Meridian 1
Succession 1000
Succession 1000M
Succession 3.0 Software

Internet Terminals
Description

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Revision history

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

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 describes the i2002 and i2004 Internet Telephones and the i2050 Software Phone. It also describes the Internet Telephone Virtual Office and Emergency Services for Virtual Office features.

Note on legacy products and releases

This NTP contains information about systems, components, and features that are compatible with Succession 3.0 Software and IP Line 3.1 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:

- Meridian 1 Option 11C Chassis

- Meridian 1 Option 11C Cabinet

- Meridian 1 Option 51C

- Meridian 1 Option 61

- Meridian 1 Option 61C

- Meridian 1 Option 61C CP PII

- Meridian 1 Option 81

- Meridian 1 Option 81C

- Meridian 1 Option 81C CP PII

- Succession 1000

- Succession 1000M Chassis

- Succession 1000M Cabinet

- Succession 1000M Half Group

- Succession 1000M Single Group

- Succession 1000M Multi Group

Note that memory upgrades may be required to run Succession 3.0 Software on CP3 or CP4 systems (Options 51C, 61, 61C, 81, 81C).

System migration

When particular Meridian 1 systems are upgraded to run Succession 3.0 Software and configured to include a Succession Signaling Server, they become Succession 1000M systems. Table 1 lists each Meridian 1 system that supports an upgrade path to a Succession 1000M system.

Table 1
Meridian 1 systems to Succession 1000M systems (Part 1 of 2)

This Meridian 1 system...	Maps to this Succession 1000M system
Meridian 1 Option 11C Chassis	Succession 1000M Chassis
Meridian 1 Option 11C Cabinet	Succession 1000M Cabinet
Meridian 1 Option 51C	Succession 1000M Half Group
Meridian 1 Option 61	Succession 1000M Single Group
Meridian 1 Option 61C	Succession 1000M Single Group
Meridian 1 Option 61C CP PII	Succession 1000M Single Group

Table 1
Meridian 1 systems to Succession 1000M systems (Part 2 of 2)

This Meridian 1 system...	Maps to this Succession 1000M system
Meridian 1 Option 81	Succession 1000M Multi Group
Meridian 1 Option 81C	Succession 1000M Multi Group
Meridian 1 Option 81C CP PII	Succession 1000M Multi Group

Note the following:

- When an Option 11C Mini system is upgraded to run Succession 3.0 Software, that system becomes a Meridian 1 Option 11C Chassis.

- When an Option 11C system is upgraded to run Succession 3.0 Software, that system becomes a Meridian 1 Option 11C Cabinet.

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

- *Small System: Upgrade Procedures* (553-3011-258)

- *Large System: Upgrade Procedures* (553-3021-258)

- *Succession 1000 System: 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":

- Meridian 1

- Succession 1000

- Succession 1000M

The following systems are referred to generically as "Small System":

- Succession 1000M Chassis

- Succession 1000M Cabinet

- Meridian 1 Option 11C Chassis

- Meridian 1 Option 11C Cabinet

The following systems are referred to generically as "Large System":

- Meridian 1 Option 51C

- Meridian 1 Option 61

- Meridian 1 Option 61C

- Meridian 1 Option 61C CP PII

- Meridian 1 Option 81

- Meridian 1 Option 81C

- Meridian 1 Option 81C CP PII

- Succession 1000M Half Group

- Succession 1000M Single Group

- Succession 1000M Multi Group

The call processor in Succession 1000 and Succession 1000M systems is referred to as the "Succession Call Server".

Related information

This section lists information sources that relate to this document.

NTPs

The following NTPs are referenced in this document:

- *i2002 Internet Telephone User Guide*

- *i2004 Internet Telephone User Guide*

- *i2050 Software Phone User Guide*

- *Data Networking for Voice over IP* (553-3001-160)

- *Branch Office* (553-3001-214)

- *Optivity Telephony Manager: Installation and Configuration* (553-3001-230)

- *Software Input/Output: Administration* (553-3001-311)

- *IP Line: Description, Installation, and Operation* (553-3001-365)

- *Software Input/Output: Maintenance* (553-3001-511)

- *Large System: Planning and Engineering* (553-3021-120)

- *Succession 1000 System: Upgrade Procedures* (553-3031-258)

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.

i2002 Internet Telephone

Contents

This section contains information on the following topics:

Introduction

This section explains how to install and maintain the i2002 Internet Telephone. For information on using the i2002 Internet Telephone, see the *i2002 Internet Telephone User Guide*.

This section contains the following procedures:

Description

The i2002 Internet Telephone brings voice and data to the desktop environment. It connects directly to the LAN through the Ethernet connection.

The i2002 Internet Telephone components are shown in Figure 1 on .

Figure 1
i2002 Internet Telephone

552-ITG0010

Table 2
i2002 Internet Telephone components and functions (Part 1 of 4)

Component	Function
Speaker	Press the Handsfree key to activate the speaker.
Programmable Line DN/ Feature Keys (self-labeled)	Four programmable line (DN)/feature keys (self-labeled) are configured for various features on the telephones. One must be the prime DN key.
	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.
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)	Soft keys (self-labeled) are located below the display area. The LCD label above the key changes, based on the active feature.
	Note: A triangle before a key label indicates that the key is active.
Navigation keys	Use the Navigation keys to scroll through menus and lists in the display area.
Inbox (Message)	Press the Inbox (Message) key to access your voice mailbox.
Shift	The Shift key is a fixed key that is reserved for future feature development.
Directory	Press the Directory key to access Directory services.

Table 2
i2002 Internet Telephone components and functions (Part 2 of 4)

Component	Function
Services	Press the Services key to access the following items: • Telephone Options (see **Notes 1 and 2**): — Volume Adjustment — Contrast Adjustment — Language — Date/Time Format — Display diagnostics — Local Dialpad Tone — Ring type — OnHook Default Path — Change Feature key label — Set Information • Virtual Office Login and Virtual Office Logout (if Virtual Office is configured) • Test Local Mode and Resume Local Mode (if Branch Office is configured)
Quit	Press the Quit key to end an active application. Pressing the Quit key does not affect the status of the calls currently on your telephone.
Expand to PC	The Expand to PC key is a fixed key that is reserved for future development.
Goodbye	Press the Goodbye key to terminate an active call.

Table 2
i2002 Internet Telephone components and functions (Part 3 of 4)

Component	Function
Hold	Press the Hold key to put an active call on hold. Press the Line (DN) key beside the flashing to return to the caller on hold.
Headset	Press the Headset key to answer a call using the headset or to switch a call from the handset or Handsfree to the headset.
Mute	Press the Mute key to listen to the receiving party without transmitting.
	Press the Mute key again to return to a two way conversation.
	The Mute key applies to Handsfree, Handset, and Headset microphones.
	The Mute LED flashes when the Mute option is in use.
Volume control bar	Use the Volume Control bar to adjust the volume of the Handset, Headset, Speaker, Ringer, and Handsfree features.
	Press the right side of the rocker bar to increase volume, the left side to decrease volume.

Table 2
i2002 Internet Telephone components and functions (Part 4 of 4)

Component	Function
Handsfree key	Press the Handsfree key to activate handsfree.
	The LED lights to indicate when handsfree is active.

Note 1: If a call is presented while the user is manipulating an option, the i2002 Internet Telephone rings and the DN key flashes. However, the screen display is not updated with Caller ID. The programming text is not disturbed.

Note 2: The user can originate a call using Autodial or Last Number Redial while manipulating an option. However, the display is not updated with dialed digits or the Caller ID and the dialpad is intercepted by the Services.

Supported features

The i2002 Internet Telephone supports the following additional features:

- 802.1Q VLAN and Layer 2 priority bit support, an industry standard for managing bandwidth usage

- Ability to change the feature key labels

- Corporate Directory

- Virtual office

- Branch Office

- Switch to support sharing LAN access with a PC or other data device

- 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.

Features not currently supported

The following features are not supported on the i2002 Internet Telephone:

- Personal Directory

- Call Log and Redial List

- Expansion Modules

- Support of accessory modules

- Live Dial pad

- Group Listening

- Set-to-Set messaging

- Context-sensitive soft keys

- Net6

The three-port switch that is internal to the i2002 Internet Telephone 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 gets priority over the Ethernet.

Display characteristics

An i2002 Internet Telephone has three major display areas:

- Programmable Line (DN)/Feature Key Label

- Soft Key Label

- Information Line

These three display areas are shown in Figure 2 on .

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.

Figure 2
i2002 Internet Telephone display areas

553-ITG0011

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 i2002 Internet Telephone 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 idle state)

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

Key number assignments

The i2002 Internet Telephone 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 .

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 .

Key number assignments at the Call Server are aligned with that of the i2004 Internet Telephone. The mappings between i2002 soft key numbers and PBX CPU key numbers are the same as on the i2004 Internet Telephone.

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 i2002 Internet Telephone.

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

Table 3
i2002 Internet Telephone 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

Table 4 lists the i2002 Internet Telephone package components.

Table 4
i2002 Internet Telephone components list (Part 1 of 2)

i2002 Internet Telephone, with North American power supply package, includes: • i2002 Internet Telephone • Handset • Handset cord • Footstand • 7ft Ethernet cable • Power transformer (117/120 VAC 50/60 Hz) • i2002 Getting Started card (English/French) Available online - cannot be ordered separately	NTDU76AB34/A0507336 (Ethergray) NTDU76AB70/A0506854 (Charcoal)
i2002 Internet Telephone, without power supply package, includes: • i2002 Internet Telephone • Handset • Handset cord • Footstand • 7ft Ethernet cable • i2002 Getting Started card (English/French) Available online - cannot be ordered separately	NTDU76BB34/A0507337 (Ethergray) NTDU76BB70/A0506856 (Charcoal)
Handset cord (Ethergray)	A0897725
8.8ft (2.7m) Handset cord (Charcoal)	A0792037
Handset (Ethergray)	A0788874
Handset (Charcoal)	A0758634

Table 4
i2002 Internet Telephone components list (Part 2 of 2)

Footstand (Charcoal)	NTDU84AA/A0891619 (Charcoal)
7ft. Ethernet cable category 5	A0648375
i2002/i2004 Power Adaptors	
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

Before you begin

The following section provides a step-by-step guide through the i2002 Internet Telephone installation process. Before installing thei2002 Internet Telephone complete the following pre-installation checklist.

Procedure 1
Pre-installation checklist

1 Ensure there is one i2002 Internet Telephone boxed package for each i2002 Internet Telephone being installed. The package contains:

- i2002 Internet Telephone

- Handset

- Handset cord

- Footstand

- 2.3m (7 foot) Ethernet cable, Category 5

- i2002 Getting Started card (English/French)
  Available online - cannot be ordered separately

2 To install and configure an i2002 Internet Telephone, the host system must be installed with the Voice Gateway Media Card.

3 Ensure you have a power supply (local or closet) appropriate for the voltage in the designated area.

4 Understand the three configuration modes that you can choose as you proceed through the installation of the i2002 Internet Telephone. 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 31.

5 A DHCP server and DHCP relay agents, if required, must also be installed, configured, and running.

―――――――――――――― **End of Procedure** ――――――――――――――

Startup sequence

When an i2002 Internet Telephone is connected to the network, it must perform a startup sequence. The elements of the startup sequence include:

- obtaining the IP parameters

- finding a 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
i2002 Internet Telephone 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.

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 description" on .

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 i2002 Internet Telephone parameters are entered manually using the keypad.

Your System Administrator provides the following information: IP address, subnet mask, and the default gateway.

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

Dynamic IP address assignment — Partial DHCP

For a partial DHCP installation, you must provide, through the i2002 Internet Telephone's keypad, the Connect Server parameters including: IP address, port number, action, and retry count. Other parameters (Internet Telephone IP address, subnet mask and default gateway) are retrieved from the DHCP server.

The i2002 Internet Telephone password, node ID and TN must be entered manually from the keypad.

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

Go to Procedure 3, "Installing an i2002 Internet Telephone for the first time using DHCP" on page 36.

Dynamic IP address assignment — Full DHCP

For a full DHCP installation, all parameters (Internet Telephone IP address, subnet mask, default gateway, Connect Server IP address, port number, action, and retry count) are retrieved from the DHCP server to recognize the i2002 Internet Telephone.

The i2002 Internet Telephone password, node ID, and TN must be entered manually from the keypad.

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

Go to Procedure 3, "Installing an i2002 Internet Telephone for the first time using DHCP" on page 36.

Procedure 2
Installing an i2002 Internet Telephone 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 i2002 Internet Telephone on the system using LD 11.

    For more information, see *Software Input/Output: Administration* (553-3001-311).

3   Connect the i2002 Internet Telephone 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   Power the i2002 Internet Telephone using either the Power over LAN Hub™ (closet power) or an AC power transformer (local power).

    a.   If local power is used, plug the AC power transformer into the nearest power outlet. Ensure the correct AC power transformer is used for the country. Connect the power jack as shown in Figure 4 on page 33.

Be sure to thread the cord around the retaining hook to provide strain relief for a secure power connection.

b. If using the Power over LAN Hub^TM, a power splitter is required to split the power from the CAT-5 line cable (see Figure 3 on page 32 and Figure 4 on page 33). Refer to the Power over LAN Hub^TM User Guide included in the Power over LAN Hub^TM package for more details on configuring power over LAN.

Figure 3
Power splitter

c. Choose one of the following connections:

i. For a telephone not sharing LAN access with a PC:

Connect one end of the CAT-5 line cable to the LAN ethernet jack located on the back of the telephone (identified with a LAN icon, see Figure 4 on page 33). The other end of the CAT-5 line cable plugs into the IP network.

ii. For a telephone sharing LAN access with a PC:

Connect one end of the CAT-5 line cable to the LAN ethernet jack located on the back of the telephone (identified with a LAN icon, see Figure 4) and the other end to the IP network. Insert a second CAT-5 line cable into the PC ethernet jack located on the back of the telephone (identified with a PC icon, see Figure 4 on page 33) and the other end into the computer.

Figure 4
i2002 Ethernet port connections

Network Ethernet

PC Ethernet
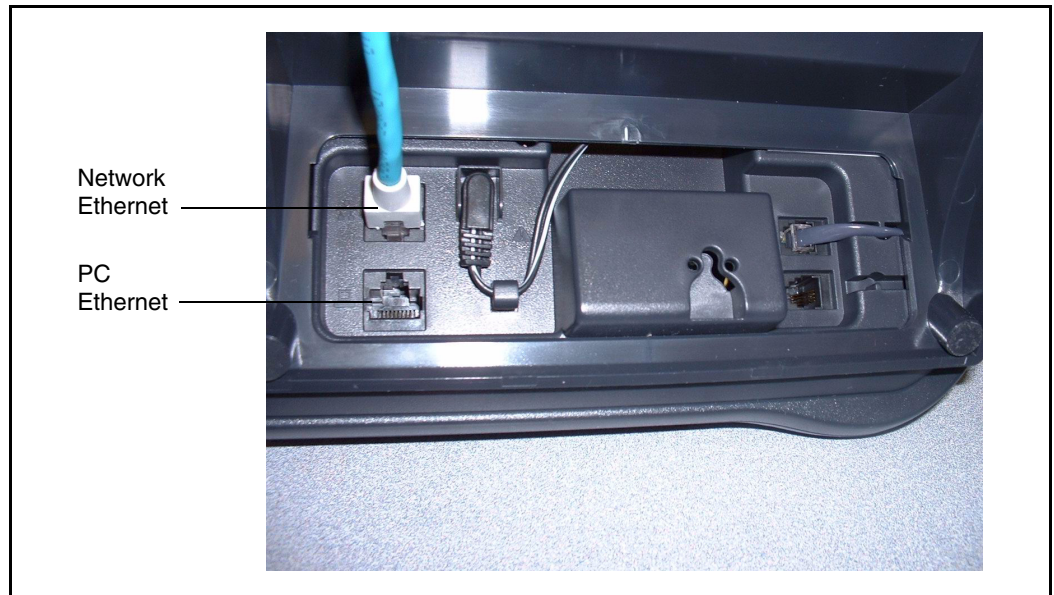
IMPORTANT!

Timing information
There are only four seconds between plugging in the i2002 Internet Telephone'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 i2002 Internet Telephone attempts to locate the connect server. Wait until it is finished, and then begin the power up sequence again.

---

5   Reset the i2002 Internet Telephone by unplugging and replugging the power jack.

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 i2002 Internet Telephone IP address.
net msk	A subnet mask.
def gw	The default gateway for the i2002 Internet Telephone 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 i2002 Internet Telephone 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 Net6 is not supported on the i2002 Internet Telephone. This prompt exists to support future implementation of Net6.

Note: The i2002 Internet Telephone can support a primary (S1) and secondary (S2) connect server. If you require Internet Telephones 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 Internet Telephone. 0-No is the default value.
1-Yes	Enable the 802.1Q header.

10 If 802.1Q is *not* required, go to step 12, otherwise select **1-Yes** to display the following VLAN ID:

```
Manual Cfg
VLAN: 1234
```

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

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

The i2002 Internet Telephone is configured with 802.1Q enabled, priority = 6, and the VLAN ID set to the entered value.

The i2002 Internet Telephone searches for the connect server. When the connection is complete, proceed with step 12.

12 Enter the following information provided by your System Administrator:

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

The i2002 Internet Telephone registers with the Terminal Proxy Server (TPS) and if needed, begins the firmware download. This takes several minutes. When complete, the i2002 Internet Telephone 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.

13 Check for dial tone and the correct DN above the display.

14 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.

15 (Optional) Customize the Feature Keys as required. For more information, see "Configure programmable line (DN)/feature key labels" on .

─────────────────── **End of Procedure** ───────────────────

Procedure 3
Installing an i2002 Internet Telephone for the first time using DHCP

1 Complete steps 1–5 from Procedure 2 on .

2 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.

3 At the prompt DHCP Yes/No?, select **Yes**.

4 Select Partial or Full DHCP.

    a. If you select Full DHCP, then the following parameters are retrieved from the DHCP server:

        — A valid i2002 Internet Telephone IP address.

        — A subnet mask.

        — The default gateway for the i2002 Internet Telephone 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 Internet Telephone 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:

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 i2002 Internet Telephone 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 Net6 is not supported on the i2002 Internet Telephone.
	This prompt exists to support future implementation of Net6.

Note: The i2002 Internet Telephone can support a primary (S1) and secondary (S2) connect server. If you require Internet Telephones 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.

5 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 7 to continue the i2002 Internet Telephone configuration.

1-Ma	Enter a VLAN ID manually.
	If this is selected, proceed to step 6 to continue the 802.1Q configuration.
2-Au	Automatically enter a VLAN ID using DHCP. DHCP auto discovers the VLAN ID.
	No further steps are required to configure 802.1Q on the i2002 Internet Telephone. If this is selected, proceed to step 7 to continue the Internet Telephone configuration.

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

```
Manual Cfg
VLAN: 1234
```

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

6   Enter a valid value and press **OK**.

The i2002 Internet Telephone is configured with 802.1Q enabled, priority = 6, and the VLAN ID set to the entered value.

The i2002 Internet Telephone searches for the connect server. When the connection is complete, proceed to step 7.

7   Enter the following information provided by your System Administrator.

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

The i2002 Internet Telephone registers with the TPS and if needed, begins the firmware download. This takes several minutes. When complete, the i2002 Internet Telephone 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.

8   Check for dial tone and the correct DN above the display.

9   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.

10 (Optional) Customize the Feature Keys as required. For more information, see "Configure programmable line (DN)/feature key labels" on .

————————————— **End of Procedure** —————————————

Power cycle description

The power cycle is similar to the initial installation. The i2002 Internet Telephone saves its firmware, IP parameters, Node Number, and TN in memory. As the i2002 Internet Telephone proceeds through a start-up sequence, it does not need to:

•   re-enter the IP parameters if they were manually entered

•   reacquire firmware or prompt the user for Node Number and TN

When the power is down on the i2002 Internet Telephone, LAN access is not available for the PC or other data devices connected to the Internet Telephone. Access is restored when power is restored to the i2002 Internet Telephone.

Reinstalling an i2002 Internet Telephone

You can reinstall an existing, previously-configured i2002 Internet Telephone on the same system. For example, the i2002 Internet Telephone 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 i2002 Internet Telephone.

Procedure 4
Changing the TN of an existing i2002 Internet Telephone

1   Repower the i2002 Internet Telephone.

Note: During the reboot sequence of a previously configured Internet Telephone, the i2002 Internet Telephone 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.

If	Then
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 i2002 Internet Telephone

IMPORTANT!

Two telephones cannot share the same TN. You must remove the i2002 Internet Telephone that is currently using the TN.

Procedure 5
Replacing an i2002 Internet Telephone

1   Disconnect the i2002 Internet Telephone that you want to replace.

2   Follow either Procedure 2 on (static IP assignment) or Procedure 3 on (dynamic IP assignment) to install and configure the i2002 Internet Telephone.

3   Enter the same TN and Node Number as the i2002 Internet Telephone you replaced. The system associates the new i2002 Internet Telephone with the existing TN.

———————— **End of Procedure** ————————

Removing an i2002 Internet Telephone from service

Procedure 6
Removing an i2002 Internet Telephone from service

1   Disconnect the i2002 Internet Telephone 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 i2002 Internet Telephone.

If the i2002 Internet Telephone 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** ————————

i2004 Internet Telephone

Contents

This section contains information on the following topics:

Introduction

This section explains how to install and maintain the i2004 Internet Telephone. For information on using the i2004 Internet Telephone, see the *i2004 Internet Telephone User Guide*.

This section contains the following procedures:

- Procedure 7, "Pre-installation checklist" on .

- Procedure 8, "Installing an i2004 Internet Telephone for the first time" on .

- Procedure 9, "Installing an i2004 Internet Telephone for the first time using DHCP" on .

- Procedure 10, "Changing the TN of an existing i2004 Internet Telephone" on .

- Procedure 11, "Replacing an i2004 Internet Telephone" on .

- Procedure 12, "Removing an i2004 Internet Telephone from service" on .

Description

The i2004 Internet Telephone brings voice and data to the desktop environment. It connects directly to the LAN through the Ethernet connection.

The i2004 Internet Telephone 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 i2004 Internet Telephone network connection, and connection to the Voice Gateway Media Card. The i2004 Internet Telephone uses the customer's IP network to communicate with the Call Server. The i2004 Internet Telephone components are shown in Figure 5 and described in Table 6 on .

Figure 5
i2004 Internet Telephone
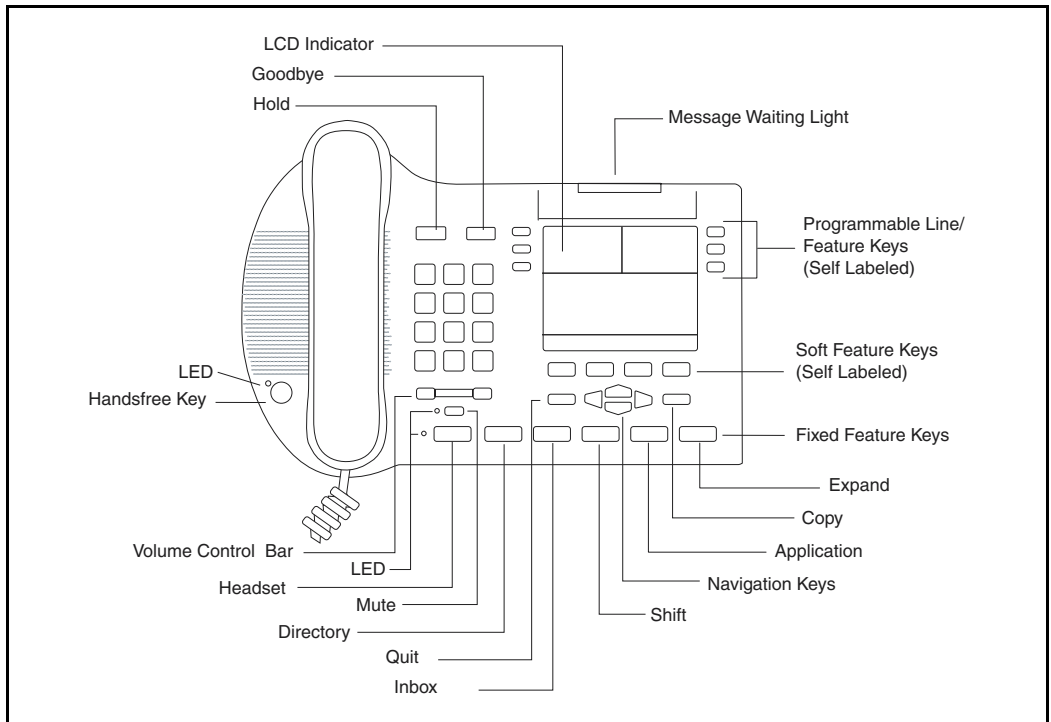
Table 6
i2004 Internet Telephone components and functions (Part 1 of 5)

Component	Function
Hold	Press the Hold key to put an active call on hold. Press the Line (DN) key beside the flashing to return to the caller on hold.
Goodbye	Press the Goodbye key to terminate an active call.

Table 6
i2004 Internet Telephone 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)	Programmable Line (DN)/Feature Keys (self-labeled) are configured for various features on the telephones.
	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.
Soft Keys (self-labeled)	Soft Keys (self-labeled) are located below the display area. The LCD label above the key changes, based on the active feature.
	Note: A triangle before a key label indicates that the key is active.
Fixed Feature Keys	Use these keys to access non-programmable standard features.
Expand to PC	The Expand to PC key is used to access applications through Net6.
Copy	A fixed key reserved for future feature development. An audible non-working tone is generated along with a display message.

Table 6
i2004 Internet Telephone components and functions (Part 3 of 5)

Component	Function
Services	Press the Services key to access the following items: • Telephone Options (see Notes 1 and 2): — Volume Adjustment — Contrast Adjustment — Language — Date/Time Format — Display diagnostics — Local Dialpad Tone — Ring type — Call timer — OnHook Default Path — Change Feature key Label — Set Information • Virtual Office Login and Virtual Office Logout (if Virtual Office is configured) • Test Local Mode and Resume Local Mode (if Branch Office is configured)
Navigation keys	Use the Navigation keys to scroll through menus and lists in the display area.
Shift	Press the Shift key to toggle between two feature key pages and access an additional six lines/features.
Inbox (Message)	Press the Inbox (Message) key to access your voice mailbox.

Table 6
i2004 Internet Telephone components and functions (Part 4 of 5)

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

Table 6
i2004 Internet Telephone components and functions (Part 5 of 5)

Component	Function
Handsfree key	Press the Handsfree key to activate handsfree.
	The LED lights to indicate when handsfree is active.

Note 1: If a call is presented while the user is manipulating an option, the i2004 Internet Telephone rings and the DN key flashes. However, the screen display is not updated with Caller ID. The programming text is not disturbed.

Note 2: The user can originate a call using Autodial or Last Number Redial while manipulating an option. However, the display is not updated with dialed digits or the Caller ID and the dialpad is intercepted by the Services.

Supported features

The i2004 Internet Telephone supports the following additional features:

- 802.1Q VLAN and Layer 2 priority bit support, an industry standard for managing bandwidth usage

- Ability to change the feature key labels

- Corporate Directory

- Virtual office

- Branch Office

- Switch to support sharing LAN access with a PC or other data device

- Net6

- 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.

Features not currently supported

The following features are not supported on the i2004 Internet Telephone:

- Personal Directory

- Call Log and Redial List

- Expansion Modules

- Support of accessory modules

- Live Dial pad

- Group Listening

- Set-to-Set messaging

- Context-sensitive soft keys

The three-port switch that is internal/external to the i2004 Internet Telephone, 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 gets priority over the Ethernet.

Display characteristics

An i2004 Internet Telephone has three major display areas:

- Programmable Line (DN)/Feature Key Label

- Soft Key Label

- Information Line

These three display areas are shown in Figure 6 on .

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.

Figure 6
i2004 Internet Telephone display areas

Programmable Line (DN)/ Feature Keys (Self-labeled)

Information display

Date/time display
Call party info
Feature Status info
Options info
Directories info

Soft Keys (Self-labeled)

Navigation Keys

Supervisor   MakeSetBusy
Activity   Not Ready
2637   In-Calls

Jan 31 5:54pm

Nortel Networks

Trans   Conf   Forward More...

553-9541

> *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 i2004 Internet Telephone 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 idle state)

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

Key number assignments

The i2004 Internet Telephone 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 5 on .

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 .

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 i2004 Internet Telephone.

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

Table 7
i2004 Internet Telephone 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	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 7
i2004 Internet Telephone dedicated keys (Part 2 of 2)

Key number	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

Package components

Table 8 lists the i2004 Internet Telephone package components. Table 9 on page 57 lists the i2004 Internet Telephone package components for telephones with an integrated three-port switch.

Table 8
i2004 Internet Telephone component list (Part 1 of 2)

i2004 Internet Telephone, with North American power supply package, includes: • i2004 Internet Telephone • Handset • Handset cord • Footstand • 7ft Ethernet cable • Power transformer (117/120 VAC 50/60 Hz) • i2004 Getting Started card (English/French) Available online - cannot be ordered separately	NTEX00BA/B0253074 (Ethergray) NT7B10AACH/ A0868556 (Ethergray) (includes FW 1.0)
i2004 Internet Telephone, without power supply package, includes: • i2004 Internet Telephone • Handset • Handset cord • Footstand • 7ft Ethernet cable • i2004 Getting Started card (English/French) Available online - cannot be ordered separately	NTEX00BB/B0256456 (Ethergray)
Handset cord	A0788682
9ft Handset cord (Charcoal)	A0720560
Handset	A0788874
Handset (Charcoal)	A0758634

Table 8
i2004 Internet Telephone component list (Part 2 of 2)

Footstand	P0886045
7ft. Ethernet cable category 5	A0648375
i2002/i2004 Power Adaptors	
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

Table 9
i2004 Internet Telephone with integrated switch component list (Part 1 of 2)

i2004 Internet Telephone, with North American power supply package, includes: • i2004 Internet Telephone • Handset • Handset cord • Footstand with cable guide • 7ft Ethernet cable • Power transformer (117/120 VAC 50/60 Hz) • i2004 Getting Started card (English/French) Available online - cannot be ordered separately	NTDU82AA/A0891620 (Ethergray) NTDU82AA70/A0997845 (Charcoal)
i2004 Internet Telephone, without power supply package, includes: • i2004 Internet Telephone • Handset • Handset cord • Footstand • 7ft Ethernet cable • i2004 Getting Started card (English/French) Available online - cannot be ordered separately	NTDU82BA/A0892049 (Ethergray) NTDU82BA70/A0997846 (Charcoal)
Handset cord (Ethergray)	A0788682
9ft Handset cord (Charcoal)	A0720560
Handset	A0788874 (Ethergray)
Handset (Charcoal)	A0758634
Footstand with cable guide	NTDU85AA/A0891623 (Charcoal)
7ft. Ethernet cable category 5	A0648375

Table 9
i2004 Internet Telephone with integrated switch component list (Part 2 of 2)

i2002/i2004 Power Adaptors	
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 & 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

Before you begin

The following section provides a step-by-step guide through the i2004 Internet Telephone installation process. Before installing the i2004 Internet Telephone, complete the following pre-installation checklist.

Procedure 7
Pre-installation checklist

1   Ensure there is one i2004 Internet Telephone boxed package for each i2004 Internet Telephone being installed. The package contains:

   •   i2004 Internet Telephone

   •   Handset

   •   Handset cord

   •   Footstand

   •   2.3m (7 foot) Ethernet cable, Category 5

   •   i2004 Getting Started card (English/French)
       Available online - cannot be ordered separately

2   To install and configure an i2004 Internet Telephone, the host system must be installed with the Voice Gateway Media Card.

3 Ensure you have a power supply (local or closet) appropriate for the voltage in the designated area.

4 Understand the three configuration modes that you can choose from as you proceed through the installation of the i2004 Internet Telephone. The three configuration modes are:

- Static IP address – see "Static IP address assignment" on .

- Dynamic Partial DHCP – see "Dynamic IP address assignment — Partial DHCP" on .

- Dynamic Full DHCP – see "Dynamic IP address assignment — Full DHCP" on .

5 A DHCP server and DHCP relay agents, if required, must also be installed, configured, and running.

———————————— **End of Procedure** ————————————

Startup sequence

When an i2004 Internet Telephone is connected to the network, it must perform a startup sequence. The elements of the startup sequence include:

- obtaining the IP parameters

- finding a gateway server

- authenticating the user

See Table 10 on 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 10
i2004 Internet Telephone 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.

First-time installation

To install and configure an i2004 Internet Telephone, you must first install an Voice Gateway Media Card in the system.

CAUTION
Damage to Equipment
Do not plug your i2004 Internet Telephone 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.

Installation scenarios

There are four possible i2004 Internet Telephone installation scenarios:

• i2004 Internet Telephone (with integrated switch) and local power

• i2004 Internet Telephone (with integrated switch) and closet power

• i2004 Internet Telephone (without integrated switch) and local power

• i2004 Internet Telephone (without integrated switch) and closet power

Figure 7 on shows the different wiring connections depending on the telephone and the power source.

Figure 7
i2004 Internet Telephone wiring
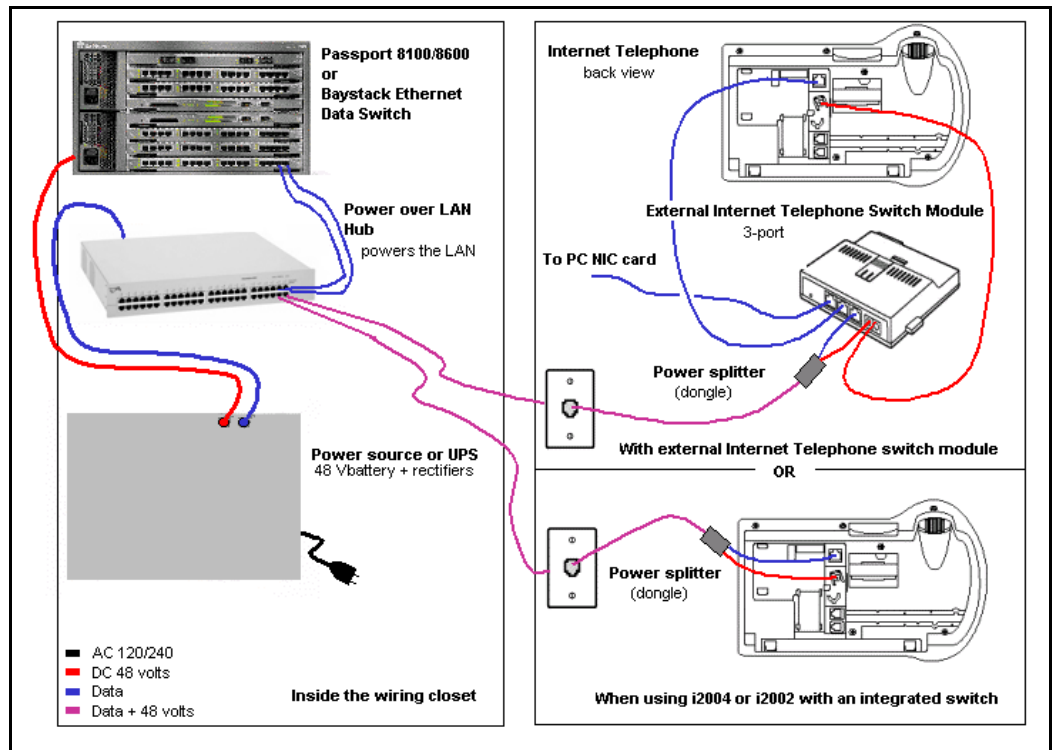
IP address assignments

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 description" on .

The three configuration modes for the i2004 Internet Telephone are described below.

Static IP address assignment

During the installation, the i2004 Internet Telephone parameters are entered manually using the keypad.

Your System Administrator provides the following information: IP address, subnet mask, and the default gateway.

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

Dynamic IP address assignment — Partial DHCP

For a partial DHCP installation, you must provide, through the Internet Telephone's keypad, the Connect Server parameters including: IP address, port number, action, and retry count. Other parameters (Internet Telephone IP address, subnet mask, and default gateway) are retrieved from the DHCP server.

The Internet Telephone password, node ID and TN must be entered manually from the keypad.

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

Dynamic IP address assignment — Full DHCP

For a full DHCP installation, all parameters (Internet Telephone IP address, subnet mask, default gateway, Connect Server IP address, port number, action, and retry count) are retrieved from the DHCP server to recognize the i2004 Internet Telephone.

The i2004 Internet Telephone password, node ID and TN must be entered manually from the keypad.

Go to Procedure 9, "Installing an i2004 Internet Telephone for the first time using DHCP" on .

Procedure 8
Installing an i2004 Internet Telephone 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 i2004 Internet Telephone on the system using LD 11.

  For more information, see *Software Input/Output: Administration* (553-3001-311).

3   Connect the i2004 Internet Telephone 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   Power the i2004 Internet Telephone using either the Power over LAN Hub™ (closet power) or an AC power transformer (local power).

  a.   If local power is used, plug the AC power transformer into the nearest power outlet. Ensure the correct AC power transformer is used for the country. Connect the power jack as shown in Figure 4 on page 33. Be sure to thread the cord around the retaining hook to provide strain relief for a secure power connection.

  b.   If using the Power over LAN Hub™, a power splitter is required to split the power from the CAT-5 line cable (see Figure 3 on page 32 and Figure 7 on page 61). Refer to the Power over LAN Hub™ User Guide included in the Power over LAN Hub™ package for more details on configuring power over LAN.

    c. Choose one of the following connections:

        i. For a telephone not sharing a LAN access with a PC:

        Connect one end of the CAT-5 line cable to the LAN ethernet jack located on the back of the telephone (identified with a LAN icon). The other end of the CAT-5 line cable plugs into the IP network.

        ii. For a telephone sharing a LAN access with a PC:

        Connect one end of the CAT-5 line cable to the LAN ethernet jack located on the back of the telephone (identified with a LAN icon, see Figure 4 on page 33) and the other end to the IP network. Insert a second CAT-5 line cable into the PC ethernet jack located on the back of the telephone (identified with a PC icon, see Figure 4 on page 33) and the other end into the computer.

IMPORTANT!

Timing information

There are only four seconds between plugging in the i2004 Internet Telephone'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 i2004 Internet Telephone attempts to locate the connect server. Wait until it is finished, and then begin the power up sequence again.

---

5 Reset the i2004 Internet Telephone by unplugging and replugging the power jack.

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 i2004 Internet Telephone IP address.
net msk	A subnet mask.
def gw	The default gateway for the i2004 Internet Telephone 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 i2004 Internet Telephone 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 i2004 Internet Telephone can support a primary (S1) and secondary (S2) connect server. If you require Internet Telephones 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 UNIStim 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 Internet Telephone. 0-No is the default value.
1-Yes	Enable the 802.1Q header.

10   If 802.1Q is *not* required, go to step 12, otherwise select **1-Yes** to display the following VLAN ID:

```
Manual Cfg
VLAN: 1234
```

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

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

The i2004 Internet Telephone is configured with 802.1Q enabled, priority = 6, and the VLAN ID set to the entered value.

The i2004 Internet Telephone searches for the connect server. When the connection is complete, proceed with step 12.

12   Enter the following information provided by your System Administrator:

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

The i2004 Internet Telephone registers with the TPS and if needed, begins the firmware download. This takes several minutes. When complete, the i2004 Internet Telephone 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.

13   Check for dial tone and the correct DN above the display.

14   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.

15   (Optional) Customize the Feature Keys as required. For more information, see "Configure programmable line (DN)/feature key labels" on .

———————— **End of Procedure** ————————

Procedure 9
Installing an i2004 Internet Telephone for the first time using DHCP

1   Complete steps 1–5 from Procedure 8 on .

2   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.

3   At the prompt DHCP Yes/No?, select **Yes**.

4   Select Partial or Full DHCP.

   a.   If you select Full DHCP, then the following parameters are retrieved from the DHCP server:

   — A valid i2004 Internet Telephone IP address.

   — A subnet mask.

   — The default gateway for the i2004 Internet Telephone 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 Internet Telephone 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 i2004 Internet Telephone 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 i2004 Internet Telephone can support a primary (S1) and secondary (S2) connect server. If you require Internet Telephones 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 UNIStim 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.

5 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 7 to continue the i2004 Internet Telephone configuration.

	1-Ma	Enter a VLAN ID manually.
		If this is selected, proceed to step 6 to continue the 802.1Q configuration.
	2-Au	Automatically enter a VLAN ID using DHCP. DHCP auto discovers the VLAN ID.
		No further steps are required to configure 802.1Q on the i2004 Internet Telephone. If this is selected, proceed to step 7 to continue the Internet Telephone configuration.

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

```
Manual Cfg
VLAN: 1234
```

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

6   Enter a valid value and press **OK**.

The i2004 Internet Telephone is configured with 802.1Q enabled, priority = 6, and the VLAN ID set to the entered value.

The i2004 Internet Telephone searches for the connect server. When the connection is complete, proceed to step 7.

7   Enter the following information provided by your System Administrator.

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

The i2004 Internet Telephone registers with the TPS and if needed, will begin the firmware download. This takes several minutes. When complete, the i2004 Internet Telephone 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.

8   Check for dial tone and the correct DN above the display.

9   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.

10   (Optional) Customize the Feature Keys as required. For more information, see "Configure programmable line (DN)/feature key labels" on .

───────── **End of Procedure** ─────────

Power cycle description

The power cycle is similar to the initial installation. The i2004 Internet Telephone saves its firmware, IP parameters, Node Number, and TN in memory. As the i2004 Internet Telephone proceeds through a start-up sequence, it does not need to:

•   re-enter the IP parameters if they were manually entered

•   reacquire firmware or prompt the user for Node Number and TN

When the power is down on the i2004 Internet Telephone, LAN access is not available for the PC or other data devices connected to the Internet Telephone. Access is restored when power is restored to the i2004 Internet Telephone.

Reinstalling an i2004 Internet Telephone

You can reinstall an existing, previously-configured i2004 Internet Telephone on the same system. For example, the i2004 Internet Telephone 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 i2004 Internet Telephone.

Procedure 10
Changing the TN of an existing i2004 Internet Telephone

1   Repower the i2004 Internet Telephone.

Note: During the reboot sequence of a previously configured Internet Telephone, the i2004 Internet Telephone 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.

If	Then
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 i2004 Internet Telephone

IMPORTANT!

Two telephones cannot share the same TN. You must remove the i2004 Internet Telephone that is currently using the TN.

Procedure 11
Replacing an i2004 Internet Telephone

1   Disconnect the i2004 Internet Telephone that you want to replace.

2   Follow either Procedure 8 on (static IP assignment) or Procedure 9 on (dynamic IP assignment) to install and configure the i2004 Internet Telephone.

3   Enter the same TN and Node Number as the i2004 Internet Telephone you replaced. The system associates the new i2004 Internet Telephone with the existing TN.

–––––––––––––––––– **End of Procedure** ––––––––––––––––––

Removing an i2004 Internet Telephone from service

Procedure 12
Removing an i2004 Internet Telephone from service

1   Disconnect the i2004 Internet Telephone 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 i2004 Internet Telephone.

If the i2004 Internet Telephone 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** ––––––––––––––––––

i2050 Software Phone

Contents

This section contains information on the following topics:

Description

The i2050 Software Phone is a Windows-based application that enables voice to make your computer a powerful tool.

The i2050 Software Phone operates on PCs running Windows 98, Windows 98 SE, Windows 2000 Professional, Windows XP Pro, and Windows XP Home.

The i2050 Software Phone supports the following attributes:

- 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.

- 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 are displayed in the Set Info menu.

- Modem support to configure the Software Phone for dial-up access.

System components

The i2050 Software Phone requires a Voice Gateway Media Card installed on the system. The i2050 Software Phone 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 11 lists the i2050 Software Phone components.

Table 11
i2050 Software Phone components

Component	Code
i2050 Software Phone application software CD	NTDW83AA
USB Audio Adapter (headset not included)	NTEX14AB

Voice Gateway Media Card

The Voice Gateway Media Card application supports the i2050 Software
Phone by providing a communication gateway between the IP data network
and the system.

For more information on the IT 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 voice mail messages.

- i2050 Smart Functions button enables the i2050 Smart Functions menu that provides quick access to i2050 Software Phone features.

- Answer, Release, Mute, and Volume buttons to control various aspects of the i2050 Software Phone.

- The Mute light indicates that a call is on mute.

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

Application

The i2050 Software Phone 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:

- a Configuration Utility — used to configure the software phone

- the i2050 Software Phone — the software phone user interface

- Nortel Networks i2050 QoS Service

The i2050 Software Phone 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

— hotkeys 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

- 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

The Primary User Interface with the operational tray retracted is shown in Figure 8 on . In this mode the user can operate most features available on the i2050 Software Phone. 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 hotkeys 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 11 on

- 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 i2050 Software Phone.

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 i2050 Software Phone support a
specific subset of the system key features.

Programmable line DN/Feature keys

Six programmable line (DN)/feature keys on the i2050 Software Phone
support up to 12 DNs or features (by using the Shift key feature). These are
displayed only 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 **Meridian** or **Succession** as 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 3x24 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 3x24 characters, a scroll icon indicates to the user to use the scroll keys to view the second line of the display.

Soft key label display

The i2050 Software Phone 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.

Keypad dialing keys

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

Release key

Press the RELEASE key to terminate an active call. Use the RELEASE key for disconnecting the headset calls. The RELEASE key is only applicable 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. Press the DN key that corresponds to the line on hold to return to the call.

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.

Message or Inbox

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

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.
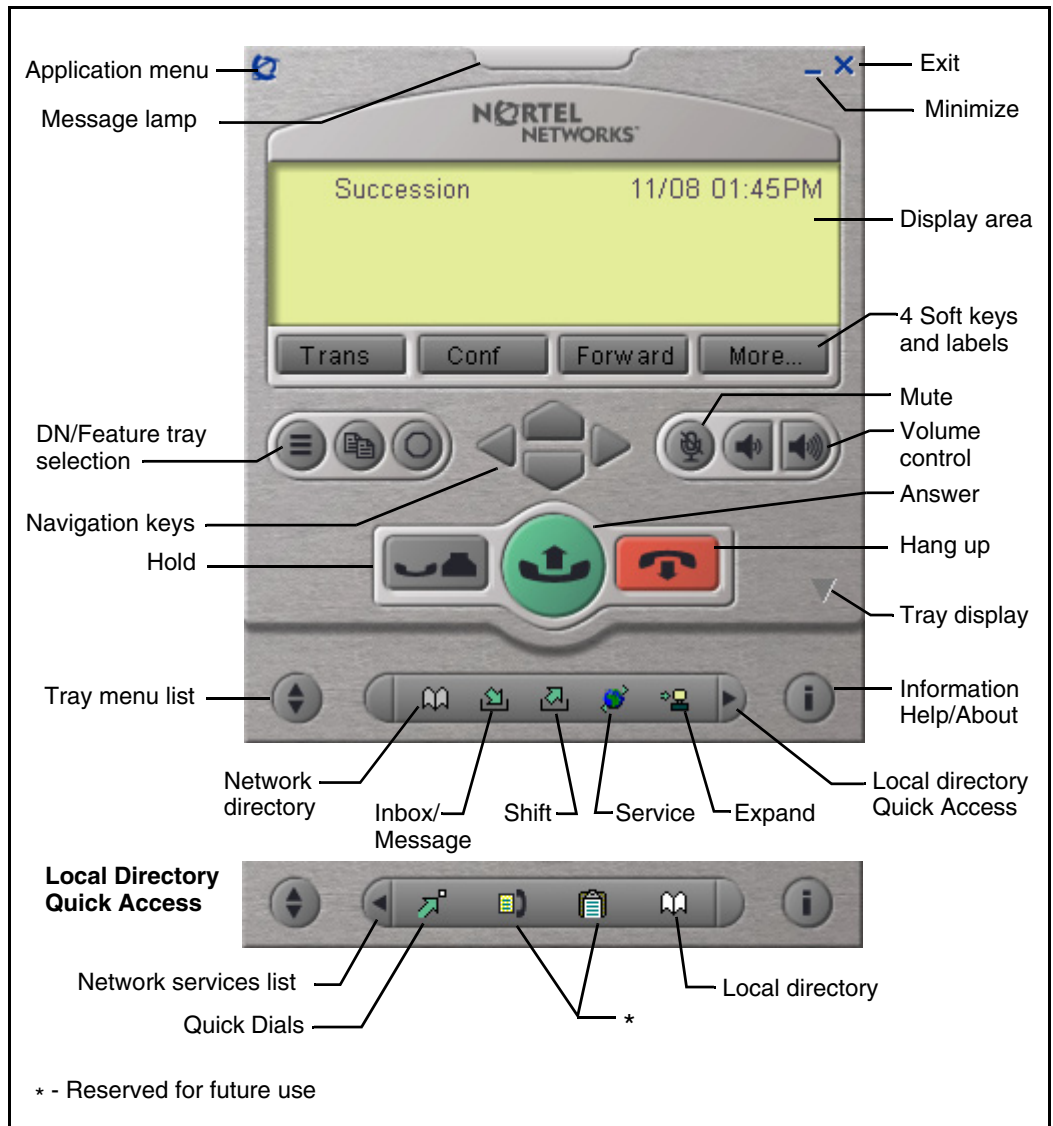
Quit

Press the Quit key to quit from the Services menu.
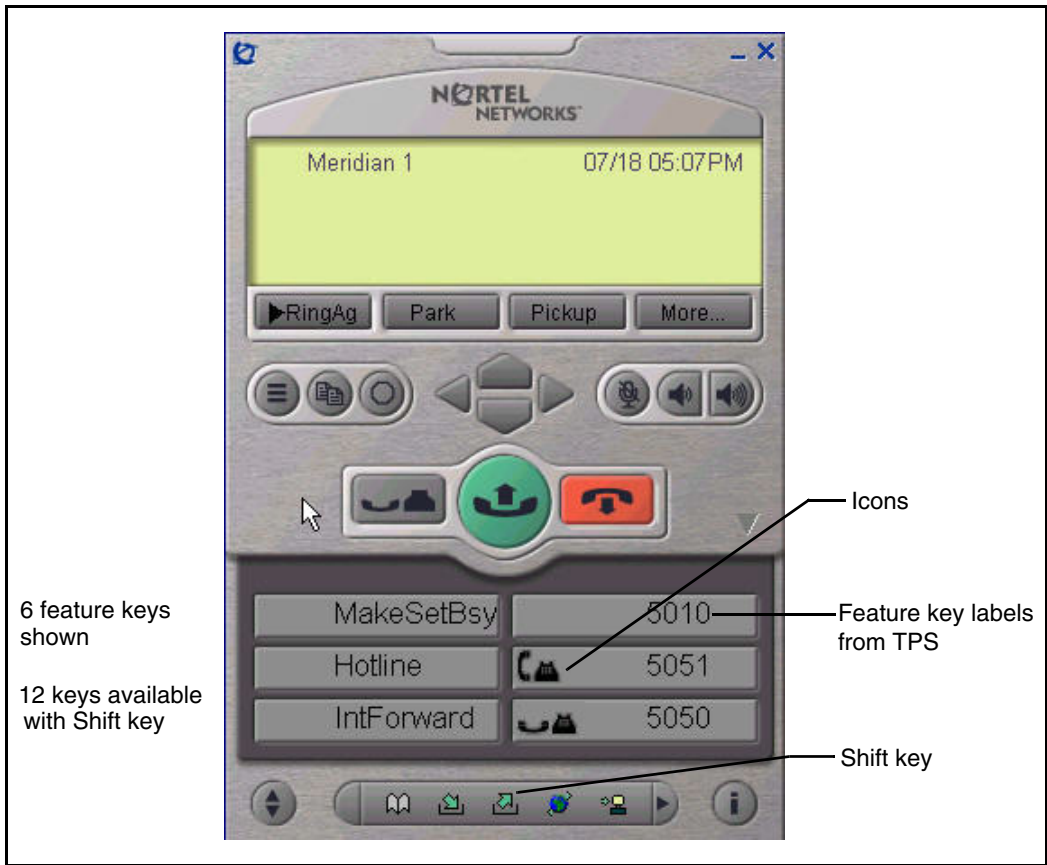
Expand key and Copy

These keys are reserved for future use.

Figure 8
**i2050 Software Phone Primary User Interface with trays retracted**

Figure 9
i2050 Software Phone DN/feature key tray

The DN/Feature Key Tray shown in Figure 9 on page 82 displays up to six DN or feature keys provisioned for the telephone by the Succession 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 10 on page 83) provides a graphic keypad 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).

Figure 10
**i2050 Software Phone number pad tray**

Dialpad
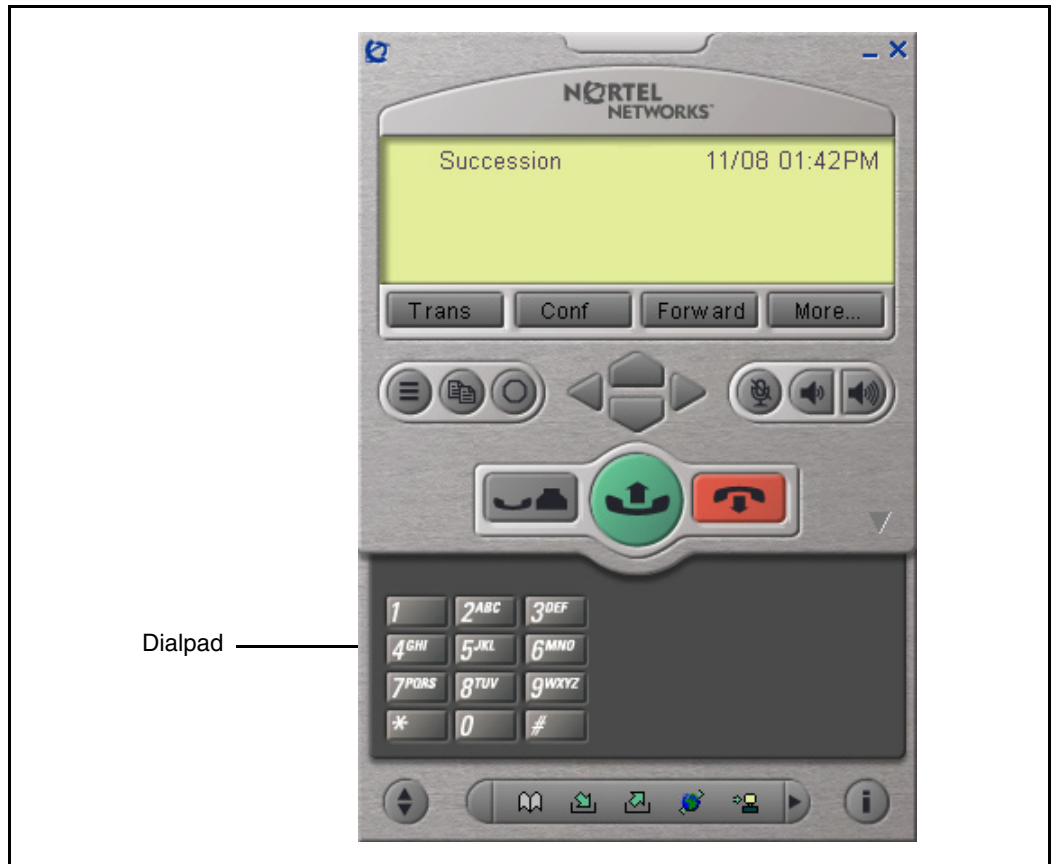
Note: The numeric lock (Num Lock) feature on your keyboard must be turned on to click the numbers on the i2050 Number Pad Tray.

The Combo Tray shown in Figure 11 on page 84 combines the DN/Feature Key Tray and the Number Pad tray. The feature keys indicate the following states:

- Idle: as shown in Figure 11 on page 84.

- Ringing: long flashing red bar on the upper left corner of the key (see Figure 12 on).

- Hold: medium winking yellow bar (see Figure 13 on).

- Off-hook (Dialing/Answer): short solid green bar (see Figure 14 on).
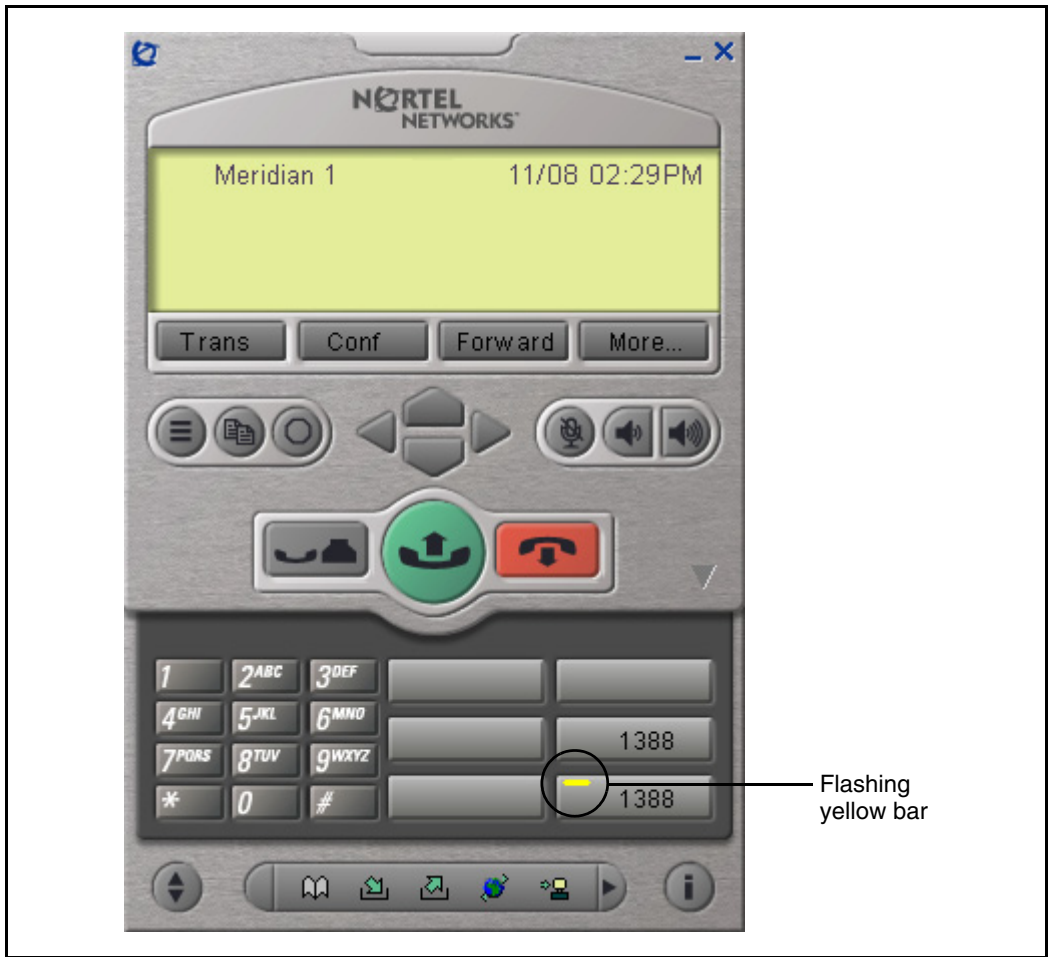
Figure 11
i2050 Software Phone combo tray
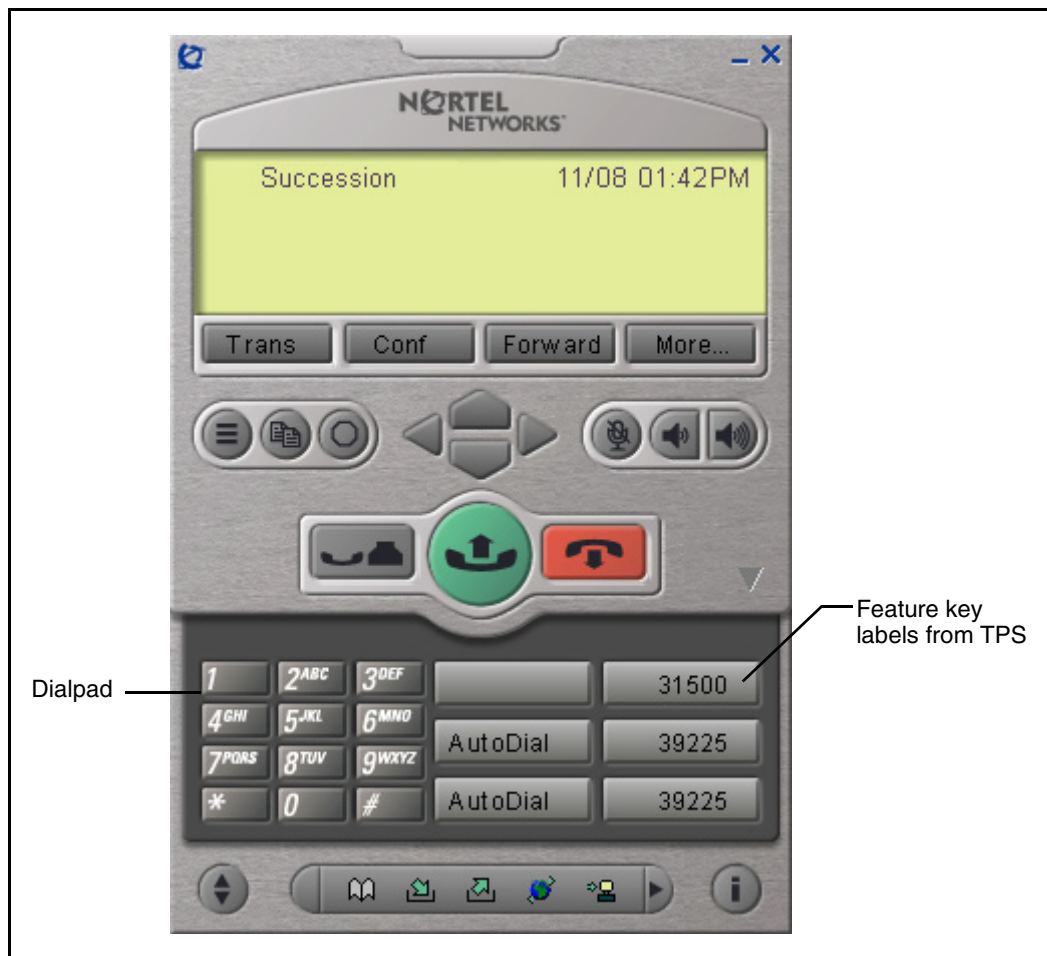
Figure 12
Feature key indicating ringing with flashing red bar

The Local Directory Quick Access Trays (see Figure 15 on page 88) 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.

Figure 13
Feature key indicating hold with flashing yellow bar
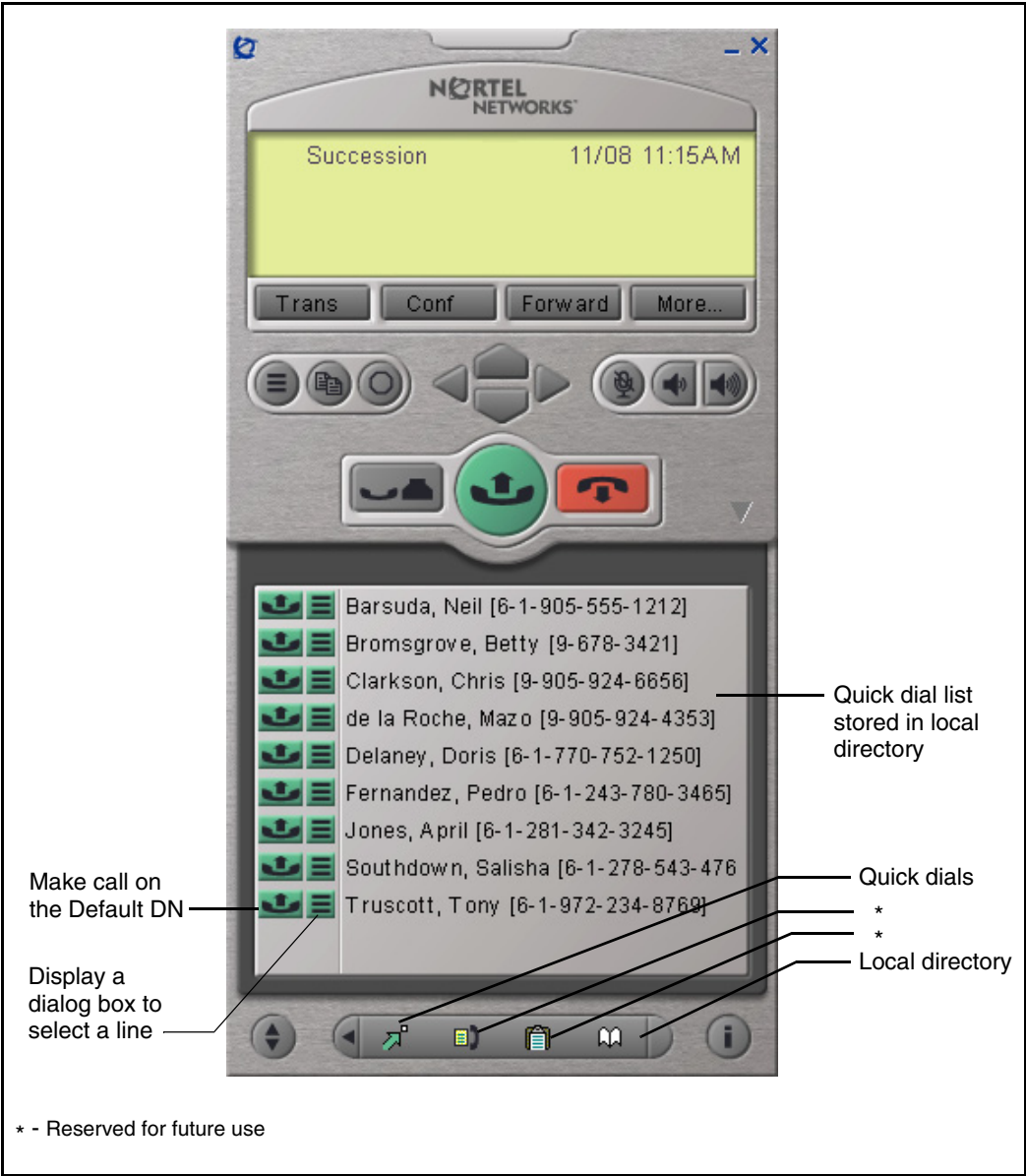

Flashing
yellow bar

The System Tray (see Figure 16 on page 89) 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
Feature key indicating off-hook (dialing/answer) with solid green bar
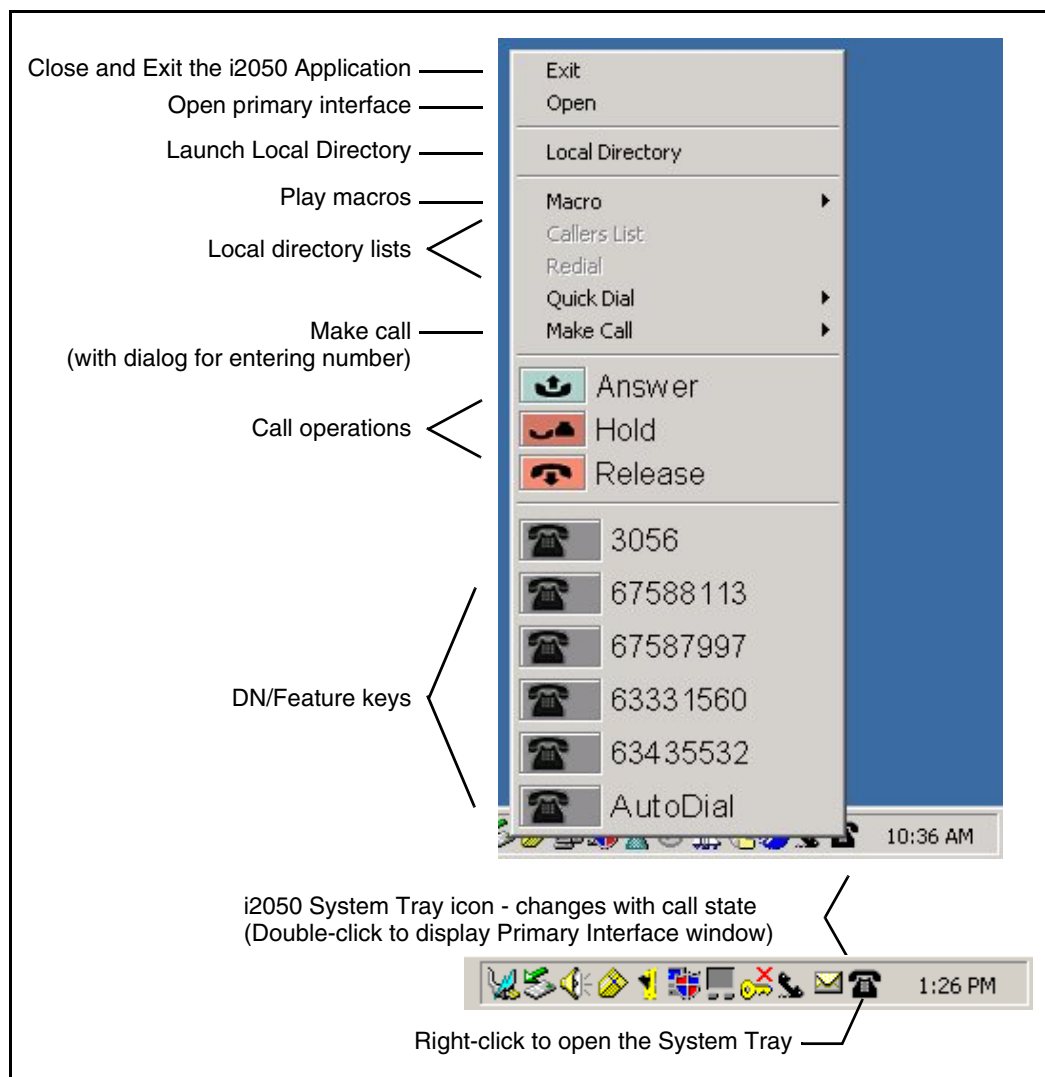

The System Tray Interface displays the current six DN/Feature keys. These keys are visible on the application's DN/Feature Key Tray or Combo Tray if the application is on the desktop. The Make Call menu item also displays the current six DN/Feature keys.

Figure 15
i2050 Software Phone local directory quick access tray

* - Reserved for future use

Figure 16
i2050 Software Phone system tray

Close and Exit the i2050 Application —— Exit
Open primary interface —— Open

Launch Local Directory —— Local Directory

Play macros —— Macro ▶
Callers List
Local directory lists ⟨ Redial
Quick Dial ▶
Make call —— Make Call ▶
(with dialog for entering number)

Call operations ⟨ Answer
Hold
Release

3056
67588113
67587997
DN/Feature keys ⟨ 63331560
63435532
AutoDial

10:36 AM

i2050 System Tray icon - changes with call state
(Double-click to display Primary Interface window)

1:26 PM

Right-click to open the System Tray ——

Dedicated keys

Table 12 on describes the specific telephone assignment functions you can program for Keys 16–26 on the i2050 Software Phones using LD 11.

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

Table 12
i2050 Software Phone 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

Table 12
i2050 Software Phone dedicated keys (Part 2 of 2)

Prompt	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

Key number assignments

The i2050 Software Phone 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 i2050 Software Phone is affected by the following three language controls:

- Operating system language

- i2050 Software Phone language selection — Sets the language displayed in the help screens and in the menus. Select the i2050 Software Phone 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 i2050 Software Phone'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 i2050 Software Phone application. The user must ensure that the appropriate language is chosen. The languages supported are shown in Table 13.

Table 13
Language support (Part 1 of 2)

TPS supports (display)...	i2050 Software Phone supports...
English	English - US
French	French - Euro
Spanish	Spanish - Euro
Portuguese	Portuguese
Danish	Danish
Dutch	Dutch
German	German
Italian	Italian
Norwegian	Norwegian

Table 13
Language support (Part 2 of 2)

TPS supports (display)...	i2050 Software Phone supports...
Swedish	Swedish
Finish	English - UK
Polish	French - Canadian
Czech	Spanish - Latin American
Hungarian	

Operating parameters

The operating parameters for the i2050 Software Phone are as follows:

- A Universal Serial Bus (USB) port is required on the PC if you are using the Nortel Networks USB Headset Adapter.

- The minimum recommended system hardware for the i2050 Software Phone 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).

- For i2050 Software Phones, the software version upgrade must be done manually by the technician at the PC. The Voice Gateway Media Card does not download any software to the i2050 Software Phone. The isetShow command on the Voice Gateway Media Card displays the current version of any registered i2050 Software Phones.

- The i2050 Software Phone does not have an ACD Supervisor headset jack. Agent walkaway is supported with the Enhanced USB Keypad Adapter.

- An i2050 Software Phone does not register against a TN configured for any other type of Internet Telephone.

- Soundcard audio is supported only for incoming call notification. Nortel Networks supports only the USB Headset Adapter for the speech path.

- The i2050 Software Phone application does not currently support Japanese, Portuguese, or Chinese languages for the help screens and skin text. See "Language support" on page 92 for more information.

- The i2050 Software Phone is supported by Nortel Networks only when used on a PC running Windows 98, Windows 98SE, 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 i2004 Internet Telephone are not required on the i2050 Software Phone. 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 i2050 Software Phone.

Procedure 13
Installing an i2050 Software Phone

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 Succession Call Server, using LD 97.

   For more information, see *Software Input/Output: Administration* (553-3001-311).

3 Configure the i2050 Software Phone in LD 11 with TYPE I2050.

4 Install the USB Headset Adapter.

5 Install the i2050 Software Phone.

6 Run the i2050 Configuration Utility.

LD 11 — Configure the i2050 Software Phone.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	i2050	Type of data block.
TN:	c u	Terminal number.
DES:	x...x	ODAS telephone designator.
CUST:	xx	Customer number.
...		
ZONE:	0-255	Zone number.
FDN:	x...x	Flexible CFNA DN.
...		
CLS:	aaa	Class of service.
		HFA - Digital Telephone Handsfree Allowed is default for i2050 to enable two-way communication.

———————————   **End of Procedure**   ———————————

Operation

Services menu

The Services features control user-specific operating parameters of the i2050 Software Phone. The i2050 Software Phone's Services menu consists of the following items:

- Language

- Ring Type

- Time and Date Format

- Call Timer

- Internet Telephone Information

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

To change any of the 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 i2050 Software Phone 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 i2050 Software Phone, 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 92.

Time and date format

To change the time and date display format of the i2050 Software Phone, 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 i2050 Software Phone, 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 i2050 Software Phone 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 i2050 Software Phone 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 i2050 Software Phone. 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 i2050 Software Phone, 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.

i2050 Software Phone information

This option item displays Internet Telephone information, including: IP address, hardware ID, current firmware version, TN, Node ID, Node IP address, and the specific Voice Gateway Media Card that the i2050 Software Phone is registered on.

Mute key operation

Press the Mute key to change between muted and unmuted. When the i2050 Software Phone 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 i2050 Software Phone is on hook and is idle or ringing, selecting the volume Up/Down buttons changes the volume of the ringer.

• Headset mode – When the i2050 Software Phone 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 displayed indicates the volume level change.

Call features

This section describes the call features that are available on the i2050 Software Phone and how they are activated. The i2050 Software Phone 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 14 on .

Key labels are downloaded from the Succession Call Server. Changes to the Succession 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 i2050 Software Phone can be used to provide up to ten features. Table 14 shows the default soft key features layout.

Table 14
i2050 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 14
i2050 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 i2050 Software Phone.

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 i2050 Software Phone.

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 Class of Service are present, all ten features on keys 17-26 are provided on the i2050 Software Phone. Table 15 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 15
Soft label keys layout

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

Appearance of fewer than ten soft label keys

The typical Internet Telephone can have less than ten soft label feature keys because of restrictions such as feature restriction or the removal of a feature key. Here is one example:

Table 16
Typical soft label keys configuration

Layer 1	Trans	Conf	Forward	More...
Layer 2	SCU	PrivRls		More...

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

Table 17
Four or less soft label key features

Layer 1	Trans	Conf	Forward	SCU

Unused keys

Some keys are not used in the implementation of the i2050 Software Phone. 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 i2050 Software Phone, 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 i2050 Software Phone, 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 i2050 Software Phone have a maximum length of 10 characters.

In this release, the i2050 Software Phone does not provide user-specified labeling of the soft keys since the text is sent from the TPS.

Registration

When you add an i2050 Software Phone to the network, the i2050 Software Phone 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 i2050 Software Phone then contacts the Connect Server that instructs the i2050 Software Phone to display a message on its display screen requesting the customer's node number and TN.

After the customer enters this information, the i2050 Software Phone contacts the Node Master which selects a TPS with sufficient capacity to register the i2050 Software Phone. The i2050 Software Phone contacts the chosen TPS, and if the i2050 Software Phone is valid, registers it with the system. The registration information is then saved to the i2050 Software Phone.

Loss plan

The USB Headset Adapter provides the i2050 Software Phone 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 Internet Telephone 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 cancel echo generated on the TDM side of the gateway. When there is audio going through the Voice Gateway Media Card, the echo cancellers are enabled.

The i2050 Software Phone has no echo canceller, so a slight echo from acoustic coupling on the headset can occur in some call situations.

Internet Telephone concentration

The Voice Gateway Media Card supports the same concentration of i2050 Software Phones as i2004 Internet Telephones; a mixture of these can exist on a Voice Gateway Media Card up to the current maximum of a total of 96 devices registered. The i2050 Software Phone uses the same UNIStim messaging for registration, call setup and teardown, and therefore imposes the same real-time impact on the Voice Gateway Media Card.

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 Internet Telephones and the DSPs on the Voice Gateway Media Card.

Jitter buffer

The jitter buffer of the i2050 Software Phone 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 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 under run and over run 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 i2050 Software Phone is an application within the context of the PC's OS, such that the OS has an effect on how flexible is the support of the i2050 of these items. The DSP functionality (such as codec packetization) implemented in DSP hardware on the i2050 Software Phone 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 114). The fewer buffers used 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 i2050 Software Phone uses DSCP settings assigned by the TPS. The i2050 Software Phone supports DSCP on Window 98, Windows 98 SE, Windows 2000 Professional, and Windows XP.

802.1Q

The i2050 Software Phone uses 802.1 priority (P) settings assigned by the TPS. The i2050 Software Phone supports 802.1 priorities on Windows 2000 Professional and Windows XP. This requires the installation of Nortel Networks i2050 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 i2050 Software Phone does not support VLAN's (the VLAN ID in 802.1Q).

The service can be installed from the CD-ROM. If you install the i2050 Software Phone with Administrators access, then this service is installed automatically.

Codec

The i2050 Software Phone 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 with voice activity detection enabled; while this provides the lowest average network bandwidth utilization, in some call environments the speech quality will suffer due to clipping of the beginning of words.

Frame size

The i2050 Software Phone supports the following range of frame sizes:

- G.711-64 A-law and μlaw: 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 i2004 Internet Telephone:

- Install the Voice Gateway Media Card. The IT Line 2.2 application must be running on the Voice Gateway Media Card.

- Configure a virtual loop on the Succession Call Server, using LD 97.

- Configure the i2050 Software Phone in LD 11 with TYPE I2050. See Table on page 95.

The remainder of this section provides information about installing the USB Headset Adapter and the i2050 Software Phone.

Installing the USB Headset Adapter

If you install the USB Headset Adapter before the i2050 Software Phone, then the USB Headset Adapter displays as an audio device during the installation of the i2050 Software Phone.

If you install the USB Headset Adapter after the i2050 Software Phone, then select the USB Headset Adapter using the Configuration Utility. See "Select Sound Devices tab" on page 114.

Procedure 14
Installing the USB Headset Adapter

1   Connect the coiled lower cord to the headset cord with the Quick
       Disconnect connector. Ensure the Quick Disconnect is securely fastened.

2   Connect the headset cord to the RJ9 jack on the adaptor.

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 appropriate driver software.
During the installation you are prompted to supply the original Windows
CD-ROM so that Windows can locate the required drivers.

——————————— **End of Procedure** ———————————

Installing or upgrading the i2050 Software Phone

There are two options to obtain the latest version of the i2050 Software
Phone:

- New installation – when the i2050 Software Phone is installed for the
  first time.

- Upgrade – when the i2050 Software Phone is already installed on the PC.

  Note 1: To upgrade on Windows 2000 and Windows XP platforms,
  refer to Procedure 16 on .

  Note 2: i2050 Software Phone 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 17 on .

  Note 3: If you are upgrading your i2050 Software Phone, record the
  information in the Configuration Utility's Server tab (see)
  before you start the upgrade. This information might be required in the
  future.

Procedure 15
Installing the i2050 Software Phone 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 the display to complete the installation.

6   Run the i2050 Software Phone 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>i2050 Software Phone* to start the i2050 Software Phone application.

———————————— **End of Procedure** ————————————

Procedure 16
Upgrading the i2050 Software Phone on your PC (for Windows 2000 and Windows XP users only)

1   Download the i2050 upgrade file from the Nortel Networks web site and extract all files to a working directory.

    Note: Please refer to either the Succession 3.0 General Release Bulletin, or the IP Line 3.1 Read Me First document on 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 the display to complete the installation.

5   Run the i2050 Software Phone 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>i2050 Software Phone* to start the i2050 Software Phone application.

───────────── **End of Procedure** ─────────────

Procedure 17
Upgrading the i2050 Software Phone on your PC (for Windows 98 platforms)

1   Record all the values from the Communications Server tab in the i2050 Software Phone Configuration Utility.

   a.   Select the i2050 Software Phone Configuration Tool from the Windows Control Panel.

   b.   Select the Communications Server tab.

   c.   Record all the values on this tab.

   d.   Exit the i2050 Software Phone Configuration Utility.

2   Start your i2050 Software Phone 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 i2050 Software Phone 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 i2050 Software Phone Configuration Utility's Communications Server tab (retrieved from step 1).

   g.   Record the Node ID value.

   h.   Exit the i2050 Software Phone application.

3   Exit any programs that are running.

4   Disable any anti-virus programs that are running.

5 Uninstall the current i2050 Software Phone 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 i2050 Software Phone 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 i2050 Software Phone Configuration utility from the Windows Control Panel.

———— **End of Procedure** ————

Configuration utility

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

- Communications server parameters

- Sound devices

- QoS

- Server type

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

Figure 17 shows the opening screen of the Configuration Utility.

Figure 17
Configuration utility
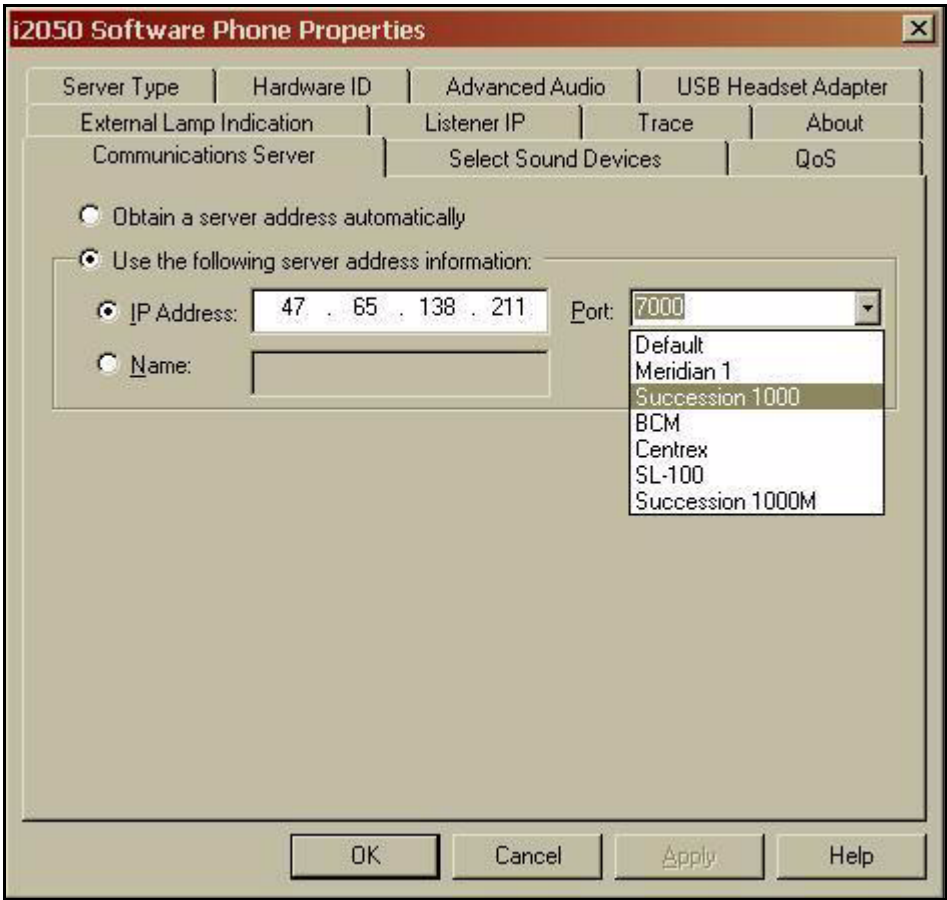
Communications Server tab

A summary of all the required parameters and the method of acquisition is given in Table 18. Information on how to set each of the parameters follows.

Table 18
IP telephone IP parameters

Parameter	Method of Acquisition
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 i2050 Software Phone uses the PC's IP address, net mask, and router address. When the i2050 Software Phone 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 i2050 Software Phone 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 is rebooted - the DHCP server is responsible for tracking IP address leases. If the DHCP extended parameters (for example, Server 1 address) are modified, the i2050 Software Phone application must be restarted.

The Node ID and TN must always be manually entered at the i2050 Software Phone's 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 17 on . If your site uses DHCP to configure Internet Telephones, 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 IT Line Node's IP address information.

If you choose to manually configure the Communications Server address, select "Use the following server address information" and enter the IP Line Node's IP address. In the Port box, select Meridian 1, Succession 1000, or Succession 1000M 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 18 on .

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 18
Select Sound Devices tab
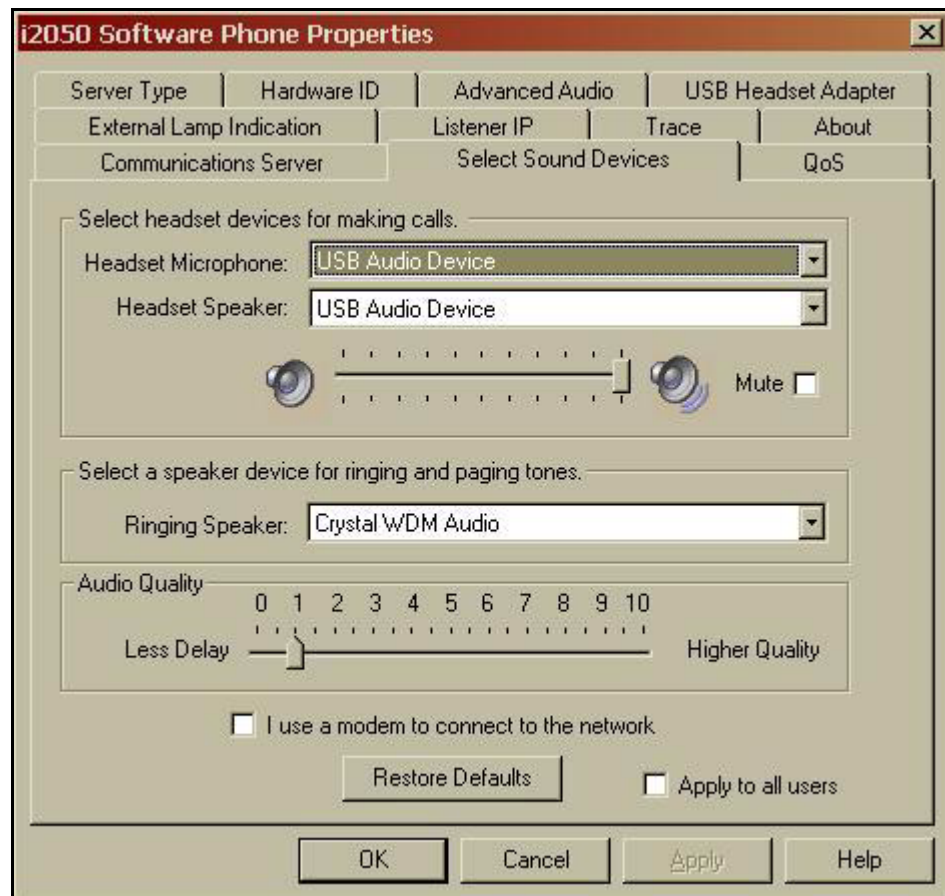
Audio Quality

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 i2050 Software Phone 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 only on newer PCs with fast CPUs.

Choosing Higher Quality increases the number of buffers, making buffer under-/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 check the box, "I use a modem to connect to the network" (see Figure 18 on page 115). The TPS queries the i2050 Software Phone during the registration process for its codec capabilities. The i2050 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 i2050 Software Phone 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 i2050 client on the desktop to re-register the i2050 Software Phone with the TPS for the change to take effect.

When supporting i2050 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 EM/OTM for the system, then calls with the i2050 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 block 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 i2050 Software Phones might connect using a modem. The typical system configuration has both G.711 and G.729A available, so instances of blocked calls to the i2050 should be low.

QoS tab

Assign the QoS settings using the QoS tab (see Figure 19 on). Check the Enable box if the i2050 Software Phone is in a QoS-enabled network. When checked, the i2050 uses the DSCP values configured at the operating system level. If unchecked, 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 on "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.

Figure 19
QoS tab

i2050 Software Phone Properties

Server Type	Hardware ID	Advanced Audio	USB Headset Adapter
External Lamp Indication	Listener IP	Trace	About
Communications Server	Select Sound Devices	QoS

802.1p
- ○ Off
- ○ On
- ● Automatic detection

☐ Apply to all users

OK   Cancel   Apply   Help
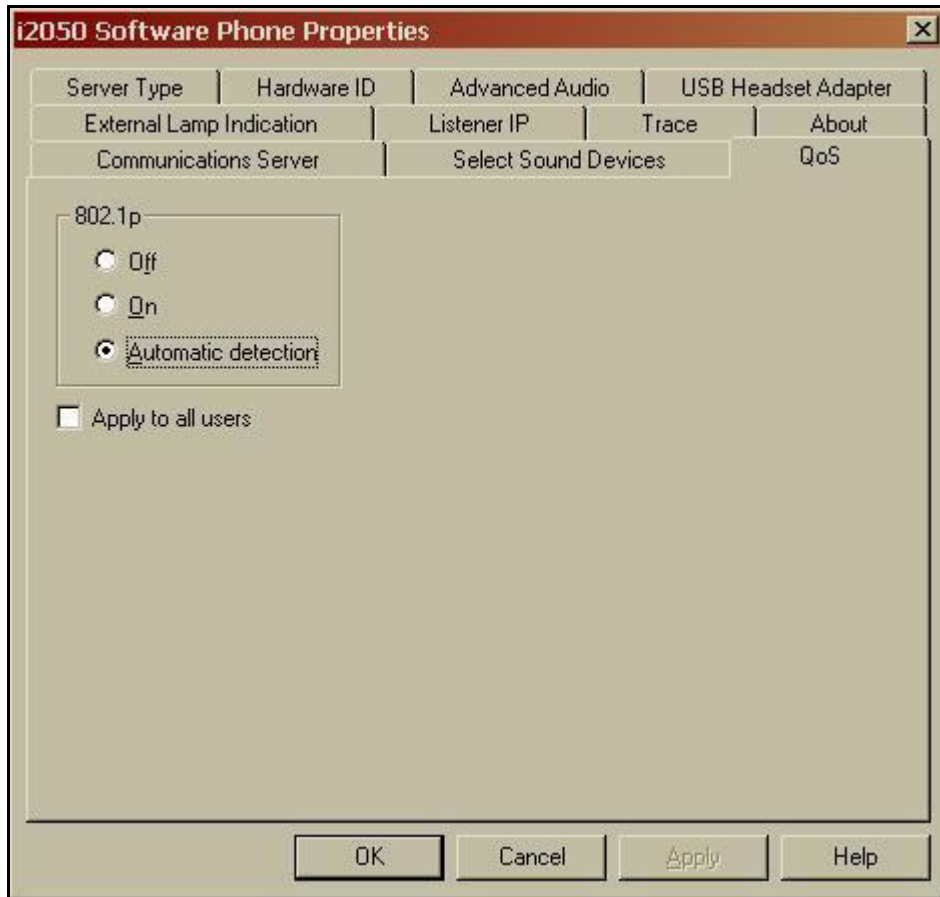
QoS registry settings assigned by the Configuration Utility

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

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

HKEY_LOCAL_MACHINE/SYSTEM/CurrentControlSet/Services/ Qossp/EnablePriorityBoost

The entry is a DWORD value and its values are:

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

Qossp and Qossp/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.

Table 19
QoS screen settings (Part 1 of 2)

Attribute	Description
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 i2050 Software Phone adds 802.1q/p to the i2050 Software Phone packets. It assigns 802.1p as determined by the Communications Server definition (default 6).
Off	Select this option to turn 802.1q/p QoS off. When you select this option, the i2050 Software Phone does not add 802.1q/p to the i2050 Software Phone packets, regardless of whether or not the QoS Server is present.

Table 19
QoS screen settings (Part 2 of 2)

Attribute	Description
Automatic detection	Select this option if you want the i2050 Software Phone to decide if 802.1q/p QoS is used.
	When you select this option, the i2050 Software Phone attempts to connect with 802.1q added to the packets. If the attempt is successful, then the i2050 Software Phone uses 802.1q/p. If the attempt fails (there is a time out approximately 1 second), the i2050 Software Phone attempts to connect again without adding 802.1q/p to the packets. This is the default option.
Apply to all users	Users with administrator privileges (as determined by Windows) can apply the QoS settings to all users on a computer.

Server Type tab

Select Meridian 1, Succession 1000, or Succession 1000M for the Server Type (see Figure 20 on). If the i2050 Software Phone is used in an ACD agent environment, check the Symposium box for ACD Hookswitch Enable.

Hardware ID tab

The Hardware ID is sent to the TPS to uniquely identify an i2050 Software Phone. 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, the radio button for "Use Communication Server values" should be selected (see Figure 21 on). This uses the jitter buffer parameters sent from the TPS. Select "Override Communication Server values" to set the jitter buffer. This is not recommended.

Figure 20
Server Type tab
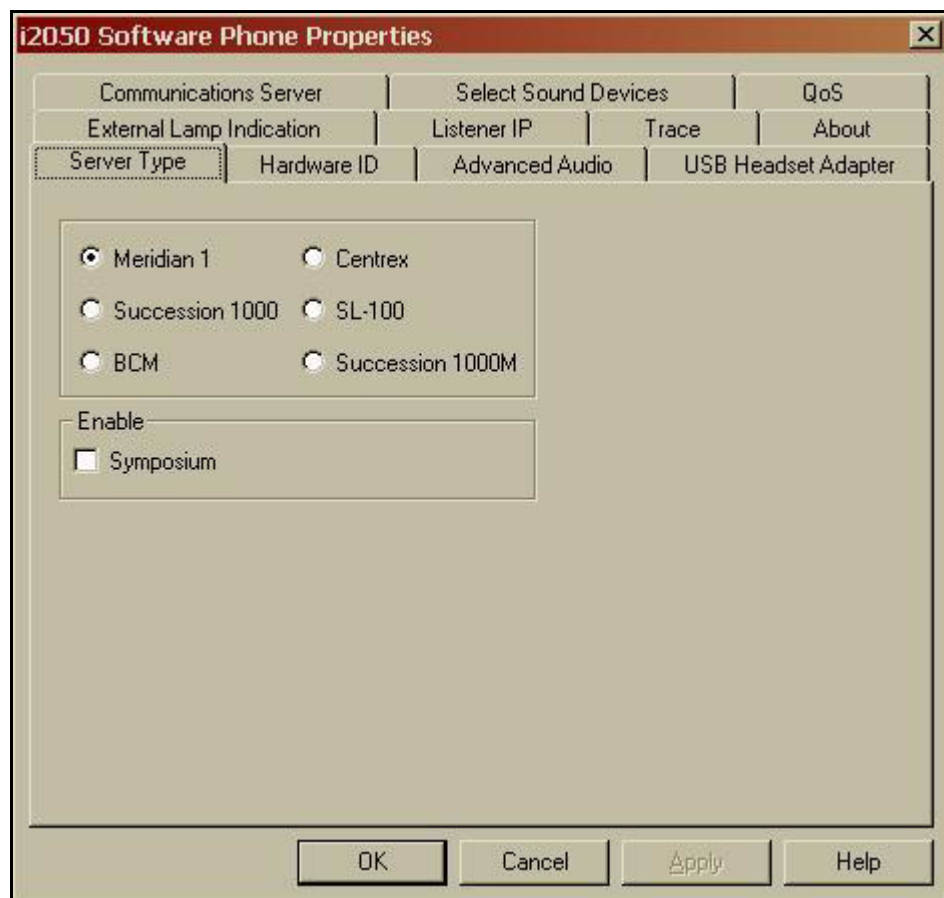
Figure 21
Advanced Audio tab
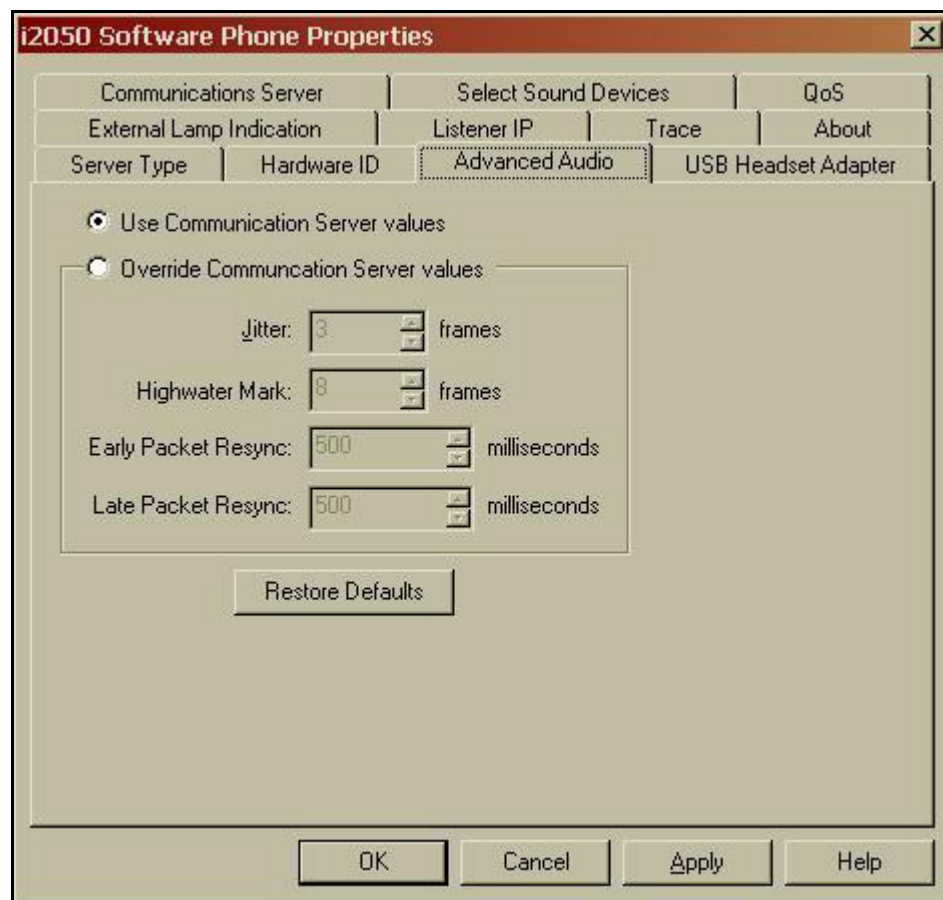
USB Headset Adapter tab

Table 20 describes the settings for the USB Headset Adapter tab (see Figure 22 on).

Table 20
USB Headset Adapter tab settings

Attribute	Description
Version	Shows the version of the USB Headset Adapter.
	Note: 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.
Headset Type	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 Headset Type drop list.
	Note: Due to differences in headset construction, you may not get optimal audio performance when using a headset that does not appear on the list.
Use backlight	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.
	Note: When you enable the backlight, you can use the state of the backlight to quickly determine if the i2050 Software Phone is running. When the backlight is on, the i2050 Software Phone is running. When the backlight is off, the i2050 Software Phone is not running.
Configure Smart Functions	Click this button to set the options that are available when you press the Smart Functions button on the USB Headset Adapter.

Figure 22
USB Headset Adapter tab
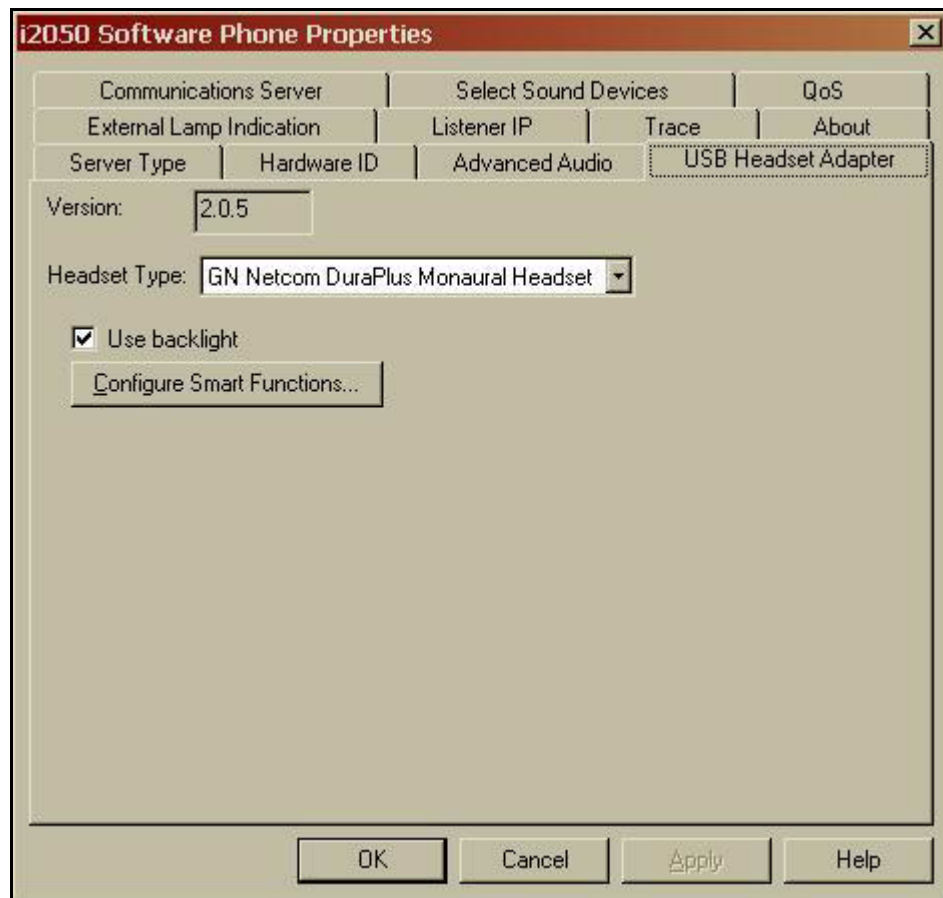
External Lamp Indication tab

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 2.5mm output jack on the USB Headset Adapter.

Table 21 describes the settings for the External Lamp Indication tab (see Figure 23 on).

Table 21
External Lamp Indication tab settings (Part 1 of 2)

Attribute	Description
Manual Override	Select one of the cadences to enable the Manual Override feature, or select None to disable this feature.
	When Manual Override is enabled, you can turn on the external lamp using the i2050 Smart Functions button on the USB Headset Adapter.
	Note: The available cadences are listed at the end of the table.
Headset Disconnect	Select one of the cadences to indicate when the headset is disconnected from the USB Headset Adapter. Select None to disable this feature.
	Note: The available cadences are listed at the end of the table.
Active Call	Select one of the cadences to indicate when there is an active call on the i2050 Software Phone. Select None 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 i2050 Software Phone.
	Note 1: 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.
	Note 2: For information about setting the ringing device, refer to "Select Sound Devices tab" on page 114.
	Note 3: The available cadences are listed at the end of the table.

Table 21
External Lamp Indication tab settings (Part 2 of 2)

Attribute	Description
Message Waiting	Select one of the cadences to indicate when the i2050 Software Phone message waiting light is on. Select None to disable this feature.
	Note 1: The i2050 Software Phone 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 i2050 Software Phone is ringing.
	Note 2: The available cadences are listed at the end of the table.

The available cadences are:

- On – The external lamp is on solid.

- Flash – The external lamp cycles at the following rate: 0.5 seconds on; 0.5 seconds off.

- Flicker – The external lamp cycles at the following rate: 1.625 seconds on; 0.375 seconds off.

- Blink – The external lamp cycles at the following rate: 0.5 seconds on; 1.5 seconds off.

Note: 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.

Figure 23
External Lamp Indication tab
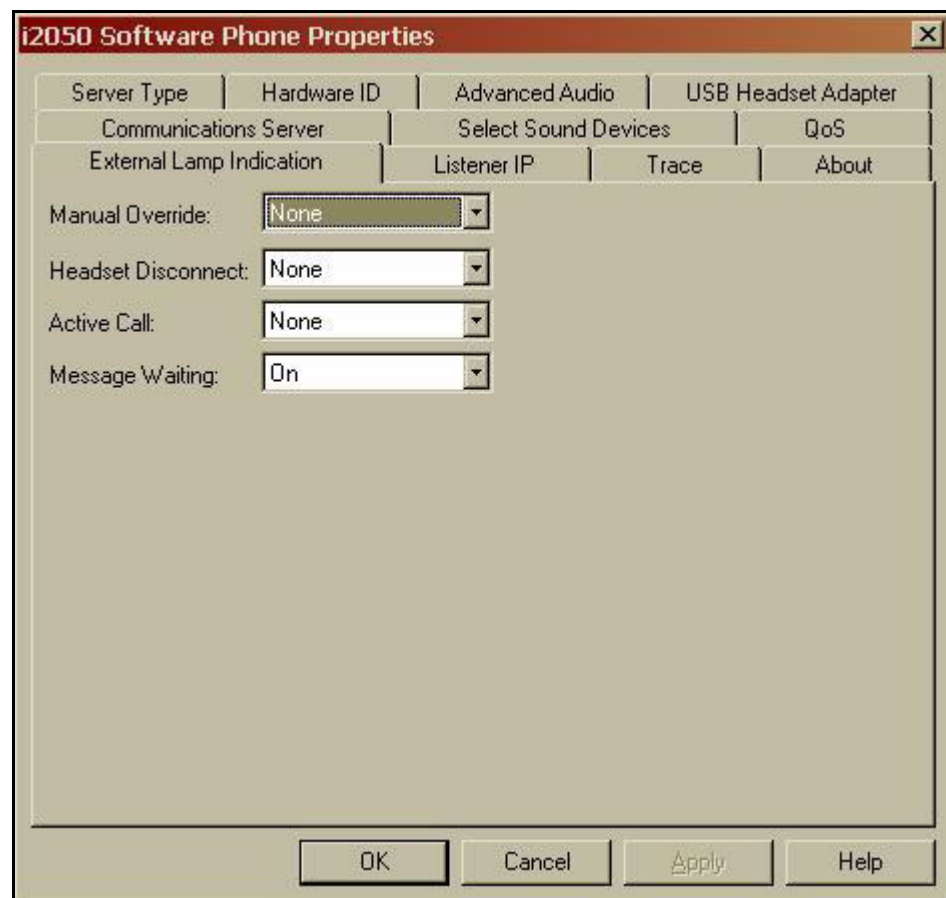
Listener IP tab

The Listener IP screen (see Figure 24 on) is intended for expert users only. This screen identifies the IP addresses and ports where the i2050 Software Phone is listening for traffic from the Communications Server. You can use this screen to override the port assignments when there is a conflicting application on the computer. Table 22 describes the Listener IP attributes that can be configured.

Table 22
Listener IP screen settings

Attribute	Description
Use all addresses	The i2050 Software Phone listens to the IP addresses on all of the network interface cards on the PC for traffic from the Communications 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 i2050 Software Phone is listening to. The i2050 Software Phone 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 24
Listener IP tab
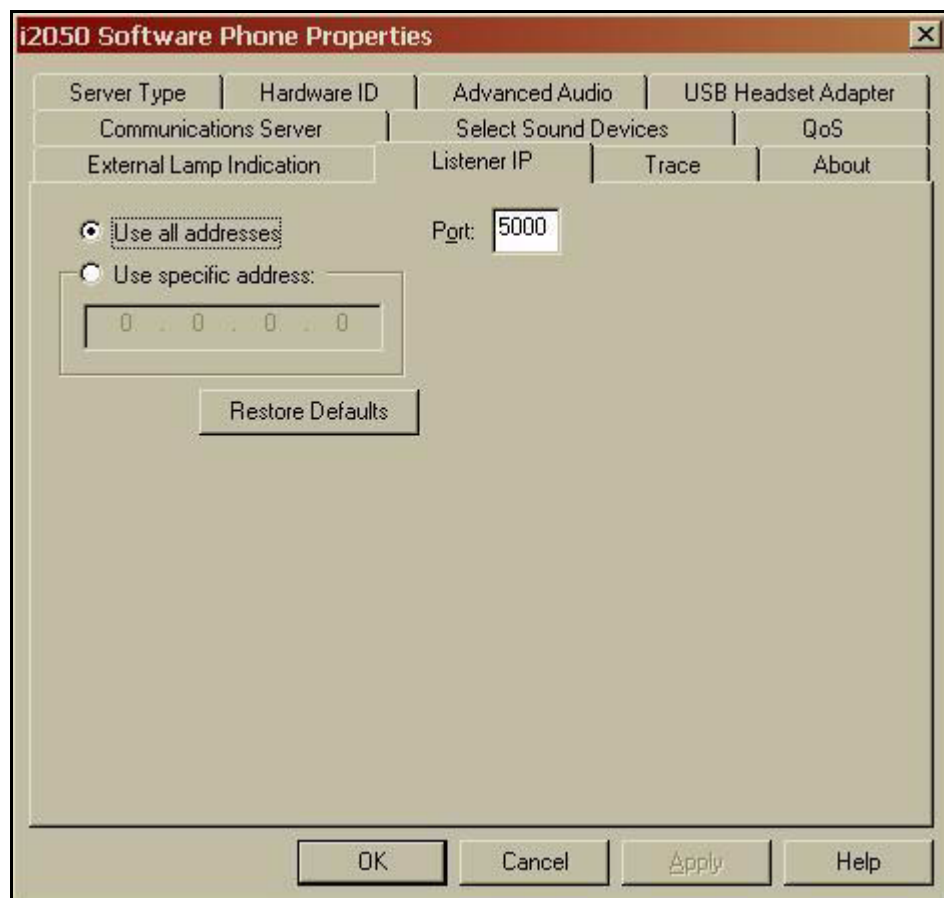
Running the i2050 Software Phone for the first time

Start the i2050 Software Phone in one of the following ways:

- Select *Start>Programs>Nortel Networks>i2050 Software Phone*.

- Click on the desktop shortcut (if one was created during the installation).

- Automatic startup sequence.

    Note: If you want the i2050 Software Phone to start automatically when the machine boots up, create a shortcut to the application in the Startup folder.

When an i2050 Software Phone is started for the first time and connects to the network, it needs to execute the following start-up sequence:

- Get the IP parameters.

- Find a gateway server and authenticate the user.

As the i2050 Software Phone 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 keypad. After the password is verified, enter the TN of the i2050 Software Phone. 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 keypad.

The i2050 Software Phone is now configured and can be used.

Changing the TN of an existing i2050 Software Phone

This procedure is required for a new user of the i2050 Software Phone application.

Procedure 18
Changing the TN of an existing i2050 Software Phone

1   Exit the i2050 Software Phone application.

2   Restart the i2050 Software Phone 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 i2050 Software Phone registers again with the TPS and the i2050 Software Phone 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** ————————

Removing an i2050 Software Phone from service

Procedure 19
Removing an i2050 Software Phone from service

1   Exit the i2050 Software Phone application.

2   Uninstall the i2050 Software Phone application from the PC by removing it through Windows Add/Remove Programs.

3   In LD 11, OUT the TN.

———————— **End of Procedure** ————————

Configure programmable line (DN)/feature key labels

Contents

This section contains information on the following topics:

Introduction

Internet Telephone feature key labels can be customized by the users. Users can program the label using the Internet Telephone keypad. The programmable line (DN)/feature key labels feature is available on the i2002 Internet Telephone, the i2004 Internet Telephone, and the i2050 Software Phone.

Description

The profile of feature key labels for each Internet Telephone is stored in the system's database.rec file on the Succession Call Server and is retrieved during sysload of the Succession Call Server.

When the Internet Telephone registers, the Call Server looks up feature key labels in memory based on the TN. If labels are found, they are sent to the Internet Telephone through SSD messages during the key map download.

The file is stored on the Call Server's directory c:/u/db/database.rec. During a Call Server sysload, the label information is retrieved from the file to the memory. During Call Server EDD, the information is dumped to the file.

When the feature key labels are changed, the information is sent to the Succession Call Server and stored in the Call Server memory. If the Succession Call Server is cold started before EDD is performed, the information is lost.

Language considerations

The feature keys are displayed on the Internet Telephone using the same characters and language as when it was programmed. If the language changes, then the labels change if the new language changes the character set on the Internet Telephone. However, the new characters are not translated to the new language. The stored character code is displayed as the character it maps to in the selected ISO character table.

The following are language change scenarios:

- Enter a label with English characters when the language is set to English. Change the language to Japanese. The label continues to be displayed in English characters.

- Enter a label with English characters when the language is set to Japanese. Change the language to English. The label will be displayed in English characters.

- Enter a label with Japanese characters when the language is set to Japanese. Change the language to English. The label appears in special characters that map from the English ISO table to the Japanese.

Procedure 20
Configuring feature keys

1   Press the Services key.

2   Select the Change Feature Key label then press the Select soft key.

3   Select Change Feature Key label.

4   Press Select to select a feature key.

5   Press a feature key.

Figure 25
Feature key label editor

```
  Edit the Feature key label
  <The new label displays here>
  _____

  Select      Delete      Clear      More...
```

6   Enter the new information for the feature key label.

To enter special characters, press the up navigation key.

Note: If you enter a prime DN key, an error message displays.

7   After the information is entered, select the Select soft key.

The feature key labels are saved to the Call Server memory.

———————————————— **End of Procedure** ————————————————

Changing feature key labels

Feature key labels can be restored to the default values. You can choose to restore all feature keys that are labelled or only one.

If a feature key label is labelled for an autodial key, the label does not change if the autodial key information changes. For example, the autodial key is programmed for your home telephone number and the feature key is labelled Home. If the autodial programming changes to your Tech Support line, the feature key label remains unchanged and displays 'Home'.

Procedure 21
Changing feature key labels

1   Press the Services key.

2   Select the **Change Feature Key label** then press the **Select** soft key.

a. Select **Restore all key labels**.

b. Select the **Yes** soft key to change all feature keys to the default values.

Note: When **Yes** is selected and the values are changed to the default values, you can not undo the change. Feature key labels are erased in the Call Server memory. The label settings must be re-entered.

c. Select **Restore one key label**.

  i. Press **Select**.

  ii. Press a feature label key.

  iii. Select **Yes** to change the selected feature label key to the default value.

──────── **End of Procedure** ────────

Table 23
Change Feature keys screen features (Part 1 of 2)

Select this key...	To...
Delete	Backspace one character.
Cancel	The action is aborted. The display returns to the default Change Feature Keys submenu.
Case	Switch the next character to either uppercase or lowercase.
More	Switch pages.
Number 1-9	Toggle characters.
Up navigation	Display a screen to enter special characters. Use the Up and Down keys to navigate through the lists of available special characters.

Table 23
Change Feature keys screen features (Part 2 of 2)

Select this key...	To...
Right/left navigation	Move cursor location. When reviewing special characters, use these keys to select a character in the line display.
Choose	Select a special character. This option is available when reviewing the special characters.
Text	Close the special character display. No special character is selected. The display returns to the default Change Feature Keys submenu.

802.1Q description

Contents

This section contains information on the following topics:

Introduction

The 802.1Q VLAN support is available for both i2002 and i2004 Internet Telephones and the i2050 Software phone (through the PC's operating system).

The 802.1Q VLAN support is configured from the user display interface of the i2002 and i2004 Internet Telephones. Configure 802.1Q VLAN support when you initially configure an Internet Telephone.

Protocol standard

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.

Currently customers must configure the VLAN and packet priority at the network switch port for each Internet Telephone. Supporting 802.1Q in the Internet Telephones simplifies this configuration and moves it to the end device. The network switching equipment must still be capable of recognizing and processing the 802.1Q header.

Only the i2002 Internet Telephone, i2004 Internet Telephone and the i2050 Software Phone running on a PC configured with 802.1Q can generate the 802.1Q header. The switch ports for Voice Gateway Media Card TLAN ports must be configured as untagged ports so the header is removed.

> *Note:* 802.1Q functionality is supported only on the Internet Telephone. 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

- a six-byte source MAC address

- a two-byte protocol identifier

Following the header is a data area.

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

i2002 and i2004 Internet Telephone support

The i2002 and i2004 Internet Telephones 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 priority bits of all frames are set to 6 (octal) and the VLAN ID is set to 000 (hex) by default. The GUI and TPS configured values override these values.

- The Internet Telephone'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 Internet Telephone's Ethernet driver strips the 802.1Q tag information from the frame prior to passing it on to the IP stack. Priority and VLAN information on received frames is not preserved and is ignored.

For more information on configuring 802.1Q on an i2002 Internet Telephone, see "First-time installation" on .

For more information on configuring 802.1Q on an i2004 Internet Telephone, see "First-time installation" on .

i2050 Software Phone support

The i2050 Software Phone 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 i2050 Software Phone section: "QoS tab" on .

Three-port switch support

The i2004 Internet Telephone 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 Internet Telephone can receive Broadcast frames from a PC's data VLAN. Any data network broadcast storm packets from the network are seen by the Internet Telephone. This type of traffic does not adversely affect the Internet Telephone.

VLAN IDs

The VLAN ID field can be specified on a "per interface" basis. There is only one network interface on the Internet Telephone, therefore, the VLAN ID field is a "global" setting. That is, all packets transmitted by the Internet Telephone have the same VLAN ID.

The VLAN ID is specified as follows:

- The default VLAN ID is 000 (hex).

- The VLAN ID can be specified in the manual configuration user interface or by the DHCP parameter when using the Automatic VLAN discovery using DHCP approach.

Automatic VLAN ID configuration

As part of the 802.1Q feature, there is an option to automatically discover the VLAN ID using DHCP. This process reduces the configuration steps since entering data manually (the VLAN ID) is not required.

When the Automatic VLAN Discovery using DHCP approach is used, and the Internet Telephone has been configured as such, the following steps are automatically taken to obtain the VLAN ID:

1   The i2002 and i2004 Internet Telephones does 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 DCHP 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 Internet Telephone if the VLAN ID does not match the VLAN IDs configured on the port. When the Internet Telephone 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 Internet Telephone accepts the offer and saves the IP address and Node IP address.

Corporate Directory

Contents

This section contains information on the following topics:

Introduction

A system database is created either from Optivity Telephony Manager (OTM) information or from a corporate LDAP server. This database is downloaded and stored on the system CPU platform and is accessible from the Internet Telephones.

Corporate directory extends the use of this database to the Internet Telephones. The corporate directory lookup feature works during call transfer and conference operations.

Operation

The i2002 Internet Telephone, i2004 Internet Telephone, and i2050 Software Phone provide access from the telephone to a corporate wide directory. The

Corporate Directory is accessed through the Directory Key. The Corporate Directory provides the following features:

- Users can search by name.

- Users can view additional information on each entry.

- Users can dial from the Corporate Directory.

- Provides an alphabetical list of entries using the last names (system generated).

- The system administrator can configure OTM to download the directory database manually or automatically to the system.

Operating parameters

The following operating parameters apply to Corporate Directory:

- The user must have an i2002 Internet Telephone, i2004 Internet Telephone, or an i2050 Software Phone to support the Corporate Directory feature.

- To access the Corporate Directory from the telephone, the user must have the Corporate Directory Class of Service enabled. See "Call Server configuration" on .

- When the Corporate Directory is being updated with new data, the user cannot access the Corporate Directory.

- The user exits the Corporate Directory by pressing the Quit Key or the Directory Key.

- The OTM Corporate Directory utility gathers data from the OTM databases and downloads it to the system. To use the Corporate Directory utility, OTM 2.0 or later must be installed. For more information, refer to *Optivity Telephony Manager: Installation and Configuration* (553-3001-230).

Special characters

The special character set includes all characters from the extended portion of the ASCII character set. The extended ASCII character set that supports the Internet Telephone's current language is the character set appears in the edit mode. The special character set contains up to 130 characters. It is displayed in six lines with 24 characters on each line. Use the navigation keys to scroll through the list or to move through a 24-character line.

The special character set does not include upper- and lower-case letters or numerals. Use the keypad of the Internet Telephone to define these characters.

Procedure 22
Accessing the Corporate Directory

1 Press the Directory key on an Internet Telephone.

A list of applications available displays.

2 Highlight Corporate Directory then press the Select soft key.

3 Go through the Status Query process.

4 Enter a name then select Search.

You can enter special characters in the search parameters. The special characters include some symbols (for example, +, -) and international characters.

5 To enter special characters, press the Up navigation key.

The special characters display.

6 Use Up/Down keys and Right/Left keys to review the special characters available.

The Corporate Directory may not be available for the following reasons:

- The Corporate Directory is locked. The message "Try again Later" displays.

- The Corporate Directory file is not available. The message "Directory unavailable" displays.

- The class of service is not configured for the Internet Telephone.

Review Table 24 on for more information on Search/Edit screen features. The features in Table 24 apply to the i2002 Internet Telephone, i2004 Internet Telephone, and i2050 Software Phone.

———————————— **End of Procedure** ————————————

Table 24
Search and Edit screen features

Select this key...	To...
Delete	Backspace one character.
Cancel	Close the Corporate Directory.
Case	Switch the next character to either uppercase or lowercase.
Search	Search for directory entries. Results are displayed in either a List View screen or No Match screen.
More	Switch pages.
Number 1-9	Toggle characters.
Up navigation	Display a screen to enter special characters. Use the Up and Down keys to navigate through the lists of available special characters.
Right/left navigation	Move cursor location. When reviewing special characters, use these keys to select a character in the line display.
Choose	Select a special character. This option is available when reviewing the special characters.
Text	Close the special character display. No special character is selected. The display returns to the default Search/Edit screen.

Corporate Directory views

There are two search results screens available for the Internet Telephones:

- ListView (default view) – available for all Internet Telephones
- CardView – available only for i2004 and i2050

If a search was successful and entries were found in the directory, the first match displays on the screen.

Note: If there is no match to the search query, you can choose to either start a new search or change the information in the initial search.

ListView

The ListView is available for all Internet Telephones. The ListView screen shows a list of names where the user selects the name they want to call from the list using the Navigation keys.

CardView

The CardView is available only on the i2004 Internet Telephone and the i2050 Software Phone. The Card view provides the following information about the name found in the directory: name, telephone number, and department name.

Table 25
ListView and CardView screen features (Part 1 of 2)

Press this key...	To...
Up or Down	Scroll through the list of directory entries that match your search criteria.
Right	On the i2004 and i2050, the view changes to the Card view where the name, phone number, and department are displayed.
Left	In Card view only, returns to List view.

Table 25
ListView and CardView screen features (Part 2 of 2)

Press this key...	To...
Dial	Dials the selected DN. — If there is no DN number associated with the directory entry, a message displays ("No number in directory"). — If there is no available DN key, a message displays ("No available line"). When displayed, select Done to return to the List view or Card view.
NewFind	Returns to the Search/Edit screen.
Resume	Returns to the Search/Edit screen with the previously entered name displayed. Appears on both views.

Call Server configuration

You can change the Call Server configuration while Internet Telephone users are logged on to the Corporate Directory. The changes only take affect when the user logs off and then logs on again to the Corporate Directory.

LD 11 needs to accept CRPA/CRPD class of service input for Internet Telephones.

LD 11 – Configuration (Part 1 of 2)

Prompt	Response	Description
REQ:	NEW/CHG	Enter main command.
TYPE:	I2002/I2004/I2050	Enter terminal type.
TN:	l s	Enter set TN.

LD 11 – Configuration (Part 2 of 2)

Prompt	Response	Description
... CLS	CRPA/CRPD	Enable/disable corporate directory feature for this TN.

Call Server memory usage

The Call Server memory usage for Corporate Directory is the same for both Internet Telephones and Digital Telephones.

The equations for approximating Call Server memory usage for Corporate Directory are:

1   Call Server hard disk space needed (bytes) = Number of directory entries * Average length of all entries *2

2   Call Server RAM needed to store database (bytes) = (Average length of all entries + 20) * 1.25 * Number of directory entries

For a sample database where the average length is 29.5 characters, the Call Server memory requirements are simplified to the table below.

Table 26
Memory requirements based on database size

Call Server RAM needed	Database size (rounded to nearest 1000)	Call Server Hard disk space needed (rounded to next 0.5 MB)
1 MB	16 000	1.5 MB
2 MB	32 000	2.0 MB
3 MB	48 000	3.5 MB
4 MB	64 000	4.0 MB
5 MB	80 000	5.5 MB

Table 26
Memory requirements based on database size

Call Server RAM needed	Database size (rounded to nearest 1000)	Call Server Hard disk space needed (rounded to next 0.5 MB)
6 MB	96 000	6.0 MB
7 MB	113 000	7.0 MB

Internet Telephone maintenance and diagnostics

Contents

This section contains information on the following topics:

Introduction

Alert: The maintenance commands in this section apply only to the i2002 and i2004 Internet Telephones' TNs. They do not affect the network access of a PC or other network devices connected to the Internet Telephones. Access to the network is affected only when:

• The power to the Internet Telephone is disconnected.

• The LAN cable is disconnected.

Maintenance and diagnostics

In the Internet Telephone, there are two types of TNs:

• A physical TN that represents a physical unit of the IT Line card.

• A virtual TN that is configured on a virtual superloop and represents an Internet Telephone.

The maintenance features apply only to the Internet Telephone. A PC's LAN connection is affected only when it is connected through the Internet Telephone's three-port switch and:

• The power to the Internet Telephone is disconnected.

• The LAN cable is disconnected.

Physical TNs that are seen as card units, are managed using existing LD 32 commands.

Virtual TNs are configured on virtual superloops. For virtual superloops, the message NPR047 displays in response to LD 32 commands such as STAT, DISL, DISC, DISI, ENLL, ENLC that do not specify the TN down to the Unit level.

IDU commands

The IDU command for Internet Telephones provides information, such as TN, TN ID, NT code, color code, release code and serial number, as well as the IP address of the Internet Telephone and the IP address of the Voice Gateway Media Card to which the set has registered for signaling purposes.

The serial number is the last three bytes of the Internet Telephone's MAC address, printed in hexadecimal format.

The system requests the information from the Internet Telephone and can be used to test the end-to-end IP connectivity of the Internet Telephone. The output format of the IDU command in LD 32 is shown in Table 27. This format applies only to Internet Telephone Virtual TNs.

If the IDU command cannot retrieve the information shown in Table 27, it responds with one of the following:

- Prints the Internet Telephone IP address and the Voice Gateway Media Card address, and generates an NPR0503 message.

- The Internet Telephone is not registered with the Call Server and an NPR0048 message is generated.

- The Internet Telephone is registered, but the Call Server is not responding, and generates an NPR0503 message.

Table 27
IDU command printout in LD 32

Item	Description
ISET TN:	l s c u
TN ID CODE:	i2001, i2002, i2004, or i2050
NT CODE:	xxxxxx
COLOR CODE:	xx
RLS CODE:	xx
SER NUM:	xxxxxxx
SET IP ADR:	xxx.xxx.xxx.xxx
TPS IP ADR:	xxx.xxx.xxx.xxx

Lamp audit and keep-alive function

The Lamp Audit function provides a continuous source of heartbeat messages to ensure the Internet Telephone is powered and the IP connection is working. Since there is a reliable UDP connection from the system core through to the Internet Telephone, any failure of the Internet Telephone, the Voice Gateway Media Card or the IP connection is detected.

You can run Network Signaling diagnostics as part of the midnight routines with LD 30.

When the TPS detects the Internet Telephone has been disconnected, the IT Line card logs the event and sends an UNREGISTER message to the Call Server for that Internet Telephone.

When the Call Server detects a loss of connection with the Voice Gateway Media Card, the system logs a message and UNREGISTERS all of the Internet Telephones and gateway channels associated with that card.

Specifications

Contents

This section contains information on the following topics:

Power requirements

i2002 and i2004 Internet Telephone power requirements

An i2002 or i2004 Internet Telephone is powered by a 16 VAC, 500 mA transformer. Line voltage is different for each country. The i2004 Internet Telephone also accommodates a 48 V dc supply. Power is applied by a "barrel" connector.

You can order i2002 and i2004 Internet Telephones with or without a power transformer. For international orders, you must order a country-specific transformer.

Environmental specifications

Table 28 shows the environmental specifications of the i2002 Internet Telephone.

Table 28
i2002 Internet Telephone—environmental specifications

Parameter	Specifications
Operating temperature	+5° to +40° C, ambient
Operating humidity	+5% to 95% RH (29 g/m3 mean absolute humidity)
Storage temperature	–40° to +70° C

Table 29 shows the environmental specifications of the i2004 Internet Telephone.

Table 29
i2004 Internet Telephone—environmental specifications

Parameter	Specifications
Operating temperature	+5° to +40° C, ambient
Operating humidity	+5% to 95% RH (29 g/m3 mean absolute humidity)
Storage temperature	–40° to +70° C

Internet Telephone Virtual Office

Contents

This section contains information on the following topics:

Introduction

The Virtual Office feature enables users to log in to any Internet Telephone using their own User ID and password. This redirects the user's telephone calls and other features to the Virtual Office logged-in Internet Telephone. The users can perform most Internet Telephone functions exactly as if they were using their regular Internet Telephone.

Upon login, the Internet Telephone de-registers with the Succession Call Server and registers to the Call Server associated with the given User ID. This can be the same Call Server or another Call Server within the network. If it is another Call Server, a Nortel Gatekeeper is required to provide the address of the Internet Telephone Terminal Proxy Server (TPS) node. Upon logout from Virtual Office, the Internet Telephone registers to the Call Server associated with the settings stored in its EEPROM: the S1 server and Terminal Number (TN).

To login using Virtual Office, the TN associated with the current Internet Telephone registration must be configured with the Virtual Office Login Allowed (VOLA) class of service. The TN associated with the User ID for the login must be configured with the CLS VOUA (Virtual Office User Allowed). For more information on VOLA and VOUA, refer to LD 11 and LD 81 in *Software Input/Output: Administration* (553-3001-311).

The i2002, i2004, and i2050 Internet Telephones support the Virtual Office feature. Refer to the following documents for more information:

• *Internet Terminals: Description* (553-3001-368)

• *i2002 Internet Telephone User Guide*

• *i2004 Internet Telephone User Guide*

• *i2050 Software Phone User Guide*

The Virtual Office feature supports only one customer. If two or more customers are configured, the one with the lowest customer number is supported.

Operating parameters

The following is the minimum software and hardware for the Internet Telephone Virtual Office:

• Succession 3.0 software and hardware

• IP Line 3.1

• i2050 software build 338 or later

• Element Manager

Firmware upgrade

The Virtual Office feature requires UNIStim protocol version 2.5, which is supported in firmware version 1.33 or later. No firmware upgrade takes place during a Virtual Office login.

The **umsUpgradeAll** command has no impact on Internet Telephones logged into Virtual Office. These telephones are not reset. If the Virtual Office login is within the same Succession Call Server, the Internet Telephone firmware is upgraded after the user has logged out. If the Virtual Office login is between different Call Servers, the Internet Telephone simply registers back to its home TPS, and follows the normal firmware upgrade rules for regular registration.

Feature interactions

Automatic Call Distribution (ACD)

Automatic Call Distribution (ACD) agents that require the Virtual Office login must have a separate, single appearance DN assigned to a programmable feature key. This unique DN is the User ID for Virtual Office login.

Branch Office DN

When a Virtual Office login is used for a Branch Office DN, the Branch Office Internet Telephone is preempted.

When the Branch Office Internet Telephone is in survival mode and there is a Virtual Office login for that DN, the Branch Office DN becomes registered to the Main Office *and* the Branch Office. This situation is resolved when WAN connectivity resumes and the Internet Telephone, in local mode, is redirected to register with the Main Office TPS in a logged out state.

Gatekeeper end points

Virtual Office support is limited to Internet Telephones registered with Succession Call Servers that are configured as end points in the same Gatekeeper. Virtual Office login between Internet Telephones registered with Call Servers that are configured as end points of different Gatekeepers is not supported.

Internet Telephone options

The Internet Telephone options are retained within the telephone regardless of the registered User ID. Remote Virtual Office logins display the time and date of the remote Call Server.

Multiple Appearance Directory Number (MADN)

When a Multiple Appearance Directory Number (MADN) is used for Virtual Office login, the TN is selected to match the provided SCPW. If this is not desirable, then a separate, secondary, single appearance DN can be assigned. After login using the single appearance DN, the user receives the assigned key map and feature key list that includes the MADN.

If there is no matching SCPW, an *Invalid ID* error displays. The login session assumes all the features of this TN (the same as a regular registration).

Registration lockout

If a user enters an incorrect password for the Virtual Office login three consecutive times, the TN is locked for one hour. This is known as *Password guessing protection*. When locked out, an information message is written to the Call Server history file and printed to the TTY. The craftsperson can unlock the TN by disabling and then re-enabling the TN in LD 32. This lockout does not survive re-registration of the Internet Telephone.

Virtual Office login using UDP

When a Branch User in local mode performs a Virtual Office login using UDP to a Branch User TN, the Internet Telephone attempts to register to the Main Office TN. Therefore, Virtual Office login using UDP will fail if the WAN connection to the Main Office is down.

Virtual Office preemption

If a user is already logged into Virtual Office, the user can log in again on another Internet Telephone. This is useful if the user forgets to log out of an Internet Telephone and returns to his/her desk. The home Internet Telephone or the logged in Virtual Office Internet Telephone is preempted upon a successful login on another Internet Telephone. The preempted Internet Telephone remains registered to the TPS but not to the Call Server, and is forced to register to the TN configured on the Internet Telephone.

Since only one registration can exist for each TN within a Call Server, the Internet Telephone is no longer operational, as indicated by the Logout Screen on the display.

The preempted Internet Telephone can be used by another user for a Virtual Office login or it can be re-registered as the home Internet Telephone. The preempted Call Server registration may be a regular registration (one in which the Internet Telephone's EEPROM S1 and TN settings match the login TN within the associated Call Server), a Virtual Office login, or a Branch User login. If it is a regular registration, the subsequent login is resolved within the Call Server as a regular registration, not a Virtual Office login or a Branch User login.

When a virtually logged in Internet Telephone resets, it attempts to register with the Call Server associated with its S1 and TN. If the TN has a Virtual Office login or Branch User login, then it does not register to its Call Server but displays the Logout Screen.

When attempting to log in, if there is an existing login to the same User ID or a home Internet Telephone for the User ID that is not in the idle state (for example, ringing, ringback, or in a call), the new login attempt gets a Login Busy message.

Feature packaging

Virtual Office requires the following packages:

- Virtual Office (VO) package 382
- Virtual Office Enhancement (VOE) package 387

Feature implementation

LD 11 – Configure Virtual Office.

Prompt	Response	Description
REQ:	NEW CHG	Add new data, or change existing data.
TYPE:		Telephone type
	i2002	i2002 - Internet Telephone
	i2004	i2004 - Internet Telephone
	i2050	i2050 - Software phone
CUST	xx	Customer number
...		
CLS		Class of Service
	(VOLA)	Allow Virtual Office login operation on this TN.
	VOLD	Deny Virtual Office login operation on this TN.
	(VOUA)	Allow Virtual Office user onto this TN using another telephone.
	VOUD	Deny Virtual Office user onto this TN using another telephone.

Feature operation

Virtual Office supports the following operations:

- Virtual Office login

- Virtual Office connection

- Virtual Office logout

Virtual Office login

Since i2004 and i2050 Internet Telephones have more key functions than the i2002, a Virtual Office login from an i2002 Internet Telephone to an i2004 or i2050 TN is blocked if:

• Key 0 is ACD.

• Any key (from key 4 to key 15) is defined as AAK, CWT, DIG, DPU, GPU, ICF, MCN, MCR, MSB, PVN, PVR, SCR, or SCN.

If a login is attempted in the above situation, an error message displays.

Note: Features configured on DN/Feature keys higher than key 3 on the i2004 Internet Telephone or i2050 Software Phone are not accessible when logged in from an i2002 Internet Telephone.

This procedure explains how to log in to Virtual Office. The Internet Telephone is operating in Normal Mode.

Procedure 23
Performing Virtual Office login

1 Press the **Services** key to display the **Options** menu.

Note: The i2002 screen displays only one line at a time. Use the **up/down arrow** key to scroll through the menu.

2 Use the **down arrow** key to highlight **Virtual Office Login**.

3 Press the **Select** softkey.

The screen prompts for the User ID.

4 Enter the User ID.

The UserID is the user's internal telephone number. Depending on the network configuration of the system and where the Virtual Office login takes place, the UserID can be:

UserID	Explanation
UDP number	A user with a Home Location Code (HLOC) of 343 visits a site where the HLOC is 393. The UserID is 6 343 5555, where: 6 = network access code (access to ESN) 343 = Home Location Code (HLOC) 5555 = Directory Number (DN).
CDP number	A user with a HLOC of 343 wants to do a Virtual Office login from the same site (HLOC = 343), on a different Internet Telephone. The UserID is 5555. *Note:* The UserID of 6 343 5555 is also acceptable.
Transferable DN	A user with HLOC of 343, using a transferable DN, is permanently transferred to a site where HLOC is 393. The previous location DN (5555) is retained as the UserID. *Note:* The UserID of 6 393 5555 is also acceptable.

5   Press the **Select** softkey.

The screen prompts for the Station Control Password (SCPW).

6   Enter the SCPW for the Main Office Internet Telephone.

When the User ID is not found locally, the message Locating Remote Server displays to indicate that connection setup is ongoing. A Nortel Gatekeeper provides the node IP address of the Home TPS associated with the User ID. The local TPS confirms connectivity to the remote TPS, then the Internet Telephone is redirected to the remote Home TPS.

———————— **End of Procedure** ————————

Login failures and errors

A Virtual Office login fails if any one of the following states occurs:

- The login User ID is not local and there is a failure to get a response from a Gatekeeper.

- The User ID is not local and the Gatekeeper does not know the endpoint of the User ID.

- The User ID is not local and the Home TPS is unreachable.

- The User ID is not known or a MADN cannot be resolved at the Home Call Server.

- An SCPW is not configured for the User ID.

- The destination TN has Virtual Office User Denied (VOUD).

- There already exists a non-idle registered instance for the User ID.

- The user selects **Cancel** after a password failure.

- The password fails to authenticate after three attempts.

- The User ID entry in the Gatekeeper database points back to the originating Call Server.

Refer to Table 30 for system messages, potential causes, and available actions.

Table 30
System messages (Part 1 of 3)

Message	Cause	Action
Busy, try again	Remote Internet Telephone is active (not idle).	Wait for remote Internet Telephone to become idle and try again.
	ACD is logged in.	Logout ACD before Virtual Office login from another Internet Telephone.
	Make-Set-Busy is inactive on ACD Internet Telephone.	Set Make-Set-Busy active on ACD Internet Telephone.

Table 30
System messages (Part 2 of 3)

Message	Cause	Action
Invalid ID (1)	Incorrect User ID entered. User ID is not in Gatekeeper database.	Enter correct User ID. Update Gatekeeper database to include User ID.
Invalid ID (2)	Incorrect User ID entered.	Enter correct User ID.
Invalid ID (3)	Incorrect User ID entered. User ID in Gatekeeper database points to originating Succession Call Server.	Enter correct User ID. Change Gatekeeper configuration for the User ID to point to the correct endpoint.
Locked from Login	Three failed attempts to enter the correct SCPW.	Wait one hour for lock to clear automatically, or disable and enable the remote Internet Telephone in LD 32 at the Succession Call Server to clear the lockout.
Logged Out	Home TN in use by Virtual Office.	Login to another TN using Virtual Office. Re-register as the Home (or Branch) Internet Telephone.
Permission Denied (1)	SCPW is not configured or enabled.	Configure a SCPW for the remote Internet Telephone.
Permission Denied (3)	Incorrect User ID entered. SCPW is not configured.	Enter correct User ID. Configure a SCPW for the remote Internet Telephone.
Permission Denied (4)	Incorrect User ID entered. Attempt to login to an i2004/i2050 TN from an i2002 Internet Telephone.	Enter correct User ID. Go to an i2004/i2050 Internet Telephone and try again.

Table 30
System messages (Part 3 of 3)

Message	Cause	Action
Permission Denied (5)	Incorrect User ID entered.	Enter correct User ID.
	The destination TN has Virtual Office User Denied (VOUD) configured.	Configure the remote Internet Telephone with Virtual Office User Allowed (VOUA).
Permission Denied (6)	Incorrect User ID entered.	Enter correct User ID.
	Incorrect SCPW is entered.	Enter correct SCPW.
Server Unreachable (1)	Gatekeeper is down.	Bring Gatekeeper up.
	The link to Gatekeeper is down.	Restore link to Gatekeeper.
Server Unreachable (2)	Remote TPS is down.	Restore remote TPS.
	Link to remote TPS is down.	Restore link to remote TPS.
	Remote Succession Call Server is down.	Bring remote Succession Call Server up.

Virtual Office connection

An Internet Telephone is registered with the TN in its EEPROM and then a User ID and password are used to determine the home TPS for the Internet Telephone during the Virtual Office connection. A Nortel Gatekeeper is required, if the home TPS is not the TPS where the Internet Telephone is registered when the user initiates a Virtual Office login.

Upon login, the Internet Telephone receives the features, time, date, and tones of the home Call Server. The Internet Telephone becomes part of the home zone and receives call service from this Call Server. When this zone is remote, voice quality may be degraded because codec selection is based on the Internet Telephone being in its expected location (subnet). Firmware upgrade on a TPS node does not upgrade the telephones logged into Virtual Office.

The Internet Telephone options stored locally in the telephone's non-volatile memory retain the characteristics of the Internet Telephone. That is, items from the Option menu such as language, display contrast, date and time format, and ring type retain the Internet Telephone properties and do not change to reflect the preferences on the Virtual Office user's home Internet Telephone.

If the Virtual Office user changes these settings, the changes persist in the Internet Telephone even after logout, power-up, or reboot. In other words, changes to Telephone Options menu items are retained (in the Internet Telephone's EEPROM) regardless of who is registered. When changing any of these preferences, the original settings should be restored as a courtesy upon logout.

When connected to a Call Server through Virtual Office, local trunks are the home CO and a call for emergency service is directed to the home PSTN. This is not ideal when the home is remote.

Virtual Office logout

The Virtual Office user initiates a logout by:

- Performing a direct Virtual Office logout on the active Internet Telephone (see Procedure 24 on page 171).

- Returning to the home location and re-registering the home Internet Telephone (using the **Home** or **Branch** softkey). This forces a logout on the idle Virtual Office Internet Telephone registered to the same User ID.

- Performing a Virtual Office login on another Internet Telephone. This forces a logout on the idle Virtual Office Internet Telephone registered to the same User ID.

The Virtual Office user is forced to logout when:

- the Internet Telephone power cycles

- the Internet Telephone loses connectivity to the Home TPS

- the automatic logout activates (see "Virtual Office auto-logout" on page 171)

Upon logout, the Internet Telephone returns to its regular keymap unless the TN owner has an active Virtual Office login or Branch User login. In these cases, the Internet Telephone displays the Logout screen. If connectivity to the Home Office is lost during a Virtual Office login, calls are not maintained and the Internet Telephone re-registers to its configured TN and Call Server.

Procedure 24
Performing Virtual Office logout

This procedure explains how to logout of Virtual Office. The Internet Telephone is operating in Normal Mode.

1   Press the **Services** key to display the **Options** menu.

     Note: The i2002 screen displays only one line at a time. Use the **up/down arrow** keys to scroll through the menu.

2   Use the **down arrow** key to highlight **Virtual Office Logout**.

3   Press the **Select** softkey.

——————————   **End of Procedure**   ——————————

Virtual Office auto-logout

The Virtual Office user can be configured to automatically logout of all Virtual Office connections at a specified hour. This is configured in LD 15 at the following prompts:

•   VO_ALO (YES/NO) – enables/disables automatic logout.

•   VO_ALOHR (0-23) – sets hour to activate automatic logout.

Refer to *Software Input/Output: Administration* (553-3001-311) for more information.

Emergency Services for Virtual Office

Contents

This section contains information on the following topics:

Introduction

The Emergency Services for Virtual Office feature allows Virtual Office users to place an emergency (E911) call to the correct Public Safety Answering Point (PSAP) for their geographical location. It recognizes when a user dials an Emergency Services Directory Number (ESDN) and forces the Virtual Office Internet Telephone to log out of the Remote Call Server and redirect to the Home Call Server. Although this adds a small delay to call processing, the delay is almost imperceptible to the user.

No overlay changes are required since there are no configuration options.

> *Note:* Unless stated otherwise, all ESA functions (for example OSN, non-DID mapping to DID, and internetworking with partner solutions) continue to operate as previously described.

Virtual Office operation with feature not enabled

Upon Virtual Office login, without the Emergency Services for Virtual Office feature enabled, the Internet Telephone de-registers with the Home Call Server and registers with the Call Server associated with the given User ID. This can be the same Call Server or another Call Server within the network. If it is another Call Server, then it might be in a different geographic area and use a different PSAP to handle emergency calls. Therefore, if a user places an emergency call using an Internet Telephone that is geographically distant from its registered Call Server, the emergency call is sent to the wrong PSAP and help might be delayed, go to the wrong location, or not arrive at all.

> *Note:* The basic ESA feature uses the premise that all the telephones connected to the Call Server are served by the same PSTN and the same PSAP. This assumption is acceptable for TDM telephones where the maximum length of the cable from the Call Server to the telephone is restricted to approximately 1000 feet. With Internet Telephones, it is possible for a telephone to be at a great distance from the Call Server.

Without the Emergency Services for Virtual Office feature configured, ESA operates the same on a Virtual Office Internet Telephone as it operates on any other Call Server telephone, and the wrong PSAP may be used. This is considered fall back mode, which is compatible with older versions of the software or firmware.

Virtual Office operation with feature enabled

Upon Virtual Office login on a Remote Call Server with the Emergency Services for Virtual Office feature enabled, the Home TPS stores the ESA configuration in the DRAM of the Internet Telephone before redirecting it to the Remote Call Server.This information tells the Remote Call Server that the Home Call Server is enabled and configured for ESA. The Remote Call Server uses this information to redirect the Internet Telephone to the Home Call Server to handle ESA calls.

> *Note:* The ESA configuration stored in the DRAM includes the Emergency Services DN (ESDN). This is implemented for future use, when the ESDN could differ on Succession Call Servers.

When the redirected Internet Telephone starts the registration and Virtual Office login procedure at the Remote Call Server, the Remote TPS reads its DRAM and passes the ESA configuration to the Succession Call Server. This lets the Succession Call Server know that if the Internet Telephone user makes an ESA call, it must use the Emergency Services for Virtual Office feature.

When the Virtual Office user dials the ESDN, then the Emergency Services for Virtual Office feature is invoked on the Remote Call Server. The feature checks for a flag that indicates that the originating Internet Telephone can be redirected to the Home Call Server to process the ESA call. If this is the case, then the Remote Call Server sends a message to the Remote TPS to write the request into the DRAM of the Internet Telephone and redirect it to the Home TPS.

> *Note:* The request to redirect the set to the Home TPS for the ESA call includes the dialed ESDN. This is implemented for future use, when the ESDN could differ on Succession Call Servers.

A message is sent to the Internet Telephone's display alerting the user that the emergency call is in progress. Then, another message is sent to the Internet Telephone's display indicating an emergency call is in progress. A final message causes the Internet Telephone to return to its Home TPS without the visible flashing of the light or clearing of the display.

When the Internet Telephone re-registers with the Home TPS, the Home TPS retrieves the DRAM and acts on the request for an ESA call. The Home TPS simultaneously refreshes the Internet Telephone's display with the correct keymap and sends a message to the Succession Call Server indicating that an emergency call must be originated on the Internet Telephone's TN.

After the emergency call ends, the Internet Telephone remains registered to the Home TPS as a normal telephone, in case the PSAP makes a call back to the originator of the emergency call.

To prevent internetworking problems with external On Site Notification (OSN) data processing devices, OSN is not changed on the Home Call Server. If OSN is changed on the Remote Call Server, then care must be taken to not confuse external OSN data processing devices.

After the Internet Telephone is redirected to its Home Site, it is not allowed to initiate a new operation for five minutes. This prevents the user from accidentally dialing the emergency DN and hanging up. In this case, the emergency response personnel might call back to confirm the accidental call (and thus confirm that there is no emergency). If the phone is allowed to immediately resume a Virtual Office login to another site, it cannot receive the call back.

Operating parameters

The following are the minimum software and firmware requirements for the Emergency Services for Virtual Office feature:

- Internet Telephone firmware 1.5x

- Succession 3.0 software

The ESA package must be enabled on the Home and Remote Call Servers. If either site does not have ESA enabled, the E911 feature operates the same with or without the feature enabled, and calls are placed to the PSAP of the user's home location.

The resources required to originate an emergency call should be blocked from use by normal call processing, and reserved for emergency calls. Since the Emergency Services for Virtual Office feature overrides access restrictions, it is possible to have resources that cannot be normally accessed, but can be accessed for an emergency call. In particular, the outbound trunks and DSP resources should be reserved in this manner.

The Internet Telephone may have a "red sticker" indicating the number to dial for emergency calls. This is only applicable when connected to the Local Call Server. A Virtual Office user, connected to a Remote Call Server, must dial the ESDN associated with the Remote Call Server (not necessarily the number indicated on the "red sticker"). It is up to the site to come up with a policy for this situation.

If the Internet Telephone does not have the correct firmware, the Emergency Services for Virtual Office feature still redirects the Internet Telephone to the Home Site. However, the Internet Telephone appears to visually reset, which may cause the user to panic.

If the Home Call Server does not have ESA configured, ESA is not configured correctly, or the TPS does not have the correct software, then the feature operates in fallback mode.

If network problems prevent a redirected Internet Telephone from registering with the Home TPS (the Home TPS or Home Call Server might be out-of-service), the Internet Telephone goes into a server unreachable mode and resets. The Internet Telephone is out-of-service until it can connect to the Home TPS, and the data in the DRAM is lost and no emergency call originates.

If the maximum number of Internet Telephones is registered with the Home TPS, then no new telephones can register. Therefore, the Virtual Office Internet Telephone returning to the Home TPS cannot initiate an emergency call. The system should be engineered such that there are enough resources for additional Internet Telephones to register.

If the TN of the redirected Internet Telephone is used by another Virtual Office session, the Internet Telephone occupying the TN is preempted so the redirected Internet Telephone can access the TN to make an emergency call.

The IP network cannot be used to directly reach the PSAP, so the Succession Call Server must have a TDM trunk to the PSTN for each PSAP. ESA does not support more than one PSAP for a given Call Server. The solution is to have a Call Server in each PSAP jurisdiction and to route the call to the appropriate Call Server based on the location of the originator of the emergency call.

If a user dials the ESDN on an Internet Telephone while logged onto a Remote Call Server using Virtual Office, it is not appropriate to have the Remote Call Server connect the call to its PSAP. It is better for the Remote Call Server to send the Internet Telephone to its Home Call Server (simulating a Virtual Office log out) along with a flag to let the Home Call Server know the reason the phone came home is to place an ESA call.

If the user changes between headset, handset, or handsfree operation between the time the final digit for the ESDN is pressed and the call is connected to the PSAP, that change will not be recognized by the Succession Call Server. The call will be completed in all cases, but the user might not hear the PSAP if they expected the change to take effect and listened to the wrong device.

The Emergency Services for Virtual Office feature introduces error messages for the following situations:

- A remote Internet Telephone, that does not function with the feature, connects to the Succession Call Server.

- A remote Internet Telephone, after generating the previous message, dials the emergency DN and is routed to the wrong PSAP.

- A TN without an active call is preempted due to an emergency call by a remote Internet Telephone.

- A TN with an active call is preempted due to an emergency call by a remote Internet Telephone.

Feature interactions

There are no feature interactions associated with this feature.

Feature packaging

The Emergency Services for Virtual Office feature requires the following packages:

- Emergency Services Access (ESA) package 329

- Virtual Office (VO) package 382

- Virtual Office Enhancement (VOE) package 387

Feature implementation

There are no specific implementation procedures for this feature.

Feature operation

No specific operating procedures are required to use this feature.

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