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## **Nortel Communication Server 1000**

Nortel Communication Server 1000 Release 4.0

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# **IP Phones**

## **Description, Installation, and Operation**

Document Number: 553-3001-368

Document Release: Standard 4.00

Date: February 2005

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## Revision history

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### February 2005

Standard 4.00. This document is up-issued to support the 8.x Firmware Upgrade for IP Phones.

### September 2004

Standard 3.00. This document is up-issued to support Communication Server 1000 Release 4.0.

### June 2004

Standard 2.00. This document is up-issued to include the Nortel Networks Mobile Voice Client 2050.

### October 2003

Standard 1.00. This document is a new NTP for Succession 3.0 Software. It was created to support a restructuring of the Documentation Library. This document contains information previously contained in the following legacy document, now retired: *Internet Terminals Description (553-3001-217)*.



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## About this document

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This document is a global document. Contact your system supplier or your Nortel Networks representative to verify that the hardware and software described is supported in your area.

### Subject

This document contains description, installation, and administration information for the following:

- Nortel Networks IP Phone 2001, IP Phone 2002, and IP Phone 2004
- Nortel Networks IP Phone Key Expansion Module (KEM)
- Nortel Networks IP Softphone 2050
- Nortel Networks Mobile Voice Client 2050 for Personal Digital Assistants (PDAs)
- Nortel Networks WLAN Handset 2210 and WLAN Handset 2211

#### **Note on legacy products and releases**

This NTP contains information about systems, components, and features that are compatible with Nortel Networks Communication Server 1000 Release 4.0 software. For more information on legacy products and releases, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

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

## Applicable systems

This document applies to the following systems:

- Communication Server 1000S (CS 1000S)
- Communication Server 1000M Chassis (CS 1000M Chassis)
- Communication Server 1000M Cabinet (CS 1000M Cabinet)
- Communication Server 1000M Half Group (CS 1000M HG)
- Communication Server 1000M Single Group (CS 1000M SG)
- Communication Server 1000M Multi Group (CS 1000M MG)
- Communication Server 1000E (CS 1000E)
- Meridian 1 PBX 11C Chassis (Meridian 1 PBX 11C Chassis)
- Meridian 1 PBX 11C Cabinet (Meridian 1 PBX 11C Cabinet)
- Meridian 1 PBX 51C
- Meridian 1 PBX 61C
- Meridian 1 PBX 61C CP PII
- Meridian 1 PBX 81
- Meridian 1 PBX 81C
- Meridian 1 PBX 81C CP PII

*Note:* When upgrading software, memory upgrades may be required on the Signaling Server, the Call Server, or both.

### System migration

When particular Meridian 1 systems are upgraded to run CS 1000 Release 4.0 software and configured to include a Signaling Server, they become

CS 1000M systems. Table 1 lists each Meridian 1 system that supports an upgrade path to a CS 1000M system.

**Table 1**  
**Meridian 1 systems to CS 1000M systems**

<b>This Meridian 1 system...</b>	<b>Maps to this CS 1000M system</b>
Meridian 1 PBX 11C Chassis	CS 1000M Chassis
Meridian 1 PBX 11C Cabinet	CS 1000M Cabinet
Meridian 1 PBX 51C	CS 1000M Half Group
Meridian 1 PBX 61C	CS 1000M Single Group
Meridian 1 PBX 61C CP PII	CS 1000M Single Group
Meridian 1 PBX 81	CS 1000M Multi Group
Meridian 1 PBX 81C	CS 1000M Multi Group
Meridian 1 PBX 81C CP PII	CS 1000M Multi Group

For more information, see one or more of the following NTPs:

- *Communication Server 1000M and Meridian 1: Small System Upgrade Procedures (553-3011-258)*
- *Communication Server 1000M and Meridian 1: Large System Upgrade Procedures (553-3021-258)*
- *Communication Server 1000S: Upgrade Procedures (553-3031-258)*

## Intended audience

This document is intended for individuals responsible for maintaining Internet Enabled systems.

## Conventions

### Terminology

In this document, the following systems are referred to generically as “system”:

- Communication Server 1000S (CS 1000S)
- Communication Server 1000M (CS 1000M)
- Communication Server 1000E (CS 1000E)
- Meridian 1

The following systems are referred to generically as “Small System”:

- Communication Server 1000M Chassis (CS 1000M Chassis)
- Communication Server 1000M Cabinet (CS 1000M Cabinet)
- Meridian 1 PBX 11C Chassis (Meridian 1 PBX 11C Chassis)
- Meridian 1 PBX 11C Cabinet (Meridian 1 PBX 11C Cabinet)

The following systems are referred to generically as “Large System”:

- Communication Server 1000M Half Group (CS 1000M HG)
- Communication Server 1000M Single Group (CS 1000M SG)
- Communication Server 1000M Multi Group (CS 1000M MG)
- Meridian 1 PBX 51C
- Meridian 1 PBX 61C
- Meridian 1 PBX 61C CP PII
- Meridian 1 PBX 81
- Meridian 1 PBX 81C
- Meridian 1 PBX 81C CP PII

## Related information

This section lists information sources that relate to this document.

### NTPs

The following NTPs and documents are referenced in this document:

- *IP Phone 2001 User Guide*
- *IP Phone 2002 User Guide*
- *IP Phone 2004 User Guide*
- *IP Phone Key Expansion Module User Guide*
- *IP Softphone 2050 and Mobile Voice Client 2050 User Guide*
- *WLAN Handset 2210 User Guide*
- *WLAN Handset 2211 User Guide*
- *Data Networking for Voice over IP (553-3001-160)*
- *IP Peer Networking: Installation and Configuration (553-3001-213)*
- *WLAN IP Telephony: Installation and Configuration (553-3001-304)*
- *Features and Services (553-3001-306)*
- *Software Input/Output: Administration (553-3001-311)*
- *IP Line: Description, Installation, and Operation (553-3001-365)*
- *Software Input/Output: Maintenance (553-3001-511)*

### Online

To access Nortel Networks documentation online, click the **Technical Documentation** link under **Support** on the Nortel Networks home page:

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

### CD-ROM

To obtain Nortel Networks documentation on CD-ROM, contact your Nortel Networks customer representative.



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# Nortel Networks IP Phone 2001

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## Contents

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## Introduction

This section explains how to install and maintain the IP Phone 2001. For information on using the IP Phone 2001, see the *IP Phone 2001 User Guide*.

This section contains the following procedures:

- Procedure 1, “Pre-installation checklist” on [page 28](#).
- Procedure 2, “Installing an IP Phone 2001 for the first time” on [page 31](#).
- Procedure 3, “Installing an IP Phone 2001 for the first time using DHCP” on [page 36](#).
- Procedure 4, “Disabling Auto Negotiate and enabling Full Duplex mode” on [page 41](#).
- Procedure 5, “Checking Ethernet Statistics” on [page 42](#).
- Procedure 6, “Changing the TN of an existing IP Phone 2001” on [page 43](#).
- Procedure 7, “Replacing an IP Phone 2001” on [page 44](#).
- Procedure 8, “Removing an IP Phone 2001 from service” on [page 44](#).

*Note:* After an IP Phone has been installed and configured, if power is to the phone is interrupted, re-entry of the IP parameters, Node Number, TN, or re-acquisition of firmware is not required.

## Description

The IP Phone 2001 brings voice and data to the desktop environment. It connects directly to the LAN through the Ethernet connection.

The IP Phone 2001 components are shown in Figure 1 on [page 19](#) and described in Table 2 on [page 19](#).

**Figure 1**  
**IP Phone 2001**



**Table 2**  
**IP Phone 2001 components and functions (Part 1 of 3)**

Component		Function
Speaker		Press the <b>Dial/Line</b> key to activate the speaker for on-hook dialing and listening.
Message Waiting/ Incoming Call Indicator		The Message Waiting lamp turns ON to indicate that a message has been left for the user. This lamp also flashes when the set ringer is ON.

**Table 2**  
**IP Phone 2001 components and functions (Part 2 of 3)**

Component		Function
Volume control bar		<p>Use the volume control bar to adjust the volume of the Handset, Ringer, and On-hook Dialing/Listen tones.</p> <p>Press the right side of the rocker bar to increase volume; press the left side to decrease volume.</p>
Navigation keys		<p>Use the navigation keys to scroll through menus and lists in the display area.</p>
Dial/Line key		<p>Use the <b>Dial/Line</b> key to access the single line and activate on-hook dialing. No status icon or LED is provided.</p>
Hold key		<p>Press the <b>Hold</b> key to put an active call on hold. Press the Dial/Line key to return to the caller on hold.</p>
Soft keys (self-labeled)		<p>Soft keys (self-labeled) are located below the display area. The LCD label above the key changes, based on the active feature.</p> <p><b>Note:</b> A triangle before a key label indicates that the key is active.</p>
Message key		<p>Press the <b>Message</b> key to access your voicemail box.</p>

**Table 2**  
**IP Phone 2001 components and functions (Part 3 of 3)**

Component		Function
Goodbye key		Press the <b>Goodbye</b> key to terminate an active call.
Services key		<p>Press the <b>Services</b> key to access the following items:</p> <ul style="list-style-type: none"> <li>• Telephone Options (see Notes 1 and 2): <ul style="list-style-type: none"> <li>— Volume adjustment</li> <li>— Contrast adjustment</li> <li>— Language</li> <li>— Date/Time</li> <li>— Local DialPad Tone</li> <li>— Set Information</li> <li>— Ring type</li> </ul> </li> <li>• Password Admin: <ul style="list-style-type: none"> <li>— Station Control Password</li> </ul> </li> <li>• Virtual Office Login and Virtual Office Logout (if Virtual Office is configured)</li> </ul> <p>Press the <b>Services</b> key to exit from any menu or menu item.</p>
<p><b>Note 1:</b> If a call is presented while the user is manipulating information, the phone rings. However, the screen display is not updated with Caller ID and the programming text is not disturbed.</p> <p><b>Note 2:</b> The user can originate a call using Autodial or Last Number Redial while manipulating an option. However, the display is not updated with the dialed digits or Caller ID, and Autodial and Last Number Redial intercept the dialpad.</p>		

## Supported features

The IP Phone 2001 supports the following additional features:

- 802.1Q VLAN and 802.1P priority support, industry standards for managing bandwidth usage
- Virtual office
- Branch Office
- Both the registered and configured TNs are displayed in the Set Info menu.
- Basic IP User License — for more information, see *IP Line: Description, Installation, and Operation* (553-3001-365)
- Language support: English, French, Swedish, Danish, Norwegian, German, Dutch, Portuguese, Czech, Finnish, Hungarian, Italian, Polish, Spanish, Japanese, Russian, Latvian, Turkish.

## Features not currently supported

The following features are not supported on the IP Phone 2001:

- External three-port switch to support sharing LAN access with a PC or other data device is not provided. However, the IP Phone 2001 does provide 100 Mbps full-duplex support.
- Integrated switch
- Personal Directory, Call Log and Redial List are not supported. However, if the primary DN on an IP Phone 2001 is an MADN of an IP Phone 2002, IP Phone 2004, or IP Softphone 2050, Preferred Name Match and Idle Set Display (new call indication) are supported.
- Corporate Directory
- Automatic Call Distribution
- IP Key Expansion Modules
- Support of accessory modules
- Live Dialpad
- Group Listening

- Set-to-Set messaging
- Context-sensitive soft keys
- Handsfree operation
- Headset support
- External Applications Server

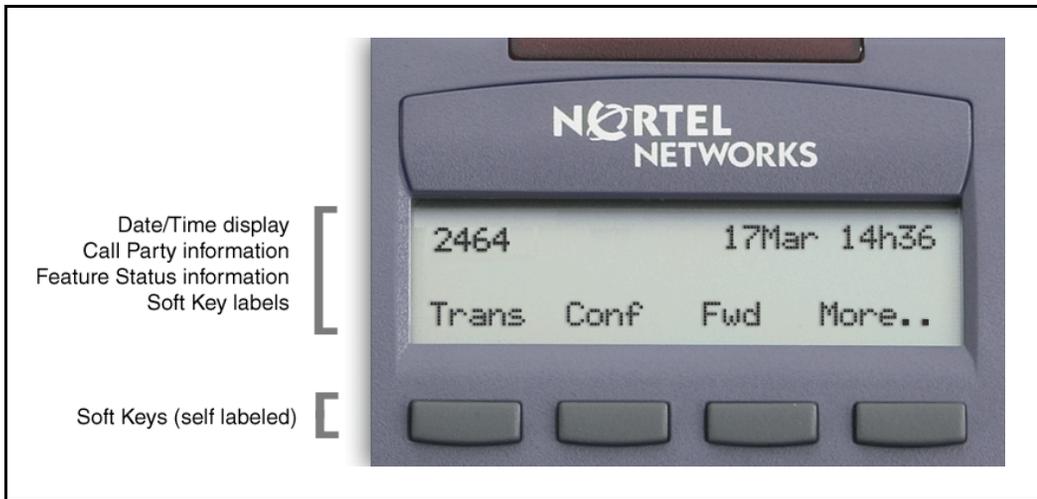
## **Display characteristics**

An IP Phone 2001 has two display areas:

- information line display
- soft key label display

Figure 2 on [page 24](#) shows these two display areas.

**Figure 2**  
**IP Phone 2001 display areas**



### **Information Line display**

An IP Phone 2001 has a one-line information display area with the following information:

- Caller Number
- Caller Name
- Feature prompt strings
- User-entered digits
- Date and time information (if the telephone is in an idle state)
- Set information

The information area displays different information, according to the telephone's call processing state and active features.

## Soft key label display

The soft key label display area displays a maximum six-character string. Each soft key includes the soft key label and an icon. When a soft key is in use, a flashing icon displays at the beginning of the soft key label, and the label shifts one character to the right. If a feature is enabled, the icon state turns on. It remains in the on state until the feature key is pressed again. This cancels the enabled feature and turns the icon off, returning the soft key label to its original string.

## Key number assignments

The IP Phone 2001 has four soft-labeled, pre-defined keys that are used to provide up to 10 features. Because they are pre-defined, the user cannot change the key number assignment.

The Message key is numbered 16. Key numbers 17-31 are the four soft key labels below the display area. See Figure 1 on [page 19](#).

Key numbers 17 - 31 support the features A03, A06, CFW, CHG, CPN, PRK, PRS, RGA, RNP, SCC, SCU, SSC, SSU and TRN, as listed in Table 3 on [page 26](#).

Key number assignments at the Call Server are aligned with that of the IP Phone 2002. The mappings between IP Phone 2001 soft key numbers and PBX CPU key numbers are the same as on the IP Phone 2002 and IP Phone 2004.

## Dedicated keys

Table 3 describes the telephone assignment functions for each of the dedicated keys. Use LD 11 to program keys 16-26 on the IP Phone 2001.

*Note:* If you attempt to configure anything other than the permitted response, the system generates an error code.

**Table 3**  
**IP Phone 2001 dedicated keys**

Key Number	Response	Description
Key 17	TRN	Call Transfer key
Key 18	A06	Six-party conference key Alternate: A03 (3-party conference)
Key 19	CFW	Call Forward key
Key 20	RGA	Ring Again key
Key 21	PRK	Call Park key
Key 22	RNP	Ring Number Pickup key
Key 23	Reserved for speed dial	Speed dial includes SCU, SCC, SSU, SSC
Key 24	PRS	Privacy Release key
Key 25	CHG	Charge Account key
Key 26	CPN	Calling Party Number key
Keys 27 - 31		Reserved

## Package components

The following information applies to Phase II IP Phones. Product codes for Phase II IP Phones are different from previous sets.

See the product code on the back of the phone to confirm whether it is a Phase II IP Phone. The product code for Phase II IP Phones appears as “IP Phone 200x”. The product code for previous versions of the IP Phones appears with an “i” in front of the model number; example, “i200x”.

The AC power adapter must be ordered separately if local power using the AC adapter is required, because Phase II IP Phones include integrated support for a number of power over LAN options, including support for IEEE 802.3af standard power.

Table 4 lists the IP Phone 2001 package components and product codes.

**Table 4**  
**IP Phone 2001 components list (Part 1 of 2)**

<b>IP Phone 2001 package contents include:</b>	
<ul style="list-style-type: none"> <li>• IP Phone 2001</li> <li>• Handset</li> <li>• Handset cord</li> <li>• Footstand</li> <li>• 7 ft. Cat5 Ethernet cable</li> <li>• Getting Started card</li> </ul>	
IP Phone 2001 (Ethergray) with Icon keycaps	NTDU90AA16/A0533387
IP Phone 2001 (Ethergray) with English text label keycaps	NTDU90BA16/A0533388
IP Phone 2001 (Charcoal) with Icon keycaps	NTDU90AA70/A0053389
IP Phone 2001 (Charcoal) with English text label keycaps	NTDU90BA70/A0533390
<b>Replacement parts</b>	
7 ft. Cat5 Ethernet Cable	A0648375
Handset, Ethergray	A0788874
Handset, Charcoal	A0758634
Handset cord, Ethergray; for IP Phone 2004 and IP Phone 2001	A088682
Handset cord, Charcoal; for IP Phone 2004 and IP Phone 2001	N0000764
<b>IP Phone 2001/2002/2004 Power Adapters</b>	
Power transformer (117/120 VAC 50/60 Hz) (North America)	A0619627

**Table 4**  
**IP Phone 2001 components list (Part 2 of 2)**

Power transformer 3 prong AC to AC, direct plug-in, 8W, 240 VAC, 50Hz to 16 VAC at 500 mA (Ireland and UK)	A0656598
Power transformer AC to AC, direct plug-in, 8W, 230 VAC, 50/60 Hz, to 16 VAC at 500 mA (Europe)	A0619635
Power transformer 2 prong wall plug direct plug-in AC to AC, 8W, 240 VAC, 50 Hz, to 16 VAC at 500 mA (Australia and New Zealand)	A0647042
Power transformer AC to AC, direct plug-in, 8W, 100 VAC, 50 Hz, to 16 VAC at 500 mA	A0828858

For more information, and for information about previous versions of the IP Phone, contact Nortel Networks.

## Before you begin

The following section provides a step-by-step guide through the IP Phone 2001 installation process. Before installing the IP Phone 2001, complete the following pre-installation checklist.

### **Procedure 1** **Pre-installation checklist**

- 1 Ensure there is one IP Phone 2001 boxed package for each IP Phone 2001 being installed. The package contains:
  - IP Phone 2001
  - Handset
  - Handset cord
  - Footstand
  - 2.3 m (7 foot) Cat5 Ethernet cable
  - Getting Started card
- 2 To install and configure an IP Phone 2001, the host system must be installed with the Voice Gateway Media Card.

- 3 If an AC power adapter is required, ensure the correct AC power transformer is used. The voltage rating of the transformer must match the wall outlet voltage. Refer to Table 4 on page 27.
- 4 Understand the three configuration modes that you can choose as you proceed through the installation of the IP Phone 2001. The three configuration modes are:
  - Static IP address – see “Static IP address assignment” on [page 30](#).
  - Dynamic Partial DHCP – see “Dynamic IP address assignment — Partial DHCP” on [page 30](#).
  - Dynamic Full DHCP – see “Dynamic IP address assignment — Full DHCP” on [page 30](#).
- 5 Make sure that a DHCP server and DHCP relay agents, if required, are installed, configured, and running.

---

**End of Procedure**

---

## First-time installation



### **CAUTION — Damage to Equipment**

Do not plug your IP Phone 2001 into an ISDN connection. Severe damage can result. Consult your system administrator to ensure that you are plugging your telephone into a 10/100BaseT Ethernet jack.

## IP address assignments

During the first-time installation, there are IP address parameters that are entered either manually or automatically depending on the installation configuration. As well, you are prompted to enable or disable 802.1Q. For more information, see “802.1Q VLAN description” on [page 257](#).

There are three configuration modes you can choose from to obtain the IP parameters. Review the following sections for more information on the configuration mode that you are using.

### **Static IP address assignment**

During the installation, the IP Phone 2001 parameters are entered manually using the key pad.

Your system administrator provides the following information: IP address, subnet mask, and default Media Gateway.

You must also enter the Connect Server parameters including: IP address, port number, action, and retry count.

Go to Procedure 2, “Installing an IP Phone 2001 for the first time” on [page 31](#).

### **Dynamic IP address assignment — Partial DHCP**

For a partial DHCP installation, you must provide, through the IP Phone 2001 key pad, the Connect Server parameters including: IP address, port number, action, and retry count. Other parameters (telephone IP address, subnet mask and default Media Gateway) are retrieved from the DHCP server.

The IP Phone 2001 password, node ID and TN must be entered manually from the key pad.

For more information about DHCP servers, see *Data Networking for Voice over IP* (553-3001-160).

Go to Procedure 3, “Installing an IP Phone 2001 for the first time using DHCP” on [page 36](#).

### **Dynamic IP address assignment — Full DHCP**

For a full DHCP installation, all parameters (telephone IP address, subnet mask, default Media Gateway, Connect Server IP address, port number, action, and retry count) are retrieved from the DHCP server to recognize the IP Phone 2001.

The IP Phone 2001 password, node ID, and TN must be entered manually from the key pad.

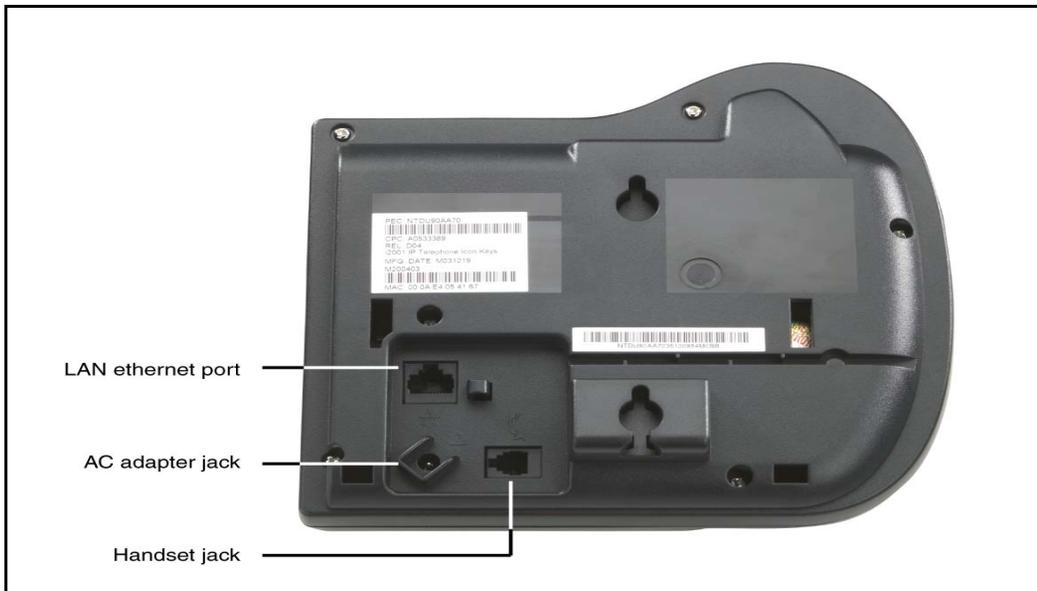
For more information on how to set up DHCP servers for use with the IP Phones, refer to *Data Networking for Voice over IP* (553-3001-160).

Go to Procedure 3, “Installing an IP Phone 2001 for the first time using DHCP” on [page 36](#).

**Procedure 2**  
**Installing an IP Phone 2001 for the first time**

- 1** Configure a virtual loop on the system using LD 97.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 2** Configure the IP Phone 2001 on the system using LD 11.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 3** Connect the IP Phone 2001 components:
  - a.** Connect one end of the handset cord to the handset jack on the back of the telephone identified with a handset icon.
  - b.** Connect the other end of the handset cord to the handset.
- 4** Connect one end of the CAT5 Ethernet cable to the network interface located on the back of the telephone (identified with a LAN icon, see Figure 3). The other end of the CAT5 Ethernet cable plugs into the IP network.

**Figure 3**  
**IP Phone 2001 rear view**



- 5 Power the IP Phone 2001 using either the Power over Ethernet or an AC power transformer (local power).

### **IMPORTANT!**

#### **Timing information**

There are only four seconds between plugging in the IP Phone 2001 power transformer and the appearance of the Nortel Networks logo on the display. When you see the logo, you have one second to respond by pressing the four feature keys at the bottom of the display in sequence from left to right. If you miss the one second response time, the IP Phone 2001 attempts to locate the connect server. Wait until it is finished, and then begin the power up sequence again.

- a. If local power is used, plug the AC power transformer into the nearest power outlet. Ensure the correct AC power transformer is used. The voltage rating of the transformer must match the wall outlet voltage. Refer to Table 4 on page 27.
    - Connect the transformer to the AC power jack shown in Figure 3 on [page 32](#). Be sure to thread the cord around the retaining hook to provide strain relief for a secure power connection.
- 6 When the Nortel Networks logo appears on the display, immediately press the four feature keys at the bottom of the display in sequence from left to right.
- 7 At the prompt DHCP Yes/No?, select **No**.
- 8 Enter the following information provided by your system administrator:

<b>Screen prompt</b>	<b>Description</b>
set IP	A valid IP Phone 2001 IP address
net msk	A subnet mask
def gw	The default Media Gateway for the IP Phone 2001 on the LAN segment to which it is connected

- 9 Enter the information for the primary Connect Server (S1) and the secondary Connect Server (S2):

Screen prompt	Description
S1 IP	The node IP address of the IP line node
S1 Port	This is a fixed value: 4100
S1 action	This is a fixed value: 1
S1 retry	The number of times the IP Phone 2001 attempts to connect to the server. Enter 10.
S2 IP	Same as S1 in most cases (see note below)
S2 Port	Same as S1
S2 action	Same as S1
S2 retry	Same as S1
Cfg XAS? (0-No,1-Yes)	Enter 0 (for No), since External Application Servers (XAS) are not supported on the IP Phone 2001

This prompt exists to support future implementation of XAS.

**Note:** The IP Phone 2001 can support a primary (S1) and secondary (S2) connect server. If you require IP Phones to register on multiple nodes, refer to “Enhanced Redundancy for IP Line Nodes” in *IP Line: Description, Installation, and Operation* (553-3001-365).

After the S1 and S2 server information is entered, the VLAN option appears on the display:

Screen prompt	Description
0-No	Disable 802.1Q and complete the configuration of the IP Phone 2001. 0-No is the default value.
1-Yes	Enable the 802.1Q header.

- 10** If 802.1Q is *not* required, select **0-No** and go to step 15; otherwise, select **1-Yes** to choose the method of VOICE VLAN configuration:

<b>Screen prompt</b>	<b>Description</b>
0-No	Automatic VLAN configuration
1-Yes	Manual VLAN configuration

- 11** If automatic configuration is required, select **0-Auto** and go to step 13; otherwise, select **1-Man** to set the VOICE VLAN ID:

**VOICE VLAN ID: 1234**

**Note:** The VOICE VLAN ID is entered as an integer. The VOICE VLAN ID is a 12-bit value between 0 and 4095.

- 12** Enter a valid value, and press **OK**.

The IP Phone 2001 is configured with 802.1Q enabled, the VOICE VLAN ID is configured to the entered value, and the VOICE VLAN priority = 6.

- 13** After the value is entered, the DATA VLAN configuration option appears on the display:

<b>Screen prompt</b>	<b>Description</b>
0-No	Data VLAN is not present
1-Yes	Data VLAN is present

- 14** Select **0-No**, since DATA VLAN is not supported on the IP Phone 2001.

The IP Phone 2001 searches for the connect server. When the connection is complete, proceed with step 15.

- 15** Enter the following information provided by your system administrator:

<b>Screen prompt</b>	<b>Description</b>
Password	IP Phone Installer Password
	You are not prompted to enter the IP Phone Installer Password if it has not been configured in your system.
Node	The node ID.
TN	The TN or VTN.

The IP Phone 2001 registers with the Terminal Proxy Server (TPS) and if needed, begins the firmware download. This takes several minutes. When complete, the IP Phone 2001 resets.

**Note:** Port 5105 on the system must be explicitly open to enable firmware download. For more information, refer to *IP Line: Description, Installation, and Operation* (553-3001-365).

The current system date and time appear on the top line of the display when the configuration is complete. Self-labelling keys also appear.

- 16 Check for dial tone and the correct DN above the display.
- 17 Secure the telephone footstand to the base of the telephone. Use the angle adjustment grip on the top back of the telephone to adjust the position.
- 18 (Optional) Customize the feature keys as required. For more information, see *IP Phone 2001 User Guide*.

---

**End of Procedure**

---

### **Procedure 3**

#### **Installing an IP Phone 2001 for the first time using DHCP**

- 1 Configure a virtual loop on the system using LD 97.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 2 Configure the IP Phone 2001 on the system using LD 11.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 3 Connect the IP Phone 2001 components:
  - a. Connect one end of the handset cord to the handset jack on the back of the telephone identified with a handset icon.
  - b. Connect the other end of the handset cord to the handset.
- 4 Connect one end of the CAT5 Ethernet cable to the network interface located on the back of the telephone (identified with a LAN icon, see Figure 3 on [page 32](#)). The other end of the CAT5 Ethernet cable plugs into the IP network.

- 5 Power the IP Phone 2001 using either the Power over Ethernet or an AC power transformer (local power).

**IMPORTANT!**

**Timing information**

There are only four seconds between plugging in the IP Phone 2001 power transformer and the appearance of the Nortel Networks logo on the display. When you see the logo, you have one second to respond by pressing the four feature keys at the bottom of the display in sequence from left to right. If you miss the one second response time, the IP Phone 2001 attempts to locate the connect server. Wait until it is finished, and then begin the power up sequence again.

- a. If local power is used, plug the AC power transformer into the nearest power outlet. Ensure the correct AC power transformer is used. The voltage rating of the transformer must match the wall outlet voltage. Refer to Table 4 on page 27. Connect the transformer to the AC power jack shown in Figure 3 on [page 32](#). Be sure to thread the cord around the retaining hook to provide strain relief for a secure power connection.
- 6 When the Nortel Networks logo appears on the display, immediately press the four feature keys at the bottom of the display in sequence from left to right.
  - 7 At the prompt DHCP Yes/No?, select **Yes**.
  - 8 Select Partial or Full DHCP.
    - a. If you select Full DHCP, then the following parameters are retrieved from the DHCP server:
      - a valid IP Phone 2001 IP address
      - a subnet mask
      - the default Media Gateway for the IP Phone 2001 on the LAN segment to which it is connected
      - the S1 node IP address of the IP line node
      - the S1 action
      - the S1 retry count. This is the number of times the IP Phone 2001 attempts to connect to the server

- the S2 node IP address of the IP line node
- the S2 action
- the S2 retry count

**b.** If you select Partial DHCP, then you must enter the following parameters:

<b>Screen prompt</b>	<b>Description</b>
S1 IP	the node IP address of the IP line node
S1 Port	this is a fixed value: 4100
S1 action	this is a fixed value: 1
S1 retry	the number of times the IP Phone 2001 attempts to connect to the server; enter 10
S2 IP	same as S1 in most cases (see note below)
S2 Port	same as S1
S2 action	same as S1
S2 retry	same as S1
Cfg XAS? (0-No,1-Yes)	enter 0 (for No), since External Application Server is not supported on the IP Phone 2001

This prompt exists to support future implementation of External Application Server.

**Note:** The IP Phone 2001 can support a primary (S1) and secondary (S2) connect server. If you require IP Phones to register on multiple nodes, refer to “Enhanced Redundancy for IP Line Nodes” in *IP Line: Description, Installation, and Operation* (553-3001-365).

After the Partial or Full DHCP steps are completed, the VLAN option appears on the display.

**9** Select either **1-Yes** or **2-Au** to enable 802.1Q from the DHCP Enabled - VLAN Options menu.

<b>Screen prompt</b>	<b>Description</b>
0-No	802.1Q remains off and initialization continues. 0-No is the default value.
	If this is selected, proceed to step 14 to continue the IP Phone 2001 configuration.

- 1-Ma Enter a VOICE VLAN ID manually.  
Proceed to step 10 to continue the VOICE VLAN configuration.
- 2-Au Automatically enter a VOICE VLAN ID using DHCP. DHCP auto discovers the VOICE VLAN ID.  
Proceed to step 12 to continue the IP Phone configuration.

**10** If **1-Ma** is selected, then the following VOICE VLAN ID displays:

```
Manual Cfg
VOICE VLAN ID: 1234
```

**Note:** The VOICE VLAN ID is entered as a decimal number. The VOICE VLAN ID is a 12-bit value between 0 and 4095.

**11** Enter a valid value, and press **OK**.

The IP Phone 2001 is configured with 802.1Q enabled, VOICE VLAN priority = 6, and the VOICE VLAN ID set to the entered value.

**12** After the value is entered, the DATA VLAN configuration option appears on the display:

Screen prompt	Description
0-No	Data VLAN is not present
1-Yes	Data VLAN is present

**13** Select **0-No**, since DATA VLAN is not supported on the IP Phone 2001.

The IP Phone 2001 searches for the connect server. When the connection is complete, proceed to step 14.

**14** Enter the following information provided by your system administrator.

Screen prompt	Description
Password	IP Phone Installer Password  You are not prompted to enter the IP Phone Installer Password if it has not been configured in your system.
Node	The node ID.
TN	The TN or VTN.

The IP Phone 2001 registers with the TPS and, if needed, begins the firmware download. This takes several minutes. When complete, the IP Phone 2001 resets.

The current system date and time appear on the top line of the display when the configuration is complete. Self-labelling keys also appear.

- 15 Check for dial tone and the correct DN above the display.
- 16 Secure the telephone footstand to the base of the telephone. Use the angle adjustment grip on the top back of the telephone to adjust the position.
- 17 (Optional) Customize the feature keys as required. For more information, see *IP Phone 2001 User Guide*.

---

**End of Procedure**

---

## Startup sequence

When an IP Phone 2001 is connected to the network, it must perform a startup sequence. The elements of the startup sequence include:

- obtaining the IP parameters
- finding a Media Gateway server
- authenticating the user

See Table 5 for a summary of the IP parameters and how they are obtained.

**Note:** For all static IP address assignments, your system administrator provides the network information.

**Table 5**  
**IP Phone 2001 IP parameters (Part 1 of 2)**

Parameter	Method of Acquisition
IP Address	Manually entered or automatically retrieved through Partial or Full DHCP.
Net Mask	Manually entered or automatically retrieved through Partial or Full DHCP.

**Table 5**  
**IP Phone 2001 IP parameters (Part 2 of 2)**

Parameter	Method of Acquisition
Router Address	Manually entered or automatically retrieved through Partial or Full DHCP.
Connect Server (IP address, port, action and retry count — primary and secondary)	Manually entered or automatically retrieved through Full DHCP.
User ID (Node ID, Node Password and TN)	Manually entered for first-time configuration. Retrieved from local storage on subsequent power cycles.  Provided by your system administrator.

## Full Duplex mode

In the Configuration menu, Auto Negotiate mode is the default setting for initial startup. Typically, the telephone is connected to a network that supports Auto Negotiate and it selects the best speed and duplex mode available. There is no intervention required under normal operation.

If the telephone is connected to a network configured for Full Duplex mode only, it is not able to automatically negotiate the proper configuration. Therefore, in this instance, to allow the telephone to work at the optimum speed and duplex mode, Auto Negotiate must be disabled. Use the following procedure to disable Auto Negotiate and enable Full Duplex mode.

### Procedure 4

#### Disabling Auto Negotiate and enabling Full Duplex mode

- 1 Reset the phone by disconnecting and re-connecting power.
- 2 When the Nortel Networks logo appears, press each of the soft keys in sequence. See Procedure 3 on [page 36](#).
- 3 If no other configuration changes are required, press the 0 Soft-key, OK, repeatedly until the Duplex network option appears.
- 4 Select 1 to enable Full Duplex mode.

- 5 When the Speed option appears, select one of the following:
  - 0 for 10 Mbps
  - 1 for 100 Mbps (default)
- 6 Select **OK** to confirm the change.
- 7 Restart the telephone. The firmware reads the new setting, and the telephone operates in Full Duplex mode.

When the telephone is re-started, the firmware reads the setting for Full Duplex mode and sets port 0, the network interface port, accordingly.

Use the following procedure to confirm activation of Full Duplex mode.

**Procedure 5**  
**Checking Ethernet Statistics**

- 1 Double-click the **Services** key. The Network Diagnostics menu appears.
- 2 Select **Ethernet Statistics**.
  - If Full Duplex mode is active, the following is displayed:
    - Link: UP
    - Duplex: Full
    - Speed: 10 (Mb) or 100(Mb)
    - Auto-Nego Capability: N
    - Auto-Nego Completed: N

---

**End of Procedure**

---

## Reinstalling an IP Phone 2001

You can reinstall an existing, previously-configured IP Phone 2001 on the same system. For example, the IP Phone 2001 can be assigned to a new user (new TN) or to an existing user who moved to a new subnet by changing the TN of the IP Phone 2001.

**Procedure 6****Changing the TN of an existing IP Phone 2001**

- 1 Repower the IP Phone 2001.

**Note:** During the reboot sequence of a previously configured IP Phone, the IP Phone 2001 displays the existing node number for approximately five seconds.

- 2 If node password is enabled and NULL, choose one of the following:
  - a. Disable password.
  - b. Set password as non-NULL.
- 3 Press **OK** when the node number displays.

<b>If</b>	<b>Then</b>
node password is enabled and is not NULL	a password screen displays. Go to step 4.
node password is disabled	a TN screen displays. Go to step 5.

- 4 Enter password at the password screen, and press **OK**.  
A TN screen displays.
- 5 Select the **Clear** soft key to clear the existing TN.  
A new parameters prompt displays.

---

**End of Procedure**

---

## Replacing an IP Phone 2001

**IMPORTANT!**

Two telephones cannot share the same TN. You must remove the IP Phone 2001 that is currently using the TN.

**Procedure 7**  
**Replacing an IP Phone 2001**

- 1 Disconnect the IP Phone 2001 that you want to replace.
- 2 Follow either Procedure 2 on [page 31](#) (static IP assignment) or Procedure 3 on [page 36](#) (dynamic IP assignment) to install and configure the IP Phone 2001.
- 3 Enter the same TN and Node Number as the IP Phone 2001 you replaced. The system associates the new IP Phone 2001 with the existing TN.

---

End of Procedure

---

## Removing an IP Phone 2001 from service

**Procedure 8**  
**Removing an IP Phone 2001 from service**

- 1 Disconnect the IP Phone 2001 from the network or turn off the power.

**Note:** The service to the PC is disconnected as well if the PC is connected to the IP Phone 2001.

If the IP Phone 2001 was automatically configured, the DHCP lease expires and the IP address returns to the available pool.

- 2 In LD 11, OUT the TN.

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End of Procedure

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# Nortel Networks IP Phone 2002

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## Introduction

This section explains how to install and maintain the IP Phone 2002. For information on using the IP Phone 2002, see the *IP Phone 2002 User Guide*.

This section contains the following procedures:

- Procedure 9, “Pre-installation checklist” on [page 58](#).
- Procedure 10, “Installing an IP Phone 2002 for the first time” on [page 60](#).
- Procedure 11, “Installing an IP Phone 2002 for the first time using DHCP” on [page 65](#).
- Procedure 12, “Disabling Auto Negotiate and enabling Full Duplex mode” on [page 73](#).
- Procedure 13, “Checking Ethernet Statistics” on [page 73](#).
- Procedure 14, “Changing the TN of an existing IP Phone 2002” on [page 74](#).
- Procedure 15, “Replacing an IP Phone 2002” on [page 75](#).
- Procedure 16, “Removing an IP Phone 2002 from service” on [page 75](#).

**Note:** After an IP Phone has been installed and configured, if power is to the phone is interrupted, re-entry of the IP parameters, Node Number, TN, or re-acquisition of firmware is not required.

## Description

The IP Phone 2002 brings voice and data to the desktop environment. It connects directly to the LAN through the Ethernet connection.

The IP Phone 2002 components are shown in Figure 4 on [page 47](#).

Figure 4  
IP Phone 2002



**Table 6**  
**IP Phone 2002 components and functions (Part 1 of 4)**

Component	Function
Speaker	Press the <b>Handsfree</b> key to activate the speaker.
Programmable Line DN/ feature keys (self-labeled)	<p>Four programmable line (DN)/feature keys (self-labeled) are configured for various features on the telephones. One must be the prime DN key.</p> <p>A steady LCD light beside a line (DN) key indicates the feature or line is active. A flashing LCD indicates the line is on hold or the feature is being programmed.</p>
Message Waiting light/ Incoming Call Indicator	The Message Waiting light turns ON to indicate that a message has been left for the user. This light also flashes when the set ringer is ON.
Soft keys (self-labeled)	<p>Soft keys (self-labeled) are located below the display area. The LCD label above the key changes, based on the active feature.</p> <p><b>Note:</b> A triangle before a key label indicates that the key is active.</p>
Navigation keys	Use the navigation keys to scroll through menus and lists in the display area.
Inbox (Message)	Press the <b>Inbox (Message)</b> key to access your voicemail box.
Shift	The <b>Shift</b> key is a fixed key that is reserved for future feature development.
Directory	Press the <b>Directory</b> key to access Directory services.

**Table 6**  
**IP Phone 2002 components and functions (Part 2 of 4)**

Component	Function
Services	<p>Press the <b>Services</b> key to access the following items:</p> <ul style="list-style-type: none"> <li>• Telephone Options (see <b>Notes 1 and 2</b>): <ul style="list-style-type: none"> <li>— Volume Adjustment</li> <li>— Contrast Adjustment</li> <li>— Language</li> <li>— Date/Time Format</li> <li>— Display diagnostics</li> <li>— Local Dialpad Tone</li> <li>— Ring type</li> <li>— OnHook Default Path</li> <li>— Change Feature key label</li> <li>— Set Information</li> </ul> </li> <li>• Virtual Office Login and Virtual Office Logout (if Virtual Office is configured)</li> <li>• Test Local Mode and Resume Local Mode (if Branch Office is configured)</li> </ul>
Quit	<p>Press the <b>Quit</b> key to end an active application.</p> <p>Pressing the <b>Quit</b> key does not affect the status of the calls currently on your telephone.</p>
Expand to PC	<p>The <b>Expand to PC</b> key is a fixed key that is reserved for future development.</p>
Goodbye	<p>Press the <b>Goodbye</b> key to terminate an active call.</p>

**Table 6**  
**IP Phone 2002 components and functions (Part 3 of 4)**

Component	Function
Hold	Press the <b>Hold</b> key to put an active call on hold. Press the line (DN) key beside the flashing LCD to return to the caller on hold.
Headset	Press the <b>Headset</b> key to answer a call using the headset or to switch a call from the handset or Handsfree to the headset.
Mute	<p>Press the <b>Mute</b> key to listen to the receiving party without transmitting.</p> <p>Press the <b>Mute</b> key again to return to a two-way conversation.</p> <p>The <b>Mute</b> key applies to Handsfree, Handset, and Headset microphones.</p> <p>The Mute LED flashes when the Mute option is in use.</p>
Volume control bar	<p>Use the volume control bar to adjust the volume of the handset, headset, speaker, ringer, and, Handsfree feature.</p> <p>Press the right side of the rocker bar to increase volume; press the left side to decrease volume.</p>

**Table 6**  
**IP Phone 2002 components and functions (Part 4 of 4)**

Component	Function
Handsfree key	<p>Press the <b>Handsfree</b> key to activate the Handsfree feature.</p> <p>The LED lights to indicate when handsfree is active.</p>
<p><b>Note 1:</b> If a call is presented while the user is manipulating an option, the IP Phone 2002 rings and the DN key flashes. However, the screen display is not updated with Caller ID information and programming text is not disturbed.</p> <p><b>Note 2:</b> The user can originate a call using Autodial or Last Number Redial while manipulating an option. However, the display is not updated with the dialed digits or the Caller ID information, and Autodial and Last Number Redial intercept the dialpad.</p>	

## Supported features

The IP Phone 2002 supports the following additional features:

- 802.1Q VLAN and 802.1P priority support, industry standards for managing bandwidth usage — full VLAN capability, including a manageable integrated switch in the IP Phone for VLAN and priority tagging for PC and IP Phone traffic
- integrated hardware to support power over Ethernet, for IEEE 802.3af standard power; also including support for PowerDsine Power over LAN Hub powering, and Cisco proprietary powering as tested with specific Cisco Ethernet switch equipment
- ability to change the feature key labels
- Corporate Directory
- Personal Directory
- Redial List
- Callers List

- Password Administration
- Virtual office
- Branch Office
- switch to support sharing LAN access with a PC or other data device
- 10/100 Mbps Full Duplex mode
- Both the registered and configured TNs are displayed in the Set Info menu.
- Language support: English, French, Swedish, Danish, Norwegian, German, Dutch, Portuguese, Czech, Finnish, Hungarian, Italian, Polish, Spanish, Japanese, Russian, Latvian, Turkish.
- IP Key Expansion modules

## Features not currently supported

The following features are not supported on the IP Phone 2002:

- Live Dialpad
- Group Listening
- Set-to-Set messaging
- Context-sensitive soft keys
- External Application Server

The three-port switch that is internal to the IP Phone 2002 is an unmanaged switch. It passes the packets (unmodified) and does not interpret the 802.1Q header. The three-port switch provides priority based on the port. The telephone port traffic takes priority over the Ethernet.

## Display characteristics

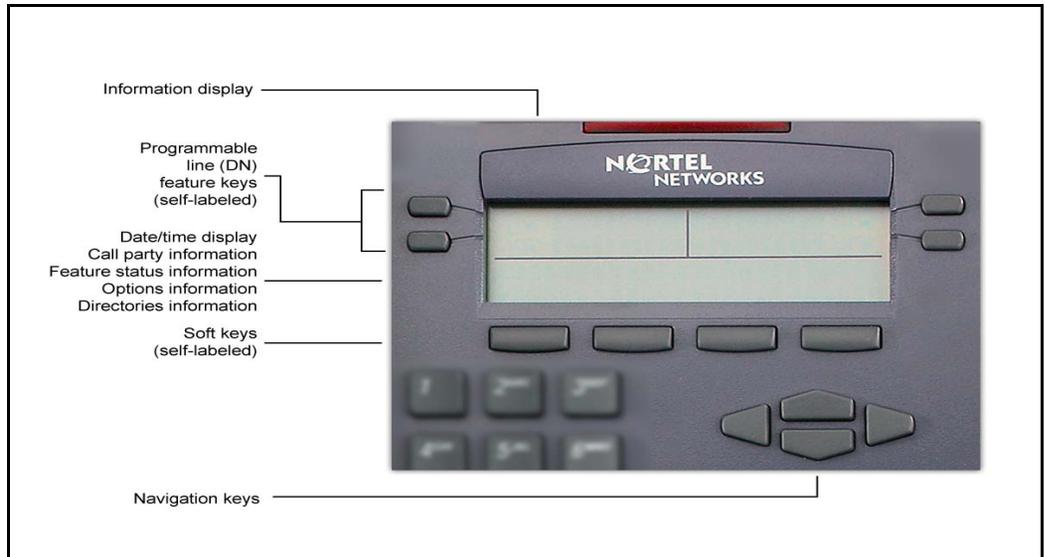
An IP Phone 2002 has three major display areas:

- programmable line (DN) feature key label

- soft key label
- information line

Figure 5 on [page 53](#) shows these three display areas.

**Figure 5**  
**IP Phone 2002 display areas**



## Programmable line (DN)/feature key label display

The feature key label area displays a ten-character string for each of the four feature keys. Each feature key includes the key label and an icon. The icon state can be on, off, or flashing. Key labels are left-aligned for keys on the left side of the screen, and right-aligned for keys on the right side of the screen.

**Note:** If a label is longer than ten characters, the last ten characters are displayed and the excess characters are deleted from the beginning of the string.

## Soft key label display

The soft-key label display area displays a maximum six-character string. Each soft key includes the soft key label and an icon. When a soft key is in use, a flashing icon displays at the beginning of the soft key label, and the label shifts one character to the right. If a feature is enabled, the icon state turns to on. It remains in the on state until the feature key is pressed again. This cancels the enabled feature and turns the icon off, returning the soft key label to its original string.

## Information line display

An IP Phone 2002 has a one-line information display area with the following information:

- Caller number
- Caller name
- Feature prompt strings
- User-entered digits
- Date and time information (if the telephone is in an idle state)

The information area displays different information, according to the telephone's call processing state and active features.

## Key number assignments

The IP Phone 2002 has four soft-labeled, pre-defined keys that are used to provide up to 10 features. Because they are pre-defined, the user cannot change the key number assignment.

The Message key is numbered 16. Key numbers 17-31 are the four soft key labels below the display area. See Figure 4 on [page 47](#).

Key numbers 17 - 31 support the features A03, A06, CFW, CHG, CPN, PRK, PRS, RGA, RNP, SCC, SCU, SSC, SSU and TRN, as listed in Table 7 on [page 55](#).

Key number assignments at the Call Server are aligned with that of the IP Phone 2004. The mappings between IP Phone 2002 soft key numbers and PBX CPU key numbers are the same as on the IP Phone 2004.

## Dedicated keys

Table 7 describes the telephone assignment functions for each of the dedicated keys. Use LD 11 to program keys 16-26 on the IP Phone 2002.

*Note:* If you attempt to configure anything other than the permitted response, the system generates an error code.

**Table 7**  
**IP Phone 2002 dedicated keys**

Key Number	Response	Description
Key 17	TRN	Call Transfer key
Key 18	A06	Six-party conference key Alternate: A03 (3-party conference)
Key 19	CFW	Call Forward key
Key 20	RGA	Ring Again key
Key 21	PRK	Call Park key
Key 22	RNP	Ringing Number Pickup key
Key 23	Reserved for speed dial	Speed dial includes SCU, SCC, SSU, SSC
Key 24	PRS	Privacy Release key
Key 25	CHG	Charge Account key
Key 26	CPN	Calling Party Number key
Keys 27 - 31		Reserved

## Package components

The following information applies to Phase II IP Phones. Product codes for Phase II IP Phones are different from previous sets.

See the product code on the back of the phone to confirm whether it is a Phase II IP Phone. The product code for Phase II IP Phones appears as “IP Phone 200x”. The product code for previous versions of the IP Phones appears with an “i” in front of the model number; example, “i200x”.

The AC power adapter must be ordered separately if local power using the AC adapter is required, because Phase II IP Phones include integrated support for a number of power over LAN options, including support for IEEE 802.3af standard power.

Table 8 lists the IP Phone 2002 package components and product codes.

**Table 8**  
**IP Phone 2002 components list (Part 1 of 2)**

<b>IP Phone 2002 package contents include:</b>	
<ul style="list-style-type: none"> <li>• IP Phone 2002</li> <li>• Handset</li> <li>• Handset cord</li> <li>• Footstand</li> <li>• 7ft Cat5 Ethernet cable</li> <li>• Getting Started card</li> </ul>	
IP Phone 2002 (Ethergray) with Icon keycaps	NTDU91AA16/A0533404
IP Phone 2002 (Ethergray) with English text label keycaps	NTDU91BA16/A0533405
IP Phone 2002 (Charcoal) with Icon keycaps	NTDU91AA70/A0533406
IP Phone 2002 (Charcoal) with English text label keycaps	NTDU91BA70/A0533407
<b>Replacement parts</b>	
7 ft. Cat5 Ethernet cable	A0648375

**Table 8**  
**IP Phone 2002 components list (Part 2 of 2)**

Handset, Ethergray	A0788874
Handset, Charcoal	A0758634
Handset cord, Ethergray	A0897725
Handset cord, Charcoal	N0000763
Footstand, Charcoal (used for Ethergray and Charcoal models)	A0891619
<b>IP Phone 2001/2002/2004 Power Adaptors</b>	
Power transformer (117/120 VAC 50/60 Hz) (North America)	A0619627
Power transformer 3 prong AC to AC, direct plug-in, 8W, 240 VAC, 50Hz to 16 VAC at 500 mA (Ireland and UK)	A0656598
Power transformer AC to AC, direct plug-in, 8W, 230 VAC, 50/60 Hz, to 16 VAC at 500 mA (Europe)	A0619635
Power transformer 2 prong wall plug direct plug-in AC to AC, 8W, 240 VAC, 50 Hz, to 16 VAC at 500 mA (Australia and New Zealand)	A0647042
Power transformer AC to AC, direct plug-in, 8W, 100 VAC, 50 Hz, to 16 VAC at 500 mA	A0828858

For more information, and for information about previous versions of the IP Phone, contact Nortel Networks.

## Before you begin

The following section provides a step-by-step guide through the IP Phone 2002 installation process. Before installing the IP Phone 2002, complete the following pre-installation checklist.

**Procedure 9**  
**Pre-installation checklist**

- 1 Ensure there is one IP Phone 2002 boxed package for each IP Phone 2002 being installed. The package contains:
  - IP Phone 2002
  - Handset
  - Handset cord
  - Footstand
  - 2.3 m (7') Cat5 Ethernet cable
  - Getting Started card
- 2 To install and configure an IP Phone 2002, the host system must be installed with the Voice Gateway Media Card.
- 3 If an AC power adapter is required, ensure the correct AC power transformer is used. The voltage rating of the transformer must match the wall outlet voltage. Refer to Table 8 on page 56.
- 4 Understand the three configuration modes that you can choose as you proceed through the installation of the IP Phone 2002. The three configuration modes are:
  - Static IP address (see “Static IP address assignment” on [page 59](#))
  - Dynamic Partial DHCP (see “Dynamic IP address assignment — Partial DHCP” on [page 59](#))
  - Dynamic Full DHCP (see “Dynamic IP address assignment — Full DHCP” on [page 60](#))
- 5 A DHCP server and DHCP relay agents, if required, must also be installed, configured, and running.

---

**End of Procedure**

---

## First-time installation

### IP address assignments

During the first-time installation, there are IP address parameters that are entered either manually or automatically depending on the installation configuration. As well, you are prompted to enable or disable 802.1Q. For more information, see “802.1Q VLAN description” on [page 257](#).

There are three configuration modes you can choose from to obtain the IP parameters. Review the following sections for more information on the configuration mode that you are using.

#### Static IP address assignment

During the installation, the IP Phone 2002 parameters are entered manually using the key pad.

Your system administrator provides the following information: IP address, subnet mask, and the default Media Gateway.

You must also enter the Connect Server parameters including: IP address, port number, action, and retry count.

Go to Procedure 10, “Installing an IP Phone 2002 for the first time” on [page 60](#).

#### Dynamic IP address assignment — Partial DHCP

For a partial DHCP installation, you must provide, through the IP Phone 2002 key pad, the Connect Server parameters including: IP address, port number, action, and retry count. Other parameters (IP Phone IP address, subnet mask and default Media Gateway) are retrieved from the DHCP server.

The IP Phone 2002 password, node ID and TN must be entered manually from the key pad.

For more information about DHCP servers, see *Data Networking for Voice over IP* (553-3001-160).

Go to Procedure 11, “Installing an IP Phone 2002 for the first time using DHCP” on [page 65](#).

### **Dynamic IP address assignment — Full DHCP**

For a full DHCP installation, all parameters (IP Phone IP address, subnet mask, default Media Gateway, Connect Server IP address, port number, action, and retry count) are retrieved from the DHCP server to recognize the IP Phone 2002.

The IP Phone 2002 password, node ID, and TN must be entered manually from the key pad.

For more information on how to set up DHCP servers for use with the IP Phones, refer to *Data Networking for Voice over IP* (553-3001-160).

Go to Procedure 11, “Installing an IP Phone 2002 for the first time using DHCP” on [page 65](#).

### **Procedure 10 Installing an IP Phone 2002 for the first time**

- 1** Configure a virtual loop on the system using LD 97.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 2** Configure the IP Phone 2002 on the system using LD 11.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 3** Connect the IP Phone 2002 components:
  - a.** Connect one end of the handset cord to the handset jack on the back of the telephone identified with a handset icon.
  - b.** Connect the other end of the handset cord to the handset.
- 4** Choose one of the following connections:
  - a.** For a telephone not sharing LAN access with a PC:

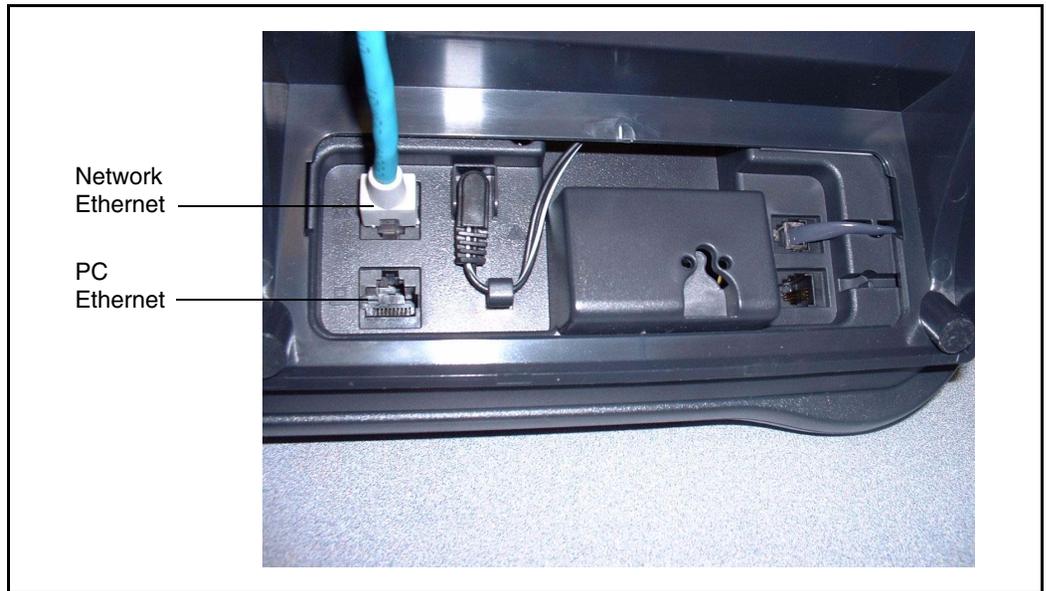
Connect one end of the CAT5 Ethernet cable to the network interface located on the back of the telephone (identified with a LAN icon, see

Figure 6). The other end of the CAT5 Ethernet cable plugs into the IP network.

- b. For a telephone sharing LAN access with a PC:

Connect one end of the CAT5 Ethernet cable to the network interface located on the back of the telephone (identified with a LAN icon, see Figure 6) and the other end to the IP network. Insert a second CAT5 Ethernet cable into the PC network interface located on the back of the telephone (identified with a PC icon, see Figure 6) and the other end into the computer.

**Figure 6**  
**IP Phone 2002 Ethernet network interface connections**



- 5 Power the IP Phone 2002 using either the Power over Ethernet or an AC power transformer (local power).

**IMPORTANT!**

**Timing information**

There are only four seconds between plugging in the IP Phone 2002 power transformer and the appearance of the Nortel Networks logo on the display. When you see the logo, you have one second to respond by pressing the four feature keys at the bottom of the display in sequence from left to right. If you miss the one-second response time, the IP Phone 2002 attempts to locate the connect server. Wait until it is finished, and then begin the power-up sequence again.

- a. If local power is used, plug the AC power transformer into the nearest power outlet.
  - b. Ensure the correct AC power transformer is used. The voltage rating of the transformer must match the wall outlet voltage. Refer to Table 8 on page 56. Connect the power jack as shown in Figure 6 on [page 61](#). Be sure to thread the cord around the retaining hook to provide strain relief for a secure power connection.
- 6 When the Nortel Networks logo appears on the display, immediately press the four feature keys at the bottom of the display in sequence from left to right.
  - 7 At the prompt DHCP Yes/No?, select **No**.
  - 8 Enter the following information provided by your system administrator:

<b>Screen prompt</b>	<b>Description</b>
set IP	A valid IP Phone 2002 IP address.
net msk	A subnet mask.
def gw	The default Media Gateway for the IP Phone 2002 on the LAN segment to which it is connected.

- 9 Enter the information for the primary Connect Server (S1) and the secondary Connect Server (S2):

Screen prompt	Description
S1 IP	The node IP address of the IP line node.
S1 Port	This is a fixed value: 4100
S1 action	This is a fixed value: 1
S1 retry	The number of times the IP Phone 2002 attempts to connect to the server. Enter 10.
S2 IP	Same as S1 in most cases (see note below).
S2 Port	Same as S1
S2 action	Same as S1
S2 retry	Same as S1
Cfg XAS? (0-No,1-Yes)	enter 1 (for yes).
XAS IP:	Enter the XAS IP address

**Note 1:** The IP Phone 2002 can support a primary (S1) and secondary (S2) connect server. If you require IP Phones to register on multiple nodes, refer to “Enhanced Redundancy for IP Line Nodes” in *IP Line: Description, Installation, and Operation* (553-3001-365).

**Note 2:** If the XAS IP is 00.00.00.00, then pressing the Blue feature key sends the normal UNISim message to the TPS. If the XAS IP is any other value, then pressing the Blue feature key sends the Resume Connection message to the entered XAS IP.

After the S1 and S2 server information is entered, the VLAN option appears on the display:

Screen prompt	Description
0-No	Disable 802.1Q and complete the configuration of the IP Phone. 0-No is the default value.
1-Yes	Enable the 802.1Q header.

- 10** If 802.1Q is *not* required, select **0-No** and go to step 16; otherwise, select **1-Yes** to choose the method of VOICE VLAN configuration:

Screen prompt	Description
0	Automatic VLAN configuration
1	Manual VLAN configuration

- 11** If automatic configuration is required, select **0-Auto** and go to step 13; otherwise,select **1-Man** to set the VOICE VLAN ID:

**VOICE VLAN ID: 1234**

**Note:** The VOICE VLAN ID is entered as an integer. The VOICE VLAN ID is a 12-bit value between 0 and 4095.

- 12** Enter a valid value, and press **OK**.

The IP Phone 2002 is configured with 802.1Q enabled, the VOICE VLAN ID is configured to the entered value, and the VOICE VLAN priority = 6.

- 13** After the value is entered, the DATA VLAN configuration option appears on the display:

Screen prompt	Description
0	Data VLAN is not present
1	Data VLAN is present

- 14** If there is *not* a Data VLAN present, select **0-No** and go to step 16; otherwise, select **1-Yes** to set the DATA VLAN ID:

**DATA VLAN ID: 1234**

**Note:** The DATA VLAN ID is entered as an integer. The DATA VLAN ID is a 12-bit value between 0 and 4095, and should be different from the VOICE VLAN ID.

- 15** Enter a valid value, and press **OK**.

The IP Phone 2002 is configured with 802.1Q enabled, the DATA VLAN ID is configured to the entered value, and the DATA VLAN priority = 0.

The IP Phone 2002 searches for the connect server. When the connection is complete, proceed with step 16.

- 16** Enter the following information provided by your system administrator:

<b>Screen prompt</b>	<b>Description</b>
Password	IP Phone Installer Password  You are not prompted to enter the IP Phone Installer Password if it has not been configured in your system.
Node	The node ID.
TN	The TN or VTN.

The IP Phone 2002 registers with the Terminal Proxy Server (TPS) and, if needed, begins the firmware download. This takes several minutes. When complete, the IP Phone 2002 resets.

The current system date and time appear on the top line of the display when the configuration is complete. Self-labelling keys also appear.

- 17** Check for dial tone and the correct DN above the display.
- 18** Secure the telephone footstand to the base of the telephone. Use the angle adjustment grip on the top back of the telephone to adjust the position.
- 19** (Optional) Customize the feature keys as required. For more information, see *IP Phone 2002 User Guide*.

---

**End of Procedure**

---

**Procedure 11**

**Installing an IP Phone 2002 for the first time using DHCP**

- 1** Configure a virtual loop on the system using LD 97.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 2** Configure the IP Phone 2002 on the system using LD 11.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 3** Connect the IP Phone 2002 components:

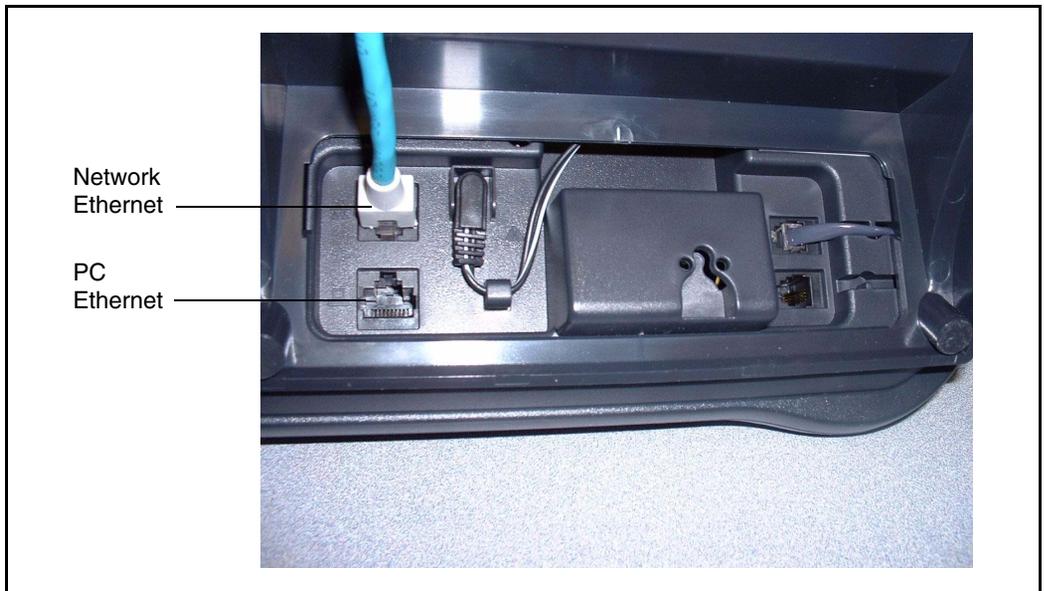
- a. Connect one end of the handset cord to the handset jack on the back of the telephone identified with a handset icon.
  - b. Connect the other end of the handset cord to the handset.
- 4 Choose one of the following connections:
  - a. For a telephone not sharing LAN access with a PC:

Connect one end of the CAT5 Ethernet cable to the network interface located on the back of the telephone (identified with a LAN icon, see Figure 7 on [page 67](#)). The other end of the CAT5 Ethernet cable plugs into the IP network.
  - b. For a telephone sharing LAN access with a PC:

Connect one end of the CAT5 Ethernet cable to the network interface located on the back of the telephone (identified with a LAN icon, see Figure 7 on [page 67](#)) and the other end to the IP network.

Insert a second CAT5 Ethernet cable into the PC network interface located on the back of the telephone (identified with a PC icon, see Figure 7 on [page 67](#)) and the other end into the computer.
- 5 Power the IP Phone 2002 using either the Power over Ethernet or an AC power transformer (local power).

**Figure 7**  
**IP Phone 2002 Ethernet network interface connections**



### **IMPORTANT!**

#### **Timing information**

There are only four seconds between plugging in the IP Phone 2002 power transformer and the appearance of the Nortel Networks logo on the display. When you see the logo, you have one second to respond by pressing the four feature keys at the bottom of the display in sequence from left to right. If you miss the one-second response time, the IP Phone 2002 attempts to locate the connect server. Wait until it is finished, and then begin the power up sequence again.

- a. If local power is used, plug the AC power transformer into the nearest power outlet.
  - b. Ensure the correct AC power transformer is used. The voltage rating of the transformer must match the wall outlet voltage. Refer to Table 8 on page 56. Connect the power jack as shown in Figure 6 on [page 61](#). Be sure to thread the cord around the retaining hook to provide strain relief for a secure power connection.
- 6 When the Nortel Networks logo appears on the display, immediately press the four feature keys at the bottom of the display in sequence from left to right.
- 7 At the prompt DHCP Yes/No?, select **Yes**.
- 8 Select Partial or Full DHCP.
- a. If you select Full DHCP, then the following parameters are retrieved from the DHCP server:
    - a valid IP Phone 2002 IP address
    - a subnet mask
    - the default Media Gateway for the IP Phone 2002 on the LAN segment to which it is connected
    - the S1 node IP address of the IP line node
    - the S1 action
    - the S1 retry count (This is the number of times the IP Phone attempts to connect to the server.)
    - the S2 node IP address of the IP line node
    - the S2 action
    - the S2 retry count
    - the External Application Server (XAS) IP address
  - b. If you select Partial DHCP, then you must enter the following parameters:

Screen prompt	Description
S1 IP	the node IP address of the IP line node
S1 Port	this is a fixed value: 4100
S1 action	this is a fixed value: 1

S1 retry	the number of times the IP Phone 2002 attempts to connect to the server; enter 10
S2 IP	same as S1 in most cases (see note below)
S2 Port	same as S1
S2 action	same as S1
S2 retry	same as S1
Cfg XAS? (0-No,1-Yes)	enter 1 (for yes).
XAS IP:	Enter the XAS IP address

**Note 1:** The IP Phone 2002 can support a primary (S1) and secondary (S2) connect server. If you require IP Phones to register on multiple nodes, refer to “Enhanced Redundancy for IP Line Nodes” in *IP Line: Description, Installation, and Operation* (553-3001-365).

**Note 2:** If the XAS IP is 00.00.00.00, then pressing the Blue feature key sends the normal UNISim message to the TPS. If the XAS IP is any other value, then pressing the Blue feature key sends the Resume Connection message to the entered XAS IP.

After the Partial or Full DHCP steps are completed, the VLAN option appears on the display.

- 9** Select either **1-Ma** or **2-Au** to enable 802.1Q from the DHCP Enabled - VLAN Options menu.

Screen prompt	Description
0-No	802.1Q remains off and initialization continues. 0-No is the default value.  If this is selected, proceed to step 15 to continue the IP Phone 2002 configuration.
1-Ma	Enter a VLAN ID manually.
2-Au	Automatically enter a VOICE VLAN ID using DHCP. DHCP auto discovers the VOICE VLAN ID.

- 10** If automatic configuration is required, select **2-Auto** and go to step 12; otherwise,select **1-Man** to set the VOICE VLAN ID:

**VOICE VLAN ID: 1234**

**Note:** The VOICE VLAN ID is entered as an integer. The VOICE VLAN ID is a 12-bit value between 0 and 4095.

- 11 Enter a valid value, and press **OK**.

The IP Phone 2002 is configured with 802.1Q enabled, the VOICE VLAN ID is configured to the entered value, and the VOICE VLAN priority = 6.

- 12 After the value is entered, the DATA VLAN configuration option appears on the display:

Screen prompt	Description
0	Data VLAN is not present
1	Data VLAN is present

- 13 If there is *not* a Data VLAN present, select **0-No** and go to step 16; otherwise, select **1-Yes** to set the DATA VLAN ID:

**DATA VLAN ID: 1234**

**Note:** The DATA VLAN ID is entered as an integer. The DATA VLAN ID is a 12-bit value between 0 and 4095, and should be different from the VOICE VLAN ID.

- 14 Enter a valid value, and press **OK**.

The IP Phone 2002 is configured with 802.1Q enabled, the DATA VLAN ID is configured to the entered value, and the DATA VLAN priority = 0.

The IP Phone 2002 searches for the connect server. When the connection is complete, proceed to step 15.

- 15 Enter the following information provided by your system administrator.

Screen prompt	Description
Password	IP Phone Installer Password  You are not prompted to enter the IP Phone Installer Password if it has not been configured in your system.
Node	the node ID
TN	the TN or VTN

The IP Phone 2002 registers with the TPS and, if needed, begins the firmware download. This takes several minutes. When complete, the IP Phone 2002 resets.

**Note:** Port 5105 on the system must be explicitly open to enable firmware download. For more information, refer to *IP Line: Description, Installation, and Operation* (553-3001-365).

The current system date and time appear on the top line of the display when the configuration is complete. Self-labelling keys also appear.

- 16** Check for dial tone and the correct DN above the display.
- 17** Secure the telephone footstand to the base of the telephone. Use the angle adjustment grip on the top back of the telephone to adjust the position.
- 18** (Optional) Customize the feature keys as required. For more information, see *IP Phone 2002 User Guide*.

---

**End of Procedure**

---

## Startup sequence

When an IP Phone 2002 is connected to the network, it must perform a startup sequence. The elements of the startup sequence include:

- obtaining the IP parameters
- finding a Media Gateway server
- authenticating the user

See Table 9 for a summary of the IP parameters and how they are obtained.

*Note:* Your system administrator provides the network information for all static IP address assignments,.

**Table 9**  
**IP Phone 2002 IP parameters**

Parameter	Method of acquisition
IP Address	Manually entered or automatically retrieved through Partial or Full DHCP.
Net Mask	Manually entered or automatically retrieved through Partial or Full DHCP.
Router Address	Manually entered or automatically retrieved through Partial or Full DHCP.
Connect Server (IP address, port, action and retry count — primary and secondary)	Manually entered or automatically retrieved through Full DHCP.
User ID (Node ID, Node Password and TN)	Manually entered for first-time configuration. Retrieved from local storage on subsequent power cycles.  Provided by your system administrator.

## Full Duplex mode

In the Configuration menu, Auto Negotiate mode is the default setting for initial startup. Typically, the telephone is connected to a network that

supports Auto Negotiate and it selects the best speed and duplex mode available. There is no intervention required under normal operation.

If the telephone is connected to a network configured for Full Duplex mode only, it is not able to automatically negotiate the proper configuration. Therefore, in this instance, to allow the telephone to work at the optimum speed and duplex mode, Auto Negotiate must be disabled. Use the following procedure to disable Auto Negotiate and enable Full Duplex mode.

### **Procedure 12**

#### **Disabling Auto Negotiate and enabling Full Duplex mode**

- 1** Reset the phone by disconnecting and re-connecting power.
- 2** When the Nortel Networks logo appears, press each of the soft keys in sequence. See Procedure 10 on [page 60](#).
- 3** If no other configuration changes are required, press the 0 Soft-key, OK, repeatedly until the Duplex network option appears.
- 4** Select 1 to enable Full Duplex mode.
- 5** When the Speed option appears, select one of the following:
  - 0 for 10 Mbps
  - 1 for 100 Mbps (default)
- 6** Select **OK** to confirm the change.
- 7** Restart the telephone. The firmware reads the new setting, and the telephone operates in Full Duplex mode.

When the telephone is re-started, the firmware reads the setting for Full Duplex mode and sets both port 0, network interface port, and port 1, PC interface port, accordingly.

Use the following procedure to confirm activation of Full Duplex mode.

### **Procedure 13**

#### **Checking Ethernet Statistics**

- 1** Double-click the **Services** key. The Network Diagnostics menu appears.
- 2** Select **Ethernet Statistics**.
  - If Full Duplex mode is active, the following is displayed:

- Link: UP
- Duplex: Full
- Speed: 10 (Mb) or 100(Mb)
- Auto-Nego Capability: N
- Auto-Nego Completed: N

---

**End of Procedure**

---

## Reinstalling an IP Phone 2002

You can reinstall an existing, previously-configured IP Phone 2002 on the same system. For example, the IP Phone 2002 can be assigned to a new user (new TN) or to an existing user who moved to a new subnet by changing the TN of the IP Phone 2002.

### Procedure 14

#### Changing the TN of an existing IP Phone 2002

- 1 Repower the IP Phone 2002.

**Note:** During the reboot sequence of a previously configured IP Phone, the IP Phone 2002 displays the existing node number for approximately 5 seconds.

- 2 If node password is enabled and NULL, choose one of the following:
  - a. Disable password.
  - b. Set password as non-NULL.
- 3 Press **OK** when the node number displays.

<b>If</b>	<b>Then</b>
node password is enabled and is not NULL	a password screen displays. Go to step 4.
node password is disabled	a TN screen displays. Go to step 5.

- 4 Enter password at the password screen and press **OK**.  
A TN screen displays.

- 5 Select the **Clear** soft key to clear the existing TN.  
A new parameters prompt displays.

————— **End of Procedure** —————

## Replacing an IP Phone 2002

### **IMPORTANT!**

Two telephones cannot share the same TN. You must remove the IP Phone 2002 that is currently using the TN.

#### **Procedure 15** **Replacing an IP Phone 2002**

- 1 Disconnect the IP Phone 2002 that you want to replace.
- 2 Follow either Procedure 10 on [page 60](#) (static IP assignment) or Procedure 11 on [page 65](#) (dynamic IP assignment) to install and configure the IP Phone 2002.
- 3 Enter the same TN and Node Number as the IP Phone 2002 you replaced. The system associates the new IP Phone 2002 with the existing TN.

————— **End of Procedure** —————

## Removing an IP Phone 2002 from service

#### **Procedure 16** **Removing an IP Phone 2002 from service**

- 1 Disconnect the IP Phone 2002 from the network or turn off the power.

**Note:** The service to the PC is disconnected as well if the PC is connected to the IP Phone 2002.

If the IP Phone 2002 was automatically configured, the DHCP lease expires and the IP address returns to the available pool.

2 In LD 11, OUT the TN.

————— **End of Procedure** —————

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# Nortel Networks IP Phone 2004

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## Introduction

This section explains how to install and maintain the IP Phone 2004. For information on using the IP Phone 2004, see the *IP Phone 2004 User Guide*.

This section contains the following procedures:

- Procedure 17, “Pre-installation checklist” on [page 90](#).
- Procedure 18, “Installing an IP Phone 2004 for the first time” on [page 93](#).
- Procedure 19, “Installing an IP Phone 2004 for the first time using DHCP” on [page 97](#).
- Table 20, “Disabling Auto Negotiate and enabling Full Duplex mode” on [page 104](#).
- Table 21, “Checking Ethernet Statistics” on [page 104](#).
- Procedure 22, “Changing the TN of an existing IP Phone 2004” on [page 105](#).
- Procedure 23, “Replacing an IP Phone 2004” on [page 106](#).
- Procedure 24, “Removing an IP Phone 2004 from service” on [page 106](#).

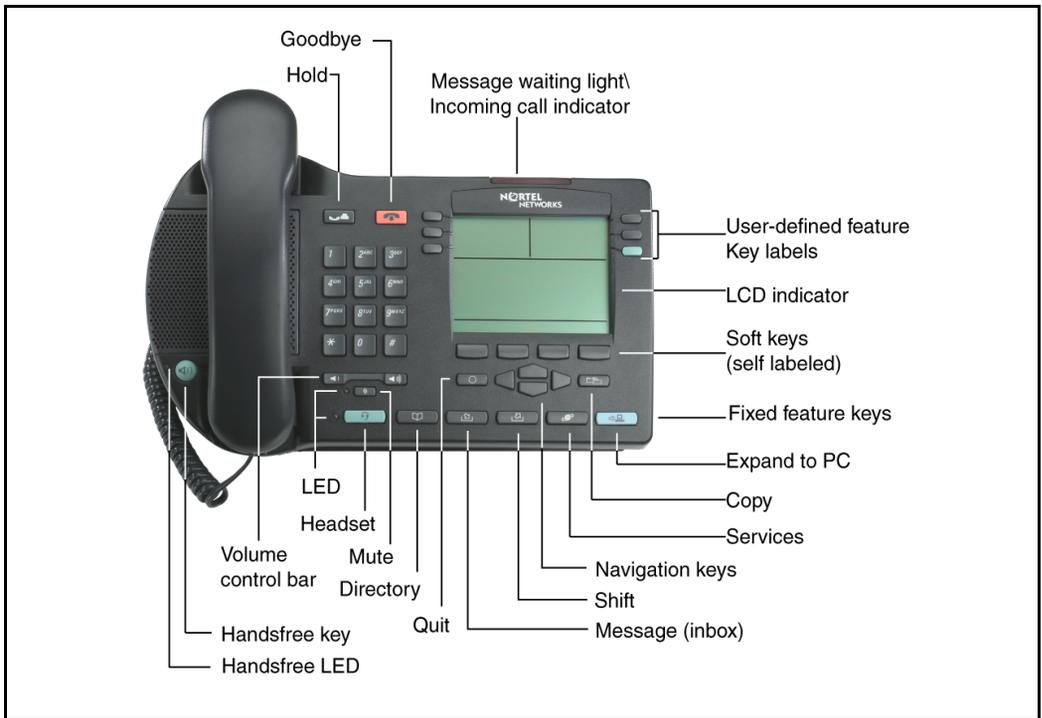
**Note:** After an IP Phone has been installed and configured, if power is to the phone is interrupted, re-entry of the IP parameters, Node Number, TN, or re-acquisition of firmware is not required.

## Description

The IP Phone 2004 brings voice and data to the desktop environment. It connects directly to the LAN through the Ethernet connection.

The IP Phone 2004 translates voice into data packets for transport using Internet Protocol. A Dynamic Host Configuration Protocol (DHCP) server can be used to provide information that enables the IP Phone 2004 network connection, and connection to the Voice Gateway Media Card. The IP Phone 2004 uses the customer’s IP network to communicate with the Call Server. The IP Phone 2004 components are shown in Figure 8 and described in Table 10 on [page 79](#).

**Figure 8**  
**IP Phone 2004**



**Table 10**  
**IP Phone 2004 components and functions (Part 1 of 5)**

Component	Function
Hold	Press the <b>Hold</b> key to put an active call on hold. Press the line (DN) key beside the flashing LCD to return to the caller on hold.
Goodbye	Press the <b>Goodbye</b> key to terminate an active call.

**Table 10**  
**IP Phone 2004 components and functions (Part 2 of 5)**

Component	Function
Message Waiting Light/ Incoming Call Indicator	The Message Waiting Indicator turns ON to indicate that a message has been left for the user. This indicator also flashes when the set ringer is ON.
Programmable line DN/ feature keys (self-labeled)	<p>Programmable line (DN)/feature keys (self-labeled) are configured for various features on the telephones.</p> <p>A steady LCD light beside a line (DN) key indicates the feature or line is active. A flashing LCD indicates the line is on hold or the feature is being programmed.</p>
Soft keys (self-labeled)	<p>Soft keys (self-labeled) are located below the display area. The LCD label above the key changes, based on the active feature.</p> <p><b>Note:</b> A triangle before a key label indicates that the key is active.</p>
Fixed feature keys	Use these keys to access non-programmable standard features.
Expand to PC	The <b>Expand to PC</b> key is used to access external server applications such as External Application Server.
Copy	A fixed key reserved for future feature development. An audible non-working tone is generated along with a display message.

**Table 10**  
**IP Phone 2004 components and functions (Part 3 of 5)**

Component	Function
Services	<p>Press the <b>Services</b> key to access the following items:</p> <ul style="list-style-type: none"> <li>• Telephone Options (see Notes 1 and 2): <ul style="list-style-type: none"> <li>— Volume Adjustment</li> <li>— Contrast Adjustment</li> <li>— Language</li> <li>— Date/Time Format</li> <li>— Display diagnostics</li> <li>— Local Dialpad Tone</li> <li>— Ring type</li> <li>— Call timer</li> <li>— OnHook Default Path</li> <li>— Change Feature key Label</li> <li>— Set Information</li> </ul> </li> <li>• Virtual Office Login and Virtual Office Logout (if Virtual Office is configured)</li> <li>• Test Local Mode and Resume Local Mode (if Branch Office is configured)</li> </ul>
Navigation keys	Use the navigation keys to scroll through menus and lists in the display area.
Shift	Press the <b>Shift</b> key to toggle between two feature key pages and access an additional six lines/features.
Inbox (Message)	Press the <b>Inbox (Message)</b> key to access your voice mailbox.

**Table 10**  
**IP Phone 2004 components and functions (Part 4 of 5)**

Component	Function
Quit	<p>Press the <b>Quit</b> key to end an active application.</p> <p>Pressing the <b>Quit</b> key does not affect the status of the calls currently on your telephone.</p>
Directory	<p>Press the <b>Directory</b> key to access Directory services.</p>
Mute	<p>Press the <b>Mute</b> key to listen to the receiving party without transmitting.</p> <p>Press the <b>Mute</b> key again to return to a two way conversation.</p> <p>The <b>Mute</b> key applies to Handsfree, Handset, and Headset microphones.</p> <p>The Mute LED flashes when the Mute option is in use.</p>
Headset	<p>Press the <b>Headset</b> key to answer a call using the headset or to switch a call from the handset or Handsfree to the headset.</p>
Volume control bar	<p>Use the Volume control bar to adjust the volume of the handset, headset, speaker, ringer, and Handsfree feature.</p> <p>Press the right side of the rocker bar to increase volume, the left side to decrease volume.</p>

**Table 10**  
**IP Phone 2004 components and functions (Part 5 of 5)**

Component	Function
Handsfree key	<p>Press the <b>Handsfree</b> key to activate handsfree.</p> <p>The LED lights to indicate when the handsfree feature is active.</p>
<p><b>Note 1:</b> If a call is presented while the user is manipulating an option, the IP Phone 2004 rings and the DN key flashes. However, the screen display is not updated with Caller ID information. The programming text is not disturbed.</p> <p><b>Note 2:</b> The user can originate a call using Autodial or Last Number Redial while manipulating an option. However, the display is not updated with the dialed digits or the Caller ID, and Autodial and Last Number Redial intercept the dialpad.</p>	

## Supported features

The IP Phone 2004 supports the following additional features:

- 802.1Q VLAN and 802.1P priority support, industry standards for managing bandwidth usage — full VLAN capability, including a manageable integrated switch in the IP Phone for VLAN and priority tagging for PC and IP Phone traffic
- integrated hardware to support power over Ethernet, for IEEE 802.3af standard power; also including support for PowerDsine Power over LAN Hub powering, and Cisco proprietary powering as tested with specific Cisco Ethernet switch equipment
- ability to change the feature key labels
- Corporate Directory
- Personal Directory
- Redial List
- Callers List

- Password Administration
- Virtual office
- Branch Office
- switch to support sharing LAN access with a PC or other data device
- 10/100 Mbps Full Duplex mode
- External Application Server
- Both the registered and configured TNs are displayed in the Set Info menu.
- Language support: English, French, Swedish, Danish, Norwegian, German, Dutch, Portuguese, Czech, Finnish, Hungarian, Italian, Polish, Spanish, Japanese, Russian, Latvian, and Turkish.
- IP Key Expansion modules

## Features not currently supported

The following features are not supported on the IP Phone 2004 :

- Live Dialpad
- Group Listening
- Set-to-Set messaging
- Context-sensitive soft keys

The three-port switch that is internal/external to the IP Phone 2004 is an unmanaged switch. It passes the packets (unmodified) and does not interpret the 802.1Q header. The three-port switch provides priority based on the port (that is, the telephone port traffic takes priority over the Ethernet).

## Display characteristics

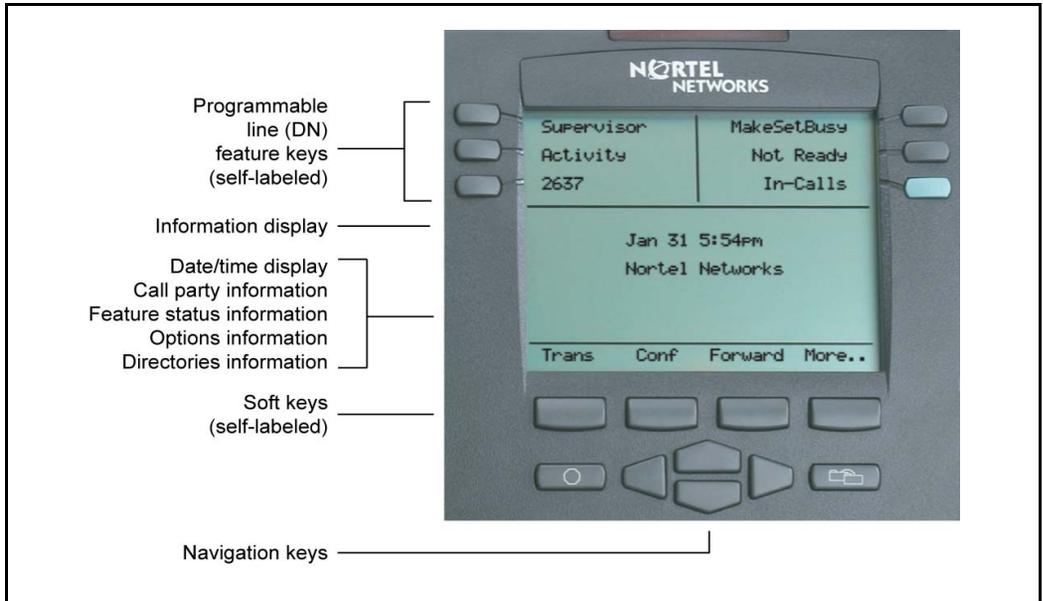
An IP Phone 2004 has three major display areas:

- programmable line (DN)/feature key label

- soft key label
- information line

Figure 9 on page 85 shows these three display areas.

**Figure 9**  
**IP Phone 2004 display areas**



### Programmable line (DN)/feature key label display

The feature key label area displays a ten-character string for each of the four feature keys. Each feature key includes the key label and an icon. The icon state can be on, off, or flashing. Key labels are left-aligned for keys on the left side of the screen, and right-aligned for keys on the right side of the screen.

**Note:** If a label is longer than ten characters, the last ten characters are displayed, and the excess characters are deleted from the beginning of the string.

## Soft key label display

The soft key label display area displays a maximum six-character string. Each soft key includes the soft-key label and an icon. When a soft key is in use, a flashing icon displays at the beginning of the soft-key label, and the label shifts one character to the right. If a feature is enabled, the icon state turns on. It remains in the on state until the feature key is pressed again. This cancels the enabled feature and turns the icon off, returning the soft-key label to its original string.

## Information line display

An IP Phone 2004 has a three-line information display area with the following information:

- caller number
- caller name
- feature prompt strings
- user-entered digits
- date and time information (if the telephone is in an idle state)

The information area displays different information, according to the telephone's call processing state and active features.

## Key number assignments

The IP Phone 2004 has four soft-labeled, pre-defined keys that are used to provide up to 10 features. Because they are pre-defined, the user cannot change the key number assignment.

The Message key is numbered 16. Key numbers 17-31 are the four soft-key labels below the display area. See Figure 8 on [page 79](#).

Key numbers 17-31 support the features A03, A06, CFW, CHG, CPN, PRK, PRS, RGA, RNP, SCC, SCU, SSC, SSU and TRN, as listed in Table 11 on [page 87](#).

## Dedicated keys

Table 11 describes the telephone assignment functions for each of the dedicated keys. Use LD 11 to program keys 16-26 on the IP Phone 2004 .

*Note:* If you attempt to configure anything other than the permitted response, the system generates an error code.

**Table 11**  
**IP Phone 2004 dedicated keys (Part 1 of 2)**

Key number	Response	Description
Key 16	MWK	Message Waiting key
	NUL	Removes function or feature from key
Key 17	TRN	Call Transfer key
	NUL	Removes function or feature from key
Key 18	A03	Three-party conference key
	A06	Six-party conference key
	NUL	Removes function or feature from key
Key 19	CFW	Call Forward key
	NUL	Removes function or feature from key
Key 20	RGA	Ring Again key
	NUL	Removes function or feature from key
Key 21	PRK	Call Park key
	NUL	Removes function or feature from key
Key 22	RNP	Ring Number Pickup key
	NUL	Removes function or feature from key

**Table 11**  
**IP Phone 2004 dedicated keys (Part 2 of 2)**

Key number	Response	Description
Key 23	SCU	Speed Call User
	SSU	System Speed Call User
	SCC	Speed Call Controller
	SSC	System Speed Call Controller
	NUL	Removes function or feature from key
Key 24	PRS	Privacy Release key
	NUL	Removes function or feature from key
Key 25	CHG	Charge Account key
	NUL	Removes function or feature from key
Key 26	CPN	Calling Party Number key
	NUL	Removes function or feature from key

## Package components

The following information applies to Phase II IP Phones. Product codes for Phase II IP Phones are different from previous sets.

See the product code on the back of the phone to confirm whether it is a Phase II IP Phone. The product code for Phase II IP Phones appears as “IP Phone 200x”. The product code for previous versions of the IP Phones appears with an “i” in front of the model number; example, “i200x”.

The AC power adapter must be ordered separately if local power using the AC adapter is required, because Phase II IP Phones include integrated support for a number of power over LAN options, including support for IEEE 802.3af standard power.

Table 12 lists the IP Phone 2004 package components and product codes.

**Table 12**  
**IP Phone 2004 component list (Part 1 of 2)**

<b>IP Phone 2004 package contents includes</b>	
<ul style="list-style-type: none"> <li>• IP Phone 2004</li> <li>• Handset</li> <li>• Handset cord</li> <li>• Footstand</li> <li>• 7 ft. Ethernet cable</li> <li>• Getting Started card</li> </ul>	
IP Phone 2004 (Ethergray) with Icon keycaps	NTDU92AA16/ A0533408
IP Phone 2004 (Ethergray) with English text label keycaps	NTDU92BA16/ A0533409
IP Phone 2004 (Charcoal) with Icon keycaps	NTDU92AA70/ A0533410
IP Phone 2004 (Charcoal) with English text label keycaps	NTDU92BA70/ A0533411
IP Phone 2004 wall mount kit (Charcoal), used with Ethergray and Charcoal models	NTMN15BA70/ A0503076
<b>Replacement parts</b>	
7 ft. Ethernet Cat5 cable	A0648375
Handset (Ethergray)	A0788874
Handset (Charcoal)	A0758634
Handset cord (Ethergray)	A0788682
Handset cord (Charcoal)	N0000764
Footstand (Charcoal), used for Ethergray and Charcoal models	A0538587
<b>IP Phone 2004 Power Adaptors</b>	

**Table 12**  
**IP Phone 2004 component list (Part 2 of 2)**

Power transformer (117/120 VAC 50/60 Hz) (North America)	A0619627
Power transformer 3 prong AC to AC, direct plug-in, 8W, 240 VAC, 50Hz to 16 VAC at 500 mA (Ireland and UK)	A0656598
Power transformer AC to AC, direct plug-in, 8W, 230 VAC, 50/60 Hz, to 16 VAC at 500 mA (Europe)	A0619635
Power transformer 2 prong wall plug direct plug-in AC to AC, 8W, 240 VAC, 50 Hz, to 16 VAC at 500 mA (Australia and New Zealand)	A0647042
Power transformer AC to AC, direct plug-in, 8W, 100 VAC, 50 Hz, to 16 VAC at 500 mA	A0828858

For more information, and for information about previous versions of the IP Phone, contact Nortel Networks.

## Before you begin

The following section provides a step-by-step guide through the IP Phone 2004 installation process. Before installing the IP Phone 2004 , complete the following pre-installation checklist.

### **Procedure 17** **Pre-installation checklist**

- 1 Ensure there is one IP Phone 2004 boxed package for each IP Phone 2004 being installed. The package contains:
  - IP Phone 2004
  - Handset
  - Handset cord
  - Footstand
  - 2.3 m (7 foot) Ethernet cable, Category 5
  - Getting Started card
- 2 To install and configure an IP Phone 2004 , the host system must be installed with the Voice Gateway Media Card.

- 3 If an Ac power adapter is required, ensure the correct AC power transformer is used. The voltage rating of the transformer must match the wall outlet voltage. Refer to Table 12 on page 89.
- 4 Understand the three configuration modes that you can choose from as you proceed through the installation of the IP Phone 2004 . The three configuration modes are:
  - Static IP address – see “Static IP address assignment” on [page 92](#).
  - Dynamic Partial DHCP – see “Dynamic IP address assignment — Partial DHCP” on [page 92](#).
  - Dynamic Full DHCP – see “Dynamic IP address assignment — Full DHCP” on [page 92](#).
- 5 A DHCP server and DHCP relay agents, if required, must also be installed, configured, and running.

---

**End of Procedure**

---

## First-time installation

To install and configure an IP Phone 2004 , you must first install a Voice Gateway Media Card in the system.



### **CAUTION**

#### **Damage to Equipment**

Do not plug your IP Phone 2004 into an ISDN connection. Severe damage can result. Consult your system administrator to ensure that you are plugging your telephone into a 10/100BaseT Ethernet jack.

## IP address assignments

During the first-time installation, there are IP address parameters that are entered either manually or automatically depending on the installation configuration. As well, you are prompted to enable or disable 802.1Q. For more information, see “802.1Q VLAN description” on [page 257](#).

The three configuration modes for the IP Phone 2004 are described below.

### **Static IP address assignment**

During the installation, the IP Phone 2004 parameters are entered manually using the key pad.

Your system administrator provides the following information: IP address, subnet mask, and default Media Gateway.

You must also enter the Connect Server parameters including: IP address, port number, action, and retry count.

Go to Procedure 18, “Installing an IP Phone 2004 for the first time” on [page 93](#).

### **Dynamic IP address assignment — Partial DHCP**

For a partial DHCP installation, you must provide, through the IP Phone’s key pad, the Connect Server parameters including: IP address, port number, action, and retry count. Other parameters (IP Phone IP address, subnet mask, and default Media Gateway) are retrieved from the DHCP server.

The IP Phone password, node ID and TN must be entered manually from the key pad.

For more information about DHCP servers, see *Data Networking for Voice over IP* (553-3001-160).

Go to Procedure 19, “Installing an IP Phone 2004 for the first time using DHCP” on [page 97](#).

### **Dynamic IP address assignment — Full DHCP**

For a full DHCP installation, all parameters (IP Phone IP address, subnet mask, default Media Gateway, Connect Server IP address, port number, action, and retry count) are retrieved from the DHCP server to recognize the IP Phone 2004 .

The IP Phone 2004 password, node ID and TN must be entered manually from the key pad.

Go to Procedure 19, “Installing an IP Phone 2004 for the first time using DHCP” on [page 97](#).

**Procedure 18****Installing an IP Phone 2004 for the first time**

- 1** Configure a virtual loop on the system using LD 97.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 2** Configure the IP Phone 2004 on the system using LD 11.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 3** Connect the IP Phone 2004 components:
  - a.** Connect one end of the handset cord to the handset jack on the back of the telephone identified with a handset icon.
  - b.** Connect the other end of the handset cord to the handset.
- 4** Choose one of the following connections:
  - a.** For a telephone not sharing a LAN access with a PC:  
Connect one end of the CAT5 Ethernet cable to the LAN ethernet

port located on the back of the telephone (identified with a LAN icon). The other end of the CAT5 Ethernet cable plugs into the IP network.

- b. For a telephone sharing a LAN access with a PC:

Connect one end of the CAT5 Ethernet cable to the LAN ethernet jack located on the back of the telephone (identified with a LAN icon, see Figure 6 on [page 61](#)) and the other end to the IP network. Insert a second CAT5 Ethernet cable into the PC ethernet jack located on the back of the telephone (identified with a PC icon, see Figure 6 on [page 61](#)) and the other end into the computer.

**IMPORTANT!**

**Timing information**

There are only four seconds between plugging in the IP Phone 2004 's power transformer and the appearance of the Nortel Networks logo on the display. When you see the logo, you have one second to respond by pressing the four feature keys at the bottom of the display in sequence from left to right. If you miss the one second response time, the IP Phone 2004 attempts to locate the connect server. Wait until it is finished, and then begin the power up sequence again.

- 5 Power the IP Phone 2004 using either the Power over Ethernet or an AC power transformer (local power).
  - a. If local power is used, plug the AC power transformer into the nearest power outlet.
  - b. Ensure the correct AC power transformer is used. The voltage rating of the transformer must match the wall outlet voltage. Refer to Table 12 on page 89. Connect the power jack as shown in Figure 6 on [page 61](#).
- 6 When the Nortel Networks logo appears on the display, immediately press the four feature keys at the bottom of the display in sequence from left to right.
- 7 At the prompt DHCP Yes/No?, select **No**.
- 8 Enter the following information provided by your system administrator:

Screen prompt	Description
set IP	a valid IP Phone 2004 IP address

net msk	a subnet mask
def gw	the default Media Gateway for the IP Phone 2004 on the LAN segment to which it is connected

- 9 Enter the information for the primary Connect Server (S1) and the secondary Connect Server (S2):

Screen prompt	Description
S1 IP	the node IP address of the IP line node
S1 Port	this is a fixed value: 4100
S1 action	this is a fixed value: 1
S1 retry	the number of times the IP Phone 2004 attempts to connect to the server (Enter 10)
S2 IP	same as S1 in most cases (see note below)
S2 Port	same as S1
S2 action	same as S1
S2 retry	same as S1
Cfg XAS? (0-No,1-Yes)	Enter 1 (for Yes).
XAS IP:	Enter the XAS IP address.

**Note 1:** The IP Phone 2004 can support a primary (S1) and secondary (S2) connect server. If you require IP Phones to register on multiple nodes, refer to “Enhanced Redundancy for IP Line Nodes” in *IP Line: Description, Installation, and Operation* (553-3001-365).

**Note 2:** If the XAS IP is 00.00.00.00, then pressing the Blue feature key sends the normal UNISim message to the TPS. If the XAS IP is any other value, then pressing the Blue feature key sends the Resume Connection message to the entered XAS IP.

After the S1 and S2 server information is entered, the VLAN option appears on the display:

Screen prompt	Description
0-No	Disable 802.1Q and complete the configuration of the IP Phone. 0-No is the default value.
1-Yes	Enable the 802.1Q header.

- 10** If 802.1Q is *not* required, select **0-No** and go to step 16; otherwise, select **1-Yes** to choose the method of VOICE VLAN configuration:

Screen prompt	Description
0	Automatic VLAN configuration
1	Manual VLAN configuration

- 11** If automatic configuration is required, select **0-Auto** and go to step 13; otherwise, select **1-Man** to set the VOICE VLAN ID:

**VOICE VLAN ID: 1234**

**Note:** The VOICE VLAN ID is entered as an integer. The VOICE VLAN ID is a 12-bit value between 0 and 4095.

- 12** Enter a valid value, and press **OK**.

The IP Phone 2004 is configured with 802.1Q enabled, the VOICE VLAN ID is configured to the entered value, and the VOICE VLAN priority = 6.

- 13** After the value is entered, the DATA VLAN configuration option appears on the display:

Screen prompt	Description
0	Data VLAN is not present
1	Data VLAN is present

- 14** If there is *not* a Data VLAN present, select **0-No** and go to step 16; otherwise, select **1-Yes** to set the DATA VLAN ID:

**DATA VLAN ID: 1234**

**Note:** The DATA VLAN ID is entered as an integer. The DATA VLAN ID is a 12-bit value between 0 and 4095, and should be different from the VOICE VLAN ID.

- 15** Enter a valid value, and press **OK**.

The IP Phone 2004 is configured with 802.1Q enabled, the DATA VLAN ID is configured to the entered value, and the DATA VLAN priority = 0.

The IP Phone 2004 searches for the connect server. When the connection is complete, proceed with step 16.

- 16** Enter the following information provided by your system administrator:

Screen prompt	Description
Password	IP Phone Installer Password  You are not prompted to enter the IP Phone Installer Password if it has not been configured in your system.
Node	The node ID.
TN	The TN or VTN.

The IP Phone 2004 registers with the TPS and if needed, begins the firmware download. This takes several minutes. When complete, the IP Phone 2004 resets.

**Note:** Port 5105 on the system must be explicitly open to enable firmware download. For more information, refer to *IP Line: Description, Installation, and Operation* (553-3001-365).

The current system date and time appear on the top line of the display when the configuration is complete. Self-labelling keys also appear.

- 17** Check for dial tone and the correct DN above the display.
- 18** Secure the telephone footstand to the base of the telephone. Use the angle adjustment grip on the top back of the telephone to adjust the position.
- 19** (Optional) Customize the feature keys as required. For more information, see *IP Phone 2004 User Guide*.

---

**End of Procedure**

---

**Procedure 19**

**Installing an IP Phone 2004 for the first time using DHCP**

- 1** Configure a virtual loop on the system using LD 97.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 2** Configure the IP Phone 2004 on the system using LD 11.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 3** Connect the IP Phone 2004 components:

- a. Connect one end of the handset cord to the handset jack on the back of the telephone identified with a handset icon.
  - b. Connect the other end of the handset cord to the handset.
- 4 Choose one of the following connections:
  - a. For a telephone not sharing a LAN access with a PC:

Connect one end of the CAT5 Ethernet cable to the LAN ethernet port located on the back of the telephone (identified with a LAN icon). The other end of the CAT5 Ethernet cable plugs into the IP network.
  - b. For a telephone sharing a LAN access with a PC:

Connect one end of the CAT5 Ethernet cable to the LAN ethernet jack located on the back of the telephone (identified with a LAN icon, see Figure 6 on [page 61](#)) and the other end to the IP network. Insert a second CAT5 Ethernet cable into the PC ethernet jack located on the back of the telephone (identified with a PC icon, see Figure 6 on [page 61](#)) and the other end into the computer.

**IMPORTANT!**

**Timing information**

There are only four seconds between plugging in the IP Phone 2004 's power transformer and the appearance of the Nortel Networks logo on the display. When you see the logo, you have one second to respond by pressing the four feature keys at the bottom of the display in sequence from left to right. If you miss the one second response time, the IP Phone 2004 attempts to locate the connect server. Wait until it is finished, and then begin the power up sequence again.

- 5 Power the IP Phone 2004 using either the Power over Ethernet or an AC power transformer (local power).

- a. If local power is used, plug the AC power transformer into the nearest power outlet.
  - b. Ensure the correct AC power transformer is used. The voltage rating of the transformer must match the wall outlet voltage. Refer to Table 12 on page 89. Connect the power jack as shown in Figure 6 on [page 61](#). When the Nortel Networks logo appears on the display, immediately press the four feature keys at the bottom of the display in sequence from left to right.
- 6** At the prompt DHCP Yes/No?, select **Yes**.
- 7** Select Partial or Full DHCP.
- a. If you select Full DHCP, then the following parameters are retrieved from the DHCP server:
    - a valid IP Phone 2004 IP address
    - a subnet mask
    - the default Media Gateway for the IP Phone 2004 on the LAN segment to which it is connected
    - the S1 node IP address of the IP line node
    - the S1 Action
    - the S1 retry count. This is the number of times the IP Phone attempts to connect to the server
    - the S2 node IP address of the IP line node
    - the S2 Action
    - the S2 retry count
    - the External Application Server (XAS) IP address

- b. If you select Partial DHCP, then you must enter the following parameters:

Screen prompt	Description
S1 IP	The node IP address of the IP line node.
S1 Port	This is a fixed value: 4100
S1 action	This is a fixed value: 1
S1 retry	The number of times the IP Phone 2004 attempts to connect to the server. Enter 10.
S2 IP	Same as S1 in most cases (see note below)

S2 Port Same as S1  
 S2 action Same as S1  
 S2 retry Same as S1  
 Cfg XAS? Enter 1 (for Yes)  
 (0-No,1-Yes)  
 XAS IP: Enter the XAS IP address.

**Note 1:** The IP Phone 2004 can support a primary (S1) and secondary (S2) connect server. If you require IP Phones to register on multiple nodes, refer to “Enhanced Redundancy for IP Line Nodes” in *IP Line: Description, Installation, and Operation* (553-3001-365).

**Note 2:** If the XAS IP is 00.00.00.00 then pressing the Blue feature key sends the normal UNISim message to the TPS. If the XAS IP is any other value then pressing the Blue feature key sends the Resume Connection message to the entered XAS IP.

After the Partial or Full DHCP steps are completed, the VLAN option appears on the display.

- 8** Select **1-Ma** or **2-Au** to enable 802.1Q from the DHCP Enabled - VLAN Options menu.

Screen prompt	Description
0-No	802.1Q remains off and initialization continues. 0-No is the default value.  If this is selected, proceed to step 14 to continue the IP Phone 2004 configuration.
1-Ma	Enter a VOICE VLAN ID manually.  If this is selected, proceed to step 9 to continue the 802.1Q configuration.
2-Au	Automatically enter a VOICE VLAN ID using DHCP. DHCP auto discovers the VOICE VLAN ID.  If this is selected, proceed to step 11 to continue the 802.1Q IP Phone configuration.

- 9** If **1-Ma** is selected, then the following VLAN ID displays:

**Manual Cfg****VOICE VLAN ID: 1234**

**Note:** The VOICE VLAN ID is entered as a decimal number. The VOICE VLAN ID is a 12-bit value between 0 and 4095.

- 10** Enter a valid value, and press **OK**.

The IP Phone 2004 is configured with 802.1Q enabled, VOICE VLAN priority = 6, and the VOICE VLAN ID set to the entered value.

- 11** After the value is entered, the DATA VLAN configuration option appears on the display:

Screen prompt	Description
0	Data VLAN is not present
1	Data VLAN is present

- 12** If there is *not* a Data VLAN present, select **0-No** and go to step 14; otherwise, select **1-Yes** to set the DATA VLAN ID:

**DATA VLAN ID: 1234**

**Note:** The DATA VLAN ID is entered as an integer. The DATA VLAN ID is a 12-bit value between 0 and 4095, and should be different from the VOICE VLAN ID.

- 13** Enter a valid value, and press **OK**.

The IP Phone 2004 is configured with 802.1Q enabled, the DATA VLAN ID is configured to the entered value, and the DATA VLAN priority = 0.

The IP Phone 2004 searches for the connect server. When the connection is complete, proceed to step 14.

- 14** Enter the following information provided by your system administrator.

Screen prompt	Description
Password	IP Phone Installer Password  You are not prompted to enter the IP Phone Installer Password if it has not been configured in your system.
Node	The node ID.
TN	The TN or VTN.

The IP Phone 2004 registers with the TPS and if needed, will begin the firmware download. This takes several minutes. When complete, the IP Phone 2004 resets.

The current system date and time appear on the top line of the display when the configuration is complete. Self-labelling keys also appear.

- 15 Check for dial tone and the correct DN above the display.
- 16 Secure the telephone footstand to the base of the telephone. Use the angle adjustment grip on the top back of the telephone to adjust the position.
- 17 (Optional) Customize the feature keys as required. For more information, see *IP Phone 2004 User Guide*.

---

**End of Procedure**

---

## Startup sequence

When an IP Phone 2004 is connected to the network, it must perform a startup sequence. The elements of the startup sequence include:

- obtaining the IP parameters
- finding a Media Gateway server
- authenticating the user

See Table 13 on [page 103](#) for a summary of the IP parameters and how they are obtained.

*Note:* For all IP static assignments, your system administrator provides the network information.

**Table 13**  
**IP Phone 2004 IP parameters**

<b>Parameter</b>	<b>Method of Acquisition</b>
IP Address	Manually entered or automatically retrieved through Partial or Full DHCP.
Net Mask	Manually entered or automatically retrieved through Partial or Full DHCP.
Router Address	Manually entered or automatically retrieved through Partial or Full DHCP.
Connect Server (IP address, port, action and retry count — primary and secondary)	Manually entered or automatically retrieved through Full DHCP.
User ID (Node ID, Node Password and TN)	Manually entered for first-time configuration. Retrieved from local storage on subsequent power cycles.  Provided by your system administrator.

## Full Duplex mode

In the Configuration menu, Auto Negotiate mode is the default setting for initial startup. Typically, the telephone is connected to a network that supports Auto Negotiate and it selects the best speed and duplex mode available. There is no intervention required under normal operation.

If the telephone is connected to a network configured for Full Duplex mode only, it is not able to automatically negotiate the proper configuration. Therefore, in this instance, to allow the telephone to work at the optimum speed and duplex mode, Auto Negotiate must be disabled. Use the following procedure to disable Auto Negotiate and enable Full Duplex mode.

### **Procedure 20**

#### **Disabling Auto Negotiate and enabling Full Duplex mode**

- 1 Reset the phone by disconnecting and re-connecting power.
- 2 When the Nortel Networks logo appears, press each of the soft keys in sequence. See Procedure 19 on [page 97](#).
- 3 If no other configuration changes are required, press the 0 Soft-key, OK, repeatedly until the Duplex network option appears.
- 4 Select 1 to enable Full Duplex mode.
- 5 When the Speed option appears, select one of the following:
  - 0 for 10 Mbps
  - 1 for 100 Mbps (default)
- 6 Select **OK** to confirm the change.
- 7 Restart the telephone. The firmware reads the new setting, and the telephone operates in Full Duplex mode.

When the telephone is re-started, the firmware reads the setting for Full Duplex mode and sets both port 0, network interface port, and port 1, PC interface port, accordingly.

Use the following procedure to confirm activation of Full Duplex mode.

### **Procedure 21**

#### **Checking Ethernet Statistics**

- 1 Double-click the **Services** key. The Network Diagnostics menu appears.
- 2 Select **Ethernet Statistics**.
  - If Full Duplex mode is active, the following is displayed:
    - Link: UP
    - Duplex: Full
    - Speed: 10 (Mb) or 100(Mb)
    - Auto-Nego Capability: N
    - Auto-Nego Completed: N

---

**End of Procedure**

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---

## Reinstalling an IP Phone 2004

You can reinstall an existing, previously-configured IP Phone 2004 on the same system. For example, the IP Phone 2004 can be assigned to a new user (new TN) or to an existing user who moved to a new subnet by changing the TN of the IP Phone 2004 .

### Procedure 22

#### Changing the TN of an existing IP Phone 2004

- 1 Repower the IP Phone 2004

**Note:** During the reboot sequence of a previously configured IP Phone, the IP Phone 2004 displays the existing node number for approximately five seconds.

- 2 If node password is enabled and NULL, choose one of the following:

- a. Disable password.
- b. Set password as non-NULL.

- 3 Press **OK** when the node number displays.

<b>If</b>	<b>Then</b>
node password is enabled and is not NULL	a password screen displays. Go to step 4.
node password is disabled	a TN screen displays. Go to step 5.

- 4 Enter password at the password screen, and press **OK**.

A TN screen displays.

- 5 Select the **Clear** soft key to clear the existing TN.

A new parameters prompt displays.

---

**End of Procedure**

---

## Replacing an IP Phone 2004

**IMPORTANT!**

Two telephones cannot share the same TN. You must remove the IP Phone 2004 that is currently using the TN.

**Procedure 23**  
**Replacing an IP Phone 2004**

- 1 Disconnect the IP Phone 2004 that you want to replace.
- 2 Follow Procedure 18 on [page 93](#) (static IP assignment) or Procedure 19 on [page 97](#) (dynamic IP assignment) to install and configure the IP Phone 2004 .
- 3 Enter the same TN and Node Number as the IP Phone 2004 you replaced. The system associates the new IP Phone 2004 with the existing TN.

---

End of Procedure

---

## Removing an IP Phone 2004 from service

**Procedure 24**  
**Removing an IP Phone 2004 from service**

- 1 Disconnect the IP Phone 2004 from the network or turn the power off.  
  
**Note:** The service to the PC is disconnected as well if the PC is connected to the IP Phone 2004 .  
  
If the IP Phone 2004 was automatically configured, the DHCP lease expires and the IP address returns to the available pool.
- 2 In LD 11, OUT the TN.

---

End of Procedure

---

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# IP Phone Key Expansion Module (KEM)

---

## Contents

This section contains information on the following topics.

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## Description

The Nortel Networks IP Phone Key Expansion Module (KEM) is a hardware component that connects to IP Phone 2002 and IP Phone 2004 and provides additional line appearances and feature keys (see Figure 10 on [page 108](#)).

Up to two IP Phone KEMs can be connected to an IP Phone 2002 or IP Phone 2004. With two IP Phone KEMs connected, the IP Phone can have up to 48Line/feature keys.

*Note:* The IP Phone 2004 can also have up to 48 additional line/feature keys using the **Shift** key functionality and one IP Phone KEM. With two IP Phone KEMs connected, the **Shift** key functionality does not affect the IP Phone KEMs since the maximum number of line/feature keys is already available. The IP Phone 2002 does not support **Shift** key functionality.

**Figure 10**  
**IP Phone 2002 with one IP Phone KEM attached**



## Features

The IP Phone KEM has the following features:

- 12 keys on each side of an LCD provide up to 24 additional self-labeled line/feature keys. Using the **Shift** key functionality, an IP Phone 2004 can have up to 48 additional logical line/feature keys.

- A desk-mount bracket and structural baseplate connect the IP Phone KEM to an IP Phone 2002 or IP Phone 2004, or to another IP Phone KEM.
- A wall-mount bracket installs the IP Phone KEM alongside a wall-mounted IP Phone 2002 or IP Phone 2004.

## Display characteristics

The IP Phone KEM has one LCD between the two rows of 12 Line/feature keys (see Figure 10 on [page 108](#)). Each of the 24 physical keys on the IP Phone KEM has a 10-character display label. This label is set automatically, however, the user can edit the label using the controls on the IP Phone.

To alter the display and contrast on the IP Phone KEM, use the **Contrast Adjustment** option under the **Telephone Options** menu on the IP Phone. Any contrast changes you make on the IP Phone affect the IP Phone KEM. The IP Phone KEM and IP Phone do not have separate contrast adjustments.

## Key number assignments

Since the IP Phone 2002 and IP Phone 2004 have key number assignments from 0 to 31, the IP Phone KEM key number assignments begin at 32. Therefore, the first IP Phone KEM has key number assignments from 32 to 55, and the second IP Phone KEM has key number assignments from 56 to 79.

## Package components

Table 14 lists the IP Phone KEM package components.

**Table 14**  
**IP Phone KEM components list (Part 1 of 2)**

Components	Order code
IP Phone KEM - Ethergray	A0540989

**Table 14**  
**IP Phone KEM components list (Part 2 of 2)**

IP Phone KEM - Charcoal	A0540990
IP Phone KEM wall mount kit - Charcoal	A0555218

## Configuration

The IP Phone KEM must be configured in LD 11 before it can be used.

### LD 11 – Configure the IP Phone KEM. (Part 1 of 5)

Prompt	Response	Description
REQ:	NEW	Add new data.
	CHG	Change existing data.
TYPE:	I2002	IP Phone 2002
	I2004	IP Phone 2004
...		...
ZONE	0 – 255	Zone number to which the IP Phone 2002 or IP Phone 2004 belongs
KEM	(0) – 2	Number of attached IP Phone KEMs
		<b>Note:</b> Up to two IP Phone KEMs can be attached to an IP Phone. Pressing <CR> without entering a number leaves the value unchanged.
....		

## LD 11 – Configure the IP Phone KEM. (Part 2 of 5)

Prompt	Response	Description
KEY	xx aaa yyyy (cccc <b>or</b> D) zz..z	<p>Telephone function key assignments</p> <p>The following key assignments determine calling options and features available to a telephone. Note that KEY is prompted until just a carriage return &lt;CR&gt; is entered.</p> <p>Where:</p> <p>xx = key number  aaa = key name or function  yyy = additional information required for the key  zz.z = additional information required for the key aaa.</p> <p>The cccc or D entry deals specifically with the Calling Line Identification feature, where:</p> <p>cccc = CLID table entry of (0)-N, where N = the value entered at the SIZE prompt in LD 15 minus 1.</p> <p>D = the character "D". When the character "D" is entered, the system searches the DN keys from key 0 and up, to find a DN key with a CLID table entry. The CLID associated with the found DN key will then be used.</p> <p><b>Note:</b> The position of the (cccc or D) field varies depending on the key name or function.</p> <p>You may enter a CLID table entry if aaa = ACD, HOT d, HOT L, MCN, MCR, PVN, PVR, SCN, or SCR.</p> <p>Type xx NUL to remove a key function or feature.</p> <p>Some data ports require specific key assignments. Refer to the <i>Meridian Data Services</i> NTPs for information regarding these requirements.</p>

**LD 11 – Configure the IP Phone KEM. (Part 3 of 5)**

Prompt	Response	Description
		<p>Key number limits that can be assigned are as follows:</p> <ul style="list-style-type: none"> <li>0-7 for Meridian Communications Adapter (MCA)</li> <li>0-5 for M2006</li> <li>0-7 for M2008</li> <li>0-59 for M2616, varies with number of add-on modules</li> <li>0-79 for I2002, varies with value of KEM</li> <li>0-79 for I2004, varies with value of KEM</li> </ul> <p><b>Note:</b> The first IP Phone KEM is assigned keys 32-55, and the second IP Phone KEM is assigned keys 56-79.</p> <p>If either the Meridian Programmable Data Adapter (MPDA) or the Display Module is equipped, then key 7 on sets M2008, M2216, and M2616 and key 5 on set M2006 will become Program keys which cannot be used as function keys.</p> <p>Any printout of the TN block will not show key 7 because it is a local function key.</p> <p>On the M2616, if CLS = HFA, key 15 on the voice TN defaults to the Handsfree key. No other feature assignment is accepted.</p> <p>Primary and secondary data DNs must be unique.</p> <p>A station SCR, SCN, MCR, or MCN DN must be removed as a member from all Group Hunt lists before the DN can be modified.</p>

## LD 11 – Configure the IP Phone KEM. (Part 4 of 5)

Prompt	Response	Description
PAGEOFST	<Page> <KeyOffset>	<p>On the M3903, keys 4-15 are blocked. No feature assignment is accepted for keys 2-15.</p> <p>On the M3903, M3904, and M3905, keys 29-31 are reserved. No feature assignment is accepted for keys 29-31 other than NUL.</p> <p>On M3904, no feature assignment is accepted for keys 12-15.</p> <p>On M3905, the craftsman can assign NUL or a server application on key 5. On key 6, the craftsman can assign NUL or a local application.</p> <p>On M3905, the craftsman can assign NUL or the program key on key 7.</p> <p>On M3905, the craftsman can assign AAG, AMG, ASP, DWC, EMR, MSB, or NRD on keys 8-11. Other features are blocked.</p> <p>Automatically calculates the IP Phone KEM key based on the entered values. This prompt enables the system administrator to enter a Page number of 0 or 1 and a Key Offset number from 0-23. Once entered, the KEY prompt is prompted with the appropriate KEY value filled in.</p> <p>Enter &lt;CR&gt; to terminate data entry.</p> <p><b>Note 1:</b> Applies to an IP Phone 2004 with KEM = 1, and where &lt;CR&gt; was entered at the KEY prompt.</p> <p><b>Note 2:</b> Does not apply to an IP Phone 2002.</p> <p>When values are entered for Page and KeyOffset, the KEY xx prompt displays, followed by PAGEOFST prompt. This loop continues until no values (&lt;CR&gt; only) are entered at the PAGEOFST prompt.</p>

**LD 11 – Configure the IP Phone KEM. (Part 5 of 5)**

Prompt	Response	Description
KEY xx		<p>Edit the IP Phone KEM key number specified by PAGEOFST, where: xx = the number of the key (for example, KEY 36)</p> <p>Enter &lt;CR&gt; to keep the current setting.</p>
KEMOFST	<KEM> <KeyOffset>	<p>Automatically calculates the IP Phone KEM key based on the entered values. This prompt enables the system administrator to enter a KEM number of 1 or 2 and a Key Offset number from 0-23. Once entered, the KEY prompt is prompted with the appropriate KEY value filled in.</p> <p>Enter &lt;CR&gt; to terminate data entry.</p> <p>When values are entered for KEM and KeyOffset, the KEY xx prompt displays, followed by KEMOFST prompt. This loop continues until no values (&lt;CR&gt; only) are entered at the KEMOFST prompt.</p> <p><b>Note 1:</b> Applies to an IP Phone 2002 if &lt;CR&gt; was entered at the KEY prompt.</p> <p><b>Note 2:</b> Applies to an IP Phone 2004 with KEM = 2, and where &lt;CR&gt; was entered at the KEY prompt.</p>
KEY xx		<p>Edit the IP Phone KEM key number specified by KEMOFST, where: xx = the number of the key (for example, KEY 36)</p> <p>Enter &lt;CR&gt; to keep the current setting.</p>

**Installation**

The IP Phone KEM mounts on the right side of an IP Phone 2002 or IP Phone 2004. The IP Phone KEM snaps into the receptacle on the back of the IP Phone using the desk-mount bracket and structural baseplate supplied with the IP Phone KEM (see Figure 11).

The IP Phone KEM connects to the IP Phone 2002 or IP Phone 2004 using the Accessory Expansion Module (AEM) port on the IP Phone.

**Figure 11**  
**IP Phone KEM attached to an IP Phone 2002**



**Procedure 25**  
**Connecting the IP Phone KEM to an IP Phone 2002 or IP Phone 2004**

Use the following instructions to install an IP Phone KEM:

- 1 Remove the IP Phone from the stand by pressing the IP Phone tilt handle, and pulling the IP Phone away from the stand.

**Note:** For the IP Phone 2004, you can also adjust the stand angle to maximum, instead of removing the stand.

- 2 Place the connecting arm of the IP Phone KEM behind the IP Phone and align the IP Phone KEM connection plug to the AEM port on the back of the IP Phone.

**Note:** The IP Phones 2002 with the product codes: NTDU76AB34, NTDU76BB34, NTDU76AB70, and NTDU76BB70 have shorter connector pins than the other IP Phone 2002. Therefore, the ribbon cable connector of the IP Phone KEM must be detached from the retaining clip and pressed manually into the header connector before attaching the IP Phone KEM.

3 Press the IP Phone KEM and IP Phone firmly together until the IP Phone KEM locks into place.

4 If connecting a second IP Phone KEM, repeat steps 1-3.

**Note:** The second IP Phone KEM is attached to the right side of the first IP Phone KEM.

5 Attach the IP Phone stand and the IP Phone KEM stand, if removed. Adjust each IP Phone KEM stand to the same angle as the IP Phone.

The IP Phone KEM powers up.

**Note:** The IP Phone KEM uses the electrical connection of the IP Phone 2002 or IP Phone 2004 for power. It does not have its own power source.

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**End of Procedure**

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## IP Phone KEM startup initialization

Once the IP Phone KEM has been installed and powered up on your IP Phone 2002 or IP Phone 2004, the IP Phone KEM initializes (see Table 15).

**Table 15**  
**Startup initialization process for the IP Phone KEM**

Phase	Description
1. IP Phone KEM performs self-test	<p>The self-test confirms the operation of the IP Phone KEM's local memory, CPU, and other circuitry. While undergoing this self-test, the IP Phone KEM display lights up.</p> <p><b>Note:</b> If the IP Phone KEM display does not light up, or lights up and then goes blank, or fails to begin flashing, check that the IP Phone KEM is correctly installed and configured.</p>

**Table 15**  
**Startup initialization process for the IP Phone KEM**

Phase	Description
<p><b>2.</b> IP Phone KEM establishes communication with the IP Phone</p>	<p>The IP Phone KEM display flashes until it establishes communication with the IP Phone.</p> <p>If the IP Phone KEM display does not stop flashing, communication has not been established with the IP Phone. Check that the IP Phone KEM is correctly installed and configured.</p>
<p><b>3.</b> IP Phone KEM downloads keymaps</p>	<p>The key labels download to the IP Phone KEM. During the download, the display is blank.</p>

When the three phases complete successfully, you are ready to use the additional line/feature keys on your IP Phone KEM.

*Note:* If you have a second IP Phone KEM installed on your IP Phone, the one to the immediate right of the IP Phone must be functional for the subsequent IP Phone KEM to work. This is because the second IP Phone KEM receives its power, and communicates with the IP Phone, through the first IP Phone KEM.

## Operating parameters

### General

If an IP Phone KEM is not responding, and lines or features are configured on keys 32–79, calls can be directed to those keys which the user cannot access. This means the IP Phone 2002 or IP Phone 2004 rings but the call cannot be answered. In such cases, the incoming call receives Call Forward No Answer (CFNA) treatment.

### IP Phone 2002

If only one IP Phone KEM is configured in LD 11, but two IP Phone KEMs are detected on an IP Phone 2002, the second IP Phone KEM is ignored. An

error message displays to alert the administrator that the hardware configuration does not match the administered configuration.

If two IP Phone KEMs are configured in LD 11, but only one IP Phone KEM is responding, the keys on the second IP Phone KEM are available for call processing but are not accessible to the user. This means that lines and features on keys 56-79 can cause the IP Phone 2002 to ring, but there is no way to answer it. An error message displays to alert the administrator that the hardware configuration does not match the administered configuration.

## IP Phone 2004

If only one IP Phone KEM is configured in LD 11, but two IP Phone KEMs are detected on an IP Phone 2004, the Terminal Proxy Server (TPS) assigns keys 56–79 to the second IP Phone KEM. An error message displays to alert the administrator that the hardware configuration does not match the administered configuration.

If two IP Phone KEMs are configured in LD 11 but only one IP Phone KEM is responding, the TPS assigns keys 32–79 to the single IP Phone KEM (using the **Shift** key functionality). An error message displays to alert the administrator that the hardware configuration does not match the administered configuration. When a second IP Phone KEM is detected, the TPS changes the key assignments to display across both IP Phone KEMs, as expected.

## Virtual Office

When a Virtual Office (VO) login occurs from an IP Phone 2002 or IP Phone 2004 that does not have the same number of IP Phone KEMs responding as configured on the IP Phone used to log in, call processing may terminate on a key that is not physically available. In other words, the IP Phone rings but the call cannot be answered.

During the VO login process, the existence of any IP Phone KEM is verified. If a mismatch is detected, the login proceeds normally; however, an error message is generated to alert the administrator of the mismatch.

## **Firmware**

The IP Phone KEM firmware is not downloadable. In the event that the IP Phone KEM firmware must be upgraded or changed, the IP Phone KEM must be replaced with a new IP Phone KEM containing the updated firmware.



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# Nortel Networks IP Softphone 2050

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## Introduction

This section explains how to install and maintain the Nortel Networks IP Softphone 2050. For information on using the IP Softphone, see the *IP Softphone 2050 and Mobile Voice Client 2050 User Guide*.

This section contains the following procedures:

- Procedure 26, “Installing an IP Softphone 2050” on [page 143](#).
- Procedure 27, “Installing the USB Headset Adapter” on [page 157](#).

- Procedure 28, “Installing the IP Softphone 2050 on your PC (New installation)” on [page 158](#).
- Procedure 29, “Upgrading the IP Softphone 2050 on your PC (for Windows 2000 and Windows XP users only)” on [page 158](#).
- Procedure 30, “Upgrading the IP Softphone 2050 on your PC (for Windows 98 platforms)” on [page 159](#).
- Procedure 31, “Changing the TN of an existing IP Softphone 2050” on [page 181](#).
- Procedure 32, “Removing an IP Softphone 2050 from service” on [page 181](#).

## Description

The IP Softphone 2050 is a Windows-based application that provides voice services for Personal Computers. Designed to work with IP-based phone systems, the IP Softphone 2050 provides Voice Over IP (VoIP) services using a telephony server and an enterprise Local Area Network (LAN).

The IP Softphone 2050 operates on PCs running Windows 98, Windows 98 SE, Windows 2000 Professional, Windows XP Pro, and Windows XP Home.

The IP Softphone 2050 supports the following:

- traditional telephony features such as Call Origination, Call Termination, Conference, Transfer, Hold, and Message Waiting Indication
- dedicated Hold, Release, Answer, Volume, Mute, Navigation and Message Waiting Indication keys
- macro functions for programming lengthy dialing patterns
- powerful directory capabilities: locally stored on the PC or linked to external directories such as LDAP, Microsoft Outlook, and ACT! contact management software
- network access and DHCP configurable services (automatic configuration of Call Server location using DHCP)

- Nortel Networks Universal Serial Bus (USB) Headset Adapter for the speech path
- end user-selectable ringer that allows the PC speakers or the headset to ring for incoming calls
- reduced number of wires to the desktop by eliminating the need for telephony wires
- online help with full index search capabilities
- both the registered and configured TNs displayed in the Set Info menu
- modem support to configure the IP Softphone for dial-up access

## System components

The IP Softphone 2050 requires a Voice Gateway Media Card installed on the system. The IP Softphone 2050 is comprised of an external Universal Serial Bus headset adapter (USB Headset Adapter) and a software application installed on the user's PC.

### Components list

Table 16 lists the IP Softphone 2050 components.

**Table 16**  
**IP Softphone 2050 components**

<b>Component</b>	<b>Code</b>
IP Softphone 2050 application software CD	NTDW83AA
USB Audio Adapter (headset not included)	NTEX14AB

### Voice Gateway Media Card

The Voice Gateway Media Card application supports the IP Softphone 2050 by providing a communication Media Gateway between the IP data network and the system.

For more information on the IP Line application, refer to *IP Line: Description, Installation, and Operation* (553-3001-365).

## USB Headset Adapter

The USB Headset Adapter provides a controlled high-quality audio environment, including:

- absolute and predictable loss and level plan implementation that is necessary to meet TIA-810, FCC part 68 and its international equivalents, as well as the ADA requirements for the hearing impaired
- compliance with version 1.1 of the USB Device Specification and Windows Plug & Play specifications
- simple installation using standard Windows drivers (requires no additional software or drivers)
- support on Windows 98, Windows 98SE, Windows 2000 Professional, Windows XP Pro, and Windows XP Home
- in-use lamp connector with in-use control provided by polarity insensitive isolated contact closure
- red Message Waiting light, located at the top of the USB Headset Adapter, that flashes when you have voicemail messages
- IP Softphone 2050 Smart Functions button enables the IP Softphone 2050 Smart Functions menu that provides quick access to IP Softphone 2050 features
- Answer, Release, Mute, and Volume buttons to control various aspects of the IP Softphone 2050
- Mute light that indicates a call is on mute

The USB Headset Adapter auto-configures in the supported Windows operating system. No additional software is required.

## Application

The IP Softphone 2050 is a Voice over IP (VoIP) application that enables users to communicate over a LAN and WAN from their PCs. It combines the system Server with PC resident directory capabilities.

The VoIP application is comprised of the following components:

- Configuration Utility — used to configure the IP Softphone
- IP Softphone 2050 — the IP Softphone user interface
- Nortel Networks IP Softphone 2050 QoS

The IP Softphone 2050 has the following functionality:

- support for 802.1 Q and DiffServ (operating system dependant)
- automatic configuration of Call Server location using Dynamic Host Configuration Protocol (DHCP)
- features and services are provided by the network (such as call features, calling line identification, and voice mail)
- intuitive and flexible interface including:
  - slide-out trays to provide access to frequently used features and services
  - retracted trays to provide a smaller interface with full operational capabilities for a single line
  - viewable line status
  - ten-item lists for quick dial access from both the main and system tray interface
  - user-customizable interface and directories
  - multilingual capabilities (English, French, or other local language)
  - programmable macro functions for lengthy dialing patterns
  - hot keys map the computer keyboard to application buttons
- Windows system tray operation that allows the user to receive and place calls without interrupting other work
- online help
- end user-selectable ringing device to alert the user to incoming calls through the speakers when the headset is not being worn
- support for G.711, G.729A, and G.729AB codecs for operation at a variety of network connection speeds

## Graphical User Interface

Figure 12 on page 130 shows the Primary User Interface with the operational tray retracted. In this mode the user can operate most features on the IP Softphone 2050. Calls can be answered or made by pressing the green Answer button. In this mode the Call Server selects the line to answer or engage. The user can hang-up, hold, retrieve from hold, mute, adjust volume and access network services such as voice mail. Within the Primary User Interface the computer keyboard provides hot keys for:

- answer (Enter)
- release (F12)
- hold (F5)
- soft keys/interactive keys (F1-F4)
- alphabetic keys map to numbers as per dial-pad mapping shown in Figure 15 on [page 133](#)
- arrow keys map to navigation keys
- \ key that maps to the # key
- CTRL-v that pastes information from the Windows buffer

## Graphical User Interface components

### Application menu

Click the **Application menu** icon (top left-hand corner) to open the Configuration Utility and configure the IP Softphone 2050.

### Message lamp

The Message lamp turns ON to indicate that there is a message waiting. This lamp flashes when there is an incoming call.

### Soft keys

Four additional soft-labeled keys on the IP Softphone 2050 support a specific subset of the key features.

### **Programmable line DN/feature keys**

Six programmable line (DN)/feature keys on the IP Softphone 2050 support up to 12 DN's or features (by using Shift key functionality). These only display on the Combo and Lines Tray displays.

### **Information display area**

The information display area can contain four lines of text, up to a maximum of 24 characters for each line. The display area consists of two areas: Info line and Info window.

#### ***Info line***

The Info Line is the first (top) line of display text. The left ten-character area shows the Call Server type. The right part of the Info Line shows the current time and date.

#### ***Info window***

The Info Window display is a 3 x 24 LED display area that shows prompts and information about calls. During a call the information area is used to display dialed digits, calling line ID, called party name, application-specific information, and various messages such as "Release and Try Again".

When the information exceeds 3 x 24 characters, a scroll icon tells the user to press the scroll keys to view the second line of the display.

### **Soft key label display**

The IP Softphone 2050 display has a character line that displays the label on the soft key. Each label is six characters. If the icon is off, the label contains seven characters.

### **Navigation keys**

If the down navigation key is green, then the up and down navigation keys are operational for scrolling the text line of the display. Otherwise, the up, down, right, and left navigation keys are used for other various functions depending on the active application.

### **Answer key**

Press the **Answer** key to answer or make a call. The **Answer** key is similar to lifting the handset on a telephone. Press the DN key in the Lines or Combo trays to answer or initiate a call.

### **Key pad dialing keys**

The numeric key pad mimics a regular telephone's dialpad. It appears in the Number Pad Tray and Combo Tray displays.

### **Goodbye/Release**

Press the **Release** key to terminate an active call. Use the **Release** key to disconnect headset calls. The **Release** key only applies to active calls.

### **Hold key**

Press the **Hold** key to place an active call on hold. The feature key label for the held line displays a flashing icon to indicate the call hold status. To return to the call, press the DN key that corresponds to the line on hold.

### **Mute key and indicator**

During a call, press the **Mute** key to mute the headset's microphone (transmit path). When the transmit audio is muted, the mute indicator flashes. To turn off muting, press the **Mute** key a second time.

### **Network Directory key**

Press the **Directory** key to access directory options. The **Directory** key is a fixed feature key.

### **Inbox/Message**

Press the **Message** key to access voice messages. The **Message** key is a fixed feature key.

### **Outbox/Shift key**

Press the **Shift** key to shift between two feature key pages when a second feature key page exists.

## Services key

Press the **Services** key to connect to applications (services) located on a server. In this release, use the **Services** key to gain access to the option menu items, such as language selection or date format.

## Quit

Press the **Quit** key to leave the Services menu.

## Expand key

The **Expand** key is reserved for future use.

## Copy key

Press the **Copy** key to copy entries between directories.

The DN/Feature Key Tray shown in Figure 13 displays up to six DN or feature keys provisioned for the telephone by the Call Server. The status of each key is illustrated by text or a graphic icon (such as idle, ringing, or connected). The keys are labeled by the Terminal Proxy Server (TPS).

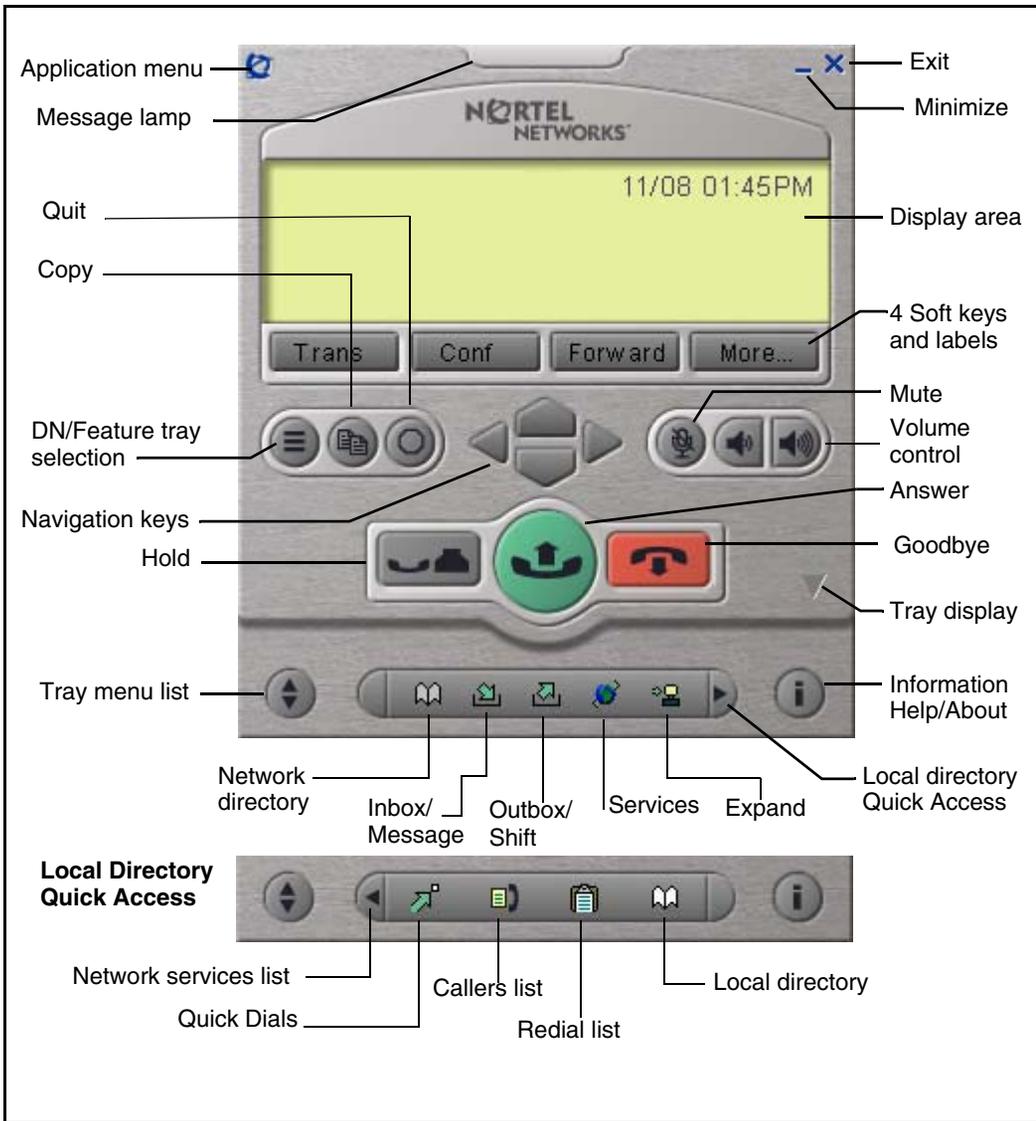
The Number Pad Tray (shown in Figure 14 on [page 132](#)) provides a graphic key pad to use with a mouse for dialing numbers. In all tray selections, you can also use the computer keyboard to dial numbers (use \ key for the # key).

*Note:* The numeric lock (Num Lock) feature on your keyboard must be turned on to click the numbers on the IP Softphone 2050 Number Pad Tray.

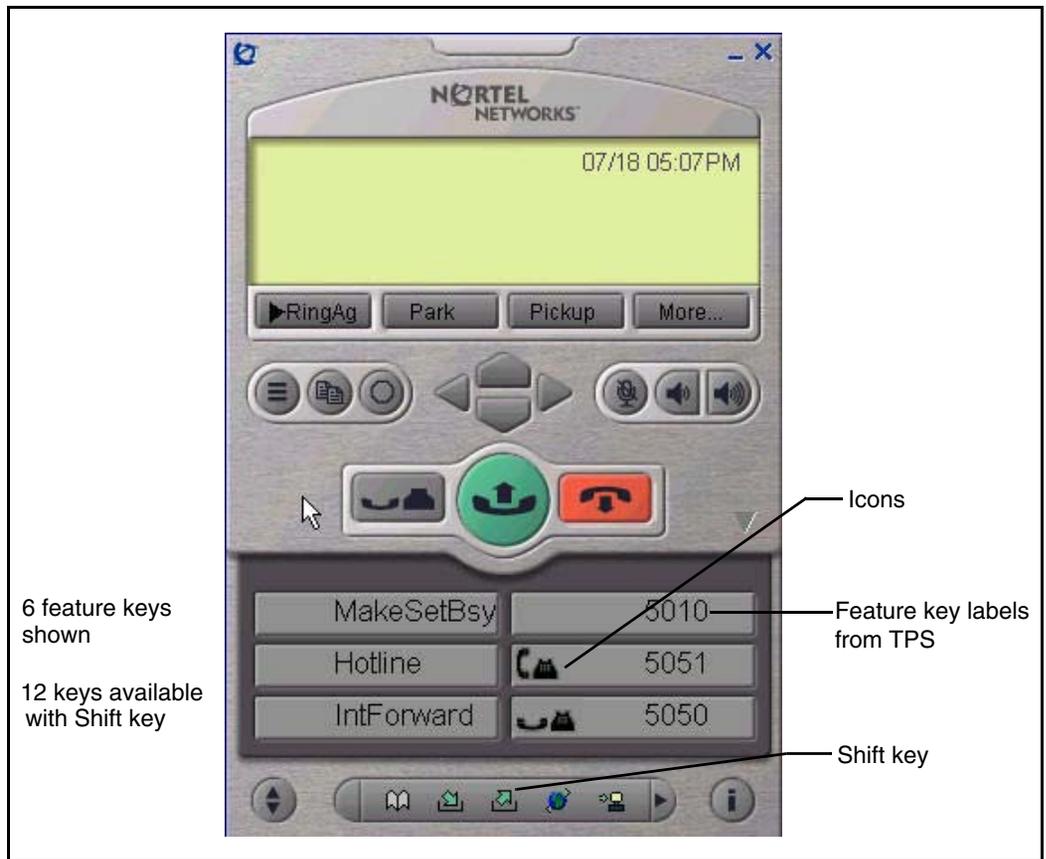
The Combo Tray shown in Figure 15 on [page 133](#) combines the DN/Feature Key Tray and the Number Pad tray. The feature keys indicate the following states:

- Idle: as shown in Figure 15 on [page 133](#).
- Ringing: long flashing red bar on the upper left corner of the key (see Figure 16 on [page 134](#)).
- Hold: medium winking yellow bar (see Figure 17 on [page 135](#)).
- Off-hook (Dialing/Answer): short solid green bar (see Figure 18 on [page 136](#)).

**Figure 12**  
**IP Softphone 2050 Primary User Interface with trays retracted**



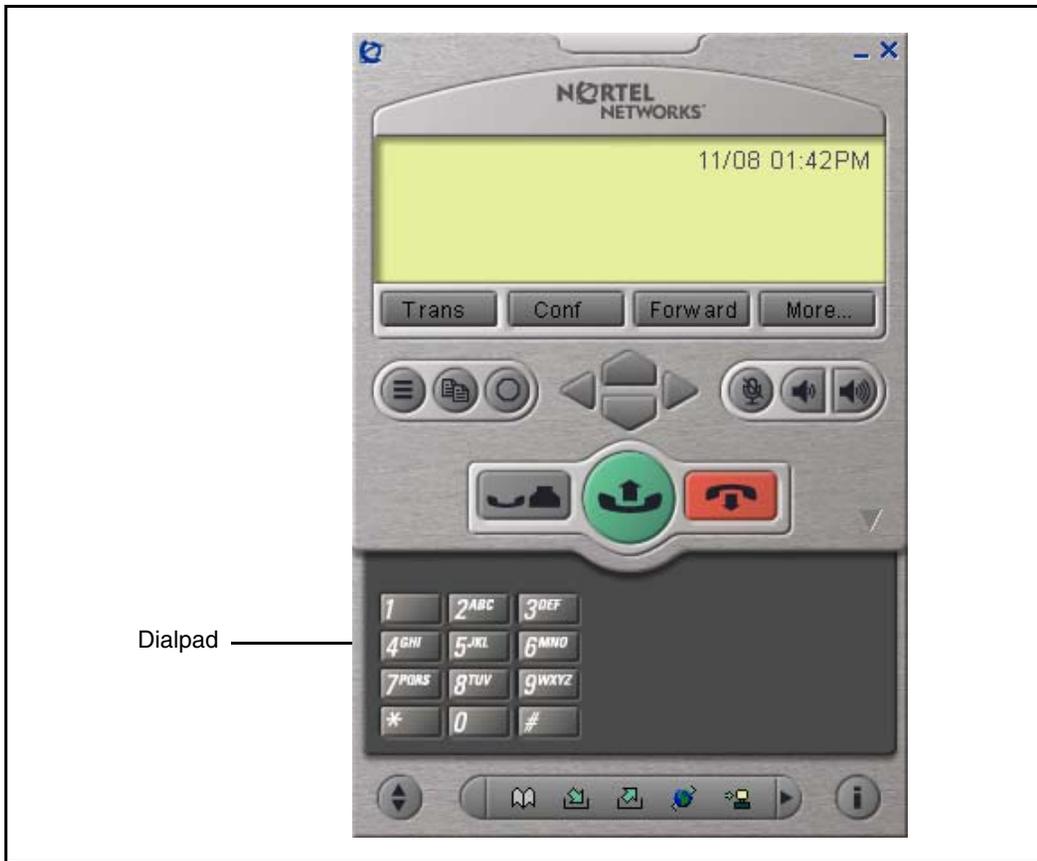
**Figure 13**  
**IP Softphone 2050 DN/feature key tray**



The Local Directory Quick Access Trays (see Figure 19 on [page 137](#)) maintain lists of quick dials. Ten items in the lists can be viewed and dialed directly from the Primary User Interface using Quick Access Trays.

The System Tray (see Figure 20 on [page 138](#)) provides fast access to most of the application’s functionality. The user can answer a call from the System Tray without launching the Primary User Interface.

**Figure 14**  
IP Softphone 2050 number pad tray

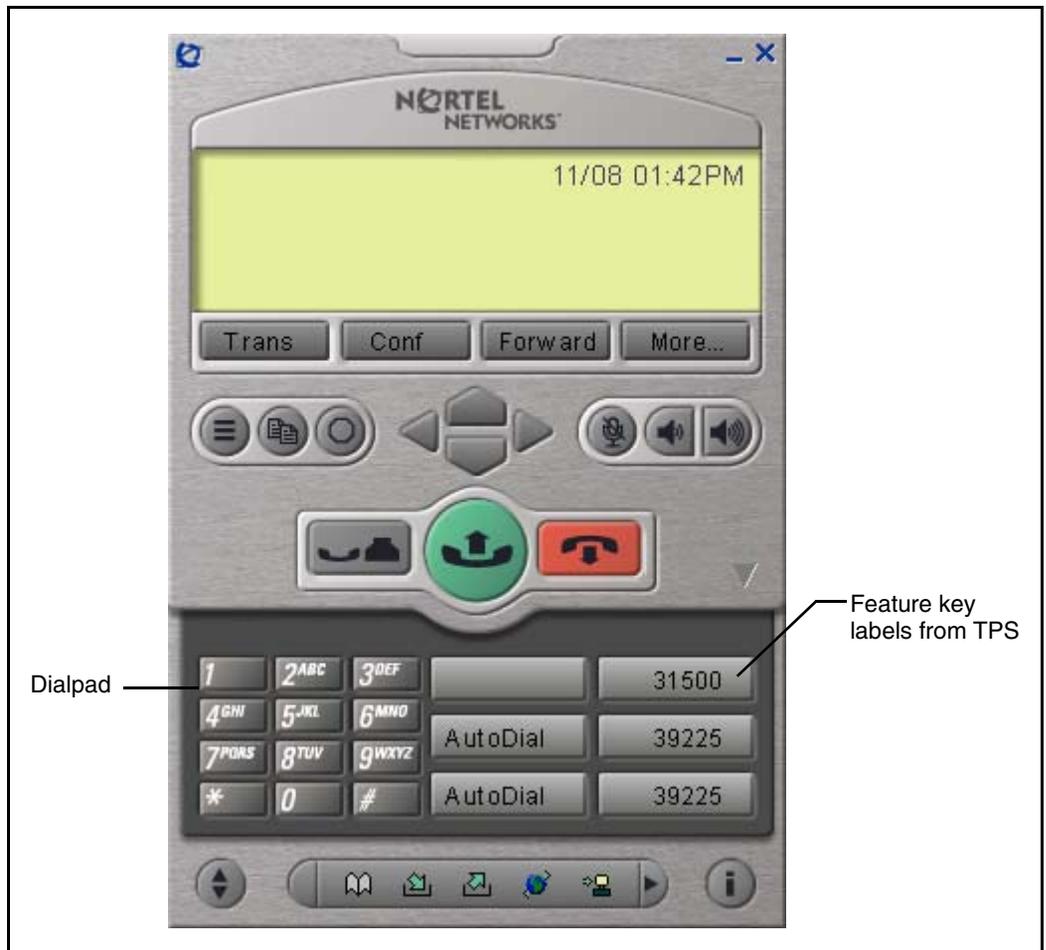


The System Tray Interface displays the current six DN/feature keys. These keys are visible on the application's DN/Feature Key Tray or Combo Tray if the application is on the desktop. The **Make Call** menu item also displays the current six DN/feature keys.

## Dedicated keys

Table 17 on [page 139](#) describes the specific telephone assignment functions you can program for Keys 16–26 on the IP Softphone 2050s in LD 11.

Figure 15  
IP Softphone 2050 combo tray



**Figure 16**  
Feature key indicating ringing with flashing red bar

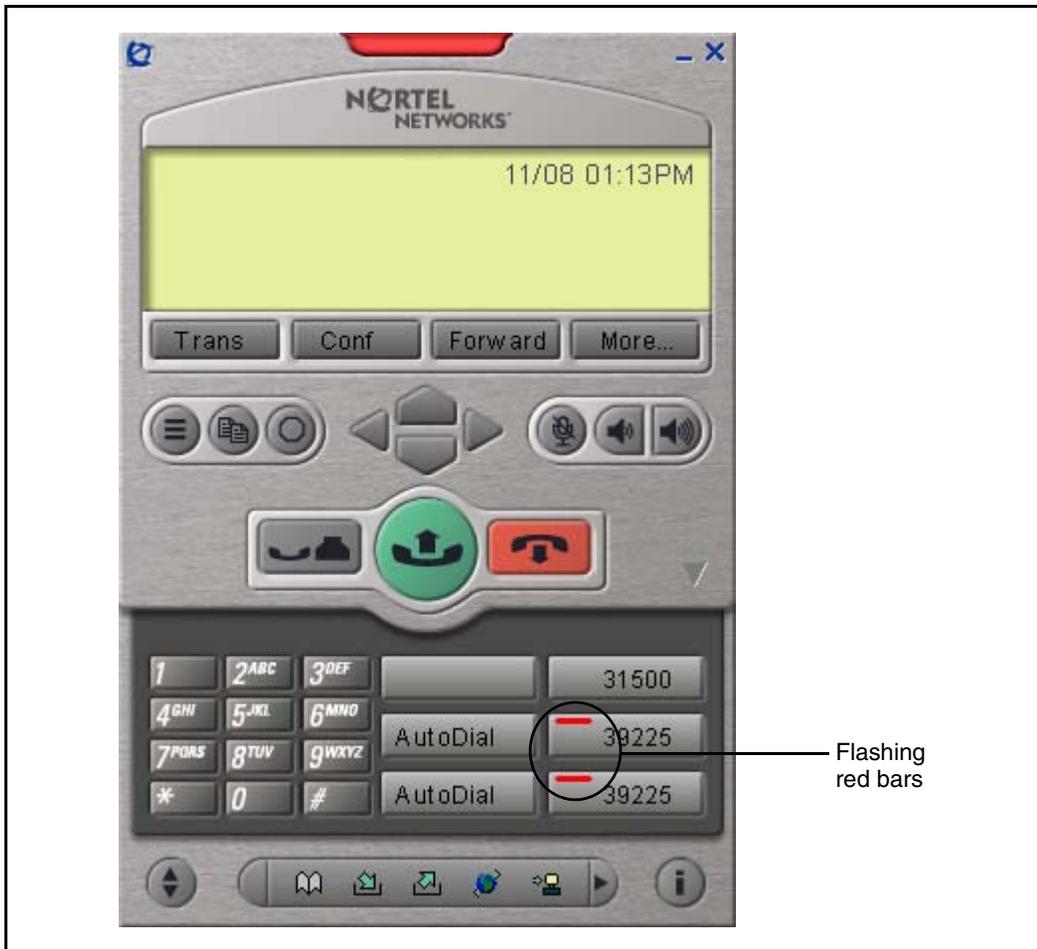


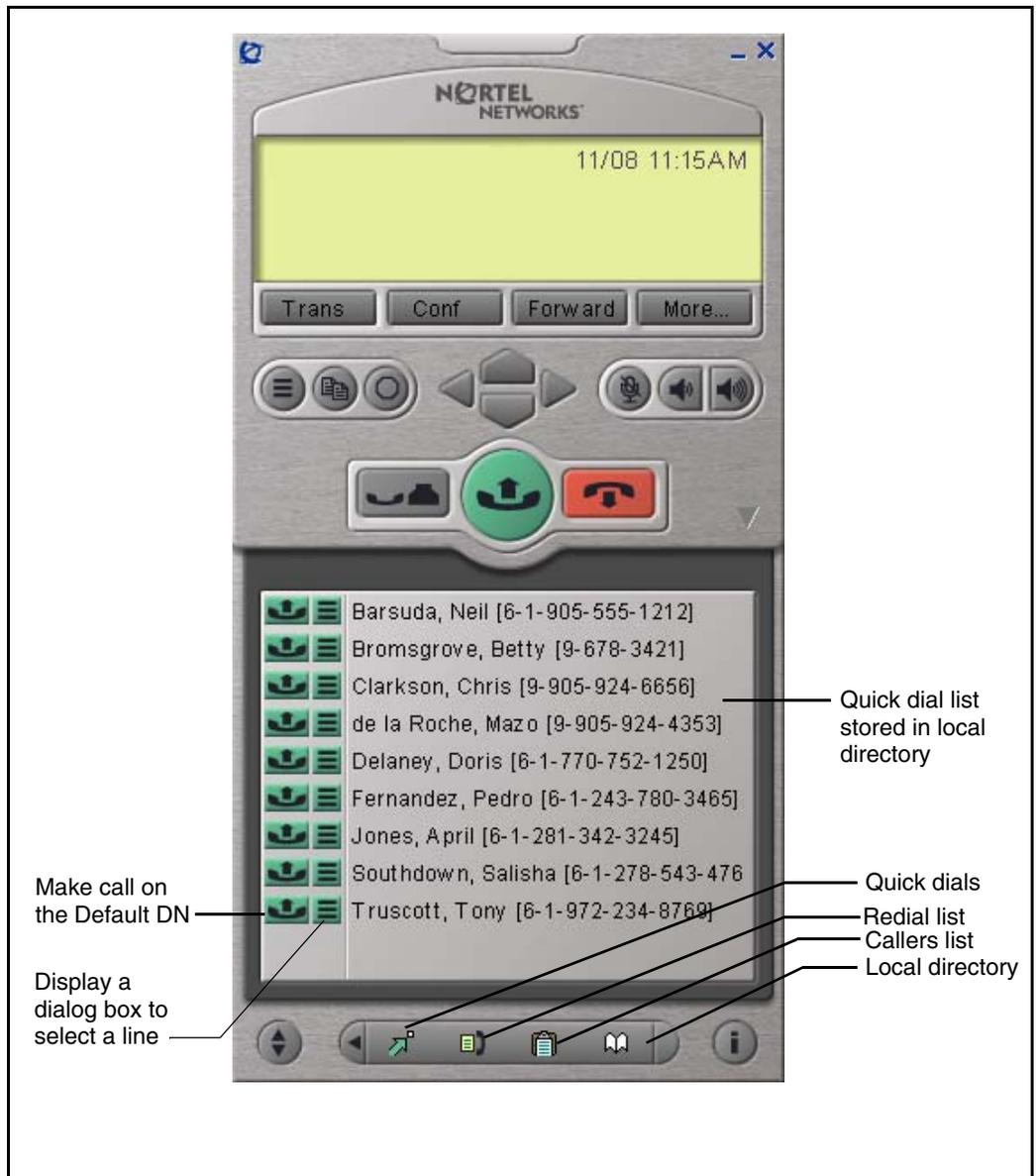
Figure 17  
Feature key indicating hold with flashing yellow bar



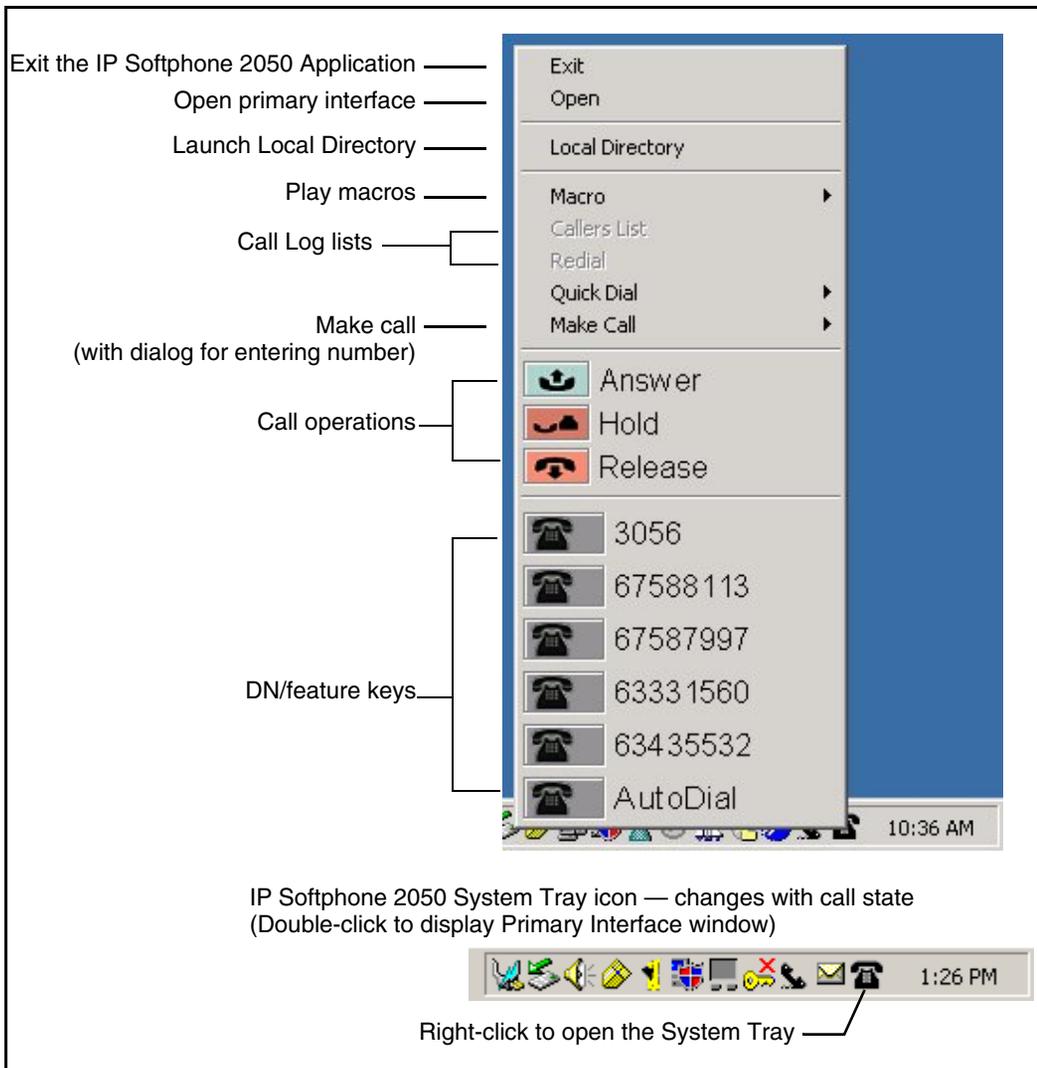
**Figure 18**  
Feature key indicating off-hook (dialing/answer) with solid green bar



**Figure 19**  
**IP Softphone 2050 local directory quick access tray**



**Figure 20**  
**IP Softphone 2050 system tray**



*Note:* If you attempt to configure anything other than the permitted response, the system generates an error code.

**Table 17**  
**IP Softphone 2050 dedicated keys (Part 1 of 2)**

Prompt	Response	Description
Key 16	MWK	Message Waiting key
	NUL	Removes function or feature from key
Key 17	TRN	Call Transfer key
	NUL	Removes function or feature from key
Key 18	A03	three-party conference key
	A06	six-party conference key
	NUL	Removes function or feature from key
Key 19	CFW	Call Forward key
	NUL	Removes function or feature from key
Key 20	RGA	Ring Again key
	NUL	Removes function or feature from key
Key 21	PRK	Call Park key
	NUL	Removes function or feature from key
Key 22	RNP	Ringing Number pickup key
	NUL	Removes function or feature from key
Key 23	SCU	Speed Call User
	SSU	System Speed Call User
	SCC	Speed Call Controller
	SSC	System Speed Call Controller
	NUL	Removes function or feature from key

**Table 17**  
**IP Softphone 2050 dedicated keys (Part 2 of 2)**

Prompt	Response	Description
Key 24	PRS	Privacy Release key
	NUL	Removes function or feature from key
Key 25	CHG	Charge Account key
	NUL	Removes function or feature from key
Key 26	CPN	Calling Party Number key
	NUL	Removes function or feature from key

## Key number assignments

The IP Softphone 2050 has six keys that present 12 feature keys, with six on each feature key page. The keys are numbered 0–11. The **Shift** key is used to change between two feature pages, 0–5 and 6–11.

The **Message** key is numbered 16. If Message Waiting is not configured then key 16 must be NUL.

Key numbers between 17–31 are assigned to the four soft label keys immediately below the display area. The supported features are: A03, A06, CFW, CHG, CPN, PRK, PRS, RGA, RPN, SCU, SCC, SSU, SSC, and TRN.

## Language support

The IP Softphone 2050 is affected by the following three language controls:

- Operating system language
- IP Softphone 2050 language selection — sets the language displayed in the help screens and in the menus (select the IP Softphone 2050 language from the Application menu or during installation)
- TPS language selection — sets the language in the display area (the language in the display areas is selected from the **Services > Language...** menu)

**Note:** In normal operation, the language chosen from the IP Softphone 2050's language setup matches the language chosen from the **Services > Language...** menu. Otherwise, the soft key labels and feature prompts will appear in a different language than the help text and menu items on the IP Softphone 2050 application. The user must ensure that the appropriate language is chosen. Table 18 shows the languages supported.

**Table 18**  
**Language support**

<b>TPS supports (display)...</b>	<b>IP Softphone 2050 supports...</b>
English	English - US
French	French - Euro
Spanish	Spanish - Euro
Portuguese	Portuguese
Danish	Danish
Dutch	Dutch
German	German
Italian	Italian
Norwegian	Norwegian
Swedish	Swedish
Finish	English - UK
Polish	French - Canadian
Czech	Spanish - Latin American
Hungarian	

## Operating parameters

The operating parameters for the IP Softphone 2050 are as follows:

- A Universal Serial Bus (USB) port is required on the PC to use the Nortel Networks USB Headset Adapter.
- The minimum recommended system hardware for the IP Softphone 2050 application is a Pentium Pro 200 MHz with 64 MB RAM (Windows 98, Windows 98 SE) or 128 MB RAM (Windows 2000 Professional, Windows XP Pro, and XP Home).
- Perform the software version upgrade for IP Softphone 2050 manually. This must be done by the technician at the PC. The Voice Gateway Media Card does not download any software to the IP Softphone 2050. The isetShow command on the Voice Gateway Media Card displays the current version of any registered IP Softphone 2050.
- The IP Softphone 2050 does not have an ACD Supervisor headset jack. Agent walkaway is supported with the Enhanced USB Key pad Adapter.
- An IP Softphone 2050 does not register against a TN configured for any other type of IP Phone.
- Soundcard audio is supported only for incoming call notification. Nortel Networks supports only the USB Headset Adapter for the speech path.
- The IP Softphone 2050 application does not currently support Japanese, Portuguese, or Chinese languages for the help screens and skin text. See “Language support” on [page 140](#) for more information.
- The IP Softphone 2050 is supported by Nortel Networks only when used on a PC running Windows 98, Windows 98SE, or Windows 2000 Professional. The minimum recommended system hardware is:
  - Pentium Pro 200 MHz with 64 MB RAM (Windows 98 and Windows 98 SE)
  - Pentium Pro 200 MHz with 128 MB RAM (Windows 2000 Professional, Windows XP Pro and Windows XP Home)
- Five menu options available on the IP Phone 2004 are not required on the IP Softphone 2050. The five options are:
  - Volume adjustment

- Contrast adjustment
- Display diagnostics
- Key click
- On-hook default path

## Implementation

A Voice Gateway Media Card must be installed in the system to configure the IP Softphone 2050.

### **Procedure 26** **Installing an IP Softphone 2050**

- 1** Install the Voice Gateway Media Card. For more information, see *IP Line: Description, Installation, and Operation* (553-3001-365)
- 2** Configure a virtual loop on the Call Server, using LD 97.  
For more information, see *Software Input/Output: Administration* (553-3001-311).
- 3** Configure the IP Softphone 2050 in LD 11 with TYPE I2050.
- 4** Install the USB Headset Adapter.
- 5** Install the IP Softphone 2050.

6 Run the IP Softphone 2050 Configuration Utility.

LD 11 — Configure the IP Softphone 2050.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	I2050	Type of data block.
TN		Terminal number.
	l s c u	Format for Large System and CS 1000E system, where l = loop, s = shelf, c = card, u = unit.
	c u	Format for Small System, CS 1000S system, Media Gateway 1000B, and Media Gateway 1000T. where c = card and u = unit.
DES	x...x	ODAS telephone designator.
CUST	xx 0-99	Customer number as defined in LD 15. Range for Large System and CS 1000E system
	0-31	Range for Small System, CS 1000S system, Media Gateway 1000B, and Media Gateway 1000T.
...		
ZONE	0-255	Zone number.
FDN	x...x	Flexible CFNA DN.
...		
CLS	aaa	Class of Service.  HFA - Digital Telephone Handsfree Allowed is default for IP Softphone 2050 to enable two-way communication.

————— End of Procedure —————

## Operation

### Services menu

The Services features control user-specific operating parameters of the IP Softphone 2050. The IP Softphone 2050 **Services** menu consists of the following items:

- Language
- Ring Type
- Time and Date Format
- Call Timer
- IP Phone Information

*Note:* These items remain the same through installs and uninstalls.

The following points explain how to change options:

- Click the **Services** key. The **Telephone Options** menu appears in the information area. The four soft keys are labeled with Select ... .. Cancel.
- Use the Up/Down navigation keys to scroll up or down the menu. When an option is highlighted, use the **Select** soft key to select it.
- When an option is selected, press the soft keys to change the settings for the option. To exit from the selected option and return to the **Services** menu, press the **Cancel** soft key.
- If a call is presented while the user is manipulating an option, the IP Softphone 2050 rings and the DN key flashes. However, the screen display is not updated with Caller ID. The programming text is not disturbed.
- The user can originate a call using Autodial or Last Number Redial while manipulating the options. However, the display is not updated with dialed digits or the Caller ID and the dialpad is intercepted by the Services.
- While active in the **Services** menu, press the **Quit** key at any time to exit the application. Any settings that are not saved at that time are lost.

## Language

To select the display language of the IP Softphone 2050, highlight the **Language** option from the **Services** menu and press the **Select** soft key. Select a language from the sub-list of supported languages that is displayed then press the **Select** soft key. When finished, press the **Exit** soft key to return to the Services menu. See “Language support” on [page 140](#).

## Time and date format

To change the time and date display format of the IP Softphone 2050, highlight the **Time and Date Format** option from the **Services** menu and press the **Select** soft key. A list of different format types displays. Highlight the format and press the **Select** soft key to change the format. When finished, press the **Exit** soft key to return to the **Services** menu and the changed format is saved. The displayed time and date is sent from the TPS to the IP Softphone 2050, and therefore can vary from the time set on the PC.

*Note:* Because of the geographic independence that an IP connection provides, it is possible that an IP Softphone 2050 is not in the same time zone as its host Call Server. The current time and date mechanism within the Call Server assumes that all of its peripheral devices are in the same time zone. The time displayed on the IP Softphone 2050 is always the time known by the internal clock of the system.

## Call timer enable

The **Call Timer** option allows the user to control the automatic timing of an established call locally at the IP Softphone 2050. The call timer can be switched between Enable and Disable mode.

To enable or disable the call timer, select the **Call Timer** option from the **Services** menu and press the **Select** soft key. The current setting of the Call Timer displays. Press the **Change** soft key to toggle the mode. When finished, press the **Cancel** soft key to return to the **Services** menu and the selected mode is saved.

## Ring type

To change the ringer tone of an IP Softphone 2050, highlight the **Ring Type** option from the **Services** menu and press the **Select** soft key.

Select a ring type from the sub-list displayed then press the **Select** soft key. Press the **Play** soft key to test the ring type. When finished, press the **Cancel** soft key to return to the main menu and the changed ring type is saved.

### **IP Softphone 2050 information**

This option item displays IP Phone information, including: IP address, hardware ID, current firmware version, TN, Node ID, Node IP address, and the specific Voice Gateway Media Card on which the IP Softphone 2050 is registered.

### **Mute key operation**

Press the **Mute** key to change between muted and unmuted. When the IP Softphone 2050 is muted:

- all audio input from the headset is muted
- the **Mute** key flashes
- the audio path for the transmit direction is turned off (the far end does not receive audio packets)

Open an audio stream to change the status of the LED. If a muted call is hung up, or if the **Conference** or **Transfer** button is pressed, the **Mute** feature and LED automatically turns off.

### **Answer key operation**

Press the **Answer** key to initiate or answer a call.

Pressing the **Answer** key connects the audio path to the USB headset. The headset can be controlled only by the Answer key or feature keys and the local volume control. The headset cannot be controlled by any Call Server software features.

### **Volume controls — headset, ringer**

The volume can be controlled independently for the ringer and headset and the setting stored locally on the PC.

- Ringer mode — When the IP Softphone 2050 is on hook and is idle or ringing, selecting the volume Up/Down buttons changes the volume of the ringer.
- Headset mode — When the IP Softphone 2050 is in headset mode, selecting the volume Up/Down buttons changes the volume levels.

When the volume level is changed, a small bar graph with a label displays to indicate that the volume level has changed.

### **Call features**

This section describes the call features that are available on the IP Softphone 2050 and how they are activated. The IP Softphone 2050 supports any combination of features and DN types up to a maximum of 12 assigned to the programmable keys plus the 10 predefined features assigned to the soft keys. See Table 19 on [page 149](#).

Key labels are downloaded from the Call Server. Changes to the Call Server configuration are reflected immediately in the key label. DN keys are labeled with the DN number (without the ESN location code).

The message waiting lamp indicates a message. The lamp also indicates alerting. The Message Waiting Key (MWK) is configured on the Message application key and cannot be configured on any other key.

## Soft label key features

The four soft-labeled programmable feature keys which appear physically on the IP Softphone 2050 can be used to provide up to ten features. Table 19 shows the default soft key features layout.

**Table 19**  
**IP Softphone 2050 default soft key features (Part 1 of 2)**

Key Number	Default Feature	Comments
Key 17	TRN (Transfer)	
Key 18	AO6 (6-party Conference)	alternate: AO3 (three-party conference).  Feature AO6 is the default feature for key number 18. You can manually re-configure key number 18 as AO3 instead of AO6 through LD 11.
Key 19	CFW (Call Forward)	
Key 20	RGA (Ring Again)	
Key 21	PRK (Call Park)	
Key 22	RNP (Ringing Number Pickup)	

**Table 19**  
**IP Softphone 2050 default soft key features (Part 2 of 2)**

Key Number	Default Feature	Comments
Key 23	(reserved for Speed Dial)	configure Speed Call: SCU/ SCC/SSU/SSC  Key 23 has no default feature configuration. The Speed Dial features require custom data that is not available during the default configuration process. Key 23 can be manually configured as SCU, SCC, SSU or SSC (all Speed Dial features).
Key 24	PRS (Privacy Release)	
Key 25	CHG (Charge Account)	
Key 26	CPN (Calling Party Number)	
Key 27–31	reserved	

If a feature requires a feature package that is not present for the Call Server installation, that feature does not appear within the default configuration for the IP Softphone 2050.

If one of the key 17–26 features depends on a Class of Service that is not present for the particular telephone, the feature does not appear in the configuration of the IP Softphone 2050.

You can remove any of the features provided on keys 17–26 by manually reconfiguring the key number as NUL using LD 11.

***Appearance of ten soft label keys***

Under feature-rich conditions, when all required packages and Classes of Service are present, all ten features on keys 17-26 are provided on the IP Softphone 2050. Table 20 shows how the maximum configuration appears on the telephone as four layers. Layer 1 is visible when the telephone is idle. The user navigates through the circular stack by using the **More...** key.

**Table 20**  
**Soft label keys layout**

<b>Layer 1</b>	Trans	Conf	Forward	More...
<b>Layer 2</b>	Ring Again	Park	Pickup	More...
<b>Layer 3</b>	SCU	PrivRls	Charge	More...
<b>Layer 4</b>	CParty			More...

***Appearance of fewer than ten soft label keys***

The typical IP Phone can have fewer than ten soft label feature keys because of restrictions such as feature restriction or the removal of a feature key. Table 21 presents an example.

**Table 21**  
**Typical soft label keys configuration**

<b>Layer 1</b>	Trans	Conf	Forward	More...
<b>Layer 2</b>	SCU	PrivRls		More...

When fewer than four soft label feature keys are configured, they can appear as a single layer, with no More... key (see Table 22).

**Table 22**  
**Four or less soft label key features**

<b>Layer 1</b>	Trans	Conf	Forward	SCU
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### ***Unused keys***

Some keys are not used in the implementation of the IP Softphone 2050. Activating an unused key does not cause the telephone to respond or the Call Server to send any messages.

### ***Soft labeling***

When a DN key or Autodial is configured on an IP Softphone 2050, the default label shown on the telephone for that line appearance is the DN number or Autodial number.

When a call processing feature is configured on an IP Softphone 2050, the default label shown on the telephone is a predetermined string. Soft labels for programmable feature keys are shown at the bottom of the display and have a maximum length of seven characters. Soft labels for programmable DN or feature keys at the top of the IP Softphone 2050 have a maximum length of 10 characters.

In this release, the IP Softphone 2050 does not provide user-specified labeling of the soft keys since the text is sent from the TPS.

### **Registration**

When you add an IP Softphone 2050 to the network, the IP Softphone 2050 can, depending on the Configuration Tool settings, connect to a pre-defined IP address or can request an IP address from a DHCP server. The IP Softphone 2050 then contacts the Connect Server that instructs the IP Softphone 2050 to display a message on its display screen requesting the customer's node number and TN.

After the customer enters this information, the IP Softphone 2050 contacts the Node Master which selects a TPS with sufficient capacity to register the IP Softphone 2050. The IP Softphone 2050 contacts the chosen TPS, and if the IP Softphone 2050 is valid, registers it with the system. The registration information is then saved to the IP Softphone 2050.

### **Loss plan**

The USB Headset Adapter provides the IP Softphone 2050 with a fixed loss plan compliant with the TIA-810A specification. If other headsets or audio devices are used, the loss plan is unknown and undefined. Nortel Networks supports the resolution of audio problems only for the USB Headset Adapter.

### **Echo cancellation**

Echo can be generated electrically when there is an impedance mismatch, or generated acoustically by feedback from a speaker or ear piece to a microphone. Any echo that is ultimately returned to the IP Phone is more noticeable to the listener because of the additional delay introduced by the IP connection.

The Voice Gateway Media Card has echo cancellers included as part of its function that cancels echo generated on the TDM side of the Media Gateway. When there is audio going through the Voice Gateway Media Card, the echo cancellers are enabled.

The IP Softphone 2050 has no echo canceller, so a slight echo from acoustic coupling on the headset can occur in some call situations.

### **Clock synchronization**

Buffer underruns and overruns can occur since there is no sample clock at the receiving end of an IP audio stream synchronized to the transmitting clock. The buffer overruns and underruns are corrected by two mechanisms, both of which apply to the IP Phones and the DSPs on the Voice Gateway Media Card.

### ***Jitter buffer***

The jitter buffer of the IP Softphone 2050 is configurable. Set the jitter buffer in one of the following ways:

- using the default value sent from the TPS (the value configured in OTM — It is recommended that the default value be used.)
- using the Configuration Utility

The jitter buffer has a desired size and a maximum allowable size. If the jitter buffer exceeds its maximum allowable size, sufficient frames are discarded to reduce the contents of the jitter buffer to the desired setting. If the jitter buffer underruns, frames are held in the jitter buffer until it fills to the desired level. Both underrun and overrun result in a discontinuity in the audio.

For codecs that support silence suppression, the jitter buffer is resynchronized at the beginning of each talk spurt.

### **QoS**

A combination of codec selection, jitter buffer and packet time, and the use of the network's DiffServ code point all contribute to the end-to-end QoS.

However, the IP Softphone 2050 is an application within the context of the PC OS, so the OS has an effect on the end-to-end QoS for the IP Softphone 2050. The DSP functionality (such as codec packetization) implemented in DSP hardware on the IP Softphone 2050 and Voice Gateway Media Card runs as part of the application code on the PC's CPU. If the CPU is busy with other tasks, voice quality can be negatively affected.

The number of buffers used to buffer audio data between the application and PC audio hardware device driver is adjustable from the Configuration Tool (see "Select Sound Devices tab" on [page 163](#)). Using fewer buffers reduces the audio path delay but increases the chances of dropouts and choppy speech, depending on the speed and utilization of the PC's CPU.

### ***DiffSERV (DSCP)***

The IP Softphone 2050 uses DSCP settings assigned by the TPS. The IP Softphone 2050 supports DSCP on Window 98, Windows 98 SE, Windows 2000 Professional, and Windows XP.

**802.1Q**

The IP Softphone 2050 uses 802.1P (priority) settings assigned by the TPS. The IP Softphone 2050 supports 802.1P on Windows 2000 Professional and Windows XP. This requires the installation of Nortel Networks IP Softphone 2050 QoS Service. The DSCP values assigned from TPS 802.1Q operation can be enabled or disabled from the QoS tab in the Configuration Utility. The IP Softphone 2050 does not support VLAN's (the VLAN ID in 802.1Q).

The service can be installed from the CD-ROM. If you install the IP Softphone 2050 with Administrators access, then this service is installed automatically.

**Codec**

The IP Softphone 2050 provides the following codecs:

- G.711 provides the highest quality (if the network facilities can handle the packet flow) since there is no compression.
- G.729A is ranked best; it has 8:1 compression but no voice activity detection.
- G.729AB is the same as G.729A but includes voice activity detection; while this provides the lowest average network bandwidth utilization, in some call environments the speech quality suffers due to clipping of the beginning of words.

### Frame size

The IP Softphone 2050 supports the following range of frame sizes:

- G.711-64 A-law and  $\mu$ law: 10-960 – 10 ms increments
- G.729A: 10-960 – 10 ms frames
- G.729AB: 10-960 – 10 ms frames

## Installation

The Call Server side of the configuration process is the same as the IP Phone 2004:

- 1 Install the Voice Gateway Media Card. The IP Line 4.0 application must be running on the Voice Gateway Media Card.
- 2 Configure a virtual loop on the Call Server, using LD 97.
- 3 Configure the IP Softphone 2050 in LD 11 with TYPE I2050.

The remainder of this section provides information about installing the USB Headset Adapter and the IP Softphone 2050.

### Installing the USB Headset Adapter

If you install the USB Headset Adapter before the IP Softphone 2050, then the USB Headset Adapter displays as an audio device during the installation of the IP Softphone 2050.

If you install the USB Headset Adapter after the IP Softphone 2050, then select the USB Headset Adapter using the Configuration Utility. See “Select Sound Devices tab” on [page 163](#).

**Procedure 27****Installing the USB Headset Adapter**

- 1 Connect the coiled lower cord to the headset cord with the Quick Disconnect connector. Ensure the Quick Disconnect connector is securely fastened.
- 2 Connect the headset cord to the RJ9 jack on the adapter.
- 3 Connect the USB cable to the headset adaptor and to one of the USB jacks on the back of your PC or USB hub.

The first time the headset adapter is plugged in, there is a delay while Windows configures the device and locates the appropriate driver software. During the installation you are prompted to supply the original Windows CD-ROM so Windows can locate the required drivers.

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**End of Procedure**

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## Installing or upgrading the IP Softphone 2050

There are two options to obtain the latest version of the IP Softphone 2050:

- new installation — when the IP Softphone 2050 is installed for the first time
- upgrade — when the IP Softphone 2050 is already installed on the PC

**Note 1:** To upgrade on Windows 2000 and Windows XP platforms, refer to Procedure 29, "Upgrading the IP Softphone 2050 on your PC (for Windows 2000 and Windows XP users only)", on [page 158](#).

**Note 2:** IP Softphone 2050 users on Windows 98, Windows 98SE, Windows 98ME, and Windows ME cannot use the normal upgrade version since it is not supported on Windows 98 platforms. Please refer to Procedure 30, "Upgrading the IP Softphone 2050 on your PC (for Windows 98 platforms)", on [page 159](#).

**Note 3:** Before you upgrade an IP Softphone 2050, record the information in the Configuration Utility's Server tab (see [page 170](#)). This information might be required in the future.

### **Procedure 28**

#### **Installing the IP Softphone 2050 on your PC (New installation)**

- 1 Insert the CD-ROM disk into the CD-ROM drive of your PC.  
*Note:* Installation should proceed automatically. If it does not, then continue with step 2. Otherwise go to Step 5.
- 2 Double-click the **My Computer** icon.
- 3 Double-click the **CD** icon.
- 4 Double-click the **Setup** icon.
- 5 Follow the instructions on-screen to complete the installation.
- 6 Run the IP Softphone 2050 Configuration Utility (from the Windows Control Panel) to assign a server address, select sound devices, and select a server type.
- 7 Select **Start > Programs > Nortel Networks > IP Softphone 2050** to start the IP Softphone 2050 application.

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**End of Procedure**

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### **Procedure 29**

#### **Upgrading the IP Softphone 2050 on your PC (for Windows 2000 and Windows XP users only)**

- 1 Download the IP Softphone 2050 upgrade file from the Nortel Networks web site and extract all files to a working directory.  
*Note:* Please refer to either the CS 1000 Release 4.0 General Release Bulletin or the IP Line 4.0 Read Me First document about download instructions.
- 2 Double-click the **My Computer** icon and navigate to the working directory.
- 3 Double-click the **Setup** icon.
- 4 Follow the instructions on-screen to complete the installation.
- 5 Run the IP Softphone 2050 Configuration Utility (from the Windows Control Panel) to assign a server address, select sound devices, and select a server type.  
*Note:* Compare the values currently in the configuration utility to the values recorded prior to the upgrade. These should be identical.

- 6 Select **Start > Programs > Nortel Networks > IP Softphone 2050** to start the IP Softphone 2050 application.

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**End of Procedure**

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### **Procedure 30**

#### **Upgrading the IP Softphone 2050 on your PC (for Windows 98 platforms)**

- 1 Record all values from the **Communication Server** tab in the IP Softphone 2050 Configuration Utility.
  - a. Select the **IP Softphone 2050 Configuration Tool** from the Windows Control Panel.
  - b. Select the **Communication Server** tab.
  - c. Record all the values on this tab.
  - d. Exit the IP Softphone 2050 Configuration Utility.
- 2 Start your IP Softphone 2050 application and record the Node and TN values displayed at startup.

If these values pass too quickly to write down, follow the steps below:

  - a. Press the **Services** button (the globe button on the **IP Softphone 2050** toolbar).
  - b. Press the down-arrow key to highlight **Set Info**.
  - c. Press the **Select** softkey.
  - d. Press the down-arrow key to highlight **Set TN**.
  - e. Record this value.
  - f. Press the down-arrow key to highlight **Node IP and Node ID**.

The Node IP should match the value in the IP Softphone 2050 Configuration Utility's Communication Server tab (retrieved from step 1).
  - g. Record the Node ID value.
  - h. Exit the IP Softphone 2050 application.
- 3 Exit any programs that are running.
- 4 Disable any anti-virus programs that are running.

- 5 Uninstall the current IP Softphone 2050 using the **Add/Remove Programs** function found in the Control Panel.
- 6 Insert the CD-ROM disk into the CD-ROM drive of your PC.  
**Note:** Installation should proceed automatically. If it does not, then continue with step 7. Otherwise go to Step 10.
- 7 Double-click the **My Computer** icon.
- 8 Double-click the **CD** icon.
- 9 Double-click the **Setup** icon.
- 10 Follow the instructions on the display to complete the installation.
- 11 Run the IP Softphone 2050 Configuration utility to assign a server address and to configure audio peripherals.  
  
Use the values you recorded in step 1, if required. You can access the IP Softphone 2050 Configuration utility from the Windows Control Panel.

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**End of Procedure**

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## Configuration utility

Use the Configuration Utility to set the following types of configuration parameters:

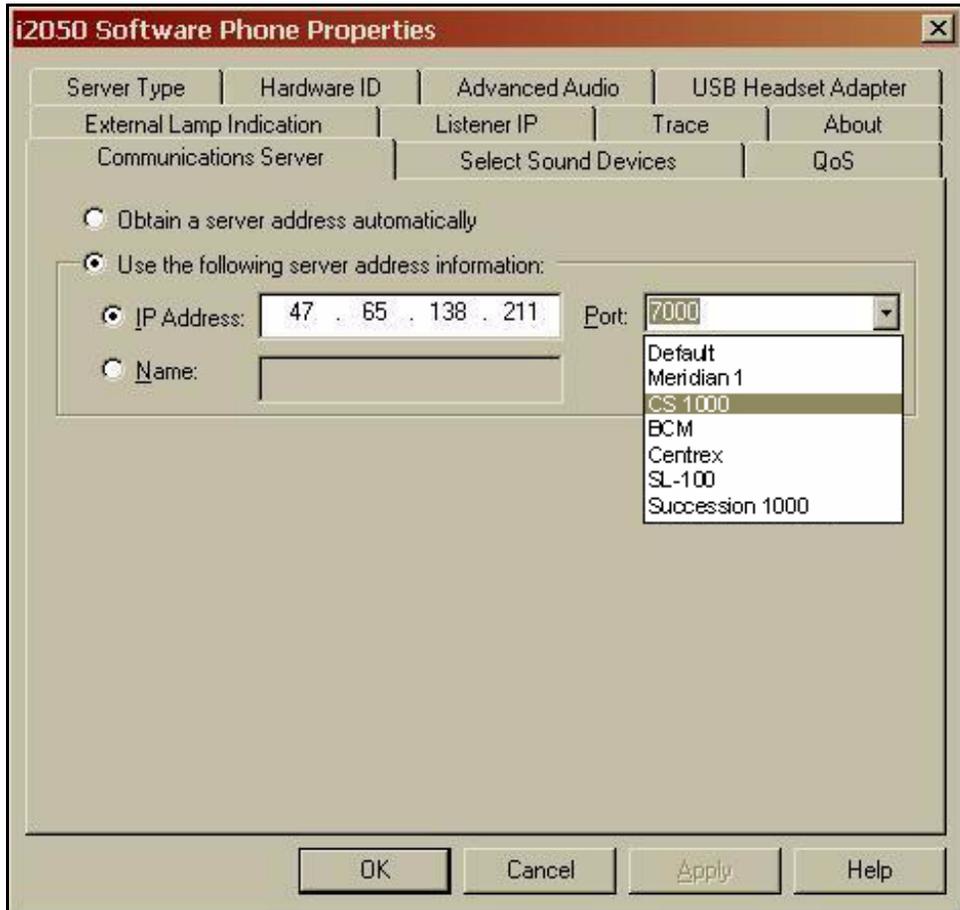
- Communication server parameters
- Sound devices
- QoS
- Server type

There are more advanced configuration settings available but they are not set as frequently. These include: hardware ID, advanced audio, Listener IP, and trace. Changing the default settings in these tabs is usually not required.

See Procedure 29, "Upgrading the IP Softphone 2050 on your PC (for Windows 2000 and Windows XP users only)", on [page 158](#).

Figure 21 shows the opening screen of the Configuration Utility.

**Figure 21**  
**Configuration utility**



## Communications Server tab

Table 23 provides a summary of all the required parameters and the method of acquisition. Information on how to set each of the parameters follows.

**Table 23**  
**IP telephone IP parameters**

<b>Parameter</b>	<b>Method of Acquisition</b>
IP Address	Configured for the PC manually or retrieved using DHCP.
Net Mask	Configured for the PC manually or retrieved using DHCP.
Router Address	Configured for the PC manually or retrieved using DHCP.
Initial Server Address (Primary and Secondary)	Configured in the Communication Server tab of the Configuration Utility.
UserID (Node ID, Node Password and TN)	Manually entered for the first time configuration. Retrieved from storage for subsequent registrations.

The IP Softphone 2050 uses the PC's IP address, net mask, and router address. When the IP Softphone 2050 is launched and DHCP is enabled, it does a DHCP request on its own. It looks only for custom values such as the Server 1 address. The Nortel application-specific strings are entered into the DHCP tables as determined by the IP Softphone 2050 values in the format defined for the specific DHCP server.

If the DHCP server is changed or rebooted, the general values (such as the PC's IP address) are refreshed only when the PC reboots. The DHCP server is responsible for tracking IP address leases. If the DHCP extended parameters (for example, Server 1 address) are modified, the IP Softphone 2050 application must be restarted.

The Node ID and TN must always be manually entered at the IP Softphone 2050 screen during the first-time registration process. If a non-null password was configured for the node, the user must enter the password correctly before going to the TN-entering screen.

See Figure 21 on [page 161](#). If your site uses DHCP to configure IP Phones, select “Obtain a server address automatically”. This is the default method of locating the Communications Server. If DHCP is used, no further configuration is required. The application does its own DHCP request to retrieve the Voice Gateway Media Card Node’s IP address information.

If you choose to manually configure the Communication Server address, select **Use the following server address information** and enter the IP Line Node’s IP address. In the Port box, select CS 1000E, CS 1000S, CS 1000M, or Meridian 1, depending on your system type. This sets the Port to 4100. The IP address is provided by your system administrator.

## Select Sound Devices tab

This tab selects the PC’s audio device for the microphone, speaker, and alerting tones. See Figure 22 on [page 164](#).

### Select headset device for making calls

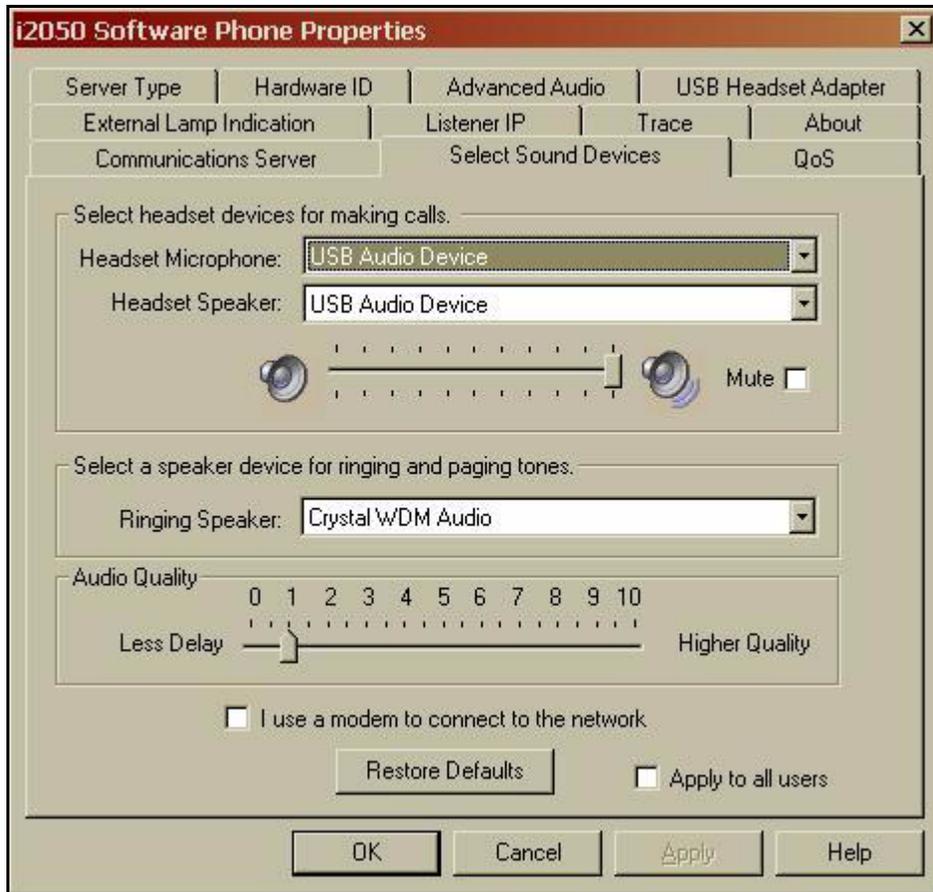
The drop-down menus contain audio devices that are recognized for the headset’s microphone and speaker. Select the USB Audio Device to choose the Nortel Networks USB Headset.

Adjust the Windows volume setting on the PC using the slider bar. Select the **Mute** check box to mute the PC’s volume. These controls apply to the device selected as the headset speaker. If the selected headset speaker device and the selected ringing device are the same, then the ringing device is also affected by these controls.

### Select a speaker device for ringing and paging tones

You can select a different speaker as a ringing device. This allows call-alerting tones to be played over the PC speaker rather than on the headset, so that you can hear the ringing phone when you have taken the headset off.

Figure 22  
Select Sound Devices tab



## Audio Quality

This slider allows the user to choose the balance between low delay or higher quality audio. The slider adjusts the number of buffers between the PC's audio device and the IP Softphone 2050 application. Less delay is achieved by reducing the number of buffers; however, this increases chances the buffers can run out, resulting in poorer audio quality. The Less Delay setting requires the PC's CPU to give attention to the application more frequently and should be chosen on newer PCs with fast CPUs.

Choosing **Higher Quality** increases the number of buffers, making buffer under or overruns less likely, but increasing the end-to-end delay. If choppy or broken speech is heard, move the slider toward **Higher Quality** to see if that eliminates the problem.

## When a modem is used to connect to the network

To connect to the network using a modem, the user must select the **I use a modem to connect to the network** check box (see Figure 22 on [page 164](#)). The TPS queries the IP Softphone 2050 during the registration process for its codec capabilities. The IP Softphone 2050 responds with the low bandwidth codecs, G.729A and G.723.

The check box combined with the TPS query of the codec list, enables the user to force the IP Softphone 2050 to use the low bandwidth codecs without the craftsperson needing to configure two TNs in different zones.

Changing the check box option requires the user to close and reopen the IP Softphone 2050 client on the desktop to re-register the IP Softphone 2050 with the TPS for the change to take effect.

When supporting IP Softphone 2050 users on modems, the customer needs to configure G.729A/B and/or G.723 on their node.

**Note:** If only G.711 is configured in Element Manager/Optivity Telephony Manager (EM/OTM) for the system, then calls with the IP Softphone 2050 are blocked. As long as G.729A/B and/or G.723 are selected in EM/OTM as a codec option, calls won't be blocked. When there is a codec mismatch, the caller hears the reorder (fast busy) tone.

It is also possible that different calls within the same system can be blocked depending on the called party's node. Since the codec selection is per node, it is possible for a system to have one node that is G.711 only and another with G.711 and G.729A.

It is recommended that the system be configured with both G.711 and G.729A if IP Softphone 2050s might connect using a modem. The typical system configuration has both G.711 and G.729A available, so instances of blocked calls to the IP Softphone 2050 should be low.

Element Manager is a simple and user-friendly web-based interface that supports a broad range of system management tasks, including:

- configuration and maintenance of IP Peer and IP telephony features
- configuration and maintenance of traditional routes and trunks
- configuration and maintenance of numbering plans
- configuration of Call Server data blocks (such as configuration data, customer data, Common Equipment data, D-channels)
- maintenance commands, system status inquiries, backup and restore functions
- software download, patch download, patch activation

Element Manager has many features to help administrators manage systems with greater efficiency. Examples are as follows:

- Web pages provide a single point-of-access to parameters that were traditionally available through multiple overlays.
- Parameters are presented in logical groups to increase ease-of-use and speed-of-access.
- The "hide or show information" option enables administrators to see information that relates directly to the task at hand.
- Full-text descriptions of parameters and acronyms help administrators reduce configuration errors.
- Configuration screens offer pre-selected defaults, drop-down lists, checkboxes, and range values to simplify response selection.

The Element Manager web server resides on the Signaling Server and can be accessed directly through a web browser or Optivity Telephony Manager (OTM). The OTM navigator includes integrated links to each network system and their respective instances of Element Manager.

## QoS tab

Assign the QoS settings using the QoS tab (see Figure 23 on [page 168](#)). Select the Enable check box if the IP Softphone 2050 is in a QoS-enabled network. When selected, the IP Softphone 2050 uses the DSCP values configured at the operating system level. If not selected, 0 is put in the DSCP field in outgoing packets.

Not all operating systems allow assignment of all QoS settings. The Configuration Utility allows settings only applicable to specific operating systems to be assigned. The only possible assignments in Windows 2000 Professional are 802.1Q and DiffServ.

*Note:* Administrator privileges are required to set 802.1Q and DiffServ.

### ***Prerequisites for Windows 2000 Professional 802.1Q/DiffServ:***

To enable QoS on Windows 2000 Professional, the administrator must install the QoS Packet Scheduler as follows:

- Open the Windows Network Properties and click **Install...**
- In the **Select Network Component Type** dialog box, choose **Service** and click **Add...**
- In **Select Network Service** dialog box, choose **QoS Packet Scheduler** and click **OK**.

*Note:* The Windows 2000 Professional CD-ROM may be required.

### ***QoS registry settings assigned by the Configuration Utility***

802.1Q and DiffServ on Windows 2000 Professional - Windows 2000 Professional requires a system-wide registry key setting to enable QoS

Figure 23  
QoS tab



capabilities. This value can be created and modified only with Administrator privileges. The key is:

HKEY\_LOCAL\_MACHINE/SYSTEM/CurrentControlSet/Services/  
Qosp/EnablePriorityBoost

The entry is a DWORD value and its values are:

<b>Value</b>	<b>Description</b>
0	Do not enable QoS (default value which is equivalent to the absence of the key).
1	Enable QoS.

Qosp and Qosp/EnablePriorityBoost are not created by default during installation. This is a system-wide registry setting that affects other applications and OS components. It is in effect only if the Windows packet scheduler is installed. See Table 24.

**Table 24**  
**QoS screen settings (Part 1 of 2)**

<b>Attribute</b>	<b>Description</b>
On	Select this option to turn 802.1q/p QoS on. When you select this option and the QoS Service is installed and running, the IP Softphone 2050 adds 802.1q/p to the IP Softphone 2050 packets. It assigns 802.1p as determined by the Communication Server definition (default 6).
Off	Select this option to turn 802.1q/p QoS off. When you select this option, the IP Softphone 2050 does not add 802.1q/p to the IP Softphone 2050 packets, regardless of whether or not the QoS Server is present.

**Table 24**  
**QoS screen settings (Part 2 of 2)**

Attribute	Description
Automatic detection	<p>Select this option if you want the IP Softphone 2050 to decide if 802.1q/p QoS is used.</p> <p>When you select this option, the IP Softphone 2050 attempts to connect with 802.1q added to the packets. If the attempt is successful, then the IP Softphone 2050 uses 802.1q/p. If the attempt fails (there is a time out approximately 1 second), the IP Softphone 2050 attempts to connect again without adding 802.1q/p to the packets. This is the default option.</p>
Apply to all users	<p>Users with administrator privileges (as determined by Windows) can apply the QoS settings to all users on a computer.</p>

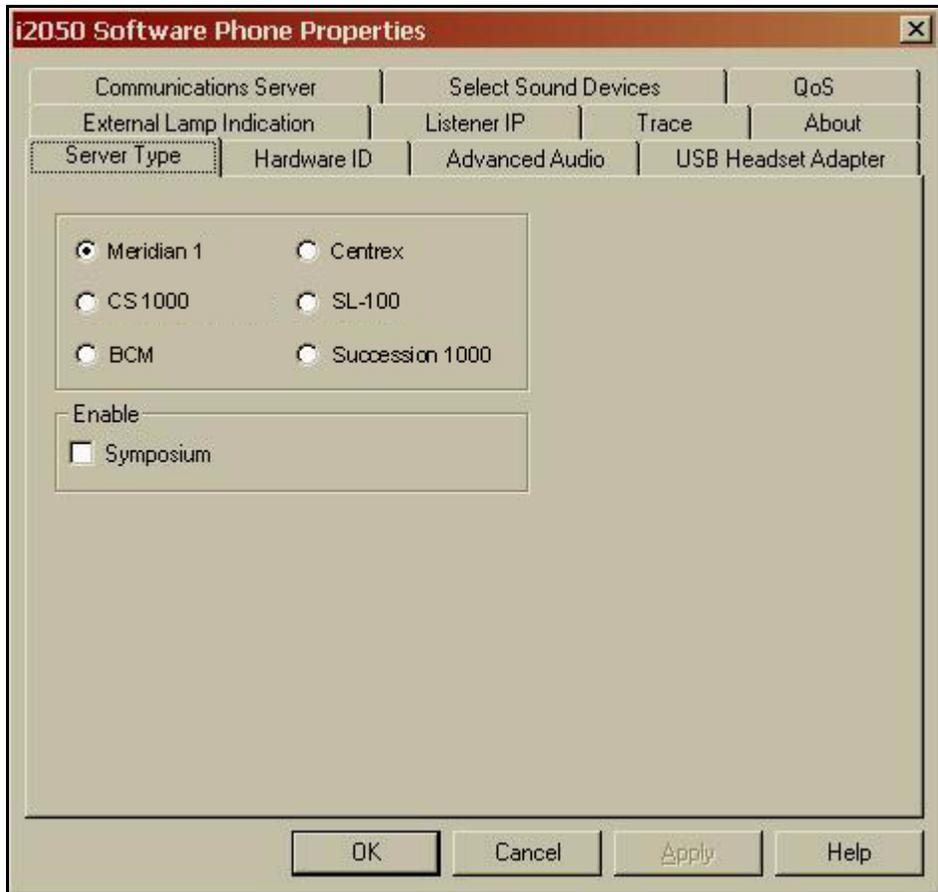
## Server Type tab

Select, for example, CS 1000 or Meridian 1, for the Server Type (see Figure 24 on [page 171](#)). If the IP Softphone 2050 is used in an ACD agent environment, select the Symposium check box for ACD Hookswitch Enable.

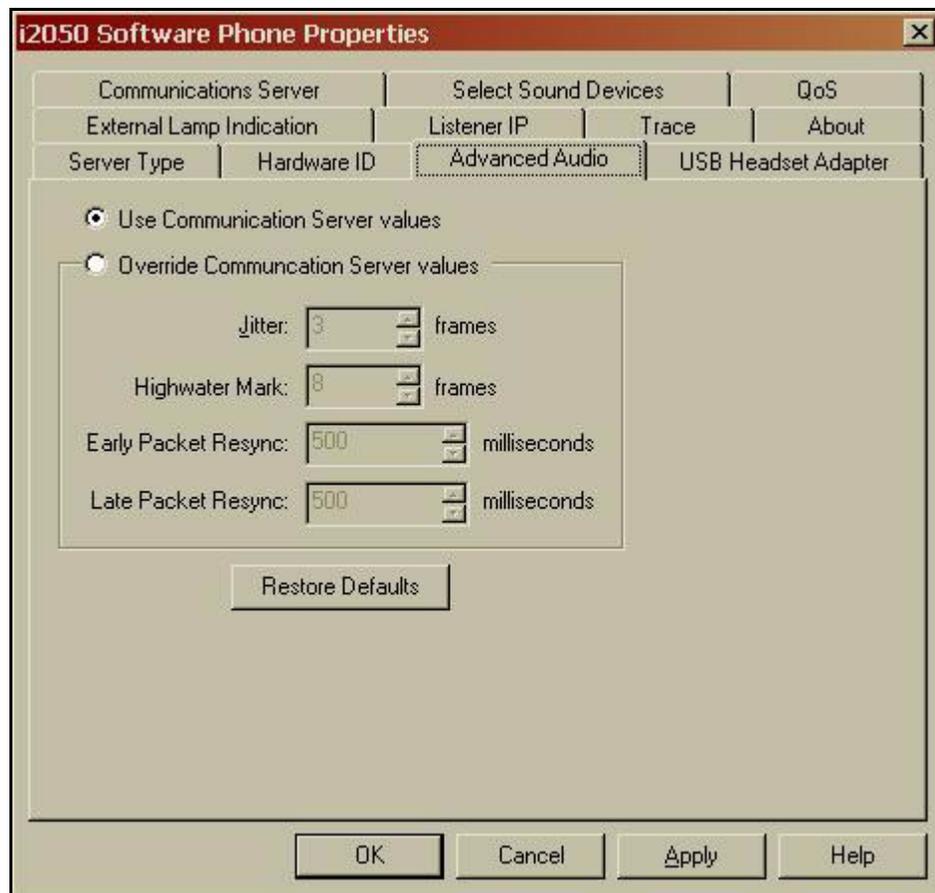
The Hardware ID is sent to the TPS to uniquely identify an IP Softphone 2050. The MAC address for the PC NIC is a large part of the Hardware ID. The Hardware ID must not be changed.

## Advanced Audio tab

Under normal circumstances, **Use Communication Server values** should be selected (see Figure 25 on [page 172](#)). This uses the jitter buffer parameters sent from the TPS. Select **Override Communication Server values** to set the jitter buffer. This is not recommended because incorrect communication server values may adversely impact voice quality.

**Figure 24**  
**Server Type tab**

**Figure 25**  
**Advanced Audio tab**



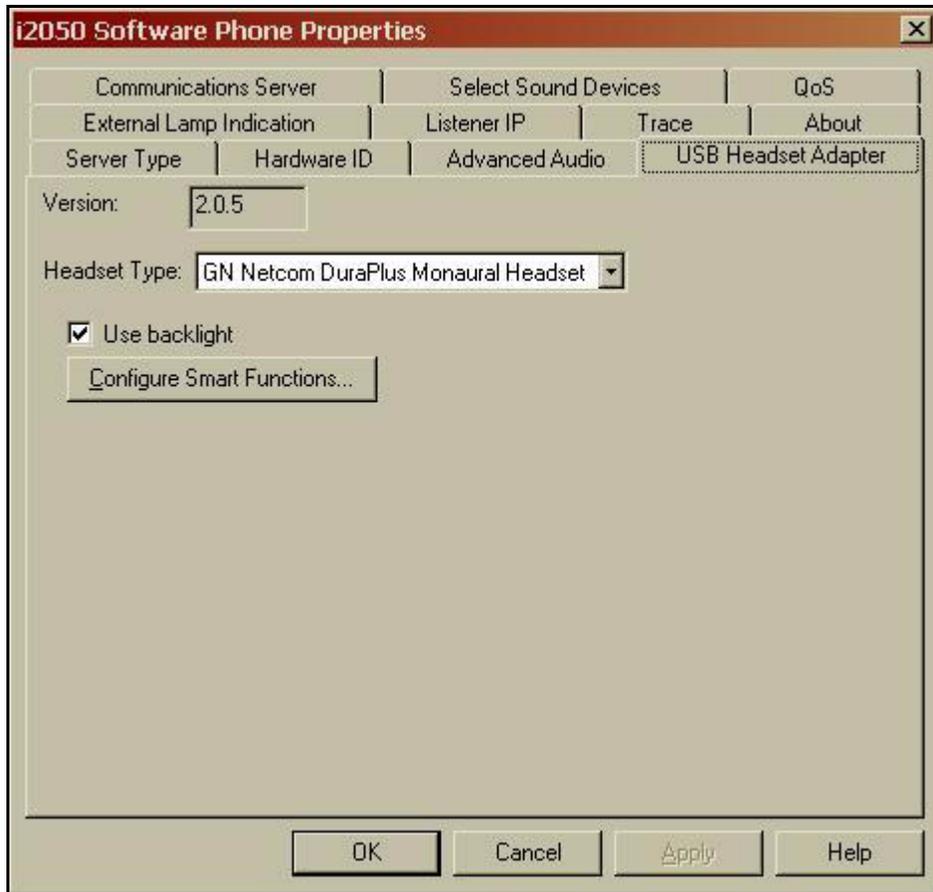
## USB Headset Adapter tab

Table 25 describes the settings for the USB Headset Adapter tab (see Figure 26 on [page 174](#)).

**Table 25**  
**USB Headset Adapter tab settings**

Attribute	Description
Version	<p>Shows the version of the USB Headset Adapter.</p> <p><b>Note:</b> If the USB Headset Adapter is not recognized or has a version number lower than 2.0, the other features are grayed out and unavailable.</p>
Headset Type	<p>Select the type of headset that you have connected to the USB Headset Adapter. For optimal performance, use a headset that matches one of the options that appear on the <b>Headset Type</b> drop-down list.</p> <p><b>Note:</b> Due to differences in headset construction, you may not get optimal audio performance when using a headset that does not appear on the list.</p>
Use backlight	<p>Select this check box to enable the backlight for the USB Headset Adapter buttons. Clear this check box to disable the backlight for the USB Headset Adapter buttons.</p> <p><b>Note:</b> When you enable the backlight, you can use the state of the backlight to quickly determine if the IP Softphone 2050 is running. When the backlight is on, the IP Softphone 2050 is running. When the backlight is off, the IP Softphone 2050 is not running.</p>
Configure Smart Functions	<p>Click this button to set the options that are available when you press the Smart Functions button on the USB Headset Adapter.</p>

**Figure 26**  
**USB Headset Adapter tab**



### **External Lamp Indication tab**

Note: The External Lamp is an optional component. It is normally not included with the USB Headset Adapter and must be ordered separately. The external lamp is also known as an “In-Use Indicator” lamp.

To connect the External Lamp to the USB Headset Adapter, plug the External Lamp cable into the 2.5 mm output jack on the USB Headset Adapter.

Table 26 describes the settings for the External Lamp Indication tab (see Figure 27 on [page 177](#)).

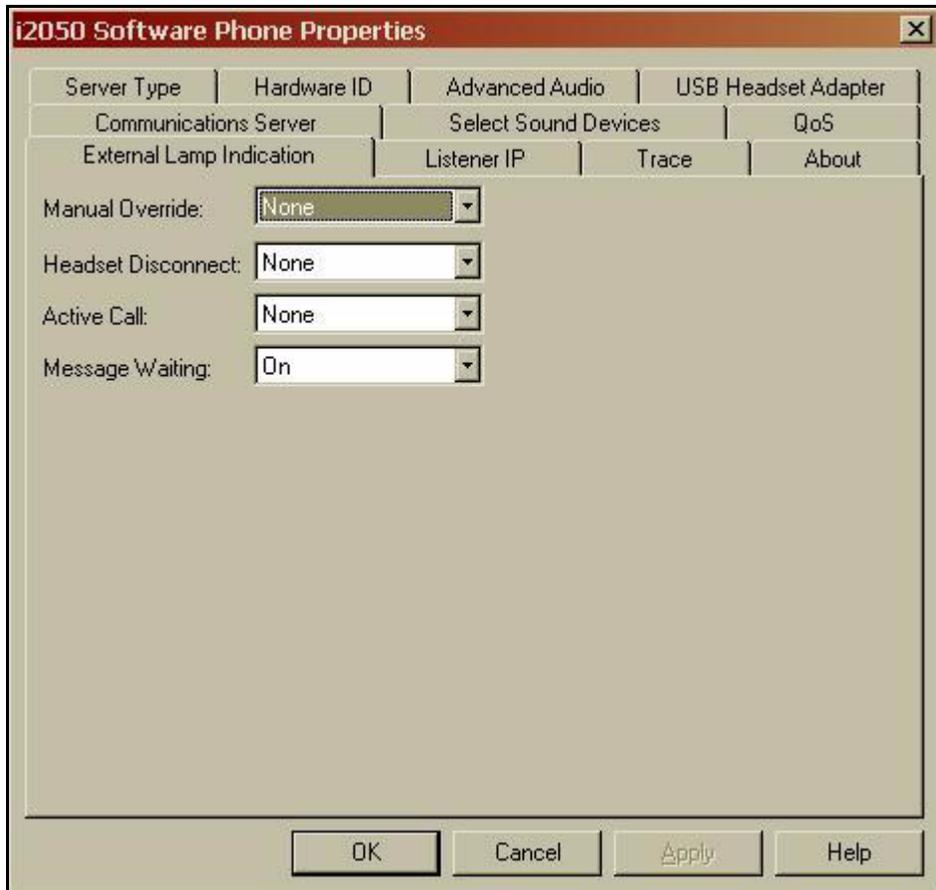
**Table 26**  
**External Lamp Indication tab settings (Part 1 of 2)**

Attribute	Description
Manual Override	<p>Select one of the cadences to enable the Manual Override feature, or select <b>None</b> to disable this feature.</p> <p>When Manual Override is enabled, you can turn on the external lamp using the <b>Configure IP Softphone 2050 Smart Functions</b> button on the USB Headset Adapter.</p> <p><b>Note:</b> The available cadences are listed at the end of the table.</p>
Headset Disconnect	<p>Select one of the cadences to indicate when the headset is disconnected from the USB Headset Adapter. Select None to disable this feature.</p> <p><b>Note:</b> The available cadences are listed at the end of the table.</p>
Active Call	<p>Select one of the cadences to indicate when there is an active call on the IP Softphone 2050. Select <b>None</b> to disable this feature. If you select a cadence for Active Call and the USB Headset Adapter is selected as the Ringing Speaker, the external lamp also indicates when there is a call ringing on the IP Softphone 2050.</p> <p><b>Note 1:</b> If you select the Active Call cadence, the external lamp also turns on or flashes when another application uses the audio channel for the USB Headset Adapter.</p> <p><b>Note 2:</b> For information about setting the ringing device, refer to “Select Sound Devices tab” on <a href="#">page 163</a>.</p> <p><b>Note 3:</b> The available cadences are listed at the end of this table.</p>

**Table 26**  
**External Lamp Indication tab settings (Part 2 of 2)**

Attribute	Description
Message Waiting	<p>Select one of the cadences to indicate when the IP Softphone 2050 message waiting light is on. Select <b>None</b> to disable this feature.</p> <p><b>Note 1:</b> The IP Softphone 2050 message waiting light normally indicates that there is a message waiting. However, most systems also turn on or flash the message waiting light when the IP Softphone 2050 is ringing.</p> <p><b>Note 2:</b> The available cadences are listed at the end of this table.</p>
	<p>The available cadences are:</p> <ul style="list-style-type: none"> <li>• On – The external lamp is solid.</li> <li>• Flash – The external lamp cycles at the following rate: 0.5 seconds on; 0.5 seconds off.</li> <li>• Flicker – The external lamp cycles at the following rate: 1.625 seconds on; 0.375 seconds off.</li> <li>• Blink – The external lamp cycles at the following rate: 0.5 seconds on; 1.5 seconds off.</li> </ul>
	<p><b>Note:</b> If more than one External Lamp Indication option is enabled and active, the external lamp shows the cadence of the option with highest priority. The priority of the External Lamp Indication options from highest to lowest is: Manual Override, Headset Disconnect, Active Call, and Message Waiting. For example, if there is a message waiting and an active call, the cadence for Active Call is used for the external lamp.</p>

**Figure 27**  
**External Lamp Indication tab**



## Listener IP tab

The Listener IP screen (see Figure 28 on [page 179](#)) is intended for expert users only. This screen identifies the IP addresses and ports where the IP Softphone 2050 is listening for traffic from the Communication Server. You can use this screen to override the port assignments when there is a conflicting application on the computer. Table 27 describes the Listener IP attributes that can be configured.

**Table 27**  
**Listener IP screen settings**

Attribute	Description
Use all addresses	The IP Softphone 2050 listens to the IP addresses on all of the network interface cards on the PC for traffic from the Communication Server. This is the normal mode of operation.  This is the default value.
Use specific address	Enter a specific address if there is more than one Ethernet card and an application conflict exists.
Port	Adjust the Port value if another application on the computer is using the same port. The two applications can co-exist by moving the port or IP address that the IP Softphone 2050 is listening to. The IP Softphone 2050 uses port 4100 to communicate from the PC.

## Trace tab

This option is for expert-level debugging. The Trace feature is turned off by default. Use this feature only for debugging purposes.

**Figure 28**  
**Listener IP tab**

## Running the IP Softphone 2050 for the first time

Start the IP Softphone 2050 in one of the following ways:

- Select **Start > Programs > Nortel Networks > IP Softphone 2050**.
- Click the desktop shortcut (if one was created during the installation).
- Click **Automatic startup sequence**.

**Note:** If you want the IP Softphone 2050 to start automatically when the machine boots up, create a shortcut to the application in the Startup folder.

When an IP Softphone 2050 is started for the first time and connects to the network, it needs to execute the following start-up sequence:

- 1 Get the IP parameters.
- 2 Find a Media Gateway server and authenticate the user.

As the IP Softphone 2050 registers with the Voice Gateway Media Card:

- If a non-null node password is enabled, it prompts for a node number and password. Enter the node number and password using the keyboard or numeric key pad. After the password is verified, enter the TN of the IP Softphone 2050. Refer to *IP Line: Description, Installation, and Operation* (553-3001-365) for more on the password feature.
- If the null node password is configured and enabled, these screens are skipped and no option is provided to change the password.
- If the node password is disabled or not configured, it prompts for a node number and TN. Enter the node number and TN using the keyboard or numeric key pad.

The IP Softphone 2050 is now configured and can be used.

## Changing the TN of an existing IP Softphone 2050

This procedure is required for a new user of the IP Softphone 2050 application.

### Procedure 31

#### Changing the TN of an existing IP Softphone 2050

- 1 Exit the IP Softphone 2050 application.
- 2 Restart the IP Softphone 2050 application.  
  
If the node password is not configured, or is configured but disabled, go to Step 3.  
  
If the node password is configured and enabled for the node, go to Step 4.
- 3 During startup, the IP Softphone 2050 registers again with the TPS and the IP Softphone 2050 displays the existing node number and TN for approximately five seconds.
- 4 If the password is configured and enabled for the node, the node number and password prompt displays for approximately five seconds; enter the correct password within this five-second period.  
  
If the user activates the **Clear** soft key during the five-second period, the existing node and TN are cleared and the user is prompted for new parameters.

---

End of Procedure

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## Removing an IP Softphone 2050 from service

### Procedure 32

#### Removing an IP Softphone 2050 from service

- 1 Exit the IP Softphone 2050 application.
- 2 Uninstall the IP Softphone 2050 application from the PC by removing it through Windows Add/Remove Programs.
- 3 In LD 11, OUT the TN.

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End of Procedure

---



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# Nortel Networks Mobile Voice Client 2050

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## Introduction

This section describes how to install, configure, and remove the Nortel Networks Mobile Voice Client 2050. For information on using the MVC 2050, see the *IP Softphone 2050 and Mobile Voice Client 2050 User Guide*.

This section contains the following procedures:

- Procedure 33, “ Starting MVC 2050” on [page 208](#).

- Procedure 34, “ Synchronizing a PDA with a desktop PC using ActiveSync” on [page 209](#).
- Procedure 35, “ Installing MVC 2050” on [page 210](#).
- Procedure 36, “ Removing MVC 2050 from your PDA” on [page 211](#).
- Procedure 37, “ Enable Auto-Create” on [page 217](#).
- Procedure 38, “ Disabling Automatic Gain Control” on [page 223](#).

## Description

Mobile Voice Client (MVC) 2050 adds wireless IP Phone services to the convenience of Personal Digital Assistants (PDAs). MVC 2050 functions like an IP Softphone 2050. However, MVC 2050 cannot be used as an Agent or Supervisor in Call Center Portal applications.

MVC 2050 is UNISTim-based software providing real-time voice communication, over a WLAN, to PDAs.

MVC 2050 operates on PDAs running the Windows Mobile 2003 operating system and can use WLAN 802.11b, interworking with various enterprise communication servers. MVC 2050 can also interwork with WLAN Access Points (WAP) and can use the WSS 2250 WLAN Security Switch. MVC 2050 can coexist with a secure Virtual Private Network (VPN) client on the same PDA. MVC 2050 requires access to an enterprise or public WLAN Access Point (WAP).

MVC 2050 is compatible with the following communication servers:

- CS 1000S
- CS 1000M
- CS 1000E
- Meridian 1

MVC 2050 supports the following:

- IP telephony features such as Messages, Directory, Shift, Services, Expand, Copy, and Quit
- audible notification of connection or disconnection to the server

- **Hold, Goodbye, Answer, Volume Up, Volume Down, Mute, Navigation** keys
- macro functions for programming lengthy dialing patterns  
*Note:* Pause is available to build into the macro to introduce a delay which may be required to access some Interactive Voice Response (IVR) applications and voicemail systems.
- contacts application: locally stored in the PDA Contacts application or linked to an external application, such as Microsoft Outlook, on a desktop
- network access and DHCP-configurable services (automatic configuration of communication server location using DHCP)
- connection to end user-supplied headsets for the speech path
- online help
- six programmable line/feature keys
- four soft keys (self-labeled)
- 12-button dialpad
- multi-field display
- end user-selectable skins

## System components

MVC 2050 is comprised of:

- MVC 2050 application software, including Global IP Sound NetEQ™ software
- end user-supplied compatible PDA
- end user-supplied headset

## Compatible PDAs

MVC 2050 is compatible with the following PDAs:

- Dell® Axim® X5

- Dell Axim X3/X3i
- Hewlett Packard® iPAQ® h5550/h5555
- Toshiba e750/e755
- Toshiba e800/e805

*Note:* The Dell Axim X3, 300 MHz model, is not supported for use with MVC 2050. Since the PDA industry evolves at a rapid pace, contact Nortel Networks technical support to determine the latest PDA models tested and supported, and for information about any known issues.

## Headsets

Headsets are end user-supplied and are an important component of audio quality. The iPAQ and Toshiba PDAs support stereo headphones and microphones like the iPAQ certified Plantronics M130 Adjustable Fit Headset. The Dell Axim X5 supports stereo headphones, but not a microphone. The Jensen JM-11 Behind-the-Neck Headphone has been tested with the MVC 2050. Consult the PDA manufacturer for headphone recommendations.



### **CAUTION**

MVC 2050 does not support the use of Bluetooth headsets and accessories. Bluetooth and the 802.11b WLAN interface operate on the same frequency band and use the same WLAN hardware on the PDA. Therefore, using Bluetooth with MVC 2050 decreases audio quality.

### **Automatic Gain Control and feedback**

Since MVC 2050 requires a headset to operate properly, disable **Automatic Gain Control**. See “Automatic Gain Control and feedback” on [page 222](#).

*Note:* When the PDA is used in handsfree mode, without a headset, the PDA microphone picks up sounds from the speaker, creating a feedback loop. **Automatic Gain Control** is used in this instance to avoid feedback.

### **Audio quality**

MVC 2050 provides a high-quality audio environment, including:

- NetEQ software (included with the software package)
- interworking with G.711 codec providing high audio quality without compression; MVC 2050 supports G.711-64 A-law and U-law.
- **Audio** selection tab providing a user-selectable quality slider
- **Advanced Audio** tab for expert users

## **Application software**

MVC 2050 is a software application that enables voice communications over a WLAN from a PDA.

The MVC 2050 software application is comprised of the following components:

- MVC 2050 software
- NetEQ software (included in MVC 2050 software)

MVC 2050 supports use of the following:

- flexible interface including:
  - end user-selectable skins to provide a variety of screen appearances
  - retractable Toolbar
  - six programmable line/feature keys (number of features available is call-server dependent)
  - four soft keys (self-labeled)
  - 12-button dialpad
  - profiles the user can customize

- contacts list the user can customize
- programmable macro functions for lengthy dialing patterns
- run-in-background application that allows the user to close the MVC 2050 interface but leave it running to allow incoming calls
- 802.11b WLAN interface
- automatic configuration of communication server location using Dynamic Host Configuration Protocol (DHCP)
- features and services provided by the network (such as call features and voicemail)
- online Help
- G.711 codec for operation without compression

## ClearType

MVC 2050 uses a special screen font which requires that Microsoft ClearType® be enabled on your PDA. ClearType software improves the appearance and readability of text on liquid crystal display (LCD), pocket PC screens, and flat panel monitors.

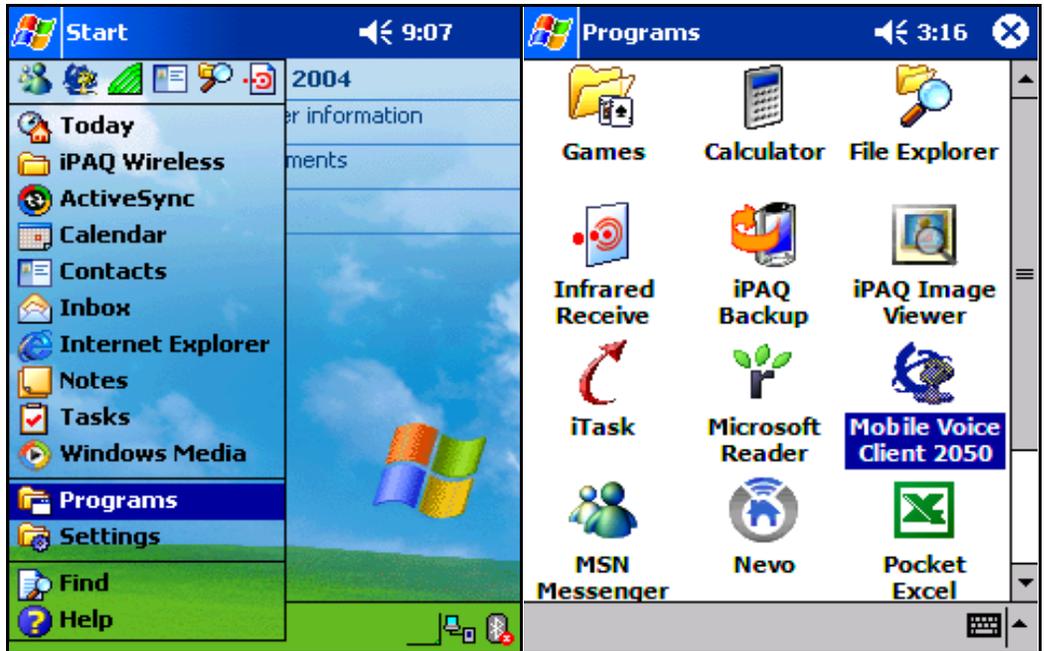
## MVC 2050 Call Handling screen

From the Call Handling screen, the end user can access and operate most features available on MVC 2050 (see Figure 29 on [page 189](#)). Calls can be answered or dial tone obtained by selecting **Answer** from the **Keys** menu or using the **Headset/Answer** icon. (see Figure 30 on [page 190](#)).

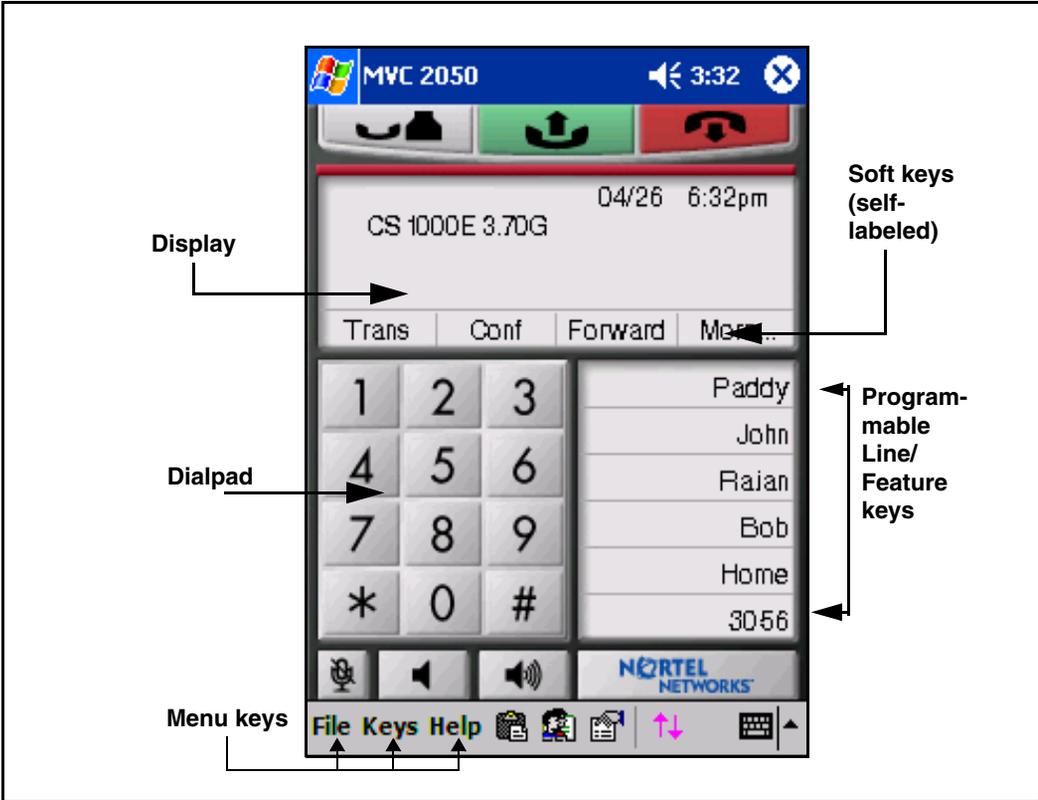
The Call Handling screen contains the telephone dialpad. The appearance of the Call Handling screen differs with each available skin. See “MVC 2050 graphical interface (skins) components” on [page 198](#). The current skin can be determined using the **Settings > Skin** dialog box. All skins share common components.

**Note:** You can use the up, down, left, and right cursor control arrow keys on your PDA as navigation buttons to navigate around the skin and move through the menu items.

Figure 29  
Starting the MVC 2050 from the Main Application screen



**Figure 30**  
**Call Handling screen**



## Display

The display is located in the central area of the skin. Messages and text are viewed on the display. See Figure 30.

## Dialpad

The twelve-button dialpad is located on the left side of the skin. See Figure 30.

## Soft keys (self-labeled)

There are four soft keys (self-labeled) located in the bottom row of the display. The labels on these keys depend on the call server. See Figure 30 on [page 190](#).

## Programmable line/feature keys

There are six programmable line/feature keys located on the right side of the skin. They are aligned vertically and are the same color as the display. The number of features available depends on the call server. See Figure 30 on [page 190](#).

## Menus

MVC 2050 provides the following menus:

- File
- Keys
- Help

### File

The **File** menu provides the following items:

- Run in background
- Paste
- Contacts
- Settings
- Exit

See Figure 31 on [page 192](#).

**Figure 31**  
**File Menu screen**



***Run-in-background***

Select **Run-in-background** to close MVC 2050 but allow it to keep running in the background so that incoming calls can ring on your PDA.

After you have completed your call, press the **X** in the upper right-hand corner of the PDA display to close the **MVC 2050** application and return it to the background.

***Paste***

Select **Paste** to paste a telephone number into your PDA from another application to place a call rather than entering an existing telephone number through your Call Handling screen dialpad.

### **Contacts**

Select **Contacts** to launch the **Contacts** dialog box. The Contacts application reads a list of contacts from the PDA Contacts list or from a list which you have synchronized onto your PDA from Outlook.

### **Settings**

Select **Settings** to provide access to the **Settings** submenu. The **Settings** menu provides windows for **Personal** settings, **System** settings, and **Connections** settings. See “Settings” on [page 213](#).

The **System** settings window provides access to settings for **memory**, **power**, **remove programs**, **screen** and **regional** settings, **iTask** settings, and **self test**.

*Note:* A reboot of MVC 2050 is required for settings changes to **Profiles**, **Hardware ID**, **Sounds**, **Servers**, and **Listener IP** to take effect.

### **Exit**

Select **Exit** to close MVC 2050. Once **Exit** has been activated, calls cannot be received until the application is re-started.

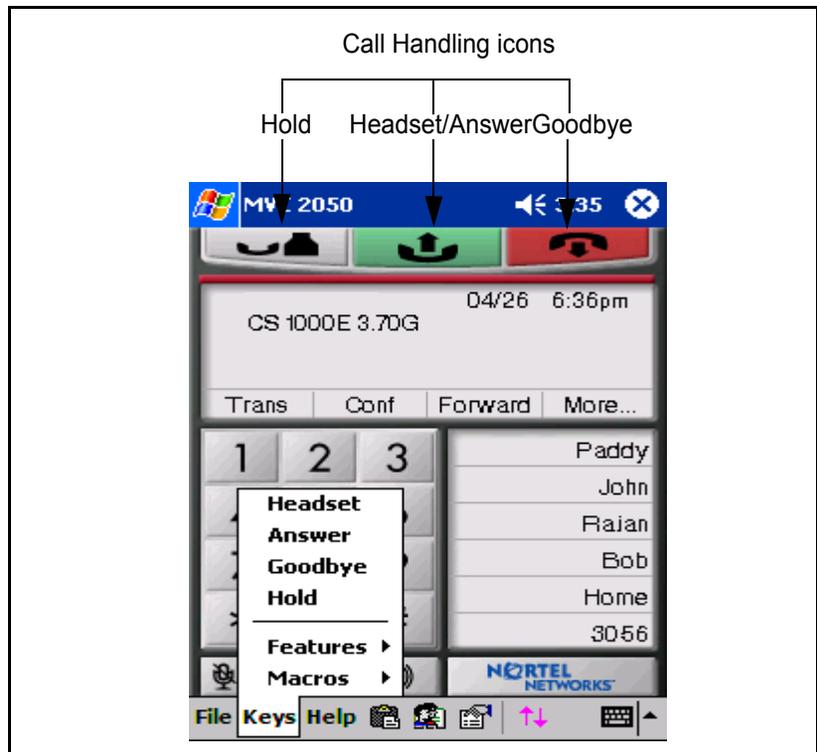
*Note:* Selecting **Exit** frees up PDA-processing resources.

### **Keys**

The **Keys** menu provides the following items: See Figure 32 on [page 194](#).

- Headset
- Answer
- Goodbye
- Hold
- Features
- Macros

**Figure 32**  
**Keys menu**



### **Headset**

Select **Headset** to answer an incoming call or to obtain dial tone to place a call (see Figure 32, "Keys menu"). You can also use the **Headset/Answer** icon located at the top, center of the screen.

### **Answer**

Select **Answer** to answer an incoming call or to obtain dial tone to place a call. You can also use the **Headset/Answer** icon on the Call Handling screen to answer an incoming call or obtain dial tone (see the **Headset/Answer** icon, located at the top, center of the screen. See Figure 32, "Keys menu").

**Goodbye**

Select **Goodbye** to end a call. You can also use the **Goodbye** icon located at the top right of the screen. See Figure 32 on [page 194](#).

**Hold**

Select **Hold** to place a call on hold. You can also use the **Hold** icon located at the top left of the screen. See Figure 32 on [page 194](#).

**Features**

Select **Features** from the **Keys** menu to access a menu of interface keys. See Figure 33 on [page 196](#).

Meridian 1, CS 1000S, CS 1000M, and CS 1000E communication servers provide the following default **Features** menu:

- Messages
- Shift
- Directory
- Services
- Expand
- Copy
- Quit
- Redial List
- Callers List

To re-arrange items on this list, open the **Settings** menu and select the **Features** tab. Items on this list cannot be added or removed.

**Figure 33**  
**Keys > Features screen**



### ***Macros***

Select **Macros** from the **Keys > Features** submenu to access macros (also available through the **Settings > Macros** dialog box). Macros can be used to make speed-dials, access voicemail, and other routine functions faster and easier. For more information about macros see “Macros” on [page 227](#).

## Help

Select **Help** to access the MVC 2050 PDA-specific version of **Help**. See Figure 34.

**Figure 34**  
**Help menu**



The **Help** menu provides the following items:

- Contents
- Diagnostics
- About MVC 2050

### **Contents**

Select the **Contents** menu item to access the **Help** system.

### ***Diagnostics***

Diagnostics provides access to a list of methods to determine server connection state.

Following are the diagnostic methods provided:

- Ping
- TraceRoute
- RUDP Ping

Also see “Profiles” on [page 219](#) for information on importing and exporting profiles to assist in troubleshooting.

### ***About MVC 2050***

**About MVC 2050** identifies the MVC 2050 application. Select **About MVC 2050** to view configuration information for your MVC 2050 (such as system product name, version number, copyright indication, manufacturer’s name and logo, and Global IP Sound name and logo). MVC 2050 uses packet loss concealment provided by Global IP Sound NetEQ software.

## **MVC 2050 graphical interface (skins) components**

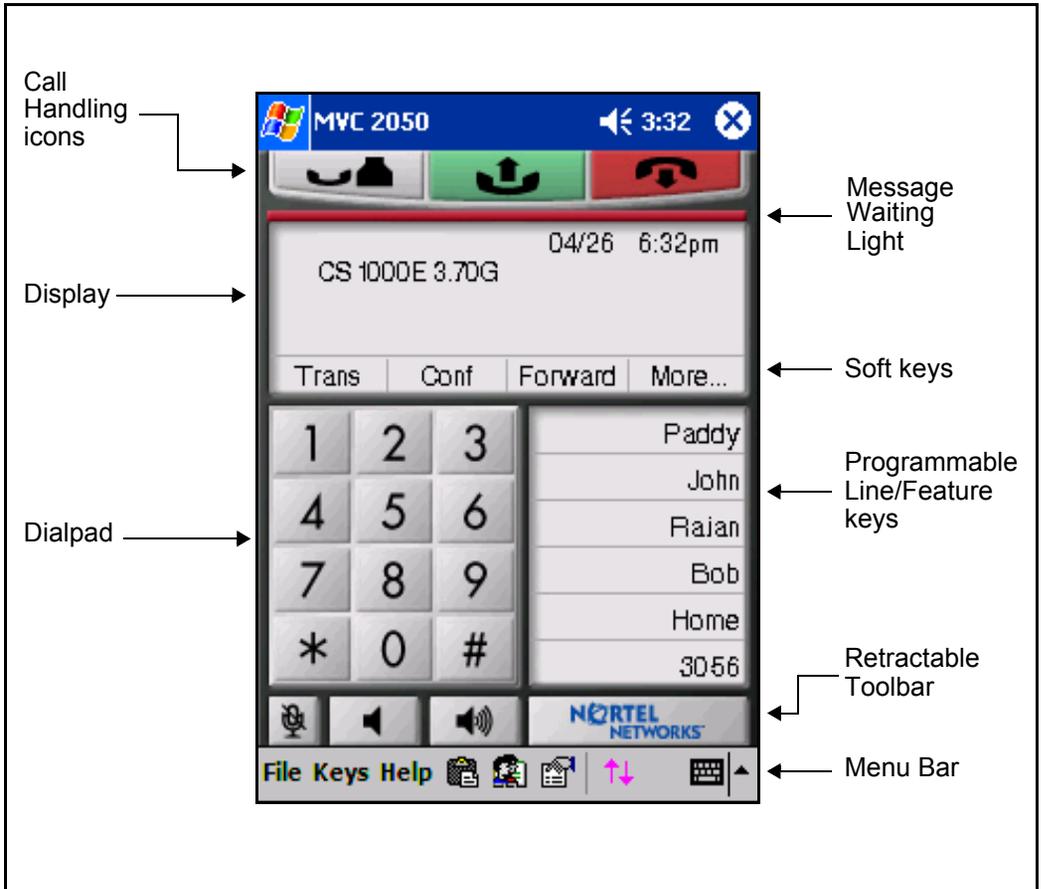
MVC 2050 provides alternative graphical images known as skins. The dialpad, menu, and icon buttons are located on the skin. Skins come in several colors and arrangements. See Figures 35 to 39, starting on page 199.

All skins share the following common components. See Figure 35 on [page 199](#).

- programmable line/feature keys
- soft keys (self-labeled)
- dialpad
- display
- Call Handling icons
- Toolbar icons
- Menu Bar icons

- retractable toolbar
- Message Waiting light
- System Input Panel icon

**Figure 35**  
**Graphical image (skin), common components**



**Figure 36**  
**Black skin**



**Figure 37**  
**Blue skin**



**Figure 38**  
**Lime skin**



**Figure 39**  
**Round skin**



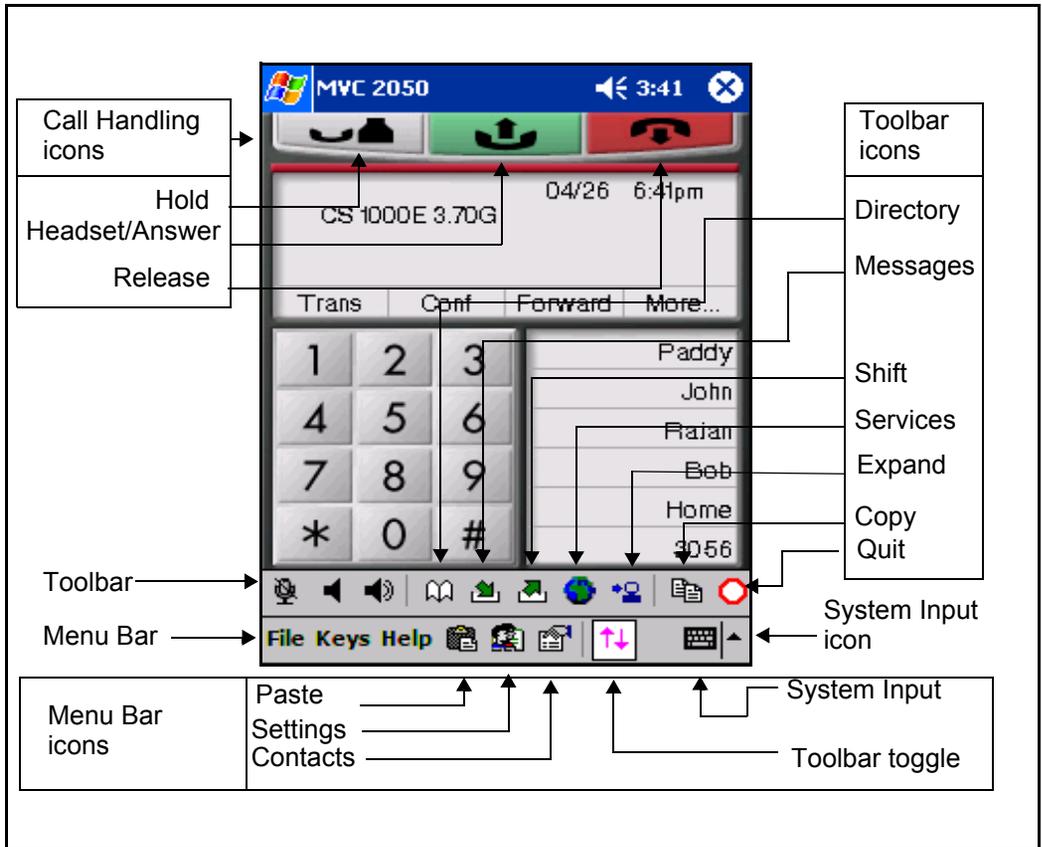
## Icons

The MVC 2050 Call Handling screen presents icon equivalents for menu items. See Figure 40: “ Call Handling screen icons (with Toolbar retracted)” on [page 203](#).

Icons can be divided into three types:

- Call Handling icons
- Toolbar icons
- Menu Bar icons

**Figure 40**  
**Call Handling screen icons (with Toolbar retracted)**



**Call Handling icons**

There are three Call Handling icons across the top of the Call Handling screen. See Figure 40.

The following are the Call Handling icons:

- Hold
- Headset/Answer
- Release

## Menu Bar icons

MVC 2050 provides icons which can be used instead of text menu equivalents. See Figure 40 on [page 203](#).

The following are the Menu Bar icons:

- Paste
- Contacts
- Settings
- Toolbar toggle
- System Input icon

## Toolbar icons

The retractable toolbar contains icons which are not present on the remainder of the display. The icons are located at the bottom of the skin and are visible when the Toolbar is retracted. You can retract the **Toolbar** using the **Toolbar Toggle** icon at the bottom of the screen. See Figure 40 on [page 203](#).

The following are the icons visible on the Toolbar:

- Mute
- Volume Down
- Volume Up

The following are the icons visible when the Toolbar is retracted:

- Mute
- Volume Down
- Volume Up
- Directory
- Messages
- Shift
- Services
- Expand

- Copy
- Quit

### **System Input Panel**

To access the **System Input Panel** from MVC 2050, tap the **System Input Panel** icon on the Menu Bar in the bottom right-hand corner of the PDA. See Figure 40 on [page 203](#). Consult the PDA documentation for a description of the System Input Panel.

You can use the System Input Panel to enter data for MVC 2050 and other applications. To enter data, use the keyboard or the transcriber. See Figure 41 on [page 206](#) for an example of transcriber use.

The following are the default System Input Panels:

- Block Recognizer
- Keyboard
- Letter Recognizer
- Transcriber

**Figure 41**  
**System Input using a transcriber**



Using the MVC 2050 application, the keyboard can act like a dialpad, interpreting the alphabetical keys as numbers. For instance, if you type a J, K, or L, it is interpreted as a number five (5). Keys which are not alphanumeric are ignored.

## Operating parameters

The operating parameters for MVC 2050 are as follows:

- MVC 2050 application supports English language only.
- MVC 2050 is supported on PDAs running Windows Mobile 2003.

The following are the minimum recommended PDA hardware specifications:

- CPU type Intel XScale® PXA 255, speed 400 MHz
- Memory 48 Mb ROM, 64 Mb RAM

## Software requirements

MVC 2050 requires Windows Mobile 2003.

For secure Virtual Private Network (VPN) access to a network, a VPN client is required. The certicom™ movianVPN™ client and the Apani™ Networks VPN client have been tested with MVC 2050. The VPN client runs on the PDA and is similar to the Contivity client that runs on a PC. The VPN client can establish the necessary IPsec tunnel through a Contivity server.

## Operation

Use Procedure 37 to start MVC 2050.

### Procedure 33 Starting MVC 2050

- 1 From the **Main Application** screen, select **Programs**.
- 2 Select **Start**.
- 3 Select **Mobile Voice Client 2050**. The Call Handling screen appears. (See "MVC 2050 Call Handling screen" on [page 188](#)).

---

#### End of Procedure

---



#### CAUTION

PDA processor models, speed, and amount of memory vary. To maintain audio quality, do not overload the processor with intensive tasks while using MVC 2050. For example, Nortel Networks does not recommend using your PDA's version of Internet Explorer while using MVC 2050.

PDA processor speed can have adverse effects on MVC 2050 performance.

#### IMPORTANT!

Set the PDA processor speed to the highest setting or to auto, which changes the processor speed according to system status. To set the PDA processor speed, select:

**Start > Setting > System > Power > Processor or CPU speed**, depending on the type of PDA.

PDA battery life can affect the MVC 2050 call duration and the call volume.

**IMPORTANT!**

PDA vendors offer two types of rechargeable battery: standard and extended-life. The extended-life battery is recommended. It provides longer call duration and increased call volume than the standard-life battery.

## **MVC 2050 installation**

If an older version of MCV 2050 is installed on the PDA, remove it prior to installing a newer version. See “MVC 2050 removal” on [page 211](#).

To install MVC 2050 on the PDA:

- 1 Place the PDA in its cradle.
- 2 Synchronize the PDA with a desktop PC running Microsoft® ActiveSync® using Procedure 34.
- 3 Install the MVC 2050 from a Desktop using Procedure 35 on [page 210](#).

## **MVC 2050 installation method**

MVC 2050 supports installation from a docked PDA with a Microsoft ActiveSync connection to a desktop PC.

### **Synchronizing a PDA with a desktop PC**

Use Procedure 34 to synchronize your PDA with your desktop PC.

#### **Procedure 34**

#### **Synchronizing a PDA with a desktop PC using ActiveSync**

- 1 Place the PDA in its cradle.
- 2 Ensure that ActiveSync is running.
- 3 Wait for the PDA and the PC to synchronize. See Figure 42 on [page 210](#).

---

**End of Procedure**

---

For details about synchronizing a PDA with a desktop PC, refer to the PDA Users Manual.

**Figure 42**  
**ActiveSync connected screen**



### **Installing MVC 2050 from a Desktop PC using ActiveSync**

Use the following procedure to install MVC 2050 using the product CD.

#### **Procedure 35** **Installing MVC 2050**

- 1 Synchronize the PC and PDA. See Procedure 34 on [page 209](#).
- 2 Insert the MVC 2050 CD into the CD-ROM drive of your desktop PC.
- 3 Go to your desktop and double-click **My Computer**. The PC files and folders menu appears.
- 4 Select the **CD Drive**.
- 5 Select **Setup**.
- 6 Follow the instructions on the screen until the Install Wizard asks you if you want to modify, install, or remove MVC 2050.

- 7 Select **Install**. The Install Wizard installs MVC 2050. When installation finishes, a message displays on the PC:
  - “attend to your device (PDA)”.
  - The PDA displays a message; “do you want to perform a soft restart?”.
- 8 Select **Yes**. Your PDA restarts.

---

**End of Procedure**

---

## MVC 2050 removal

Use the following procedure to remove MVC 2050 from your PDA. See Figure 43 on [page 212](#).

### **Procedure 36** **Removing MVC 2050 from your PDA**

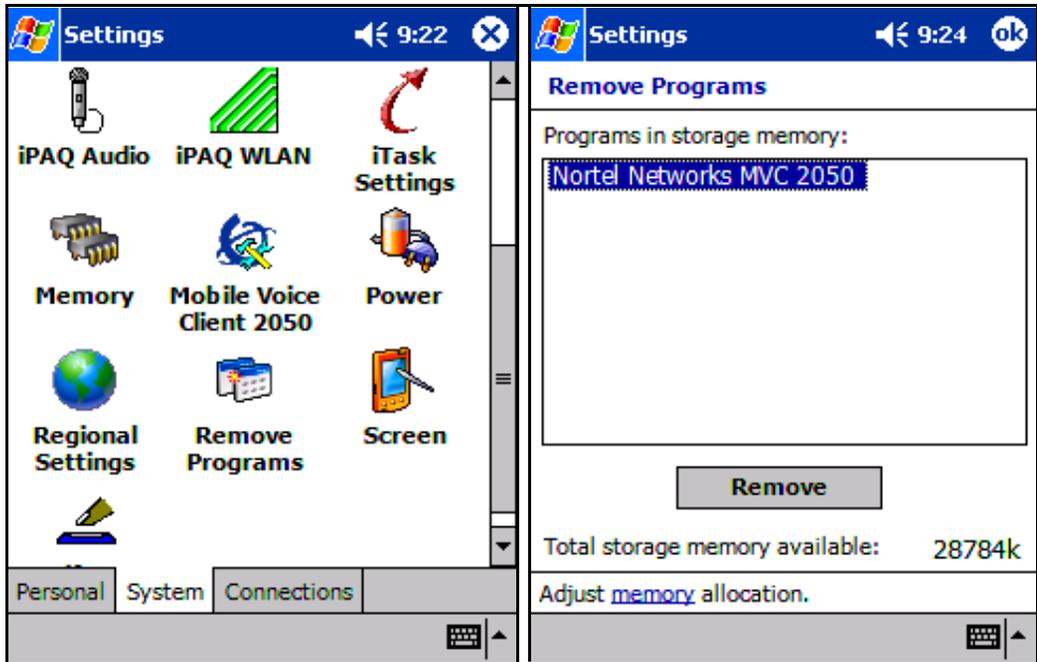
- 1 Select **Start**. A drop-down menu appears.
- 2 Select **Settings**. A Windows folder with a number of programs, usually shown as icons with names and a row of tabs across the bottom, appears.
- 3 Select the **System** tab. Another Windows program folder appears.
- 4 Select **Remove Programs**. A list of programs appears.
- 5 Select **Nortel Networks MVC 2050**.
- 6 Select **Remove**. A dialog box appears, asking you to confirm this decision.
- 7 Select **Yes**. There is a brief pause during removal of MVC 2050. After the pause, a dialog box appears asking if you want to perform a soft reset.
- 8 Select **Yes**. Your PDA restarts and MVC 2050 has been removed.

---

**End of Procedure**

---

Figure 43  
Removing MVC 2050



## Configuration

MVC 2050 has a flexible interface which enables end users to customize configurations for a variety of connections.

### About MVC 2050

**About MVC 2050** identifies the application. Select **About MVC 2050** from the **Help** menu to view configuration information for your system such as the MVC 2050 system product name, version number, copyright indication, manufacturer's name and logo, and the Global IP Sound® name and logo. MVC 2050 uses packet loss concealment provided by Global IP Sound NetEQ software.

## Settings

Select **Settings** from the **File** menu to access the **Settings** submenu. Settings provides windows for **Personal** settings, **System** settings, and **Connections** settings to control the behavior, appearance, and connection status of your MVC 2050.

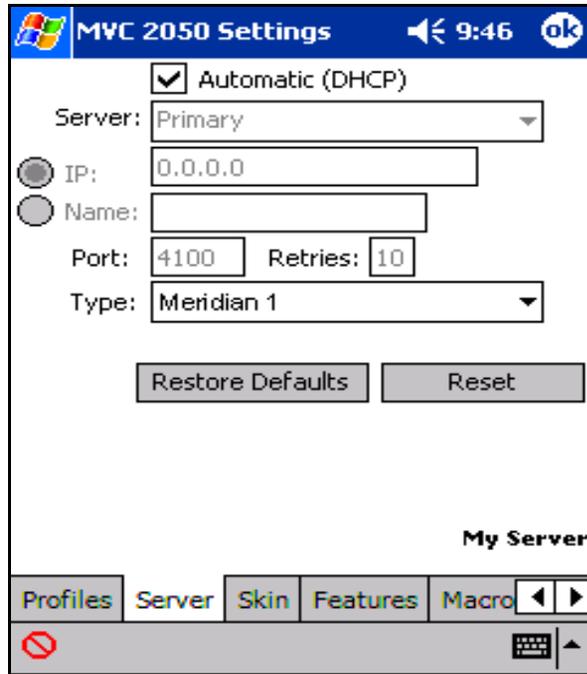
The **System** settings window provides access to settings for **memory**, **power**, **remove programs**, **screen** and **regional** settings, **iTask** settings, and **self test**.

*Note:* A reboot of MVC 2050 is required for settings changes to **Profiles**, **Hardware ID**, **Sounds**, **Servers**, and **Listener IP** to take effect.

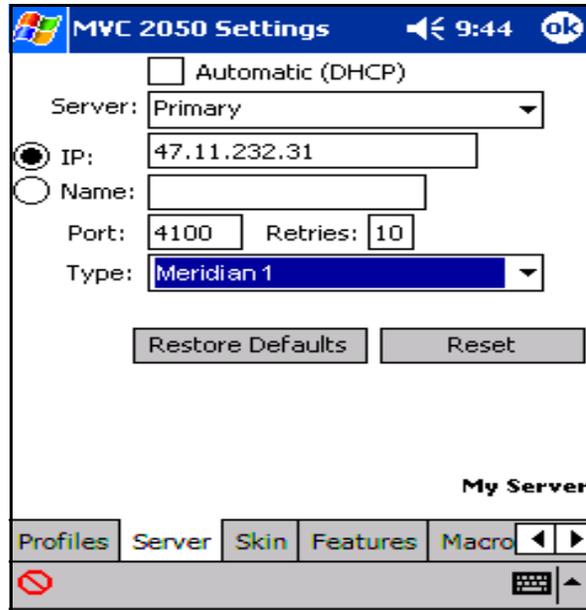
### Server

The **Server** tab, accessible from the **Settings** screen, contains all the settings necessary for MVC 2050 to contact a server. See Figure 44, "DHCP Setting on Server screen" and Figure 45 on [page 215](#). **Settings** on the **Server** tab can be changed to access a different server or you can implement the profile containing the desired server (see "Profiles" on [page 219](#)).

**Figure 44**  
**DHCP Setting on Server screen**



**Figure 45**  
**Assigning Server values**



### Connection history

Connection history writes connection and disconnection indication messages to the registry key “HKCU\Software\Nortel Networks\MVC2050\Log”. This is a circular queue of 29 entries. Each time a connection or disconnection event occurs, a log entry is written. The entries contain a date and time and a description of the connection or disconnection event. Following are the descriptions of the connection and disconnection events.

### ***Soft reset, server n***

**Server n** indicates that the server has instructed MVC 2050 to reset and connect to a server ‘n’ where ‘n’ and its value is determined, and possibly written, by the server. This message maps directly to a UNISlim message.

### ***Server connected***

**Server connected** indicates that MVC 2050 has successfully connected to the server. It means that MVC 2050 received the “Assign TerminalID” UNISlim message, which is the last message received by MVC 2050 before a normal session is started.

### ***Recovering: Server unreachable***

The **Recovering: Server unreachable** message is generated when MVC 2050 loses connection with the server. It indicates that the UNISlim “watchdog timer” has expired and indicates loss of network connection.

### ***Hard Reset***

The **Hard Reset** message indicates that the server has instructed MVC 2050 to reset and clear its UNISlim-related memory. This message maps directly to a UNISlim message.

### **Hardware ID**

The **Hardware ID** screen is used to select the MAC address that MVC 2050 reports to the communication server. The MAC address can be reset.

The **Hardware ID** being used by MVC 2050 can be viewed in the MVC 2050 **Settings** on the **Hardware ID** tab. See Figure 46 on [page 217](#).

Hardware IDs are generated by reading MAC addresses from the PDA Network Interface Card (NIC). When MVC 2050 is used with most server types, the **Hardware ID** it uses must be unique. Some software, such as VPN client software, creates artificial network interfaces with MAC addresses which are not unique. These may be addresses which will be common to all installations of a particular VPN client.

Without a unique MAC address, an MVC 2050 may not be able to connect to a server, or may connect to a server and cause another device with the same hardware ID to be disconnected from the server. If MVC 2050 is disconnected from the server it automatically attempts to reconnect. The resulting conflicts prevent a stable connection from being made.

You can enable **Auto-Create** to prevent conflict with another device. **Auto-Create** fabricates a MAC address with a random value which is unlikely to be repeated by another device.

Use Procedure 37 to enable **Auto-Create**.

**Procedure 37**  
**Enable Auto-Create**

- 1 Select **Settings**.
- 2 Select **Hardware ID**.
- 3 Select **Auto-Create**.

————— **End of Procedure** —————

**Figure 46**  
**Hardware ID screen**



For more information about the **Hardware ID** screen, see Table 28.

**Table 28**  
**Hardware ID screen**

Selection	Description
Hardware ID	This box contains the MAC address for the Ethernet hardware installed in your device. MVC 2050 uses the MAC address of the Ethernet hardware as its hardware ID. You may have to change this value if there is more than one MAC address, or if the device is using an extranet client that hides the true MAC address. For example, the Nortel Networks Contivity Extranet Switch uses a single MAC address for all clients. This might cause connection problems with your communication server.
Auto-create	This changes the MAC address that appears in the <b>Hardware ID</b> box. If your device has more than one MAC address, tap the <b>Auto-Create</b> button to cycle through the set of MAC addresses on your computer. <b>Auto-Create</b> also makes up random hardware IDs in case the Ethernet hardware addresses are not unique to the communication server.
Firmware Version	Shows the build number of MVC 2050 installed on your device. This value is the version number of the application last reported by the server.

### Dialing formats

Dialing Locations settings set the dialing rules to be applied to properly route a call when an end user dials a number. The dialing rules establish prefixes to access local and long-distance numbers using the location of the end user's

server. To establish the dialing rules and dialing patterns, see *IP Softphone 2050 and Mobile Voice Client 2050 User Guide*.

## **Profiles**

Each profile is a named file that contains a combination of servers and other attributes that control connection, behavior, and appearance of the MVC 2050.

A number of profiles can be created and saved to allow easy switching among different servers, feature programming, and audio programming.

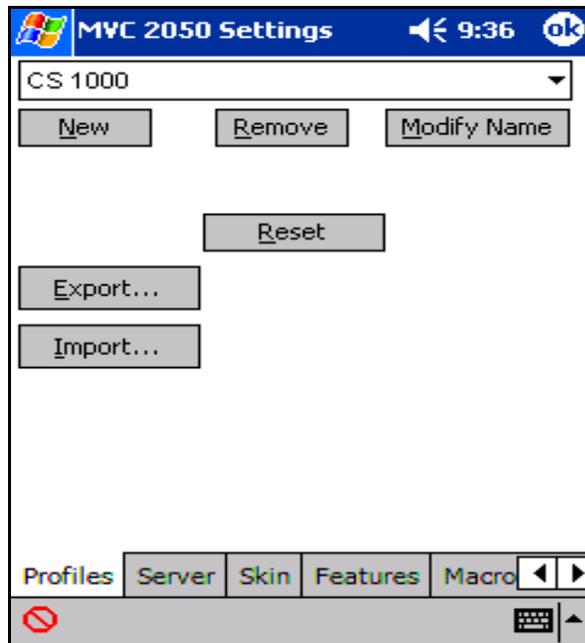
Profiles can be created, selected, modified, or deleted. When you select a profile you can change the name, modify it or delete it.

When a profile is selected, all other Settings tabs refer to the selected profile. The name of the selected profile is shown in the lower right corner on each tab. See Figure 47 on page 220.

From the **Profiles** screen you can:

- create profiles
- delete profiles
- modify a profile's name
- change the profile used by the application
- export profiles
- import profiles

**Figure 47**  
**Profiles screen**



When a new profile has been created and selected, the values on all of the other tabs have been set to the defaults for this profile. Any value modified on any of the other tabs will be associated with this profile until another profile is selected. To change settings on other tabs for this profile, select the tab you wish to change. For example, go to the **Server** tab to modify the server settings.

### **Sounds**

MVC 2050 can make sounds to indicate server connection or disconnection.

Sound files and sound settings are not saved when Profiles are saved, so the sounds must be programmed by the end user. Up to three sounds can be programmed for use with audible notification of server connection or disconnection.

Following are descriptions of the events for which the sounds are used. See Figure 48 on [page 221](#).

### ***Server unreachable***

The sound you select for this event plays when MVC 2050 loses contact with the server. The message “Server unreachable” displays on the PDA screen.

### ***Server unresponsive***

The sound you select for this event plays if MVC 2050 fails to connect to the server. The message “Server unresponsive” displays on the PDA screen.

### ***Server connected***

The sound you select for this event plays when MVC 2050 connects to a server.

**Figure 48**  
**Events List**



## **Audio Quality**

Audio quality is controlled from two screens:

- **Audio**, the quality slider tab
- **Advanced Audio**

### ***Audio quality slider tab***

You can control audio quality using the slider tab to reduce audio delay and increase audio clarity. This slider controls the number of audio buffers the PDA uses to smooth out incoming audio streams.

If you experience audio delay, you can decrease the number of buffers and reduce the delay by using the slider on the **Audio** screen.

If you experience broken or choppy speech at either end of the call, or the dial tone sounds choppy, the PDA's volume control may be the cause. To prevent this problem, use the volume controls on the MVC 2050 toolbar to adjust volume while using the MVC 2050.

If you experience reduced audio clarity in the receive audio stream, try increasing this setting. Increasing the **Audio clarity** setting increases the number of audio buffers used to process incoming audio. If the delay is too large, you can decrease this setting.

### ***Automatic Gain Control and feedback***

Since MVC 2050 requires a headset to operate properly, disable the **Automatic Gain Control**.

*Note:* When the PDA is used in handsfree mode, without a headset, the PDA microphone picks up sounds from the speaker, creating a feedback loop. **Automatic Gain Control** is used in this instance to avoid feedback.

Use the following procedure to disable the Automatic Gain Control.

**Procedure 38**  
**Disabling Automatic Gain Control**

- 1 Select **Start**.
- 2 Select **Settings**.
- 3 Select **System**.
- 4 Select **iPAQ Audio**.
- 5 Select **Automatic Gain Control**.
- 6 Select **Disable**.
- 7 Select **Yes**.

---

**End of Procedure**

---

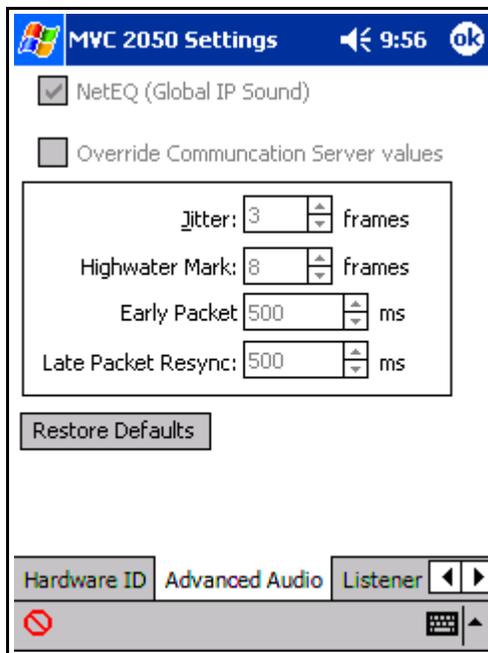
**Advanced Audio**

Global IP Sound NetEQ software provides loss concealment and compensation.

NetEQ is the default setting and MVC 2050 **Advanced Audio** settings cannot be adjusted.

Figure 49 on [page 224](#) shows the Advanced Audio screen.

**Figure 49**  
**Advanced Audio screen**



See Table 29 for more information about the **Advanced Audio** screen.

**Table 29**  
**Advanced Audio screen**

<b>Selection</b>	<b>Description</b>
NetEQ (Global IP Sound)	NetEQ packet loss concealment software is the default mode of operation.
Jitter Buffer	A Jitter Buffer is used to minimize a change in rate for arriving voice frames. The Jitter Buffer sends voice frames to your PDA sound system at a fixed rate. The rate of arrival of voice frames is variable. The value of "jitter" is the normal number of voice frames the application should have in its jitter buffer.
Highwater Mark	Highwater Mark indicates the maximum number of voice frames the application should have in its jitter buffer before it starts discarding packets. This value should be at least 2.5 times the value of jitter. If a smaller value is assigned, MVC 2050 regards it as an error and corrects it.
Early Packet and Late Packet Resync	Early Packet Resync and Late Packet Resync indicate the points at which MVC 2050 discards and restarts the jitter buffer contents. This value should be at least five times the Highwater Mark.

### ***Echo cancellation***

MVC 2050 can use the Voice Gateway Media Card for echo cancellation.

### ***Jitter Buffer***

Global IP Sound NetEQ, bundled with MVC 2050 software, provides loss concealment and compensation for up to 30% packet loss.

NetEQ is an advanced jitter buffer and packet loss concealment unit that delivers improvements in sound quality, while minimizing latency, for IP telephone systems. It is a one-sided, embedded solution that enables high-quality voice over networks. NetEQ reduces jitter buffer delay 30-80 ms and automatically provides a solution to clock drift present in VoIP hardware. NetEQ is codec independent.

The jitter buffer is used to minimize a change in rate for arriving voice frames. The jitter buffer sends voice frames to the PDA sound system at a fixed rate. The rate of arrival of voice frames is variable. The value of “jitter” is the normal number of voice frames the application should have in its jitter buffer.

### ***Codec***

MVC 2050 supports G.711 which provides higher audio quality with no compression.

### ***Frame Size***

MVC 2050 supports G.711-64 A-law and U-law with 10 ms to 960 ms frame sizes in 10 ms increments. Optimum and recommended payload is established as 30 ms frame size.

**Listener IP**

Use the Listener IP screen to override the port assignments when there is a conflicting application on the PDA.

See Table 30 for information about selections available on the **Listener IP** screen.

**Table 30**  
**Listener IP screen**

Selection	Description
Use a specific address	MVC 2050 normally listens to all IP addresses on the device for communication server-to-terminal (UNISim) messaging on all the network interface cards on the device. This is the default mode of operation. To override this behavior, select the check box and enter a specific IP address.
Use a specific port	MVC 2050 listens to IP port 5000 on the device for communication server-to-terminal (UNISim) messaging.

**Macros**

The Mobile Voice Client (MVC) 2050 **Macros** tab enables you to record and use macros. A macro is a recorded sequence of steps that saves you keystrokes.

For example, you can create a macro that selects a particular line and then dials that telephone number automatically. Another example of macro use is programming voicemail access numbers and codes for faster access.

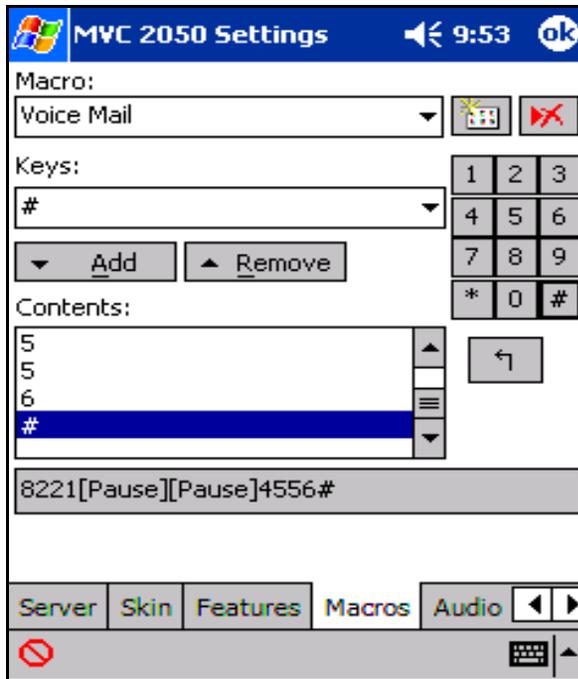
**Macro screen**

To enter a new macro name, or to select an existing macro to modify or delete, select the **New** icon to the right of the list box. See Figure 50 on [page 228](#).

To select an existing macro, tap the down arrow in the **Macro** list box and make your selection.

To delete a selected macro, tap the **Delete** icon (the button to the right of the list box).

**Figure 50**  
**Macro screen**



### **Keys**

Once you have selected a macro name, tap the down arrow in the **Keys** drop-down list to select a key to add to the macro. Press the **Add** button to add the key.

The **Pause** key is used to insert a short pause in the macro. A pause introduces a delay which may be required to access some Interactive Voice Response (IVR) applications and the voicemail systems.

### ***Contents***

A list of the macro's contents appears in the **Contents** list box. Once there are two or more entries in this box, the keystrokes can be moved around by using the up and down buttons which appear to the right of the box.

You can remove keystrokes from the **Contents** box by selecting a keystroke and pressing the **Remove** button.

### ***Preview***

You can preview your macro in a single view by viewing the read-only field under the **Contents** box.

### ***Dialpad***

You can select the **Keys** list box and press the **Add** button, or you can use the numbers on the dialpad to enter numbers into your macro.

## **MVC 2050 and WLAN**

### **802.11b wireless ethernet networking**

MVC 2050 uses an 802.11b WLAN interface.

Audio quality is affected by the distance from the AP and enclosed spaces. Audio quality is also affected by the use of Bluetooth accessories while on a voice call due to interference and contention.



#### **CAUTION**

MVC 2050 does not support use of Bluetooth accessories.

### ***QoS***

Due to device constraints, 802.11 p/q is not supported.

## WiFi

ActiveSync of a PDA with a PC can be accomplished using Wireless Fidelity (WiFi).



### **CAUTION**

When you return the PDA to its cradle, if you want to maintain the MVC 2050 connection to the server, deactivate ActiveSync. Otherwise the connection is lost because ActiveSync uses Point-to-Point Protocol (PPP). This will cause the PDA connection to the voice network to be dropped and connected to the PC.

## Roaming and handover

If you experience slight gaps and pauses in transmission and reception during calls, MVC 2050 may be experiencing roaming/handover difficulties attributable to the wireless network.

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# Nortel Networks WLAN Handset 2210 and WLAN Handset 2211

---

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## Introduction

This section explains how to install and configure the Nortel Networks WLAN Handset 2210 and Nortel Networks WLAN Handset 2211. For information on using these WLAN Handsets, see the *WLAN Handset 2210 User Guide* and *WLAN Handset 2211 User Guide*.

## Description

The WLAN Handset 2210 and WLAN Handset 2211 are almost identical in features and functions. For this reason, this section applies to both WLAN

Handsets. Any differences in operation of the WLAN Handsets are clearly documented.

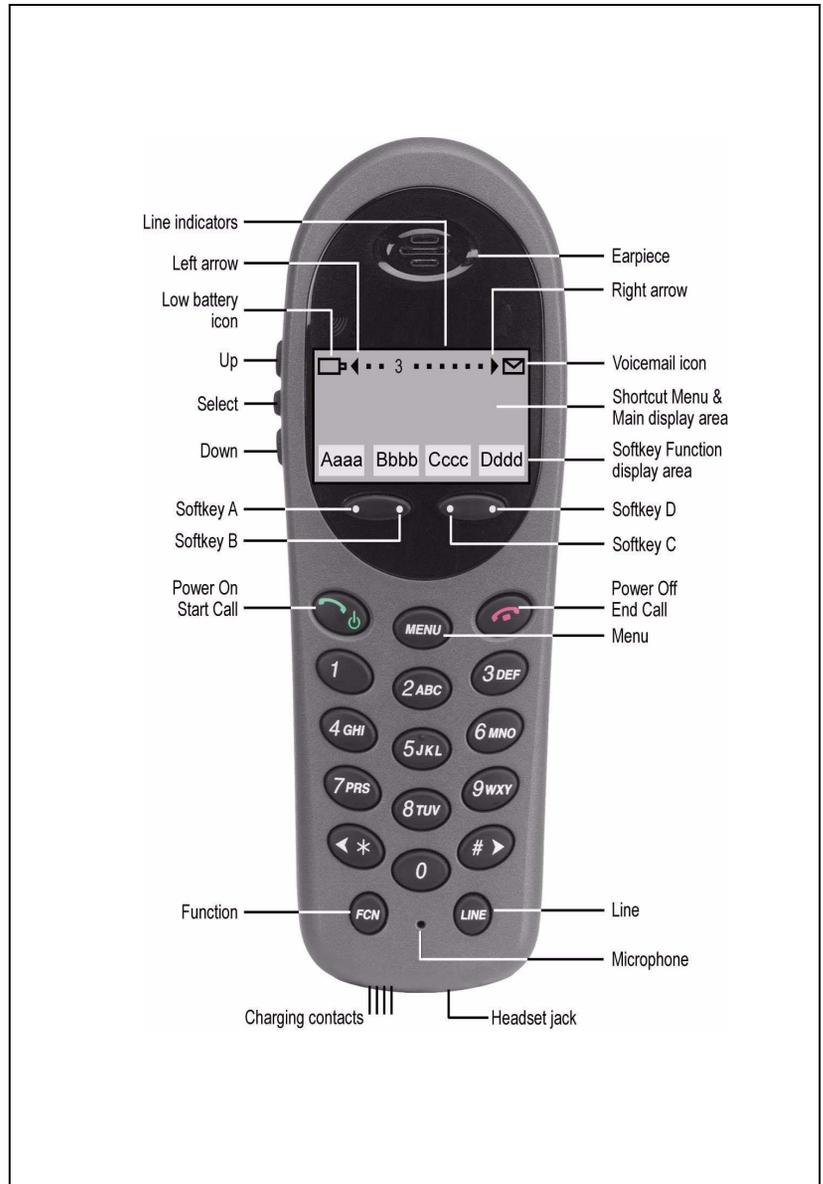
## **WLAN Handset 2210 and WLAN Handset 2211 differences**

The differences between the WLAN Handset 2210 and WLAN Handset 2211 are as follows:

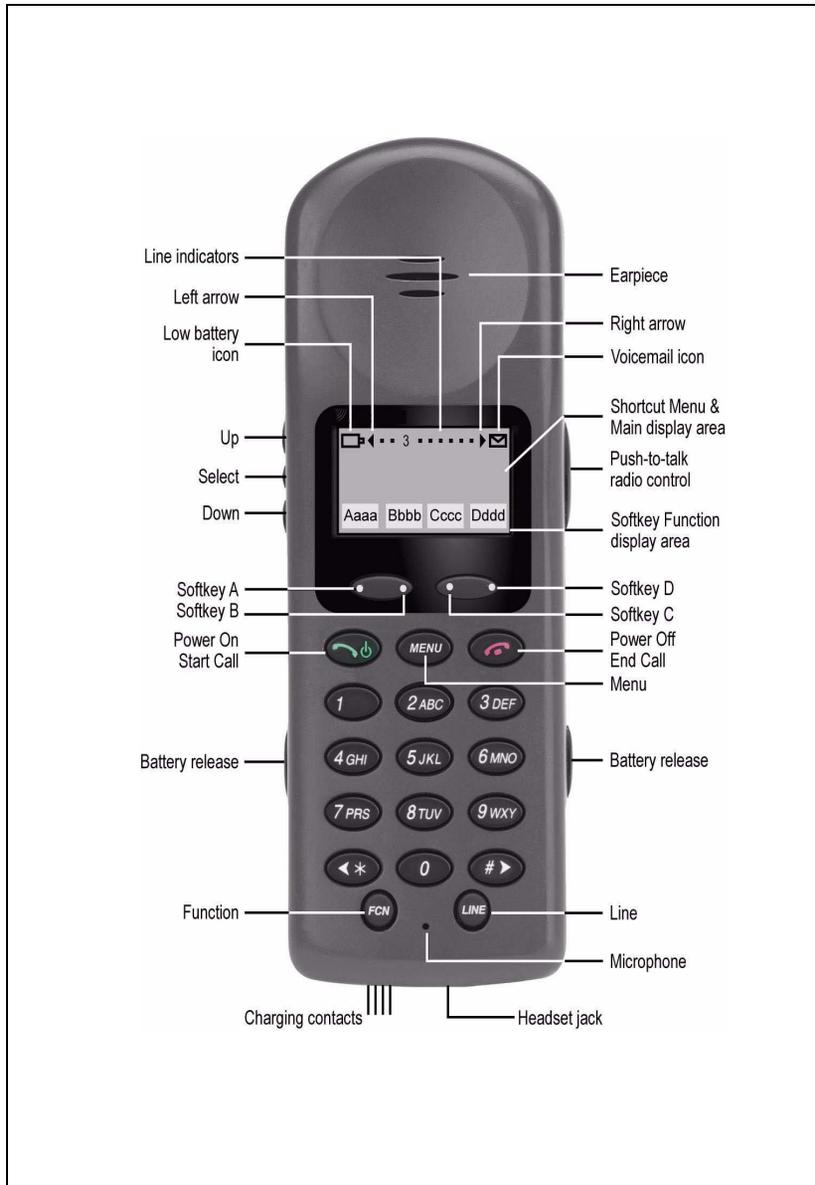
- The WLAN Handset 2210 is sleeker, smaller, and lighter. It is more suitable for an office environment. See Figure 51 on [page 233](#).
- The WLAN Handset 2211 is slightly larger and more rugged. It is more suitable in an environment where it might be knocked, bumped, or dropped (for example, a warehouse). See Figure 52 on [page 234](#).
- The WLAN Handset 2211 has a slightly larger battery pack, although, the battery life is the same as the WLAN Handset 2210.
- The Push-to-Talk feature is supported on the WLAN Handset 2211 only.
- The WLAN Handset 2210 does not have an adjustable ringer volume.

The WLAN Handsets appear to the Terminal Proxy Server (TPS) as an IP Phone 2004: therefore the WLAN Handsets support most of the IP Phone 2004 features.

**Figure 51**  
**WLAN Handset 2210**



**Figure 52**  
**WLAN Handset 2211**



**Table 31**  
**WLAN Handset components and functions**

Component	Function
Power On/Start Call	Use the <b>Power On/Start Call</b> key to turn on your WLAN Handset 2210. This key also affects some of the states of the handset.
Power Off/End Call	Use the <b>Power Off/End Call</b> key to terminate an active call and turn off the handset.
Menu	Press the <b>Menu</b> key to view the full description of the soft key abbreviations and access the handset features. Press and hold <b>Power On/Start Call</b> . Two chirps sound. The <b>Menu</b> key displays a list of features. Select these features by pressing the number key corresponding to the feature or by using the Up, Down, and Select buttons.
Line	Use the Line key to access the feature keys menu. Select these features by pressing the number key associated with each feature.  The Line key accesses the same six feature keys located at the top of an IP Phone 2004 display area.
Function	Use the <b>Function</b> key to access the handset functions when in the active (idle) state (see Table 3 on page 21).  The Function key also provides access to the <b>User Option</b> menu in the standby state.
Soft keys	Soft keys (self-labeled) are located below the display area. The LCD label above the key changes, based on the state of the handset. Use the four soft keys (A, B, C, D) to activate the displayed soft key feature.

## Supported features

The WLAN Handsets support the following additional features:

- bandwidth management mechanism (using bandwidth zones)
- Wired Equivalent Privacy (WEP) with both 40-bit and 128-bit encryption, as defined by the 802.11b specification
- ability to change the feature key labels
- Branch Office
- language support: English only
- Push To Talk (PTT) feature which allows the WLAN Handset 2211 to operate in a group-broadcast mode like a two-way radio.

## Features not currently supported

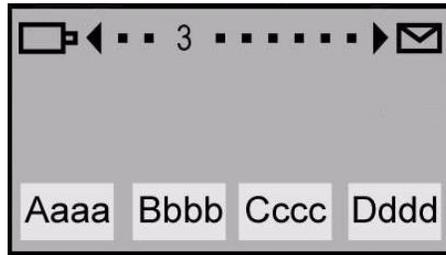
The following features are not supported on the WLAN Handsets:

- Personal Directory
- Callers List
- Redial List
- Corporate Directory
- Virtual Office
- External Application Server
- Handsfree functionality

## Display characteristics

This section summarizes the display features of the WLAN Handsets.

**Figure 53**  
**WLAN Handset display**



The WLAN Handsets have three display areas:

- The upper display area is a status row that displays the handset status. It can include: a battery-level indicator, left and right arrows, a series of dots, and a message waiting indicator. Each dot represents a line that changes to a number when active.
- The middle display area is a text area, four lines by 19 characters in size. Lines in the text area longer than 19 characters are truncated by a special algorithm that removes spaces and punctuation first and then vowels.
- The lower display area provides soft key labels. Each soft key label is a maximum of four characters long. The soft key labels are compressed with the same algorithm as used in the text area.

## Key number assignments

The WLAN Handsets have four soft-labeled, pre-defined keys that are used to provide up to 10 features. Because they are pre-defined, the user cannot change the key number assignment.

The **Message** key is numbered 16. Key numbers 17-31 are the four soft key labels below the display area. See Figure 53 on [page 237](#).

Key numbers 17 - 31 support the features A03, A06, CFW, CHG, CPN, PRK, PRS, RGA, RNP, SCC, SCU, SSC, SSU and TRN, as listed in Table 32 on [page 238](#).

## Dedicated keys

Table 32 describes the telephone assignment functions for each of the dedicated keys. Use LD 11 to program keys 16-26 on the WLAN Handsets.

*Note:* If you attempt to configure anything other than the permitted response, the system generates an error code.

**Table 32**  
**WLAN Handset dedicated keys (Part 1 of 2)**

Key number	Response	Description
Key 16	MWK	Message Waiting key
	NUL	Removes function or feature from key
Key 17	TRN	Call Transfer key
	NUL	Removes function or feature from key
Key 18	A03	Three-party conference key
	A06	Six-party conference key
	NUL	Removes function or feature from key
Key 19	CFW	Call Forward key
	NUL	Removes function or feature from key
Key 20	RGA	Ring Again key
	NUL	Removes function or feature from key
Key 21	PRK	Call Park key
	NUL	Removes function or feature from key

**Table 32**  
**WLAN Handset dedicated keys (Part 2 of 2)**

<b>Key number</b>	<b>Response</b>	<b>Description</b>
Key 22	RNP	Ringling Number Pickup key
	NUL	Removes function or feature from key
Key 23	SCU	Speed Call User
	SSU	System Speed Call User
	SCC	Speed Call Controller
	SSC	System Speed Call Controller
	NUL	Removes function or feature from key
Key 24	PRS	Privacy Release key
	NUL	Removes function or feature from key
Key 25	CHG	Charge Account key
	NUL	Removes function or feature from key
Key 26	CPN	Calling Party Number key
	NUL	Removes function or feature from key

## Package components

Table 33 lists the package components for the WLAN Handsets.

**Table 33**  
**WLAN Handset component list (Part 1 of 4)**

WLAN Handset 2210 kit North America	NTTQ40AA/A0548444
WLAN Handset 2210 kit Global (power supply not included)	NTTQ40BA/A0548450
North American kit includes:	
WLAN 2210 Handset	NTTQ4010/A0548445
WLAN Handset 2210 Battery Pack	NTTQ4050/A0548446
WLAN Handset 2210 Desktop Charger	NTTQ4060/A0548447
WLAN 2210/2211 Charger & Nortel Networks Application Gateway 2246-64 Power Supply for North America	NTTQ4101/A0548449
Global kit is the same as the North American kit without the power supply	
WLAN Handset 2211 kit North America	NTTQ50AA/A0548451
WLAN Handset 2211 kit Global (power supply not included)	NTTQ50BA/A0548455
North American kit includes:	
WLAN 2211 Handset	NTTQ5010/A0548452
WLAN Handset 2211 Battery Pack	NTTQ5050/A0548453
WLAN Handset 2211 Desktop Charger	NTTQ5060/A0548454
WLAN 2210/2211 Charger & WLAN Application Gateway 2246-64 Power Supply for North America	NTTQ4101/A0548449
Global kit is the same as the North American kit without the power supply	
WLAN Handset 2211 Gang Charger	NTTQ5070/A0548039
WLAN Handset 2210 Clothing Clip	NTTQ4080/A0548940
WLAN Handset 2211 Clothing Clip	NTTQ5101/A0548941

**Table 33**  
**WLAN Handset component list (Part 2 of 4)**

WLAN Handset Headset with noise cancellation	NTTQ5501/A0548946
WLAN Handset Headset, over ear	A0548947
WLAN Handset Headset quick disconnect cord	NTTQ5521/A0548948
WLAN Handset 2210/2211 User Guide CD ROM	NTLH21AB/A0548993
WLAN Handset 2211 carrying case, black	NTTQ/5111/A0548942
WLAN Handset 2211 carrying case, (key cover) black	NTTQ5131/A0548944
WLAN Handset 2211 carrying case, yellow	NTTQ5121/A0548943
WLAN Handset 2211 carrying case, (key cover) yellow	NTTQ5141/A0548945
Nortel Networks WLAN IP Telephony Manager 2245, a minimum of one Telephony Manager is required per system order	NTTQ60AA/A048950
WLAN Application Gateway 2246	
64 users	NTTQ65AA/A0548970
128 users	NTTQ65BA/A0548971
256 users	NTTQ65CA/A0548972
512 users	NTTQ65DA/A0548973
1,024 users	NTTQ65EA/A0548974
10,000+ users	NTTQ65FA/A0548975

**Table 33**  
**WLAN Handset component list (Part 3 of 4)**

<p>The following items must be ordered with the applicable power supply:</p> <ul style="list-style-type: none"><li>WLAN Handset 2210 Desktop Charger</li><li>WLAN Handset 2211 Desktop Charger</li><li>WLAN Handset 2211 Gang Charger</li><li>WLAN IP Telephony Manager 2245</li><li>WLAN Application Gateway 2246 - 64 users</li><li>WLAN Application Gateway 2246 - 128 users</li><li>WLAN Application Gateway 2246 - 256 users</li><li>WLAN Application Gateway 2246 - 512 users</li><li>WLAN Application Gateway 2246 - 1024 users</li><li>WLAN Application Gateway 2246 - 10,000 users</li></ul>
---

**Table 33**  
**WLAN Handset component list (Part 4 of 4)**

Power supplies —	
WLAN Handset 2211 Gang Charger:	
• North America	NTTQ4301/A0548951
• Europe	NTTQ4311/A0548952
• UK-HK	NTTQ4321/A0548953
• Switzerland	NTTQ4331/A0548954
• Australia-New Zealand	NTTQ4341/A0548955
• Mexico	NTTQ4351
WLAN Handset 2210/2211 Charger & WLAN Application Gateway 2246-64:	
• North America	NTTQ4101/A0548499
• Europe	NTTQ4111/A0548956
• UK-HK	NTTQ4121/A0548958
• Switzerland	NTTQ4131/A0548959
• Australia-New Zealand	NTTQ4141/A0548960
• Mexico	NTTQ4151
WLAN IP Telephony Manager 2245 & WLAN Application Gateway 2246 (128+ users):	
• North America	NTTQ4201/A0548961
• Europe	NTTQ4211/A0548962
• UK-HK	NTTQ4221/A0548964
• Switzerland	NTTQ4231/A0548966
• Australia-New Zealand	NTTQ4241/A0548967
• Mexico	NTTQ4251

## Before you begin

Before configuring a WLAN Handset, the Nortel Networks WLAN IP Telephony network must be installed and configured.

The Nortel Networks WLAN IP Telephony network consists of the following components:

- Call Server
- DHCP server
- Firewall
- WLAN IP Telephony Manager 2245
- WLAN Application Gateway 2246 (optional)
- Access Points (APs)

For more information on the Nortel Networks WLAN IP Telephony network installation and configuration, see *WLAN IP Telephony: Installation and Configuration* (553-3001-304).

**Note:** Each WLAN Handset must be configured individually.

## Installation and configuration

For detailed information on the installation and configuration of the WLAN Handset on the Nortel Networks WLAN IP Telephony network, see *WLAN IP Telephony: Installation and Configuration* (553-3001-304).

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# SIP Phone

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## Introduction

CS 1000 Release 4.0 supports Session Initiation Protocol (SIP). SIP is a protocol standard used for establishing, modifying, and terminating conference and telephony sessions in IP networks. A SIP session can be a simple two-way telephone call or it can be a collaborative multimedia conference session. SIP initiates real-time, multimedia sessions which can integrate voice, data, and video. CS 1000 Release 4.0 supports SIP phones.

Nortel Networks supports certified compatible third party SIP phones. In contrast to IP Phones, SIP Phones use an industry standard open standards-based signaling protocol, whereas IP Phone signaling is UNISlim based. A Signaling Server is required to establish signaling for SIP Phones and SIP Phones exchange signaling with SIP components residing on the Signaling Server. Available features for SIP Phones depend on the devices themselves, and the communication server, and vary from manufacturer to manufacturer and between models. Features are delivered to IP Phones from the communication server.

SIP Phones communicate with SIP-network components which reside on the Signaling Server. These components include the following:

- **SIP Gateway** — The SIP Gateway provides a direct trunking interface between the CS 1000 systems and a SIP domain. The SIP Gateway is implemented according to SIP standards. The SIP Gateway connects CS 1000 systems to other Nortel Networks or third-party SIP-enabled products. This direct SIP interface is used to interwork with products such as the Multimedia Communication Server (MCS) 5100 or CS 2000.
- **SIP Redirect Server** — The SIP Redirect Server is used to facilitate centralized dialing plan management and the configuration of the network routing information for the SIP domain. A SIP Redirect Server translates telephone numbers recognized by Enterprise Business Network (EBN) voice systems to IP addresses in the SIP domain. As a result, the SIP Redirect Server interfaces with SIP-based products. The SIP Redirect Server has the ability to access the CS 1000 system's endpoint/location database in order to direct SIP Gateways and SIP Phones within the networked environment.
- **SIP Registrar** — The SIP Registration Server, which is also known as the SIP Registrar, is used for endpoint registration. Registration is one way that the server can learn the location of a user (SIP client). Upon initialization, and at periodic intervals, a user's telephone sends REGISTER messages to the SIP Registrar in the same domain. The contact information from the REGISTER request is then made available to other SIP servers, such as proxies and redirect servers, within the same administrative domain. The registration process precedes the call setup.

CS 1000 Release 4.0 also supports SIP-based Converged Desktop Service (CDS). CDS provides the telephony features of the CS 1000 systems, along with the multimedia applications of the MCS 5100. CDS allows a user to have an identity in the SIP domain (for example, a registered PC client), as well as in the CS 1000 system as a telephone. For further information, refer to *Multimedia Communication Portfolio Interworking - Basics* (NN10372-111), and for information about calls between SIP Phones and SIP Gateways, refer to *IP Peer Networking: Installation and Configuration* (553-3001-213).

## SIP Phone features

The following is a list of features delivered through the Communication Server 1000:

- Calling Line Identification (CLID)
- Network Call Party Name display
- Network Call Redirection
- Message Waiting Indication
- Network Class of Service Access controls
- Network Alternate Route Selection (NARS, UDP, CDP)
- Call Detail Recording (CDR) — using Tandem CDR features

Other telephony features are available and vary, depending on the particular SIP Phone.

The following list contains examples of intelligent SIP Phone-based features that may be supported on a SIP Phone. Please consult the particular phone specification for details.

- Conference calling
- Call hold
- Call waiting
- Call forwarding
- Call transfer
- Caller ID
- Call waiting caller ID
- Speed dial from phone book
- Call logs

## Installation and configuration overview

A SIP Phone must be installed and properly configured before it can be used. SIP Phone configuration involves configuration on the phone itself and configuration on the Signaling Server.

- Follow the manufacturer's installation and configuration instructions to set up your SIP Phone.
- To configure a SIP Phone on the Signaling Server, refer to *IP Peer Networking: Installation and Configuration* (553-3001-213) which provides the required configuration procedures for adding a SIP Phone user endpoint to the Signaling Server using the Network Routing Service (NRS) Manager.

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# Features overview

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## Introduction

This chapter provides an overview of the following software features available for IP Phones.

Personal Directory, Redial List, Callers List, Application Server Administration, Password Administration, and IP Call Recording are part of the IP Line 4.0 software on the Signaling Server. An IP Phone must be registered to a Signaling Server to access these features.

## Corporate Directory

The Corporate Directory feature extends the use of a system database, created from Optivity Telephony Manager (OTM) information, to the IP Phones. This database is downloaded and stored on the system CPU platform. For information about using Corporate Directory from IP Phones, see the appropriate user guide. For details about Corporate Directory, see *Features and Services* (553-3001-306).

## Personal Directory

Personal Directory allows an end user to create and control a personal directory. Up to 100 Personal Directory entries can be created, edited, copied from other sources, or deleted. (For information about using Personal Directory on IP Phones, see the appropriate user guide. For more information about the Personal Directory feature, see *Features and Services* (553-3001-306).) Personal Directory uses a separate central database, called the Application Server, to store directory data and end-user profile options. The application Server is part of the IP Line 4.0 software on the Signaling Server.

## Redial List

Redial List is a call log feature whose content is generated by the system during call processing. The list resides on the Application Server. An end user can scroll through a list of up to 20 entries of the most recent calls dialed from the IP Phone and redial a selected telephone number. For more information about using Redial List with IP Phones, see the appropriate user guide. For more information about the Redial List feature, see *Features and Services* (553-3001-306).

## Callers List

Callers List is a call log feature whose content is generated by the system during call processing. The list resides in the Application Server. An end user can scroll through a list of up to 100 entries of the most recent calls received by the IP Phone and call a selected telephone number. For more information about using Callers List with IP Phones, see the appropriate user guide. For

more information about the Callers List feature, see *Features and Services* (553-3001-306).

## Password Administration

Once the Station Control password (SCPW) has been set by the system administrator on the Call Server, end users can operate this feature from IP Phones to protect private directory information stored on the Application Server. For more information about using Password Administration from IP Phones, see the appropriate user guide. For information about the Password Administration feature, see *Features and Services* (553-3001-306).

## IP Call Recording

IP Call Recording enables a Call Recording application to monitor the media stream for the active call and record it by providing the IP address and port information for an IP Phone in an active call. For more information about the IP Call Recording feature, see *Automatic Call Distribution: Description* (553-3001-351).

## Virtual Office

The Virtual Office feature enables end users to log into any IP Phone using their own user ID and password. This redirects the end-user's telephone calls and other features to the Virtual Office logged-in IP Phone. For information about using Virtual Office on an IP Phone, see the appropriate user guide. For more information about the Virtual Office feature, see *Features and Services* (553-3001-306).

## Emergency Services for Virtual Office

The E911 for Virtual Office feature allows Virtual Office users to place an emergency call to the correct Public Safety Answering Point (PSAP) for their geographic location. For more information about the E911 for Virtual Office feature, see *Emergency Services Access: Description and Administration* (553-3001-313).



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# Appendix A: Specifications

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## Contents

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### IP Phone power requirements

Phase II IP Phones have integrated hardware to support power over Ethernet for 802.3af standard power and other powering options, including ongoing support for PowerDsine Power over LAN Hub powering, and Cisco proprietary powering (as tested with specific Cisco Ethernet switch equipment). Nortel Networks recommends Power over Ethernet deployment since it allows for power backup in case of power failures. Note that, with Phase II IP Phones, power splitters are no longer needed to support Power over Ethernet.

Phase II IP Phones also support connection to AC local power using the appropriate adapter. If local power using the AC adapter is required with a Phase II IP Phone, the AC adapter must be ordered separately. If the network LAN infrastructure supports Power over Ethernet, an AC adapter may not be required.

**Note:** You must order a country-specific power adapter. See the IP Phone components list table in the applicable IP Phone chapter for AC adapter descriptions and product codes.

Nortel Networks does not advise connecting a local power adapter in addition to power over Ethernet.

Table 34 provides power requirements for Phase II IP Phones using Power over Ethernet Classification 2.

**Table 34**  
**Power requirements for Phase II IP Phones using power over Ethernet classification 2**

<b>IP Phone</b>	<b>Product Code</b>	<b>Maximum Load</b>	<b>Normal Load</b>
2001	NTDU90BA	5.0 W	3.4 W
2002	NTDU91BA	5.0 W	3.4 W
2004	NTDU92BA	6.0 W	3.6 W
<b>Note 1:</b> Heavy load is defined as all LEDs on and 1kHz tone on speaker.			
<b>Note 2:</b> Normal load is defined as set powered up.			

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## Environmental specifications

Table 35 shows the environmental specifications of the IP Phone 2002 and IP Phone 2004.

**Table 35**  
**IP Phone 2001, IP Phone 2002 and IP Phone 2004 — environmental specifications**

<b>Parameter</b>	<b>Specifications</b>
Operating temperature	+5° to +40° C, ambient
Operating humidity	+5% to 95% RH (29 g/m <sup>3</sup> mean absolute humidity)
Storage temperature	−40° to +70° C



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# Appendix A: 802.1Q VLAN description

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## Contents

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## Introduction

The 802.1Q support is available for IP Phone 2001, IP Phone 2002, IP Phone 2004, and the IP Softphone 2050 (through the PC's operating system).

The 802.1Q support is configured from the user display interface of the IP Phone. Configure 802.1Q VLAN support when you initially configure an IP Phone. The switch ports for Voice Gateway Media Card TLAN network interfaces must be configured as untagged ports so the header is removed. While the IP Phone 2001 provides VLAN support, it does not provide a port for a PC.

The 802.1Q IEEE protocol standard allows virtual LANs (VLANs) to be defined within a single LAN. This improves bandwidth management and limits the impact of broadcast and multicast messages. A higher level of security between segments in a network can also be achieved.

*Note:* 802.1Q functionality is supported only on the IP Phone. The IP Line application's IP stack does not provide 802.1Q support for the ITG-P or SMC.

## Description

The p bits within the 802.1Q standard allow packet prioritization at Layer 2 improving network throughput for VoIP data.

The 802.1Q standard specifies a new format of Ethernet frame. A standard Ethernet frame contains:

- a header consisting of a six-byte destination MAC address (following the header is a data area)
- a six-byte source MAC address
- a two-byte protocol identifier

The 802.1Q formatted frame is identical to a standard Ethernet frame, with the exception of the 4-byte 802.1Q tag that is inserted between the source MAC address and the protocol identifier. The first 16 bits of the 802.1Q tag field is the Tag Protocol Identifier containing 8100 (hex), allowing the Ethernet interface to distinguish it from standard Ethernet frames. The last 16 bits of the 802.1Q tag contain the following information:

- a 3-bit Priority field (the 802.1p defined bits)
- a 1-bit Canonical Field Identifier (CFI)
- a 12-bit VLAN ID field

## IP Phone support

The IP Phone 2001, IP Phone 2002 and IP Phone 2004 support 802.1Q as follows:

- 802.1Q can be enabled or disabled at boot time using manual configuration or control downloaded from the TPS.
- If 802.1Q is disabled, standard Ethernet frames are transmitted.

- If 802.1Q is enabled, all frames transmitted by the Ethernet driver have the 802.1Q tag bytes inserted between the source MAC address and the protocol type field. The tag protocol identifier field contains 8100 (hex) and the CFI bit is set to 0.
- When 802.1Q is enabled, the configuration of separate voice and data VLANs is possible. Each VLAN has its own ID and priority on the IP Phone. Voice messages have the priority bits of all frames set to 6 (octal) and the VOICE VLAN ID is set to 000 (hex) by default. Data messages have the priority bits of all frames set to 0 and the DATA VLAN ID is set to 000 (hex) by default. The GUI and TPS configured values override these values.
- The IP Phone's Ethernet driver receives any Ethernet frame destined for it, regardless of whether 802.1Q is enabled or whether the received frame is an 802.1Q tagged frame.

*Note:* The only exception is any 802.1Q tagged frame with the CFI = 1. In this case the frame is discarded.

- The IP Phone's Ethernet driver strips the 802.1Q tag information from the frame prior to passing it on to the IP stack.
- The IP Phone's Ethernet driver filters packets by the VLAN tag and MAC address. Tagged traffic is prioritized and routed based on the priority bits.

For more information on configuring 802.1Q on an IP Phone 2001, see "First-time installation" on [page 29](#).

For more information on configuring 802.1Q on an IP Phone 2002, see "First-time installation" on [page 59](#).

For more information on configuring 802.1Q on an IP Phone 2004, see "First-time installation" on [page 91](#).

## IP Softphone 2050 support

The IP Softphone 2050 supports 802.1Q with Windows 2000. By default, when 802.1Q is enabled, the priority bits of all frames are set to 6 and the VLAN ID is set to 0 (a restriction of Windows 2000).

For more information, see the IP Softphone 2050 section: “QoS tab” on [page 167](#).

## Three-port switch support

The IP Phone 2002 and IP Phone 2004 three-port switch does not interpret the 802.1Q header, but rather, allows the packets to pass through unmodified. Priority is achieved on a per port basis. The phone “port” traffic has higher priority over the Ethernet port to which the PC is connected.

An IP Phone can receive Broadcast frames from a PC’s data VLAN. Any data network broadcast storm packets from the network are seen by the IP Phone. This type of traffic does not adversely affect the IP Phone.

## VLAN IDs

The VOICE and DATA VLAN ID fields can be specified on a “per interface” basis. There is only one network interface on the IP Phone; however, the IP Phone has two internal IDs, one for voice and one for data traffic. The IP Phone firmware can detect and route the voice and data traffic. The VLAN ID fields are “global” settings. That is, all voice packets transmitted by the IP Phone have the same VOICE VLAN ID. If DATA VLAN is enabled, the telephone will add the DATA VLAN ID to untagged traffic. However, if the traffic arriving on the PC port is already tagged, the frame will pass through unchanged.

Each VLAN ID is specified as follows:

- The default VLAN ID is 000 (hex).
- The VOICE and DATA VLAN IDs can be specified in the manual configuration user interface.
- Or, in the case of the VOICE VLAN ID, the VOICE VLAN ID can also be configured by the DHCP parameter when using the Automatic VLAN discovery using DHCP approach.

## Automatic VOICE VLAN ID configuration

As part of the 802.1Q feature, there is an option to automatically discover the VOICE VLAN ID using DHCP. This process reduces the configuration steps since entering data manually (the VOICE VLAN ID) is not required.

When the Automatic VOICE VLAN Discovery using DHCP approach is used, and the IP Phone has been configured as such, the following steps are automatically taken to obtain the VOICE VLAN ID:

- 1 The IP Phone 2001, IP Phone 2002 and IP Phone 2004 perform an initial DHCP Discovery Request in the default VLAN.
- 2 The DHCP server returns a DHCP Ack message with an IP address in the data VLAN and one or more voice VLAN IDs in the vendor-specific field.
- 3 The telephone reads and saves the VOICE VLAN IDs.
- 4 The telephone rejects the DHCP offer (accepts it but immediately gives up the lease).
- 5 The telephone reboots and sends a DHCP Discovery Request with the first VLAN ID from the saved list. This is repeated for each VLAN ID in the list until a response is received.

This works because the Layer 2 switch discards every DHCP Discovery Request it receives from the IP Phone if the VLAN ID does not match the VLAN IDs configured on the port. When the IP Phone sends a DHCP Discovery Request with the port's configured VLAN ID, the packet passes into the network and the DHCP server's Ack message is passed back.

When a DHCP Ack message is received, the IP Phone accepts the offer and saves the IP address and Node IP address.



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# Appendix B: IP Phone diagnostic utilities

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## Contents

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## Introduction

Two types of IP Phone diagnostic utility are described in this section: set-based, and call server console-based. These utilities provide testing and verification of end-to-end connectivity, verification of statistics and settings, and retrieval of set information.

## Diagnostics from the IP Phone

### Network Diagnostic Utilities

Network Diagnostic Utilities are accessible on IP Phones to isolate voice quality and network performance problems.

The diagnostic utilities are available on the IP Phone itself, or from the Command Line Interface (CLI). For further information about CLI, see “IDU commands” on [page 290](#).

The Network Diagnostic Utilities include Network Diagnostic Tools (Ping and traceRoute), Ethernet Statistics, IP Networking Statistics, DHCP Information Process, RUDP Statistics, and Network QoS Process.

IP Phone-based Network Diagnostic Utilities are available for Phase II Nortel Networks IP Phone 2001, IP Phone 2002, and IP Phone 2004. See Table 36 for a description of diagnostic utilities availability for each phone state.

For detailed information on Quality of Service (QoS) and Proactive Voice Quality Management (PVQM), refer to *Data Networking for Voice over IP* (553-3001-160).

Table 36 lists the Network Diagnostic Utilities available on the IP Phone in different states.

**Table 36**  
**Network Diagnostic Utilities availability (Part 1 of 2)**

Function module	Before IP Address assignment	After IP Address assignment, unregistered - Local Mode	Registered (TPS) - Remote Mode	Call in progress (TPS)
Local diagnostic tools (Ping & TraceRoute)	N/A	Yes	Yes	Yes
Ethernet statistics	Yes	Yes	Yes	Yes
IP Networking statistics	N/A	Yes	Yes	Yes
DHCP information process	N/A	Yes, part of information	Yes	Yes

**Table 36**  
**Network Diagnostic Utilities availability (Part 2 of 2)**

<b>Function module</b>	<b>Before IP Address assignment</b>	<b>After IP Address assignment, unregistered - Local Mode</b>	<b>Registered (TPS) - Remote Mode</b>	<b>Call in progress (TPS)</b>
UNIStim/RUDP statistics	N/A	N/A	Yes	Yes
RTP/RTCP statistics	N/A	N/A	Yes	Yes
Network QoS process	N/A	N/A	Yes, last call	Yes, renew

### **Ping and TraceRoute**

The system administrator can use the local diagnostic tools, Ping or Traceroute command, from a specific endpoint with any arbitrary destination, typically another endpoint or Signaling Server. Ping and TraceRoute are available in Local or Remote mode.

### **Ethernet statistics**

In Local or Remote Mode, the system administrator can view ethernet statistics (for example, number of collisions, VLAN ID, speed and duplex) for the IP Phone on a particular endpoint. The exact statistics will depend on what is available from the IP Phone for the specific endpoint. The user may select either the Network Port (NIport) or PC port (PCport).

### **IP Networking statistics**

In Local or Remote Mode, the system administrator can view information on the packets sent, packets received, broadcast packets received, multicast packets received, incoming packets discarded, and outgoing packets discarded.

### **DHCP information process**

In Remote Mode, the system administrator can view DHCP settings (for example, IP address, S1, S2, and S4 addresses) for each IP Phone. In Local Mode partial information is available.

### **UNISlim/RUDP statistics**

In Remote Mode, the system administrator can view RUDP statistics (for example, number of messages sent, received, retries, resets, and uptime) for the IP Phones.

### **RTP/RTCP statistics**

In Remote Mode, the system administrator can view RTP/RTCP QoS metrics (for example, packet loss and jitter) while a call is in progress.

### **Network QoS Process**

In Remote Mode, the system administrator can view QoS statistics (for example, packets sent, packets received, packet loss, jitter average and jitter maximum, and round trip delay).

## **Accessing Network Diagnostic Utilities from the IP Phone**

Local diagnostics are available from the IP Phone for either Local or Remote mode.

*Note:* Diagnostics prompts are presented in English.

### **Local Mode**

When the IP Phone is not registered with the signaling server, the **Network Diagnostic Tools** menu is available from the IP Phone in Local Mode (see Table 36 on page 264). This menu is controlled by the firmware on the IP phone.

Use Procedure 39 on [page 267](#) to access the Network Diagnostic Tools in Local mode.

**Procedure 39****Accessing the Network Diagnostic Tools menu in Local mode**

- 1 Double-click the **Services** key. The Local Main Menu, Network Diagnostic Tools, appears.
- 2 Press **Cancel** to quit, or use the **Navigation** keys to scroll through the menu and select one of the following:
  - Ping
  - TraceRoute
  - Ethernet Statistics
  - IP Network Statistics
  - IP Set & DHCP Information

**Procedure 40****Executing Ping**

- 1 Select **Ping** from the **Network Diagnostic Tools** submenu.
- 2 Press the **IP** soft key and enter the IP address to Ping.  
**Tip:** Use the dialpad to enter the IP address. The \* key is used for dots and the # key produces a space.
- 3 Press the **Ping** soft key. The results of the Ping appear on the display.
- 4 Use the **Navigation** keys to browse the data. See Figure 54 on [page 276](#).  
**Tip:** Press the **Ping** soft key again to stop the pinging.
- 5 Press one of the following soft keys:
  - **Reset** — to clear the data
  - **Exit** — to return to the **Network Diagnostic Tools** menu.

**Procedure 41****Executing TraceRoute**

- 1 Select **TraceRoute** from the **Network Diagnostic Tools** submenu.
- 2 Press the **IP** soft key and enter the IP address to trace.
- 3 Press the **Tracert** soft key. The results of the TraceRoute appear on the display.
- 4 Use the **Navigation** keys to browse the data. See Figure 55 on [page 277](#).

**Tip:** Press the **Tracert** soft key again to stop the route tracing.

- 5 Press one of the following soft keys:
  - **Reset** — to clear the data
  - **Exit** — to return to the **Network Diagnostic Tools** menu

**Procedure 42**  
**Accessing Ethernet Statistics**

- 1 Select **Ethernet Statistics** from the **Network Diagnostic Tools** menu. The Ethernet statistics appear on the display.
- 2 Use the **Navigation** keys to browse the data. See Figure 56 on [page 278](#).
- 3 Press one of the following soft keys:
  - **Reset**— to clear the data and reset the statistic counter
  - **Exit** — to return to the **Network Diagnostic Tools** menu

**Procedure 43**  
**Accessing IP Network Statistics**

- 1 Select **IP Network Statistics** from the **Network Diagnostic Tools** menu. The IP Network Statistics appear on the display.
- 2 Use the **Navigation** keys to browse the data. See Figure 57 on [page 279](#).
- 3 Press one of the following soft keys:
  - **Reset** — to clear the data and reset the statistic counter
  - **Exit** — to return to the **Network Diagnostic Tools** menu

**Procedure 44**  
**Accessing IP Set & DHCP Information**

- 1 Select **IP Set & DHCP Information** from the **Network Diagnostic Tools** menu. The IP Set and DHCP information appears on the display.
- 2 Use the **Navigation** keys to browse the data. See Figure 58 on [page 280](#).

**Note:** In Local Mode, **Exit** is the only soft-key available in this submenu.

## Remote Mode

When the IP Phone is registered to the signaling server, diagnostics are available through the Telephone Options menu in Remote Mode. This menu is controlled by the TPS.

*Note:* When the user selects **Diagnostics** from the **Telephone Options** menu, if an IP Phone Installer Password is enabled in the Signaling Server, the **Diagnostics** menu is locked and the message “Access denied” displays on the IP Phone display.

Use Procedure 45 to access the **Diagnostics** submenu in Remote Mode:

### Procedure 45

#### Accessing the Diagnostics submenu in Remote Mode

- 1 Press the **Services** key.
- 2 Select **Telephone Options**.
- 3 Select **Diagnostics**.
- 4 Do one of the following:
  - Press the **Cancel** soft key to quit the **Diagnostics** submenu and return to the **Telephone Options** menu.
  - Use the **Navigation** keys to scroll through the **Diagnostics** submenu.
  - Press **Select** to select one of the diagnostics.

The following items are available on the **Diagnostics** submenu:

- Diag Tools (Diagnostic Tools: Ping and TraceRoute)
- EtherStats (Ethernet Statistics)
- IP Stats (IP Statistics)
- RUDP Stats (RUDP Statistics)
- QoS Stats (Quality of Service Statistics)

### **Procedure 46**

#### **Accessing Diagnostic Tools in Remote mode**

- 1 Select **Diagnostic Tools** from the **Diagnostics** submenu.
- 2 Do one of the following:
  - Press the **Cancel** soft key to return to the **Diagnostics** submenu.
  - Use the **Navigation** keys to scroll to the **DiagnosticTools** selection.
- 3 Press the **Select** soft key to choose one of the following:
  - Ping (see Figure 61 on [page 283](#))
  - TraceRoute (see Figure 62 on [page 284](#))

### ***Ping***

The following items are available on the **Ping** submenu in Remote mode:

- IP Addr
- Nr of Pings
- Ping!
- Last ping

### **Procedure 47**

#### **Entering an IP address**

- 1 Scroll through the **Ping** submenu to the **IP Addr** menu item. An IP address appears if previously entered. Example 47.249.48.20.
- 2 Press the **Select** soft key.
- 3 Use the **Navigation** keys to scroll to the destination IP address.
  - If the destination IP address is in the list, press the **Select** soft key to select the IP address. Press the **Select** soft key again to return to the **Ping** submenu.
  - If the destination IP address is not in the list, continue scrolling through the available IP address list until the IP address 0.0.0.0 appears. Press the **Select** soft key.

**Tip:** To edit the IP address, use the keypad and the **Delete** soft key and the **Cancel** soft key. Use the \* key for dots.
- 4 Press the **Select** soft key to save the new IP address or press the **Cancel** soft key to return to the **Ping** submenu.

**Procedure 48****Changing the number of Pings**

- 1 From the **Ping** submenu, use the **Navigation** keys to scroll to the **Nr of Pings** submenu item.
- 2 Press the **Select** soft key.

**Tip:** Use the **Delete** and **Clear** soft keys to enter the number of pings.

- 3 Do one of the following:
  - Press the **Select** soft key to accept the change and return to the **Ping** submenu.
  - Press the **Cancel** soft key to return to the **Ping** submenu.

**Procedure 49****Pinging an IP address**

- 1 From the **Ping** submenu, use the **Navigation** keys to scroll to the **Ping!** submenu item.

- 2 Press the **Select** soft key. Pinging starts.

**Tip:** Press the **Stop** soft key to stop pinging.

- 3 Press the **OK** soft key to return to the **Ping** submenu.

**Procedure 50****Reviewing the results of the Ping:**

- 1 Use the **Navigation** keys to scroll to the **Last Ping** submenu item.
- 2 Press the **Select** soft key.
- 3 Use the **Navigation** keys to scroll through the results.
- 4 Press the **Cancel** soft key to return to the **Ping** submenu.

**TraceRoute**

The following items are available on the **TraceRoute** submenu in Remote mode:

- IP Addr
- Max Nr of Hops
- TraceRt!
- Last TraceRt

**Procedure 51**  
**Entering an IP address**

- 1 Scroll through the **TraceRoute** submenu to the **IP Addr** menu item. An IP address appears if previously entered. Example 47.249.48.20.
- 2 Press the **Select** soft key.
- 3 Use the **Navigation** keys to scroll to the destination IP address.
  - If the destination IP address is in the list, press the **Select** soft key to select the IP address. Press the **Select** soft key again to return to the **TraceRoute** submenu.
  - If the destination IP address is not in the list, continue scrolling through the available IP address list until the IP address 0.0.0.0 appears. Press the **Select** soft key.

**Tip:** To edit the IP address, use the **Delete** soft key and the **Cancel** soft key. Use the \* key for dots.
- 4 Press the **Select** soft key to save the new IP address, or press the **Cancel** soft key to return to the **TraceRoute** submenu.

**Procedure 52**  
**Changing the number of Hops**

- 1 From the **TraceRoute** submenu, use the **Navigation** keys to scroll to the **Max Nr of Hops** submenu item.
- 2 Press the **Select** soft key.

**Tip:** Use the keypad and the **Delete** and **Clear** soft keys to enter the number of Hops.
- 3 Do one of the following:
  - Press the **Select** soft key to accept the change and return to the **TraceRoute** submenu.
  - Press the **Cancel** soft key to return to the **TraceRoute** submenu.

**Procedure 53**  
**Tracing a route**

- 1 From the **TraceRoute** submenu, use the **Navigation** keys to scroll to the **TraceRoute!** submenu item.
- 2 Press the **Select** soft key. Route tracing starts.

**Tip:** Press the **Stop** soft key to stop the trace.

- 3 Press the **OK** soft key to return to the **TraceRoute** submenu.

**Procedure 54****Reviewing the results of the trace**

- 1 From the **TraceRoute** submenu, use the **Navigation** keys to scroll to the **Last TraceRt** submenu item.
- 2 Press the **Select** soft key.
- 3 Use the **Navigation** keys to scroll through the results.
- 4 Press the **Cancel** soft key to return to the **TraceRoute** submenu.

***Ethernet Statistics***

Use Procedure 55 to access the **EtherStats** submenu item in Remote mode.

**Procedure 55****Browsing Ethernet Statistics**

- 1 Select **EtherStats** from the **Diagnostics** submenu. The Ethernet statistics appear on the display.
- 2 Do one of the following:
  - Press the **OK** soft key to return to the **Diagnostics** submenu.
  - Use the **Navigation** keys to browse the data. See Figure 63 on [page 285](#).
  - Press the **Cancel** soft key to return to the **Diagnostics** submenu.

### ***IP Statistics***

Use Procedure 56 to access the **IP Stats** submenu item in Remote mode.

#### **Procedure 56 Browsing IP Statistics**

- 1 Select **IP Stats** from the **Diagnostics** submenu. The IP Statistics appear on the display.
- 2 Do one of the following:
  - Press the **OK** soft key to return to the **Diagnostics** submenu.
  - Use the **Navigation** keys to scroll through the data display results. See Figure 64 on [page 286](#).
  - Press the **Cancel** soft key to return to the **Diagnostics** submenu.

### ***RUDP Statistics***

Use Procedure 57 to access the **RUDP Stats** submenu item in Remote mode.

#### **Procedure 57 Browsing RUDP Statistics**

- 1 Select **RUDP Stats** from the **Diagnostics** submenu. The RUDP statistics appear on the display.
- 2 Do one of the following:
  - Press the **OK** soft key to return to the **Diagnostics** submenu.
  - Use the **Navigation** keys to scroll through the data display results. See Figure 65 on [page 287](#).
  - Press the **Cancel** soft key to return to the **Diagnostics** submenu.

### **QoS Statistics**

Use Procedure 58 to access the **QoS Stats** submenu item in Remote mode.

#### **Procedure 58**

#### **Browsing Quality of Service Statistics**

- 1** Select **QoS Stats** from the **Diagnostics** submenu. The Quality of Service statistics appear on the display.
- 2** Do one of the following:
  - Press the **OK** soft key to return to the **Diagnostics** submenu.
  - Use the **Navigation** keys to scroll through the results. See Figure 66 on [page 287](#).
  - Press the **Cancel** soft key to return to the **Diagnostics** submenu.

*Note:* The IP Phone screen display returns to an idle state after 5 minutes if the user does not interact with menu items.

## Network Diagnostic Utilities data display pages

Data from the diagnostic utilities is displayed on the IP Phone screen display. One line of data at a time is displayed on IP Phone 2001 and IP Phone 2002 and 3 lines of data are displayed at a time on IP Phone 2004. Each line of data is up to 24 characters long. Use the **Navigation** keys to scroll through the lines of data.

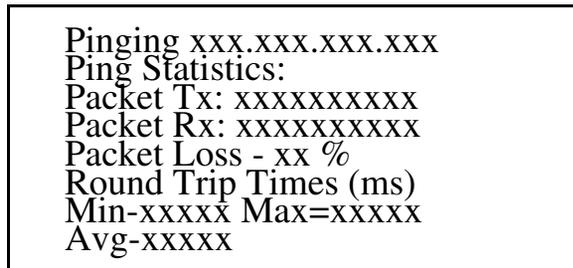
### Local Mode data display pages

The following figures illustrate the Network Diagnostic Utilities data display pages in Local Mode.

#### *Ping*

Figure 54 illustrates the data displayed from the **Ping** diagnostic tool.

**Figure 54**  
**PING data display page**



```
Pinging xxx.xxx.xxx.xxx  
Ping Statistics:  
Packet Tx: xxxxxxxxxxxx  
Packet Rx: xxxxxxxxxxxx  
Packet Loss - xx %  
Round Trip Times (ms)  
Min-xxxxx Max=xxxxx  
Avg-xxxxx
```

In Figure 54,

- PacketTx = packets sent
- PacketRx = packets received

#### *TraceRoute*

Figure 55 on [page 277](#) illustrates the data displayed from the **TraceRoute** diagnostic tool. Browse through the last 30 items by pressing the **Navigation** keys.

**Figure 55**  
**TraceRoute data display screen**

```
xxx: xxxxx xxxxx xxxxx  
IP: xxx.xxx.xxx.xxx  
xxx: xxxxx xxxxx xxxxx  
IP: xxx.xxx.xxx.xxx
```

In Figure 55,

- xxx: = Time To Live (TTL):Round Trip Time1, Round Trip Time2, Round Trip Time3
- IP: = IP address

### ***Ethernet Statistics***

Figure 56 on [page 278](#) illustrates the data displayed from the **Ethernet Statistics** submenu item.

**Figure 56**  
**Ethernet Statistics data display page**

```
1.Link: UP/Down
2.Duplex:Full/Half
3.Speed: xxx (MB)
4.Auto Sense/Negotiate
Auto-Nego Capability:Y/N
Auto-Nego Completed:Y/N
5.VLANPriority:xxx
6.VLANID:xxxx
7.PktColl:xxxxxxxxxxx
8.CRCErrors:xxxxxxxxxxx
9.FrameErrors:xxxxxxxxxxx
```

In Figure 56,

- Duplex = duplex mode
- Speed = network speed 10MB/100MB
- Auto Sense/Negotiate = Auto Negotiate Protocol Received or Not (Y – Yes, N – No)

**Note:** In the **IP Phone Configuration** menu, Auto Negotiate mode is the default setting for initial startup. If the telephone is connected to a network that supports Auto Negotiate, it selects the best speed and duplex mode available. For more information, see “Full Duplex mode” on [page 41](#), on [page 72](#), and on [page 103](#).

- VLANPriority = IP Phone VLAN priority
- VLANID = IP Phone VLAN ID
- PCollision = network packet collision peg counts
- CRCErrors = network CRC errors peg counts
- FrameErrors = network Framing errors peg counts

**IP Networking Statistics**

Figure 57 illustrates the data displayed from the **IP Networking Statistics** submenu item.

**Figure 57**  
**IP Networking Statistics data display screen**

```
1. Packet Tx: xxxxxxxxxxxx
2. PacketRx: xxxxxxxxxxxx
3. BcastPktRx: xxxxxxxxxxxx
4. McastPktRx: xxxxxxxxxxxx
5. InPktDisc: xxxxxxxxxxxx
6. OutPktDisc: xxxxxxxxxxxx
7. UnknownPkts: xxxxxxxxxxxx
8. ICMPType—Code: xxx—xxx
```

In Figure 57,

- PacketTx = IP Phone packets sent
- PacketRx = IP Phone packets received
- BcastPktRx = broadcast packets received
- McastPktRx = multicast packets received
- InPktDisc = incoming packets discarded
- OutPktDisc = outgoing packets discarded
- UnknownPkts = unknown protocol packets discarded
- ICMPType-Code = the last ICMP message: XXX-XXX

**DHCP Statistics**

Figure 58 on [page 280](#) illustrates the data displayed from the **DHCP Statistics** submenu item.

**Figure 58**  
**DHCP information data display page**

```
1.Configuration:
NetworkDataValided:Yes/No
MACAddressStored:Yes/No
PerformDHCP:Full/Partial
VLANEnable:Yes/No
VLANConfig:Manual/Auto
VLANIDsDiscovered:Yes/No
PrimaryServer:S1/S2
2.FWVersion:xxxxxxx
3.HWIDxxxxxxxxxxxxxxxxxxxxx
4.SetIP:xxx.xxx.xxx.xxx
5.SbMask:xxx.xxx.xxx.xxx
6.GtWay:xxx.xxx.xxx.xxx
7.PROMS1:xxx.xxx.xxx.xxx
  Port:xxxx Act:xxx
  Retries:xxx
8.PROMS2:xxx.xxx.xxx.xxx
  Port:xxxx Act:xxx
  Retries:xxx
9.VLANPriority:xxx
10.VLANID:xxxx
11.DHCPRespondString:
xxxxxxxxxxxxxxxxxxxxxxxxxxxx
xxxxx.....
12.Servers'Information:
  SN:xxx.xxx.xxx.xxx
  Port:xxxx Act:xxx
  Retries:xxx FailOver:xxx
```

In Figure 58,

- NetworkDataValided = is EEPROM Network Data validated?
- MACAddressStored = is MAC Address stored in EEPROM?
- FWVersion = IP Phone firmware version
- HWID = IP Phone hardware ID
- SbMask = subnet mask
- GtWay = Gateway
- PROMS1 = EEPROM Server1 information
- PROMS2 = EEPROM Server2 information
- Sn = S: Server n is from 1 to 16

### ***UNIStim/RUDP statistics***

Figure 59 illustrates the data displayed from the **UNIStim/RUDP statistics** submenu item.

**Figure 59**

#### **UNIStim/RUDP statistics data display screen (TPS)**

```
1.MessageTx:xxxxxxxxxxxxx
2.MessageRX:xxxxxxxxxxxxx
3.Retries:xxxxxxxxxxxxx
4.UpTime:xxx/xx/xx/xx
```

In Figure 59,

- MessageTx = messages sent
- MessageRx = messages received
- Retries = number of retries
- UpTime = up-time of current TPS registration (days/hours/minutes/seconds)

### ***RTP/RTCP statistics***

Figure 60 illustrates the data displayed from the **RTP/RTCP statistics** submenu item.

**Figure 60**  
**RTP/RTCP statistics data display page**

```
1.EndIP:xxx.xxx.xxx.xxx
2.PortID:xxxx
3.PacketTX:xxxxxxxxxxx
4.PacketRx:xxxxxxxxxxx
5.DiscPktRx:xxxxxxxxxxx
6.PacketLossRx:xxx%
7.JittAveRx:xxxxxxxxxxx
8.JittMaxRx:xxxxxxxxxxx
9.RdTripDelay:xxxxx ms
```

In Figure 60,

- EndIP = endpoint IP address
- PortID = port ID
- PacketTx = RTP packets sent
- PacketRx = RTP packets received
- DPacketRx = BTR Disorder packets received
- PacketLossRx = packet loss received xxx%
- JittAveRx = jitter average received xxxxxx
- JittMaxRx = jitter maximum received xxxxxx
- RdTripDelay = round trip delay

**Note:** Each new call resets the counters.

## Remote Mode data display pages

The following figures illustrate the **Network Diagnostic Utilities** data display pages in Remote Mode.

### **PING**

Figure 61 illustrates the data displayed from the **Ping** Diagnostic Tool.

**Figure 61**

#### **Ping data display page**

```
Rx 64 bytes time xx ms
Rx 64 bytes time xx ms
Rx 64 bytes time xx ms
For xxx.xxx.xxx.xxx
PacketTx:xxx
Packet Loss = xx%
Min RTT: xxx ms
Avg RTT: xxx ms
Max RTT: xxx ms
```

In Figure 61,

- Packet TX = packets sent
- Packet Rx = packets received
- RTT - Round Trip Time (for Min RTT, Avg RTT, and Max RTT)

### ***TraceRoute***

Figure 62 illustrates the data displayed from the **Tracert** Diagnostic tool.

**Figure 62**  
**Tracert data display screen**

```
Hopxxx: RTT = xxx xxx xxx
IP: xxx.xxx.xxx.xxx
Hopxxx: RTT = xxx xxx xxx
IP: xx.xxx.xxx.xxx
Hopxxx: RTT = xxx xxx xxx
IP: xxx.xxx.xxx.xxx
Hopxxx: RTT = xxx xxx xxx
IP: xxx.xxx.xxx.xxx
Hopxxx: RTT = xxx xxx xxx
IP: xxx.xxx.xxx.xxx
```

In Figure 62,

- Hopxxx = the Hop number
- xxx = Round Trip Time1, Round Trip Time2, Round Trip Time3
- IP: = IP address

### ***Ethernet Statistics***

Figure 63 illustrates the data displayed from the **EtherStats** submenu item.

**Figure 63**  
**Ethernet statistics data display screen**

```
1.Link: UP/Down
2.Duplex:Full/Half
3.Speed: xxx (MB)
4.Auto Sense/Negotiate
Auto-Nego Capability: Y/N
Auto-Nego Completed: Y/N
5.VLANPriority:xxx
6.VLANID:xxxx
7.PktColl:xxxxxxxxxxx
8.CRCErrors:xxxxxxxxxxx
9.FrameErrors:xxxxxxxxxxx
```

In Figure 63,

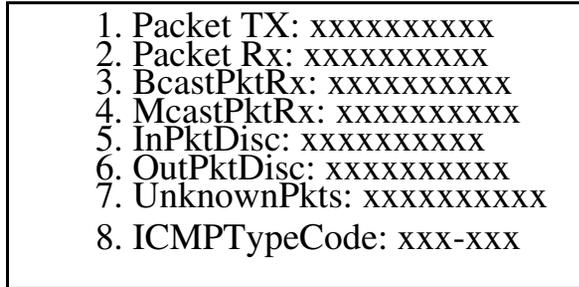
- Duplex - duplex mode
- Speed - network speed 10MB/100MB
- Auto Sense/Negotiate = Auto Negotiate Protocol Received or Not (Y - Yes, N - No)
- VLANPriority = IP Phone VLAN priority
- VLANID = IP Phone VLAN ID
- PCollision = network packet collision peg counts
- CRCErrors = network CRC errors peg counts
- FrameErrors = network Framing errors peg counts

**Note:** In the **IP Phone Configuration** menu, Auto Negotiate mode is the default setting for initial startup. If the telephone is connected to a network that supports Auto Negotiate, it selects the best speed and duplex mode available. For more information, see “Full Duplex mode” on [page 41](#), on [page 72](#), and on [page 103](#).

### ***IP Networking Statistics***

Figure 64 illustrates the data displayed from the **IP Stats** submenu item.

**Figure 64**  
**IP Networking statistics data display screen**



In Figure 64,

- PacketTx = IP Phone packets sent
- PacketRX = IP Phone packets received
- BcastPktRx = broadcast packets received
- McastPkeRx = multicast packets received
- InPktDisc = incoming packets discarded
- OutPktDisc = outgoing packets discarded
- UnknownPkts = unknown protocol packets discarded
- ICMPTypeCode = the last ICMP message: xxx-xxx

***RUDP statistics data display screen (TPS)***

Figure 65 illustrates the data displayed from the **RUDP Stats** submenu item.

**Figure 65**  
**RUDP statistics data display page**

```
1.MessageTx:xxxxxxxxxxxxx
2.MessageRx:xxxxxxxxxxxxx
3.Retries:xxxxxxxxxxxxx
4.UpTime:xxx/xx/xx/xx
```

In Figure 65,

- MessageTx = messages sent
- MessageRx = messages received
- Retries = number of retries
- UpTime = up-time of current TPS registration (days/hours/minutes/seconds)

***Quality of Service statistics***

Figure 66 illustrates the data displayed from the **QoS Stats** menu item.

**Figure 66**  
**QoS statistics data display page**

```
FarEndIP:xxx.xxx.xxx.xxx
PortEndPortID:xxxx
LocPktLossRx:xxxxxxxxxxxxx
LocJittAvgRx:xxx
LocLatAvg:xxx
LocPktTx:xxx
LocPktRx:xxx
LocOutOrdRx:xxx
LocListR:xxx
RmtPktLossRx:xxx
RmtJittAvgRx:xxx
RmtLatAvg>xxx
RmtListR:xxx
```

In Figure 66,

- EndIP = endpoint IP address
- PortID = port ID
- PacketTx = RTP packets sent
- Packet Rx = RTP packets received
- DPacketRx = BTR Disorder packets received
- PacketLossRx = packet loss received xxx%
- JittAveRx = jitter average received xxxxxx
- JittMaxRx = jitter maximum received xxxxxx
- RdTripDelay = round trip delay

*Note:* Each new call resets the counters.

## Network Address Translation (NAT) Traversal

This section describes the Network Address Translation (NAT) Traversal feature as it effects IP Phones. NAT Traversal is required to permit IP Phones working behind a NAT box to connect and maintain signaling and media paths.

NAT Traversal is applicable to all UNISim IP Phone clients and is one-ended. That is, it does not require the other end of a call to support any special protocol, and it is interoperable with any other media termination.

In this document NAT refers to both IP port address mapping and IP address mapping (also known as NAPT). A NAT can be used with or without a Virtual Private Network (VPN).

The NAT Traversal feature supports only IP clients behind cone NAT types. There are three types of cone NAT — the full cone, restricted cone, and the port restricted cone. NAT traversal is not compatible with symmetric NATs. If the IP Phone is behind a Symmetric NAT, the LTPS unregisters the phone from the call server (while remaining registered on the LTPS), and displays the following message on the IP Phone display: “Error! Symmetric NAT”.

For detailed information about the NAT Traversal feature, refer to *IP Line: Description, Installation, and Operation* (553-3001-365).

Network Address Translation information accessible from the IP Phones includes:

- Public Set IP
  - SIG
- Public Set IP
  - RTP
- Private Set IP
  - SIG
- Private Set IP
  - RTP
- type of NAT

**Procedure 59**  
**Accessing NAT information**

- 1 Press the **Services** key.
- 2 Press the **Navigation** keys to scroll and highlight **Telephone Options**.
- 3 Press the **Select** soft key.
- 4 Press the **Navigation** keys to scroll and highlight **Set Info**.
- 5 Press the **Select** soft key.
- 6 Press the **Navigation** keys to scroll and highlight **Set IP Info**.
- 7 Press the **Select** soft key
- 8 Press the **Navigation** keys to scroll through the NAT information.

**IMPORTANT!**

Nortel Networks recommends partial DHCP configuration for IP Phones residing behind a NAT router unless the NAT router supports special configuration of the DHCP server. For more information, refer to *IP Line: Description, Installation, and Operation* (553-3001-365).

## Using CLI Commands

### IDU commands

The system-based IDU command in LD 32 can be used to test the end-to-end IP connectivity of the IP Phone from the call server console instead of using set-based diagnostics.

The IDU command provides the following information:

- TN
- TN ID
- MAC address
- IP address
- LTPS IP address
- Manufacturer code
- Model
- NT code
- Color code
- Release code
- Serial number
- Firmware/Software version

**Note:** For an IP Phone behind a NAT, the IP address is composed of the public address followed by the private address in parentheses (see Table 37 on page 291). For an IP Phone without a NAT, the IP address is the signaling IP address of the IP Phone as seen by the LTPS (see Table 38 on page 291).

For detailed information, see *Software Input/Output: Maintenance* (553-3001-511).

Table 37 and Table 38 on [page 291](#) provide the output format of the IDU commands in LD 32.

Table 37 provides the output format of the IDU commands in LD 32 for an IP Phone with a NAT.

**Table 37**  
**IDU command printout in LD 32 for IP Phone with a NAT**

Item	Description
ISET TN:	l s c u
TN ID CODE:	i2001, i2002, i2004, or i2050
ISET MAC ADR	xx.xx.xx.xx.xx.xx
ISET IP ADR	xx.x.x.xxx:xxxx(xxx.xxx.x.xx)
LTPS IP ADR	xx.xx.xxx.xx
MANUFACTURER CODE	[NAME]
MODEL	
NT CODE:	xxxxxxxx
COLOR CODE:	xx
RLS CODE:	x
SER NUM:	xxxxxx
FW/SW VERSION	xxxxxxx

Table 38 provides the output format of the IDU commands in LD 32 for an IP Phone without a NAT.

**Table 38**  
**IDU command printout in LD 32 for IP Phone without a NAT (Part 1 of 2)**

Item	Description
ISET TN:	l s c u
TN ID CODE:	i2001, i2002, i2004, or i2050
ISET MAC ADR	xx.xx.xx.xx.xx.xx

**Table 38**  
**IDU command printout in LD 32 for IP Phone without a NAT (Part 2 of 2)**

Item	Description
ISSET IP ADR	xx.x.x.xxx:xxxx
LTPS IP ADR	xx.xx.xxx.xx
MANUFACTURER CODE	[NAME]
MODEL	
NT CODE:	xxxxxxxx
COLOR CODE:	xx
RLS CODE:	x
SER NUM:	xxxxxx
FW/SW VERSION	xxxxxxxx

- If the IDU command cannot retrieve the information shown in Table 37 or Table 38, it responds with one of the following:
- prints the IP Phone IP address and the Voice Gateway Media Card address, and generates an NPR0503 message
- the IP Phone is not registered with the Call Server and generates an NPR0048 message
- the IP Phone is registered, but the Call Server is not responding, and generates an NPR0503 message.

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Nortel Communication Server 1000

## **IP Phones**

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Publication number: 553-3001-368  
Document release: Standard 4.00  
Date: February 2005  
Produced in Canada



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