detail records that are kept on the NBX system, present them in report format and export them in a format suitable for other reporting applications. No license required.
- **NBX ACD Desktop Statistics** is a PC based program that enables you to monitor data streamed from the Automatic Call Distribution feature of the NBX system.
- **NBX TAPI Service Provider (NBXTSP)** provides the interface between the NBX system and the Microsoft Telephone API to enable software applications to use NBX Telephone services and features.
- **Desktop Call Assistant** is a TAPI-based program that allows you to dial calls from your computer screen.
- **NBX Media Driver** works with the NBXTSP to provide external software applications access to the features of the NBX system.
- **NBX LabelMaker** is available through the NBX NetSet utility. It enables you to define custom telephone button labels. You can create, print, and save the labels for later use.

- **MultiSite Backup Tool** enables you to automate the task of archiving NBX systems. You can schedule backups of one or many NBX systems and create a backup schedule for each NBX location.
- **NBX Dial Plan Editor** provides a visual interface for editing an NBX dial plan. It lets system administrators navigate and execute complex commands with the click of a mouse.

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## NBX Licensing

Each NBX system is shipped with a total-device-limit license that controls the total number of devices that you can configure on the system. However, there are other factors to consider when determining what your system can support. Your configuration must conform to **all** of these limits:

- The limit imposed by the total system license (explained next)
- The individual limits on certain device types (explained later in this topic)
- The license requirements for some hardware and software



*A V3000, V3001R, or V5000 system operating in SIP mode has further device limit considerations. The NBX 100 does not support SIP mode operations. For more information, see the NBX Administrator's Guide.*

### What Counts Toward the Total Device Limit?

NBX systems count many physical devices and certain software applications as devices toward the total device limit:

- **Physical Devices** — Each 3Com Telephone, each Analog Terminal Adapter, each channel on a Digital Line Card, and each port on an Analog Line Card counts as one device. Physical device limits are listed in [Table 13](#).
- **Software “Devices”** — Each NBX Media Driver port counts as one device. Each installation (client) of the pcXset Soft Telephone application counts as one device.

### What Does NOT Count Toward the Total Device Limit?

The NBX systems do not count most applications toward the total device limit, although some may be governed by license limits. Examples: NBX Messaging voice mail ports and automated attendant ports, Call Park zones, and System Speed Dials.

### Individual Device Limits

Certain individual device types are limited to a maximum per system because of internal product rules. For example, the NBX Analog Line Card has 4 ports. Although each of these ports counts as a device, the NBX system architecture limits the system to 180 Analog Line Cards (4 x 180), and thus the system can support a maximum of 720 not 1500 analog line ports.

### Features and System Performance

Some combinations of features on NBX 100 systems and V3000 systems that do not have the optional memory upgrade installed can create system performance issues. These notes describe system configuration issues that affect performance. Performance on V3001R, V5000, and V3000 systems that have the optional memory upgrade installed are not affected by these features performance limits.

- A V3000 without the optional memory upgrade can provide acceptable performance for the maximum of 250 devices if the combined number of ACD Groups plus Hunt Groups plus Calling Groups in the system is less than 70. Alternatively a V3000 system supports the maximum number of ACD Groups plus Hunt Groups plus Calling Groups, 100, if the number of devices in the system is less than 100.
- An NBX 100 can provide acceptable performance for the maximum of 200 devices if the combined number of ACD Groups plus Hunt Groups plus Calling Groups in the system is less than 50.

Guidelines:

- 5 devices for every ACD Group plus Hunt Group plus Calling Group
  - 75 Phantom mailboxes for every ACD Group plus Hunt Group plus Calling Group
- or**
- 500 Account codes for each ACD Group plus Hunt Group plus Calling Group. For example, on a V3000 system, to have 75 Groups and 250 devices , you can have no more than 2500 Account codes and 150 Phantom mailboxes.

### Licensed Device Limits

Certain devices and applications have limits that are governed by licenses. Device licensing is explained in detail in [“Device Licenses”](#) on [page 72](#). Your 3Com NBX Voice-Authorized Partner can provide details on available incremental device licences.



V3000 platforms come with 128 MB of memory. You must install an optional memory upgrade to support some features. See [Table 13](#) on [page 60](#) for more information.

### How the System Limits Interact

As you add devices to an NBX system, you must keep in mind **all** of these limitations:

- **Total** device limit for the system
- **Individual** device limit for certain device types
- **License** limit for certain device types
- **System memory**

**Example:** Your V3000 has the memory upgrade installed. (V3000 systems come with 128 MB of memory. You must install an optional memory upgrade to support more than 250 devices.) It is licensed for 1500 total devices and you want to configure 450 telephones:

- You configure 6 NBX Analog Line Cards, and 12 NBX Analog Terminal Cards (for analog telephones and FAX machines).

The total device count is now  $(6 \times 4) + (12 \times 4) = 72$ .

- You then configure 450 3Com Telephones.

The total device count is now 522. You can configure 978 additional devices (1500–522).

- You want to configure 200 Attendant Consoles, but, because the individual device limit for Attendant Consoles is 100, you can configure only 100 Attendant Consoles.

The total device count is now 622. You can configure 878 additional devices (1500–622).

- You want to add Virtual Tie Lines (VTLs), but you can add only 48 because that is the maximum license level available for VTLs.

VTLs do not count toward the device limit, so the total device count remains at 622. So, after you add 48 VTLs, you can still configure up to 878 additional devices.

## Maximum Device Counts and Memory Requirements

This section lists each NBX device and application with information on whether it counts toward the total device count and the maximum number allowed per NBX system and shows which devices and features require the optional memory upgrade on V3000 and V5000 systems. The maximum number for each device and application assumes that there are no other types of devices connected to the system — the total device limit always takes precedence.

For information about feature interactions and performance issues, see [“Features and System Performance”](#) on [page 57](#).

For the current device and license configuration on your system, see *Licensing and Upgrades > Licenses* as well as the *Usage Report* accessible from the Licenses screen in the NBX NetSet utility.



*SIP mode operations are supported on V3000 and V5000 platforms with the optional memory upgrade installed and on V3001R platforms. SIP mode operations are not supported on the NBX 100 or on V3000 or V5000 platforms that have only 128 MB of memory. You can use the NBX NetSet utility to verify the memory configuration on a system. See the NBX Administrator’s Guide from more information about SIP on NBX.*



*Some of the device limits in can be affected by your dial plan. The 3-digit dial plan does not support enough extensions to allow you to reach all the device limits.*

- [Table 13](#), next, lists V3000 limits
- [Table 14](#) on [page 63](#) lists V3001R limits
- [Table 15](#) on [page 66](#) lists V5000 limits
- [Table 16](#) on [page 69](#) lists NBX 100 limits

**Table 13** Detailed Device Limits - V3000 Analog or V3000 BRI

Description	Per-Unit Device Count Toward Total	Max with Memory Upgrade	Max without Memory Upgrade	Device or Site License Required?
A system without the memory upgrade cannot always provide acceptable performance if you configure the maximum number of Phantom Mailboxes, Groups, devices, and Account Codes. For more information, see <a href="#">“Features and System Performance”</a> on <a href="#">page 57</a> .				
1102, 2102, or 2102-IR Business Telephone	1	1500	250	No
2101 Basic Telephone	1	1500	250	No
1105 Attendant Console	1	100	100	No
3106C Cordless Telephone	1	10	10	Yes
3107C Cordless Telephone	1	3	3	Yes
The limits on cordless telephones are due to radio frequency issues rather than system capacity limits. For more information, see <a href="#">“Cordless Telephone Installation Notes”</a> on <a href="#">page 130</a> .				
3103 Manager’s Telephone	1	1500	250	Yes
3102 Business Telephone	1	1500	250	Yes
3101 or 3101SP Basic Telephone	1	1500	250	Yes
3100 Entry Telephone	1	1500	250	Yes
3108 Wireless Telephone	1	1500	250	Yes
3105 Attendant Console	1	100	100	Yes
pcXset Soft Telephone	1 per pcXset PC telephone client	1500	250	Yes
NBX Media Driver (for WAV devices)	1 driver/system enables the max allowable number of WAV devices	1500	250	Yes

**Table 13** Detailed Device Limits - V3000 Analog or V3000 BRI (continued)

Description	Per-Unit Device Count Toward Total	Max with Memory Upgrade	Max without Memory Upgrade	Device or Site License Required?
Polycorn IP 3000 Speaker Phone	1	1500	250	Yes
Legacy Link Handset Gateway card	16 (16-port card)	1488 (93 cards)	240 (15 cards)	Yes
NBX Analog Terminal Card (ATC)	4 4-port card)	1500 (375 cards)	248 (62 cards)	No
NBX Analog Terminal Adapter (ATA)	1	1500	250	No
NBX Analog Line Card	4 per card	720 ports (180 cards)	248 ports (62 cards)	No
NBX T1 Card (DS1)	24 per card	720 channels (30 cards)	240 channels (10 cards)	No
NBX T1 Card (ISDN PRI)	23 per card	713 channels (31 cards)	230 channels (10 cards)	No
NBX E1 Card (ISDN PRI)	30 per card	720 channels (24 cards)	240 channels (8 cards)	No
NBX ISDN BRI-ST channels	8 per card	720 channels (90 cards)	248 channels (31 cards)	No
<b>System Architecture Attributes</b>				
Virtual Tie Lines	None	48	8	Yes
Bridged Extensions	None	400 Primary 1200 Bridged	400 Primary 1200 Bridged	No
Account Codes	None	5000	5000	No
A system without the memory upgrade cannot always provide acceptable performance if you configure the maximum number of Phantom Mailboxes, Groups, devices, and Account Codes. For more information, see <a href="#">"Features and System Performance"</a> on <a href="#">page 57</a> .				
<b>Application and Call Processing Attributes</b>				
Auto Attendants (NBX Messaging)	None	100	100	No
The 3-digit dial plan might not provide enough extensions to support 100 Auto Attendants.				
Voice Mail Ports (NBX Messaging)	None	72	12	Yes (above 4 ports)

**Table 13** Detailed Device Limits - V3000 Analog or V3000 BRI (continued)

Description	Per-Unit Device Count Toward Total	Max with Memory Upgrade	Max without Memory Upgrade	Device or Site License Required?
Voice Mailboxes (NBX Messaging)	None	1500	250	Covered by total system device license
Phantom Mailboxes (NBX Messaging)	None	1000	150	No
<p>A system without the memory upgrade cannot always provide acceptable performance if you configure the maximum number of Phantom Mailboxes, Groups, devices, and Account Codes. For more information, see <a href="#">“Features and System Performance”</a> on <a href="#">page 57</a>.</p> <p>The 3-digit dial plan does not provide enough extensions to support 1000 Phantom Mailboxes.</p>				
Automatic Call Distribution Groups	0	100	48	Yes (above 2 agents/group)
<p>ACD Groups, Hunt Groups, and Calling Groups all count towards the same maximum total. For example, on a V3000 system with the memory upgrade, if you have 50 Hunt Groups, the system can also support any combination of 50 ACD and Calling Groups.</p>				
Call Park Zones	None	100	100	No
<p>The 3-digit dial plan might not provide enough extensions to support 100 zones.</p>				
Call Pickup	None	100	100	No
Conference Calls	None	12	12	No
Directed Pickup	None	50	50	No
Group Pickup	None	50	50	No
Hunt Groups or Calling Groups	None	100	100	No
<p>The 3-digit dial plan might not provide enough extensions to support 100 groups.</p> <p>ACD Groups, Hunt Groups, and Calling Groups all count towards the same total. For example, on a V3000 system with the memory upgrade, if you have 50 Hunt Groups, the system can also support any combination of 50 ACD and Calling Groups.</p> <p>A system without the memory upgrade cannot always provide acceptable performance if you configure the maximum number of Phantom Mailboxes, Groups, devices, and Account Codes. For more information, see <a href="#">“Features and System Performance”</a> on <a href="#">page 57</a>.</p>				
Music On Hold	None	1	1	No
Paging	None	3	3	No

**Table 13** Detailed Device Limits - V3000 Analog or V3000 BRI (continued)

Description	Per-Unit Device Count Toward Total	Max with Memory Upgrade	Max without Memory Upgrade	Device or Site License Required?
Page Zones	None	9	9	No
System Speed Dials	None	100	100	No
Personal Speed Dials	None	100	100	No
Call Detail Reporting	None	1	1	No
Call Record and Monitor	None	1	1	No
TAPI Route Points	None	100	100	No

The 3-digit dial plan might not provide enough extensions to support 100 TAPI Route Points.

**Table 14** Detailed Device Limits - V3001R

Device/application Description	Per-Unit Device Count Toward Total	System Maximum	License Required?
1102, 2102, or 2102-IR Business Telephone	1	1500	No
2101 Basic Telephone	1	1500	No
1105 Attendant Console	1	100	No
3106C Cordless Telephone	1	10	Yes
3107C Cordless Telephone	1	3	Yes
3103 Manager's Telephone	1	1500	Yes
3102 Business Telephone	1	1500	Yes
3101 or 3101SP Basic Telephone	1	1500	Yes
3100 Entry Telephone	1	1500	Yes

The limits on cordless telephones are due to radio frequency issues rather than system capacity limits. For more information, see [“Cordless Telephone Installation Notes”](#) on [page 130](#).

**Table 14** Detailed Device Limits - V3001R (continued)

<b>Device/application Description</b>	<b>Per-Unit Device Count Toward Total</b>	<b>System Maximum</b>	<b>License Required?</b>
3108 Wireless Telephone	1	1500	Yes
3105 Attendant Console	1	100	Yes
pcXset Soft Telephone	1 per pcXset PC telephone client	1500	Yes
NBX Media Driver (for WAV devices)	1 driver/system enables the max allowable number of WAV devices	1500	Yes
Polycom IP 3000 Speaker Phone	1	1500	Yes
Legacy Link Handset Gateway card	16 (16-port card)	1488 (93 cards)	Yes
NBX Analog Terminal Card (ATC)	4 (4-port card)	1500 (375 cards)	No
NBX Analog Terminal Adapter (ATA)	1	1500	No
NBX Analog Line Card	4 per card	720 ports (180 cards)	No
NBX T1 Card (DS1)	24 per card	720 channels (30 cards)	No
NBX T1 Card (ISDN PRI)	23 per card	713 channels (31 cards)	No
NBX E1 Card (ISDN PRI)	30 per card	720 channels (24 cards)	No
NBX ISDN BRI-ST card	8 per card	720 channels (90 cards)	No
<b>System Architecture Attributes</b>			
Virtual Tie Lines	None	48	Yes
Bridged Extensions	None	400 Primary 1200 Bridged	No
Account Codes	None	5000	No
<b>Application and Call Processing Attributes</b>			
Auto Attendants	None	100	No
Voice Mail Ports	None	72	Yes (above 4 ports)

**Table 14** Detailed Device Limits - V3001R (continued)

<b>Device/application Description</b>	<b>Per-Unit Device Count Toward Total</b>	<b>System Maximum</b>	<b>License Required?</b>
Voice Mailboxes (NBX Messaging)	None	1500	Covered by total system device license
Phantom Mailboxes	None	1000	No
The 3-digit dial plan does not provide enough extensions to support 1000 Phantom Mailboxes.			
Automatic Call Distribution Groups	0	100	Yes (above 2 groups)
ACD Groups, Hunt Groups, and Calling Groups all count towards the same maximum total. For example, on a V3001R system, if you have 50 Hunt Groups, the system can also support any combination of 50 ACD and Calling Groups.			
Call Park Zones	None	100	No
The 3-digit dial plan might not provide enough extensions to support 100 zones.			
Call Pickup	None	100	No
Conference Calls	None	12	No
Directed Pickup	None	50	No
Group Pickup	None	50	No
Hunt Groups or Calling Groups	None	100	No
The 3-digit dial plan might not provide enough extensions to support 100 groups.			
ACD Groups, Hunt Groups, and Calling Groups all count towards the same total. For example, on a V3000 system, if you have 50 Hunt Groups, the system can also support any combination of 50 ACD and Calling Groups.			
Music On Hold	None	1	No
Paging	None	3	No
Page Zones	None	9	No
System Speed Dials	None	100	No
Personal Speed Dials	None	100	No
Call Detail Reporting	None	1	No
Call Record and Monitor	None	1	No
TAPI Route Points	None	100	No
The 3-digit dial plan might not provide enough extensions to support 100 TAPI Route Points.			

**Table 15** Detailed Device Limits - V5000

<b>Device/application Description</b>	<b>Per-Unit Device Count Toward Total</b>	<b>System Maximum</b>	<b>Device or Site License Required?</b>
1102, 2102, or 2102-IR Business Telephone	1	1500	No
2101 Basic Telephone	1	1500	No
1105 Attendant Console	1	100	No
3106C Cordless Telephone	1	10	Yes
3107C Cordless Telephone	1	3	Yes
The limits on cordless telephones are due to radio frequency issues rather than system capacity limits. For more information, see <a href="#">“Cordless Telephone Installation Notes”</a> on <a href="#">page 130</a> .			
3103 Manager’s Telephone	1	1500	Yes
3102 Business Telephone	1	1500	Yes
3101 or 3101SP Basic Telephone	1	1500	Yes
3100 Entry Telephone	1	1500	Yes
3108 Wireless Telephone	1	1500	Yes
pcXset Soft Telephone	1 per pcXset PC telephone client	1500	Yes
NBX Media Driver (for WAV devices)	1 driver/system enables the max allowable number of WAV devices	1500	Yes
Polycom IP 3000 Speaker Phone	1	1500	Yes
Legacy Link Handset Gateway card	16 (16-port card)	1488 (93 cards)	Yes
NBX Analog Terminal Card (ATC)	4 (4-port card)	1500 (375 cards)	No
NBX Analog Terminal Adapter (ATA)	1	1500	No

**Table 15** Detailed Device Limits - V5000 (continued)

<b>Device/application Description</b>	<b>Per-Unit Device Count Toward Total</b>	<b>System Maximum</b>	<b>Device or Site License Required?</b>
NBX Analog Line Card	4 per card	720 ports (180 cards)	No
NBX T1 Card (DS1)	24 per card	720 channels (30 cards)	No
NBX T1 Card (ISDN PRI)	23 per card	713 channels (31 cards)	No
NBX E1 Card (ISDN PRI)	30 per card	720 channels (24 cards)	No
NBX ISDN BRI-ST card	8 per card	720 channels (90 cards)	No
<b>System Architecture Attributes</b>			
Virtual Tie Lines	None	48	Yes
Bridged Extensions	None	400 Primary 1200 Bridged	No
Account Codes	None	5000	No
<b>Application and Call Processing Attributes</b>			
Auto Attendants	None	100	No
The 3-digit dial plan might not provide enough extensions to support 100 Auto Attendants.			
Voice Mail Ports	None	72	Yes (above 4 ports)
Voice Mailboxes	None	1500	Covered by total system device license
Because of system performance issues, a V5000 system should have no more than 1000 Phantom Mailboxes.			
Automatic Call Distribution Groups	0	100	Yes (above 2 agents/group)
ACD Groups, Hunt Groups, and Calling Groups all count towards the same total. For example, on a V3000 system, if you have 50 Hunt Groups, the system can also support any combination of 50 ACD and Calling Groups.			
Phantom Mailboxes	None	1000	No
The 3-digit dial plan does not provide enough extensions to support 1000 Phantom Mailboxes.			
Call Park Zones	None	100	No
The 3-digit dial plan might not provide enough extensions to support 100 zones.			

**Table 15** Detailed Device Limits - V5000 (continued)

<b>Device/application Description</b>	<b>Per-Unit Device Count Toward Total</b>	<b>System Maximum</b>	<b>Device or Site License Required?</b>
Call Pickup	None	100	No
Conference Calls	None	12	No
Directed Pickup	None	50	No
Group Pickup	None	50	No
Hunt Groups or Calling Groups	None	100	No
<p>The 3-digit dial plan might not provide enough extensions to support 100 groups. ACD Groups, Hunt Groups, and Calling Groups all count towards the same total. For example, on a V3000 system, if you have 50 Hunt Groups, the system can also support any combination of 50 ACD and Calling Groups.</p>			
Music On Hold	None	1	No
Paging	None	3	No
Page Zones	None	9	No
System Speed Dials	None	100	No
Personal Speed Dials	None	100	No
Call Detail Reporting	None	1	No
Call Record and Monitor	None	1	No
TAPI Route Points	None	100	No
<p>The 3-digit dial plan might not provide enough extensions to support 100 TAPI Route Points.</p>			

**Table 16** Detailed Device Limits - NBX100

<b>Device/application Description</b>	<b>Per-Unit Device Count Toward Total System Count</b>	<b>NBX 100 System Maximum</b>	<b>Device or Site License Required?</b>
An NBX 100 system cannot always provide acceptable performance if you configure the maximum number of Phantom Mailboxes, Groups, devices, and Account Codes. For more information, see <a href="#">“Features and System Performance”</a> on <a href="#">page 57</a> .			
1102, 2102, or 2102-IR Business Telephone	1	200	No
2101 Basic Telephone	1	200	No
1105 Attendant Console	1	50	No
3106C Cordless Telephone	1	10	Yes
3107C Cordless Telephone	1	3	Yes
The limits on cordless telephones are due to radio frequency issues rather than system capacity limits. For more information, see <a href="#">“Cordless Telephone Installation Notes”</a> on <a href="#">page 130</a> .			
3103 Manager’s Telephone	1	200	Yes
3102 Business Telephone	1	200	Yes
3101 or 3101SP Basic Telephone	1	200	Yes
3108 Wireless Telephone	Not supported		
3105 Attendant Console	1	50	Yes
pcXset Soft Telephone	1 per pcXset PC telephone client	200	Yes
NBX Media Driver (for WAV devices)	1 driver/system enables the max allowable number of WAV devices	200	Yes
Polycom IP 3000 Speaker Phone	1	200	Yes
Legacy Link Handset Gateway card	16 (16-port card)	192 (12 cards)	Yes
NBX Analog Terminal Card (ATC)	4 4-port card)	200 (50 cards)	No

**Table 16** Detailed Device Limits - NBX100 (continued)

<b>Device/application Description</b>	<b>Per-Unit Device Count Toward Total System Count</b>	<b>NBX 100 System Maximum</b>	<b>Device or Site License Required?</b>
NBX Analog Terminal Adapter (ATA)	1	200	No
NBX Analog Line Card	4 per card	100 ports (25 cards)	No
NBX T1 Card (DS1)	24 per card	72 channels (3 cards)	No
NBX T1 Card (ISDN PRI)	23 per card	69 channels (3 cards)	No
NBX E1 Card (ISDN PRI)	30 per card	90 channels (3 cards)	No
NBX ISDN BRI-ST card	8 per card	96 channels (12 cards)	No
<b>System Architecture Attributes</b>			
Virtual Tie Lines	None	8	Yes
Account Codes	None	5000	5000
An NBX 100 system cannot always provide acceptable performance if you configure the maximum number of Phantom Mailboxes, Groups, devices, and Account Codes. For more information, see <a href="#">“Features and System Performance”</a> on <a href="#">page 57</a> .			
<b>Application and Call Processing Attributes</b>			
Auto Attendants	None	100	No
The 3-digit dial plan might not provide enough extensions to support 100 Auto Attendants.			
Voice Mail Ports	None	12	Yes (above 4 ports)
Voice Mailboxes	None	200	Covered by total system device license
Phantom Mailboxes	None	150	No
An NBX 100 system cannot always provide acceptable performance if you configure the maximum number of Phantom Mailboxes, Groups, devices, and Account Codes. For more information, see <a href="#">“Features and System Performance”</a> on <a href="#">page 57</a> .			
Automatic Call Distribution Groups	0	48	Yes (above 2 groups)
ACD Groups, Hunt Groups, and Calling Groups all count towards the same total. For example, on a V3000 system, if you have 50 Hunt Groups, the system can also support any combination of 50 ACD and Calling Groups.			

**Table 16** Detailed Device Limits - NBX100 (continued)

<b>Device/application Description</b>	<b>Per-Unit Device Count Toward Total System Count</b>	<b>NBX 100 System Maximum</b>	<b>Device or Site License Required?</b>
Call Park Zones	None	9 with the 3-digit dial plan; 100 with the 4-digit plan.	No
The 3-digit dial plan might not provide enough extensions to support 100 zones.			
Call Pickup	None	32	No
Conference Calls	None	4	No
Directed Pickup	None	10	No
Group Pickup	None	32	No
Hunt Groups or Calling Groups	None	48	No
The 3-digit dial plan might not provide enough extensions to support 100 groups. ACD Groups, Hunt Groups, and Calling Groups all count towards the same total. For example, on a V3000 system, if you have 50 Hunt Groups, the system can also support any combination of 50 ACD and Calling Groups.			
Music On Hold	None	1	No
Paging	None	3	No
Page Zones	None	9	No
System Speed Dials	None	100	No
Personal Speed Dials	None	100	No
Call Detail Reporting	None	1	No
Call Record and Monitor	None	1	No
TAPI Route Points	None	48	No
The 3-digit dial plan might not provide enough extensions to support 100 TAPI Route Points.			

**Device Licenses** The basic NBX system includes default licenses. You can add licenses to increase the system capacity, which might require a memory upgrade on V3000 and older V5000 systems. See [“Maximum Device Counts and Memory Requirements”](#) on [page 59](#) for more information. [Table 17](#) shows the defaults and maximums for licensed items on each NBX platform.

**Table 17** NBX Device Licensing Summary

License	NBX 100		V5000 and V3001R		V3000 Analog and BRI	
	Default	Max.	Default	Max.	Default	Max.
Device	200	200	250	1500	250	1500
Voice mail	4 ports 30 min.	12 ports 80 hours	4 ports 400 hours	72 ports unlimited	4 ports 400 hours	72 ports unlimited
	<b>NOTE:</b> Some NBX 100 Bundles support 4 ports/ 4 hours.					
Virtual Tie Lines	1	8	1	48	1	48
Disk Mirroring	na	na	0	1	na	na
NBX pcXset	1	200	1	750	1	750
NBX Media Driver	1	96	1	750	1	750
NBX VPIM Messaging License	0	Site	0	Site	0	Site
NBX 3rd-party Messaging License	0	Site	0	Site	0	Site
NBX Complement Attendant Software (CAS) License	0	Site	0	Site	0	Site
Call Record and Monitor License	0	Site	0	Site	0	Site
Automatic Call Distribution Agents	2	200	2	200	2	200
Group 0 Devices (3100)	0	200	0	1500	0	1500
Group 1 Devices (3101, 3101SP, 3106, 3107)	0	200	0	1500	0	1500
Group 2 Devices (3103, 3102, 3105, 3108)	0	200	0	1500	15	1500
Group 3 Devices	Reserved for future use.					
Group 4 Devices	Reserved for future use.					

### NBX Licensing Summary Notes

- NBX cards, Analog Terminal Adapters, and legacy devices (1102, 2102, 2102-IR Business Telephones, 2101 Basic Telephones, and 1105

Attendant Consoles) do not require a license. The number of these devices is governed solely by the system device license.

- The V3000 comes with four NBX Messaging ports and a limit of 400 hours of message storage. (A messaging port is used for each Automated Attendant session and each voice mail session.) If you want more than 4 ports, you must purchase and install additional NBX Messaging licenses. To go above 12 NBX Messaging ports, you must install the optional memory upgrade kit if you have not already done so to upgrade the device limit. If you purchase additional NBX Messaging capacity, message storage hours are limited only by available disk space, however, the NBX administrator can establish limits on the number of messages, message length, and retention period.
- The V3000 BRI has 4 physical ports (8 channels). Two ports (4 channels) are enabled by default. An optional license is required to activate the other two ports.

### **Group Device Licenses**

NBX Group Licensing provides a flexible system of licensing NBX telephones and attendant consoles. For licensing purposes, NBX devices are grouped according to the features the device can support. Lower cost devices that have fewer features are part of lower numbered License Groups while the more capable full-featured devices are part of the higher numbered License Groups.

#### **Group 0 Devices**

- 3100 Entry Telephone

#### **Group 1 Devices:**

- 3101 Basic Telephone
- 3101SP Basic Telephone
- 3106C Cordless Telephone
- 3107C Cordless Telephone
- 3108 Wireless Telephone

#### **Group 2 Devices:**

- 3103 Manager's Telephone
- 3102 and 3102B Business Telephone
- 3105 Attendant Console



*The 3Com Convergence Client (supported in SIP mode only) and generic SIP telephones are all Group 1 devices.*

### Dynamic License Assignment

NBX Group Licensing is a dynamic system that assigns licenses in the most efficient manner. A Group License can activate devices belonging to that group or devices with fewer features. For example, a Group 2 license normally activates Group 2 devices but it may also activate Group 1 or Group 0 devices. If a device needs a license and no license is available for that group, the system “loans” a license from a higher license group if a license is available in that group.

License loans are automatic. The system dynamically assigns available licenses to devices to achieve the most efficient use of the installed licenses. Dynamic allocation can cause a more valuable license to be used for a less valuable telephone. For example, using a Group 2 license for a Group 0 device might be desirable as an interim solution, but if you later add a Group 2 device, you would probably want to purchase a Group 0 license for the Group 0 telephone and use the Group 2 license for the Group 2 device.

**Figure 24** Licensing and Upgrades > Licenses > Usage Report

<b>Group 0 Devices License:</b>	1	1
3100 Phones:	1	
Loan From Group 1:	(0)	
Loan From Group 2:	(0)	
<b>Group 1 Devices License:</b>	2	2
3101 Phones:	1	
3106/3107 Cordless Phones:	2	
Loan To Group 0:	0	
Loan From Group 2:	(1)	
<b>Group 2 Devices License:</b>	10	17
3102 Phones:	4	
3103 Phones:	1	
3105 Attendant Consoles:	4	
Loan To Group 0:	0	
Loan To Group 1:	1	
<b>Group 3 Devices License:</b>	0	0
<b>Group 4 Devices License:</b>	0	0
<b>Total number of devices:</b>	22	250

The first column in the License Usage Report shows the number of device licenses currently in use. The second column shows the number of licenses in each License Group that have been installed on the system.

These examples demonstrate the flexibility of NBX Group Licenses.

**Example 1— All devices in the same License Group:** You purchase and install a package of ten Group 2 Licenses on your NBX system and then add five 3102 Business Telephones, one 3103 Manager's Telephone and one 3105 Attendant Console for a total of seven Group 2 devices. The system has three Group 2 licenses still available.

**Example 2 — Borrowing from the next highest License Group:** You add a 3101 Basic Telephone (Group 1 device) to your NBX system, which has three Group 2 licenses available. You do not add a Group 1 license to the system. The system checks for the availability of a Group 1 license. Since no Group 1 licenses are available, the system assigns a Group 2 license to the 3101 Basic Telephone. The system now has two Group 2 licenses available.

**Example 3 — Borrow from the highest License Group:** You add two 3100 Entry Telephones (Group 0 device) to your NBX system, which has two Group 2 licenses available. You do not add a Group 0 license to the system. The system checks for the availability of a Group 0 license, then checks for the availability of a Group 1 license, and since there are no Group 0 or 1 licenses available, assigns the Group 2 licenses to the 3100 Entry Telephones. The system now has no licenses available.

**Example 4 — Dynamic License Group Adjustment:** You add another 3103 Manager's Telephone (Group 2 device) to your an NBX system that has no licenses available in any group. The system will not enable the new telephone. You could add another Group 2 license, but it would be more cost-effective to add a less expensive Group 0 license instead. After you add a Group 0 license, the system automatically reassigns licenses in this manner:

- Releases one of the Group 2 licenses that was assigned to one of the 3100 Entry Telephones.
- Assigns the new Group 0 license to the 3100 Telephone.
- Assigns the released Group 2 license to the new 3103 Telephone.

The system now has no licenses available.

**Example 5 — Manual License Group readjustment:** You add another 3103 Manager's Telephone (Group 2 device) to an NBX system that has no licenses available in any group. Instead of adding a Group 0 license, as shown in Example 4, you could manually remove one of the telephones from the system to free a license. For example, you could use the NBX

NetSet utility to remove the 3101 Basic Telephone. Since that telephone was using a Group 2 license, removing the telephone makes a Group 2 license available.

### Group License Notes

- To view the number of Group Licenses you have installed on your system open the License Summary page in the NBX NetSet utility, *Licensing and Upgrades > Licenses*. To view how the number of Group Licenses have been allocated, including licenses loaned to different groups, open the License Usage Report in the NBX NetSet utility, *Licensing and Upgrades > Licenses > Usage Report*.
- To achieve the best licensing configuration, you should always add license keys to the system (*Licensing and Upgrades > Licenses > Add License*) before you add devices.
- If you are removing a telephone to manually readjust licenses, you should first make sure that *Auto Discover Telephones* is disabled (*System-wide Settings > Auto Discovery*) to ensure that the telephone is not automatically added to the system again.
- A basic V3000 system includes fifteen Group 2 Licenses.

### Upgrading Device Licenses from R4.X

Group Licensing is not available on systems prior to R5.0. Licensed devices that are installed on a system at the time that system is upgraded to R5.0 will have their licenses converted to appropriate License Groups:

- 3101 and 3101SP Basic Telephone licenses convert to Group 1 Licenses
- 3102 Business Telephone licenses convert to Group 2 Licenses
- 3105 Attendant Console licenses convert to Group 2 Licenses

### Rebooting to R4.X

If you reboot an R5.0 or R6.0 system to an earlier software version, these license conversions are in effect:

- Device licenses that were converted to Group 1 and Group 2 licenses during the upgrade to R5.0 are active as 3101, 3102 and 3105 licenses.
- Group 1 licenses applied after the upgrade to R5.0 are converted to 3101 licenses.
- Group 2 licenses applied after the upgrade to R5.0 are converted to 3102 licenses.

- Devices introduced at R5.0 or higher will not be recognized.

### **Group Licensing, 3105 Attendant Consoles, and R4.X Software**

If you reboot to R4.4 or R4.3, Group 2 licenses are converted to 3102 device licenses, which means that a 3105 Attendant Console, which is a Group 2 device, could become unavailable. The following examples show what happens to 3105 Attendant Consoles when you reboot to R4.4 or R4.3.

**Example 1:** Your system is running R4.3 (or R4.4) software. The system has one 3105 Attendant Console installed and you have one 3105 device license installed on the system. You upgrade the system. The 3105 device license becomes a Group 2 license and the 3105 continues to operate. You reboot the system to R4.3 or R4.4 and the 3105 continues to operate under the original 3105 device license.

**Example 2:** Your system is running R4.3 (or R4.4) software. The system has one 3105 Attendant Console installed and you have one 3105 device license installed on the system. You upgrade the system software, and then add another 3105 and a Group 2 license. You reboot the system to R4.3 or R4.4. One of the 3105 Attendant Consoles continues to work and the other does not because the Group 2 license that was used by the 3105 while operating after the upgrade is converted to a 3102 device license. To enable the 3105 under R4.4 or R4.3, you need to add a 3105 device license.

**Example 3:** Your system is running R4.3 (or R4.4) software. The system has one 3105 Attendant Console installed and you have *two* 3105 device licenses installed on the system. You upgrade the system software, and then add another 3105 and a Group 2 license. You reboot the system to R4.3 or R4.4. Both 3105s continues to work.



# 2

## INSTALLING SYSTEM HARDWARE COMPONENTS

This chapter explains how to install standard and optional hardware components for the NBX Networked Telephony System. This chapter includes information about using the Auto Discover feature to add telephones. See [Chapter 3](#) for more detailed information about adding telephones. See the SIP chapter of the NBX Administrator's Guide for information about adding SIP devices. This chapter covers these topics:

- [Introduction](#)
- [International Feature Support](#)
- [Installation Requirements](#)
- [Installation Questions](#)
- [Before You Begin Installation](#)
- [Important Safety Information](#)
- [Unpacking and Examining the Components](#)
- [Installing the NBX System Hardware](#)
- [Configuring NBX System Networking](#)
- [Connecting Cards and Devices](#)
- [Selecting Regional Software and Components](#)
- [Using Auto Discover for Initial System Configuration](#)
- [Connecting Telephone Lines](#)
- [Adding External Hardware](#)
- [Configuring Routing Devices](#)

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## Introduction

This guide uses the following definitions for administrators, users, and callers on the NBX system:

- **Administrator** — The person responsible for managing and maintaining the NBX system.
- **User** — A person with user login privileges for a telephone extension
- **Caller** — A person calling into the system

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## International Feature Support

For international users, the following features and devices warrant special attention.

### Power Fail Transfer

For the Power Fail Transfer (PFT) feature, is available only in North America.



**CAUTION:** *You should have access to a mobile or analog telephone that is connected to your standard PSTN.*

### Analog Terminal Connectors

The NBX Analog Terminal Adapter, the ATA port on the NBX V3000, and each port on the NBX Analog Terminal Card may require a telephone connector for use outside North America. Contact your 3Com NBX Voice-Authorized Partner for information on country-specific requirements.

### Language Support

The NBX Resource Pack includes these localized components:

- Telephone tones and cadences that match those used by telephone companies in different countries
- Localized online user documentation
- Localized voice prompts

Localized versions of the user portal of the NBX NetSet utility are dependent on the language settings of your browser.

If the required language is not provided in the voice prompts, which you can load and activate using the NBX NetSet utility, you can record new Automated Attendant main menu and system-wide Time-dependent greetings. For information on how to modify an Automated Attendant, see the “Automated Attendant” section in Chapter 6, “NBX Messaging,” in the *NBX Administrator’s Guide*.

## Installation Requirements

Verify that you meet the prerequisites that are detailed in the following sections before you install the NBX system.



*3Com does not support more than one NBX system on a local area network. You can connect NBX systems over a WAN (using VTLs or SIP trusted endpoints), however, installing more than one NCP on a LAN can cause unpredictable results.*

## Electrical Requirements

Verify that the site meets the following electrical requirements.

- Each NBX chassis requires an electrical connection.
- The NBX system should have its own breaker-protected circuit that uses the standard, three-wire, grounded configuration.
- Verify that there are enough outlets and circuit capacity in the chosen location to supply power to the NBX chassis and any auxiliary equipment that you install, such as a paging amplifier and an MOH device. The label on each chassis lists the electrical requirements of the system.
- You can eliminate the power adapter for a telephone by using a powered Ethernet cable. See [“Connecting Power to a 3Com Telephone”](#) in [Chapter 3](#) for more information.



**CAUTION:** *3Com strongly recommends that you use UL listed surge suppression devices for the telephones and the local telephone lines and an uninterruptible power supply for each NBX chassis.*

## Environmental Requirements

You can install the NBX system in any clean, dry, well-ventilated location. Take these environmental guidelines into consideration:

- The area must be safe from water damage. A wet basement, a utility closet, or an area near a window are not proper locations.



**CAUTION:** *Do not use the NBX system outdoors.*

- The area must be safe from physical interference. For example, do not put the chassis where it might be struck by a swinging door or where cables might be disturbed by a door or by people passing by.
- Do not install the NBX system in an area that is exposed to strong electromagnetic fields, dust, smoke, or airborne debris.

- Verify that the installation site has sufficient cooling and air circulation to maintain ambient temperatures from 0 °C through 40 °C (32 °F through 104 °F) and a humidity range of 5% to 85%, noncondensing.

### Physical Requirements

When you install an NBX system, verify that the installation site meets these physical requirements:

- The NBX system should be installed in a secure area. Telephone service and voice messaging are crucial business services. Protect them from tampering or accidental interference.
- To rack-mount an NBX system, use a standard 486-mm (19-in.) equipment rack, properly installed and grounded according to the manufacturer's instructions.
- Allow at least 8 cm (3 in.) of space on either side of the NBX chassis for proper ventilation.

### Local Telephone Service

Before you install the NBX system, be sure that the installation site meets the following local telephone service requirements:

- The local telephone company has installed local telephone lines and assigned telephone numbers.
- If necessary, you have extended the wires from a centrally located telephone interface panel to the installation site.
- Each analog telephone line has dial tone.



**CAUTION:** *3Com strongly recommends that you use UL-listed surge suppression devices on all local telephone lines.*

- If you are installing an optional BRI-ST, T1, or E1 Digital Line Card, verify that the telephone company has installed BRI-ST, T1, or E1 lines and run them to the installation location.

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### Installation Questions

If you have not already planned the installation, the following topics discuss issues that you may encounter when you install the telephone system.

#### Who Should Install the NBX System?

A technician who understands Ethernet cabling requirements and telephony configuration should install and configure the system. If you are using the IP capabilities of the NBX system, the technician also needs to understand IP, subnetworks, and DHCP (Dynamic Host Configuration Protocol).

After the initial installation, the local administrator should be able to install additional telephones and manage the system.

### Does the Telephone Company Need to Be Involved?



You must rely on the local telephone company to provide one or more loop-start lines and the telephone number or numbers. A fax machine can connect to the NBX system through an Analog Terminal Adapter.

**CAUTION:** To avoid damage to any 3Com telephone, do not connect it directly to a standard telephone line. Although the RJ-11 connector for a traditional telephone fits into the 3Com telephone's RJ-45 jack, the electrical interfaces are not compatible and the telephone will not work.

### Is Any Additional Equipment Required?

You may need some of the following components:

- To configure the NBX system, you need a computer equipped with a browser and a network interface card. You also need to provide IP configuration parameters for the system.
- If you choose to install the NBX system in an equipment rack, you need a standard 486 mm (19 in.) rack.
- You may need 10BASE-T or 100BASE-T Ethernet cable and connectors to connect the telephones to the hub.
- 3Com strongly recommends that you use surge suppression devices on all local telephone lines.
- 3Com telephones and attendant consoles that support Power over Ethernet (PoE) do not come with AC power adapters. You can power these devices with any IEEE 802.3af-compliant power source or with optional AC power adapters. The packing sheet that ships with each device shows the device power options.

### What External Devices Can Connect to an NBX System?

The following devices can be connected to an NBX system:

- Music-on-hold device, such as a radio, tape player, disk player, or computer sound card, equipped with a line out (600 ohm) connection can be connected directly into the NCP to provide audio for callers waiting on hold.
- Third-party 10BASE-T or 100BASE-T Ethernet hubs and switches.
- An ISDN (Integrated Services Digital Network) router, Frame Relay Access Device (FRAD) router, or Voice Over IP gateway.
- A WAN. You can access NBX systems located at branch offices through a wide area network (WAN). Before you use the NBX system

for voice over the WAN, verify that the WAN offers adequate bandwidth, and that the gateways can be configured to provide the correct routing information.

- External paging amplifier. The NBX system includes an RJ-11 jack to connect an externally powered paging amplifier.
- Standard telephone for power-fail situations. In the United States, you can connect a standard POTS (Plain Old Telephone Service — 2500-series compatible) telephone to an RJ-11 connector on the front of an NBX Analog Line Card or a V3000 Analog.

### **What Effect Does an NBX System Have on a LAN?**

A 10 Mbps Ethernet LAN can support a fully configured, fully utilized NBX 100 system. A 100 Mbps Ethernet LAN can support a fully configured, fully utilized V5000, V3000, or V3001R system. That is, a 10 Mbps Ethernet LAN with 200 “voice devices” (3Com telephones and outside telephone lines) can support the toll-quality audio provided by the NBX 100 system even when all 200 devices are in use. Similarly, a 100 Mbps LAN can support toll-quality audio with a fully configured V5000, V3000, or V3001R system. If you use an Ethernet switch, verify that it supports the 802.1P and 802.1Q specifications.

### **Silence Suppression and Bandwidth**

Silence suppression enables you to reduce network traffic. When silence suppression is enabled, the NBX device detects silence in the audio stream, such as a pause in conversation, and stops sending packets. The receiving NBX device generates white noise for the periods represented by silence indicator packets so that the listener does not hear true silence and worry that the call has been disconnected. The receiving NBX device can be another 3Com telephone, or for external calls, it can be an analog line port or a channel on an NBX Digital Line Card.

A careful listener might notice the difference between generated and actual background noise, so silence suppression is turned off by default. Silence Suppression settings result in a small compromise to audio quality. Do not enable Silence Suppression unless you are trying to solve bandwidth constraint issues.

You can enable or disable silence suppression for the entire system or for individual telephones and line card ports.

## NBX System Quality of Service

Quality of Service (QoS) is a way to allocate resources in data switches and routers so that data can be prioritized, with the most time-critical data receiving higher priority. At Layer 2, the NBX system supports Ethernet 802.1Q, “Standard for Virtual Bridged Local Area Networks,” and its associated specification, 802.1P, “Standard for Local and Metropolitan Area Networks, Supplement to Media Access Control (MAC) Bridges: Traffic Class Expediting and Dynamic Multicast Filtering.” These IEEE Ethernet standards define how Ethernet packets can be prioritized.

At Layer 3, the NBX supports IP Precedence, also called IP Type Of Service (ToS), to specify the class of service for each packet. The default hexadecimal value for NBX system IP ToS settings is 0xb8.

## Low-bandwidth Connections

You can configure a telephone to operate in lower-bandwidth environments such as a single B channel of a BRI ISDN line or other links with bandwidth as low as 56 Kbps.

- The preferred method for enabling a low-bandwidth connection is to select G729 audio, forcing the device to use lower-bandwidth compressed audio when communicating with other system devices.
- Alternatively, you can configure the telephone as a low-bandwidth device by disabling some of the internal features such as paging, conferencing, and music-on-hold. A check box in the NBX NetSet device configuration screen (*Telephone Configuration > Telephones*) automatically selects the best parameters for low-bandwidth connections.



*You can also connect an NBX Telephone to the system over a broadband connection and that is not considered a low-bandwidth connection. See the NBX Administrator's Guide for information about connecting a remote telephone over a broadband connection.*

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## Before You Begin Installation

Before you install the NBX system hardware:

- Complete the system plan. See the *System Planning Guide* on the *NBX Resource Pack*.
- Verify that the external telephone lines are active and present at the installation location.

- Gather the system components at the installation location.
- Verify that an existing LAN is in place and is operational and that LAN port connections are available.
- Read and follow the safety notes and precautions later in this chapter.

### Required and Recommended Tools and Equipment

These items are typically required to install an NBX system:

- Screwdrivers (flat and Phillips)
- Pliers
- Antistatic grounding strap
- Punch down tool
- Test set
- Four rack screws appropriate to the rack

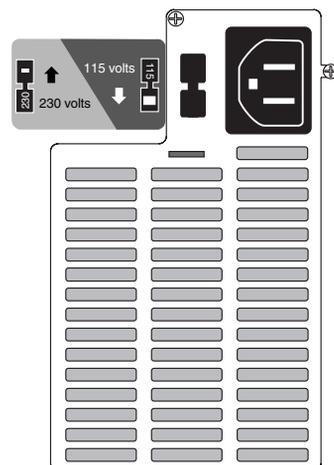
### Important Safety Information

Before you install or remove any components or perform any maintenance procedures on the system, you must read the following safety information.



**WARNING:** Verify that each NBX 100 Chassis is set to the correct voltage for your country requirements. The voltage is indicated on the voltage selector switch next to the main cable inlet on the front panel of each chassis. (See [Figure 25.](#))

**Figure 25** NBX 100 Voltage Selector Switch



The label to the left of the voltage selector switch shows the 115 and 230 volt selection positions. If the incorrect voltage for your country is set, use a small flat-blade screwdriver to toggle the switch up or down on each chassis.

The V3000, V3001R, and the V5000 work automatically with either 115 volt or 230 volt power, so they have no mechanism for changing voltage.



**WARNING:** *The system must be installed in a secure (locked) area.*

The components and telephones of the NBX system are electronic devices. To avoid injury and damage to the equipment, follow these important safety precautions when you install, use, or service it:

- Allow only qualified personnel to install and remove the unit.
- Always connect the unit to a grounded (protective earthed) outlet to comply with international safety and EMC standards.
- Read and understand all instructions.
- Always disconnect a device from its power source before you clean it.



**CAUTION:** *Each of the two power supply units in a V3001R or a V5000 with redundant power supplies has its own overcurrent protection device which operates independently — the overcurrent device for one power supply does not protect the second power supply. You must connect both AC power cords to provide power to both of the power supplies. Disconnect all power inputs to power off the device.*

- Do not disassemble components of the system. If you suspect that a card, chassis, or telephone is defective, call a service representative.
- Do not use this product near water. Do not install this product or a telephone in a damp area, such as a basement.
- Never cover or block the ventilation holes on the chassis or telephones. Proper ventilation is required to ensure normal operation of each component and to avoid component failures.



■ **WARNING:** *Never push objects into ventilation holes on the chassis or telephone. Electrical voltages in system components can cause bodily harm.*

- Do not use the telephone during an electrical storm. Lightning poses a remote risk of electric shock through any telephone system.
- Never use a telephone that is near the source of a gas leak to report the leak.
- Each NBX system and chassis is equipped with a three-prong grounding plug. Do not defeat the protection offered by the plug by clipping the grounding prong or by using an adapter to connect the system to a two-wire power source.
- Do not staple the power cord or otherwise attach it to building surfaces.

- Do not use any AC power converter on a 3Com device other than the one that is shipped with the device. On 3Com PoE-compliant devices, the power converter is an optional component.
- **Power Cord Set:**
  - For European countries, see [Table 18](#). If your country is not listed specifically, use the power cord set information for Europe.
  - For countries outside of Europe, you must use a power cord set that complies with the relevant national standards for cable type and appliance coupling.

**Table 18** Regulatory Requirements

Country or Region	Power Cord Set Details
Europe	<ul style="list-style-type: none"> <li>■ The supply plug must comply with CEE 7/7 (“SCHUKO”)</li> <li>■ The main cord must be &lt;HAR&gt; or &lt;BASEC&gt; marked and be of type HO3VVF3GO.75 (minimum).</li> </ul>
United Kingdom	<ul style="list-style-type: none"> <li>■ The supply plug must comply with BS1363 (3-pin 13 A) and be fitted with a 5A fuse that complies with BS1362.</li> <li>■ The main cord must be &lt;HAR&gt; or &lt;BASEC&gt; marked and be of type HO3VVF3GO.75 (minimum).</li> </ul>
Italy	<ul style="list-style-type: none"> <li>■ The supply plug must comply with CEI23-16/VII.</li> <li>■ The main cord must be &lt;HAR&gt; or &lt;BASEC&gt; marked and be of type HO3VVF3GO.75 (minimum).</li> </ul>
Denmark	<ul style="list-style-type: none"> <li>■ The supply plug must comply with section 107-2-D1, standard DK2-1a or DK2-5a.</li> </ul>
Switzerland	<ul style="list-style-type: none"> <li>■ The supply plug must comply with SEV/ASE 1011.</li> </ul>

- The appliance coupler (that is, the connector to the *unit*, not the connector to the *wall plug*) must have a configuration that mates with an EN60320/IEC320 appliance inlet.
- The socket outlet must be near the unit and easily accessible. You can remove power from the unit only by disconnecting the power cord from the outlet. If your NBX system has redundant power supplies, you must disconnect power from both power supplies.
- This unit operates under SELV (Safety Extra Low Voltage) conditions according to IEC 60950. These conditions are maintained only if the equipment to which the unit is connected also operates under SELV conditions.
- France only:  
This unit cannot be powered from IT (Impédance à la Terre) supplies. If

your supplies are of IT type, this unit must be powered by 230V (2P+T) via an isolation transformer ratio 1:1, with the secondary connection point labelled Neutral, connected directly to earth (ground).



*When this system is used in Australia, you must connect the equipment to the telephone network via a line-isolating unit (LIU) that complies with ACA TS001-1997.*



**CAUTION:** (Australia only.) NBX equipment will be inoperable when main power fails.

### Lithium Battery Safety



The following information is important. Read it carefully.

**WARNING:** The battery is not field replaceable. If you suspect a battery failure, contact your 3Com NBX Voice-Authorized Partner.

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

---

### Consignes Importantes de Sécurité



Nous vous demandons de lire attentivement les consignes suivantes de sécurité avant d'installer ou de retirer l'appareil.

**AVERTISSEMENT:** Les avertissements présentent des consignes que vous devez respecter pour garantir votre sécurité personnelle. Vous devez respecter attentivement toutes les consignes.



**AVERTISSEMENT:** Vérifiez que le système est paramétré sur le réglage de tension conforme aux exigences du pays d'utilisation.



**AVERTISSEMENT:** Le système doit être rangé (verrouillé) dans un endroit sûr et seul le personnel ayant reçu une formation peut y avoir accès.

- L'installation et la dépose de cette unité doivent être confiés à un personnel qualifié.
- L'unité ne devrait pas être branchée à une prise de courant alternatif (C.A.) sous aucun prétexte sans un branchement mise à la terre protectrice (mise à la masse).
- Vous devez raccorder cette unité à une sortie mise à la terre protectrice (mise à la masse) afin de respecter les normes internationales de sécurité et les normes de compatibilité électromagnétique.
- Cordon Électrique:  
Pour les pays européens, consultez le tableau 9 et utilisez les informa-

tions sur le cordon d'alimentation pour Europe si votre pays ne figure pas dans la liste. Pour les pays noneuropéens, utilisez obligatoirement un cordon d'alimentation conforme aux normes nationales pertinentes au couplage d'appareils et aux types de câblages.

**Table 19** Cordon Électrique

Pays ou Region	Détails du Cordon Électrique
Europe	<ul style="list-style-type: none"> <li>■ La prise secteur doit être conforme aux normes CEE 7/7 ("SCHUKO")</li> <li>■ Le cordon secteur doit porter la mention &lt;HAR&gt; ou &lt;BASEC&gt; et doit être de type HO3VVF3GO.75 (minimum).</li> </ul>
Royaume-Uni	<ul style="list-style-type: none"> <li>■ La prise secteur doit être conforme aux normes BS1363 (tripolaire, 13 amp) et équipée d'un fusible 5A à conformité BS1362.</li> <li>■ Le cordon secteur doit porter la mention &lt;HAR&gt; ou &lt;BASEC&gt; et doit être de type HO3VVF3GO.75 (minimum).</li> </ul>
Italie	<ul style="list-style-type: none"> <li>■ La prise secteur doit être conforme aux normes CEI23-16/VII.</li> <li>■ Le cordon secteur doit porter la mention &lt;HAR&gt; ou &lt;BASEC&gt; et doit être de type HO3VVF3GO.75 (minimum).</li> </ul>
Danemark	<ul style="list-style-type: none"> <li>■ La prise mâle d'alimentation doit respecter la section 107-2 D1 de la norme DK2 1a ou DK2 5a.</li> </ul>
Suisse	<ul style="list-style-type: none"> <li>■ La prise mâle d'alimentation doit respecter la norme SEV/ASE 1011.</li> </ul>

- Le coupleur d'appareil (le connecteur de l'unité et non pas la prise murale) doit respecter une configuration qui permet un branchement sur une entrée d'appareil EN60320/IEC 320.
- La prise secteur doit se trouver à proximité de l'appareil et son accès doit être facile. Vous ne pouvez mettre l'appareil hors circuit qu'en débranchant son cordon électrique au niveau de cette prise.
- L'appareil fonctionne à une tension extrêmement basse de sécurité qui est conforme à la norme IEC 60950. Ces conditions ne sont maintenues que si l'équipement auquel il est raccordé fonctionne dans les mêmes conditions.
- **Uniquement pour la France:**  
Ce groupe ne peut pas être alimenté par un dispositif à impédance à la terre. Si vos alimentations sont du type impédance à la terre, ce groupe doit être alimenté par une tension de 230 V (2 P+T) par le biais d'un transformateur d'isolement à rapport 1:1, avec un point secondaire de connexion portant l'appellation Neutre et avec raccordement direct à la terre (masse).

**Batterie au lithium** Veuillez lire attentivement la note suivante.



**AVERTISSEMENT:** Le remplacement incorrect de batterie au lithium présente un risque d'explosion. Remplacez cette batterie par une batterie identique ou de type équivalent, en respectant les recommandations du constructeur. Vous devez vous débarrasser des batteries usées en respectant les consignes du constructeur.

**Wichtige Sicherheitsinformationen**

Sie müssen die folgenden Sicherheitsinformationen sorgfältig durchlesen, bevor Sie das Gerät installieren oder ausbauen.



**WARNHINWEIS:** Warnhinweise enthalten Anweisungen, die Sie zu Ihrer eigenen Sicherheit befolgen müssen. Alle Anweisungen sind sorgfältig zu befolgen.



**WARNHINWEIS:** Achten Sie darauf, daß an dem NBX die Ihrem Land entsprechende Spannung eingestellt ist.



**WARNHINWEIS:** Das NBX muß an einem sicheren (abgeschlossenen) Ort aufbewahrt werden, zu dem nur ausgebildete Mitarbeiter Zugang haben.

- Die Installation und der Ausbau des Geräts darf nur durch Fachpersonal erfolgen.
- Das Gerät nicht an eine Wechselstromsteckdose anschließen, die über keine Schutzerdung verfügt.
- Das Gerät muß an eine Steckdose mit Schutzerdung angeschlossen werden, die internationalen Sicherheitsvorschriften und den Vorschriften zur EMV entspricht.
- Netzkabelsatz:  
Für europäische Länder, siehe Tabelle 10 und einen Netzkabelsatz verwenden für Europa wenn Ihr Land nicht einzeln aufgeführt ist. Für nichteuropäische Länder müssen Sie einen Netzkabelsatz verwenden, der die entsprechenden nationalen Geräteanschluß- und Kabeltypnormen erfüllt.

**Table 20** Anschlußkabelsatz

Land	Anschlußkabelsatz
Europa	<ul style="list-style-type: none"> <li>■ Der Netzstecker muß die Norm CEE 7/7 erfüllen ("SCHUKO").</li> <li>■ Das Netzkabel muß vom Typ HO3VVF3GO.75 (Mindestanforderung) sein und die Aufschrift &lt;HAR&gt; oder &lt;BASEC&gt; tragen.</li> </ul>

**Table 20** Anschlußkabelsatz (continued)

Land	Anschlußkabelsatz
Vereinigtes Königreich	<ul style="list-style-type: none"> <li>■ Der Netzstecker muß die Norm BS1363 (13 Ampere, 3 Stifte) erfüllen und mit einer 5-A-Sicherung gemäß Norm BS1362 ausgestattet sein.</li> <li>■ Das Netzkabel muß vom Typ HO3VVF3GO.75 (Mindestanforderung) sein und die Aufschrift &lt;HAR&gt; oder &lt;BASEC&gt; tragen.</li> </ul>
Italien	<ul style="list-style-type: none"> <li>■ Der Netzstecker muß die Norm CEI23-16/VII erfüllen.</li> <li>■ Das Netzkabel muß vom Typ HO3VVF3GO.75 (Mindestanforderung) sein und die Aufschrift &lt;HAR&gt; oder &lt;BASEC&gt; tragen.</li> </ul>
Dänemark	<ul style="list-style-type: none"> <li>■ Der Netzstecker muß die Vorschriften laut Abschnitt 107-2-D1 der Norm DK2-1a oder DK2-5a erfüllen.</li> </ul>
Schweiz	<ul style="list-style-type: none"> <li>■ Der Netzstecker muß die Norm SEV/ASE 1011 erfüllen</li> </ul>

- Der Gerätestecker (der Anschluß an das Gerät, nicht der Wandsteckdosenstecker) muß eine passende Konfiguration für einen Geräteeingang gemäß EN60320/IEC320 haben.
- Die Netzsteckdose muß in der Nähe des Geräts und leicht zugänglich sein. Die Stromversorgung des Geräts kann nur durch Herausziehen des Gerätenetzkabels aus der Netzsteckdose unterbrochen werden.
- Der Betrieb dieses Geräts erfolgt unter den SELV-Bedingungen (Sicherheitskleinstspannung) gemäß IEC 60950. Diese Bedingungen sind nur gegeben, wenn auch die an das Gerät angeschlossenen Geräte unter SELV-Bedingungen betrieben werden.
- **Nur für Frankreich:**  
Diese Einheit kann nicht über Anschlüsse des Typs IT<sup>+</sup> betrieben werden. Wenn Sie über IT-Anschlüsse verfügen, muß die Einheit über einen geerdeten Trenner mit einem Übersetzungsverhältnis 1:1 mit 230 V (2P+T) betrieben werden; dabei muß der zweite Anschlußpunkt die Bezeichnung Neutral tragen.

**Lithiumbatterie**

Bitte lesen Sie den folgenden Hinweis sorgfältig durch.



**WARNHINWEIS:** Wird die Lithiumbatterie falsch ersetzt, besteht Explosionsgefahr. Die Batterie nach den Empfehlungen des Herstellers durch eine Batterie des gleichen oder eines gleichwertigen Typs ersetzen. Verbrauchte Batterien nach den Angaben des Herstellers entsorgen.

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## Unpacking and Examining the Components

Unpack the system components and examine them. Depending on the size and configuration of the system that was ordered, there may be multiple chassis and line cards. If you have not received all components, contact your 3Com NBX Voice-Authorized Partner.

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## Installing the NBX System Hardware

Before you begin to install the hardware, you can perform optional steps:

- [Recording MAC Addresses](#)
- [Optionally Upgrading NBX Memory](#)

### Recording MAC Addresses

After you install the system disk drive, you should record the MAC addresses of the ports that interface with CO equipment. If you will be installing optional cards into a chassis, 3Com recommends that you install one card at a time, and that you install the cards in the order of the MAC addresses of the ports on the card. This process ensures that the NBX system assigns sequential, contiguous groups of device extensions to each board. If you enable the Auto Discover process to configure the cards, you can then use the NBX NetSet utility to view the MAC address of each individual port.

A well-organized physical configuration can simplify:

- Management of incoming telephone lines, by associating line card ports with specific telephone numbers
- Troubleshooting, by associating groups of channel numbers with specific cards
- System expansion

### V3000

- To determine the MAC address of the analog lines of the NBX V3000, view the label on the back of the NBX V3000. The MAC address is labeled **FXO MAC Address**. All four analog line ports share one MAC address. After the ports are discovered by the NBX Auto Discover process, they are differentiated in the NBX NetSet utility by a channel number, 1-4.

### Optional NBX Cards

- To determine the MAC addresses of the ports on optional NBX Analog Line Cards, NBX Analog Terminal Cards, and NBX Digital Line Cards,

view the MAC address label attached to each card. MAC address labels are located on the component side of NBX cards. All four ports on a card share one MAC address and they are differentiated by a channel number, 1-4. After a card is inserted into a chassis, the MAC address is not visible.



*On Analog Line Card 3C10114, which is no longer in production, each port has a different MAC address and port addresses are consecutive. A label on the card shows the base MAC address, which is the address for port 1. The other three ports are incremented versions of the base MAC address.*

### **Optionally Upgrading NBX Memory**

The V3000 and V5000 systems can accept a memory upgrade module. If your system requires a memory upgrade, see the instruction sheet that comes with the memory kit.

For more information on which NBX features require expanded memory, see [“Maximum Device Counts and Memory Requirements”](#) on [page 59](#).

### **Mounting an NBX Chassis**

To mount the chassis in an equipment rack or on the wall (NBX 100 only), you need:

- Two mounting brackets (supplied with the Call Processor)
- Four mounting screws (supplied with the Call Processor)
- Phillips screwdriver
- Drill and drill bit (wall-mount only)
- Level (wall-mount only)
- 19-in. equipment rack (for rack mounting only)

#### **Mounting an NBX Chassis in an Equipment Rack**

To mount an NBX chassis in an equipment rack:

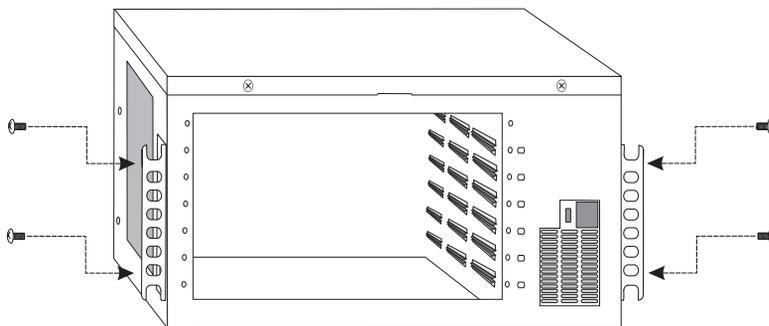


*Verify that the equipment rack is properly installed and grounded and that the installation area is properly ventilated.*

- 1 Attach the two mounting brackets securely to the sides of the NBX chassis (NBX 100 chassis shown in [Figure 26](#)) using the upper and

lower holes in each of the brackets and the two holes near the front of the chassis. See [Figure 26](#).

**Figure 26** Attaching Rack Mounting Brackets to the NBX 100 Chassis



- 2 Install one screw into each vertical rail of the rack. Leave a space of at least 6.5 cm (2.5 in.) between this location and any other equipment in the rack.

Do not tighten the screws. Thread them just far enough so that they are secure. The slots on the bottom of the Call Processor chassis mounting brackets slip onto these screws.

- 3 Lift the chassis and slip the keyed slots of the mounting brackets onto the two screws you installed in Step 1.
- 4 Hold the chassis in place and install a mounting screw in the top keyed slot of each bracket.
- 5 Tighten all four screws securely.

### Mounting an NBX 100 Chassis on a Wall

To mount the NBX 100 system chassis on a wall:

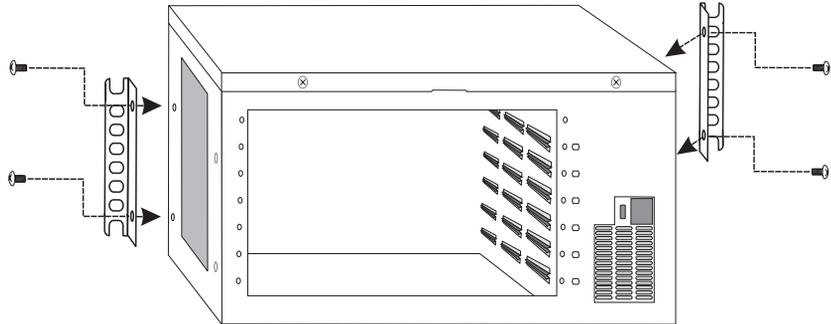


*Before you wall-mount a chassis, prepare an area by attaching a suitable mounting surface securely to the wall studs. For effective cooling air flow,*

*do not mount multiple chassis side by side. If you do, one chassis draws in warm air from the other, limiting the effectiveness of the cooling fans.*

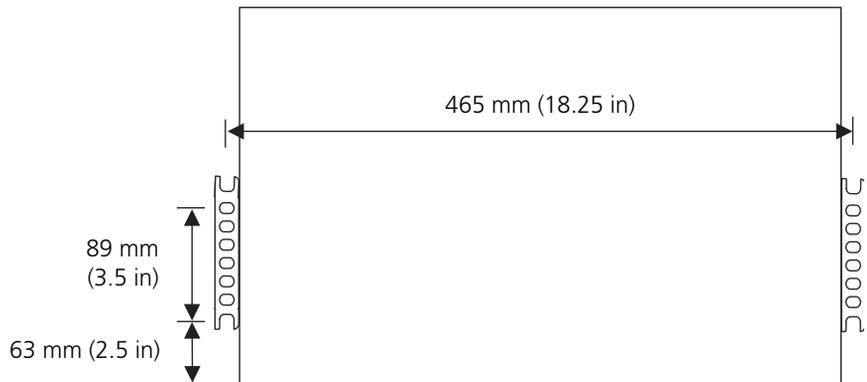
- 1 Install the brackets at the back of the chassis, as shown in [Figure 27](#).

**Figure 27** Attaching Wall Mounting Brackets to the NBX 100 Chassis



- 2 Use the dimensions shown in [Figure 28](#) to mark the locations where you will drill the pilot holes into the mounting surface.

**Figure 28** Chassis Wall-mount Dimensions



**CAUTION:** *If you wall-mount the NBX 100 chassis, you must attach the chassis securely to a plywood mounting board which is firmly attached to the wall. A fully configured 6-slot chassis can weigh up to 13.5 kg (30 lb).*

- 3 Drill pilot holes at the locations you marked.
- 4 Install the two lower mounting screws.

Do not tighten the screws. Thread them just far enough so that they will support the weight of the NBX 100 chassis.

- 5 Lift the chassis and slide the two keyed mounting brackets over the screws in the wall.
- 6 While holding the chassis in place, install screws into the top holes of each mounting bracket, and then tighten all four screws.

### Installing a Disk Mirroring Kit

Disk mirroring is an option that is supported on the V5000 and the V3001R. Disk mirroring provides the ability to run a second disk in parallel with the first. Data is kept current on both disks. If one disk fails, the second disk takes over without any system interruption. The primary disk is already mounted in your V5000 or V3001R chassis. The second disk (if you purchased one) is packaged separately for you to install. If you are not installing a second disk with your NBX system, you can skip this section and proceed to [“Powering Your NBX System”](#) on [page 100](#).



*Disk Mirroring is enabled when you install the disk mirroring license key in the NBX NetSet utility. The NBX NetSet utility prompts you to reboot the system after you install the license key to activate mirroring. To disable mirroring, you must remove the mirroring license.*



*Always perform a system backup that includes your licenses and voice mail before you make a hardware change. Be sure to copy the backup file to a remote location. When you install a second drive for disk mirroring, the system automatically synchronizes the disks, but it is still good practice to perform a data backup before you begin the operation.*



**CAUTION:** *To avoid damage to electronic circuits, always wear an anti-static grounding strap when handling the disk drive or NBX system components. When you ground the strap, do not ground it to an NBX chassis because the chassis is not grounded until you install it in a properly grounded setting.*

To check the status of the disk system:

- 1 Login to the NBX NetSet utility as administrator.
- 2 Click *Reports > System Data*.
- 3 Scroll to the bottom of the System Data screen and click the Disk Status button.



*Disk Mirroring is an optional feature. If you do not install a second disk when you first install your system, you can purchase an upgrade kit at a later time.*

See the appropriate page for instructions on how to install an optional second disk when you are setting up your NBX system:

- See the next topic, [“V5000 Disk Mirroring”](#) for procedures on how to install second disk on a V5000 system.
- See [“V3001R Disk Mirroring”](#) on [page 99](#) for procedures on how to install second disk on a V3001R system.

### V5000 Disk Mirroring

To install an additional disk drive for disk mirroring on a V5000:

- 1 Install the key code for your disk mirroring license, *Licensing and Upgrades > Licenses*.
- 2 Shut down system software, *System Maintenance > Reboot / Shutdown*.
- 3 Turn off power to your system. If your NBX system has redundant power supplies, disconnect both supplies.



**WARNING:** *This device has more than one power input. Disconnect all power inputs to power off this device.*



**AVERTISSEMENT:** *Ce périphérique comporte plusieurs entrées d'alimentation. Déconnectez toutes les entrées d'alimentation afin de le mettre hors tension.*



**VORSICHT:** *Dieses Gerät besitzt mehrere Eingänge zur Stromversorgung. Trennen Sie das Gerät zum Ausschalten von allen Stromquellen.*

- 4 Remove the disk drive tray. The tray is equipped with a lock so you might need to unlock the tray. Unscrew the two knurl nuts on either side of the disk tray and then pull the tray forward.
- 5 Unpack the second disk drive and install it in the open slot of the disk tray.
- 6 Connect the ribbon cable and power connector correctly.
- 7 Re-insert the disk drive tray and tighten the locking nuts.
- 8 Connect power to the system.

Disk synchronization begins automatically and finishes in approximately 60 to 90 minutes, depending on the amount of information on disk 1 that must be mirrored on disk 2.

The status lights on the front of the V5000 indicate disk status. For detailed information, see [“V5000 System Status LEDs”](#) on [page 29](#).

## V3001R Disk Mirroring

To install an additional disk drive for disk mirroring on a V3001R:

- 1 If you have not already done so, login to the NBX NetSet utility as administrator and perform a data backup.



**CAUTION:** V3001R disk drives are not “hot-swappable.” To avoid potential loss of data, you must shut down the system software and turn off the power to the V3001R before you add or remove a disk drive.

- 2 Add the disk mirroring license; **Licensing and Upgrades > Licenses**, and then shut down the system software; **System Maintenance > Reboot / Shutdown**.
- 3 Remove the face panel from the front of the V3001R by placing a flat blade screwdriver into the slot at each edge of the beveled front panel surface, then gently press the screwdriver blade towards the center of the box until the tab releases from the slot, and pull the front panel forward.
- 4 Turn off both power supplies by using the two power switches, **1** in [Figure 29](#).



**WARNING:** This device has more than one power input. Disconnect all power inputs to power off this device.

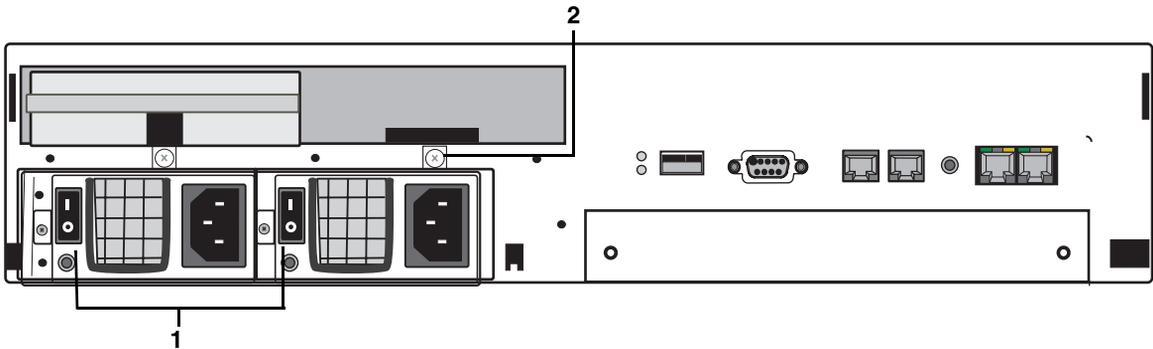


**AVERTISSEMENT:** Ce périphérique comporte plusieurs entrées d'alimentation. Déconnectez toutes les entrées d'alimentation afin de le mettre hors tension.



**VORSICHT:** Dieses Gerät besitzt mehrere Eingänge zur Stromversorgung. Trennen Sie das Gerät zum Ausschalten von allen Stromquellen.

- 5 Remove the disk drive locking bracket, **2** in [Figure 29](#), from the empty disk drive bay.

**Figure 29** V3001R with One Disk and Face Panel Removed

- 6 Slide the new disk into the empty disk drive bay until you feel it contact the rear connector. Press firmly until you feel the disk drive seat into the connector. Attach the disk drive locking bracket.
- 7 Turn on power to both power supplies, and then install the front cover. Disk synchronization begins automatically and finishes in approximately 20 hours. The system is operational during the disk synchronization. If you reboot the system during the synchronization, the system continues the operation after the reboot.

The status lights on the front of the V3001R indicate disk status. For detailed information, see [“V3001R System Status LEDs - S1 and S2”](#) on [page 29](#).

### Powering Your NBX System

To turn on power to the NBX system and the optional NBX chassis, follow these steps:

- 1 Attach a power cord to each unit. For an NBX 100, a V5000, or a chassis, attaching the power cord applies power to the unit. For a V3000, you must also press the power button on the back of the unit to the ON position. For a V3001R, the power buttons on the two power supplies are located on the front of the unit, behind the face panel.
- 2 Allow approximately 3 minutes for the system to complete the boot process.

Examine the status lights (LEDs) on the front panel to ensure that the system is running properly. For status light descriptions, see:

- V3000 Analog — [Figure 1](#) on [page 22](#).
- V3000 BRI — [Figure 2](#) on [page 24](#).
- V3001R — [Figure 3](#) on [page 26](#).

- V5000 — [Figure 4](#) on [page 28](#).
- NBX 100 — [Figure 6](#) on [page 31](#).

You are now ready to establish network/LAN Connectivity. See [“Configuring NBX System Networking”](#) next.

## Configuring NBX System Networking

Configuring the networking for the NBX system involves these steps:

- [Establishing IP Connectivity](#)
- [Modifying Default IP Settings](#)
- [Establishing LAN Connections](#)
- [Configuring the NBX System IP Address](#)

### Establishing IP Connectivity

You need IP connectivity to use the NBX NetSet utility to configure and manage the NBX system. You do not need to install any special software to run the NBX NetSet utility, but you must have Microsoft Internet Explorer 5.5 or higher, or Mozilla Firefox 1.0 or higher to access the NBX NetSet utility, the configuration interface for the NBX system.

### Modifying Default IP Settings

Each NBX system is shipped with default IP settings. The default IP address is part of a block of addresses reserved by the Internet Engineering Task Force (IETF) for use on private IP networks, that is, networks that do not connect to the Internet.



**CAUTION:** *Connecting two NBX systems to the same subnetwork (for example, using IP addresses 10.233.20.100 and 10.233.20.200 for two NCPs) is unsupported.*

With most installations, you need to change the IP settings of the NBX system to conform to the network. The IP settings include:

- **Host Name** — A name for the system, up to 30 characters in length, including spaces, underscores, and hyphens.
- **IP Address** — An IP address for the NBX system that is consistent with your local area network. Consult your network administrator if you need assistance.
- **Default Gateway** — An IP address for the gateway through which you access the NBX system. If all devices (telephones, adaptors, and cards) are on the same subnet as the NCP, you do not need to specify

a gateway IP address. Consult your network administrator if you need assistance.

- **Subnet Mask** — An IP address mask that is consistent with your local area network. Consult your network administrator if you need assistance.

To help you determine if you need to make changes to the NBX system IP settings, see [Table 21](#), later in this section. To avoid address conflicts with devices on your local network, change the IP settings of NBX system *before* you connect the system to the LAN.

**Summary of how to change the IP settings of the NBX system:**

- Temporarily change the IP address of your computer to conform with the default IP settings of the NBX system.
- Connect your computer to the NBX system.
- Use the NBX NetSet utility to modify the IP settings of the NBX system.
- Restore the IP settings of your computer and reconnect it to the LAN.
- Connect the NBX system to your local network.

To change the IP settings of the NBX system:

- 1 Use a category 5 Ethernet crossover cable to connect the computer's network interface card (NIC) directly to your NBX system Ethernet port.

By connecting the computer directly to the NBX system, you isolate the system from the network and eliminate the influence of routers and proxy servers.

- 2 Record the existing IP settings on the computer so you can restore them later.
- 3 Change the IP settings of your computer to:

IP address:	192.168.1.191
Default gateway:	0.0.0.0
Subnet mask:	255.255.255.0



**CAUTION:** Do not set your computer address to 192.168.1.192 because that IP address is used temporarily during system startup. If you use that address for your computer, a conflict results and the system might not start properly.

- 4 Reboot the computer so that the new settings take effect.

- 5 Start a browser.
- 6 To access the NBX NetSet utility, enter the following address into the browser's address field:

**192.168.1.190**

This is the default IP address of the NBX system.

If the connection attempt fails, check the browser's Proxy Server setting and verify that it is configured for a direct connection. Also, check the Connection setting and verify that it is set for a direct LAN connection, not a dial-up connection.

After you connect, you can log in to the NBX NetSet utility using the default administrator user name and password. See the next topic, ["Configuring the NBX System IP Address"](#) for instructions on configuring the NBX IP settings.



**CAUTION:** *If you change the administrator password, you cannot retrieve (return) to the default, nor can you retrieve your new password if you forget it. If you make any password changes, record them in a safe place.*

[Table 21](#) describes possible network environments and the configuration needed to enable IP connectivity to the NBX system.

**Table 21** IP Addressing and the NBX System

Local IP Environment	NBX System Configuration
No IP networking currently in use	<p>You do not need to change the IP settings in the NBX system, but you probably need to configure the IP settings in the computer that you use to communicate with the NBX NetSet utility.</p> <p>Set the computer's IP parameters to these settings:</p> <ul style="list-style-type: none"> <li>■ IP address: 192.168.1.191</li> <li>■ Default gateway: 192.168.1.1</li> <li>■ Subnet mask: 255.255.255.224</li> </ul> <p>If you connect the LAN to the Internet in the future, your Internet service provider gives instructions on how to configure the IP settings of devices on the network. You must change the IP settings of the NBX system at that time.</p>

**CAUTION:** *Do not set your computer address to 192.168.1.192 because this IP address is used temporarily during system startup. If you use that address for your computer, a conflict results and the system may not start properly.*

**Table 21** IP Addressing and the NBX System (continued)

Local IP Environment	NBX System Configuration
Private IP network, no subnets	<p>You probably need to change the NBX system IP address to conform with the existing IP addressing scheme.</p> <p>You must change the NBX system IP address (192.168.1.190) if that address is already in use on the network or if you are using a different range of addresses.</p>
Private IP network, with subnets	<p>You probably need to change the NBX system IP address to conform with the existing address space. You must change the NBX system IP address (192.168.1.190) if that address is already in use on the network.</p> <p>You must change the NBX System subnet mask (255:255:255:0) if it does not conform to the network subnet scheme.</p> <p>You must change the NBX system default gateway from 0.0.0.0 to the IP address of the default gateway for the subnet where you install the NBX system.</p>
Internet connectivity; addresses provided by the Internet Service Provider.	<p>You must change the NBX system IP address, default gateway, and possibly the subnet mask. Ask the ISP to provide a fixed IP address, subnet mask, and default gateway. You must have a fixed IP address for the NCP.</p>
Internet connectivity; addresses provided from address block controlled by the client's organization.	<p>You must change the NBX system IP address, default gateway, and possibly the subnet mask. Ask the local network administrator to provide a fixed IP address, (the NBX NCP does not support DHCP or BOOTP) a subnet mask, and a default gateway.</p>

### Configuring the NBX System IP Address

You must change the default IP address of the NBX system and specify IP settings appropriate for your LAN.

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *System-wide Settings > IP Settings*.
- 3 Edit the IP settings to conform to your LAN.
- 4 Click *Apply* or *OK* to close the dialog box.
- 5 Click *System Maintenance > Reboot/Shutdown*.
- 6 Click *Reboot*.

Be sure to restore your computer's original IP settings.

### Establishing LAN Connections

After you establish IP connectivity, you are ready to install the LAN connections.

- Connect a V3000, V5000, or V3001R system to your LAN using the Ethernet port. This port can operate at 10 Mbps and 100 Mbps; it automatically senses the speed of your LAN. Check the NCP status lights to verify network connectivity:

- Connect the NBX 100 Call Processor to your network using either the BNC 10B2 connector (3C10110C only) or the 10BT UPLINK MDI-X port. The 10B2 connection and the Uplink port on the 3C1011C Call Processor are two different connection points for a single port. They cannot be used simultaneously. If you use the Uplink connector, be sure to program the switch or router on the other end for 10 MB operation.

You do not need to connect cards to each other within a chassis. They are connected by the chassis backplane.



*Do not connect telephone lines or 3Com telephones yet.*

**Test Connectivity** After the NBX system finishes its reboot operation and you have restored your computer's original IP settings, test connectivity to the NBX system.

- 1 Open a browser on your computer.
- 2 Type the IP address you assigned to the NBX system in the browser's address box, and then press Enter.

The NBX NetSet utility login screen should appear in your browser.

**Set NBX System-wide Preferences** Before you begin configuring devices, you should verify these default settings:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *Telephone Configuration > System-wide Telephone Settings*.

---

**Connecting Cards and Devices** After you configure and test the NBX system, you can add optional cards and attach optional devices such as Music On Hold.

**Connecting Analog Line Cards** You can install cards with the power on to the chassis. To connect and configure an NBX Analog Line Card:

- 1 Remove the blank faceplate from one of the slots.
- 2 Verify that the edges of the card ride in the chassis guide slots, and then slide the card in until you feel slight resistance. Press firmly on both sides of the front of the card until you feel it seat in the connector, and then tighten the two knurled knobs.



*If you cannot seat the card with light pressure, remove it and check for obstructions.*

- 3 After you seat the card, wait at least 2 minutes for the card to initialize.
- 4 Use the NBX Auto Discover feature to configure the card. The Auto Discover feature finds each line card port and assigns extensions. For more information, see [“Using Auto Discover for Initial System Configuration”](#) on [page 112](#).



*3Com recommends that you install the cards in MAC address order. This practice makes it easier to diagnose and troubleshoot problems.*

### Mapping Line Card Ports to Telephone Lines

You can run the system using the default configuration, but to have complete control over telephone operations, you need to know which telephone line is assigned to which analog line port so that you can map CO telephone lines to telephones and manage lines for maximum performance. Use the NBX NetSet utility to quickly reassign extensions.

When you connect the telephone lines, the order in which the telephone lines deliver calls matches the order of Line Card port extensions. For example, connect the line that rings first to the port with the lowest numbered extension, connect the next telephone line to next-lowest extension, and so forth. Extension numbers for Line Card ports are assigned based on the first unused extension number. Therefore, the extensions vary from system to system.

Line Card ports are labeled on the front panel. The first connector, labeled PFT (Power Fail Transfer), accepts a standard POTS (2500 touch-tone series compatible) telephone. If there is a power failure, this port continues to provide dial tone and telephone service. Do *not* count this port as a line port.

### Connecting Digital Line Cards

You can install cards with the power on to the chassis. To connect and configure the digital line cards:

- 1 Remove one of the blank faceplates from the chassis.
- 2 Install the card securely.

Verify that the edges of the card ride in the chassis guide slots, and then slide the card in until you feel slight resistance. Press firmly on both sides of the front of the card until you feel it seat in the connector, and then tighten the two knurled knobs.



*If you cannot seat the card with light pressure, remove it and check for obstructions and alignment problems.*

- 3 Wait at least 3 minutes for the card to initialize.
- 4 Use the Auto Discover feature to configure the digital line card. The Auto Discover feature finds each port on each digital line card and assigns port extensions.



*Use the Auto Discover feature to configure telephones and analog line cards before you enable Auto Discover for digital line cards. For more information about the Auto Discover feature, see [“Using Auto Discover for Initial System Configuration”](#) on [page 112](#).*

### Connecting Analog Terminal Cards

You can install cards with the power on to the chassis. To connect and configure analog terminal cards:

- 1 Remove one of the blank faceplates from the chassis.
- 2 Install the analog terminal card securely.

Verify that the edges of the card ride in the chassis guide slots, and then slide the card in until you feel slight resistance. Press firmly on both sides of the front of the card until you feel that it is seated in the connector, and then tighten the knurled knobs.



*If you cannot seat the card with light pressure, remove it and check for obstructions.*

- 3 Wait at least 2 minutes for the card to initialize.
- 4 Use the Auto Discover feature to configure the analog terminal card. For more information about the Auto Discover feature, see [“Using Auto Discover for Initial System Configuration”](#) on [page 112](#).

The Auto Discover process finds each port on each Analog Terminal Card and assigns port extensions.

### Connecting an Analog Terminal Adapter

If you are installing one or more Analog Terminal Adapters (ATA), install them after installing chassis cards.

To install an ATA:

- 1 Connect the analog telephone or fax machine to the analog port on the ATA. The analog port on a 3C10120B ATA has a picture of an analog telephone beside it. See [Figure 30](#). The analog port on a 3C10400 or the

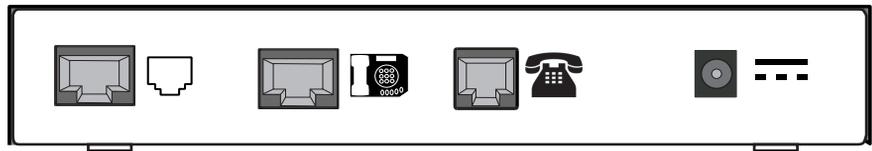
3C10400B ATA is labeled POTS (Plain Old Telephone Service). See [Figure 31](#).



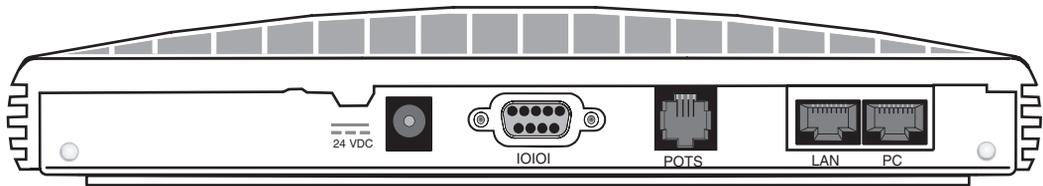
*The Analog Terminal Adapter may require a telephone connector for use outside North America. Contact your supplier for more information on country-specific requirements.*

- 2 Connect the Ethernet port on the ATA to the LAN. The Ethernet port on a 3C10120B ATA is the connector on the far left side. On the 3C10400B ATA, the Ethernet port is labeled LAN.

**Figure 30** 3C10120B ATA Connectors



**Figure 31** 3C10400B ATA Connectors



- 3 You can optionally connect a PC (or other Ethernet device) to the Ethernet port on the ATA. The 3C10120B Ethernet port has a picture of an NBX telephone beside it. The Ethernet port on the 3C10400B ATA is labeled PC.
- 4 Connect the AC power adapter to the AC power connector on the ATA. If you are using a powered Ethernet cable instead of the AC adapter, see [“Using Power over Ethernet with an ATA”](#) next.
- 5 Plug the AC power adapter into a wall outlet.
- 6 Use the Auto Discover feature to configure the ATA. For more information about Auto Discover, see [“Using Auto Discover for Initial System Configuration”](#) on [page 112](#).
- 7 If the ATA is connected to a fax machine, configure the port for fax usage:
  - a Open the NBX NetSet utility and click *Telephone Configuration > ATA*.
  - b Click the extension to open the Modify page.

- c Enable the check box labeled *Fax Machine*, then click *Apply*.



*Configuring an ATA port for fax operation optimizes the performance for inbound and outbound faxes. If you make a voice call using the ATA device (for example, if you use the telephone portion of the fax machine), the quality of the audio may be affected. If you make a VTL call using the ATA device, the audio may be unusable. If you configure the port for fax operation, expect lower quality voice calls on that port. If you configure the port for voice calls, the performance is not optimized for faxes.*

### Using Power over Ethernet with an ATA

The 3C10120B requires the use of a splitter device to accept Power over Ethernet (PoE).

The 3C10400B ATA can accept power over the Ethernet cable. It meets the IEEE 802.3af standard for Power over Ethernet. See [Table 22](#) for power connection instructions. The 3C10400B ATA is a Class 3 PoE device.

The 3C10400B ATA can also accept power from an AC power adapter plugged into a wall socket. If you supply power to the ATA using an AC power adapter and then also supply power on the Ethernet cable, the ATA uses the Ethernet power source. If you supply power to the ATA over the Ethernet cable and then also connect the AC power adapter, the ATA continues to use the Ethernet cable power source. If you connect both power sources to the ATA and later remove the Ethernet cable, the ATA switches to use the AC power adapter.

**Table 22** Connecting Power to an NBX Analog Terminal Adapter

Power Source	NBX ATA Model	Connection Details
AC power adapter	3C10400B 3C10120B	Any NBX ATA can accept power from an AC power adapter. Use the power adapter that comes with your ATA. On all NBX devices, the power connector is labeled with the DC power symbol: <b>==</b>

**Table 22** Connecting Power to an NBX Analog Terminal Adapter (continued)

Power Source	NBX ATA Model	Connection Details
Power over Ethernet (IEEE 802.3af) power source	3C10400B 3C10120B	Connect the powered Ethernet cable directly to the telephone's Ethernet connector. No separate power connection is required.  Devices that predate the 802.3af standard can be powered by an 802.3af-compliant power supply with the use of the 3Com Network Jack to NBX Phone Power Module (3CNJVOIPMOD-NBX), which is 802.3af-compliant. The module removes power from a powered Ethernet cable and splits it into a power jack and an unpowered Ethernet connection that you connect to the ATA's LAN port and power connection.
3Com Ethernet Power Source:	3C10400B 3C10120B	The 3Com Ethernet Power Source predates the 802.3af standard. Any NBX device can be powered by a 3Com Ethernet Power Source if you use and NBX Power Splitter (3C10223 – package of 12). The NBX Power Splitter removes power from a powered Ethernet cable and splits it into a power jack and an unpowered Ethernet connection that you connect to the ATA's LAN port and power connection.
<ul style="list-style-type: none"> <li>■ 3C10220 (12-port)</li> <li>■ 3C10222 (24-port)</li> </ul>		



**CAUTION:** You can damage an NBX device by using an NBX power splitter (3C10223) with the 3Com Network Jack Power over Ethernet Multiport Midspan Solution (3CNJPSE24). Use the NBX power splitter (3C10223) only with the 3Com Ethernet Power Source (3C10220, 12-port, or 3C10222, 24-port).

### Selecting Regional Software and Components

After you complete the hardware installation, you can download your preferred regional language software and components.



*U.S. English is installed by default and cannot be removed. It is used as a fallback in case another Regional Software Pack fails to load properly.*

The Regional Software Packs include:

- Localized voice prompts heard by callers, telephone users, and administrators. These are messages that users or administrators are not able to change by recording a new message, for example, prompts used for setting up Auto Attendants and voice mailboxes.
- Default prompts for configurable voice messages. Users and administrators can record these messages and substitute their recorded messages for the default versions.
- Tones and cadences
- Localized User Help for the NBX NetSet utility

- Localized NBX Telephone Guides and Quick Reference Guides, which are accessed from the NBX NetSet utility and the *Resource Pack*.



*NBX 6.0 and higher includes a localized NetSet utility interface for telephone users. The localized NetSet interface is set by the host computer's browser language setting.*

### Installing Regional Software and Components

When you access the NBX NetSet utility for the first time, you can select and download the regional language software and components.

- 1 Log in to the NBX NetSet utility using the administrator username and password and then click *Country Settings > Install Regional Software*.  
For a description of the status values for each listed region see [Table 23](#).
- 2 Select *Install*, and then either browse to the *install* folder on the *NBX Resource Pack* and select the language (.taz file) that you want, or type the path in the text box.
- 3 Click *Upgrade*.



*After you install the regional software and components, you must enable the language. That is, you must make your preferred language the current language on the NBX system. For more information, see the NBX Administrator's Guide, or use the NBX NetSet utility to go to Country Settings > Regional Settings.*

**Table 23** NBX NetSet Regional Software Tab – Status Values

Status	Description
In Use	All of the components associated with the language and country are installed and at least one (voice prompts, tones and cadences, or documentation) has been selected for use.
Available for Use	All of the components associated with the language and country are installed, but none of them are currently selected for use.
Not Fully Installed	One or more of the components associated with the language and country are either not installed, or the wrong version of at least one component is installed.
Error while Loading	One or more of the files associated with a component are missing. This situation should never occur.

## Using Auto Discover for Initial System Configuration

Using the Auto Discover feature simplifies initial system configuration by adding information about new devices to the configuration database. “Devices” include telephones, Analog Line Card ports, Digital Line Card channels, Analog Terminal Adapter ports, 3Com Attendant Consoles, and “virtual devices” such as the pcXset Soft Telephone.



*Before you use the Auto Discover process to configure telephones and attendant consoles, you should review the procedures in [“Telephones and Attendant Consoles”](#) in [Chapter 3](#).*



*After a device has been discovered, the Auto Discover process does not find that device again. To remove a device from the system database, you must use the NBX NetSet utility to manually remove the device and its database record. Deleting a user does not delete the device associated with that user.*



*Licensed devices will not be discovered until after you have entered the appropriate Group License to the system. For more information on Group Licensing, see [“Device Licenses”](#) on [page 72](#).*

[Table 24](#) summarizes Auto Discover actions for NBX system components.

**Table 24** Auto Discover Actions on NBX System Components

Component	Auto Discover Action
NBX Analog Line Card and V3000 analog line ports	Gathers configuration information from each port on the card, assigns a default extension, and enters the information into the configuration database.
NBX Digital Line Card	Gathers configuration information from the card, assigns a default extension, and enters the information into the configuration database. After you Auto Discover the Digital Line Card, you may need to edit the Dial Plan to configure Direct Inward Dial (DID) numbers.
Telephones Analog Terminal Cards Analog Terminal Adapters V3000 ATA port	Gathers configuration information from the telephone, assigns a default User Profile labeled “new user,” assigns the next lowest available extension number to the profile, and enters the information into the configuration database. Auto Discover Telephones finds both Analog Terminal Cards and Analog Terminal Adapters. By default, the Auto Discover process assigns extension number 1000 (4-digit Dial Plan) or 100 (3-digit Dial Plan) as the first telephone extension. You can use the NBX NetSet utility to specify a new extension starting number. To simplify Auto Attendant configuration, you should start a range at a base number, for example, 1000/100, 2000/200, 3000/300, or 4000/400. The default Auto Attendant assumes that extension 1000 (4-digit dial plan) or 100 (3-digit dial plan) is the extension of a human attendant (receptionist).

**Table 24** Auto Discover Actions on NBX System Components (continued)

Component	Auto Discover Action
3Com Attendant Console	Finds and configures any installed 3Com Attendant Consoles. The first 100 existing telephones, except for the extension that is associated with the Attendant Console, are mapped to Attendant Console buttons. The lowest extension is automatically associated with the Attendant Console. Typically, you would wait until you have installed all your telephones before you enable Auto Discover Attendant Consoles.
pcXset Soft Telephone	Enables the Auto Discover feature on installations of the pcXset PC Telephone Client when the following conditions are true: <ul style="list-style-type: none"> <li>■ The pcXset PC Soft Telephone program is running on the host PC.</li> <li>■ The pcXset PC Soft Telephone host computer is connected to the network.</li> <li>■ You have entered the proper license key into the NBX NetSet utility.</li> </ul>



Before you use the Auto Discover process to configure telephones and attendant consoles, you should review the procedures in [Chapter 3, Telephones and Attendant Consoles](#).

### Initial System Configuration

To use the Auto Discover feature for initial system configuration:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *System-wide Settings > Enable Features System-wide*.
- 3 Verify that the box labeled **Extensions Start At** is set to what you want, and then click *Apply*.

For a 4-digit dial plan, extensions start by default at 1000. For a 3-digit dial plan, extensions start at 100.



Do not specify a starting extension that begins with zero (0) as that will cause the Auto Discover process to fail.

- 4 Click *System-wide Settings > Auto Discovery*.
- 5 Select the check box for the device type you are configuring, and then click *Apply*. 3Com recommends that you Auto Discover one device type at a time. For detailed information about each field, click the *Help* button on the page.

### Auto Discover Usage Notes

- If devices are on a different subnet from the NCP, you must enable IP on the NCP (*System-wide Settings > IP Settings*), and each device must have IP configuration information. You can use DHCP to configure the

phones. The DHCP server must also be configured to provide the NCP IP address through option 184. Or you can program IP settings into each device using the dialpad. See the *NBX Administrator's Guide* for DHCP information and for telephone local programming instructions.

- It takes a few moments for the Auto Discover process and the software download process to complete. The NCP initializes devices one at a time. If you have connected many new devices to the system at the same time, the Auto Discover process requires more time.
- A fully initialized telephone displays its extension and the date and time. If there are no extensions available, the Auto Discover process fails, and the telephone's display panel continues to display the telephone's MAC address.
- If you are adding devices that do not have a display panel, such as 3100 Entry Telephones, connect the devices one at a time and then refresh the *Telephone Configuration > Telephones* list after you connect a device to see the extension assigned to that device.
- Do not specify an Auto Discovery starting extension that begins with zero (0) as that will cause the Auto Discover process to fail.
- If you are installing a 3Com Attendant Console, connect it *after* you have discovered all of the telephones. The Auto Discover Attendant Consoles process maps all existing telephone extension to the Attendant Console.
- If you are adding licensed devices to the system, the devices will not be discovered until you add the appropriate Group License to the system. For more information on Group Licensing, see ["Device Licenses"](#) on [page 72](#).

### Disabling the Auto Discover Feature

After you finish the Auto Discover process for the initial configuration, you can disable it so that the NCP does not continue to search for added devices.

To disable the Auto Discover feature:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *System-wide Settings > Auto Discovery*.
- 3 Clear all *Auto Discover* check boxes.
- 4 Click *Apply*.

## NBX System Operating Modes

You can configure the NBX system to behave in one of the three traditional telephone system modes:

- **Key mode – CO lines map to buttons on users’ telephones**

To configure key mode behavior using the NBX NetSet utility, use Button Mappings and the Auto Extension setting for each line card port. Button Mappings enable you to map a line card port extension to a specific Access button on a 3Com telephone. Button Mappings identify the telephones that ring when a call comes in on the mapped CO line. Auto Extension specifies the destination of a call that is not answered at any of the telephones. The system must be using 3Com call control mode because you cannot map telephone lines to phone buttons if the NBX system is operating in SIP mode. See the *NBX Administrator’s Guide* for more information on SIP on the NBX.

- **PBX mode – CO lines are pooled and arbitrated by the NCP**

The CO lines do not map to individual telephones. All incoming calls go first to a receptionist’s telephone or the Automated Attendant. If the call goes to a receptionist’s telephone, the receptionist forwards the call to the user’s extension, or if the user is out of the office, the call can be sent directly to the user’s voice mailbox. To call an outside number, a user must dial the line pool access number, typically 9, and the NCP assigns the next available line. PBX mode allows you to make maximum use of a limited number of CO lines.



*Direct Inward Dialing (DID) configuration requires changes to the system dial plan. For more information on DID, see the NBX Administrator’s Guide.*

- **Hybrid mode – Combines key mode and PBX mode**

Some CO lines are mapped directly to telephones, while the rest are pooled. The system must be using 3Com call control mode because you cannot map telephone lines to phone buttons if the NBX system is operating in SIP mode. See the *NBX Administrator’s Guide* for more information on SIP on the NBX.



*Direct Inward Dialing (DID) configuration requires changes to the system dial plan. For more information on DID, see the NBX Administrator’s Guide.*

PBX mode is the easiest configuration to set up and manage. Key mode requires more configuration because you must map the CO lines to telephones.

**Reassigning Extensions and Setting Line Card Port Options**

For this procedure, you need the list of line card port MAC addresses that were created when you installed the line cards.

To reassign extensions and set line card port options:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *PSTN Gateway Configuration > Analog Line Cards*.
- 3 Click the lowest extension to open the *Modify* screen.
- 4 Edit the line card port fields as needed. Click the *Help* button for information about each field.
- 5 After you have made all of your changes for the current Line Card port, click *Apply* to enable the changes and review them.
- 6 Click *OK* to exit the dialog box and return to the Line Cards tab.
- 7 Repeat this procedure for each line card port.

**Example:**

During the Auto Discover process, the NBX system may assign extensions to Line Card ports as shown in [Table 25](#).

**Table 25** Examples of Line Card Addresses

<b>Analog Line Card (3C10114)</b>		<b>Analog Line Card (3C10114C)</b>	
<b>MAC Address</b>	<b>Extension</b>	<b>MAC Address</b>	<b>Extension</b>
00:e0:bb:03:8d:c8	7260	00:e0:bb:03:8d:cc(1)	7260
00:e0:bb:03:8d:c9	7261	00:e0:bb:03:8d:cc(2)	7261
00:e0:bb:03:8d:ca	7259	00:e0:bb:03:8d:cc(3)	7259
00:e0:bb:03:8d:cb	7258	00:e0:bb:03:8d:cc(4)	7258

Typically, you want to have the lowest extension number associated with the first port, the next highest extension number associated with the second port, and so on.

To reassign the extension numbers:

- 1 Record the extensions and either the MAC addresses or port numbers for the four Line Card ports.
- 2 In the NBX NetSet Menu window, click *Reports > Device List*.

- 3 Click on the Extension column heading to sort the list by extension from the lowest extension. Click the heading again to sort from the highest extension.
- 4 Review the extensions in the list to find the highest extension number that has been assigned. Add one to that extension and record it. For example, if the highest assigned extension number is 7268, you record 7269.
- 5 Click *PSTN Gateway Configuration > Analog Line Cards*.
- 6 From the four Line Card ports you recorded, click the extension number of the port with highest MAC address or port number to open the *Modify* screen.
- 7 Change the extension number (7258 in this example) to the extension number you recorded when you were viewing the Device List tab (7269).
- 8 Click *OK*. The Line Card Ports tab reappears showing the new extension number. Extension 7258 is now unused.
- 9 From the four Line Card Ports you recorded, select the port to which you want to assign the unused extension. In the example, 7258 is the lowest extension number of the four, so select the port with the lowest MAC address or port number and click its extension.
- 10 Change the extension number and click *OK*.

Repeat steps 9 and 10. Each time that you assign an extension, the previous extension is no longer used, and you can assign it to the appropriate port. When you are finished:

- The four original extensions (7258 through 7261) are assigned to the line card ports in the same order as the MAC addresses or port numbers.
- The unused extension (7269) is again unused.

---

## Connecting Telephone Lines

After you have installed and configured the system for initial startup, connect the telephone company lines to the analog line ports so that you can start receiving outside calls.

---

## Adding External Hardware

External devices connect to the front of the NBX system. See [“What External Devices Can Connect to an NBX System?”](#) on [page 83](#).

### Connecting a Music-on-Hold (MOH) Input Device

Use a patch cord with phono-type connectors (stereo or mono) to connect line level audio from any audio device that has a line-out jack to the MOH jack on the front of the NCP. The audio input should be max 2V peak to peak.

### Adjusting Music-on-Hold (MOH) Volume

The NBX 100 and V5000 have an external control for adjusting the MOH volume. For a V3000 or V3001R system, use the volume control on the external MOH device.

To adjust the volume of music on hold on an NBX 100 or V5000:

- 1 Use a nonferrous (plastic or aluminum) adjustment tool to adjust the volume control on the front of the Call Processor to about mid-range.
- 2 Use a 3Com Telephone to call another extension, and have the person put you on hold.
- 3 While listening to the music, adjust the volume control on the music-on-hold input device.

### Connecting a Paging Amplifier

Connect the paging device to the paging connector on the front of the NCP. See the documentation for your paging amplifier for information about that device. For information about how to page from a telephone on the NBX system, see "Paging" in the *NBX Telephone Guide*.

The paging connector on the NCP is an RJ-11 connector. It is a line-out, 600 ohm audio interface with a dry contact closure for use with an external paging amplifier ([Table 26](#)).

**Table 26** Paging Amplifier Connector

Pin 1	Not connected
Pin 2	Relay common
Pin 3	Ring
Pin 4	Tip
Pin 5	Relay contact
Pin 6	Not connected

### Configuring Routing Devices

If you have a low-bandwidth device on the LAN, such as an ISDN router, you must update the device's routing table to filter NBX system multicast

addresses. The NBX system uses Ethernet multicast addresses to implement some system features.

If you have telephones connected to the network through a low-bandwidth link, such as an ISDN connection, you can configure them so that they do not generate multicast traffic ([Table 27](#)). For more information, see the *NBX Administrator's Guide*. You must still filter multicasts to ensure that multicasts generated by other NBX devices are not propagated through the low-bandwidth link.

**Table 27** Layer 2 Multicast Addresses

Multicast Address	Description
01:e0:bb:00:00:1d	System state
01:e0:bb:00:00:15	Music on hold
01:e0:bb:00:00:11	Page
01:e0:bb:00:00:25	Conference call channel 0
01:e0:bb:00:00:35	Conference call channel 1
01:e0:bb:00:00:31	Conference call channel 2
01:e0:bb:00:00:39	Conference call channel 3
01:e0:bb:00:00:09	Download service
01:e0:bb:00:00:01	Paging audio 1
01:e0:bb:00:00:05	Paging audio 2
01:e0:bb:00:00:0d	Paging audio 3
01:e0:bb:00:00:3d	Conference 4
01:e0:bb:00:00:30	Conference 5
01:e0:bb:00:00:34	Conference 6
01:e0:bb:00:00:3c	Conference 7
01:e0:bb:00:00:38	Conference 8
01:e0:bb:00:00:28	Conference 9
01:e0:bb:00:00:2c	Conference 10
01:e0:bb:00:00:24	Conference 11



# 3

## TELEPHONES AND ATTENDANT CONSOLES

This chapter explains how to install:

- 3Com Telephones
- 3Com Attendant Consoles

For information on how to add a 3108 Wireless Telephone or a generic SIP telephone to an NBX system that is running in SIP mode, see the *NBX Administrator's Guide*.



**WARNING:** 3Com Telephones are intended for connection only on internal Local Area Networks. Do not install them outside of buildings.

---

### Adding Telephones

There are two ways to add a new telephone: Auto Discover, and manual configuration.

#### Auto Discover Telephones

Auto Discover is the simplest and most common method of adding a new telephone. When you enable the Auto Discover feature and then connect a new 3Com Telephone to the LAN, the telephone receives the next lowest available extension and a default set of properties. You can then move the telephone to another location on the LAN and it retains its extension number. For instructions on connecting a telephone to the LAN, see [“Connecting the Telephone to the LAN”](#) on [page 126](#).

It is good installation practice to add telephones one at a time, label each with the extension number assigned by the Auto Discover process, and then disconnect them. Extensions are assigned in sequence starting with extension 1000 on a four-digit dial plan and extension 100 on a three-digit dial plan. You can see the extension associated with the new telephone on the telephone's display panel (except for the 3100 Entry Telephone). You can see and change the extension number in the *Telephone Configuration > Telephones* page of the NBX NetSet utility. You can use the telephone's MAC address to match a physical telephone

with an entry in the NBX NetSet utility Telephones tab. Each telephone has its MAC address printed on a label on the bottom of the phone. You can then define the user profiles for each telephone (*User Configuration > Users*) and place the telephones in the correct locations.

### Auto Discover Notes

- If you are using IP as your network protocol, see also [“Configuring IP Telephony”](#) on [page 179](#).
- You should connect the telephone to the network segment on which the NCP resides. You may configure a telephone on a subnet that is remote to the NCP, but to do so you must first configure the network information in the telephone using a option 184 on your DHCP server, the Telephone Local User Interface utility (LUI), or the 3Com Telephone Local Configuration Application (TLC). These options are described in the *NBX Administrator’s Guide*.
- You must enable the Auto Discover Telephones feature *before* you connect the telephone.



*If you are adding licensed devices, you must first add the license key into the NBX NetSet utility.*

### Adding a New Telephone Using the Auto Discover Feature

Before you enable the Auto Discover feature, be sure that you have the dial plan you want installed. To Auto Discover a telephone:

- 1 Login to the NBX utility as administrator and then click *System-wide Settings > Auto Discovery*.
- 2 Enable the check box labeled Auto Discovery Telephones.  
For detailed information on each item in the Auto Discovery page, click the Help button.
- 3 Optionally, enable the *Auto Add Phones to Call Pickup Group 0* check box.

Members of a Call Pickup Group can answer calls that ring on other group members’ telephones. The default system includes one Call Pickup Group. Whether or not you select this check box, you can later change the call pickup group for any telephone. See the *NBX Administrator’s Guide* for information about Call Pickup Groups.

- 4 Click *Apply*.

- 5 For each telephone that you want to Auto Discover:
  - a Remove the telephone from the packing box.
  - b Connect power to the telephone as described on [page 124](#) or on the packing sheet that comes with the telephone.
  - c Connect the telephone to the LAN on which the NCP resides as described on [page 126](#) or on the packing sheet that comes with the telephone.
  - d Wait until the telephone display panel displays an extension number. If you are configuring a device that does not have a display panel, such as a 3100 Entry Telephone, you should display the *Telephone Configuration > Telephones* tab in the NBX NetSet utility. After the system discovers the telephone and you refresh the *Telephones* tab, The new device appears as the highest extension.
  - e Record the extension number on the telephone's shipping box. If you are configuring a 3100 Entry Telephone, you can use the NBX LabelMaker utility, *Downloads > LabelMaker*, to create a label that shows the telephone's extension and then place the label in its holder underneath the handset.
  - f Disconnect the telephone from the LAN.
  - g Disconnect power from the telephone.

After you have discovered a telephone, it retains its settings. The telephone can now be placed at its intended location. When you connect the telephone to the LAN and power, the extension appears on the display panel.



*If the telephone will be located on a different subnet from the NCP, you must configure the network to provide the proper IP information to the telephone. See [Chapter 10, "Configuring IP Telephony"](#) on [page 179](#) for more information.*

## Manually Configure Telephones

You can add telephones to the system manually using the NBX NetSet utility. However, if you have many telephones to configure, manual configuration can be a tedious and error-prone process. For information about adding telephones manually, see the *NBX Administrator's Guide*.

### Manual Configuration Notes

- Typically, you must connect the telephone to the network segment on which the NCP resides to enable the NCP to communicate with the telephone. You can manually define a telephone's ability to communicate with its NCP by using the Telephone Local User Interface utility (LUI) or the 3Com Telephone Local Configuration application (TLC). The LUI utility resides on each 3Com telephone. You can install the TLC application to your PC by clicking *Downloads > Applications*. For details about these tools, see the *NBX Administrator's Guide*.

## Connecting Power to the Telephone

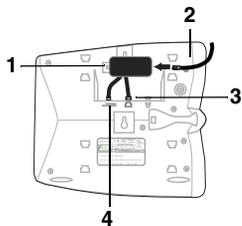
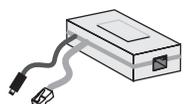
All 3Com telephones can accept power from an AC converter, however, the power converter is an optional component on 3Com 3100-series telephones because these devices are compliant with the IEEE 802.3af Power over Ethernet (PoE) standard.

To eliminate the power converter, you can connect your 3Com Telephone to a powered Ethernet cable. NBX devices can use Ethernet power directly or through the use of a splitter device. The method you use to connect an NBX device to a powered Ethernet cable depends on the type of Ethernet power in use at your facility and the type of NBX device you are connecting. See [Table 28](#) for power connection details.

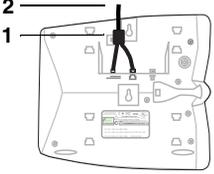
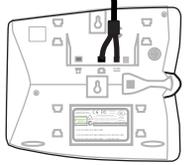
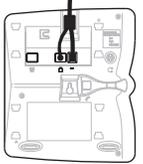
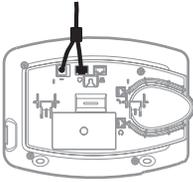


*The base stations for 3Com 3106C and 3107C Cordless Telephones do not support PoE.*

**Table 28** Connecting Power to a 3Com Telephone

Power	3Com Telephone	Connection Details
AC power adapter (commonly known as a 'power brick')	Any 3Com Telephone can accept power from a power adapter. On all NBX devices, the power connector is marked by the DC power symbol: 	<p>Connect the AC adapter's power jack to the  connector on the bottom of the phone.</p> <p>A strain relief tab is molded into the bottom of 1102, 2102, and 2101 phones. A strain relief clamp is molded into the adjustable stand on 3100-series devices.</p> <p>If you need an AC adapter, order the optional power adapter 3C10444-XX, where XX is the country code:</p> <ul style="list-style-type: none"> <li>■ AA (Australia/New Zealand)</li> <li>■ SA (South Africa)</li> <li>■ CN (China)</li> <li>■ UK (United Kingdom)</li> <li>■ ME (Europe/LAT)</li> <li>■ US (North America)</li> </ul> <p>NOTE: If you use a power brick on a 3103 Manager's Telephone, you <i>must</i> use the 3C10444-XX power brick. All other 3Com devices can use either 3C10444-XX or the older power brick, 3C10224-XX.</p>
Power over Ethernet (IEEE 802.3af standard) power source	<p>3103 Manager's Telephone: 3C10403A; 3C10403B</p> <p>Business Telephones: 3C10281PE (1102) 3C10226PE (2102) 3C10228IRPE (2102) 3C10402A (3102) 3C10402B (3102B)</p> <p>Basic Telephones: 3C10410A (3101) 3C10410SPKRA (3101) 3C10410B (3101B) 3C10410SPKRB (3101B) 3C10248PE (2101)</p> <p>3100 Entry Telephone: 3C10399A; 3C10399B</p>	<p>The part number appears in the label on the bottom of the telephone.</p> <p>Connect the powered Ethernet cable directly to the telephone's Ethernet connector.</p> <p>All 3Com telephones identify the Ethernet connection with this icon: </p> <p>No separate power connection is required. However, if you connect both an AC adapter and a powered Ethernet cable, the device uses the power from the AC adapter and switches automatically to Ethernet power if you remove the adapter.</p>
	<p>3Com Business Telephones: 3C10121 (1102) 3C10122(1102) 3C101226A (2102) 3C101226B (2102) 3C10228IRA (2102) 3C10228IRB (2102) 3C10281B (2102)</p> <p>3Com Basic Telephone: 3C10248B (2101)</p>	<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;">  </div> <div style="flex: 2;"> <p>3Com Telephones that predate the IEEE 802.3af standard can be powered by an 802.3af-compliant power supply with the use of the 3Com Network Jack to NBX Phone Power Module (3CNJVOIPMOD-NBX). The module <b>1</b> receives power from an Ethernet cable <b>2</b> and splits it into an unpowered Ethernet <b>3</b> connection and a power jack <b>4</b>.</p> </div> <div style="flex: 1; text-align: center;">  <p>3CNJVOIPMOD-NBX</p> </div> </div>

**Table 28** Connecting Power to a 3Com Telephone (continued)

Power	3Com Telephone	Connection Details		
3Com Ethernet Power Source: ■ 3C10220 (12-port) ■ 3C10222 (24-port)	3103 Manager's Telephone 3C10403A; 3C10403B Business Telephones: 3C10121 (2102) 3C10122 (2102) 3C101226A (2102) 3C101226B (2102) 3C10228IRA (2102) 3C10228IRB (2102) 3C10281B (2102) 3C10281PE (2102) 3C10226PE (2102) 3C10228IRPE (2102) 3C10402A (3102) 3C10402B (3102B)	   	The 3Com Ethernet Power Source predates the IEEE 802.3af standard. 3Com Telephones that are 802.3af-compliant can be powered by a 3Com Ethernet Power Source if you use an NBX Power Splitter (3C10223 – package of 12). The NBX Power Splitter <b>1</b> removes power from a powered Ethernet cable <b>2</b> .	 3C10223
	Basic Telephones: 3C10410A (3101) 3C10410SPKRA (3101SP) 3C10410B (3101B) 3C10410SPKRB(3101SPB) 3C10248B (2101) 3C10248PE (2101)		2101 Basic Telephone	
	3100 Entry Telephone: 3C10399A; 3C10399B		3103 Manager's Telephone 3102 Business Telephone (shown) 3101 and 3102 SP Basic Telephones 3100 Entry Telephone	



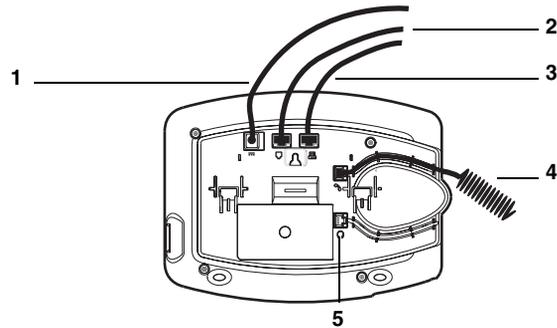
**CAUTION:** You can damage an NBX device by using an NBX power splitter (3C10223) with the 3Com Network Jack Power over Ethernet Multiport Midspan Solution (3CNJPSE24). Use the NBX power splitter (3C10223) only with the 3Com Ethernet Power Source (3C10220, 12-port, or 3C10222, 24-port).

**Connecting the Telephone to the LAN**

To connect the telephone:

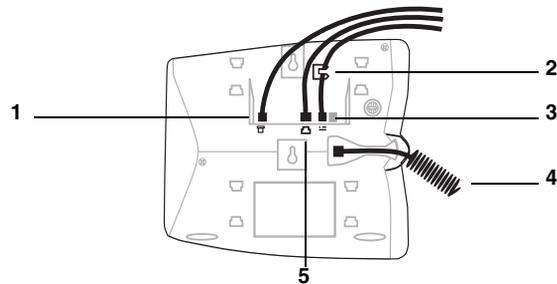
- 1 Connect a Category 5 Ethernet cable to an available hub port or wall jack that is connected to the same subnet as the NCP.
- 2 Connect the other end of the Ethernet cable to the LAN connector on the underside of the telephone.

**Figure 32** Connections for 3Com 3102 Business Telephone (shown) and 3103 Manager's Telephone



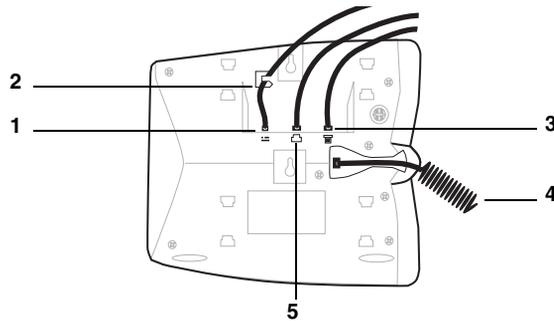
- 1 Power cable. Ask your Administrator how you should power your phone. Then see [Table 28](#) for instructions on how to connect your telephone to power. [Figure 34](#) shows a connection using an optional AC adapter.
- 2 Ethernet cable (to data jack)
- 3 Ethernet cable (optional; to connect a computer or an Attendant Console to the network)
- 4 Handset cord (to handset)
- 5 Headset connection (to connect an optional headset)

**Figure 33** Connections for 3Com 1102 Business Telephone



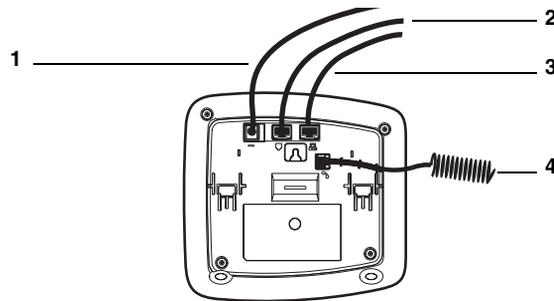
- 1 Ethernet cable (optional; to connect a computer or an Attendant Console to the network)
- 2 Strain-relief tab to prevent power cord from becoming disconnected
- 3 Power cable. Ask your Administrator how you should power your phone. Then see [Table 28](#) for instructions on how to connect your telephone to power. [Figure 34](#) shows a connection using an optional AC adapter.
- 4 Handset cord (to handset)
- 5 Ethernet cable (to data jack)

**Figure 34** Connections for 3Com 2102 Business Telephone

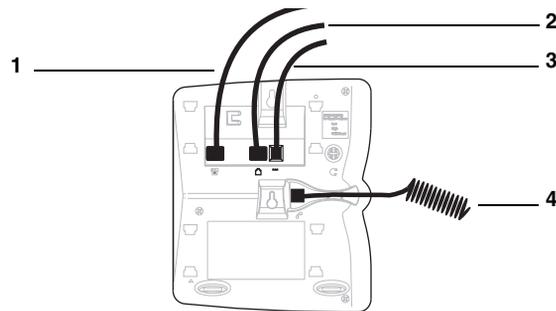


- 1 Power cable. Ask your Administrator how you should power your phone. Then see [Table 28](#) for instructions on how to connect your telephone to power. ([Figure 34](#) shows a connection using an AC adapter.)
- 2 Strain-relief tab to prevent power from becoming disconnected
- 3 Ethernet cable (optional; to connect a computer or an Attendant Console to the network)
- 4 Handset cord (to handset)
- 5 Ethernet cable (to data jack)

**Figure 35** Connections for 3Com 3101 and 3101SP Basic Telephones (shown) and 3100 Entry Telephone



- 1 Power cable. Ask your Administrator how you should power your phone. Then see [Table 28](#) for instructions on how to connect your telephone to power. ([Figure 35](#) shows a connection using an optional AC adapter.)
- 2 Ethernet cable (to data jack)
- 3 Ethernet cable (optional; to connect a computer or an Attendant Console to the network)
- 4 Handset cord (to handset)

**Figure 36** Connections for 3Com 2101 Basic Telephones

- 1 Ethernet cable (optional; to connect a computer or an Attendant Console to the network)
- 2 Ethernet cable (to data jack)
- 3 Power cable. Ask your Administrator how you should power your phone. Then see [Table 28](#) for instructions on how to connect your telephone to power. ([Figure 36](#) shows a connection using an optional AC adapter.)
- 4 Handset cord (to handset)

### Using the Telephone's Switch Port

Many 3Com telephones contain a two-port Ethernet switch with connectors on the underside of the phone. One port is used to connect the telephone to the LAN and the other port connects a computer or other Ethernet device to the LAN.

To connect a computer to the switch port on the telephone:

- Use a Category 5 UTP cable with RJ-45 connectors.
- Connect one end of the Category 5 cable to the computer's Ethernet network interface card (NIC).
- Connect the other end of the cable to the Ethernet switch port on the underside of the telephone.

The Ethernet port is labeled with this icon: 

- Do not use the telephone's Ethernet port to connect another 3Com telephone to the system.

### 3Com Cordless Telephones

Connection details for the 3106C and 3107C Cordless Telephones are included in the Cordless Telephone Guide. The guide also covers each of the accessories that are shipped with the telephone. See [Table 29](#) and the installation notes that follow for installation guidelines.

**Table 29** Cordless Telephone Installation Guidelines

Telephone Model	Max range (ideal conditions)
3106C (3C10406A)	Approximately 915 meters (3,000 ft.)
3107C (3C10407A)	Approximately 1,370 meters (4,500 ft.)

#### Cordless Telephone Installation Notes

- Because of radio frequency issues, you can install a limited number of cordless telephones in one location. In an ideal environment, up to 10 cordless phones can be used in the same environment. For installations of three or fewer cordless telephones, 3Com recommends that you use 3107C Telephones. For installations of 3 to 10 cordless telephones, 3Com recommends that you use 3106C Telephones.
- [Table 29](#) shows the telephones' range (the distance between the base unit and the telephone) under ideal conditions. The actual range depends on environmental factors such as building structure, size of the room, RF interference, and other electronic equipment installed in the same area. A higher location for the base unit reduces the factors that can interfere with the coverage area.
- Place the base unit in the center of your coverage area. If the phone will be also used in the outdoor area, install the base unit in an area close to the window.
- For best performance, make sure you have at least five meters of space between base units and that each base unit antenna is raised to the vertical position.
- Avoid placing the base unit in a location surrounded by metal surfaces or near a PC, a monitor, or a telephone.

### 3Com Entry Telephones

The 3Com 3100 Entry Telephone does not have a display panel to show the status of the process of initializing the telephone when you connect it to an NBX system or when you reboot the phone of the NBX system. However, the 3100 Entry Telephone indicates its status by displaying a series of blinking patterns using its message waiting indicator light. [Table 30](#) describes the 3100 Entry Telephone initialization states.

**Table 30** 3100 Entry Telephone Initialization Status

Blink Pattern	Telephone State	Notes
2 blinks in 2 seconds Pause 2 seconds Repeat	The 3100 is searching for an NBX system using a Layer 2 protocol	No action required. If the 3100 does not find an NBX system using Layer 2, it will search for an NBX system using a Layer 3 protocol.
3 blinks in 3 seconds Pause 2 seconds Repeat	The 3100 is searching for an NBX system using a Layer 2 protocol	The 3100 will start using Layer 3 after it has received IP configuration information from a DHCP server.
Continuous slow blinks with no pause	The 3100 has detected an NBX system using a Layer 2 protocol.	If this pattern persists, it could indicate that the device is not in the NBX database. You should use the NBX NetSet utility to add the device to the system.
3 blinks in 1.5 seconds Pause 2 seconds Repeat	The 3100 is trying to obtain IP information from a DHCP Server.  If it is successful the pattern will change to Layer 3 Discovery. If DHCP configuration fails then the 3100 pattern will temporarily indicate DHCP Failure, described below.	If this state persists for 20 or more seconds then the device is not able to detect a DHCP server.  If this state ends and the device transitions to DHCP Failure, and the device is expected to utilize DHCP, then the DHCP offer is incorrect or missing Option-184 information. Correct the DHCP configuration or program IP information into the 3100 using the 3Com Telephone Local Configuration tool, which is described in the <i>NBX Administrator's Guide</i> .

**Table 30** 3100 Entry Telephone Initialization Status

Blink Pattern	Telephone State	Notes
10 blinks in 2 seconds Pause 2 seconds	The 3100 has detected more than one NBX system on the local subnet and does not have information to select the correct one.	Configure the network correctly so that only a single NBX system is on the subnet.
25 blinks in 5 seconds Pause New pattern	The 3100 was unable to get information from a DHCP server.	If this occurs within the first minute (typically in the first 10 to 20 seconds) of searching for a DHCP server then a DHCP Offer was received from the server but it did not contain valid or complete information.  If this state occurs after a minute or more of searching for a DHCP server then no DHCP Offer was received.

### Verifying Telephone Installation

When you initialize a telephone by enabling the Auto Discover feature (see [“Using Auto Discover for Initial System Configuration”](#) on [page 112](#)), the display panel on the telephone shows several messages. After the initialization is complete, the display panel shows the current system date and time and the telephone’s extension. Pick up the handset and listen for dial tone.

The 3100 Entry Telephone does not have a display panel. To verify successful initialization of a 3100 Entry Telephone through Auto Discover feature:

- 1** Login to the NBX NetSet utility as administrator and then click *Telephone Configuration > Telephones*.
- 2** Verify the MAC address listed in the Telephones list against the MAC address printed on the label on the bottom of the telephone.
- 3** Make note of the extension assigned to the telephone.
- 4** Use another NBX telephone on the system to call the Entry telephone.

## Adding a 3Com Attendant Console

The optional 3Com Attendant Console provides extension button mappings for up to 100 extensions per console and displays the current status of each mapped extension. A receptionist typically uses the Attendant Console to connect incoming calls to telephone extensions.

When you install a new NBX system, add all telephones before you Auto Discover any Attendant Console. The Auto Discover process assigns the extension of each known telephone to a button on the Attendant Console and associates the Attendant Console with an existing telephone extension.



*You can associate any 3Com telephone with an attendant console. However, if you use a 3Com 3103 Manager's Telephone, you cannot map a CO line directly to a button on the Attendant Console and the Attendant Console will not support Bridged Station Appearances.*

## Connecting Power to the Attendant Console

Connect the AC power converter provided with the Attendant Console to the power connection on the bottom of the Attendant Console and then connect the other end of the power converter to an AC power outlet. On all NBX devices, the power connector is marked by the DC power symbol:



The 3Com 3105 Attendant Console complies with the IEEE 802.3af standard, commonly called Power over Ethernet (PoE), so a power converter is an optional component. To use a power converter, order power adapter 3C10224-XX, where XX is the country code:

- AA (Australia/New Zealand)
- CN (China)
- ME (Europe/LAT)
- SA (South Africa)
- UK (United Kingdom)
- US (North America)

## Using a Powered Ethernet Cable to Power an Attendant Console

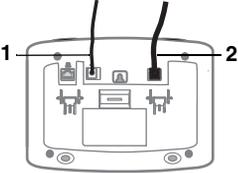
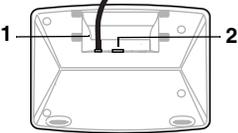
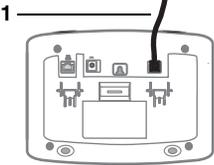
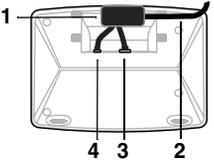
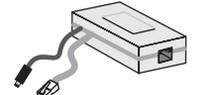
To eliminate the power converter, you can connect your Attendant Console to a powered Ethernet cable. The Attendant Console cannot accept power directly from an IEEE 802.3af-compliant power source. You must use a device to remove power from the cable. The device you use to

connect an Attendant Console to a powered Ethernet cable depends on the type of Ethernet power in use at your facility. NBX devices work with:

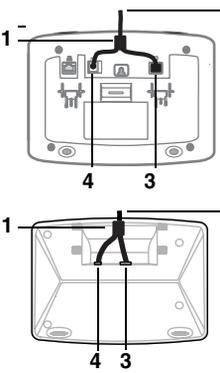
- Ethernet power sources that comply with the IEEE 802.3af standard
- 3Com Ethernet power sources that predate 802.3af

See [Table 31](#) for power connection instructions for 3Com Attendant Consoles.

**Table 31** Connecting Power to a 3Com Attendant Console

Power Source	Connection Details
<p>AC power adapter</p> <p>The Attendant Console can accept power from a power adapter. Use the adapter that comes with your Attendant Console.</p>	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div> <p>Connect the AC adapter's power jack <b>1</b> on the bottom of the Attendant Console. Connect an Ethernet cable <b>2</b> from a 3Com Telephone switch port or from a data jack to the Ethernet connector on the bottom of the Attendant Console.</p> </div> </div> <div style="margin-top: 20px;">  <p>3105 Attendant Console, top 1105 Attendant Console, bottom</p> </div>
<p>Power over Ethernet (802.3af-compliant) power source</p>	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;">  </div> <div> <p>The 3105 is compliant with 802.3af. You can connect a powered Ethernet cable <b>1</b>, directly to the device's Ethernet connector.</p> </div> </div> <div style="margin-top: 20px;">  <p>The 1105 predates the 802.3af standard so you must use a <i>3Com Network Jack to NBX Phone Power Module (3CNJVOIPMOD-NBX) 1</i>.</p> <p>The module receives power from an 802.3af-compliant power source through an Ethernet cable <b>2</b> and splits it into an unpowered Ethernet connection <b>3</b> and a power jack <b>4</b>.</p> </div> <div style="margin-left: 20px; margin-top: 20px;">  <p>3CNJVOIPMOD-NBX</p> </div>

**Table 31** Connecting Power to a 3Com Attendant Console (continued)

Power Source	Connection Details
3Com Ethernet Power Source: <ul style="list-style-type: none"> <li>■ 3C10220 (12-port)</li> <li>■ 3C10222 (24-port)</li> </ul>	<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;">  </div> <div style="flex: 2; padding-left: 20px;"> <p>The 3Com Ethernet Power Source predates 802.3af so you must use a 3Com NBX Telephone Power Splitter (3C10223) <b>1</b> to split a powered Ethernet connection <b>2</b> into an unpowered Ethernet connection <b>3</b> and a power jack <b>4</b></p> <p><b>1</b> 3105 Attendant Console, top 1105 Attendant Console, bottom</p> </div> <div style="flex: 0.5; text-align: center; padding-left: 20px;">  <p>3C10223</p> </div> </div>

**Connecting the Attendant Console to the Network**

To connect a 3Com Attendant Console:

- 1** Connect the Attendant Console to the Ethernet port located on the bottom of the 3Com telephone. The telephone's Ethernet port is identified by this symbol:



The Attendant Console does not need to be connected directly to a telephone. You can connect it to the LAN instead. The LAN port on the bottom of the Attendant Console is identified by this symbol:



**Using Auto Discover for an Attendant Console**

When you use the Auto Discover feature to configure an Attendant Console, the NBX system associates the Attendant Console with a telephone based on the these factors:

- If one or more Attendant Consoles are already configured in the system, the Auto Discover process finds all 3Com Telephones that currently have an associated Attendant Console and associates the new Attendant Console with the telephone that has the lowest extension number. For example, if the existing Attendant Console is associated with extension 1000, the new Attendant Console will also be associated with extension 1000.

- The system will map up to 100 extensions to the Attendant Console. These extensions will always be the lowest 100 extensions even if these extensions are already mapped to an existing Attendant Console. To map other extensions to an Attendant Console, you must map the extensions manually using the Attendant Console Button Mappings screen in the NBX NetSet utility.

Typically, you want to associate an Attendant Console with the telephone beside it. If the Auto Discover process associates an Attendant Console with a telephone other than the one you want, see [“Associating an Attendant Console with a Specific Telephone”](#) on [page 136](#) for instructions on how to change the association.



*Do not Auto Discover the Attendant Console before you have configured all telephones and Analog Line Cards.*

To Auto Discover an Attendant Console:

- 1 Login to the NBX NetSet utility as administrator and click *System-wide Settings > Auto Discovery*.
- 2 Enable *Auto Discover Attendant Consoles* and click *Apply*.
- 3 Wait at least 2 minutes for the NBX system to Auto Discover the Attendant Console and assign the extensions of all known telephones to its buttons.

### **Attendant Console Notes**

- When automatically mapping extensions to an Attendant Console, the system maps the first 100 extension to Attendant Console buttons except for the extension associated with the Attendant Console. If you add a second Attendant Console to the system, that Attendant Console will also have the first 100 extensions mapped to its buttons. To map extensions above the first 100, you must manually map the extensions. For more about manually adding an Attendant Console and mapping Attendant Console buttons, see Chapter 3, “Device Configuration,” in the *NBX Administrator’s Guide*.
- When you are finished configuring the Attendant Console, you can use the NBX LabelMaker utility to create printed labels.

### **Associating an Attendant Console with a Specific Telephone**

You can associate any 3Com telephone with an attendant console. However, if you use a 3Com 3103 Manager’s Telephone, you cannot map a CO line directly to a button on the Attendant Console and the Attendant Console will not support Bridged Station Appearances.

To associate an Attendant Console with a specific telephone:

- 1 Login to the NBX NetSet utility as administrator and click *Telephone Configuration > Attendant Console*.
- 2 Click the extension number of an Attendant Console in the list to open the Modify page and then select a telephone from the list.

### **Verifying Extension Assignments on an Attendant Console**

After you Auto Discover an Attendant Console, you can verify which telephone extensions have been mapped to the Attendant Console buttons.

To verify the extension assignments:

- 1 Login to the NBX NetSet utility as administrator and click *Telephone Configuration > Attendant Console*.
- 2 Click the extension number of an Attendant Console in the list to open the Modify page.
- 3 Make sure the correct extension is selected and then and then click the *Button Mapping* tab.

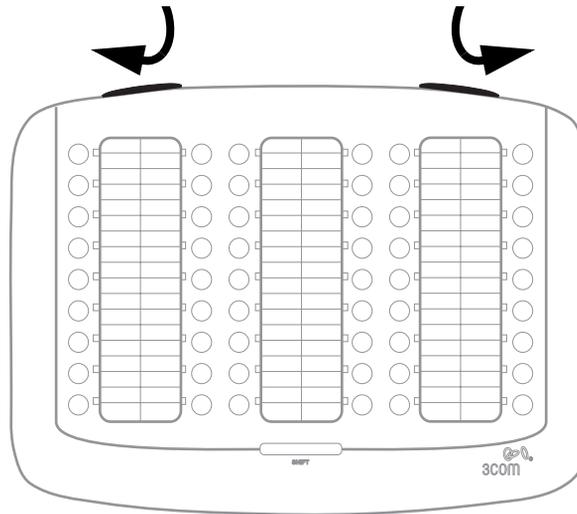
For more about button mappings on an Attendant Console, see Chapter 3, "Device Configuration," in the *NBX Administrator's Guide*.

### **Attendant Console Labels**

You can create and print Attendant Console labels using the NBX LabelMaker utility. To download the LabelMaker utility:

- 1 Log into NBX NetSet as an administrator.
- 2 Click *Downloads > LabelMaker*.

After you print the labels and then cut them out, remove the plastic cover from the Attendant Console and install the labels. On the 3Com 3105 Attendant Console, remove the cover by pulling up on the two tabs at the top of the Attendant Console until the top of the cover pops off.

**Figure 37** 3105 Attendant Console Label Cover Tabs

## Adding a Remote Telephone

NBX system software (release R4.2 and higher) supports Network Address Port Translation (NAPT, also called NAT overloading). NAPT allows you to put a 3Com Telephone behind a device that applies network address translation at a remote location, such as a home office, and connect to the NBX NCP through an Internet connection. One typical configuration is to connect a cable/DSL modem to a small office/home office router that includes a firewall and Ethernet ports. You connect the 3Com Telephone directly to one of the Ethernet ports. Another option is use the pcXset soft telephone application instead of a 3Com Telephone.

For information about installing a remote telephone, see Chapter 3, "Device Configuration," in the *NBX Administrator's Guide*.

# 4

## ANALOG LINES

This chapter tells you how to install and how to verify the successful installation of optional Analog Line Cards and to configure analog ports.

The NBX system treats a line card port as an extension and assigns a unique extension number to each port. You use the Auto Discover feature to detect analog line ports, and you define the starting address used by the Auto Discover process in the system dial plan. For a 4-digit dial plan, the starting address is 7250. For a 3-digit dial plan, the default starting address is 750. The Auto Discover process assigns the first unassigned number to the first analog line port.



*Before you install any Analog Line Cards, you may want to configure the Outdialing Prefixes. For information on this topic, see “Outdialing Prefix Settings” in Chapter 2 of the Administrator’s Guide or the Help for Dial Plan > Configure > Set Outdial Prefixes.*

---

### **Auto Discover Analog Line Cards**

To Auto Discover analog line ports:

- 1** Log in to the NBX NetSet utility using the administrator username and password.
- 2** Click *System-wide Settings > Auto Discovery*.
- 3** Clear all check boxes associated with Auto Discover.
- 4** Enable *Auto Discover Other Devices*.
- 5** Click *Apply*.

---

## Inserting an Analog Line Card

When you insert an Analog Line Card into an NBX chassis, you may leave the system powered up. The Auto Discover process begins as soon as the system detects the new card.

To insert the Analog Line Card:

- 1 Find the MAC address of the card on the label on the card.
- 2 Record the MAC address for the configuration process.
- 3 Select a slot for the card in the chassis and remove the faceplate.
- 4 Insert the card into the slot. Slide the card into the chassis until you feel it touch the connectors. To seat the card into the connectors, apply firm pressure to both the left and right sides of the front of the card.



**CAUTION:** *If you cannot seat the card with light pressure, remove it and check for obstructions.*

- 5 Tighten the left and right screws on the front of the card to secure it to the chassis.

Wait at least two minutes for the card to initialize and for the system to update its database.

---

## Verifying an Analog Line Card

After you have added an Analog Line Card, you can verify that the card was properly discovered and is ready for configuration by:

- [Using the NBX NetSet Utility](#)
- [Using Status Lights](#)

## Using the NBX NetSet Utility

To verify the status of an Analog Line Card using the NBX NetSet utility:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *PSTN Gateway > Analog Line Cards*.
- 3 Compare the MAC addresses to the MAC address of the card that you recorded before you inserted the card. [Table 32](#) shows a typical set of MAC addresses, with the associated port numbers and assigned extensions.

**Table 32** MAC Addresses for the Ports on an Analog Line Card

ATA Card or Port	MAC Address	Extension
Port 1	00:e0:bb:03:91:45	7251
Port 2	00:e0:bb:03:91:46	7250
Port 3	00:e0:bb:03:91:47	7252
Port 4	00:e0:bb:03:91:48	7253



*The ports on an Analog Line Card are usually not auto discovered in order. The example in [Table 32](#) shows that port 2 was discovered first (because it was assigned the lowest extension number), then ports 1, 3, and 4.*

### Using Status Lights

You can use the status lights on an Analog Line Card to help verify that the card has been properly discovered by the NBX system.

When an Analog Line Card is initializing, all four status lights (labelled 1 through 4) blink on and off in unison, approximately once every second.

After an Analog Line Card has been auto discovered, each status light is off most of the time, but blinks on briefly approximately once every 10 seconds. The order in which the status lights blink is the same as the order in which the ports were auto discovered. For the example shown in [Table 32](#), the lights would blink on in the order 2, 1, 3, 4.

For detailed information on Analog Line Card status lights, see [page 35](#).



# 5

## ANALOG DEVICES

This chapter tells you how to install and verify the successful installation of these analog devices:

- Analog Terminal Card
- Analog Terminal Adapter
- The ATA port on a V3000



**WARNING:** *The 3Com Analog Terminal Adapter is intended for connection only on internal LANs. Do not install it outside of buildings. Do not connect it to any networking device outside of the building in which the telephones are located.*

A four-port Analog Terminal Card (ATC), a single-port Analog Terminal Adapter (ATA), or the ATA port on a V3000 allows analog (2500-series compliant) devices, such as cordless telephones and fax machines, to operate with NBX systems.

Certain limitations apply to a phone connected through an analog port because of the differences between an analog device and a 3Com Telephone:

- A user cannot forward calls to voice mail by enabling a button such as the FWD MAIL button on the 3Com Business Telephone. You can use a feature code to have the system automatically transfer calls to voice mail if your analog telephone is not answered.
- An analog telephone can make or answer only one call. If the analog telephone is in use, an incoming call automatically goes to voice mail. However, if you have purchased the Call Waiting service from your telephone company, and you have an incoming analog telephone line mapped directly to your analog telephone, you can press the hook switch to toggle back and forth between two calls.

- To transfer a call from an analog telephone, you must depress the hook switch briefly to obtain dial tone, and then dial the extension to which you want to transfer the call and hang up.
- By using feature codes, you can create conference calls and forward calls using your analog telephone. See the *NBX Feature Codes Guide* in the NBX NetSet utility.
- Configuring an analog port for fax operation optimizes the performance for inbound and outbound faxes but compromises audio quality. If you make a voice call using the analog device (for example, if you use the telephone portion of the fax machine), the quality of the audio may be affected. If you make a VTL call using the analog device, the audio may be unusable.

### Adding an Analog Terminal Card

To add an optional Analog Terminal Card to the NBX system:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *System-wide Settings > Auto Discovery*.
- 3 Enable the *Auto Discover Other Devices* check box.
- 4 Click *Apply*.

### Inserting an Analog Terminal Card

When you insert the ATC into the chassis, you may leave the system powered up. The Auto Discover process begins as soon as the system senses the new card.



*Functionally, ATCs 3C10114 and 3C10114C are identical. However, 3C10114C uses some different internal components so that 3C10114C requires NBX software release R4.1 or higher.*

To insert the analog terminal adapter card:

- 1 Find the MAC address of the ATC on the label on the card.
- 2 Record the MAC address for the configuration process.
- 3 Select a slot for the card in the chassis and use a Phillips screwdriver to remove the blank faceplate from the slot.

- 4 Insert the card into the slot. Slide the card into the chassis until you feel it touch the connectors. To seat the card into the connectors, apply firm pressure to both the left and right sides of the front of the card.



**CAUTION:** *If you cannot seat the card with light pressure, remove it and check for obstructions.*

- 5 Tighten the left and right screws on the front of the card to secure it to the chassis.



*Wait at least 2 minutes for the Analog Terminal Card to initialize and for the system to update its database.*

### Verifying Analog Terminal Card Ports

After you have used the Auto Discover feature to add an Analog Terminal Card, you can verify that the card is properly installed by using the NBX NetSet utility, described next, and by examining the status lights on the front of the card, which are described on [page 46](#).

### Using the NBX NetSet Utility

To verify the proper installation of an Analog Terminal Card using the NBX NetSet utility:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *Telephone Configuration > ATA*.
- 3 Compare the MAC addresses or port numbers that appear in the list to the MAC address and port numbers you recorded before you inserted this card.

The four ports of an Analog Terminal Card appear in the list of ATAs, along with the ports of any previously discovered Analog Terminal Cards, and any Analog Terminal Adapters (ATAs) and the ATA port on an NBX V3000.

### Adding an Analog Terminal Adapter (ATA)

To add an Analog Terminal Adapter (ATA) to your NBX system you must first enable the Auto Discover feature. You Auto Discover an Analog Terminal Adapter (ATA) in the same way that you discover 3Com telephones and Analog Terminal Cards.



See ["3Com Telephones"](#) on [page 52](#) for information on system software and licensing requirements for an ATA.

See [“3Com Telephones”](#) on [page 52](#) for information on system software and licensing requirements.

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *System-wide Settings > Auto Discovery*.
- 3 Enable the *Auto Discover Other Devices* check box.
- 4 Click *Apply*.

---

## Connecting the Analog Terminal Adapter

After you have enabled the Auto Discover feature, connect the Analog Terminal Adapter (ATA) to the same network segment as the one on which the NCP resides. To connect the ATA:

- 1 Connect the AC power converter provided with the ATA to the power connector on the ATA. Connect the other end of the power converter to an AC power outlet.  
  
If you are using a powered Ethernet cable with your 3C10400B ATA, see the [“Using Power over Ethernet with a 3C10400B ATA”](#) next. The 3C10120B cannot use a powered Ethernet cable due to its power requirements.
- 2 Connect a Category 5 Ethernet cable to the ATA RJ-45 connector that has no icon beside it. Connect the other end of the Category 5 Ethernet cable to the LAN on which the NCP is located.
- 3 Wait 2 minutes (more on a system with many devices) for the NBX system to discover the ATA.
- 4 If the ATA is connected to a fax machine, configure the port for fax usage:
  - a Open the NBX NetSet utility and go to *Telephone Configuration > ATA*.
  - b Select the ATA from the list and click its extension.
  - c Enable the check box labeled *Fax Machine*, then click *Apply*.



*Configuring an ATA port for fax operation optimizes the performance for inbound and outbound faxes. If you make a voice call using the ATA device (for example, if you use the telephone portion of the fax machine), the quality of the audio may be affected. If you make a VTL call using the ATA device, the audio may be unusable. If you configure the port for fax*

operation, expect lower quality voice calls on that port. If you configure the port for voice calls, the performance is not optimized for faxes.

### Using Power over Ethernet with a 3C10400B ATA

The NBX Analog Terminal Adapter 3C10400B meets the IEEE 802.3af standard for Power over Ethernet and can accept power directly from an 802.3af-compliant power source. Earlier models of the ATA, 3C10120B, require an AC power converter due to their power requirements.

The table describes how to connect a powered Ethernet cable to a 3C10400B Analog Terminal Adapter.

Power Source	Connection Details
Power over Ethernet (IEEE 802.3af) power source	Connect the powered Ethernet cable directly to the telephone's Ethernet connector. No separate power connection is required.
3Com Ethernet Power Source: <ul style="list-style-type: none"> <li>■ 3C10220 (12-port)</li> <li>■ 3C10222 (24-port)</li> </ul>	The 3Com Ethernet Power Source predates 802.3af. Any NBX device can be powered by a 3Com Ethernet Power Source if you use an NBX Power Splitter (3C10223 – package of 12). The NBX Power Splitter removes power from a powered Ethernet cable and splits it into a power jack and an unpowered Ethernet connection that you connect to the ATA's LAN port (labeled <i>LAN</i> ) and power connection (labeled <b>====</b> ).



3C10223

**CAUTION:** You can damage an NBX device by using an NBX power splitter (3C10223) with the 3Com Network Jack Power over Ethernet Multiport Midspan Solution (3CNJPSE24). Use the NBX power splitter (3C10223) **only** with the 3Com Ethernet Power Source (3C10220, 12-port, or 3C10222, 24-port).

### Verifying an Analog Terminal Adapter or the ATA Port

After the NBX system has discovered an Analog Terminal Adapter or the ATA port on an NBX V3000, you can verify that the port has been properly discovered and see which extension number the system has assigned. The system assigns the next lowest available extension to the analog port.

To verify that the NBX system properly discovered the ATA:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *Telephone Configuration > ATA*.
- 3 Use the MAC address that you recorded prior to installing the ATA to identify it in the list. The MAC address on the ATA and the MAC address displayed in the list on the ATA tab should be identical.

Use the status lights on an ATA to help verify that the ATA has been properly discovered:

- For information on the status light of the ATA port of an NBX V3000, see [page 22](#).
- For information on the status light of the ATA 3C10400B, see [page 51](#).

# 6

## BRI-ST DIGITAL LINE CARD

This chapter tells you how to install and verify the installation of the optional ISDN BRI-ST (Basic Rate Interface) Digital Line Card.



*For information about installing the system hardware components, see [Chapter 2](#).*

The following sections describe how to add and configure a BRI-ST Digital Line Card to handle four BRI spans using the ST interface. In this section, and in the NBX NetSet utility, digital line cards are referred to as cards and boards.

This section covers the following topics:

- [Adding a BRI-ST Digital Line Card](#)
- [Verifying a BRI-ST Digital Line Card](#)



*Before you install any BRI-ST Digital Line Cards, you may want to configure the Outdialing Prefix settings. For information on this topic, see the “Outdialing Prefix Settings” section in Chapter 2, “Dial Plan,” in the NBX Administrator’s Guide or the Help: Dial Plan > Configure > Set Out Dial Prefixes.*

---

## Adding a BRI-ST Digital Line Card

To add an ISDN BRI-ST Digital Line Card to an NBX system, use the information in these sections:

- [Preparing the NBX System for BRI Cards](#)
- [Ordering DID, CLIP, and MSN Services for BRI](#)
- [Inserting the BRI-ST Digital Line Card](#)

### Preparing the NBX System for BRI Cards

Before you insert the BRI-ST Digital Line Card into an NBX chassis, order an ISDN BRI-ST line from your telephone carrier and have them install it.

### Ordering DID, CLIP, and MSN Services for BRI

When you order BRI services with DID, CLIP, or MSN, the local telephone carrier assigns a block of telephone numbers to you. You might be able to request that the local telephone carrier pass you a specific number of digits for each incoming call. Sometimes the carrier does not offer a choice. In either case, you need to know how many digits the carrier passes.

**Example:** Carriers commonly pass either the last three digits or last four digits of the number for each incoming call.

Sometimes the last digits of the telephone numbers the carrier assigns to you do not match the telephone extension numbers you want to use for internal calls. You can create entries in your Dial Plan file to translate the incoming numbers into the corresponding extension numbers.

**Example:** You want to use internal extensions from 4000 through 4999, but the local telephone carrier assigns you numbers from 617-555-3500 through 617-555-4499. You can create translator entries in the Dial Plan configuration file to translate an incoming digit sequence such as 3795 into extension number 4295, and a sequence such as 4213 into 4713. The configuration would require several translator entries to handle subsets of the total range. A unique set of entries would handle incoming digit sequences from 3500 through 3599, from 3600 through 3699, and each of the other sequences in which the first two digits were unique in the range from 37XX through 44XX.

If the DDI/DID numbers match your internal extension numbers, the translator entries in your Dial Plan configuration file can be much simpler.

**Example:** You plan to use internal extensions from 100 through 299, and the local telephone company assigns you numbers from 617-555-4100 through 617-555-4299. If the local telephone carrier

passes you three digits, you need no translator entries in the Dial Plan configuration file. If the carrier passes you four digits, you could add a single set of translator entries to the configuration file to remove the first digit (4) and use the remaining three digits as the internal extension.

### Enabling the Auto Discover Feature

To enable the Auto Discover feature for digital line cards:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *System-wide Settings > Auto Discovery*.
- 3 Enable *Auto Discover Other Devices*.
- 4 Click *OK*.

### Inserting the BRI-ST Digital Line Card

When you insert the BRI-ST card into the chassis, you may leave the system powered up. The Auto Discover process begins as soon as the system senses the new card.

To insert the BRI-ST card into the chassis:

- 1 Write down the MAC address of the BRI-ST card.
- 2 Insert the BRI-ST card into an available slot on the chassis. Slide the card into the chassis until you feel it touch the connectors. To seat the BRI-ST card into the connectors, press firmly on both sides of the front of the card.



**CAUTION:** *If you cannot seat the card with light pressure, remove it and check for obstructions and misalignment.*

- 3 Tighten the left and right screws on the front of the card to secure it to the chassis.
- 4 Wait at least 3 minutes for the system to discover the card and update the database.



*When you insert the BRI-ST Digital Line Card, it begins an initialization sequence. Also, because you enabled Auto Discovery, the system recognizes the addition of the card and begins to update its database. Allow at least 3 minutes for both of these processes to be completed. If you attach a cable to the CONSOLE port on the BRI-ST card and use Hyperterminal software to view the text output, you can see status messages. See ["Connecting a Computer to a Console Port"](#) in [Chapter 11](#).*

---

**Verifying a BRI-ST Digital Line Card**

After you Auto Discover a BRI-ST Digital Line Card, you can verify that it was properly discovered by using the NBX NetSet utility, described next, or by viewing the card's status lights, which is described later.

**Using the NBX NetSet Utility**

To verify that the BRI-ST card has been properly discovered:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click the *Click PSTN Gateway Configuration > Digital Line Cards*.
- 3 Examine the list of Digital Line Cards to find the BRI-ST board with the correct MAC address. The *Type* column should contain *BRI* and the *Status* column should contain *Ready*.
- 4 Click the MAC address for the card to open the Modify page.
- 5 In the Channel List, click each entry to view that channel's status and verify that the each channel has an extension number.
- 6 Verify that the *Status* column contains *Ready* for each channel.

You can also use the status lights on the front of the card to verify that a BRI-ST Digital Line Card has been properly discovered. See [page 43](#) for details about BRI-ST card status lights.

You are now ready to configure the ISDN BRI-ST Digital Line Card. See Chapter 3, "Device Configuration," in the *NBX Administrator's Guide*.

# 7

## E1 ISDN PRI DIGITAL LINE CARD

This section describes how to add an E1 Digital Line Card and how to connect to an E1 service provided by the local telephone company. In the NBX NetSet utility, digital line cards are referred to as either cards or boards.



*For information about installing system hardware, see [Chapter 2](#).*

This section covers the following topics:

- [Adding an E1 Digital Line Card](#)
- [Verifying an E1 Digital Line Card](#)

### Installation Notes

- See [“NBX Licensing”](#) on [page 56](#) for information on the number of E1 cards supported by an NBX Network Call Processor.
- You can configure an E1 Digital Line Card for ISDN PRI signaling only.
- The 3C10165D E1 Digital Line Card can be installed at a remote location and communicate with its NCP over a routed network. For information on how to set up a remote E1 card, see the *NBX Administrator’s Guide*.
- Before you install E1 Digital Line Cards, you may want to configure the Outdialing Prefix settings. For more information, see the Dial Plan chapter of the *NBX Administrator’s Guide*.
- 3C10165D E1 Digital Line Cards do not support DHCP lease times of less than 20 minutes.

---

## Adding an E1 Digital Line Card

The following sections tell you how to add an E1 Digital Line Card to an NBX system:

- [Preparing the NBX System for E1 Cards](#)
- [Ordering DID, CLIP, and MSN Services for E1](#)
- [Inserting the E1 Digital Line Card](#)

### Preparing the NBX System for E1 Cards

Before you insert the E1 Digital Line Card into the chassis, order an E1 line, with the specifications you want, from your telephone carrier, and have them install the line.

### Ordering DID, CLIP, and MSN Services for E1

When you order E1 with DID, CLIP, or MSN services, the local telephone carrier assigns a block of telephone numbers to you. Usually, you can request a specific range of numbers, but sometimes the carrier assigns numbers other than the ones you request. You may be able to request that the local telephone carrier pass you a specific number of digits for each incoming telephone call. Sometimes the carrier does not offer any choice. In either situation, you need to know how many digits the carrier passes.

**Example:** Carriers commonly pass either the last three digits or last four digits of the number for each incoming call. Sometimes the last digits of the telephone numbers the carrier assigns to you do not match the telephone extension numbers you want to use for internal calls. You can create entries in your Dial Plan configuration file to translate the incoming numbers into the corresponding extension numbers.

**Example:** You want to use internal extensions 4000 through 4999, but the local telephone carrier assigns you numbers from 617-555-3500 through 617-555-4499. You can create translator entries in the Dial Plan configuration file to translate an incoming digit sequence such as 3795 into extension number 4295, and a sequence such as 4213 into 4713. The configuration would require several translator entries to handle subsets of the total range. A unique set of entries would handle incoming digit sequences from 3500 through 3599, from 3600 through 3699, and each of the other sequences in which the first two digits were unique in the range from 37XX through 44XX. If the DDI/DID numbers match your internal extension numbers, the translator entries in your Dial Plan can be much simpler.

**Example:** You plan to use internal extensions from 100 through 299, and the local telephone company assigns you numbers from

617-555-4100 through 617-555-4299. If the local telephone carrier passes you three digits, you need no translator entries in the Dial Plan configuration file. If the carrier passes you four digits, you could add a single set of translator entries to the configuration file to remove the first digit (4) and use the remaining three digits as the internal extension.

### Enabling the Auto Discover Feature for Digital Line Cards

To enable the Auto Discover feature for digital line cards:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *System-wide Settings > Auto Discovery*.
- 3 Enable *Auto Discover Other Devices*.
- 4 Click *Apply*.

### Inserting the E1 Digital Line Card

When you insert the E1 card into the chassis, you may leave the system powered up. The Auto Discover process begins as soon as the system senses the new card.

To insert the E1 Digital Line Card into the chassis:

- 1 Write down the MAC address of the E1 card.
- 2 Select a slot for the E1 card in the chassis.
- 3 Slide the E1 card into the chassis until you feel it touch the connectors. To seat the E1 card into the connectors, press firmly on both sides of the front of the card.



**CAUTION:** *If you cannot seat the card with light pressure, remove it and check for obstructions.*

- 4 Tighten the left and right screws on the front of the E1 card.
- 5 Wait at least 3 minutes for the Auto Discovery process to complete.

When you insert the card, it runs an initialization sequence and the system recognizes the addition of the card begin to updates its database. Allow 3 minutes for both of these processes to complete, or longer on a system with many devices. If you attach a computer to the CONSOLE port on the E1 card to view the text output from the card, you see status messages associated with the initialization of the card. See [“Connecting a Computer to a Console Port”](#) in [Chapter 11](#).

---

**Verifying an E1 Digital Line Card**

After the Auto Discover process is completed, you can verify that the E1 Digital Line Card has been properly discovered by using the NBX NetSet utility, described next, and by examining the status light on the Digital Line Card, described on [page 156](#).

**Using the NBX NetSet Utility**

To verify that the E1 Digital Line Card has been properly discovered you can use the NBX NetSet Utility.

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *PSTN Gateway Configuration > Digital Line Cards*.
- 3 Verify that the E1 Digital Line Card appears in the *T1/ISDN Board List*. To help identify the board, use the E1 board MAC address that you wrote down. The *Status* column should contain *Ready*.
- 4 Click the MAC address of the card to view its Channel List.
- 5 Scroll through the channel list to verify that 30 channels appear. Use the MAC addresses of the channels to identify the ones associated with the E1 Digital Line Card. The MAC addresses of the channels follow in sequential order from the MAC address of the E1 Digital Line Card.

**Using the Status Lights**

You can use the E1 Digital Line Card status lights to verify that the E1 card was properly discovered.

3C10165C — After the Auto Discover process has completed, and before you connect the E1 Digital Line Card to the telephone company's E1 line, the CF (Carrier Fail) light should appear solid green.

3C10165D — After the Auto Discover process has completed, and before you connect the E1 Digital Line Card to the telephone company's E1 line, the POST (Power On Self Test) light and the NCP light should both be solid green.

For a complete description of all the status lights on the front of the E1 card, see [“E1 Digital Line Card”](#) on [page 39](#).

You are now ready to configure the E1 Digital Line Card. See the *NBX Administrator's Guide* for instructions.

# 8

## T1 DIGITAL LINE CARD

This chapter tells you how to install a T1 Digital Line Card. In the NBX NetSet utility, digital line cards are referred to as either cards or boards. The following sections describe how to add a T1 Digital Line Card (3C10116C and 3C10116D) and how to connect to a T1 service provided by the local telephone company:

- [Adding a T1 Digital Line Card](#)
- [Verifying the T1 Digital Line Card](#)

### Installation Notes

- See [“NBX Licensing”](#) on [page 56](#) for information on the number of T1 cards supported by an NBX Network Call Processor.
- You can choose to configure a T1 Digital Line Card to use one of two types of signaling:
  - DS1 protocol (sometimes called Standard T1). By default, the Auto Discover process selects DS1 as the signaling type.
  - ISDN PRI (Primary Rate Interface) signaling.
- The 3C10116D T1 Digital Line Card can be installed at a remote location and communicate with its NCP over a routed network. For more information, see the *NBX Administrator's Guide*.
- Before you install any T1 Digital Line Cards, you may want to configure the Outdialing Prefix settings. For more information, see the Dial Plan chapter of the *NBX Administrator's Guide*.
- 3C10116D T1 Digital Line Cards do not support DHCP lease times of less than 20 minutes.
- The NBX system provides E911 (emergency) connectivity if the T1 Digital Line Card is configured for ISDN PRI (Primary Rate Interface) signaling. The system provides the calling number (ANI) so that the emergency services personnel can determine the location of the caller from the E911 database. You must update the CO (PSAP) databases.

---

## Adding a T1 Digital Line Card

Adding a T1 Digital Line Card to a system requires:

- [Preparing the NBX System for a T1 Card](#)
- [Ordering DID \(Direct Inward Dialing\) Services for T1](#)
- [Enabling Auto Discover for Digital Line Cards](#)
- [Inserting the T1 Digital Line Card](#)

### Preparing the NBX System for a T1 Card

Before you insert the T1 Digital Line Card into the chassis, order a T1 line from your telephone carrier and have them install the line. In some cases, the telephone company offers T1 services only with specific, pre-defined parameters. However, some telephone companies offer a number of configuration choices with their T1 services.

### Ordering DID (Direct Inward Dialing) Services for T1

When you order a T1 line with DID capability (Direct Inward Dial), the local telephone carrier assigns a block of telephone numbers to you. Usually, you can request a specific range of numbers, but sometimes the carrier assigns numbers other than the ones you request.

You may be able to request that the local telephone carrier pass you a specific number of digits for each incoming telephone call. Sometimes the carrier does not offer any choice. In either situation, you need to know how many digits the carrier passes.

**Example:** Carriers commonly pass either the last three digits or last four digits of the number for each incoming call. Sometimes the last digits of the telephone numbers the carrier assigns to you do not match the telephone extension numbers you want to use for internal calls. You can create entries in your Dial Plan configuration file to translate the incoming numbers into the corresponding extension numbers.

**Example:** You want to use internal extensions from 4000 through 4999, but the local telephone carrier assigns you numbers from 617-555-3500 through 617-555-4499. You can create translator entries in the Dial Plan configuration file to translate an incoming digit sequence such as 3795 into extension number 4295, and a sequence such as 4213 into 4713. The configuration would require several translator entries to handle subsets of the total range. A unique set of entries would handle incoming digit sequences from 3500 through 3599, from 3600 through 3699, and each of the other sequences in which the first two digits were unique in the range from 37XX through 44XX.

If the DDI/DID numbers match your internal extension numbers, the translator entries in your Dial Plan configuration file can be much simpler.

**Example:** You plan to use internal extensions from 100 through 299, and the local telephone company assigns you numbers from 617-555-4100 through 617-555-4299. If the local telephone carrier passes you three digits, you need no translator entries in the Dial Plan configuration file. If the carrier passes you four digits, you could add a single set of translator entries to the configuration file to remove the first digit (4) and use the remaining three digits as the internal extension.

### Enabling Auto Discover for Digital Line Cards

To enable the Auto Discover feature for digital line cards:

- 1 Log in to the NBX NetSet utility as administrator.
- 2 Click *System-wide Settings > Auto Discovery*.
- 3 Click the *Auto Discover Other Devices* check box to select it.
- 4 Click *Apply*.

### Inserting the T1 Digital Line Card

When you insert the T1 Digital Line Card into the chassis, you may leave the system powered up. The Auto Discover process begins as soon as the system senses the new card.

To insert the T1 card:

- 1 Find the MAC address of the T1 card on the label on the component side of the card.
- 2 Record the MAC address for the configuration process.
- 3 Select a slot for the T1 card in the chassis and remove the blank faceplate from the slot.
- 4 Insert the T1 card into the slot. Slide the T1 card into the chassis until you feel it touch the connectors. To seat the T1 card into the connectors, apply firm pressure to both the left and right sides of the front of the card.



**CAUTION:** *If you cannot seat the card with light pressure, remove it and check for obstructions.*

- 5 Tighten the left and right screws on the front of the T1 card to secure it to the chassis.

- 6 Wait at least 3 minutes.



*When you first insert the T1 card it must initialize and the NBX system must update its database. You must wait 3 minutes because the T1 card reboots twice during the initialization process. On a system with many devices, you may need to allow additional time. If you attach a console cable to the CONSOLE port on the T1 card and use Hyperterminal software to view the text output from the card, you will see status messages associated with the two reboot processes. See [“Connecting a Computer to a Console Port”](#) on [page 196](#).*

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### Verifying the T1 Digital Line Card

After the Auto Discover process has completed, you can verify that the T1 Digital Line Card has been properly discovered by using the NBX NetSet utility and by examining the T1 status lights.

### Using the NBX NetSet Utility

To use the NBX NetSet utility to verify that the T1 Digital Line Card has been properly discovered:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click *PSTN Gateway Configuration > Digital Line Cards*.
- 3 Verify that the T1 board appears in the T1/ISDN Board List. Use the MAC addresses of the channels to identify the ones associated with the T1 Digital Line Card. The MAC addresses of the channels follow in sequential order from the MAC address of the T1 Digital Line Card.
- 4 Click the MAC address to view the channel list for the card.

### Using the Status Lights

To verify the presence of a Digital Line Card in the system, you can use the status lights on the front of the card.

3C10116C — After the Auto Discover process has completed, and before you connect the T1 Digital Line Card to the telephone company's T1 line, the CF (Carrier Fail) light should appear solid green.

3C10116D — After the Auto Discover process has completed, and before you connect the T1 Digital Line Card to the telephone company's T1 line, the POST (Power On Self Test) light and the NCP light should both be solid green.

For a complete description of the status lights on the front of the card, see ["T1 Digital Line Card"](#) on [page 36](#).

You are now ready to configure the T1 Digital Line Card for either DS1 signaling or ISDN PRI signaling. See Chapter 2, "Device Configuration," in the *NBX Administrator's Guide* for instructions.



# 9

## 3COM LEGACY LINK CARDS

The 3Com Legacy Link Cards enable you to use existing Meridian, Norstar, or analog telephones with an NBX system. Each card supports up to 16 handsets using the existing telephone wiring, punchdown blocks, and connectors.

3Com offers these Legacy Link Cards

- [3Com Legacy Link Analog Card](#)
- [3Com Legacy Link Meridian Card](#)
- [3Com Legacy Link Norstar Card](#)



*3Com Legacy Link Cards are not compatible with an NBX system that has been SIP-enabled.*

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### **3Com Legacy Link Analog Card**

The 3Com Legacy Link Analog Card fits into an available slot in an NBX chassis. It translates the analog handset protocol to a format suitable for use with an NBX system.

The telephone features available through a connected analog handset are as described in the *NBX Feature Codes Guide for Analog Handsets* subject to the analog phone capability. For example, paging requires an on-hook speaker capability that might not be available on an analog phone.

No additional power is required for the phones. The analog phones are line powered from the 3Com Legacy Link Analog Card.

#### **Legacy Link Analog Card Installation Notes**

- Legacy Link Cards require NBX system software version R4.1.6 or higher.
- You must install a license on your NBX system before the system will recognize Legacy Link Cards. See [“NBX Licensing”](#) on [page 56](#) for

information on the number of Legacy Link cards supported by an NBX system.

- Each card supports up to 16 handsets and is rated at 2 REN per port. Each card can support up to 8 fax devices.
- You must have an analog telephone for each extension that is to be connected. The maximum loop length for an analog telephone line is 2500ft/750m.
- Legacy Link Analog Cards support these devices and features:
  - Modems
  - Payphones that require metering pulses
  - Pulse (loop disconnect) dialing - only tone (DTMF) dialing is supported
  - Non-Bellcore Caller ID
  - Message Waiting Indicator (neon lamp) and a stutter dial tone for message waiting indication
- The Legacy Link Cards take an external power supply, which is shipped with the card, to supply power to the telephones. Before you install the card in the NBX chassis, be sure you have an AC power point (preferably UPS-protected) within 5 feet of the installation location.
- NBX chassis: Install no more than two 3Com Legacy Link Cards in an NBX chassis. If additional 3Com Legacy Link Cards are required, use additional NBX chassis.
- The 3Com Legacy Link cards do not support compression. Voice traffic between a legacy handset and an NBX device that supports compression will be uncompressed.

### **3Com Legacy Link Meridian Card**

The 3Com Legacy Link for Meridian Card enables the an NBX system to support legacy Meridian handsets. Each Legacy Link for Meridian Card supports up to 16 handsets. The card connects to the Meridian handsets using the existing telephone wiring, punchdown blocks, and connectors.

#### **Legacy Link Meridian Card Installation Notes**

- Legacy Link Cards require NBX system software version R4.1.6 or higher.
- You must install a license on your NBX system before the system will recognize Legacy Link Cards. See [“NBX Licensing”](#) on [page 56](#) for

information on the number of Legacy Link cards supported by an NBX system.

- The maximum loop length is 1000ft (300m).
- Handsets connected to the card can be configured through the Button Mappings page of the NBX NetSet utility. You can configure each phone individually, but 3Com recommends that you use the Telephone Groups option within the NBX NetSet utility to define a group with specific button mappings for each telephone type, which can then be used for any number of phones.
- The Meridian Handset Overview document is available from the 3Com web site.
- Quick reference cards are supplied with the 3Com Legacy Link for Meridian card. Please replace the existing Meridian Quick Reference Cards (situated under the handset on the Meridian phone) with the new 3Com IP Gateway Quick Reference Cards provided.
- Templates for Meridian Key Cap Labels and Meridian Phone Quick Reference Cards can be obtained at [www.desi.com](http://www.desi.com).
- The 3Com Legacy Link cards do not support compression. Voice traffic between a legacy handset and an NBX device that supports compression will be uncompressed.
- The supported Meridian handsets are the M2006, M2008, M2616, M3110, M3310, M3820, M3901, M3902, M3903, and M3804.
- When connected to the card, the Meridian handset reflects the features and functionality of the NBX Business Telephone. For details of specific phone model features and capabilities, see the *Legacy Link for Meridian Handset Compatibility and Overview*.
- The Meridian phones are line-powered from the card through an external power source. No additional phone power is required.

### **3Com Legacy Link Norstar Card**

The 3Com Legacy Link for Norstar card enables the an NBX system to support legacy Nortel Norstar handsets. Each Legacy Link for Norstar card supports up to 16 handsets. The card connects to the Norstar handsets using the existing telephone wiring, punchdown blocks, and connectors.

#### **Legacy Link Norstar Card Installation Notes**

- Legacy Link Cards require NBX system software version R4.1.6 or higher.

- You must install a license on your NBX system before the system will recognize Legacy Link Cards. See [“NBX Licensing”](#) on [page 56](#) for information on the number of Legacy Link cards supported by an NBX system.
- The maximum loop length is 1000ft (300m).
- The supported Norstar handsets are the M7000 Series and T-Series models: M7100, M7208, M7310, M7208N, M7310N, M7324, T7100, T7208, T7316, T7406 (digital cordless).
- When connected to the card, the Norstar handset reflects the features and functionality of the NBX Business Telephone. For details of specific phone model features and capabilities, see the *Legacy Link for Norstar Handset Compatibility and Overview*.
- The Norstar phones are line-powered from the card through an external power source. No additional phone power is required.
- The 3Com Legacy Link cards do not support compression. Voice traffic between a legacy handset and an NBX device that supports compression will be uncompressed.
- Handsets connected to the card can be configured through the Button Mappings page of the NBX NetSet utility. You can configure each phone individually, but 3Com recommends that you use the Telephone Groups option within the NBX NetSet utility to define a group with specific button mappings for each telephone type, which can then be re-used for any number of phones.
- The Norstar Handset Overview document is available from the 3Com web site. It compares the differences in operation of the Norstar handsets, including button mapping and default layouts.
- Quick reference cards are supplied with the 3Com Legacy Link for Norstar card. You should replace the existing Norstar Quick Reference Cards (situated under the handset on the Norstar phone) with the new 3Com Quick Reference Cards provided.
- Templates for Norstar Key Cap Labels and Norstar Phone Quick Reference Cards can be obtained at [www.desi.com](http://www.desi.com).

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### **Adding a Legacy Link Card to an NBX System**

When you unpack your Legacy Link Card, be sure you receive, in addition to the card, an external power supply. You connect the power supply to the front of the Legacy Link Card after you install it into an NBX chassis so

that the card can supply line power to the phones through the telephone wiring.

Adding a Legacy Link Card to a system requires these steps:

- [Prerequisites for Installing a Legacy Link Card](#)
- [Enabling Auto Discover for Legacy Link Cards](#)
- [Installing the Legacy Link Card](#)
- [Configuring a Legacy Link Card](#)
- [Upgrading Legacy Link Card Software](#)

### **Prerequisites for Installing a Legacy Link Card**

Before you install the card, verify that all prerequisites in this section are met:

- Be sure to read and comply with the Safety Information in the Statutory Warnings Section of the Analog Approvals document on the 3Com Partner Access web site. Be sure to communicate the safety information to users and administrators of the NBX system in which the card is operating.
- The 3Com Legacy Link Card must be installed by a 3Com Voice-Authorized Reseller.
- The NBX system must have at least one spare card slot.
- If you will be installing the card in a V5000 Gateway Chassis, ensure that all uplinks are using the 10/100M switched ports. Do not use the 10M shared ports.
- You must use NBX software Release 4.1.6x or later, and you must install a license for the correct number of Legacy Link cards.
- An AC mains power point (preferably UPS-protected) must be within 5 feet of the installed card.
- You need an RJ21x (25-pair/50-way female Amphenol-type) connector to connect to the 50-way male connector on the card for the telephones.
- You must wear a connected and grounded anti-static wrist strap with the grounding lead in operation.

**Adding the Legacy Link License Key** You must use the NBX NetSet utility to add the Legacy Link license key before the system will recognize a Legacy Link Card.

- 1 Log in to the NBX NetSet utility using the administrator login ID and password.
- 2 Click *Licenses and Upgrades > Licenses*, and then click *Add License*.
- 3 In the License Key field, type or paste the license key provided by the dealer.
- 4 If you have more licenses to add, click *Apply*. If you are finished adding licenses, click *OK*.
- 5 Reboot the system.

**Enabling Auto Discover for Legacy Link Cards** To enable the Auto Discover feature for Legacy Link cards:

- 1 Log in to the NBX NetSet utility using the administrator login ID and password.
- 2 Click *System-wide Settings > Auto Discovery*.
- 3 Enable *Auto Discover Other Devices*.
- 4 Click *OK*.

**Installing the Legacy Link Card** When you insert a card into an NBX chassis, you may leave the system powered up. If the Auto Discovery feature is enabled, the Auto Discover process begins as soon as the system senses the new card.

To install the card:

- 1 Wear a personal anti-static wrist strap and connect it according to the manufacturer's instructions.
- 2 Inspect the card, external power supply, and connectors for signs of damage.
- 3 Remove the faceplate from the NBX chassis slot where the card is to be fitted.
- 4 Insert the card into the slot. Slide the card into the chassis until you feel it touch the connectors. To seat the card into the connectors, apply firm pressure to both the left and right sides of the front of the card.



**CAUTION:** *If you cannot seat the card with light pressure, remove it and check for obstructions.*

- 5 Tighten the left and right screws on the front of the card to secure it to the chassis.
- 6 If the NBX system is not already powered-up, then apply power at this stage.
- 7 Check that the  (card power) LED is lit.
- 8 Wait a few minutes until the port LEDs stop flashing. For detailed information about the meaning of LED sequences, see [page 46](#).
- 9 Check that the  (OK) LED is flashing. If this LED is not lit, refer to [“Troubleshooting Legacy Link Card Installation”](#) on [page 174](#).
- 10 Connect the RJ21x 50-way extension line connector to the Gateway front panel.

The other end of the RJ21x connector must be connected to a punch-down block. The handsets will then terminate on this block. For North American wiring details, see [“Line Connector \(RJ21x\) Wiring for North America”](#) on [page 175](#).

- 11 Connect the external power supply output lead to the 48V power supply 6-pin DIN connector on the front of the card.
- 12 Connect the power input lead of the external power supply to the AC supply.
- 13 Switch on the power to the external power supply.
- 14 Check that the  (card DC power) LED is lit. If this LED is unlit, refer to [page 174](#).
- 15 Replace any cover plates over unused chassis slots.



*The Legacy Link Card itself does not appear in device lists in the NBX NetSet utility however, the telephones will appear after they have been added to the system by the Auto Discover feature.*

## Removing a Card

To remove a 3Com Legacy Link Card from an NBX system, wear an anti-static wrist strap and follow the reverse procedure to that used to install the card.

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## Configuring a Legacy Link Card

There is no configuration necessary for a 3Com Legacy Link Card except when Standard IP or IP on the Fly is enabled on the NBX system. If you are using Standard IP or IP on the Fly on your NBX system, you must use the GWconfig utility, a Windows program, to assign IP address settings to your Legacy Link card.

To download the GWconfig utility:

- 1 Open a browser and go to [www.3com.com](http://www.3com.com).
- 2 Click *Support & Downloads > Downloads & Drivers*.
- 3 In the Select a Download Type box, select `Utility Software`.
- 4 In the Select a Product Category box, select `Convergence/IP Telephony`.
- 5 Click Search.
- 6 In the results list, select the appropriate file to download. The filename depends on the release version number. The filename will be similar to one of these:  
`1230_3Com_N_3.0.0.2_HG.zip`  
3Com Legacy Link Norstar Operational Software  
`1712_3Com_M1_HG_3.0.0.2.zip`  
3Com Legacy Link Meridian Operational Software  
`1547_3Com_A_3.0.0.2_HG.zip`  
3Com Legacy Link Analog Operational Software
- 7 After you download the zip file, unzip it and install the GWconfig utility, and then start the program from your Windows Start menu.

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## Upgrading Legacy Link Card Software

Software upgrades are available online at [3com.com](http://3com.com). See the preceding topic, [“Configuring a Legacy Link Card”](#) for information on how to find and download the Legacy Link software from the 3Com web.



**CAUTION:** Note that the Uploader program and the Legacy Link software are inter-dependent. Always use the specific Uploader supplied with the software.

The upgrade method varies, depending on whether the Legacy Link Card is running existing software at release 3.0.0.0 or later. Refer to Section A or Section B:

To check the Legacy Link Card Software Version:

- 1 Log in to the NBX NetSet utility using the administrator login ID and password.
- 2 Click *PSTN Gateway Configuration > ATA*.
- 3 Select a port on the Gateway card, click the extension, and then click the Status tab to view the Software Version. The Software Version corresponds to the release number as follows.

If the NBX NetSet Software Version is Ra\_b\_c (where a, b, and c are numbers); then the release number is a.0.b.c. For example, R2\_0\_0 represents release 2.0.0.0; R2\_5\_0 represents release 2.0.5.0; R3\_0\_2 represents release 3.0.0.2.

If you are currently running a release earlier than 3.0.0.0, use [“Upgrading Software Versions Earlier than 3.0.0.0”](#) on [page 171](#). This section describes how to upgrade your Gateway by connecting a PC to the card's serial port, and run the Citel Technologies Gateway Uploader application.

If you are currently running release 3.0.0.0 or later, use [“Upgrading Software Versions 3.0.0.0 and Later”](#) on [page 173](#).

## General Prerequisites

Hardware:

- Windows 2000 or Windows XP Workstation, with available COM port and WinZip or similar application. Ensure you log on with an account that has administrator privileges.

Technical Training

- This software upgrade must be carried out by a Citel Channel Partner, who has attended the Citel Technical Authorization Training.

Additional Prerequisites - pre-3.0.0.0:

- 9 pin straight-through Serial Cable as detailed in the Citel Technical Authorization Training

## Upgrading Software Versions Earlier than 3.0.0.0

Follow these instructions if your Gateway is currently running a release earlier than 3.0.0.0.

The Gateway card will be out of service during the software upgrade. Ensure users are notified that their phones will be unavailable during this period.

## Installing the Gateway Uploader

The upload package is supplied as a set of files in a zipped folder. These may be installed anywhere convenient on your PC.

Unzip the zip file provided in the Citel Technologies Gateway Uploader Software Upgrade Release, into a new folder named according to the software release version (<myfolder>). Ensure you unzip with folders enabled, to preserve the file structure supplied.

Once unzipped the following file structure will be created with folders and files as shown below.

Note - During the flash software upload, the warning LED at the front of the Gateway is lit. This is normal operation during a software upgrade, and no intervention is required.

- 1** Disconnect the RJ21 (amphenol) and external power connectors from the front of the Gateway card. Do not reconnect until the final step of this procedure
- 2** Connect your PC to the Gateway card using the 9 pin Serial Cable between the PC's serial COM port and the Gateway diagnostic port.
- 3** Open the folder <myfolder>\bin. Double-click uploadstarter.exe to run the upgrade application.
- 4** A message box appears, titled CITELink Software Upgrade Tool. Read and follow the instructions.
- 5** After clicking YES (or NO), all LEDs on the Gateway card except the backplane power and warning indicators go off. This is due to the card being reset from flash boot mode to serial boot mode.
- 6** A new message box appears. DO NOT click OK immediately. REMOVE THE CARD, wait 10 seconds, RESEAT THE CARD, and then click OK.
- 7** The Gateway Uploader program runs, although on certain laptops it may fail to connect first time. If you experience this issue, click Go. When a new message box appears, click OK. There is no need to reseal the card.
- 8** A progress bar details the upgrade operation. When a new message box appears, DO NOT click OK immediately. REMOVE THE CARD, wait 10 seconds, RESEAT THE CARD, and then click OK. The Gateway Uploader uploads the Flash software to the card. Do not remove power from the card until the upgrade process is finished.
- 9** When the process is finished, the Gateway card automatically reboots.

- 10 Disconnect the serial cable from the Gateway card.
- 11 Ensure that the Gateway card has completed its reboot (check indicator LEDs on the front panel).
- 12 Re-connect the RJ21 and external power connectors to the front of the Gateway card.

### **Upgrading Software Versions 3.0.0.0 and Later**

Follow these instructions if your Gateway is currently running 3.0.0.0 or a later release. An NBX reboot is required. The Gateway card is updated at the next Gateway reboot (usually at the same time as the NBX reboot).

Ensure that users are notified that the phones will be out of service during this period.

The upload package is supplied as a set of files in a zipped folder. These may be installed anywhere convenient on your PC.

- 1 Unzip the zip into a new folder named according to the software release version (<myfolder>). Ensure you unzip with folders enabled, to preserve the file structure supplied.
- 2 Log in to the NBX NetSet utility using the administrator login ID and password.
- 3 Click *Licensing and Upgrades > Third party Drivers*, and then click Install.
- 4 Browse to the folder ...Full Loader\NBX and select the .taz file. Click Upgrade to upload the .taz file. When complete, NBX NetSet prompts you to reboot the NBX system.

### **Installing the Software Using Auto-Upload**

The software on the Gateway card will automatically update at the next reboot if the software version on the NBX is a different version to that which is already on the Gateway flash load. The Gateway will reboot when the NBX reboots, or if manually reset.

If an update is available on the NBX, the Gateway detects the new software, loads it into flash, and automatically reboots. The external power supply for the Gateway card must be connected, to ensure the Gateway reboots when the NBX does

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## Troubleshooting Legacy Link Card Installation

If you encounter problems with a Legacy Link Card, try checking the following items:

- Is the NBX system functioning properly? See the NBX documentation.
- Are the RJ21x and 48V external power connectors firmly seated into their front-panel connectors? Is the power indicator on the external power supply lit?
- Are the card LED indications correct?
- Check the basics: swap out the phone, check the handset cable, the base cable, and so forth.
- Check that the Legacy Link Card license is installed on the NBX system. This can be found within the NBX NetSet utility in the *Operations > Licenses* screen as the `Citel Analog Phone License`.
- Check that the Auto Discover Other Devices feature is enabled on the NBX system. (*System-wide Settings > Auto Discovery*.)
- Review the FAQs and Release Notes listed at 3Com Partner Access web site.
- If you are using Standard IP or IP on the Fly on your NBX system, be sure you have used the GWconfig utility to assign an IP address to your Legacy Link Card.

If a problem still exists after working through the checklist, contact your distributor for advice and further support.

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## RJ21x Wiring for North America

Note that 2 wires only per handset should be cabled to the center pair of the RJ11 connector. Level 3 or greater cable is recommended, with a maximum loop-length of 2500ft/750m, and up to REN2.

Analog telephone cable pairings for North America are shown in [Table 33](#) on [page 176](#).

[Table 34](#) on [page 177](#) shows cable pairing for Meridian handsets.

[Table 35](#) on [page 178](#) shows cable pairing for Norstar handsets.



**CAUTION:** Phone cables should be clearly labeled, especially if other 3Com Legacy Link Cards are in use on the same site. The operating voltage on the phone cable varies between different 3Com Legacy Link



**Table 33** Card Wiring for North American Analog Handsets

Pin	Wire Color	Port	Handset	RJ11 Pin
26	White-Blue	01	01	3
1	Blue-White	01	01	2
27	White-Orange	02	02	3
2	Orange-White	02	02	2
28	White-Green	03	03	3
3	Green-White	03	03	2
29	White-Brown	04	04	3
4	Brown-White	04	04	2
30	White-Slate	05	05	3
5	Slate-White	05	05	2
31	Red-Blue	06	06	3
6	Blue-Red	06	06	2
32	Red-Orange	07	07	3
7	Orange-Red	07	07	2
33	Red-Green	08	08	3
8	Green-Red	08	08	2
34	Red-Brown	09	09	3
9	Brown-Red	09	09	2
35	Red-Slate	10	10	3
10	Slate-Red	10	10	2
36	Black-Blue	11	11	3
11	Blue-Black	11	11	2
37	Black-Orange	12	12	3
12	Orange-Black	12	12	2
38	Black-Green	13	13	3
13	Green-Black	13	13	2
39	Black-Brown	14	14	3
14	Brown-Black	14	14	2
40	Black-Slate	15	15	3
15	Slate-Black	15	15	2
41	Yellow-Blue	16	16	3
16	Blue-Yellow	16	16	2

**Table 34** Card Wiring Chart for Meridian Handsets

<b>Pin</b>	<b>Wire Color</b>	<b>Port</b>	<b>Handset</b>
26	White-Blue	01	01
1	Blue-White	01	01
27	White-Orange	02	02
2	Orange-White	02	02
28	White-Green	03	03
3	Green-White	03	03
29	White-Brown	04	04
4	Brown-White	04	04
30	White-Slate	05	05
5	Slate-White	05	05
31	Red-Blue	06	06
6	Blue-Red	06	06
32	Red-Orange	07	07
7	Orange-Red	07	07
33	Red-Green	08	08
8	Green-Red	08	08
34	Red-Brown	09	09
9	Brown-Red	09	09
35	Red-Slate	10	10
10	Slate-Red	10	10
36	Black-Blue	11	11
11	Blue-Black	11	11
37	Black-Orange	12	12
12	Orange-Black	12	12
38	Black-Green	13	13
13	Green-Black	13	13
39	Black-Brown	14	14
14	Brown-Black	14	14
40	Black-Slate	15	15
15	Slate-Black	15	15
41	Yellow-Blue	16	16
16	Blue-Yellow	16	16

**Table 35** Card Wiring Chart for Norstar Handsets

<b>Pin</b>	<b>Wire Color</b>	<b>Port</b>	<b>Handset</b>
26	White-Blue	01	01
1	Blue-White	01	01
27	White-Orange	02	02
2	Orange-White	02	02
28	White-Green	03	03
3	Green-White	03	03
29	White-Brown	04	04
4	Brown-White	04	04
30	White-Slate	05	05
5	Slate-White	05	05
31	Red-Blue	06	06
6	Blue-Red	06	06
32	Red-Orange	07	07
7	Orange-Red	07	07
33	Red-Green	08	08
8	Green-Red	08	08
34	Red-Brown	09	09
9	Brown-Red	09	09
35	Red-Slate	10	10
10	Slate-Red	10	10
36	Black-Blue	11	11
11	Blue-Black	11	11
37	Black-Orange	12	12
12	Orange-Black	12	12
38	Black-Green	13	13
13	Green-Black	13	13
39	Black-Brown	14	14
14	Brown-Black	14	14
40	Black-Slate	15	15
15	Slate-Black	15	15
41	Yellow-Blue	16	16
16	Blue-Yellow	16	16

# 10

## CONFIGURING IP TELEPHONY

This chapter describes IP telephony and provides instructions for configuring IP. It covers these topics:

- [IP Telephony Overview](#)
  - [Implementing IP](#)
  - [Standard IP Configuration](#)
  - [IP On-the-Fly Configuration](#)
  - [Providing the NCP IP Address to Devices](#)
- [Configuring IP Telephony](#)
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  - [Selecting the Operating Mode](#)
  - [Configuring IP On-the-Fly](#)
  - [Configuring the DHCP Server](#)
  - [Manually Configuring Telephone IP Settings](#)
  - [Automatically Configuring Telephone IP Settings](#)
  - [Configuring Analog Line Card Port IP Settings](#)
  - [Configuring T1, E1, and BRI Channel IP Settings](#)
  - [Low-bandwidth Telephony](#)
  - [Broadband Telephony](#)

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## IP Telephony Overview

You can integrate the NBX system into any network infrastructure because it can operate at either Layer 2 (Ethernet) or Layer 3 (IP).



*For information on configuring an NBS system to run SIP mode, see the NBX Administrator's Guide.*

If all the telephones in your office connect to the same Local Area Network (LAN) and you do not have your LAN segmented into subnetworks, there is little reason to implement IP telephony. Even if your network includes a few subnetworks, you can configure the routers to pass NBX Ethernet frames and avoid the need for IP operation. In a more widely distributed setting with several subnetworks or with a part of the network distributed over a Wide Area Network (WAN), IP telephony may be required.

This section covers these topics:

- [Implementing IP](#)
- [Standard IP Configuration](#)
- [IP On-the-Fly Configuration](#)
- [Providing the NCP IP Address to Devices](#)

### Implementing IP

You can implement IP in one of two ways:

- Standard IP

All devices receive an IP address, either from a Dynamic Host Configuration Protocol (DHCP) server or through manual assignment.

- IP On-the-Fly

Telephones and other devices on the same subnet as the NCP communicate with other devices on that subnet using Ethernet frames so they do not need IP addresses. Devices receive an IP address only when they need to communicate with a device on a different subnet. The system administrator specifies a list of IP addresses using the NBX NetSet utility. When a local device needs an IP address, the system assigns one from the list. Remote devices receive their IP addresses either through a DHCP server or through manual assignment.

## Standard IP Configuration

The NBX system must be configured differently in each of the following situations:

- All telephones and devices are on the same subnetwork as the NCP.  
If you use Standard IP with a DHCP server, verify that the server has enough IP addresses to handle the number of telephones and devices in the NBX system.  
  
If you are not using a DHCP server, use the NBX NetSet utility to configure an IP address for each 3Com telephone and device.
- Some telephones are on separate subnetworks.  
If you use a DHCP server, verify that the server has enough IP addresses to handle the number of telephones and devices on the separate subnet. If you connect a new telephone to the subnet, you must provide a means for the telephone to get the IP address of the NCP. You can configure DHCP option 184 on your DHCP server for this purpose.  
  
You can manually define network settings for a telephone, including the NCP address, using the Local User Interface (LUI) utility, which resides on each telephone that has an LCD display, or the Telephone Local Configuration application (TLC), a program that you can install from the NBX Resource Pack. For more information on these tools, see Chapter 10, "Troubleshooting," in the *NBX Administrator's Guide*.

## Using DHCP

A DHCP server can assign IP addresses to telephones from a predefined group of addresses. (The NCP must have a static IP address.) The DHCP server assigns these addresses for a fixed amount of time that depends on how the server is configured. At the end of the time period, if the device is still active and needs the IP address to continue operating, the DHCP server renews the same IP address for another time period. If the device is no longer active at the end of the time period, the DHCP server returns the IP address to the list of available addresses that can be allocated to requesting devices.

If your DHCP server can serve multiple subnets (by using a BOOTP Relay agent, also known as an IP helper address), you can provide IP settings (IP address, subnet mask, and default gateway address) for all of your system devices. However, each NBX device in the system must know the IP address of the NCP. If the device and the NCP are located on the same subnet, the device receives this information through status messages passed at the Ethernet layer. If the device and the NCP are located on

different subnets, you can configure the DHCP server to pass the IP address of the NCP to the device. See [“Providing the NCP IP Address to Devices”](#) on [page 182](#).

### **IP On-the-Fly Configuration**

The NBX system must be configured differently in each of the following IP On-the-Fly situations:

- All telephones and devices are on the same subnet as the NCP.

You do not need to use IP in this environment. Devices always use Ethernet (Layer 2) communications, and the NCP never needs to give out an IP address.

- Some telephones are on separate subnets.

If you use a DHCP server, verify that the server has enough IP addresses to handle the number of telephones and devices in the NBX system. Optionally, you can configure the DHCP server to pass the IP address of the NCP to DHCP client devices. For an example, see Appendix C, “Configuring Option 184 on a Windows 2000 DHCP Server,” in the *NBX Administrator’s Guide*.

If you are not using DHCP, you must use the NBX NetSet utility to configure a block of IP addresses for use by IP On-the-Fly devices, and configure the NCP’s IP address into each telephone that will be located on a remote subnet.

Devices on the same subnet as the NCP are given an IP address only if they need to communicate with a device that is on a different subnet. See [“Configuring IP On-the-Fly”](#) on [page 184](#).

### **Providing the NCP IP Address to Devices**

To provide the IP address of the NCP to devices on other subnetworks, use one of these methods:

- Program the IP address of the NCP directly into each telephone using the telephone key pad. For devices the 3Com 3100 Entry Telephone, which does not have an LCD display panel, you can use the Telephone Local Configuration application, which you can install on a computer from the NBX Resource Pack. See Chapter 10, Troubleshooting, in the *NBX Administrator’s Guide* for instructions on how to use these tools.
- Program a custom DHCP option on the DHCP server and configure the server to pass the IP address of the NCP to remote devices through the standard DHCP configuration process.

RFC 2132 (DHCP Options and BOOTP Vendor Extensions) defines vendor specific options that allow you to configure the server to send locally defined information to DHCP clients. NBX system devices support option 184. If you create and activate option 184 on your DHCP server, and use it to specify the IP address of the NCP, you do not need to manually configure the address on the NBX devices. For an example of how to configure a DHCP server for option 184, see Appendix C, "Configuring Option 184 on a Windows 2000 DHCP Server" in the *NBX Administrator's Guide*.

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## Configuring IP Telephony

Setting up IP telephony is the same whether you are installing the NBX system for the first time or adding IP to an existing system. The steps for setting up IP telephony are covered in these sections:

- [Selecting the Operating Mode](#)
- [Configuring IP On-the-Fly](#)
- [Configuring the DHCP Server](#)
- [Manually Configuring Telephone IP Settings](#)

### Selecting the Operating Mode

To select the IP operating mode:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click the *System-wide Settings > IP Settings*.
- 3 Select the appropriate entry from the *Network Protocol* list. The choices:
  - **Ethernet Only** — Layer 2.
  - **Standard IP** — Every device requires an IP address. Either use DHCP or manually assign the IP addresses.
  - **IP On-the-Fly** — The NCP provides IP addresses as needed to local devices. Remote devices obtain IP addresses from the DHCP server, or you can manually program their IP addresses.
- 4 Click *Apply*.

### Configuring IP On-the-Fly

Before you configure IP On-the-Fly, consider how many addresses you need.

The number of addresses needed depends on the number of devices that are likely to use IP communications at one time and in one device location. For example, if you have twelve devices (four line card ports and eight telephones) on the NCP subnetwork, and four telephones on other subnetworks, the number of IP addresses required depends on the activity on the system.

If an external telephone call arrives on one of the line card ports and the call is intended for one of the *remote* telephones, then the line card port needs an IP address to participate in the call and obtains one from the IP On-the-Fly address pool. The remote telephone needs an IP address too. However, the remote telephone cannot obtain an IP address from the IP On-the-Fly pool of addresses because it is not on the same subnet as the NCP. If the remote telephone does not already have an IP address, either assigned by a DHCP server or manually programmed through the telephone buttons, it cannot participate in the call.

If an external telephone call arrives on one of the line card ports and the call is intended for one of the *local* telephones, neither the line card port nor the telephone require an IP address. Both can communicate at the Ethernet layer (Layer 2).

After you determine the range of IP addresses that you need, configure IP On-the-Fly:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 Click the *System-wide Settings > IP Settings*, and then click the *IP Address Ranges* tab.
- 3 In the *IP Addresses* dialog box, click *Add*.
- 4 Specify an address range, and then click *OK*.

### Configuring the DHCP Server

If you choose to use DHCP, contact your network administrator to configure the DHCP server. For an example, see Appendix C, "Configuring Option 184 on a Windows 2000 DHCP Server," in the *NBX Administrator's Guide*.



*In NBX releases prior to R6.0, 3C10165D E1 Digital Line Cards and 3C10116D T1 Digital Line Cards did not support DHCP option 184, so*

*you needed to initialize the card by connecting it to the same subnet as the NCP if you were installing the card on a subnet that was remote from the system's NCP. With NBX R6.0 or higher, these cards support DHCP option 184.*



*3C10165D E1 Digital Line Cards and 3C10116D T1 Digital Line Cards do not support DHCP lease times of less than 20 minutes.*

## Manually Configuring Telephone IP Settings

If a phone is located on a different subnet from the NCP, the phone and the NCP cannot communicate with each other until the telephone is configured with its own IP settings and the IP address of the NCP. After the telephone can communicate with the NCP, you can use the NBX NetSet utility to change the device IP settings. If you first connect the telephone to the same subnet as the NCP, the telephone receives and retains the NCP IP information required to communicate with the NCP when the telephone is moved to a different subnet.

To edit telephone IP settings with the NBX NetSet utility:

- 1 Connect the telephone to the same subnet as the NCP.



*If the telephone has not already been discovered by the NCP, click System-wide Settings > Auto Discovery and enable Auto Discover Telephones.*

- 2 Log in to the NBX NetSet utility using the administrator name and password.
- 3 Click *Telephone Configuration > Telephones*.
- 4 Select the telephone from the list by clicking its extension. If you are not sure which telephone to select, match the MAC address with the MAC address printed on the label on the bottom of the telephone.
- 5 When the Modify page opens, click the IP Settings dialog box appears. (The IP Settings button does not appear unless you have enabled IP for the system.)
- 6 In the *IP Settings* dialog box, specify the IP settings for this device. The IP Settings dialog box shows two groups of IP settings:
  - **IP Settings Reported by Device** — Typically, if you are configuring a new telephone, you see 0.0.0.0 in each of the IP address, Default Gateway, and Subnet Mask fields. Note that if a telephone has an IP address, default gateway, and subnet mask, you cannot change those values using the NBX NetSet utility.

- **Manually Assigned IP Settings** — Use these fields to configure the IP settings for the telephone. You can change an IP setting only if the corresponding field under IP Settings Reported by Device is 0.0.0.0. If the field contains a value other than 0.0.0.0, you can change the value only through the telephone buttons. See the next section.



*Manually assigned settings take precedence over settings assigned automatically by DHCP. If you manually enter the IP settings for a telephone, these settings replace any settings supplied by a DHCP server, and the telephone no longer searches for a DHCP server when it is plugged into a network.*

#### 7 Click OK.

The Ethernet (Layer 2) communications between the NCP and the telephone ensure that the telephone receives the IP address of the NCP as part of the configuration.

You can program IP configuration directly into a telephone using the telephone Local User Interface (LUI) utility. For the 3100 Entry Telephone, which does not have display panel, you can use the Telephone Local Configuration application. For detailed instructions on how to use these tools, see the *NBX Administrator's Guide*.

### Automatically Configuring Telephone IP Settings

When you connect a 3Com Telephone to a network, it searches for a DHCP server. If the telephone is on the same subnet as the NCP, the telephone receives the following configuration information from the NCP:

- The IP settings (IP address, subnet mask, and default gateway address) for the telephone to use
- The IP address of the NCP

The telephone then stops searching for a DHCP sever.

If a telephone is on a different subnet than the NCP and a DHCP server provides IP settings to the telephone, the telephone cannot communicate with the NCP until it has the NCP IP address. There are two methods of providing the NCP IP address to the telephone:

- Manually configure the NCP IP address into the telephone using the telephone LUI utility. See [“Manually Configuring Telephone IP Settings”](#) on [page 185](#).
- Provide the IP address to the telephone using DHCP option 184. For an example of how to configure option 184 on a DHCP server, see

Appendix C, “Configuring Option 184 on a Windows 2000 DHCP Server,” in the *NBX Administrator’s Guide*.



*The methods for configuring special options vary depending on the DHCP server, and the example in the NBX Administrator’s Guide may not apply directly to your DHCP server. For assistance, contact your network administrator, the vendor of the DHCP server, or a qualified 3Com service representative.*

### **Configuring Analog Line Card Port IP Settings**

Typically, your analog line card ports reside on the same subnetwork as the NCP. If you use IP On-the-Fly, or if you use Standard IP with DHCP, IP configuration is automatic. Verify that your server has enough addresses. However, if you are using Standard IP without DHCP, you must manually configure the IP settings for each line card port.

To manually configure IP settings for line card ports:

- 1** Log in to the NBX NetSet utility using the administrator username and password.
- 2** If you have not already done so, use the Auto Discover feature to add line card ports to the configuration database. For more information see “Configuring a Line Card Port” in the *NBX Administrator’s Guide*.
- 3** Click *PSTN Gateway Configuration > Analog Line Cards*.
- 4** Select a line card port from the list by clicking its extension, and then click the *IP Settings* tab.

### **Configuring T1, E1, and BRI Channel IP Settings**

If all digital line cards reside on the same subnetwork as the NCP, and you are using IP On-the-Fly or Standard IP and DHCP, IP configuration is automatic. If you are using Standard IP without DHCP, you must manually configure the IP settings for T1, E1, and ISDN BRI cards.

3C10165D E1 cards and 3C10116D T1 cards can be installed in a remote location and communicate with the NCP over a routed network. For information on how to configure these cards for remote operation, see the *NBX Administrator’s Guide*.



*3C10165D E1 Digital Line Cards and 3C10116D T1 Digital Line Cards do not support DHCP lease times of less than 20 minutes.*

To manually configure channel IP addresses:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 If you have not already done so, use the Auto Discover feature or manual configuration to add the T1, E1, or ISDN BRI channels to the configuration database.

To manually configure IP settings for digital line card ports:

- 1 Log in to the NBX NetSet utility using the administrator username and password.
- 2 If you have not already done so, use the Auto Discovery feature to add line card ports to the configuration database, *System-Wide Settings > Auto Discovery Settings*.
- 3 Click *PSTN Gateway Configuration > Digital Line Cards*.
- 4 Select a line card port from the list by clicking its MAC address, and then click the *IP Settings* tab.
- 5 To assign one IP address manually and have the NBX system assign the remaining addresses to each successive channel on the card automatically, enter the first address in the *First IP Address* box. The system adds the remaining addresses sequentially when you apply the changes.

3C10165D E1 cards and 3C10116D T1 cards need only one IP address. Enter the IP address in the *First IP Address* box. The *Assign Addresses Individually* button does not appear when you are configuring 3C10165D E1 cards and 3C10116D T1 cards.

- 6 To assign IP addresses individually on digital line cards other than 3C10165D E1 cards and 3C10116D T1 cards, click *Assign Addresses Individually*.
  - a Specify an IP address for each channel.
  - b In the *Common Subnet Mask* and *Common Default Gateway* fields, enter IP values that are appropriate for your network.
  - c Click *Ok*.
- 7 In the IP Settings screen, click *Apply*.
- 8 Wait 3 minutes for the changes to take effect.
- 9 Verify your changes.

## Low-bandwidth Telephony

To support remote users, you can configure a 3Com Telephone to operate over a low-bandwidth link. For reliable audio, the link must support throughput of at least 64 Kbps. An example is a single B channel of a Basic Rate Interface (BRI) ISDN line or a single channel on a T1 line.

An ISDN connection is not the only method of connecting a remote telephone. The ability of NBX systems to operate in Ethernet (Layer 2) mode or IP (Layer 3) mode gives you several connection options such as cable modem, frame relay, and DSL. Your 3Com NBX Voice-Authorized Partner can help you to design a system to meet your needs.

You enable low-bandwidth communications in an NBX system at the device level using the NBX NetSet utility.

To enable low-bandwidth communication for a telephone:

- 1 Log in to the NBX NetSet utility using the administrator name and password.
- 2 Click *Telephone Configuration > Telephones*.
- 3 Select the telephone from the list by clicking its extension.
- 4 When the Modify page opens, enable these check boxes:
  - Disable Line Appearance/BLF
  - Disable Conferencing
  - Disable Paging Output
  - Disable Periodic Status Message

Disabling these features reduces the network traffic, but the low-bandwidth telephone cannot play music on hold, initiate a page or participate in conference calls.

- 5 In the Audio Compression Settings, make sure *Lowest Bandwidth Utilization* is selected.

The rest of the configuration is done at the telephone and at the router. At the telephone, you specify the IP address of the NCP. See [“Manually Configuring Telephone IP Settings”](#) on [page 185](#). When your low-bandwidth link is operational and connected to the NCP, the Auto Discover process can discover and configure the telephone, or you can manually configure it through the NBX NetSet utility.

You can operate with the link “always open” or you can set it up to autodial. With an autodial connection, when you lift the receiver on the telephone, the ISDN router or terminal adapter establishes the link to the

NCP. In the other direction, a call to the extension of the remote telephone initiates the connection. To ensure that there is time to complete the call, you may need to modify the time-out values of the system. Consult your 3Com NBX Voice-Authorized Partner or a 3Com-qualified service technician for assistance.

The specific configuration tasks required for setting up the link between the NCP and the remote telephone depend on the type of equipment and the Telco/ISP that you use. For help in selecting equipment and configuring it, contact your 3Com NBX Voice-Authorized Partner or a 3Com-qualified support technician.

After you enable low-bandwidth communication for a telephone, complete the configuration of the low-bandwidth IP connection:

- 1 Use the telephone key pad to configure IP settings on the telephone. See [“Manually Configuring Telephone IP Settings”](#) on [page 185](#) for more information.
- 2 Configure the telephone in the configuration database.

## Broadband Telephony

NBX system software (release R4.2 and higher) supports Network Address Port Translation (NAPT, also called NAT overloading). NAPT allows you to put an NBX Telephone behind a device that applies network address translation at a remote location, such as a home office, and connect to the NCP through an Internet connection. One typical configuration is to connect a cable/DSL modem to a small office/home office router that includes a firewall and Ethernet ports. You connect the NBX Telephone directly to one of the Ethernet ports.



*Another option is use the NBX pcXset Soft Telephone Client instead of an NBX Telephone. You can then use a VPN connection for your voice connection and avoid firewall configuration problems.*

This section summarizes the tasks you must complete to configure an NBX Telephone for operation behind the NAPT device. Because the configuration interface on each device varies, detailed procedures for NAPT device configuration are beyond the scope of this document. For information about configuring the NAPT device, see the documentation for that device.

To add a broadband connected telephone behind a NAPT device:

- 1 Make sure the NBX system is set up for IP operations, either Standard IP or IP On-the-Fly. 3Com recommends that you use a VPN connection to establish access from your home system to the NBX system network to avoid security issues on the NBX system.
- 2 Use the NBX NetSet utility to enable *Auto Discover Telephones* (*System-wide Configuration > Auto Discovery*) and then connect the NBX Telephone to the NBX system.

Auto discovering the telephone while it is connected locally to the NBX network allows the system to configure the phone in the database and assign an extension number. You could manually add the telephone to the database instead of using the Auto Discover feature.

- 3 Move the telephone to its intended location. Connect it to power and then use the telephone Local User Interface (LUI) utility to program these settings:
  - NCP MAC address — Required only when the network has more than one Network Call Processor.
  - Telephone IP address — A private IP address matching the IP address scheme on the LAN side of the NAPT device but outside of the DHCP address range configured in the NAPT device. The telephone must have a static IP address. For pcXset, this would be the IP address of the computer.
  - NCP IP address — The IP address of the NCP that the phone must communicate with. If you are not connecting to the network through a VPN connection, the NBX system must have a public IP address.
  - Subnet Mask — The address mask in use on the LAN side of the NAPT device.
  - Default Gateway — The IP address of the NAPT device on the LAN.

For details on how to start the LUI utility, see the *NBX Administrator's Guide*.

- 4 Configure the NAPT device:

Use the device's user interface to map UDP ports 2093-2096 to the NBX telephone IP address. These UDP ports are registered ports for NBX operations. This mapping feature, known as virtual server, port mapping, port range forwarding, or rules, is required to allow traffic to pass to and from the NBX Telephone.



# 11

## TROUBLESHOOTING

This chapter contains maintenance and troubleshooting information that can help you resolve simple problems. It covers these topics:

- [System-level Troubleshooting](#)
- [Connecting a Computer to a Console Port](#)
- [Servicing the Network Call Processor Battery](#)
- [Getting Service and Support](#)

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### System-level Troubleshooting

For each symptom listed in [Table 36](#), perform the suggested actions in the order listed.



**WARNING:** Before you remove any component, shut down the system software and then turn off the power to the system.

**Table 36** Troubleshooting Actions

Symptom	Possible Cause	Suggested Action
Date/time display on telephones is wrong, either incorrect date or shows random characters.	A power surge has corrupted the system time.	If the display shows incorrect date, use NBX NetSet to reset the system time. If the display shows random characters, for example, 00; 0 #, you must: <ol style="list-style-type: none"><li>1 Disconnect power to the chassis that holds the NCP.</li><li>2 Wait 60 seconds.</li><li>3 Reconnect power to the system.</li><li>4 Use NBX NetSet to enter the correct date and time.</li></ol>
	Problem with Network NCP battery.	Contact your 3Com NBX Voice-Authorized Partner.

**Table 36** Troubleshooting Actions (continued)

Symptom	Possible Cause	Suggested Action
Your browser cannot connect to the NBX NetSet utility.	No IP connectivity	Verify that the computer you are using to run the browser has network connectivity. See <a href="#">“Establishing IP Connectivity”</a> on <a href="#">page 101</a> .
	Routing problems	If your local IP environment includes a proxy server, you might need to reconfigure your browser parameters to ignore the proxy server. See the Help for your browser.
	Invalid IP configuration	The system has a default IP configuration which might need to be changed to match your local IP environment. Temporarily change the IP configuration of your computer so that the subnet configuration matches the system configuration. Specify 255.255.255.0 as the subnet and use IP address 192.168.1.191. After you change your computer’s IP configuration, connect to the system and change its IP configuration to match the IP environment of your local network. Change your computer’s IP configuration back to its original settings, and then connect to the NBX NetSet utility using the new IP address. See <a href="#">“Establishing IP Connectivity”</a> on <a href="#">page 101</a> complete information.
Cannot open NBX NetSet using the administrator username and password.	The CAPS LOCK key on your keyboard is activated.	NBX NetSet username and passwords are case-sensitive. For example, NBX NetSet accepts “administrator” but it rejects “Administrator” and “ADMINISTRATOR”.
Callers on hold do not hear music.	No music source is connected to the Call Processor.	See <a href="#">“Adding External Hardware”</a> on <a href="#">page 117</a> for more information.
	MOH audio is disabled.	Enable MOH audio in NBX NetSet > System Configuration > System Settings > System-wide. See <a href="#">“Connecting a Music-on-Hold (MOH) Input Device”</a> on <a href="#">page 118</a> .
	MOH volume is set too low.	Adjust the MOH volume on the device that is providing audio to the NBX system. The audio input should be max 2V peak to peak.

**Table 36** Troubleshooting Actions (continued)

Symptom	Possible Cause	Suggested Action
Lose date and time when rebooting the system.	Problem with the battery on the NCP.	See <a href="#">“Servicing the Network Call Processor Battery”</a> on <a href="#">page 197</a> .
NBX NetSet is very slow in responding.	Your network uses a proxy server for Internet access.	A common networking practice is to employ a proxy server to shield your network from intrusion by unauthorized users. However, communications with NBX NetSet do not need to pass through the proxy server. To speed access to NBX NetSet, configure your browser to access the NBX system without going through the proxy server.
All greetings and prompts are missing. For example, calling the Auto Attendant or a user’s mailbox produces silence instead of the expected greetings.	The wrong message compression format was selected.	<p>Prior to R1.1.0, all audio used MuLaw compression. With R1.1.0, audio, that is, any prompt, message, or greeting, was recorded using ADPCM compression. If you are running R1.1.0 or higher, you must leave the compression format set to ADPCM. The ability to select the format allows you to migrate existing data into an older database for backwards compatibility.</p> <p>In release R2.6 and all later releases, the compression is set to ADPCM and you cannot change it.</p>
Caller ID information is not appearing when an outside call arrives.	Your local telephone company is not providing Caller ID service to you.	<p>Caller ID is typically an optional service which you must order from your telephone company.</p> <p>You may be able to see caller ID by number or by name (or both) depending on the service your telephone company provides.</p>
	You are answering the telephone before the Caller ID information is fully received.	Caller ID information does not appear immediately. It usually appears between the first and second rings. If you answer the call too quickly, the information is never received.

## Connecting a Computer to a Console Port

You can connect a computer directly to an NBX Network Call Processor, an analog terminal adapter, digital and analog line cards, and the 3Com Attendant Console and access CLI commands and system status messages through a terminal emulation program. Typically, direct access to the device is for maintenance and troubleshooting purposes and should be done only under the direction of a support technician. However, the serial port provides easy access for configuring IP settings using the `nbxlpConfig` command (case sensitive).

You can connect a computer directly to these NBX devices:

**Table 37** Serial Port Connections

Card	Port
NBX NCP	CONSOLE or COM1
BRI-ST Digital Line Card	CONSOLE
E1 Digital Line Card	CONSOLE
T1 Digital Line Card	CONSOLE
NBX Analog Line Card (3C10114C only)	CONSOLE
NBX Analog Terminal Card (3C10117C only)	CONSOLE
NBX Analog Terminal Adapter (3C10400 only)	10101
3Com 3105 Attendant Console	Serial



*To connect to the serial port on a 3Com 3105 Attendant Console, you must use a DB9 (female)-to-RJ-45 adapter.*

It does not matter which computer operating system you use. As long as the computer has a terminal emulation program that can emulate a VT100 terminal (for example, Microsoft Hyperterminal), it can communicate with any of the cards listed in [Table 37](#).

To connect the computer to the COM1 or CONSOLE port:

- 1** Using a standard computer serial cable (9-pin male to 9-pin female), connect the male end of the cable to the female connector (COM1 or CONSOLE) on the front panel of the board.
- 2** Connect the female end of the cable to an available serial port on the computer.
- 3** Start the terminal emulation software and create a new connection.

- 4 Configure the connection to use the serial port to which you connected the cable and to use the settings in [Table 38](#).

**Table 38** Terminal Emulation Program Properties

Property	Value
Emulation	VT100
Baud Rate	9600
Data bits	8
Parity	None
Stop bits	1
Flow control	None

All messages that associated with the board (for example, the initialization process) appear in the terminal emulation window.

### CLI Commands

The command `nbxIpConfig` provides a simple way to set the static IP address settings required by the NCP and other NBX devices. For any other purpose, 3Com recommends that you use the command line interface only under the direction of an authorized service technician.

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## Servicing the Network Call Processor Battery

If you lose the system date and time when you reboot an NBX system, it could mean that the NCP battery must be replaced. The battery is not a user-serviceable item. If you suspect a problem with the battery, contact your 3Com Technical Support representative.



**WARNING:** *There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.*

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## Getting Service and Support

Your authorized 3Com NBX Voice-Authorized Partner can assist you with all of your support needs, including systems and cable plant design, installation, configuration, and project management.

A choice of maintenance services, including remote diagnostics, on-site support, telephone technical support, and hardware replacement, is available from your 3Com NBX Voice-Authorized Partner. Training and enhancement services are also available.



# A

## SPECIFICATIONS

Specifications for NBX hardware:

[V3000 Analog Call Processor](#)

[V3000 BRI Call Processor](#)

[V3001R Call Processor](#)

[V5000 Call Processor](#)

[NBX 100 Call Processor](#)

[NBX V3000 Gateway Chassis](#)

[NBX V5000 Gateway Chassis](#)

[NBX 100 6-Slot Chassis](#)

[NBX Analog Line Card](#)

[NBX Analog Terminal Card](#)

[NBX Analog Terminal Adapter \(ATA\)](#)

[NBX BRI-ST Digital Line Card](#)

[NBX E1 and T1 Digital Line Cards](#)

[NBX Hub Card](#)

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[3102 Business Telephone](#)

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[3100 Entry Telephone](#)

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**Government Approvals**



The 3Com® Networked Telephony Solutions are in compliance with the industry standards listed in this section.

**Safety** IEC60950 Edition 3 (plus all national deviations)  
 EN60950 1992 / A11: 1997 (plus ZB & ZC deviations)  
 UL 60950-1  
 CSA 22.2#950 3rd Edition  
 AS/NZS 3260

**EMC Emissions** EN55022, CISPR22, AS/NZS3548, FCC Part 15, ICES-003 (Class A)

**EMC Immunity** EN55024  
 IEC61000-4-2 Electrostatic discharge  
 IEC61000-4-3 Radiated immunity  
 IEC61000-4-4 Fast transients  
 IEC61000-4-5 Surge  
 IEC61000-4-6 Conducted immunity  
 IEC61000-4-8 Magnetic  
 IEC61000-4-11 Dips and interruptions

**European Community CE Notice**

Marking by the symbol:



indicates compliance with the essential requirements of Directive 73/23/EC and the essential requirements of articles 3.1(b), 3.2, and 3.3 of Directive 1999/5/EC.

**Other Approvals** EN61000-3-2 Harmonic emission  
 EN61000-3-3 Flicker  
 CTR3/A1 BRI Interface  
 CTR4/A1 PRI Interface  
 ACA TS031 Australian BRI Interface  
 ACA TS038 Australian PRI Interface  
 FCC Part 68

## V3000 Analog Call Processor

See [Figure 1](#) on [page 22](#) for information about V3000 connectors and status lights.

**Table 39** V3000 Analog Specifications

Weight	5.45 kg (12 lbs.)
Dimensions	H: 42 mm (1.6 in.) W: 440 mm (17.3 in.) D: 355 mm (14 in.)
Compliance	This is an FCC Class A device.
Electrical	100-240 VAC, 50-60Hz Maximum power: 40 W
Environmental	Ambient temperature: 0 to 40 °C (32 to 104 °F) Storage temperature: -10 to 70C Humidity: 10% to 90% relative humidity noncondensing, operational and storage Vibration and shock: EN 60068 (IEC 68) Altitude: 10,000 ft Operational; 30,000 ft Non-operational
Safety	EN60950 1992 / A5: 1998 + ZB & ZC deviations IEC 950 Edition 3 plus all national deviations (TUV GS Certificate) CSA 22.2 # 950 3rd Edition: 1995 UL 1950 3rd Edition NOM-019 SCFI AS/NZS 3260 ECMA 97 Russian GOST safety approval
Emissions	IECS-003 CLASS A FCC PART 15 CLASS A EN 55022 CLASS A VCCI CLASS A AS/NZS 3548 CLASS A EN61000-3-2 EN61000-3-3 CNS 13438 CLASS A KOREAN EMI CLASS A

## V3000 BRI Call Processor

See [Figure 2](#) on [page 24](#) for information about V3000 BRI connectors and status lights.

**Table 40** V3000 BR Specifications

Weight	5.45 kg (12 lbs.)
Dimensions	H: 42 mm (1.6 in.) W: 440 mm (17.3 in.) D: 355 mm (14 in.)
Compliance	This is an FCC Class A device.
Electrical	100-240 VAC, 50-60Hz Maximum power: 40 W
Environmental	Ambient temperature: 0 to 40 °C (32 to 104 °F) Storage temperature: -10 to 70C Humidity: 10% to 90% relative humidity noncondensing, operational and storage Vibration and shock: EN 60068 (IEC 68) Altitude: 10,000 ft Operational; 30,000 ft Non-operational
Safety	EN60950 1992 / A5: 1998 + ZB & ZC deviations IEC 950 Edition 3 plus all national deviations (TUV GS Certificate) CSA 22.2 # 950 3rd Edition: 1995 UL 1950 3rd Edition NOM-019 SCFI AS/NZS 3260 ECMA 97 Russian GOST safety approval
Emissions	IECS-003 CLASS A FCC PART 15 CLASS A EN 55022 CLASS A VCCI CLASS A AS/NZS 3548 CLASS A EN61000-3-2 EN61000-3-3 CNS 13438 CLASS A KOREAN EMI CLASS A

## V3001R Call Processor

See [Figure 3](#) on [page 26](#) for information about V3001R connectors and status lights.

**Table 41** V30001R Specifications

Weight	8.89 kg (19.61 lbs)
Dimensions	H: 89 mm (3.5 in.) W: 440.7 mm (17.25 in.) D: 310.9 mm (12.24 in.)
Compliance	This is an FCC Class A device.
Electrical	100-240 VAC, 50-60 Hz Maximum power: 100 W
Environmental	Ambient temperature: 0 to 40 °C (32 to 104 °F) Storage temperature: -10 to 70C Humidity: 10% to 90% relative humidity noncondensing, operational and storage Vibration and shock: EN 60068 (IEC 68) Altitude: 10,000 ft Operational; 30,000 ft Non-operational
Safety	EN60950 1992 / A5: 1998 + ZB & ZC deviations IEC 950 Edition 3 plus all national deviations (TUV GS Certificate) CSA 22.2 # 950 3rd Edition: 1995 UL 1950 3rd Edition NOM-019 SCFI AS/NZS 3260 ECMA 97 Russian GOST safety approval
Emissions	IECS-003 CLASS A FCC PART 15 CLASS A EN 55022 CLASS A VCCI CLASS A AS/NZS 3548 CLASS A EN61000-3-2 EN61000-3-3 CNS 13438 CLASS A KOREAN EMI CLASS A

## V5000 Call Processor

The V5000 (formerly the SuperStack 3 V5000) includes the box, fans, one or two power supplies, backplane, and mounting brackets. It can accommodate a second drive for disk mirroring.

**Table 42** V5000 Call Processor Specifications (3C10201, 3C10202)

Weight	As Shipped (One disk): 9.1 kg (20 lbs.) With two disks: 10.5 kg (23 lbs.)
Dimensions	H: 133 mm (5.24 in.) W: 440 mm (17.3 in.) D: 320 mm (12.6 in.)
Compliance	This is an FCC Class A device.
Controls	Music on Hold level adjustment (controls the gain of the input circuit for the Music on Hold function).
Electrical	100-240 VAC @ 2.2A, 50-60 Hz Optional: Second power supply
Environmental	Ambient temperature: 0 to 40 °C (32 to 104 °F) Humidity: 5% to 85% noncondensing

## NBX 100 Call Processor

The NBX 100 Call Processor must reside in the top slot in an NBX 6-Slot chassis.

**Table 43** 3C10110C, 3C10110D NBX 100 Call Processor

Weight	1 lb 2 oz (510 gm)
Environmental	Ambient temperature: 32 °F to 104 °F (0 °C to 40 °C) Humidity: 5% to 85% noncondensing
Controls	Music on Hold level adjustment (adjustable, controls the gain of the input circuit for the music-on-hold function).

**Table 43** 3C10110C, 3C10110D NBX 100 Call Processor (continued)

Connectors	<p>10BASE2 port BNC male connector for external hub connection (BNC connector discontinued on 3C10110D)</p> <p>RJ-45 10BASE-T DCE port for external hub connection</p> <p>RS-232, DB9 DTE connector (serial port)</p> <p>RS-232, DB9 DCE connector (serial port)</p> <p>3.5 mm Audio input jack for line-level audio</p> <p>RJ-11 Ext. Alert (Reserved for future use).</p> <p>RJ-11 Paging (Line-out 600-ohm audio interface with a dry contact closure for use with an external paging amplifier.)</p> <p>Pin 1 - Not Connected</p> <p>Pin 2 - Relay common</p> <p>Pin 3 - Ring</p> <p>Pin 4 - Tip</p> <p>Pin 5 - Relay Contact</p> <p>Pin 6 - Not connected</p>
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**NBX V3000 Gateway Chassis**

The V3000 Chassis includes the metal box, fans and power supply, backplane, and mounting brackets.

**Table 44** 3C10605A Chassis Specifications

Weight	Empty: 6 kg (13.2 lbs)
Dimensions	<p>H: 133 mm (5.24 in.)</p> <p>W: 440 mm (17.3 in.)</p> <p>D: 320 mm (12.6 in.)</p>
Compliance	This is an FCC Class A device.
Electrical	100-240 VAC @ 2.2A, 50-60 Hz
Environmental	<p>Ambient temperature: 0 to 40 °C (32 to 104 °F)</p> <p>Humidity: 5% to 85% noncondensing</p>
4 Slots	For NBX interface cards
Connectors	Two redundant uplink ports 10/100 Mbps switched Ethernet connections. The lower port is normally inactive and becomes active only if the upper port experiences a link failure.

## NBX V5000 Gateway Chassis

The V5000 Chassis includes the metal box, fans and power supply, backplane, and mounting brackets.

**Table 45** 3C10200 and 3C10200B Chassis Specifications

Weight	Empty: 6 kg (13.2 lbs)
Dimensions	H: 133 mm (5.24 in.) W: 440 mm (17.3 in.) D: 320 mm (12.6 in.)
Compliance	This is an FCC Class A device.
Electrical	100-240VAC @ 2.2A, 50-60Hz
Environmental	Ambient temperature: 0 to 40 °C (32 to 104 °F) Humidity: 5% to 85% noncondensing
4 Slots	For NBX interface cards

## NBX 100 6-Slot Chassis

The NBX 100 6-Slot chassis includes the fan, power supply, disk drive, backplane, and mounting brackets.

**Table 46** 3C10111C NBX 100 6-Slot Chassis Specifications

Weight	Empty: 22 lb (9.9 kg) Configured: 30 lb (13.5 kg)
Dimensions	H: 10.5 in. (264.7 mm) W: 17.3 in. (431.8 mm) D: 9.0 in. (225.6 mm)
Electrical	US and Canada: 115/230 VAC @ 4/2 A, 60/50 Hz
Environmental	Ambient temperature: 32 °F to 104 °F (0 °C to 40 °C) Humidity: 5% to 85% noncondensing

## NBX Analog Line Card

An optional analog line card is the system's interface to the telephone company's CO lines.

**Table 47** 3C10114C NBX Analog Line Card Specifications

Weight	510 gm (18 oz)
Government approvals	<p>FCC Part 68</p> <p>FCC registration numbers: SSAUSA-25639-PF-TQ</p> <p>Fully Protected PBX SSAUSA-25639-MF-T</p> <p>Fully Protected Multifunction Systems SSAUSA-25639-KF-T</p> <p>Fully Protected Key Telephone System FCC Part 15 Class A</p> <p>CE: This product complies with the requirements of European Directive 1995/5/EC</p>
	<p>Emissions</p> <p>IECS-003 Class A</p> <p>FCC Part 15 Class A</p> <p>EN 55022 Class A</p> <p>AS/NZS 3548 Class A</p> <p>EN61000-3-2</p> <p>EN61000-3-3</p> <p>CNS 13438 Class A</p>
Facility Interface Code	02LS2
Service Organization Code	9.0 F
REN	0.2 A
Environmental	<p>Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F)</p> <p>Humidity: 10% to 90% noncondensing</p>

## NBX Analog Terminal Card

The Analog Terminal Card is an optional card. It enables you to connect up to four analog components, such as analog phones or fax machines, to an NBX system.



**CAUTION:** *The NBX Analog Terminal Card is not intended to connect directly to any telephone network.*

**Table 48** 3C10117C Analog Terminal Card Specifications

Connectors	RJ-11. Connects up to four analog devices to the NBX system Serial port (CONSOLE) for diagnostic access
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 10% to 90% noncondensing

## NBX Analog Terminal Adapter (ATA)

The Analog Terminal Adapter (ATA) enables you to connect a single analog device, such as a cordless telephone or fax machine, to an NBX system ([Table 49](#)). The 3C10400 ATA can accept power from an IEEE 802.3af-compliant (Power over Ethernet) power supply.

**Table 49** 3C10120B, 3C10400 ATA Specifications

Connectors	Standard RJ-11 port Standard RJ-45 port Hub port for additional Ethernet component
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% noncondensing
PoE Power Rating (3C10400 only)	Class 3

## NBX BRI-ST Digital Line Card

The BRI-ST Digital Line Card enables you to connect a BRI-ST line to an NBX system through an NBX expansion chassis.

**Table 50** 3C10164C-ST BRI-ST Digital Line Card Specifications

Weight	455 gm (1 lb)
Connectors	Four RJ-45 connectors (one for each BRI-ST line) and one serial diagnostic port
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% noncondensing

**Table 51** 3C10164D-ST BRI-ST Digital Line Card Specifications

Weight	455 gm (1 lb)
Connectors	Four RJ-45 connectors (one for each BRI-ST line) and one serial diagnostic port
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% noncondensing
ISDN Protocols Supported (BRI)	<p>Point to Point BRI (2B + D) implementation for European Deployment. ISDN Standards supported:</p> <p>Euro ISDN: ETS 300 102-1, ETS 300 102-2: ISDN User Network interface Layer 3 - Specifications for Basic Call Control, December 1990, Sections 2.1, 2.4, 3,4, 5.1-5.3, 5.8 (Layer 3)</p> <p>Euro ISDN: ETS 300 125, ISDN User Network interface data link layer specifications. Application of CCITT Recommendations Q.920/I.440 and Q.921/I.441 (except Appendix IV) [1991]. (Layer 2)</p> <p>Euro ISDN: ETS 300 403-1, ISDN DSS1 Signaling Network Layer for circuit-mode basic call control; Part 1: Protocol specification; June 1996 (except Annex H is not supported).</p> <p>Euro ISDN: ETS 300 403-2, ISDN DSS1 Signaling Network Layer for circuit-mode basic call control; Part 2: Specification and Description Language diagrams; Nov. 1995.</p> <p>Euro ISDN: ETS 300 403-3, ISDN DSS1 Signaling Network Layer for circuit-mode basic call control; Part 3: Protocol Implementation Conformance Statement; Sept. 1996.</p> <p>Euro ISDN: ETS 300 403-4, ISDN DSS1 Signaling Network Layer for circuit-mode basic call control; Part 4: Test Suite Structure and Test Purposes specification for the user; Jan. 1997</p>

**Table 51** 3C10164D-ST BRI-ST Digital Line Card Specifications (continued)

Supports Trunk Side TE at S/T interface
Supports Line Coding as pseudo-ternary
Supports distance between NT and TE as 1000m
Supports Voice/G3 FAX on either B1 or B2
Compliant with Telecom Italia
NET3 (CTR3) compliant without splitting bearer channels
Compliant with TBR 3 - Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access, November 1995

**NBX E1 and T1 Digital Line Cards**

The E1 and T1 Digital Line Cards enable you to connect an E1 or T1 line to an NBX system.

**Table 52** 3C10165D E1 and 3C10116D T1 Digital Line Card Specifications

Weight	397 gm (14 oz)
Connectors	One RJ-45 connector for 10BASE-T line One RJ-45 connector for T1/E1 line Serial port (CONSOLE) for diagnostic access
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 10% to 90% noncondensing Humidity: 10% to 90% relative humidity noncondensing, operational and storage Vibration and shock: EN 60068 (IEC 68) Altitude: 10,000 ft Operational; 30,000 ft Non-operational

**NBX Hub Card**

The NBX Hub Card has been replaced by the NBX Uplink Card.

**Table 53** 3C10115 NBX Hub Card Specifications

Weight	397 gm (14 oz)
Connectors	Eight RJ-45 connectors for 10BASE-T lines One BNC male connector for 10BASE2 coaxial line
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% noncondensing

## NBX Uplink Card

The uplink card is an optional component that provides 10BASE connections.

**Table 54** 3C10370 NBX Uplink Card Specifications

Weight	397 gm (14 oz)
Connectors	Eight RJ-45 connectors for 10BASE-T lines
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% noncondensing



**WARNING:** 3Com Telephones are intended for connection only on internal Local Area Networks. Do not install them outside of buildings. Do not connect them to any networking device outside of the building in which the telephones are located.

## Legacy Link Analog Card

The 3Com Legacy Link Analog Card enables an NBX system to support analog handsets.

**Table 55** 3C10392 Legacy Link Analog Card Specifications

Weight	500 gm (1.10 lb)
Connectors	RJ-21x 50-way male for handset connection. D-type 9-pin female RS232 diagnostics port. Mini-DIN 6-pin female power input.
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% noncondensing
Telephone	2 REN per port Connection Two Wire Loop Start Feature access uses Hook Flash (HF) or Timed Break Recall (TBR)
Electrical	Voltage input: 3·3, 5 and 12V D.C. derived from the NBX power rails. 48V D.C. As with most telecommunications power supplies, the PSU voltage is negative (i.e. 48V). PSU: 100 - 240V A.C. 47 - 63Hz, 1·6A. Power input: < 10W internally from NBX rail. PSU: 70W maximum

## Legacy Link Meridian Card

The 3Com Legacy Link Meridian Card enables an NBX system to support Meridian handsets.

**Table 56** 3C10391 NBX Legacy Link Meridian Card Specifications

Weight	500 gm (1.10 lb)
Connectors	RJ-21x 50-way male for handset connection. D-type 9-pin female RS232 diagnostics port. Mini-DIN 6-pin female power input.
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% noncondensing
Telephone	2 REN per port Connection Two Wire Loop Start Feature access uses Hook Flash (HF) or Timed Break Recall (TBR)
Electrical	Voltage input: 3-3, 5 and 12V D.C. derived from the NBX power rails. 48V D.C. As with most telecommunications power supplies, the PSU voltage is negative (i.e. 48V). PSU: 100 - 240V A.C. 47 - 63Hz, 1-6A. Power input: < 10W internally from NBX rail. PSU: 70W maximum

## Legacy Link Norstar Card

The 3Com Legacy Link Analog Card enables an NBX system to support analog handsets.

**Table 57** 3C10393 NBX Legacy Link Norstar Card Specifications

Weight	500 gm (1.10 lb)
Connectors	RJ-21x 50-way male for handset connection. D-type 9-pin female RS232 diagnostics port. Mini-DIN 6-pin female power input.

**Table 57** 3C10393 NBX Legacy Link Norstar Card Specifications (continued)

Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% noncondensing
Telephone	2 REN per port Connection Two Wire Loop Start Feature access uses Hook Flash (HF) or Timed Break Recall (TBR)
Electrical	Voltage input: 3-3, 5 and 12V D.C. derived from the NBX power rails. 48V D.C. As with most telecommunications power supplies, the PSU voltage is negative (i.e. 48V). PSU: 100 - 240V A.C. 47 - 63Hz, 1-6A. Power input: < 10W internally from NBX rail. PSU: 70W maximum

## 3102 Business Telephone

The 3Com 3102 Business Telephone (3C10402B) includes a 2 x 24 character display, 18 programmable buttons, 8 dedicated feature buttons, and a 10/100 switch port. 3102 Business Telephones can accept power from an IEEE 802.3af-compliant (Power over Ethernet) power supply.

**Table 58** 3Com 3102 Business Telephone Specifications

Compliance	FCC Class A device
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% non condensing
Weight	1061 gm. (2lb 6oz)
Dimensions	27 x 23 x 11 cm. (10.6 x 9.1 x 4.3 in)
Power	5 W
PoE Power Rating	Class 2

**2102 and 2102-IR Business Telephones**

The 3Com 2102 and 2102-IR Business Telephones, which are no longer available, include a 2 x 24 character display, 18 programmable buttons, 10 dedicated feature buttons, and a 10/100 Mbps switch port. 3Com 2102 series telephones that have “PE” in the part number, for example, 3C10226PE, can accept power from an 802.3af-compliant (Power over Ethernet) power supply.

**Table 59** 2102 and 2102-IR Business Telephone

Compliance	FCC Class A device		
Electrical			
	2102	3C10226A-AA Australia:	240VAC, 50Hz, 13W
		3C10226A-CN China:	220VAC, 50Hz, 13W
		3C10226A-ME Europe:	230VAC, 50Hz, 13W
		3C10226A-SA South Africa:	230VAC, 50Hz, 13W
		3C10226A-UK United Kingdom:	230VAC, 50Hz, 13W
		3C10226A-US North America:	120VAC, 60Hz, 13W
	2102-IR	3C10228IRA-AA Australia:	240VAC, 50Hz, 13W
		3C10228IRA-CN China:	220VAC, 50Hz, 13W
		3C10228IRA-ME Europe:	230VAC, 50Hz, 13W
		3C10228IRA-SA South Africa:	230VAC, 50Hz, 13W
		3C10228IRA-UK United Kingdom:	230VAC, 50Hz, 13W
		3C10228IRA-US North America:	120VAC, 60Hz, 13W
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F)		
	Humidity: 5% to 85% noncondensing		

**1102 Business Telephone**

The 3Com 1102 Business Telephone includes 18 programmable buttons, 10 dedicated feature buttons, a 2 x 16 display, and a 10 Mbps hub port.

**Table 60** 1102 Business Telephone Specifications

Weight	1.8 kg (4 lbs)
Compliance	FCC Class A device

**Table 60** 1102 Business Telephone Specifications (continued)

Electrical	3C10121-AA Australia:	240VAC, 50Hz, 13W
	3C10121-CN China:	220VAC, 50Hz, 13W
	3C10121-ME Europe:	230VAC, 50Hz, 13W
	3C10121-SA South Africa:	230VAC, 50Hz, 13W
	3C10121-UK United Kingdom:	230VAC, 50Hz, 13W
	3C10121-US North America:	120VAC, 60Hz, 13W
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F)	
	Humidity: 5% to 85% noncondensing	

## 3101 and 3101SP Basic Telephones

The 3Com 3101B (3C10401B) and 3101SPB (3C10401SPKRB) Basic Telephones include a 2 x 24 character display, four programmable buttons, and a 10/100 switch port.

**Figure 39** 3101 Basic Telephone Specifications

Compliance	FCC Class A device
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F)
	Humidity: 5% to 85% non condensing
Weight	870 gm. (1lb 15oz)
Dimensions	21 x 22 x 11 cm. (8.3 x 8.7 x 4.3 in)
Power	4.7 W
PoE Power Rating	Class 1

## 2101 Basic Telephone

The 3Com 2101 Basic Telephone (no longer available) includes a 2 x 24 character display, three programmable buttons, and a 10/100 Mbps switch port.

**Table 61** 2101 Basic Telephone Specifications

Compliance	FCC Class A device
Electrical	3C10248A-AA Australia: 240VAC, 50Hz, 13W
	3C10248A-CN China: 220VAC, 50Hz, 13W
	3C10248A-ME Mainland Europe: 230VAC, 50Hz, 13W
	3C10248A-SA South Africa: 230VAC, 50Hz, 13W
	3C10248A-UK United Kingdom: 230VAC, 50Hz, 13W
	3C10248A-US North America: 120VAC, 60Hz, 13W
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F)
	Humidity: 5% to 85% noncondensing

## 3105 Attendant Console

The 3Com 3105 (3C10224B) Attendant Console supports up to 100 functions with status LED display (50 buttons, each with high/low shift position). It operates at 10Mbps, in half duplex mode.

**Table 62** 3105 Attendant Console Specifications

Compliance	FCC Class A device
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F)
	Humidity: 5% to 85% non condensing
Weight	792 gm. (1lb 15oz)
Dimensions	26 x 19 x 8 cm. (10.3 x 7.5 x 3.2 in)
Power	3 W
PoE Power Rating	Class 1

## 1105 Attendant Console

The 3Com 1105 Attendant Console supports up to 100 functions with status LED display (50 buttons, each with high/low shift position). It operates at 10Mbps, in half duplex mode.

**Table 63** 1105 Attendant Console Specifications

Compliance	FCC Class A device
Electrical	3C10223-AA Australia: 240VAC, 50Hz, 13W
	3C10223-CN China: 220VAC, 50Hz, 13W
	3C10223-ME Mainland Europe: 230VAC, 50Hz, 13W
	3C10223-SA South Africa: 230VAC, 50Hz, 13W
	3C10223-UK United Kingdom: 230VAC, 50Hz, 13W
	3C10223-US North America: 120VAC, 60Hz, 13W
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F)
	Humidity: 5% to 85% noncondensing

## 3106C Cordless Telephone

The 3Com 3106C Cordless Telephone is a high performance 900MHz narrow band FM device.

**Table 64** 3106C Cordless Telephone Specifications

Compliance	FCC Class B device
RF Characteristics	Frequency: 902-905 MHz and 925-928 MHz
	Bandwidth: $\pm 30$ KHz
	Transmit Power: .4mW approx.
	Method: Narrow Band FM
Base station	Dimensions: 108 mm (4 1/4 in) x 57.1 mm (2 1/4 in) x 193.5 mm (7 5/8 in)
	Weight: 334.5 gm (11.8 oz)
Handset	50.8 mm (2 in) x 139.7 mm (5 1/2 in) x 31.75 mm (1 1/4 in) without antenna
	147.4 gm (5.2 oz) with battery
Desktop Charger	Dimensions: 82.55 mm (3 1/4 in) x 55 mm (2 1/6 in) x 89 mm (3 1/2 in)
	Weight: 70.9 gm (2.5 oz)

**Table 64** 3106C Cordless Telephone Specifications (continued)

Battery	Type: 3.6V 750mAh nickel metal hydride rechargeable Battery pack charging time: 5-6 hours max. to full charge Battery pack duration: Up to 7 hours talk time; up to 5 days standby
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**3107C Cordless Telephone**

The 3Com 3107C Cordless Telephone is a high performance 900MHz narrow band FM device.

**Table 65** 3107C Cordless Telephone Specifications

Compliance	FCC Class B device
RF Characteristics	Frequency: 902-905 MHz and 925-928 MHz Bandwidth: ±30KHz Transmit Power: .4mW approx. Method: Narrow Band FM
Base station	Dimensions: 108 mm (4 1/4 in) x 57.1 mm (2 1/4 in) x 193.5 mm (7 5/8 in) Weight: 334.5 gm (11.8 oz)
Handset	50.8 mm (2 in) x 139.7 mm (5 1/2 in) x 31.75 mm (1 1/4 in) without antenna 147.4 gm (5.2 oz) with battery
Desktop Charger	Dimensions: 82.55 mm (3 1/4 in) x 55 mm (2 1/6 in) x 89 mm (3 1/2 in) Weight: 70.9 gm (2.5 oz)
Battery	Type: 3.6V 750mAh nickel metal hydride rechargeable Battery pack charging time: 5-6 hours max. to full charge Battery pack duration: Up to 7 hours talk time; up to 5 days standby

## 3103 Managers Telephone

The 3Com 3103 Managers Telephone (3C10403B) is a multi-line PoE-compatible device with a large display panel and two switched 10/100/1000 uplink ports

**Table 66** 3103 Manager's Telephone Specifications

Compliance	FCC Class A device
Power	10 W
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% non condensing
Weight	1210 gm. (2 lb. 9 oz.)
Dimensions	28.6 x 20.3 x 6.4 cm. (11.25 x 8 x 2.5 in)
Power	8.5 W
PoE Power Rating	Class 3

## 3100 Entry Telephone

The 3Com 3100 Entry Telephone (3C10399B) is a single-line PoE-compatible device with no display panel.

**Table 67** 3100 Entry Telephone Specifications

Compliance	FCC Class A device
Environmental	Ambient temperature: 0 °C to 40 °C (32 °F to 104 °F) Humidity: 5% to 85% non condensing
Weight	620 gm. (1 lb. 4 oz.)
Dimensions	15.9 x 15.9 x 4.5 cm. (6.25 x 6.25 x 1.75 in.)
Power	3 W
PoE Power Rating	Class 1

## 3108 Wireless Telephone

The 3Com 3108 Wireless Telephone is a wireless (802.11d) clamshell type VoIP telephone. The 3108 Wireless Telephone uses SIP (Session Initiation Protocol) as the control protocol. The 3108 operates with an NBX system that is running in SIP mode.

**Table 68** 3108 Wireless Telephone Specifications

Compliance	FCC Class B device
Weight (with battery)	90 gm
Battery	Type: Li-ion Standby time: >90 hrs Talk time: > 2 hrs
Display	2.0" color LCD, 262K Color, 176*220 pixel
Network	TCP/IP IPv4 SNMPv2
Address acquisition	DHCP Client acquisition or static address option. Static address will be retained after power off. Option 120 supported
WLAN	IEEE 802.11b IEEE 802.11g
Radiated TX Power (802.11b)	≥17 dBm for all bitrates
Radiated TX Power (802.11g)	OFDM / 6, 9, 12, 18 Mbps: ≥17 dBm OFDM / 24, 36 Mbps: ≥14 dB OFDM / 48, 54 Mbps: ≥12 dB
Environmental	Operating temperature: 0 °C to 50 °C (32 °F to 122 °F) Storage temperature: -40 °C to 70 °C (-40 °F to 158 °F) Operating humidity: 95% Storage humidity: 95%

**Table 68** 3108 Wireless Telephone Specifications (continued)

---

Security	WEP Shared-key Encryption
	WPA-PSK (WPA with preshared keys)
	WPA2-PSK (WPA2 with preshared keys)
	802.1x with EAP-TLS
	802.1x with EAP-TTLS
	802.1x with PEAP (MSCHAPv2)
	802.11i cached PMK
	Number of CA profile: 8
	RFC 2246
	RFC 3268
	RFC 3546
	RFC 3711

---



# B

## CIRCUIT PROVISIONING

This appendix describes the circuit provisioning requirements for analog telephone lines, T1 lines, and for ISDN PRI services on T1 lines. It contains the following topics:

- [Caller ID Choices for Analog Lines](#)
- [T1 Prerequisites](#)
- [T1 Recommendations](#)
- [ISDN PRI Prerequisites](#)
- [ISDN PRI Recommendations](#)
- [ISDN BRI Prerequisites](#)
- [ISDN BRI Recommendations](#)

---

### **Caller ID Choices for Analog Lines**

When you order analog telephone lines from your telephone service provider, you can also order caller ID service. Your telephone service provider can tell you the format in which they provide caller ID information.

You can configure your NBX system to work with any of these formats:

- Bellcore GR-30-CORE
- ETSI FSK
- ETSI DTMF
- British Telecom SIN 242
- NTT Telephone Interface Services

See the *NBX Administrator's Guide* for information on how to configure Analog Line Card ports for the caller ID format you want to use.

---

## T1 Prerequisites

All contact information *must* be available at time of installation, including telephone numbers and appropriate account representative contact information from the client's carrier.

---

## T1 Recommendations

If the client is using standard (DS1) T1 lines, 3Com recommends that the circuits from the T1 provider meet the following criteria:

- **Framing Type** — Use either ESF with B8ZS.
- **Zero Code Suppression** — Use D4 with AML.
- **Signaling** — E&MWink is required.
- **Start Type** — Wink Start is required.



*Some Central Offices that use a DMS 100 switch may configure T1 circuits with an option to provide outbound dial tone. This configuration does not provide a wink for outbound calls. The NBX system does not need dial tone as it provides its own. Verify that the outbound channels are configured for Wink Start.*

- **Line Hunting** — Obtain from the telephone company the method they use to hunt for an available channel on the T1 span. The NBX system typically searches downward from high-numbered channels when trying to place an outgoing call. If the telephone company searches upward from low-numbered channels for calls to the NBX system, conflicts are avoided.
- **Circuit Type** — 4-wire is required.
- **DID Applications** — When using DID or DNIS, 3Com recommends ordering telephone numbers that easily fit into the NBX system numbering plan. Although the numbering plan is extremely flexible, it is far easier to use if you have 3 or 4 digit DID\DNIS codes. This allows for a simple dial plan implementation.

For 3-digit internal extensions, try to use the 100-499 range. Have the carrier provide the corresponding three digits for the DID\DNIS numbers/code. For 4-digit extensions, ask for the 1000-4999 range and request that the carrier use corresponding four digits for the DID\DNIS numbers/code.

For Caller-ID type services, the carrier *must support* in-band ANI.

For more information, see [“Ordering DID \(Direct Inward Dialing\) Services for T1”](#) on [page 158](#).

- **CSU** — A CSU (Channel Service Unit) is required with each T1 installation. You must have an external CSU when you use the 3C10116C T1 Digital Line Card. 3C10116D includes an onboard CSU. Many CSUs support conversion of ESF (with B8ZS) services into D4 (with AMI). In some locations it may be easier to order the T1 as ESF with B8ZS and perform the conversion in the CSU. You must verify that the external CSU supports this conversion.

---

## ISDN PRI Prerequisites

Before you install and configure ISDN PRI services on T1 circuits, gather the following information and have it available at the time of installation:

- All telephone numbers to be activated
- PRI circuit ID
- Carrier's testing department name and telephone numbers
- Carrier's circuit provisioning department names and numbers
- Carrier's account representative account information
- Requested smart jack be installed in customer's suite (not at the minimum point of entry)

---

## ISDN PRI Recommendations

For ISDN PRI services, 3Com recommends the settings discussed in the following sections.

- **Framing Type** — The recommended (also the default) configuration is Extended Super Frame (ESF).  
The multi-frame formats F4, F12 (D4 or SF), and F72 are also supported.
- **Zero Code Suppression** — The recommended (also the default) configuration is B8ZS.  
AMI is also supported, but 3Com does not recommend this choice.
- **DID Applications** — For DID or DNIS, 3Com recommends that you order telephone numbers that easily fit in the NBX system numbering plan. If possible, use 3 or 4 digit DID/DNIS codes, which allow for simple dial plan implementation.

*Recommended:*

- With 3 digit extensions 100-499, the last three digits of the DID/DNIS codes should be 100-499.
- With 4 digit extensions 1000-4999, the last four digits of the DID/DNIS codes should be 1000-4999.
- **Line Hunting Sequence** — 3Com recommends that the telephone company start with channel one and hunt upward for incoming calls. This works well with NBX systems, because they start at the highest channel number and hunt down for outgoing calls. Verify which services are available from the telephone company.
- **Supported Telephone Central Office Switch Protocols** — NBX system ISDN PRI services support the following central office switch protocols:
  - AT&T 5ESS Custom
  - DMS Custom
  - National ISDN NI-1/NI-2
- **Caller ID by Name** — If you configure your T1 Digital Line Card for ISDN PRI operation, you can subscribe with your telephone service provider for caller ID by name service, but only if your telephone service provider uses National ISDN-2 or AT&T 5ESS Custom.

---

**ISDN BRI  
Prerequisites**

Before you start to install a BRI circuit, collect all of the following information:

- All telephone numbers to be activated
- Circuit ID
- Carrier's testing department name and telephone numbers
- Carrier's circuit provisioning department names and numbers
- Carrier's account representative account information

---

## ISDN BRI Recommendations

When you work with the telephone company to install an ISDN BRI circuit, 3Com recommends the parameters discussed in the following sections.

- **Interface** — The BRI connection supplied by the telephone company must terminate at an S/T interface. Connections terminating at the U interface are not supported.
- **Point-to-Point and Point-to-Multipoint** — Both point-to-point and point-to-multipoint configurations are supported.

The appropriate TEI (Terminal Endpoint Identifier) must be entered when configuring the BRI card. Typically, Automatic TEI assignment is used on Point-to-Multipoint lines. For Point-to-Point lines, set the TEI value to 0 (zero).

By default the system is configured to use Automatic TEI assignment. Thus, if the line provided is Point-to-Point, this will typically mean the TEI has to be set to 0 (zero) when configuring.

- **DDI/MSN Applications** — For DDI/MSN, 3Com recommends that you order telephone numbers that easily fit in the NBX system numbering plan. If possible, use 3 or 4 digit DDI/MSN codes, which allow for simple dial plan implementation.
  - With 3 digit extensions 100-499, the last three digits of the DDI/MSN codes should be 100-499.
  - With 4 digit extensions 1000-4999, the last four digits of the DDI/MSN codes should be 1000-4999.
- **Supported Telephone Central Office Switch Protocols** — NBX system ISDN BRI services support the ETSI central office switch protocol.



# C

## GUIDELINES FOR CONNECTING REMOTE AUDIO DEVICES

This appendix provides guidelines for connecting a remote audio device to an NBX System. The remote audio device can be a 3Com Telephone, an Analog Line Card, an Analog Terminal Adapter (ATA), an Analog Terminal Card, a Digital Line Card, or other product.

For instructions on configuring an NBX device to connect over a broadband connection (for example, a 3Com Telephone in your home, behind a DSL Router) see *“Adding a Remote Telephone”* in Chapter 2 of the *NBX Administrator’s Guide*.

The guidelines provided are for a single device, but the issues discussed can be scaled to cover multiple devices. The guidelines include the following topics.

- [Maximum Transfer Unit \(MTU\)](#)
- [Communication Latency Requirements](#)
- [Bandwidth Requirements](#)
- [Installing Fax Machines with ATAs](#)

---

### Maximum Transfer Unit (MTU)

The system requires that the interconnection mechanism provide an apparent MTU of a full size IEEE 802.1 packet (1514 bytes of information plus 4 byte CRC). The interconnection can fragment packets into smaller frames but *must* reassemble the packets prior to delivery to any NBX device. The NBX devices do not presently support IP (or other) packet fragmentation and reassembly.

---

**Communication  
Latency  
Requirements**

The interconnect latency requirements can be broken into two main categories: large packet latency and small packet latency. Depending on the configuration of the interconnection mechanism, these latencies can be quite different, often due to the interconnection device applying compression to the packets. The compression function can increase exponentially with packet size, resulting in very long delays for large packets.

**Large Packet Latency**

The round-trip latency on large packets, 300 bytes to full MTU, must be less than 450 ms. The system will support an occasional packet delay of 450 to 900 ms, but each such delay will cause retries and thus affect bandwidth and performance. If delays in excess of 450 ms occur at a "high rate" (more than one such delay every three seconds) then system degradation can occur, resulting in problems initializing (downloading devices) as well as sluggish performance of system features.

**Small Packet Latency**

The round-trip latency on small packets, from 64 bytes up to the large packet size, should be less than 150 ms, to maintain a high performance level (this is especially significant in the quality of user conversations). Longer latency will not cause system failure but can result in "talk-over" situations within a conversation. Additionally, the longer latency can cause the system to appear sluggish during user interaction (dialing, answering, etc.).

---

**Bandwidth Requirements**

The interconnect bandwidth requirements depend on the selected audio compression and system configuration [Layer 2 or Layer 3 (IP)] topology.



*NBX default audio settings deliver optimum audio quality. Any change to default audio settings affects audio quality.*

**Layer 2 Mulaw (G.711) Audio (Normal Setting)**

The interconnection bandwidth requirements for a device configured as a Layer 2 device running G.711 audio for each party in a conversation requires a maximum of 73 Kbps. Thus, a point-to-point call requires this peak bandwidth in each direction, while a 3-party conference requires a peak of 219 Kbps in one direction. For more information, see [“Notes on Bandwidth Requirements”](#) later in this appendix.

**Layer 3 Mulaw (G.711) Audio**

The overhead for running a device as a Layer 3 device results in a maximum bandwidth requirement of 86 Kbps per party in the conversation. Thus, a point-to-point call requires this peak bandwidth in each direction, while a 3-party conference requires a peak of 258 Kbps in one direction. For more information, see [“Notes on Bandwidth Requirements”](#) later in this chapter.

**Layer 2 ADPCM Audio (Reduced Bandwidth Setting)**

The interconnection bandwidth requirements for a device configured as a Layer 2 device running ADPCM audio for each party in a conversation requires a maximum of 42 Kbps. Thus, a point-to-point call requires this peak bandwidth in each direction, while a 3-party conference requires a peak of 126 Kbps in one direction. For more information, see [“Notes on Bandwidth Requirements”](#) later in this chapter.

**Layer 3 ADPCM Audio (Reduced Bandwidth Setting)**

The overhead for running a device as a Layer 3 device results in a maximum bandwidth requirement of 54.7 Kbps per party in the conversation. Thus, a point-to-point call requires this peak bandwidth in each direction, while a 3-party conference requires a peak of 164 Kbps in one direction. See [“Notes on Bandwidth Requirements”](#) next.

**Notes on Bandwidth Requirements**

Silence suppression reduces bandwidth requirements on average by 30 to 40 percent. However, do not assume this much bandwidth reduction when determining peak requirements. These bandwidth reduction values do not include link overhead (packet encapsulation, additional bytes for error detection/correction, etc.) which may be added by the specific interconnection device. This overhead is not under the control of the NBX system, but must be added based upon the device specification.

---

**Installing Fax Machines with ATAs**

When installing a fax machine with a single-port Analog Terminal Adapter, consider the following points:

- A fax machine requires twice the bandwidth (160 Kbps) of a voice device.
- A fax machine must be configured to use Mulaw compression.
- Problems encountered receiving or sending faxes could indicate network traffic issues.
- Some PC faxes or modems may not work properly due to the very low latency requirements of such devices.
- The most effective way to install a fax machine is to install it using an ATA connected to an uplink card or hub card in the NBX system, or to use a dedicated switch port for the ATA connected to the fax machine.
- Configuring an ATA port for fax operation optimizes the performance for inbound and outbound faxes. If you make a voice call using the ATA device (for example, if you use the telephone portion of the fax machine), the quality of the audio may be affected. If you make a VTL call using the ATA device, the audio may be unusable.

# D

## OBTAINING SUPPORT FOR YOUR 3COM PRODUCTS

3Com offers product registration, case management, and repair services through [eSupport.3com.com](http://eSupport.3com.com). You must have a user name and password to access these services, which are described in this appendix.

---

### Register Your Product to Gain Service Benefits

To take advantage of warranty and other service benefits, you must first register your product at:

<http://eSupport.3com.com/>

3Com eSupport services are based on accounts that are created or that you are authorized to access.

---

### Solve Problems Online

3Com offers the following support tool:

- **3Com Knowledgebase** — Helps you to troubleshoot 3Com products. This query-based interactive tool is located at:

<http://knowledgebase.3com.com>

It contains thousands of technical solutions written by 3Com support engineers.

---

**Purchase Extended Warranty and Professional Services**

To enhance response times or extend your warranty benefits, you can purchase value-added services such as 24x7 telephone technical support, software upgrades, onsite assistance, or advanced hardware replacement.

Experienced engineers are available to manage your installation with minimal disruption to your network. Expert assessment and implementation services are offered to fill resource gaps and ensure the success of your networking projects. For more information on 3Com Extended Warranty and Professional Services, see:

<http://www.3com.com/>

Contact your authorized 3Com reseller or 3Com for additional product and support information. See the table of access numbers later in this appendix.

---

**Access Software Downloads**

You are entitled to *bug fix / maintenance releases* for the version of software that you initially purchased with your 3Com product. To obtain access to this software, you need to register your product and then use the Serial Number as your login. Restricted Software is available at:

<http://eSupport.3com.com/>

To obtain software releases that *follow* the software version that you originally purchased, 3Com recommends that you buy an Express or Guardian contract, a Software Upgrades contract, or an equivalent support contract from 3Com or your reseller. Support contracts that include software upgrades cover feature enhancements, incremental functionality, and bug fixes, but they do not include software that is released by 3Com as a separately ordered product. Separately orderable software releases and licenses are listed in the 3Com Price List and are available for purchase from your 3Com reseller.

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**Contact Us**

3Com offers telephone, internet, and e-mail access to technical support and repair services. To access these services for your region, use the appropriate telephone number, URL, or e-mail address from the table in the next section.

## Telephone Technical Support and Repair

To obtain telephone support as part of your warranty and other service benefits, you must first register your product at:

<http://eSupport.3com.com/>

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

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

To send a product directly to 3Com for repair, you must first obtain a return materials authorization number (RMA). Products sent to 3Com without authorization numbers clearly marked on the outside of the package will be returned to the sender unopened, at the sender's expense. If your product is registered and under warranty, you can obtain an RMA number online at <http://eSupport.3com.com/>. First-time users must apply for a user name and password.

Telephone numbers are correct at the time of publication. Find a current directory of 3Com resources by region at:

<http://csoweb4.3com.com/contactus/>

Country	Telephone Number	Country	Telephone Number
<b>Asia, Pacific Rim — Telephone Technical Support and Repair</b>			
Australia	1 800 678 515	Pakistan	+61 2 9937 5083
Hong Kong	800 933 486	Philippines	1235 61 266 2602 or
India	+61 2 9424 5179 or 000800 650 1111	P.R. of China	1800 1 888 9469 800 810 3033
Indonesia	001 803 61009	Singapore	800 6161 463
Japan	00531 616 439 or 03 3507 5984	S. Korea	080 333 3308
Malaysia	1800 801 777	Taiwan	00801 611 261
New Zealand	0800 446 398	Thailand	001 800 611 2000

You can also obtain support in this region at this e-mail address: [apr\\_technical\\_support@3com.com](mailto:apr_technical_support@3com.com)

Or request a return material authorization number (RMA) by FAX using this number: +61 2 9937 5048

Country	Telephone Number	Country	Telephone Number
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### Europe, Middle East, and Africa — Telephone Technical Support and Repair

From anywhere in these regions, call: +44 (0)1442 435529

From the following countries, call the appropriate number:

Austria	01 7956 7124	Luxembourg	342 0808128
Belgium	070 700 770	Netherlands	0900 777 7737
Denmark	7010 7289	Norway	815 33 047
Finland	01080 2783	Poland	00800 441 1357
France	0825 809 622	Portugal	707 200 123
Germany	01805 404 747	South Africa	0800 995 014
Hungary	06800 12813	Spain	9 021 60455
Ireland	01407 3387	Sweden	07711 14453
Israel	1800 945 3794	Switzerland	08488 50112
Italy	199 161346	U.K.	0870 909 3266

You can also obtain support in this region using this URL: <http://emea.3com.com/support/email.html>

### Latin America — Telephone Technical Support and Repair

Antigua	1 800 988 2112	Guatemala	AT&T +800 998 2112
Argentina	0 810 444 3COM	Haiti	57 1 657 0888
Aruba	1 800 998 2112	Honduras	AT&T +800 998 2112
Bahamas	1 800 998 2112	Jamaica	1 800 998 2112
Barbados	1 800 998 2112	Martinique	571 657 0888
Belize	52 5 201 0010	Mexico	01 800 849CARE
Bermuda	1 800 998 2112	Nicaragua	AT&T +800 998 2112
Bonaire	1 800 998 2112	Panama	AT&T +800 998 2112
Brazil	0800 13 3COM	Paraguay	54 11 4894 1888
Cayman	1 800 998 2112	Peru	AT&T +800 998 2112
Chile	AT&T +800 998 2112	Puerto Rico	1 800 998 2112
Colombia	AT&T +800 998 2112	Salvador	AT&T +800 998 2112
Costa Rica	AT&T +800 998 2112	Trinidad and Tobago	1 800 998 2112
Curacao	1 800 998 2112	Uruguay	AT&T +800 998 2112
Ecuador	AT&T +800 998 2112	Venezuela	AT&T +800 998 2112
Dominican Republic	AT&T +800 998 2112	Virgin Islands	57 1 657 0888

You can also obtain support in this region in the following ways:

- Spanish speakers, enter the URL: <http://lat.3com.com/lat/support/form.html>
- Portuguese speakers, enter the URL: <http://lat.3com.com/br/support/form.html>
- English speakers in Latin America, send e-mail to: [lat\\_support\\_anc@3com.com](mailto:lat_support_anc@3com.com)

### US and Canada — Telephone Technical Support and Repair

All locations:	Network Jacks; Wired or Wireless Network Interface Cards:	1 847-262-0070
	All other 3Com products:	1 800 876 3266

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## FCC CLASS A VERIFICATION STATEMENT

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manuals, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will have to correct the interference at his or her own expense.

Changes or modifications not expressly approved by 3Com could void the user's authority to operate this equipment.

This equipment complies with Part 68 of the FCC rules. This unit bears a label which contains the FCC registration number and Ringer Equivalency Number (REN). If requested, this information must be provided to the telephone company.

This equipment uses the following standard FCC Part 68-compliant jacks and plugs for network connections:

USOC RJ11C for connecting to the telephone network

USOC RJ45 and BNC connectors for connecting to the local area network

This equipment contains FCC-compliant modular jacks. It is designed to be connected to the telephone network or premises wiring using compatible modular plugs and cabling which comply with the requirements of FCC Part 68 rules.

The Ringer Equivalency Number (REN) is used to compute the number of devices that can be connected to a telephone line. An excessive REN value on a line can result in the devices not ringing in response to incoming calls. In most, but not all areas, the sum of the RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company. For products approved after July 23, 2001, the REN for this product is part of a product identifier that has the format US:AAAEQ##TXXXX. The digits represented by ## are the REN without a decimal point (for example, 03 is a REN of 0.3). For earlier products, the REN is separately shown on the label.

In the unlikely event that this equipment causes harm to the telephone network, the telephone company can temporarily disconnect your service. The telephone company will try to warn you in advance of any such disconnection, but if advance notice is not practical, it may disconnect the service first and notify you as soon as possible afterwards. In the event that such a disconnection is deemed necessary you will be advised of your right to file a complaint with the FCC.

From time to time, the telephone company may make changes in its facilities, equipment, operations, or procedures which could affect the operation of this equipment. If this occurs, the telephone company is required to provide you with advance notice so you can make the modifications necessary to maintain uninterrupted service.

Repairs to this equipment can be made only by the manufacturer or its authorized agents. In the event that this equipment requires service, contact your equipment vendor or the manufacturer, 3Com Corporation.

NBX Telephones are compatible with inductively coupled hearing aids.

If trouble is experienced with this NBX equipment, for repair or warranty information, please contact 3Com Corporation, 350 Campus Drive, Marlborough, MA 01752-3064, USA, Telephone: 800-NET-3Com or visit the web site at [www.3com.com](http://www.3com.com). If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

If your home has specially wired alarm equipment connected to the telephone line, ensure the installation of this NBX equipment does not disable your alarm equipment. If you have questions about what will disable alarm equipment, consult your telephone company or a qualified installer.

This equipment is capable of providing users access to interstate providers of operator services through the use of access codes. Modification of this equipment by call aggregators to block access to dialing codes is a violation of the Telephone Operators Consumers Act of 1990.

## INDUSTRY CANADA NOTICE

**NOTICE:** The Industry Canada (IC) label identifies certified equipment. This certification means that the equipment meets the 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 work 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 user should be aware that compliance with the above conditions might 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 electrical inspection authority or electrician, as appropriate.

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

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