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NEC

MH110/MH120
IP Wireless Telephone

Setup and Administration Guide

NEC Business Solutions Ltd.

Doc. No. NEC-9123
Revision 1
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This document explains how to configure and maintain the MH110/MH120 IP Wireless Telephone within the NEC Platform. Chapter Topics · Using this Guide · Document Conventions Using this Guide This guide is designed to make MH110 and MH120 Wireless Telephones easy to configure and maintain.

There are step-by-step instructions for the procedures you need to perform.



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How this Guide is Organized Chapter 1 Introduction This chapter outlines how to use the manual, including the organization, chapter layout, and conventions used in the MH110/MH120 Wireless Telephone Setup and Administration Guide. This chapter contains a Quick Start Guide and descriptions for MH110/ MH120 IP UNIVERGE WL Mobile Handsets, which are mobile handsets for workplace IP telephone systems. This chapter discusses the requirements for the MH110/MH120 Mobile Handsets and the items on their display. This chapter describes how to configure the Mobile Handset. Chapter 2 MH110/MH120 IP Quick Start Guide Chapter 3 MH110/MH120 Mobile Handsets Chapter 4 Mobile Handset Configuration Chapter 5 License Management Chapter 6 NEC VoIP Integration Factors This chapter details the process to properly configure MH110/MH120 UNIVERGE WL Mobile Handsets and download software via over-the-air file transfer. This chapter describes the mapping between the emulated NEC DtermIP-16LD and the MH110/MH120 UNIVERGE WL Mobile Handsets. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 1-2 Introduction Chapter 7 Feature Programming Chapter 8 Testing a Mobile Handset This chapter describes feature programming for the MH110/MH120 UNIVERGE WL Mobile Handsets.

This chapter describes tests that can be performed in an active wireless area to verify proper registration and operation of each Mobile Handset. Chapter 9 Certifying MH110/MH120 Mobile Handsets This chapter explains how to conduct a preliminary Site Survey Mode test. Chapter 10 Software Maintenance This chapter describes how to upgrade and maintain software for the MH110/MH120 UNIVERGE WL Mobile Handsets. Chapter 11 Troubleshooting Mobile Handset Problems This chapter discusses problem sources that determine the best method of approaching any specific situation when using and troubleshooting Mobile Handsets. Document Conventions This guide uses the conventions listed in Table 1-1. Table 1-1 Document Conventions When you see: It means: Field names Button names Clicpically 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. NOTE Quick Start Guide Table 2-1 describes five conditions that must be met for MH110/MH120 Wireless Telephones. Table 2-1 MH110/MH120 Wireless Telephones Requirements Requirements Wireless LAN Descriptions A wireless LAN must be properly configured and operational through the use of 802.11b wireless access points (APs) listed on the Access Point Compatibility matrix.

A TFTP Server must be available on the network in order to load the appropriate software into the Wireless Telephones. Refer to Chapter 5, "License Management" for detailed instructions for loading software on Wireless Telephones. TFTP Server NEC VoIP The supported NEC VoIP solution must be connected to your network and completely operational. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 MH110/MH120 IP Quick Start Guide 2-3 Requirements NEC SVP Serve Descriptions The NEC SVP Server, which facilitates the QoS on the wireless LAN for the Wireless Telephones, must be on the same subnet as the Wireless Telephones and have the proper versions of software. Note: Ensure you have the following versions: · 173.

xxx svp100.toc · 174.xxx zvmlinux · 175.xxx flashfs Wireless Telephone Configure your 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 NEC IP telephony system. Refer to Chapter 5, "License Management" for detailed instructions about loading software on Wireless Telephones.

MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 2-4 MH110/MH120 IP Quick Start Guide System Diagram Figure 2-1 shows the NEC components residing on a network with the NEC IP telephony system, access points (APs), and wireless LAN Ethernet Switched Hub. Figure 2-1 NEC IP telephony server architecture example SVP SERVER MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 MH110/MH120 IP Quick Start Guide 2-5 System Components · The MH110 is a lightweight, durable handset specifically designed for mobile workplace use within a facility using the supported NEC IP telephony system and 802.11b APs in a wireless LAN. · The MH120 offers a durable design with push-to-talk functionality. The MH110/MH120 functionality is provided by emulating the NEC DtermIP-16LD. Among other features, the Mobile Handset 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 Mobile Handsets are to be used on-premises; they are not cellular or satellite phones. UNIVERGE WL Mobile Handsets use Direct Sequence Spread Spectrum radio technology (DSSS) to transmit audio packets over wireless LAN APs that support SVP Server. · SVP Server - SVP Server is the NEC quality of service (QoS) mechanism that is implemented in the Mobile Handset and AP to enhance voice quality over the wireless network. SVP Server 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 Server is fully compatible with the IEEE 802.11b standards. The SVP Server is an Ethernet LAN appliance that works with the AP to provide QoS on the wireless LAN. All Protims packets to and from the MH110/MH120 pass through the SVP Server and are encapsulated for prioritization as they are routed to and from the supported NEC VoIP solution or other Mobile Handset. SVP Server 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 Server in an industry standard, thus ensuring high-quality voice in a mixed client environment. Once 802.11e is ratified, NEC and its 802.

11b technology partners will adopt the new specification. · NEC IP System - NEC 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 Mobile Handsets 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 MH110/MH120 are similar to that of wireless data devices. Access points must utilize SVP Server. Contact NEC, or a certified NEC distributor, for information about APs that support SVP Server.



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MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 2-6 MH110/MH120 IP Quick Start Guide · Ethernet Switch - interconnects multiple network devices, including the SVP Server, the supported NEC IP telephony system, NEC DtermIP-16LDs 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 MH110/MH120 UNIVERGE WL Mobile Handsets. Although a single Ethernet switch network is recommended, the Mobile Handsets and the 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 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. The MH110/MH120 cannot "roam" from one subnet to another. If routers and multiple subnets are in use, the Mobile Handsets must only use access points attached to a single subnet, or be powered off and back on to switch to a different subnet. NOTE · NEC DtermIP-16LD - The wired LAN desksets provided by NEC for use with the supported NEC IP telephony system. · TFTP Server - Required in the system to distribute software to the Mobile Handsets. May be on a different subnet than the supported NEC IP telephony device(s) and APs. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 3-1 3 MH110/MH120 Mobile Handsets This chapter discusses the requirements for the MH110/MH120 UNIVERGE WL Mobile Handsets and the items on their display.

Chapter Topics · Requirements · Display Figure 3-1 MH110/MH120 Mobile Handsets Line indicators Left arrow Low battery icon Up Select Down Softkey A Softkey B Power On Start Call Earpiece Right arrow Voicemail icon Shortcut menu & Main display area Softkey Function display area Softkey D Softkey C Power Off End Call Menu Line indicators Left arrow Low battery icon Up Select Down Softkey A Softkey B Power On Start Call Earpiece Right arrow Voicemail icon Shortcut menu & Main display area Push-to-talk radio control Softkey Function display area Softkey D Softkey C Power Off End Call Menu Battery release Battery release Function Line Microphone Function Line Microphone Charging contacts Headset jack Charging contacts Headset jack MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 3-2 MH110/MH120 Mobile Handsets Requirements In order for the MH110/MH120 UNIVERGE WL Mobile Handsets to operate properly, your operating environment must meet the following requirements. Table 3-1 Requirements Requirements Radio frequency Transmission type Transmit data rate Radio QoS Wireless security FCC certification Management Voice encoding VoIP Protocols Transmit power Display SNP Dimensions RNP Dimensions SNP Weight RNP Weight Battery capacity 2.400 - 24835 GHz Specifications Direct-Sequence Spread Spectrum (DSSS) Up to 11 Mb/s SVP Server Wired Equivalent Privacy (WEP), 40-bit and 128-bit Part 15.247 DHCP, TFTP G.711, G.729a/ab Protims 100mW peak, < 10 mW average Pixel-based (up to 4-line x 18-character) alphanumeric, plus line and status indicators 5.5" x 2.0" x 0.9" (14.0 x 5.

1 x 2.3 cm) 5.9" x 2.2" x 1.0" (15.0 x 5.6 x 2.5 cm) 4.2 ounces (119.0 g) 6.

0 ounces (170.1 g) 4 hours talk time, 80 hours standby Display The Display section is broken in to the following subsections: Alphanumeric Voice mail Icon Ringing and Tones Audio Features Line Indicators MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 MH110/MH120 Mobile Handsets 3-3 Figure 3-2 The Display Alphanumeric Display information provided by the supported NEC VoIP solution when the Mobile Handset is off-hook will be passed directly to the Mobile Handset display. The Mobile Handset will display up to 18 characters of each line. Certain characters may be used by the supported NEC VoIP solution that are not implemented in the Mobile Handset such as definable and 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. Voice mail Icon The Voicemail icon is controlled only by the OAI application. Ringing and Tones The ringing types are programmed by the Mobile Handset user into the Mobile Handset and are not accessible or changeable by the supported NEC VoIP solution. Whenever possible the audible and vibrating ringer on the Mobile Handset will follow the Protims cadence commands provided by the supported NEC VoIP solution. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 3-4 MH110/MH120 Mobile Handsets Audio Features Speakerphone features such as paging, hands-free mode and voice announce are not available on the Mobile Handset.

The telephony switch should not be programmed to support such features on the Mobile Handset. Line Indicators The line indicators on the Mobile Handset will convert to a solid or flashing number to mimic the icons next to Line keys on the NEC DtermIP-16LD. The text that appears next to the line keys on the IP Phone is accessed on the Mobile Handset by pressing the LINE key. Line keys must be programmed on Lines 1-4 while features are programmed on keys 5-16. NOTE MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 4-1 4 Mobile Handset Configuration The MH110/MH120 UNIVERGE WL Mobile Handsets (Mobile Handsets) should be provisioned in the supported NEC VoIP solution in the same manner as the NEC DtermIP-16LDs. Each Mobile Handset 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 Mobile Handset being configured is affected by the Admin menu settings. The Mobile Handset user may select several usability options from the Standby menu, described in the "User-defined Preferences" on page 410. This information is also provided in the end user manual.

Chapter Topics · The Admin Menu · User-defined Preferences The Admin Menu The Admin Menu contains configuration options that are stored locally (on each Mobile Handset). Every Mobile Handset is independent and if the default settings are not desired, the admin options must be set in each Mobile Handset requiring different settings. Opening the Admin Menu Step 1 Step 2 With the Mobile Handset powered OFF, simultaneously press and hold the Power ON and Power OFF keys.



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Release the Power On key, wait for a single beep, then release the Power Off key. The Admin Menu displays.

NOTE 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. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 4-2 Mobile Handset Configuration Entering and Editing Admin Menu options An asterisk (*) next to an option in the display indicates that it is selected. The default settings are shown in Table 4-1. Use the Up, Down, and Select side buttons and the softkeys to navigate and select options.

Table 4-1 Admin menu options Buttons & Softkeys Up/Down buttons Select button OK softkey Save softkey Bksp softkey Cncl softkey Up softkey Exit softkey End Call key Descriptions Display previous/next menu item. Selects the menu item or option. Selects the menu item or option. Saves the entry. Backspaces to allow editing of entry. Cancels edit and returns to previous menu level. Returns to previous menu level. Exits the menu (at the top level). Exits to standby state (from any level) Alphanumeric String Entry Step 1 Press the first digit/letter. The digit displays.

Press the key again to scroll through the letters associated with that key. Press 2 repeatedly and you will see 2, A, B, and C, a, b, and c. Example: Table 4-2 describes keys which allow you to enter non-numeric characters or other characters not represented on the keypad. Table 4-2 Special Characters To Enter . - _! # \$% & (,.;: / \ = @ ~ Space Q,q Z,z 1 0 7 9 Press MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 Mobile Handset Configuration 4-3 Step 2 When the correct entry displays, press the RIGHT ARROW to move on to the next character. Repeat for each digit/letter of the entry. To erase, press the LEFT ARROW or BACKSPACE softkey to erase the previous character. 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. Step 3 Table 4-3 lists the Admin Menu commands.

Detailed descriptions of each command appear in the following sections: "IP Address" on page 4-4 "ESSID" on page 4-6 "License Management" on page 4-6 "Restore Defaults" on page 4-7 "Site Survey Mode" on page 4-7 "Regulatory Domain" on page 4-7 "Security" on page 4-8 "NEC Options" on page 4-9 "OAI On/Off" on page 4-9 "Set Admin P.W." on page 4-10 Table 4-3 Admin menu commands Admin Menu Items IP Address 2nd Level *Use DHCP Static IP 3rd Level 4th Level Phone IP TFTP Server IP Default Gateway Subnet Mask NEC PBX IP DRS Self Port SVPII IP OAI Server IP ESSID Static Entry *Learn Once Learn Always License Management Restore Defaults Site Survey Mode Regulatory Domain Set Current MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 4-4 Mobile Handset Configuration Admin Menu Items Security *None WEP 2nd Level 3rd Level 4th Level Authentication WEP On/Off Key Information Open System Shared Key Default Key Key Length Key 1-4 Rotation Secret Cisco FSR Extension number OAI on/off Admin PW Enable OAI Disable OAI Username Password IP Address Table 4-4 describes two modes in which Wireless Telephones can operate: . DHCP enabled . Static IP Select the mode for operation from the IP Address menu. Table 4-4 Wireless Telephone Modes Modes Use DHCP Descriptions Will use Dynamic Host Configuration Protocol to assign an IP address each time the Mobile Handset is turned on. If DHCP is enabled, the Mobile Handset also receives all other IP address configurations from the DHCP server.

* Allows you to manually set a fixed IP address. If selected, the Mobile Handset 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. Static IP Table 4-5 describes components that must be configured, regardless of the mode in which the Wireless Telephone is operating.

MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 Mobile Handset Configuration 4-5 Table 4-5 Wireless Telephone Configuration Components Modes Phone IP Descriptions The IP address of the Mobile Handset. 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. The IP address of the NEC PBX call server. If using static IP configuration, this is simply the IP address of the device. The UDP port of the Mobile Handset used to communicate with the DRS in the NEC PBX. (Leave at default value 3455.) The IP address of the SVP Server. If using Static IP configuration, this is simply the IP address of the SVP Server. Note that the SVP Server must be statically configured to have a permanent IP address.

If DHCP is being used, the Mobile Handset 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. NEC PBX IP DRS Self Port SVP II IP Table 4-6 describes components that may be configured optionally. Table 4-6 Optionally configured components Components TFTP Server IP Descriptions The IP address of a TFTP server on your network which holds software images for updating the Mobile Handsets. 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 Mobile Handset 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 Mobile Handsets in your network are kept up-to-date with the same version of software. The IP address of the NEC OAI Gateway (if applicable). If using Static IP configuration, this is simply the IP address of the NEC OAI Gateway. If DHCP is being used, the Mobile Handset will try the DHCP option 152. 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 Mobile Handset 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 Mobile Handsets 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.



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The Mobile Handset can change subnets if DHCP is enabled, and the Mobile Handset is powered off then back on when within range of access points on the new subnet. OAI Server IP Default Gateway and Subnet Mask MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 4-6 Mobile Handset Configuration ESSID Select the option that will enable the Mobile Handset 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.

REFERENCE Overlapping wireless systems complicate the use of ESSID learning as the Mobile Handset 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 Mobile Handset to scan all ESSIDs for a DHCP server and/or TFTP server. Once either is found, the Mobile Handset retains the ESSID from whichever access point it associates with at that point. When overlapping wireless systems exist, the Learn Once feature allows the Mobile Handset to use only the ESSID established at first learn at all subsequent power ons. This ESSID is retained by the Mobile Handset until the ESSID option is reselected. · Learn Always: allows the Mobile Handset 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 Mobile Handset 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 Protims protocol to use for the MH110/MH120 UNIVERGE WL Mobile Handsets is 013. Any other protocol will cause the Mobile Handset to malfunction. After selecting the correct protocol for your site, you should upgrade the software for the Mobile Handsets. Refer to "Upgrade Mobile Handsets" on page 10-1 for more information. REFERENCE MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 Mobile Handset Configuration 4-7 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 Mobile Handset will remain in this mode until it is powered off. Refer to Chapter 9, "Certifying MH110/MH120 Mobile Handsets" for more information on this mode. REFERENCE Regulatory Domain The Regulatory Domain will default to North America on the Mobile Handset 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 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. NOTE MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 4-8 Mobile Handset Configuration 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 Mobile Handset to correspond with the encryption protocol set up in the access points. Select the entries from the options below to enable the Mobile Handset to acquire the system. · Set each of these options to match exactly the settings in your APs.

NOTE · 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 Mobile Handsets. 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. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 Mobile Handset Configuration 4-9 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, NEC and Cisco Systems have cooperated to implement the Fast Secure Roaming mechanism. FSR is designed to minimize call interruptions for Mobile Handset 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 Mobile Handset, you must enter a Radius Server username and password into each phone. 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. NEC Options The NEC Options menu includes the following sub-menus: NEC PBX IP, DRS Self Port, DRS Far Port, PROTIMS Port, RTP Port, NGT Port, and Listen Port. The administrator enters the NEC Telephony Servers IP Address in the NEC PBX IP menu.



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All other parameters should remain at the default value. OAI On/Off NEC's Open Application Interface (OAI) enables third-party computer applications to display alphanumeric messages on the Mobile Handset display and take input from the Mobile Handset 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 Mobile Handset. You may select whether the Mobile Handset should attempt to connect to the NEC OAI Gateway by choosing either the ENABLE or DISABLE commands on 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 NEC OAI Gateway installed at your site, you should disable the OAI feature to preserve network bandwidth and battery life. MH110/MH120 IP Wireless Telephone

Setup and Administration Guide - Revision 1 4-10 Mobile Handset Configuration Set Admin P.W. The Admin PW (password) controls access to the administration functions in the Admin Menu. The password must be set in each Mobile Handset for which controlled access is desired. Mobile Handsets 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. NOTE User-defined Preferences Table 4-7 lists navigation keys used to display and select options. User-defined preferences are also covered in the MH110/MH120 UNIVERGE WL Mobile Handsets User Guide. The system administrator can refer to this list for more information about customizing Mobile Handset settings. REFERENCE To configure the following options, the Mobile Handset 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. Table 4-7 Navigation keys Key Names Up/Down buttons Select button OK softkey Save softkey Bksp softkey Cncl softkey Up softkey Exit softkey End Call key Descriptions Displays previous/next menu item. Selects the menu item or option. Selects the menu item or option.

Saves the entry. Backspaces to allow editing of entry. Cancels edit and returns to previous menu level. Returns to previous menu level. Exits the menu (at the top level). Exits to standby state (from any level). MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 Mobile Handset Configuration 4-11 Table 4-8 Standby menu items Standby menu items Ring Type 2nd Level Telephone ring 3rd Level 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 Push-to-talk Channel Enable/Disable 1-8 Enable Disable Table 4-9 User-defined preferences Preferences Ring Type Descriptions Select Ring Type then Telephone Ring to change the standard ring used for normal operation. Select one of the following from the Telephone Ring menu: · Normal Ring (an audible alert) · Vibrate Ring · Vib/Norm Ring (vibrate for five seconds and then audible alert for subsequent rings). Note: The Auxiliary Ring modes are reserved for future use. The ring type currently in use displays with an asterisk (*).

Noise Mode Provides options that describe the noise level in your environment. Selecting the correct option will adjust the Mobile Handset to account for background noise. Select one of the following: · Normal: for most office environments · High: for moderate background noise · 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 Mobile Handset. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 4-12 Mobile Handset Configuration Preferences Alias IP Addr

Current IP Addr Descriptions Displays the IP address currently assigned to this Mobile Handset by the SVP Server. Displays the IP address currently assigned to the Mobile Handset. The IP address is not set here, it is merely displayed and may not be changed. Allows you to enter the user extension for this Mobile Handset. This number is for display purposes only, entering it does not assign the extension in the host telephone system. Displays the menu for the two way radio feature in the MH120.

· 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. Refer to the MH120 UNIVERGE WL Mobile Handsets end user document for more information about push-to-talk. Extension Push-to-talk Additional options may be present. Contact your system administrator for information.

MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 5-1 5 License Management The MH110/MH120 UNIVERGE WL Mobile Handset system supports a number of different IP protocol integrations. All MH110/MH120 Handsets are shipped from NEC with a generic software load that allows them to associate to a wireless LAN and download their functional software from a TFTP server. The Mobile Handsets will not function properly without downloading appropriate software. This chapter details the process to properly configure MH110/MH120 Handsets and download software via over-the-air file transfer. Chapter Topics · Requirements · Configuration Process Requirements · A wireless LAN must be properly configured and operational through the use of 802.

11b wireless access points. · The supported NEC 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 Mobile Handsets. · Finally, ensure that the Battery Pack on the Mobile Handset is fully charged. Configuration Process Step 1 Step 2 Download the latest MH110/MH120 Handsets IP software. @@@@The Protims code will now download to the handset. @@@@Available lines and features are displayed on three different lists. These are accessed by pressing the LINE or FCN key in the active off-hook mode or the MENU key while in the active on-hook mode. Lines and features may be selected in two ways either by using the shortcut key that is displayed next to the label on the list of options or by using the Up, Down, and Select side buttons to scroll through and select an option. Feature Assignment Table 7-1 through Table 7-3 show how the Wireless Telephone displays the features of the DtermIP-16LD and the key sequences (shortcuts) used to activate the corresponding feature.



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MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 Feature Programming 7-3 Table 7-1 Function key displays Function key displays 1 Hold 2 Transfer 3 Conf 4 Recall 5 Redial 7 Directory 8 Message 9 Mute Hold Emulates fixed operation keys Mobile Handset key sequences FCN + 1 FCN + 2 FCN + 3 FCN + 4 FCN + 5 FCN + 7 FCN + 8 FCN + 9 Transfer Conference Recall Redial Directory Message Mic Table 7-2 Line key displays Line key display 1-4 shortcut plus the label in sequence as received from PBX. Emulates lines programmed + number label Unlabeled keys will not be displayed. Line + 1 - 4 Table 7-3 Menu key displays Menu key displays 1-9, *, 0, # shortcut plus label in sequence as received from PBX. Emulates programmed features Unlabeled keys will not be displayed. Menu + 1 to 9, *, 0, # If no shortcut is available, the feature must be activated through the side buttons. NOTE 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. The OAI label will appear on the Function key display. Note that FCN *, 0, # are not assigned and may be used by

OAI without overriding any assigned sequence. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 7-4 Feature Programming Feature Access In its standby state, the Mobile Handset displays the extension assigned to the handset or the extension the user entered at login. The active state is initiated by pressing the Start Call key.

When the active state is initiated, the Mobile Handset contacts the PBX and displays the data provided the time, date, default line icon, any voice mail icon, softkey and feature key labels. The Mobile Handset is off-hook and there is a dial tone. 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. Figure 7-2 Feature Access Line indicators Left arrow Low battery icon Up Select Down Softkey A Softkey B Power On Start Call Earpiece Right arrow Voicemail icon Shortcut Menu & Main display area Softkey Function display area Softkey D Softkey C Power Off End Call Menu Function Line Microphone Charging contacts Headset jack MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 Feature Programming 7-5 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 which correspond to the nine indicators at the top of the Mobile Handset display. Only the first four of the nine line keys are used for line appearances. When a line is in use, the indicator converts to the line number and a PLUS SIGN (+) will appear after the shortcut key on the list, emulating a lit LED. There are four possible line appearances which correspond to the indicators at the top of the Handset display. To use an extension, press the corresponding shortcut key.

You may also use the Up, Down, and Select buttons to scroll through the displays and activate the line appearances on this list. Press the End Call key to exit the Line Appearance list. Menu Display While off hook, press the MENU key to view the shortcut keys and assigned extensions for features programmed to the programmable line and feature keys. Press the MENU key again to display the second page of the list if more than four line keys have been programmed. To activate a feature, press the corresponding shortcut key. You may also use the Up, Down, and Select buttons to scroll through the displays and activate features on this list. Note that there are 12 possible shortcuts and programmable keys. If fewer than four lines have been programmed and the remaining keys have been programmed to features, the last features on the list will not have shortcut keys. Activate these by using the side buttons. Press the End Call key to exit the Menu Display list.

MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 7-6 Feature Programming Feature List The IP Phone has several fixed feature keys. The NEC implementation supports five fixed features that are suitable to a mobile user through the Function (FCN) key on the Mobile Handset. 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 shown in the preceding table. 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 Mobile Handset by pressing FCN + the shortcut key. You may also use the Up, Down and Select buttons to scroll through and activate the features on this list. Press the End Call key to exit the list. 1 Hold 2 Transfer 3 Conf 4 Recall 5 Redial 7 Directory 8 Message 9 Mute * (OAI) 0 (OAI) # (OAI) First Screen Second Screen Third Screen MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 8-1 8 Testing a Mobile Handset This chapter describes tests that can be performed in an active wireless area to verify proper registration and operation of each Mobile Handset.

Use the following steps to test a Mobile Handset. Step 1 Power on the Mobile Handset by pressing Power On. You will see a series of messages displayed as the Mobile Handset acquires the system. The Mobile Handset should display the user extension or the login screen. Login using the proper login id and password.

Any error messages should clear. Press the Start Call key. The extension number should be replaced by information from the supported NEC 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.

Place a call to the Mobile Handset and verify ring, answer, clear transmit, and clear receive audio. Go off-hook and use the FCN key to verify the Features list. Go off-hook and use the LINE key to verify the Line appearances/Line features list. Press the End Call key. Any line indicators should turn off and the extension number display should return. Step 2 Step 3 Step 4 Step 5 Step 6 Step 7 Step 8 MH110/MH120 IP Wireless Telephone Setup and Administration

Guide - Revision 1 8-2 Testing a Mobile Handset MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 9-1 9 Certifying MH110/MH120 Mobile Handsets This chapter explains how to conduct a preliminary Site Survey Mode test. Areas where coverage is conflicting, inadequate, or where there are system difficulties should be noted and discussed with your wireless LAN and/or LAN system administrator to determine the cause and possible remedy. Refer to Chapter 11, "Troubleshooting Mobile Handset Problems" for clues to possible sources of difficulties.



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Chapter Topics · Site Certification · Site Survey Mode · Solving Coverage Issues 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 Mobile Handset in Site Survey Mode and walk the entire coverage area to verify all access points. The installation is not complete until these certification steps have been performed. Do not hand out Mobile Handsets at a site that has not been certified.

IMPORTANT MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 9-2 Certifying MH110/MH120 Mobile Handsets Site Survey Mode Signal strength in the covered area is tested by performing a Site Survey. Put a Mobile Handset in Site Survey Mode Refer to "Configuration Process" on page 5-1 for more information. **REFERENCE** Walk the entire coverage area while viewing the display. The FCN key toggles between the three coverage modes: · Detect dBm coverage · Detect Overlap or Conflicts · Confirm Supported Data Rates The Mobile Handset will remain in Site Survey mode until it is powered off.

When testing is complete, press Power Off to turn off the Mobile Handset. Numbers racing across the Mobile Handset display indicate AP information is being obtained. A Waiting message indicates the system is not configured properly and the Mobile Handset 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 Mobile Handset can contact in a code as illustrated below. Figure 9-1

Detect dBm coverage · 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 Mobile Handset) displays first, followed by the three access points with the next strongest signals. · YY is the power level in dBm at which this Mobile Handset heard the associated access point. Although shown as a positive number, YY represents negative dBm and lower numbers represent stronger signals. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 Certifying MH110/MH120 Mobile Handsets 9-3 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. **NOTE** 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. Figure 9-2 Detect Overlap or Conflicts · 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. **NOTE** 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.

MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 9-4 Certifying MH110/MH120 Mobile Handsets Confirm Supported Data Rates Press FCN to toggle to the Detail function. Use this information to confirm signal strength and supported data rates.

Figure 9-3 Confirm signal strength and 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 click the RIGHT ARROW key to display the second best AP, click the RIGHT ARROW again to display 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. 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. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 10-1 10 Software Maintenance This chapter describes how to upgrade and maintain software for the The MH110/MH120 UNIVERGE WL Mobile Handsets.

The MH110/MH120 Handsets use proprietary software programs written and maintained by NEC. The software versions that are running on the Mobile Handsets can be displayed during power on by holding down the Power On key. NEC or its authorized dealer will provide information about software updates and how to obtain the software (for example, downloading from a web site). Chapter Topics · Upgrade Mobile Handsets · Download Failure or Recovery Messages Upgrade Mobile Handsets After software updates are obtained from NEC, they must be transferred to the appropriate location in the LAN to update the code used by the Mobile Handsets. MH110/MH120 UNIVERGE WL Mobile Handsets allow over-the-air transfer of software updates from the designated TFTP server to the Mobile Handsets.

The downloader function in the Mobile Handset checks its software version every time the Mobile Handset is powered on. If there is any discrepancy, the Mobile Handset immediately begins to download the update. **Normal Download Messages** When the Mobile Handset 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 shown in Table 10-1. MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 10-2 Software Maintenance Table 10-1 Normal Download Messages Messages Checking Code Descriptions Mobile Handset is contacting the TFTP Server to determine if it has a newer version of software that should be downloaded.

Mobile Handset has determined that a download should occur and is erasing the current software from memory.



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This message also displays a progress bar. When the progress bar fills the display line the erase operation is complete. Mobile Handset 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.

Erasing Memory Updating Code When the update is complete, the Mobile Handset displays the login screen or 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. **Table 10-2 Download Failure and Recovery Messages** Messages Server Busy Descriptions Mobile Handset is attempting to download from a TFTP Server that is busy downloading other phones and refusing additional downloads. The Mobile Handset will automatically retry the download every few seconds.

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). TFTP ERROR(x);yy 07 = TFTP server reported "No such user" error. Check the TFTP server configuration. 81 = File put into memory did not CRC. The Mobile Handset will attempt to download the file again. FF = Time-out error. TFTP server did not respond within a specified period of time.

Erase Failed Waiting Download process failed to erase the memory in the Mobile Handset. This operation will retry. Mobile Handset has attempted some operation several times and failed, and is now waiting for a period of time before attempting that operation again. **MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 11-1 11 Troubleshooting Mobile Handset Problems MH110/MH120 UNIVERGE WL Mobile Handsets can exhibit transmission problems in several ways. They can cease functioning properly, display error messages, or display incorrect data.**

This chapter discusses problem sources that determine the best method of approaching any specific situation when using and troubleshooting Mobile Handsets. **Chapter Topics · Access Point Problems · Configuration Problems · Mobile Handset Status Messages** Access Point Problems Most, but not all, Mobile Handset audio problems have to do with access point range, positioning and capacity. Performing a Site Survey as described in "Site Survey Mode" on page 9-2 can isolate the AP causing these types of problems. If the Mobile Handset itself is suspected, conduct a parallel Site Survey with a Mobile Handset 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 Mobile Handset 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 Mobile Handset. 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. **MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 11-2 Troubleshooting Mobile Handset Problems 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.

Configuration Problems Certain problems are associated with improper configuration of either the supported NEC VoIP solution or the Mobile Handset. Configuration problems are generally corrected by changing the configuration at the supported NEC VoIP solution or on the Mobile Handset. There may also be incorrect programming of the AP. Refer to the Configuration Note for the AP in use at the site. **REFERENCE Mobile Handset Status Messages** Mobile Handset status messages provide information about the MH110/ MH120 Handset's communication with the AP and host telephone system. The following table summarizes the status messages, in alphabetical order. **Table 11-1 Mobile Handset Status Messages** Messages 3 chirps Descriptions Mobile Handset is not able to communicate with the best AP, probably because that AP has no bandwidth available. Some needed configuration parameter has not been set. The

Mobile Handset is configured for "static ESSID" (as opposed to "Learn once" or "Learn always" and no ESSID has been entered. Actions None.

This is only a warning, the call will handoff to the best AP once it becomes available. **Bad Config Bad ESSID** Check all required Mobile Handset configuration parameters for valid settings. Enter an ESSID in the configuration settings or change to one of the "Learn" modes. **MH110/MH120 IP Wireless Telephone Setup and Administration Guide - Revision 1 Troubleshooting Mobile Handset Problems 11-3 Messages (battery icon), Low Battery and beep** Descriptions Low battery Actions In call: the battery icon displays and a soft beep will be heard when the user is on the Mobile Handset and the battery charge is low. User has 1530 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 Mobile Handset. The Mobile Handset will not work until the Battery Pack is charged. **Can't Renew DHCP** The functional code is not able to get a lease renewal. Charging ..

. **Charge Complete** Checking Code The Mobile Handset is charging in the Desktop Charger. The Mobile Handset is now fully charged. Mobile Handset is contacting the TFTP Server to determine if it has a newer version of software that should be downloaded. The Mobile Handset is retrieving DHCP information from the DHCP server. The software which has been TFTP downloaded has a bad redundancy code check. The software loaded into the Mobile Handset is incorrect for this model phone. **DHCP Error 1 DHCP Error 2 DHCP Error 3 DHCP Error 4** Configuration problem. Check the gateway address in the DHCP server. No action needed.

No action needed. None, this message should only last for approximately one second. If message remains displayed, power off and contact NEC customer support. None. This is informational only. **Checking DHCP IP CRC Code Error** Try the download again, it is possible the software was corrupted during download.



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