SpectraLink
Wireless@work™

NetLink e340/i640 Wireless Telephone

Mitel Networks 3300 and SX-200 ICP with 5220 IP Phone emulation

Setup and Administration

Part Number: 72-1084-02
Issue D

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Table of Contents

1. About This Document

This document explains how to configure and maintain the SpectraLink e340/i640 Wireless Telephone within the Mitel Networks 3300 and SX-200 Integrated Communications Platform (ICP).

1.1 Contacting SpectraLink

SpectraLink wants you to have a successful installation. If you have questions please contact our **Customer Support Hotline at (800) 775-5330.** The Hotline is open Monday through Friday, 6:00 AM to 6:00 PM Mountain Time.

1.2 Icons and Conventions

This manual uses the following icons and conventions.

Caution! Follow these instructions carefully to avoid danger.

Note these instructions carefully.

NORM This typeface indicates a key, label, or button on SpectraLink hardware.

2. NetLink e340/i640 Wireless Telephone Overview

The NetLink e340/i640 Wireless Telephone is a mobile handset for workplace IP telephone systems. NetLink Wireless Telephones operate over an 802.11b wireless Ethernet LAN providing users a wireless voice over IP (VoIP) extension. By seamlessly integrating with the Mitel IP telephony system, NetLink Wireless Telephone users are provided with high-quality mobile voice communications throughout the workplace. The NetLink Wireless Telephone gives users the freedom to roam throughout the workplace while providing all the features and functionality of an IP desk phone.

The NetLink e340/i640 Wireless Telephone provides a wireless extension to the Mitel Networks 3300 and SX-200 ICP VoIP solutions. The NetLink Wireless Telephone supports the MiNET protocol, a proprietary protocol developed by Mitel Networks for communication between a Mitel Networks IP phone and a Mitel Networks PBX.

The NetLink Wireless Telephones reside on the wireless LAN with other wireless devices using Direct Sequence Spread Spectrum (DSSS) radio technology. The handset radio transmits and receives packets at up to 11Mb/s. The NetLink e340/i640 Wireless Telephone supports Wired Equivalent Privacy (WEP) as defined by the 802.11b specification. SpectraLink offers the product with both 40-bit and 128-bit encryption. WEP increases the security of the wireless LAN to a level similar to a wired Ethernet LAN.

IP multicast addresses are used by the NetLink i640 Wireless Telephone. This requires that multicasting be enabled on the subnet used for the NetLink Wireless Telephones, SVP Server, and Telephony Gateways.

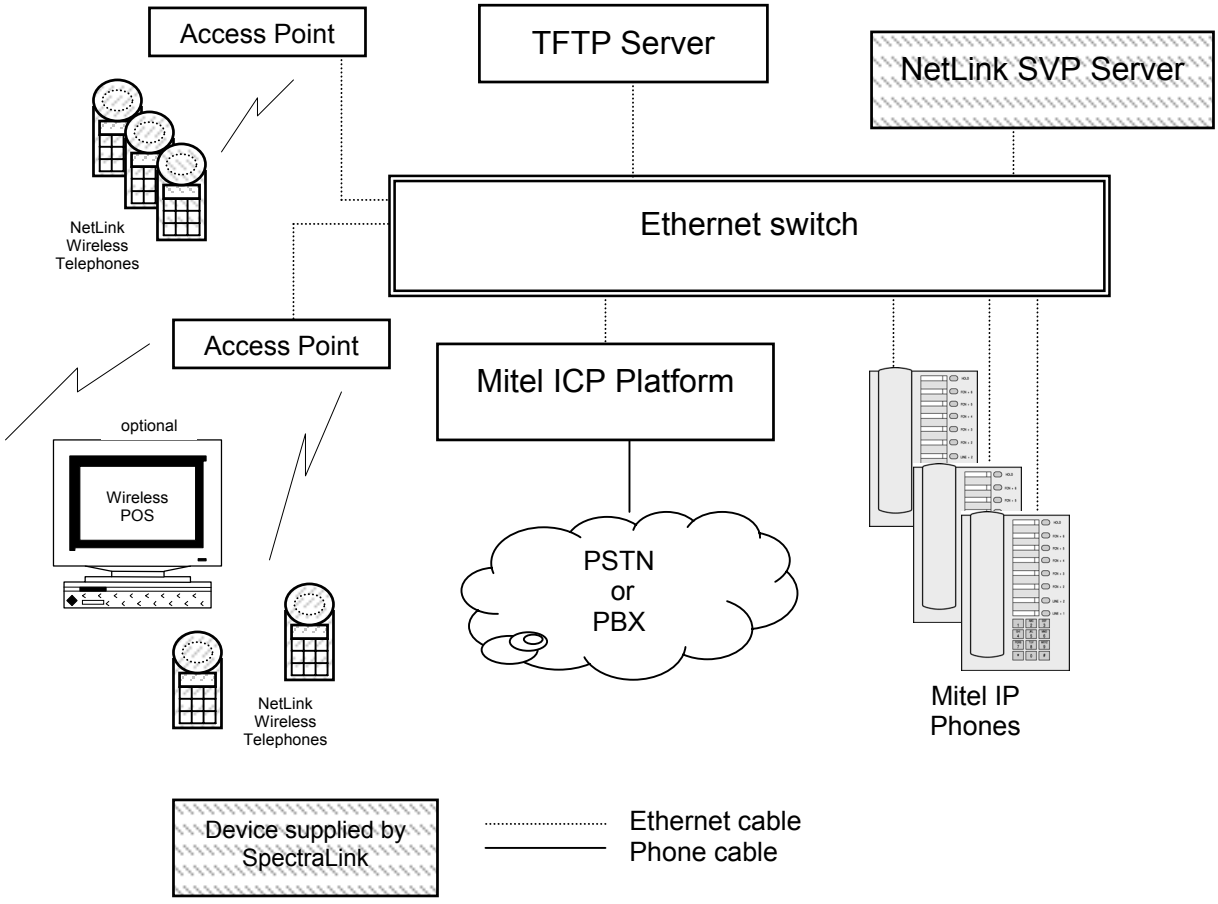
Routers are typically configured with filters to prevent multicast traffic from flowing outside of specific domains. The wireless LAN can be placed on a separate VLAN or subnet to reduce the effects of broadcast and multicast traffic from devices in other network segments.

2.1 Quick Start Guide

1. A wireless LAN must be properly configured and operational through the use of 802.11b wireless access points (APs) listed on the *NetLink Wireless Telephone Access Point Compatibility* matrix.
2. A TFTP Server must be available on the network in order to load the appropriate software into the NetLink Wireless Telephones. See the *License Management* section for detailed instructions for loading software on NetLink Wireless Telephones.
3. The supported Mitel Networks VoIP solution must be connected to your network and completely operational.
4. The NetLink SVP Server, which facilitates the QoS on the wireless LAN for the NetLink Wireless Telephones, must be on the same subnet as the NetLink Wireless Telephones and have the proper versions of software.
   Ensure you have the following versions for the SVP Server:
   173 svp100.toc
   174 zvmlinux
   175 flashfs
5. Visit http://www.spectralink.com/service/software.php to download the latest NetLink Wireless Telephone and any updates to the NetLink SVP Server software.
6. Install the correct NetLink Wireless Telephone software and any updates to the NetLink SVP Server software per Section 5.2 *Configuration Process* for the NetLink Wireless Telephones and per *NetLink SVP Server Installation, Setup and Maintenance* Section 6.1 *Software Updates* (72-0178-00) for the NetLink SVP Server. Ensure the software is properly loaded on the TFTP server.
7. Configure your NetLink Wireless Telephone to ensure that it is associated with the wireless LAN, has the appropriate software, and has the correct IP Address for the supported Mitel Networks IP telephony system. See the *License Management* section and the *NetLink e340/i640 Wireless Telephone Configuration* section for detailed instructions for loading software onto and configuring NetLink Wireless Telephones.

2.2 System Diagram

The following diagram shows the NetLink components residing on a network with the Mitel Networks IP telephony system, access points (APs), and wireless LAN Ethernet Switched Hub:



Mitel Networks IP telephony server architecture example

2.3 System Components

- **NetLink e340 Wireless Telephone** – The NetLink e340 Wireless Telephone is a lightweight, durable handset specifically designed for mobile workplace use within a facility using the supported Mitel Networks IP telephony system and 802.11b APs in a wireless LAN.
- **NetLink i640 Wireless Telephone** – The NetLink i640 Wireless Telephone offers a durable design with push-to-talk functionality.

  Wireless Telephone functionality is provided by emulating the Mitel Networks 5220 Internet Telephone. Among other features, the Wireless Telephone can receive calls directly, receive transferred calls, transfer calls to other extensions, and make outside and long distance calls (subject to the restrictions applied in your facility.) The Wireless Telephones are to be used on-premises; they are not cellular or satellite phones.

  NetLink e340/i640 Wireless Telephones use Direct Sequence Spread Spectrum radio technology (DSSS) to transmit audio packets over wireless LAN APs that support SpectraLink Voice Priority (SVP).
- **NetLink SVP Server** – SpectraLink Voice Priority (SVP) is the SpectraLink quality of service (QoS) mechanism that is implemented in the Wireless Telephone and AP to enhance voice quality over the wireless network. SVP gives preference to voice packets over data packets on the wireless medium, increasing the probability that all voice packets are transmitted efficiently and with minimum or no delay. SVP is fully compatible with the IEEE 802.11b standards.

  The NetLink SVP Server is an Ethernet LAN appliance that works with the AP to provide QoS on the wireless LAN. All MiNET packets to and from the NetLink e340/i640 Wireless Telephones pass through the NetLink SVP Server and are encapsulated for prioritization as they are routed to and from the supported Mitel Networks VoIP solution or other Wireless Telephone.

  SVP is required for QoS because the current IEEE 802.11b wireless LAN standard provides no mechanism for differentiating audio packets from data packets. This standard is undergoing revision to version 802.11e to provide all the functionality of SVP in an industry standard, thus ensuring high-quality voice in a mixed client environment. Once 802.11e is ratified, SpectraLink and its 802.11b technology partners will adopt the new specification.
- **Mitel Networks IP System** - Mitel Networks 3300 or SX-200 ICP VoIP solution.
- **Access Points** – supplied by third party vendors, access points provide the connection between the wired Ethernet LAN and the wireless (802.11b) LAN. Access points must be positioned in all areas where NetLink Wireless Telephones will be used. The number and placement of access points will affect the coverage area and capacity of the wireless system. Typically, the requirements for use of NetLink e340/i640 Wireless Telephones are similar to that of wireless data devices.

Access points must utilize SpectraLink Voice Priority (SVP). Contact SpectraLink, or a certified SpectraLink distributor, for information about APs that support SVP.

- **Ethernet Switch** – interconnects multiple network devices, including the NetLink SVP Server, the supported Mitel Networks IP telephony system, Mitel Networks IP Phones and the access points. Ethernet switches provide the highest performance networks, which can handle combined voice and data traffic, and are required when using the NetLink e340/i640 Wireless Telephones.

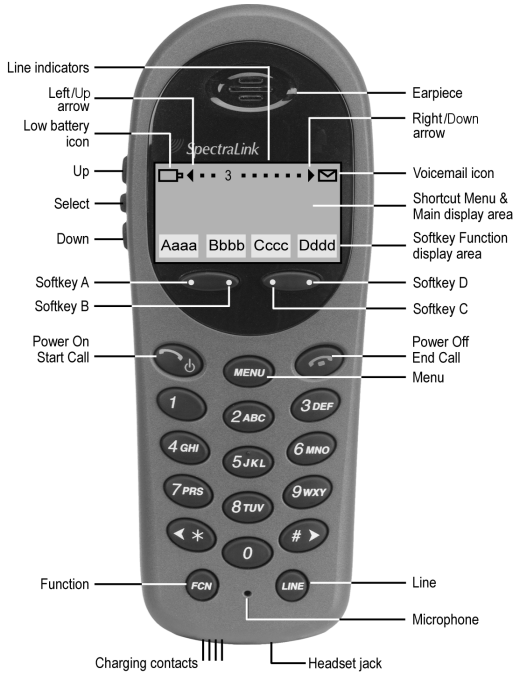
  Although a single Ethernet switch network is recommended, the Wireless Telephones and the NetLink SVP Server can operate in larger, more complex networks, including networks with multiple Ethernet switches, routers, VLANs, and/or multiple subnets, as long as the SVP Server and access points are on the same subnet. However, in such networks, it is possible for the quality of service (QoS) features of the NetLink SVP Server to be compromised, and voice quality may suffer. Any network that consists of more than a single Ethernet switch should be thoroughly tested to ensure any quality issues are detected.

  Note that the NetLink e340/i640 Wireless Telephones cannot actively roam from one subnet to another. If routers and multiple subnets are in use, the NetLink Wireless Telephones must only use access points attached to a single subnet, or be powered off and back on to switch to a different subnet.

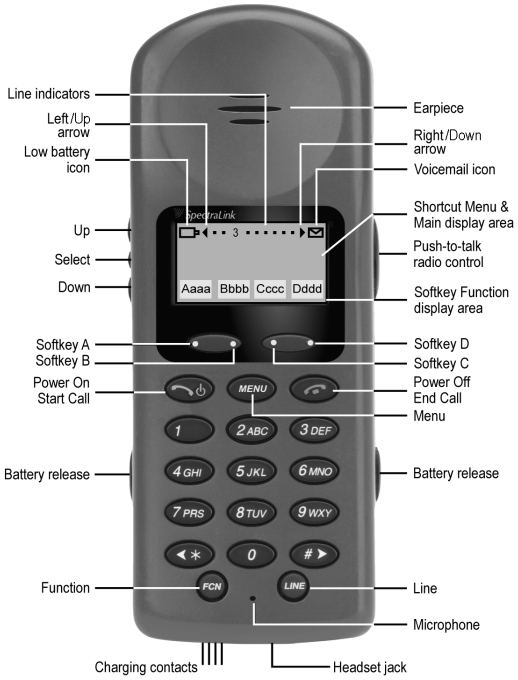
- **Mitel Networks IP Phone** – The wired LAN desksets provided by Mitel Networks for use with the supported Mitel Networks IP telephony system.

- **TFTP Server** – Required in the system to distribute software to the Wireless Telephones. May be on a different subnet than the supported Mitel Networks IP telephony device(s) and APs.

3. The NetLink e340/i640 Wireless Telephone



NetLink e340 Wireless Telephone

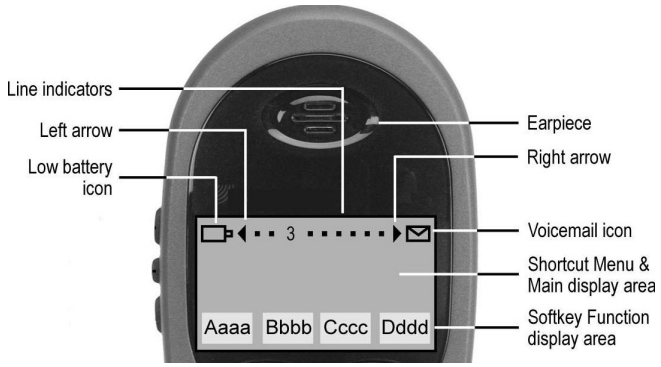


NetLink i640 Wireless Telephone

3.1 Specifications

Radio frequency	2.4000 – 2.4835 GHz
Transmission type	Direct Sequence Spread Spectrum (DSSS)
Transmit data rate	up to 11 Mb/s
Radio QoS	SpectraLink Voice Priority (SVP)
Wireless security	Wired Equivalent Privacy (WEP), 40-bit and 128-bit
FCC certification	Part 15.247
Management	DHCP, TFTP
Voice encoding	G.711, G.729a/ab
VoIP Protocols	MiNET
Transmit power	100 mW peak, < 10 mW average
Display	Pixel-based (up to 4-line x 18-character) alphanumeric, plus line and status indicators
e340 Dimensions	5.5” x 2.0” x 0.9” (14.0 x 5.1 x 2.3 cm)
i640 Dimensions	5.9” x 2.2” x 1.0” (15.0 x 5.6 x 2.5 cm)
e340 Weight	4.2 ounces (119.0 g)
i640 Weight	6.0 ounces (170.1 g)
Battery capacity	4 hours talk time, 80 hours standby

3.2 The Display



Alphanumeric

Display information provided by the supported Mitel Networks VoIP solution when the Wireless Telephone is off-hook will be passed directly to the Wireless Telephone display. The Wireless Telephone will display up to 18 characters of each line. Certain characters may be used by the supported Mitel IP PBX solution that are not implemented in the Wireless Telephone, such as definable or special characters.

Press the **FCN** key while off hook to scroll through features and emulated keys. Press the **LINE** key while off hook to scroll through the line/memory keys.

Ringing and Tones

The ringing types are programmed by the Wireless Telephone user into the Wireless Telephone and are not accessible or changeable by the supported Mitel Networks VoIP solution. Whenever possible the audible and vibrating ringer on the Wireless Telephone will follow the MiNET cadence commands provided by the supported Mitel Networks VoIP solution.

Audio Features

Speakerphone features such as paging, hands-free mode and voice announce are not available on the Wireless Telephone. The telephony switch should not be programmed to support such features on the Wireless Telephone.

Line Indicators

The line indicators on the Wireless Telephone will convert to a solid or flashing number to mimic the icons next to Line keys on the Mitel Networks 5220. The text that appears next to the line keys on the 5220 IP Phone is accessed on the Wireless Telephone by pressing the **LINE** key.

3.3 Startup Sequence

The Wireless Telephone goes through an initialization sequence at startup that follows the following pattern:

Icon	The icon(s) shown in bold turns off when:
123456789	The Wireless Telephone has located and authenticated and associated with at least one AP, and is proceeding to bring up higher-layer networking functions.
12345678	The Wireless Telephone is either configured for Static IP, or if configured for DHCP the DHCP discovery process has started.
1234567	If DHCP is configured, a DHCP response was received which contains a good DNS server configuration.
12345	Note: Only valid on non-SRP protocol. Indicates one of the following: Static IP configuration, or SVP Server address found in DHCP response, or SVP Server address found via DNS lookup.
1234	All networking functions are complete (notably, DHCP) and the Wireless Telephone is proceeding with establishing the SRP link to the SVP Server.
123	The SRP link is established, all network stack initialization is complete, proceeding with application-specific initialization.
12	The link between the Wireless Telephone and the PBX is established.
1	The Wireless Telephone has registered to the PBX.
1 Please Enter PIN	Requested if PIN had not previously been entered, if PIN has been cleared, or if MAC address not entered in the DN con-figuration table on the PBX. The PIN may be up to 18 characters. The first few are a secret number defined at the PBX, the rest are the extension of this handset. User must enter a valid PIN number and press the **Send** softkey. Alternately, the handset may be configured in the DN configuration table on the PBX. Note: there is no timeout and the user must reboot if an invalid PIN is entered.
1	The Wireless Telephone has received a definition string for each of the 14 programmable buttons. If the handset hangs up at this point, there has been an undetected error in the retrieval process and the handset will need to be rebooted.
(no icons) **EXT. XXXXX**	Initialization is complete. The Wireless Telephone is in standby mode ready to receive and place calls.

3.4 Wireless Telephone Modes

Standby (on-hook)

In the standby mode the Wireless Telephone is waiting for an incoming call or for the user to place an outgoing call. The extension number is shown on the display and there is no dial tone. In this mode, the Wireless Telephone is conserving battery power and wireless LAN bandwidth.

When an incoming call occurs the handset will ring loudly until the call is answered or the **End Call** key is pressed to silence the ringing.

Active (off-hook)

To place a call, press the **Start Call** key. This transitions the Wireless Telephone to active off-hook mode. There is a dial tone, the Wireless Telephone is in communication with the PBX, and the display shows information as it is received from the PBX. The user may place a call or press the **FCN** or **LINE** key to access operations.

The Wireless Telephone is also in the active mode when a call is received.

If an incoming call occurs the handset will play the second line ringing sound until the call is answered, the caller hangs up, or the call transfers to voice mail. If **End Call** is pressed, the first call is terminated and the handset reverts to a full ring.

The active modes utilize the most bandwidth and battery power. To conserve these resources, return the Wireless Telephone to the standby mode when a call is completed by pressing the **End Call** key.

Active (on-hook)

To transition from the standby mode to the active on-hook mode, press the **MENU** key. In this mode, the handset displays the text display as seen on an idle 5220 IP phone, usually the date and time. There is no dial tone. The user may press the **FCN** or **LINE** key to access all operations available from the active off-hook mode.

When an incoming call occurs the handset will ring loudly until the call is answered or the **End Call** key is pressed. If an active key is pressed, the ring will convert to the second-line ringing sound.

If there is no activity for 45 seconds, to conserve bandwidth and battery power the handset will return to the standby mode.

3.5 Wireless Telephone Displays

Status display Displays information from the PBX in one line of text and displays available softkeys on the second line. **Muted** is displayed when local muting is activated. The PBX text may be truncated as the 5220 IP phone has 20 characters and the Wireless Telephone display area is 18 characters.

LINE display Pressing the **LINE** key from the active mode displays a list of line appearances extracted from the programmable keys list. The line appearances are also mapped to corresponding line icons. If more than nine lines are mapped to a handset, the remaining line appearances will show up on the **FCN** list.

Menu display Pressing the **MENU** key from the active state displays the descriptive text of four softkeys. The first three are defined by the PBX. The fourth key is normally the Superkey, but changes to HOLD when audio is flowing and SEND when a PIN number is being set.

FCN display Pressing the **FCN** key from the active state displays the list of six predefined fixed function keys that emulate the fixed keys on the 5220 IP phone. Additionally, up to 13 programmable keys that are not on the **LINE** list may be displayed and up to 12 keys defined by an OAI server. The programmable key items that appear on this list each have a state indicator in the second column of the display that shows a plus sign if the associated feature is active. This second column is blank if the associated feature is not active. The plus sign emulates a lit or blinking LED on a deskset.

4. NetLink e340/i640 Wireless Telephone Configuration

The NetLink e340/i640 Wireless Telephones should be provisioned in the supported Mitel Networks VoIP solution in the same manner as the Mitel Networks 5220 Internet Telephones. Each Wireless Telephone may be configured for site-specific requirements by opening the Admin menu and selecting options or entering specific information. Any settings entered in the Admin menu must conform to system settings. Only the Wireless Telephone being configured is affected by the Admin menu settings.

The Wireless Telephone user may select several usability options from the Standby menu, described below in the *User-defined Preferences* section. This information is also provided in the end-user manual.

4.1 The Admin Menu

The Admin Menu contains configuration options that are stored locally (on each Wireless Telephone). Every Wireless Telephone is independent and if the default settings are not desired, the admin options must be set in each Wireless Telephone requiring different settings.

Opening the Admin Menu

1. With the Wireless Telephone powered OFF, simultaneously press and hold the **Power On** and **Power Off** keys.
2. Release the **Power On** key, wait for a single beep, then release the **Power Off** key. The Admin Menu displays.

If an admin password has been set, the display will require its entry before opening the Admin Menu. If no password is set, the display will proceed directly into the Admin Menu.

Entering and editing Admin Menu options

An asterisk (*) next to an option indicates that it is selected. The default settings are shown in the table below with an * prior to the option. Use the **Up**, **Down**, and **Select** side buttons and the softkeys to navigate and select:

Up/**Down** buttons:	display previous/next menu item.
Select button:	selects the menu item or option.
OK softkey	selects the menu item or option.
Save softkey:	saves the entry.
Bksp softkey:	backspaces to allow editing of entry.
Cncl softkey:	cancels edit and returns to previous menu level.
Up softkey:	returns to previous menu level.
Exit softkey:	exits the menu (at the top level).
End Call key:	exits to standby state (from any level)

Alphanumeric String Entry

1. Press the first digit/letter. The digit displays. Press the key again to scroll through the letters associated with that key.

   Example: if you press 2 repeatedly, you will see 2, A, B, and C, a, b, and c.

   The following table shows which key will allow you to enter non-numeric characters or other characters not represented on the keypad.

To Enter	Press
. - _ ! # $ % & ‘ ( ) , : ; / \ = @ ~	1
Space	0
Q,q	7
Z,z	9

2. When the correct entry displays, press Right Arrow to move on to the next character. Repeat for each digit/letter of the entry. To erase, press the Left Arrow or **Bksp** softkey to erase the previous character.
3. Press the **Save** softkey to save the entry and return to the menu.
   Press the **Cncl** softkey to abort and return to the menu without saving any changes.

The following table lists the Admin Menu items. Detailed descriptions of each item appear below the table.

Admin Menu Items	**2nd Level**	**3rd Level**	**4th Level**
IP Address	*Use DHCP		
	Static IP	Phone IP TFTP Server IP Default Gateway Subnet Mask SVP IP Addr RTC IP Addr OAI Server IP	
ESS ID	Static Entry		
	*Learn Once		
	Learn Always		
License Management	Set Current		
Restore Defaults			
Site Survey Mode			
Regulatory Domain			
Security	*None		
	WEP	Authentication	Open System Shared Key
		WEP On/Off	
		Key Information	Default Key Key Length Key 1-4
		Rotation Secret	
	Cisco FSR	Username Password	
Clear PIN number			
5220 Emulation	Disable 5220 Enable 5220		
OAI on/off	Enable OAI Disable OAI		
Admin PW			

IP Address

There are two modes in which the Wireless Telephone can operate: DHCP enabled or Static IP. Select the mode for operation from the IP Address menu:

> *** Use DHCP**: will use Dynamic Host Configuration Protocol to assign an IP Address each time the Wireless Telephone is turned on. If DHCP is enabled, the Wireless Telephone also receives all other IP Address configurations from the DHCP server.
>
> **Static IP**: allows you to manually set a fixed IP Address. If selected, the Wireless Telephone will prompt for the IP Addresses of each configurable network component. When entering addresses, enter the digits only, including leading zeroes. No periods are required.

Regardless of the mode in which the Wireless Telephone is operating, the following components must be configured:

Phone IP – the IP Address of the Wireless Telephone. This is automatically assigned if DHCP is used. If using Static IP configuration, you must obtain a unique IP Address for each phone from your network administrator.

SVP Server IP – the IP Address of the NetLink SVP Server. If using Static IP configuration, this is simply the IP Address of the NetLink SVP Server. Note that the NetLink SVP Server must be statically configured to have a permanent IP Address. If DHCP is being used, the Wireless Telephone will try the following, in order: the DHCP option 151, then a DNS lookup of "SLNKSVP2" if the DHCP options 6 (DNS Server) and 15 (Domain Name) are configured.

RTC IP Addr – the IP Address of the primary Mitel Networks device. If using Static IP configuration, this is simply the IP Address of the device. If DHCP is being used, the Wireless Telephone will try to obtain the device's IP Address and port information using the following DHCP options: 129.

The following components may be configured optionally:

TFTP Server IP – the IP Address of a TFTP server on your network which holds software images for updating the Wireless Telephones. If this feature is configured (not set to 0.0.0.0 or 255.255.255.255) either via Static IP configuration or using DHCP option 66 (TFTP Server), or the Boot server/next server (siaddr) field, the Wireless Telephone will check for newer software each time it is powered on or comes back into range of your network. This check takes only a second and ensures that all Wireless Telephones in your network are kept up-to-date with the same version of software.

OAI Server IP – the IP Address of the SpectraLink OAI Gateway (if applicable). If using Static IP configuration, this is simply the IP Address of the SpectraLink OAI Gateway. If DHCP is being used, the Wireless Telephone will try the DHCP option 152.

Default Gateway and Subnet Mask – used to identify subnets, when using a complex network which includes routers. Both of these must be configured (not set to 0.0.0.0 or 255.255.255.255) for the Wireless Telephone to contact any network components on a different subnet. They can be set using either Static IP configuration or via DHCP options 3 (Default Gateway) and 1 (Subnet Mask) respectively. Contact your network

administrator for the proper settings for your network. Note that the Wireless Telephones cannot "roam" across subnets, since they cannot change their IP Address while operational. Ensure that all your access points are attached to the same subnet for proper operation. The Wireless Telephone can change subnets if DHCP is enabled, and the Wireless Telephone is powered off then back on when within range of access points on the new subnet.

ESSID

Select the option that will enable the Wireless Telephone to acquire APs with the correct ESSID (Extended Service Set ID, aka SSID) each time it is turned on.

Note about Automatic Learn options: Broadcast ESSID must be enabled in the access points for ESSID learning to function. Refer to the *Configuration Note* for your access point or call your access point vendor for specifics. Overlapping wireless systems complicate the use of ESSID learning as the Wireless Telephone in an overlapping area could receive conflicting signals. If this is the situation at your site, use Static Entry or Learn Once in an area without overlapping ESSIDs.

*** Learn Once**: allows the Wireless Telephone to scan all ESSIDs for a DHCP server and/or TFTP server. Once either is found, the Wireless Telephone retains the ESSID from whichever access point it associates with at that point. When overlapping wireless systems exist, the Learn Once feature allows the Wireless Telephone to use only the ESSID established at first learn at all subsequent power ons. This ESSID is retained by the Wireless Telephone until the ESSID option is reselected.

Learn Always: allows the Wireless Telephone to automatically learn the ESSID at each power on or loss of contact with the wireless LAN (out of range). This may be useful if the Wireless Telephone will be used at more than one site.

Static Entry: If your access points do not accept broadcast ESSID or if there are overlapping wireless systems in use at the site, enter the correct ESSID manually.

License Management

License Management lets you select the VoIP protocol that your site is licensed to download and run. The MiNET protocol to use for the NetLink e340/i640 Wireless Telephones is **014**. Any other protocol will cause the Wireless Telephone to malfunction. After selecting the correct protocol for your site, you should upgrade the software for the Wireless Telephones. See the *Upgrading Wireless Telephones* section for more information.

Restore Defaults

The Restore Defaults option will set all user and administrative parameters to their factory defaults.

Site Survey Mode

Site Survey Mode is used to check the signal strength from access points. When you select Site Survey Mode, the Wireless Telephone will remain in this mode until it is

powered off. See the *Certifying the NetLink e340/i640 Wireless Telephone* section for more information on this mode.

Regulatory Domain

The Regulatory Domain will default to North America on the Wireless Telephone display. FCC requirements dictate that the menu for changing the domain be available by password, which in our case is the **LINE** key. To change the domain, press **LINE** and then enter the digits that represent the site's domain. Note that both digits must be entered.

01 - North America

02 - Europe (except Spain and France); Japan (channels 1-13)

04 - Spain

05 – France

Note: as of this writing, Spain and France are adopting the general European Regulatory rules. Check with your wireless LAN administrator or supplier for which domain to enter in these countries.

Security

***NONE** disables any 802.11 encryption or security authentication mechanisms.

WEP (Wired Equivalent Privacy) is a wireless encryption protocol that encrypts data frames on the wireless medium allowing for greater security in the wireless network. If WEP/Encryption is required at this site, you must configure each Wireless Telephone to correspond with the encryption protocol set up in the access points. Select the entries from the options below to enable the Wireless Telephone to acquire the system.

Set each of these options to match exactly the settings in your APs.

Encryption codes display as they are entered. For security reasons codes will not display when a user returns to the Admin menu, Encryption options.

Note that WEP may be set to "optional" at the AP if there are wireless devices in use that do not have WEP capability. All wireless devices must be upgraded to WEP capability for a fully secured WEP environment.

Authentication

Select either **Open System** or **Shared Key**.

WEP On/Off

Select either **WEP Off** or **WEP On**.

Key Information

Press the Right Arrow key to scroll through the options:

Default Key: Enter the key # specified for use by the Wireless Telephones. This will be 1 through 4.

Key Length: Select either **40-bit** or **128-bit** depending on the key length specified for use at this location.

Key 1-4: Scroll to the key option that corresponds to the **Default Key** that was entered above. Enter the encryption key as a sequence of hexadecimal characters. (Use the **2** and **3** keys to access hexadecimal digits A-F, use the Right Arrow key to advance to the next digit, and the Left Arrow key to backspace.) For 40-bit keys you will need to enter 10 digits, for 128-bit keys you will need to enter 26 digits. The display will scroll as needed.

Rotation Secret: This is used for proprietary WEP key rotation. Refer to your custom document if this feature is supported in your system.

Cisco FSR (Fast Secure Roaming) In order to provide the highest level of security without compromising voice quality on Cisco Aironet wireless LAN access points, SpectraLink and Cisco Systems have cooperated to implement the Fast Secure Roaming mechanism. FSR is designed to minimize call interruptions for NetLink Wireless Telephone users as they roam throughout a facility. Existing Aironet 350, 1100, and 1200 APs may require a firmware upgrade to support FSR. Cisco FSR requires advanced configuration of the Cisco access points in your site. See your Cisco representative for detailed documentation on configuring your access points and other required security services on your wired network. To configure Cisco FSR in your NetLink Wireless Telephone, you must enter a Radius Server username and password into each handset.

Username: Enter a username that matches an entry on your Radius server. Usernames are alphanumeric strings, and can be entered using the alphanumeric string entry technique.

Password: Enter the password that corresponds to this Username.

Clear PIN Number

The PIN number is saved in the Wireless Telephone's local memory. If it is necessary to change the PIN number assigned to this Wireless Telephone, clear the existing number through this Admin menu option and power cycle the Wireless Telephone. The PBX will request a PIN number when the handset is powered on, just as it does with the 5220 IP Phone. Enter the PIN number and press the **Save** softkey. The new PIN number is saved in the Wireless Telephone's local memory.

5220 Emulation

Disable 5220 is the default and should be used if configuring for the SX-200 ICP or the 3300 ICP is using software version 5.1 or greater. With this revision, the Mitel Networks system became capable of recognizing NetLink Wireless Telephones. If the 3300 ICP software version in use is below 5.1, select **Enable 5220** to allow Mitel Networks to recognize the NetLink Wireless Telephone as a 5220 IP Phone.

OAI On/Off

SpectraLink's Open Application Interface (OAI) enables third-party computer applications to display alphanumeric messages on the Wireless Telephone display and take input from the Wireless Telephone keypad. Refer to the *Open Application Interface (OAI) Specification (Version 1.2)* documentation for information about administering the OAI Gateway and the services it can provide.

If you have an OAI Gateway installed in your system, OAI may be optionally enabled in each Wireless Telephone. You may select whether the Wireless Telephone should attempt to connect to the SpectraLink OAI Gateway by choosing either the Enable or Disable options in this menu.

If OAI is enabled, and an OAI IP Address is available to the telephone (either via DHCP or Static IP configuration), the telephone will communicate with the OAI Server at power on, and periodically while it is powered on. If you don't have a SpectraLink OAI Gateway installed at your site, you should disable the OAI feature to preserve network bandwidth and battery life.

Admin PW

The Admin PW (password) controls access to the administration functions in the Admin Menu. The password must be set in each Wireless Telephone for which controlled access is desired. Wireless Telephones are shipped without any Admin Menu password.

If you exit with no entry, the password is erased and the display will not require it before displaying the Admin Menu.

4.2 User-defined Preferences

The following user-defined preferences are also covered in the NetLink e340/i640 Wireless Telephone user guide. The system administrator can refer to this list for more information about customizing Wireless Telephone settings.

To configure the following options, the Wireless Telephone must acquire the system (no error message may display) and be at the extension display. This is the standby state. While in the standby state, press and hold **FCN** briefly to open the user options menu. Use the following keys to display and select options:

Up/Down buttons: display previous/next menu item.
Select button: selects the menu item or option.
OK softkey selects the menu item or option.
Save softkey: saves the entry.
Bksp softkey: backspaces to allow editing of entry.
Cncl softkey: cancels edit and returns to previous menu level.
Up softkey: returns to previous menu level.
Exit softkey: exits the menu (at the top level).
End Call key: exits to standby state (from any level)

Standby menu item	2nd Level	3rd Level
Ring Type	Telephone ring	Normal Ring Vibrate Ring Vib/Norm Ring
	Auxiliary ring 1	“
	Auxiliary ring 2	“
Noise Mode	Normal High Severe	
Alias IP Addr		
Current IP Addr		
Extension		
Mitel options	Current RTC IP Current TCP Port Current RTP Port	
Push-to-talk	Channel	1-8
	Enable/Disable	Enable Disable

Ring Type Select **Ring Type** then **Telephone Ring** to change the standard ring used for normal operation. From the **Telephone Ring** menu, select either **Normal Ring** (an audible alert), **Vibrate Ring** or **Vib/Norm Ring** (vibrate for five seconds and then audible alert for subsequent rings). The **Auxiliary Ring** modes are reserved for future use. The ring type currently in use displays with an asterisk (*).

Noise Mode Select **Noise Mode** to adjust the Wireless Telephone for background noise. Select **Normal**: for most office environments; **High**: for moderate background noise; or **Severe**: for extremely noisy conditions. Use of the non-Normal modes is not recommended unless you are in a loud environment or you may find it difficult to be heard on your Wireless Telephone.

Alias IP Addr This option displays the IP address currently used for this Wireless Telephone by the SVP Server for communications with the call server.

Current IP Addr This option displays the IP address currently assigned to the Wireless Telephone. The IP address is not set here; it is merely displayed and may not be changed.

Extension This option allows you to enter the user extension for this Wireless Telephone. This number is for display purposes only; entering it does not assign the extension in the host telephone system.

Mitel options This option displays the ports being utilized for receiving data at the Wireless Telephone.

Push-to-talk This option displays the menu for the two way radio feature in the NetLink i640 Wireless Telephone. The **Channel** option allows you to select a channel 1-8 to send and receive radio messages. The **Enable/Disable** option allows you to enable or disable the radio feature. See the NetLink i640 Wireless Telephone end-user document for more information about push-to-talk.

(Additional options may be present. Contact your system administrator for information.)

5. License Management

The NetLink e340/i640 Wireless Telephone system supports a number of different IP protocol integrations. All NetLink e340/i640 series Wireless Telephones are shipped from SpectraLink with a generic software load that allows them to associate to a wireless LAN and download their functional software from a TFTP server. **The Wireless Telephones will not function properly without downloading appropriate software.**

The following details the process to properly configure NetLink e340/i640 Wireless Telephones and download software via over-the-air file transfer.

5.1 Requirements

- A wireless LAN must be properly configured and operational through the use of 802.11b wireless access points.
- The supported Mitel Networks IP telephony system must also be connected to your network and completely operational.
- A TFTP Server must be available on the network in order to load the appropriate software into the Wireless Telephones.
- The SVP Server is installed and properly configured.
- Finally, ensure that the Battery Pack on the Wireless Telephone is fully charged.

5.2 Configuration Process

1. Download the latest NetLink e340/i640 Wireless Telephone IP software from http://www.spectralink.com/service/software.php
2. Load the latest version of the NetLink e340/i640 Wireless Telephone MiNET code and place it on the TFTP Server and ensure the TFTP Server is started. The three files that are needed must be named
   slnk_cfg.cfg
   pd11mtc.bin
   pi110001.bin.
3. If statically assigning IP Addresses, ensure that the Phone IP Address, TFTP Server IP, Subnet Mask, and Default Gateway information are accurate in the Admin Menu. If using a DHCP Server, ensure that the DHCP options are set. See the *NetLink e340/i640 Wireless Telephone Configuration* section for detailed configuration instructions.
4. Ensure the Wireless Telephone has properly configured ESSID and Reg Domain Information within the Admin Menu. If you are accepting broadcast ESSIDs at your access points, the handset will automatically learn the ESSID information when powering on. See the *NetLink e340/i640 Wireless Telephone Configuration* section for detailed configuration instructions.

5. Using the Admin Menu on the Wireless Telephone, ensure the License Management menu option is set to 014. This ensures the handset will check for the proper MiNET files each time it powers on. See the *NetLink e340/i640 Wireless Telephone Configuration* section for detailed configuration instructions.
6. Power cycle the Wireless Telephone.
7. The MiNET code will now download to the handset. The status bar will increment fully across the display for each function that is being performed in the download process. Upon completion of the update process, the handset will re-boot with the new firmware.
8. If the Wireless Telephone is statically configured, you may now enter the SVP IP address and RTC address as detailed in the *NetLink e340/i640 Wireless Telephone Configuration* section above.
9. Register the Wireless Telephone with the supported Mitel Networks VoIP solution as if it were a Mitel Networks 5220 IP Phone and properly label the handset with the appropriate extension.

For future software upgrades, simply update the files that are stored on the TFTP Server. Each time the Wireless Telephone is powered on, it will check with the TFTP Server to ensure it has the proper software version.

6. Mitel Networks VoIP Integration Factors

This section describes the mapping between the emulated Mitel Networks 5220 IP Phone and the NetLink e340/i640 Wireless Telephone.

Voice Messaging Access

Voicemail access is obtained through the Message key which is assigned on the Wireless Telephone to **FCN** + **3**.

CODECs

The NetLink e340/i640 Wireless Telephone is compatible with the G.711 and G.729a/ab CODECs. There is no setting required on the Wireless Telephone.

DHCP

Dynamic Host Configuration Protocol (DHCP) is a standardized protocol that enables clients to be dynamically assigned with various configuration parameters, such as an IP Address, subnet mask, default gateway, and other critical network configuration information. DHCP servers centrally manage such configuration data, and are configured by network administrators with settings that are appropriate for a given network environment. The Wireless Telephone will search for Mitel Networks server configuration in the vendor specific and site-specific options listed in the table below. The Wireless Telephone will use the following DHCP options if DHCP use is enabled:

Option	Meaning
1	Subnet Mask
3	Default Gateway
6	DNS Server
15	Domain Name
66	TFTP Server
151	NetLink SVP Server
152	SpectraLink OAI Gateway
128	Mitel TFTP Server address (not currently used by Wireless Telephone)
129	Mitel PBX RTC IP address
130	String containing “MITEL IP PHONE”
siaddr	Boot server or next server

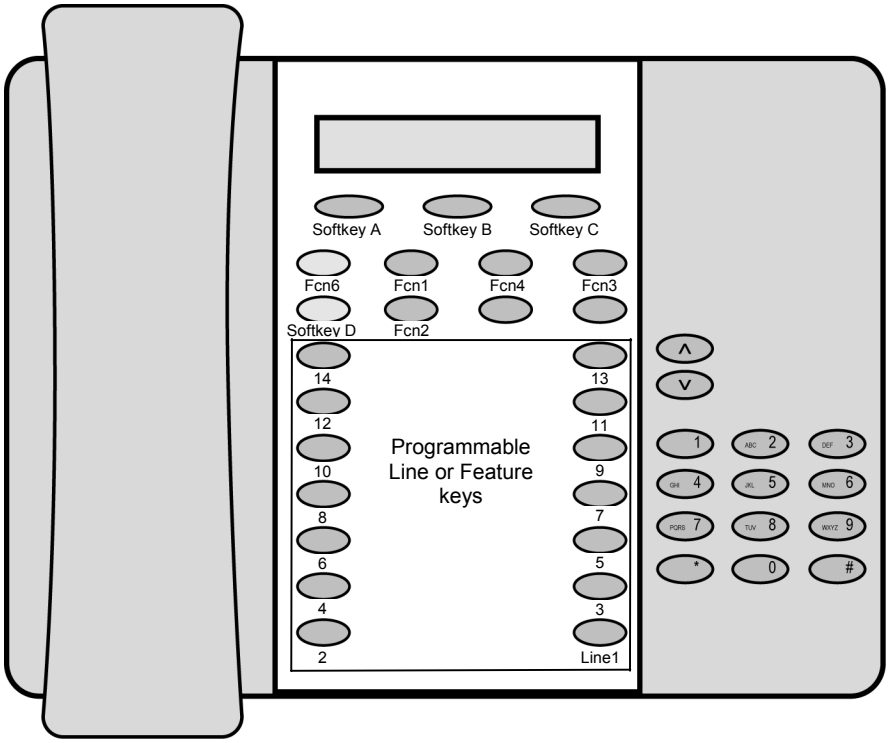
TFTP

The Wireless Telephone uses TFTP to update the Wireless Telephone software over the 802.11b wireless LAN.

DNS

Domain Name System (DNS), an industry-standard protocol, locates computers on an IP-based network. IP networks rely on number-based addresses to move information on the network. However, users are better at remembering friendly names than number-based addresses, so, it is necessary to translate user-friendly names into addresses that the network can recognize. The Wireless Telephone will use DNS to automatically translate names into IP Addresses for these components: TFTP Server and the NetLink SVP Server.

7. Feature Programming



The button mapping from the Mitel Networks 5220 IP Phone to the NetLink Wireless Telephone is designed to preserve nearly all of the functionality of the 5220 IP Phone within a small, mobile device. All telephone functions and messaging features are supported if possible. Speakerphone functions are not supported.

The Wireless Telephone has four softkeys to the 5220's three softkeys. The last or rightmost softkey on the Wireless Telephone, known as Softkey D, emulates the Hold key on the 5220. The other three softkeys emulate the functions of the three softkeys of the 5220.

The Wireless Telephone uses "shortcut keys" to emulate the feature keys on the 5220. Pressing **LINE**, **FCN**, or **MENU** plus a shortcut key will activate the assigned line appearance or feature.

Feature key number 1 on the 5220 is the Line 1 key in the Wireless Telephone. All other feature keys may be programmed to either line appearances or features. When the Wireless Telephone becomes active, it requests a label for each of the feature keys from the PBX which tells it whether the feature key is assigned to a feature or to a line appearance. If the key is assigned to a line appearance, the Wireless Telephone lists the line extension plus any shortcut key on the Line Appearance display, visible when the **LINE** key is pressed. If the key is assigned to a feature, the Wireless Telephone lists it and any shortcut key on the Feature display, visible when the **FCN** key is pressed. Each line or feature appears in feature key order. Its shortcut key is determined by this order. OAI programming will override any shortcut keys assigned by the Wireless Telephone.

7.1 Feature Assignment

The table below shows how the keys of the 5220 IP Phone are mapped to key sequences on the Wireless Telephone.

5220 key	**Feature**	**Wireless Telephone Shortcut & Key Sequence**
Trans/Conf	Transfer or conference	FCN + 1
Cancel	Cancel	FCN + 2
Message	Voicemail	FCN + 3
Redial	Redial	FCN + 4
	Mute/Unmute	FCN + 5
Programmable Feature Key 2-14 Programmable to either line appearances or features.	If a feature, the feature name appears on the Feature menu with a shortcut key[1] in the order of assignment to a feature key.	FCN + 7 8 9 * 0 **#**
Feature Key #1	Line appearance	Line + 1
	If a line, the line extension appears on the Line Appearance list, with a line number that corresponds to the order of assignment to a feature key.	Line + 2 3 4 5 6 7 8 9
Softkey1	Phonebook (Phbk)	Softkey A
Softkey2	Programmable	Softkey B
Softkey3	Programmable	Softkey C
Superkey Hold (in call)	Superkey Hold	FCN + 6 (Superkey) Softkey D (toggles between Superkey and Hold)

If an Open Application Interface (OAI) is operational, a function key sequence will be assigned in the OAI configuration and will override any function sequence established in the PBX.

[1] Note: There may be more features programmed than there are available shortcut keys. In this situation, the feature may be activated by using the Up, Down, Select buttons on the side of the Wireless Telephone.

7.2 Feature Access

In its standby state, the Wireless Telephone displays the extension assigned to this Wireless Telephone. The active state is initiated by pressing either the **Start Call** key or the **MENU** key. When the active state is initiated, the Wireless Telephone contacts the PBX and displays the data provided – the time, date, default line icon, any voicemail icon, and softkey and feature key labels. If the **Start Call** key has been pressed, the Wireless Telephone is off-hook and there is a dial tone. If the **MENU** key is pressed, there is no dial tone; pressing **MENU** again will bring up the Menu display.

While in the active state, you may switch to any display – Line, Feature, or Menu – by pressing its corresponding key. Pressing a softkey will activate the feature displayed.

The Wireless Telephone emulates the operation of the 5220 IP Phone including: superkey, local muting, timed reminder, ringer adjust (via superkey), forwarding (via superkey), hot desk, auto answer (via superkey), and resiliency. Some or all of these features may be implemented locally.

Line Appearances

While off hook, press the **LINE** key to view the shortcut keys and assigned extensions for line appearances. There are nine possible line appearances that correspond to the nine indicators at the top of the Wireless Telephone display. When a line is in use, the indicator converts to the line number and a + will appear after the shortcut key on the list, emulating a lit LED. Press the **LINE** key again to display the second page of the list if more than four line keys have been programmed. To use an extension, press the corresponding shortcut key. You may also use the **Up**, **Down**, and **Select** side buttons to scroll through the displays and activate the line appearances on this list. Up and down arrows on the display indicate additional items may be viewed by using the side buttons. Press the **End Call** key to exit the Line Appearance list.

Menu Display

The softkey labels on the Wireless Telephone are truncated to four characters. The complete text for each softkey may be displayed by pressing the **MENU** key from the standby state. The shortcut key assigned to the softkey feature and the complete text for each of the softkeys displays.

Activate the softkey features while in the Menu display by pressing the softkey, pressing the shortcut key, or using the **Up**, **Down**, and **Select** side buttons to scroll through and activate the features on this list. Up and down arrows on the display indicate additional items may be viewed by using the side buttons. Press the **End Call** key to exit the Menu display.

Feature List

The 5220 IP Phone has several fixed feature keys. The NetLink implementation supports five fixed features that are suitable to a mobile user through the Function (**FCN**) key on the Wireless Telephone. When **FCN** is pressed, the display lists the first four fixed features and the assigned shortcut key. Pressing **FCN** repeatedly will display the

remaining items on the list as programmed to the 5220 keys. These display in the order programmed to the corresponding keys on the 5220, along with any shortcut key, as available. A "+" will appear after the shortcut key, which emulates a lit LED on the emulated desk phone, indicating that the corresponding feature is turned on. OAI options appear at the end of the list. All OAI keys will preempt shortcuts assigned to other keys.

Activate the fixed features on the off-hook Wireless Telephone by pressing **FCN** + the shortcut key. You may also use the **Up**, **Down** and **Select** side buttons to scroll through and activate the features on this list. Up and down arrows on the display indicate additional items may be viewed by using the side buttons. Press the **End Call** key to exit the list.

1 Trans/Conf 2 Cancel 3 Message 4 Redial	First screen
5 Mute/Unmute 6 Superkey/Hold 7 8	Second screen
9 (feature) (feature) (feature)	Third screen
* (OAI) 0 (OAI) # (OAI)	Fourth screen, etc.[2]

Superkey

The superkey and hold features swap places depending on the mode of the Wireless Telephone. When in a call, the superkey is menu item **FCN** + **6** and the **Hold** feature is available through softkey Dddd. When not in a call, the superkey (**Skey**) is available as softkey Dddd and the Hold feature is displayed as number 6 on the Feature list.

Hot Desking

The Mitel PBX allows configuration of a hot desking feature which allows a Wireless Telephone to register with the PBX as a different extension. If so configured, a **HDsk** softkey in position Cccc will appear on the Wireless Telephone in the active (on-hook) mode. When the hot desk softkey is pressed, the PBX displays **No user logged in** and the current extension. Press the Login softkey (**Logi**) and enter the new extension. Press the **OK** softkey. The display prompts for a PIN number. Enter the PIN and press the **OK** softkey. The Wireless Telephone will display **Get button defs** as it checks in with the PBX. Once registration is complete, the new extension will display and the Wireless Telephone will be in standby mode.

[2] Note: There may be more features programmed than there are available shortcut keys. In this situation, the feature may be activated by using the Up, Down, Select buttons on the side of the Wireless Telephone.

Resiliency

If the primary PBX fails and a secondary PBX is configured, any Wireless Telephone that is configured to be resilient and powered on at the time of failure will switch to the backup PBX. During the switchover the Wireless Telephone tries to register with each of the resiliency IP addresses provided by the primary PBX at power on. These are stored in static memory. If the Wireless Telephone is in a call during the failure of the primary PBX, it will attempt to register with a backup PBX after the call is completed. Note that the **End Call** button must be pressed at the end of a call to ensure correct functioning of this feature.

Paging

The Wireless Telephone does not incorporate speakerphone capabilities and therefore receiving a page is not supported. The user may send a page if this feature has been programmed.

8. Testing a Wireless Telephone

Verify proper registration and operation of each Wireless Telephone by performing the following tests on each Wireless Telephone in an active wireless area.

1. Power on the Wireless Telephone by pressing **Power On**. You will see a series of messages displayed as the Wireless Telephone acquires the system. The Wireless Telephone should display the user extension or dashes if no extension is programmed. Any error messages should clear.
2. Press the **Start Call** key. The extension number should be replaced by information from the supported Mitel Networks VoIP solution and you should hear dial tone. Place a call and listen to the audio quality. End the call by pressing the **End Call** key.
3. Place a call to the Wireless Telephone and verify ring, answer, clear transmit, and clear receive audio.
4. Go off-hook and use the **FCN** key to verify the Features list.
5. Go off-hook and use the **LINE** key to verify the Line appearances / Line features list.
6. Press the **End Call** key. Any line indicators should turn off and the extension number display will return.

9. Certifying the NetLink e340/i640 Wireless Telephones

Conduct a preliminary Site Survey Mode test according to the directions given below. Note any areas where coverage is conflicting or inadequate. Note any system difficulties and work with your wireless LAN and/or LAN system administrator to determine the cause and possible remedy. See the section *Troubleshooting Wireless Telephone Problems* for clues to possible sources of difficulties.

9.1 Site Certification

The installer should not leave the site before performing installation verification.

These tests must be performed in typical operating conditions, especially if heavy loads occur. Testing sequence and procedure is different for every installation. Generally, you should organize the test according to area and volume, placing numerous calls to others who can listen while you perform coverage tests. Note any areas with excessive static or clarity problems and report it to Customer Service.

The coverage test will also require you to put the Wireless Telephone in **Site Survey Mode** and walk the entire coverage area to verify all access points.

The Wireless Telephone performing the site survey must be configured for ESSID Learn Once or Static. Site survey mode is not available in Learn Always.

The installation is not complete until these certification steps have been performed. Do not hand out Wireless Telephones at a site that has not been certified.

9.2 Site Survey Mode

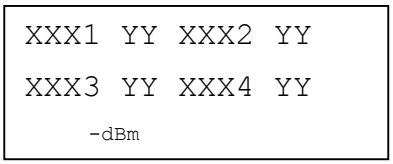
Test signal strength in the covered area by performing a Site Survey. Put a Wireless Telephone in Site Survey Mode (see *NetLink e340/i640 Wireless Telephone Configuration* section) and walk the entire coverage area while viewing the display.

The **FCN** key toggles between the three coverage modes described below. The Wireless Telephone will remain in Site Survey mode until it is powered off. When testing is complete, press **Power Off** to power off the Wireless Telephone.

Numbers racing across the Wireless Telephone display indicate AP information is being obtained. A **Waiting** message indicates the system is not configured properly and the Wireless Telephone cannot find any APs.

Detect dBm coverage

As you walk the perimeter, the two-line display will show the top four access points that the Wireless Telephone can contact in a code as illustrated below.

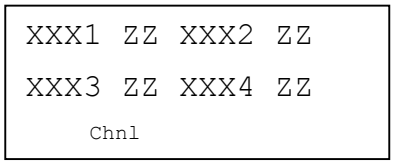


- XXX1 through XXX4 are the last four digits of the access points' MAC address. The primary access point (the access point which had the strongest signal to this Wireless Telephone) displays first, followed by the three access points with the next strongest signals.
- YY is the power level in dBm at which this Wireless Telephone heard the associated access point. Although shown as a positive number, YY represents negative dBm and lower numbers represent stronger signals. For example, a displayed value of 40 indicates -40dBm, and is therefore a stronger signal than a display of 50 (which indicates -50dBm). At least one access point's reading should be stronger than -70 dBm in all areas.

Note any areas that have inadequate dBm readings.

Detect Overlap or Conflicts

Press **FCN** to toggle to the Site Survey function that shows the channel number of the access points. Use this information to detect overlaps or conflicts in access point signaling.



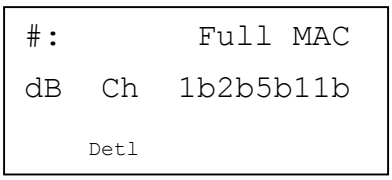
- XXX1 through XXX4 are the last four digits of the access points' MAC address.
- ZZ is the channel number that the access point is using.

Note any areas that have access points that are in contention for the same channel.

It is preferable that no overlaps exist anywhere in your facility. If the site survey mode indicates two APs using the same channel, then at least one other AP must be indicated at 10 dBm stronger than those APs to avoid channel conflicts.

Confirm Supported Data Rates

Press **FCN** to toggle to the Detail function. Use this information to confirm signal strength and supported data rates.



- # is the number (1-4) of the AP
- Full MAC is the MAC address of the AP
- dB is the signal strength of the AP
- Ch is the channel of the AP
- 1b2b5b11b is an example of the data rate that may be displayed

Walk around the site to determine supported data rates, one AP at a time. In any location you may use the Right Arrow key to display the second best AP, arrow again to the third best, and so on to the fourth best. The Left Arrow key steps you back to the first best.

Each data rate (1,2,5.5, or 11Mb/s) that is supported by the AP is shown. Those rates that are in the Basic Rate set (sometimes referred to as “required” rates) are indicated by a ‘b’ following the rate number. The Supported and Basic data rate(s) should be the same on all APs as is appropriate for your environment.

9.3 Solving Coverage Issues

Coverage issues are best resolved by adding and/or relocating access points.

Overlap issues may be resolved by reassigning channels to the access points or by relocating the access points.

10. Software Maintenance

The NetLink e340/i640 Wireless Telephones use proprietary software programs written and maintained by SpectraLink. The software versions that are running on the Wireless Telephones can be displayed during power on by holding down the **Power On** key.

SpectraLink or its authorized dealer will provide information about software updates and how to obtain the software (for example, downloading from a web site).

10.1 Upgrading Wireless Telephones

After software updates are obtained from SpectraLink, they must be transferred to the appropriate location in the LAN to update the code used by the Wireless Telephones.

NetLink e340/i640 Wireless Telephones allow over-the-air transfer of software updates from the designated TFTP server to the Wireless Telephones. The downloader function in the Wireless Telephone checks its software version every time the Wireless Telephone is powered on. If there is any discrepancy, the Wireless Telephone immediately begins to download the update.

Normal Download Messages

When the Wireless Telephone is powered on, it displays a series of messages indicating that it is searching for new software, checking the versions, and downloading. The normal message progression is:

Message	Description
Checking Code	Wireless Telephone is contacting the TFTP Server to determine if it has a newer version of software that should be downloaded.
Erasing Memory	Wireless Telephone has determined that a download should occur and is erasing the current software from memory. This message also displays a progress bar. When the progress bar fills the display line the erase operation is complete.
Updating Code	Wireless Telephone is downloading new software into memory. This message also displays a progress bar. When the progress bar fills the display line the update operation is complete on that file.

When the update is complete, the Wireless Telephone displays the extension number, and is ready for use.

Download Failure or Recovery Messages

The following display messages indicate a failure or recovery situation during the download process.

Message	Description
Server Busy	Wireless Telephone is attempting to download from a TFTP Server that is busy downloading other phones and refusing additional downloads. The Wireless Telephone will automatically retry the download every few seconds.
TFTP ERROR(x):yy	A failure has occurred during the TFTP download of one of the files. (x) = The file number which was being downloaded; yy is an error code describing the particular failure. Possible error codes are: 01 = TFTP server did not find the requested file. 02 = Access violation (reported from TFTP server). 07 = TFTP server reported "No such user" error. Check the TFTP server configuration. 81 = File put into memory did not CRC. The Wireless Telephone will attempt to download the file again. FF = Timeout error. TFTP server did not respond within a specified period of time.
Erase Failed	Download process failed to erase the memory in the Wireless Telephone. This operation will retry.
Waiting	Wireless Telephone has attempted some operation several times and failed, and is now waiting for a period of time before attempting that operation again.

11. Troubleshooting Wireless Telephone Problems

Wireless Telephones can exhibit transmission problems in several ways. They can cease functioning properly, display error messages, or display incorrect data. When using and troubleshooting Wireless Telephones, consider the following problem sources to determine the best method of approaching any specific situation.

11.1 Access Point Problems

Most, but not all, Wireless Telephone audio problems have to do with access point range, positioning and capacity. Performing a Site Survey as described in *Section 9.2* can isolate the AP causing these types of problems. If the Wireless Telephone itself is suspected, conduct a parallel Site Survey with a Wireless Telephone that is known to be properly functioning.

In range/Out of range – service will be disrupted if a user moves outside the area covered by the wireless LAN access points. Service is restored if the user moves back within range. If a call drops because a user moves out of range, the Wireless Telephone will recover the call if the user moves back into range within a few seconds.

Capacity – in areas of heavy use, the call capacity of a particular AP may be filled. If this happens, the user will hear three chirps from the Wireless Telephone. The user can wait until another user terminates a call, or move within range of another AP and try the call again. If a user is on a call and moves into an area where capacity is full, the system attempts to find another AP. Due to range limitations, this may be the same as moving out of range.

Transmission Obstructions – prior to system installation, the best location for APs for optimum transmission coverage was determined. However, small pockets of obstruction may still be present, or obstructions may be introduced into the facility after system installation. This loss of service can be restored by moving out of the obstructed area, or by adding APs.

11.2 Configuration Problems

Certain problems are associated with improper configuration of either the supported Mitel Networks VoIP solution or the Wireless Telephone.

Configuration problems are generally corrected by changing the configuration at the supported Mitel Networks VoIP solution or on the Wireless Telephone. There may also be incorrect programming of the AP. See the *Configuration Note* for the AP in use at the site.

11.3 Wireless Telephone Status Messages

Wireless Telephone status messages provide information about the NetLink e340/i640 Wireless Telephone's communication with the AP and host telephone system. The following table summarizes the status messages, in alphabetical order.

Message	Description	Action
3 chirps	Wireless Telephone is not able to communicate with the best AP, probably because that AP has no bandwidth available.	None. This is only a warning, the call will handoff to the best AP once it becomes available.
Bad Config	Some needed configuration parameter has not been set.	Check all required Wireless Telephone configuration parameters for valid settings.
Bad ESSID	The Wireless Telephone is configured for “static ESSID” (as opposed to “Learn once” or “Learn always” and no ESSID has been entered.	Enter an ESSID in the configuration settings or change to one of the “Learn” modes.
(battery icon), Low Battery and beep	Low battery	In call: the battery icon displays and a soft beep will be heard when the user is on the Wireless Telephone and the battery charge is low. User has 15–30 minutes of battery life left. Not in call: The battery icon displays whenever the battery charge is low The message Low Battery and a beep indicate a critically low battery charge when user is not on the Wireless Telephone. The Wireless Telephone will not work until the Battery Pack is charged.
Can’t Renew DHCP	The functional code is not able to get a lease renewal.	Configuration problem. Check the gateway address in the DHCP server.
Charging …	The Wireless Telephone is charging in the Desktop Charger.	No action needed.
Charge Complete	The Wireless Telephone is now fully charged.	No action needed.
Checking Code	Wireless Telephone is contacting the TFTP Server to determine if it has a newer version of software that should be downloaded.	None, this message should only last for approximately one second. If message remains displayed, power off and contact SpectraLink customer support.
Checking DHCP IP	The Wireless Telephone is retrieving DHCP information from the DHCP server.	None. This is informational only.

Message	Description	Action
CRC Code Error	The software which has been TFTP downloaded has a bad redundancy code check.	Try the download again; it is possible the software was corrupted during download. If the error repeats, check that the download image on the TFTP server is not corrupted.
Code Mismatch!	The software loaded into the Wireless Telephone is incorrect for this model phone.	Replace the software image on the TFTP server with software that is correct for the phone model.
DHCP Error (1-4)	DHCP Error 1	The Wireless Telephone cannot locate a DHCP server. It will try every 4 seconds until a server is located.
	DHCP Error 2	The Wireless Telephone has not received a response from the server for a request to an IP Address. It will retry until a server is found.
	DHCP Error 3	The server refuses to lease the Wireless Telephone an IP Address. It will keep trying.
	DHCP Error 4	The server offered the Wireless Telephone a lease that is too short. The minimum lease time is 10 minutes but SpectraLink engineers recommend at least one hour minimum lease time. The Wireless Telephone will stop trying. Reconfigure the server and power cycle the Wireless Telephone.
DHCP Lease Exp	The Wireless Telephone's DHCP lease has expired, and the call (if any) cannot continue.	The Wireless Telephone failed to renew its DHCP lease, either because the DHCP server is not running, or because the configuration has been changed by the administrator. The Wireless Telephone will attempt to negotiate a new lease, which will either work, or change to one of the above DHCP errors (1-4).
DHCP NACK error	A NACK (Negative ACKnowledge) was received from the DHCP server.	The DHCP lease currently in use by the Wireless Telephone is no longer valid, which forces the Wireless Telephone to restart. This problem should resolve itself on the restart. If it does not, the problem is in the DHCP server.

Message	Description	Action
DO NOT POWER OFF	The Wireless Telephone is in a critical section of the software update.	None. Do not remove the Battery Pack or attempt to power off the handset while this is displayed. Doing so may require the handset to be returned to SpectraLink to be recovered.
Duplicate IP	The Wireless Telephone has detected another device with its same IP Address.	If using DHCP, check that the DHCP server is properly configured to avoid duplicate addresses. If using Static IP, check that the Wireless Telephone was assigned a unique address.
Erase Failed	Download process failed to erase the memory in the Wireless Telephone.	Operation will retry but may eventually report the error "int. error: 0F" Power cycle the handset.
Erasing Memory	Wireless Telephone has determined that a download should occur and is erasing the current software from memory.	None. When the progress bar fills the display line the erase operation is complete.
Initializing …	The Wireless Telephone is performing power on initialization.	None. This is informational only.
Internal Err. # #	The Wireless Telephone has detected a fault from which it cannot recover.	Record the error code so it can be reported. Turn the Wireless Telephone off then on again. If error persists, try registering a different Wireless Telephone to this telephone port. If error still persists, contact SpectraLink Technical Support and report the error.
Network Busy	All APs are full or busy.	Try call again later.
No Host IP	The Wireless Telephone is configured for “static IP” (as opposed to “use DHCP”) and no valid host IP Address (the Wireless Telephone’s IP Address) has been entered.	Enter a valid IP Address in the configuration settings or change to “use DHCP”.
No IP Address	Invalid IP.	Check the IP Address of the Wireless Telephone and re-configure if required.
No PBX Response	The Wireless Telephone tried to send a message to the supported Mitel Networks VoIP solution and failed to get a response.	Verify the supported Mitel Networks VoIP solution is operational and connected to the network.

Message	Description	Action
No SVP IP	The Wireless Telephone is configured for “static IP” (as opposed to “use DHCP”) and no valid NetLink SVP Server address has been entered.	Enter a valid NetLink SVP Server IP Address in the configuration setting or change to “use DHCP.”
No SVP Response	The NetLink SVP Server is not responding to requests from the Wireless Telephone.	This may be caused by bad radio reception or a problem with the NetLink SVP Server. The Wireless Telephone will keep trying to fix the problem for 20 seconds, and the message may clear by itself. If it does not, the Wireless Telephone will restart. Report this problem to the system administrator if it keeps happening.
No SVP Server	Wireless Telephone can’t locate SVP Server.	IP Address configuration of NetLink SVP Server is wrong or missing.
	SVP Server is not working.	Check error status screen on NetLink SVP Server.
	No LAN connection at the SVP Server	Verify NetLink SVP Server connection to LAN.
No Net Access	Cannot authenticate / associate with AP	Verify the AP configuration.
No Net Found	This indicates any of the following: • No radio link • No ESSID – Autolearn not supported (or) incorrect ESSID	Verify that the AP is turned on. Verify the ESSID of the wireless LAN and enter or Autolearn it again if required.
	• Out of range	Try getting closer to an AP. Check to see if other Wireless Telephones are working within the same range of an AP. If so, check the ESSID of this Wireless Telephone.
	• Incorrect WEP settings	Verify that all the WEP settings in the Wireless Telephone match those in the APs.
No Reg Domain	Regulatory Domain not set.	Configure the Regulatory Domain of the Wireless Telephone
Not Installed!	A required software component is missing.	Check that all required software files are on the TFTP server, if over-the-air downloading is being used. If the error repeats, contact SpectraLink Technical Support.

Message	Description	Action
Press End Call	Your call has ended.	Press the Power Off / End Call key to return to standby mode.
Restart Command	The Wireless Telephone received a restart command from the supported Mitel Networks VoIP solution.	None. The Wireless Telephone will automatically restart in a few seconds.
Select License	The correct protocol has not been selected from the license set.	Using the administrative menus, select one license from the set to allow the phone to download the appropriate software.
Server Busy	Wireless Telephone is attempting to download from a TFTP Server that is busy downloading other devices and refusing additional downloads.	None, the Wireless Telephone will automatically retry the download every few seconds.
SKT Open Fail	Socket open fail. Occurs when the Wireless Telephone tries to connect to the PBX but there is no response. If resiliency is active, the Wireless Telephone will keep trying.	If the PBX is inoperative and resiliency is not active or the Wireless Telephone cannot locate a backup PBX, turn off the Wireless Telephone and repair the primary PBX. Note that it may be advisable to reconfigure the backup PBX to be the primary PBX if the repair is more time-consuming than the reconfiguration.
SVP Service Rej.	The NetLink SVP Server has rejected a request from the Wireless Telephone.	The Wireless Telephone will restart and attempt to re-register with the SVP Server, which should fix the problem. Report to your administrator if it keeps happening.
System Locked (with Busy Tone)	NetLink SVP Server is locked.	Try call again later, system has been locked for maintenance.
System Busy (with Busy Tone)	NetLink SVP Server is busy or out of resources.	All call paths are in use, try call again in a few minutes.
TCP Rcv Timeout	If the PBX has failed, this message may display briefly as the Wireless Telephone tries to connect to the backup PBX in a resilient setting. This message may be replaced by the SKT Open Fail message if the Wireless Telephone is unsuccessful at connecting with the backup PBX or if resiliency is not programmed.	Wait for the Wireless Telephone to cycle through attempts to connect to the backup PBX. See SKT Open Fail above.

Message	Description	Action
TFTP ERROR(x):yy	A failure has occurred during a TFTP software download. (x) = The file number which was being downloaded; yy is an error code describing the particular failure. Possible error codes are: 01 = TFTP server did not find the requested file. 02 = Access violation (reported from TFTP server). 07 = TFTP server reported "No such user" error. 81 = File put into memory did not CRC. FF = Timeout error. TFTP server did not respond within a specified period of time.	Error code 01, 02 or 07 - check the TFTP server configuration. Error code 81, the Wireless Telephone will attempt to download the file again. For other messages, power off the Wireless Telephone, then turn it on again to retry the download. If the error repeats, note it and contact SpectraLink Technical Support.
Too Many Errors	The Wireless Telephone continues to reset and cannot be recovered.	Fatal error. Return handset to SpectraLink.
Updating Code…	Wireless Telephone is downloading new software into memory.	None. When the progress bar fills the display line the update operation is complete on that file.
Updating …	The Wireless Telephone is internally updating its software images.	None. The Wireless Telephone may do this briefly after a download. This is informational only.
Waiting…	Wireless Telephone has attempted some operation several times and failed.	None. The Wireless Telephone is waiting for a specified period of time before attempting that operation again.
Watchdog Timeout	The Wireless Telephone failed to hear from the supported Mitel Networks VoIP solution within the watchdog timeout interval.	Verify the supported Mitel Networks VoIP solution is operational and connected to the network.

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