# VX5 Reference Guide

**IMPORTANT NOTICE - The LXE VX5 computers and accessories are obsolete. This electronic manual has been made available as a courtesy to LXE's VX5 customers. Please contact your LXE customer support representative for replacement and assistance.**


**E-EQ-VX5RG-G-ARC**

# Notices

**Notice:**

LXE Inc. reserves the right to make improvements or changes in the products described in this manual at any time without notice. While reasonable efforts have been made in the preparation of this document to assure its accuracy, LXE assumes no liability resulting from any errors or omissions in this document, or from the use of the information contained herein. Further, LXE Incorporated, reserves the right to revise this publication and to make changes to it from time to time without any obligation to notify any person or organization of such revision or changes.

**Copyright Notice:**


125 Technology Parkway, Norcross, GA 30092 U.S.A. (770) 447-4224

**Trademarks:**

**LXE**® is a registered trademark of LXE Inc. **RFTerm**® is a registered trademark of EMS Technologies, Norcross, GA.

**Microsoft**, Windows and the Windows logo are registered trademarks of Microsoft Corporation in the United States and/or other countries.

**RAM**® and RAM Mount™ are both trademarks of National Products Inc., 1205 S. Orr Street, Seattle, WA 98108.

**My-T-Soft**® is a registered trademark of Innovation Management Group, Inc.

**BC-WEDGE**™ is a trademark of TAL Technologies (TALtech).

**Intel**® and Pentium® are registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

**Summit** Data Communications, Inc. Summit Data Communications, the Summit logo, and "The Pinnacle of Performance" are trademarks of Summit Data Communications, Inc.

The **Cisco** Square Bridge logo is a trademark of Cisco Systems, Inc.; Aironet, Cisco and Cisco Systems are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

**Symbol**, the Symbol logo and Spectrum24 are registered trademarks of Symbol Technologies, Inc.

The **Bluetooth**® word mark and logos are owned by the Bluetooth SIG, Inc. and any use of such marks by LXE, Inc. is under license.

**Wavelink**®, the Wavelink logo and tagline, Wavelink Studio™, Avalanche Management Console™, Mobile Manager™, and Mobile Manager Enterprise™ are trademarks of Wavelink Corporation, Kirkland, WA.

All other brand or product names are trademarks or registered trademarks of their respective companies or organizations.

When this manual is in PDF format: "**Acrobat**® Reader® Copyright © 2007 Adobe Systems Incorporated. All rights reserved. Adobe®, the Adobe logo, Acrobat®, and the Acrobat logo are registered trademarks of Adobe Systems Incorporated." applies.

**Archive December 2008**

# Revision Notice

## VX5 Reference Guide
## Upgrade From Revision F to Revision G

| Section | Explanation |
|---|---|
| Chapter 1 – Introduction | Added footnote to "Overview" section. |
| Chapter 3 – System Configuration | Revised "Drive C Directory Structure".<br>Revised "Wavelink Avalanche Enabler Configuration" for Avalanche Mobility Center. |
| Appendix B – Technical Specifications | Revised "Physical Specifications". |

*Note: A complete revision history is included in Appendix B, "Technical Specifications".*

# Table of Contents

## Illustrations

# Chapter 1 Introduction

## Overview

The VX5 Vehicle Mount Computer (VMC) is a rugged, vehicle mounted, PC (Personal Computer) running a Microsoft® Windows® operating system and capable of wireless data communications from a fork-lift truck or any properly configured vehicle. The VX5 provides the power and functionality of a desktop computer in a vehicle mounted unit, with a wide range of options:

| | |
|---|---|
| CPU | 933MHz PIII |
| Memory | 256 or 512MB SDRAM |
| Display | Indoor or Outdoor 12.1" display, integrated Touchscreen, adjustable brightness |
| Network connectivity | 2.4 Wireless LAN radio (single or dual antenna)<br>Ethernet port |
| Audio | Speakers in front bezel, audio jack for headset with microphone |
| Storage media [1] | Removable rotating<br>Compact Flash<br>PCMCIA |
| Operating system | Microsoft Windows 2000 or XP Professional<br>No operating system |
| Other options | Extended temperature version (512MB RAM only)<br>RAM Mount™ vehicle mounting |

For information on installing Microsoft Windows on a VX5 ordered with no operating system, please refer to Chapter 3, "System Configuration", section titled "VX5 Delivered with No OS".

### Microsoft Windows License Agreement (First Boot)

If your VX5 is shipped with a Microsoft Windows operating system pre-installed, it is necessary to complete the Windows licensing/registration screens when starting the VX5 for the first time. To complete this information, you need the Microsoft Windows software/product key that was included with the VX5.

Please refer to Chapter 3 "System Configuration", section titled "Microsoft Windows License Agreement (First Boot)" for instruction.

The "VX5 User's Guide" is directed toward the VX5 user. It is delivered on the LXE Documentation CD. It contains safety warnings, descriptions of the controls and connectors, instruction on installing antennas, and day to day operation.

---

[1] The available storage media types and capacity may vary depending on date of manufacture and other VX5 options. Contact your LXE representative for details.

## When to Use this Guide

As the reference for LXE's VX5 equipped with a Microsoft Windows operating system, this guide provides detailed information on its features and functionality. Use this guide as you would any other source book -- reading portions to learn about the VX5, and then referring to it when you need more information about a particular subject.

This chapter, **"Introduction",** briefly describes this reference guide structure, contains setup and installation instruction, briefly describes data entry processes, and explains how to get help.

**Chapter 2 "Physical Description and Layout"** describes the function and layout of the controls and connectors on the VX5. Also included is information on the AC power and DC power connections.

**Chapter 3 "System Configuration"** takes you through the BIOS Setup, hardware configuration, VX5 file structure, system files and Microsoft Windows configuration.

**Chapter 4 "Wireless Network Configuration"** presents information and instruction for using and managing radio cards in the VX5.

**Chapter 5 "Troubleshooting"** is split into several areas. The solution may be found in one area or it may be a combination of the solutions in several areas. It contains a listing of Power On Self Test (POST) messages and run time messages.

**Appendix A "Key Maps"** describes the keypress sequences for the LXE VMC keyboard.

**Appendix B "Technical Specifications"** lists technical specifications including physical, environmental, display and the radios.

## Document Conventions

This reference guide uses the following document conventions:

| | |
|---|---|
| ALL CAPS | All caps are used to represent disk directories, file names, and application names. |
| **Menu** \| **Choice** | Rather than use the phrase “choose the **Save** command from the **File** menu”, this guide uses the convention “choose **File** \| **Save**”. |
| “Quotes” | Indicates the title of a book, chapter or a section within a chapter (for example, “Document Conventions”). |
| < > | Indicates a key on the keyboard (for example, <Enter> ). |
|  | Indicates a reference to other documentation. |
|  | Differences in operation or commands due to radio type. |
|  | Differences in operation or commands due to operating system. |
| **ATTENTION** | Keyword that indicates vital or pivotal information to follow. |
|  | Attention symbol that indicates vital or pivotal information to follow. Also, when marked on product, means to refer to the manual or user’s guide. |
|  | International fuse replacement symbol. When marked on the product, the label includes fuse ratings in volts (v) and amperes (a) for the product. |
| *Note:* | Keyword that indicates immediately relevant information. |
| ***Caution***  | Keyword that indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. |
| **WARNING**  | Keyword that indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury. |
| **DANGER**  | Keyword that indicates an imminent hazardous situation, which, if not avoided, will result in death or serious injury. |

## Quick Start

This section's instructions are based on the assumption that your new system is pre-configured and requires only accessory installation (e.g. antenna, external keyboard and/or barcode scanner) and a power source.

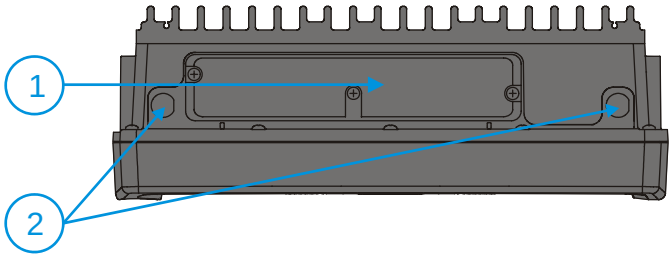
In general, the sequence of events is:

1. Install Vehicle Mounting Bracket (and keyboard mounting bracket) on vehicle.
2. Secure VX5 in Mounting Bracket Assembly.
3. Connect power cable to the VX5. The power cable can also be connected to a UPS battery pack, which is then connected to the VX5.
4. Connect power cable to the VX5.
5. Connect accessories to VX5, e.g. scanner, antenna, keyboard.
6. Secure all cables to the VX5 with the Strain Relief Cable Clamps.
7. Turn the VX5 on.

The VX5 and its keyboard should be mounted in an area in the vehicle where it:

- Does not obstruct the vehicle driver's vision or safe vehicle operation.
- Can be easily accessed by anyone seated in the driver's seat.

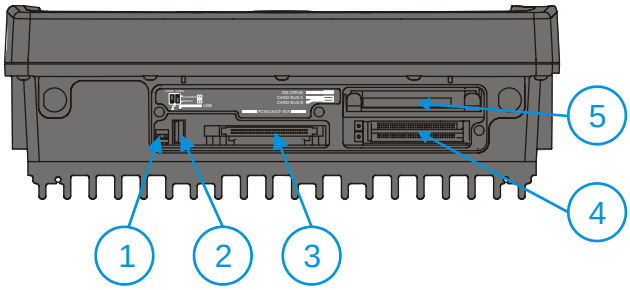
## Components




1 Access Panel Cover (See Following Illustrations for Detail)

2 Antenna Connectors or Hole Plugs

**Figure 1-1 VX5 Components, Top**




1 COM Port DIP Switches

2 USB Connector

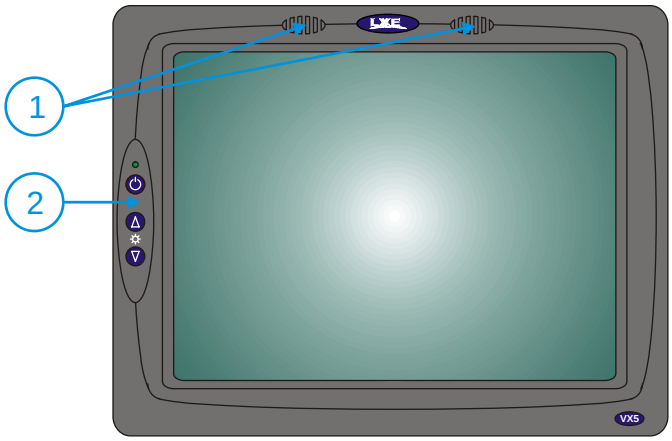
3 ATA Slot (PCMCIA / Compact Flash)

4 CardBus (PCMCIA) Slots

5 IDE Drive

**Figure 1-2 VX5 Access Panel**

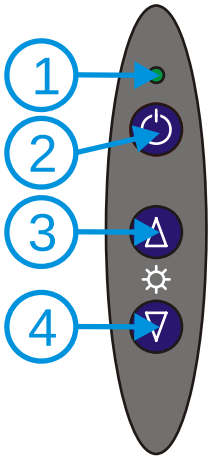
*Note: The tethered access panel cover is not shown in the illustration above.*




1 Speakers

2 Control Panel (See Following Illustrations for Detail)

**Figure 1-3 VX5 Components, Front**



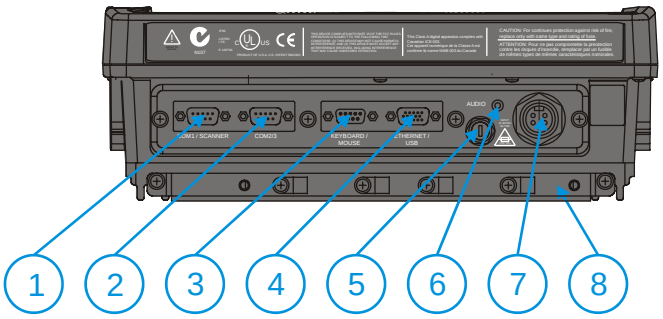

1 Power LED

2 Power Switch

3 Brightness Increase

4 Brightness Decrease

**Figure 1-4 VX5 Control Panel**




1 COM1/Scanner Connector

2 COM2 Connector

3 Keyboard/Mouse Connector

4 Ethernet/USB Cable Connector

5 Fuse

6 Audio Connector

7 Power Cable Connector

8 Cable Strain Relief Bracket and Clips

**Figure 1-5 VX5 Components, Bottom**

*Note: By default, COM1 is configured with Pin 9 +5V and COM2 (labeled either "COM2" or "COM2/3") is configured with Pin 9 RI. Refer to Chapter 3, "System Configuration", for more information.*

## Data Entry

You can enter data into the VX5 through several different methods. A tethered scanner connected to the COM1 serial port provides barcode data entry, the serial ports are used to input/output data, keyboards provide manual entry and the touchscreen also provides manual entry (simulating a desktop PC's mouse).

## Keyboard Data Entry

Refer to "Appendix A - Key Maps" for 101-key keyboard equivalent keypresses.

The keyboard is used to manually input data that is not collected otherwise. Almost any function that a full sized computer keyboard can provide is duplicated on the LXE VMT keyboard but it may take a few more keystrokes to accomplish a keyed task.

When using the LXE 60-key keyboard. almost every key has two or three different functions. The primary alpha or numeric character is printed on the key.

For example, when the <2nd> key is selected pressing the desired second-function key produces the <2nd> character i.e. <2nd> + <F1> toggles the CAPS Lock function. The specific <2nd> character is printed above the corresponding key.

Please refer to "Appendix A - Key Maps" for instruction on the specific keypresses to access all PC-compatible keyboard functions.

## Barcode Data Entry

The VX5 supports an accessory barcode label reading device. Keyboard data entries can be mixed with barcode data entries. Any scanner that decodes the barcode internally and outputs an RS-232 data stream may be used. COM port 1 is designed to be used with a hand held tethered barcode scanner.

COM1 is set to +5V on pin 9 up to accept input from a barcode scanner by default. COM2 pin 9 is set to RI. To change the default settings for pin 9 on either port, refer to Chapter 3: "System Configuration" section titled "Serial Port Pin 9" for details.

## RS-232 Data Entry

The VX5 accepts input from an RS-232 device connected to either RS-232 port, COM1 or COM2. The data is entered at the cursor position, and the data is subject to all of the barcode/RS-232 input menu parameters, such as truncate.

## Touchscreen Entry

*Note: The touch screen should be calibrated before initial use. See "Touchscreen Calibration" in Chapter 3, "System Configuration".*

*Note: Always use the point of the stylus for tapping or making strokes on the display. Never use an actual pen, pencil or sharp object to write on the touch screen.*

The touchscreen input performs the same function as the mouse that is used to point to and click elements on a desk top computer. A stylus is used in the same manner as a mouse – single tap or double tap to select menu options, drag the stylus across text to select, hold the stylus down to activate slider bars, etcetera. Right click is accomplished via the <Ctrl> key, either as pressing of the <Ctrl> key followed by a screen touch or holding the <Ctrl> key down flowed by a screen touch. Please refer to "Configuring Right Click on the Touchscreen" in Chapter 3, "System Configuration" for more details.

*Note: For the 60-key keyboard, the right click MUST BE configured as holding the <Crtl> key followed by a screen touch.*

Hold the stylus as if it were a pen or pencil. Touch an element on the screen with the tip of the stylus then remove the stylus from the screen. The touch screen responds to an actuation force (touch) of up to 4 oz. of pressure.

The touch screen can be used in conjunction with the keyboard and scanner and an input/output device connected to one of the VX5's serial ports.

- Touch the stylus to the field of the data entry form to receive the next data feed.
- The cursor begins to flash in the field.
- The unit is ready to accept data from either the keyboard, integrated scanner or a device connected to a serial port.

*Note: The touchscreen may be disabled. Please refer to "Disabling the Touchscreen" in Chapter 3, "System Configuration" for details.*

## Virtual Keyboard

The optional My-T-Soft® software provides a virtual keyboard on the touchscreen. To start the virtual keyboard, click on the My-T-Soft icon on the desktop or select **Start | Programs | My-T-Soft | My-T-Soft.**

The virtual keyboard provides several configuration options, including:

- Keyboard size
- QWERTY vs. ABCD
- Standard 101 key format vs. Windows 104 key format

For more information on configuring the virtual keyboard, click on **Start | Programs | My-T-Soft | My-T-Soft Setup.**


**Figure 1-6 Virtual Keyboard, Typical Configuration**

Virtual keyboards display the actual character the keypress outputs. For example, pressing the <Shift> key on the virtual keyboard toggles the characters displayed on the keys between upper and lower case.

*Note: When the virtual keyboard is displayed, the physical keyboard is still active, if attached. Therefore it is possible to input data from both keyboards.*

## Getting Help

**All LXE manuals are now available on one CD** and they can also be viewed/downloaded from the LXE website. Contact your LXE representative to obtain the LXE Manuals CD.

You can also get help from LXE by calling the telephone numbers listed on the LXE Manuals CD, in the file titled "Contacting LXE". This information is also available on the LXE website www.lxe.com.

Explanations of terms and acronyms used in this guide are located in the file titled "Glossary" on the LXE Manuals CD.

## Manuals and Accessories

## Manuals

The following manuals are available on the LXE Manuals CD:

- VX5 User's Guide
- RFTerm® Reference Guide
- Contacting LXE
- LXE Technical Glossary

## Accessories

The table below lists the available VX5 accessories.

- Where two parts numbers are listed for a given part, the part number ending in "-R" is the RoHS compliant version.
- When only one part number is listed, the part is RoHS compliant unless otherwise noted.

| | |
|---|---|
| **VX5 Brackets** | |
| Bracket, U Style, VX5 | VX5A001UBRACKET-R |
| Bracket, U Style w/ Integrated Keyboard Mount, VX5 | VX5A001UBRKTWKBDMNT-R |
| Kit, VXX U-Bracket to VX5 Adapter | VX5A002BRKTADPTKIT-R |
| Kit, VXX U-Bracket to VX5 Adapter w/ Keyboard Mount | VX5A002BRKTADPKBDMNT-R |
| Bracket, RAM Mount, VX5 | VX5A003BRKTRAMMOUNT-R |
| Bracket, Combo RAM VMT Mount w/ Keyboard Mount, VX5 | VX5A003BRKTRAMWKBMNT-R |
| Bracket, RAM Squeeze Mount, VX5 | VX5A007BRKTRAMSQZMNT-R |
| Bracket, RAM Squeeze Mount w/ Keyboard Mount, VX5 | VX5A008BRKTRAMSQKBMT-R |
| Bracket, RAM Backup Mounting Plate | 90000A033BACKUPPLATE |
| Bracket, Back, VX5 with Isolators | VX5A006BRKTRAMPARTS-R |
| Custom RAM ball for VX5 Back Bracket | 9000A028RAMPLATEBALL-R |
| Special RAM kit without keyboard mount | VX5A010RAMKIT1 |
| Special RAM kit with keyboard mount | VX5A011RAMKIT2 |
| Std. RAM ball used in VX5A003BRKTRAMWKBMNT-R kit | 990014-0003 |
| Std. RAM arm used in VX5A003BRKTRAMWKBMNT-R kit | 990014-0004 |
| Standard RAM Squeeze ball | 990014-0011 |
| **Keyboard Brackets** | |
| Bracket, Keyboard, Integrated U Style, VX5 | VX5A004BRKTUMOUNT-R |
| Bracket, Keyboard, RAM Mount, VX5 VX7 | 9000A017BRKTKBDRAM-R |
| Bracket, Remote, Keyboard, LXE | 9000A021BRKTRMTLXE<br>9000A012BRKTRMTLXE-R |
| Bracket, Remote, Mouse Keyboard | 9000A018BRKTMKBDRMT<br>9000A018BRKTMKBDRMT-R |
| **Keyboards** | |
| Keyboard, LXE Standard, D9, ANSI/PC Overlay, QWERTY | 9000A157KBDSTDD9ANSI<br>9000A157KBDSTDD9ANSI-R |
| Keyboard, LXE Standard, D9, 5250 Overlay, QWERTY | 9000A158KBDSTDD95250-R |
| Keyboard, LXE Standard, D9, 3270 Overlay, QWERTY | 9000A159KBDSTDD93270<br>9000A159KBDSTDD93270-R |
| Keyboard, Rugged PC Style w/Mouse, PS2 D9 | 9000A160MOUSEKBDD9-R |

| | |
|---|---|
| **Data Cables** | |
| Cable, Combo D15 to USB and Ethernet Adapter 1 Ft | 9000A071CBLD15USBETH |
| Cable, Combo D15 to USB-H, USB-C and Ethernet Adapter | 9000A075CBLUSBHCETH |
| Cable, Keyboard/Mouse Dual PS2 Adapter 1 Ft | 9000A072CBLD9DUALPS2 |
| Cable, Printer/PC, D9 to D25 | 9000A053CBL6D9D25<br>(above part is ***not*** RoHS compliant) |
| Cable, PC, D9 to D9 | 9000A054CBL6D9D9 |
| *Note: Cable 9000A075CBLUSBHCETH (Cable, Combo D15 to USB-H, USB-C and Ethernet Adapter) can be used in place of 9000A071CBLD15USBETH. However, the USB-Client port is not supported when 9000A075CBLUSBHCETH is used with the VX5.* | |
| **Power Cables** | |
| Cable, Input Power, 12 FT, VX5 VX6 VX7 | 9000A073CBLPWR12FT-R |
| Adapter Cable, VX1 VX2 VX4 Power Cable to VX5 VX6 VX7 | 9000A077CBLPWRADPTR |
| **Power Supplies** | |
| Power Supply, External, AC, W/US Power Cord VX5 VX6 VX7 | 9000A318PSACUS-R |
| Power Supply, External, AC, No Power Cord VX5 VX6 VX7 | 9000A318PSACWW-R |
| **UPS Battery and Cables** | |
| Battery, UPS Lead Acid, VX5 VX6 VX7 | 9000A378UPSBATTPACK-R |
| Cable, UPS Battery, Remote Mount Extender, 6 Ft | 9000A074CBLUPSEXTNDR |
| **Antenna and Antenna Mount Kits** | |
| Replacement antenna, 2.4GHz | 153180-0001 |
| Remote Mount Antenna Assembly Kit, 8 Ft Cable | 9000A279ANTREMOTE8-R |
| Remote Mount Antenna Assembly Kit, 6 Ft Cable | 9000A278ANTREMOTE6-R |
| Right Angle Remote Mount Antenna Assembly Kit, 6 Ft Cable | 9000A280ANTREMOTE6RT |
| Right Angle Remote Mount Antenna Assembly Kit, 15 Ft Cable | 9000A281ANTREMOT15RT |
| **Miscellaneous** | |
| Stylus, with Tethers and Sleeves, 5 Pack | 9000A510STYLUS |
| Media BC-WEDGE™ DOS/Windows Taltech Floppy | 9000A485BCWEDGEMEDIA |
| On-Screen Software Keyboard Windows 95 Through XP | 11201 MY-T-SOFT |
| Protective Film, 12 in Display, 10 Pack, VX5 VX7 | 9000A511PROTFILM12IN |
| Software, Drivers, VX5 | VX5A477DRIVERS |
| Bracket, Hard Drive Kit | VX5A005HDDBRACKETKIT-R |
| **Printers** | |
| Zebra, PA400, 240VAC, EC | PA400-050-12100<br>(above part is ***not*** RoHS compliant) |
| Zebra, PA400, 120VAC, US | PA400-050-11100<br>(above part is ***not*** RoHS compliant) |
| Zebra, PA400, 20-80VDC | PA400-050-99100<br>(above part is ***not*** RoHS compliant) |
| Zebra, PT400, 240VAC, EC | PT400-050-12100<br>(above part is ***not*** RoHS compliant) |
| Zebra, PT400, 120VAC, US | PT400-050-11100<br>(above part is ***not*** RoHS compliant) |
| Zebra, PT400, 20-80VDC | PT400-050-99100<br>(above part is ***not*** RoHS compliant) |

| Scanners | |
|---|---|
| Scanner, Powerscan, SR, 8’ Cbl, WW | 8300A326SCNRPWRSR8DA9F<br>8300A326SCNRPWRSR8DA9F-R |
| Scanner, Powerscan, SR, 12’ Cbl, US | 8300A327SCNRPWRSR12DA9F<br>(above part is ***not*** RoHS compliant) |
| Scanner, Powerscan, SR, Low Temp, 8’ Cbl | 8300A332SCNRS8D9FLT<br>(above part is ***not*** RoHS compliant) |
| Scanner, Powerscan, SR, Low Temp, 12’ Cbl | 8300A333SCNRS12D9FLT<br>(above part is ***not*** RoHS compliant) |
| Scanner, Powerscan, LR, 8’ Cbl, WW | 8310A326SCNRPWRLR8DA9F<br>8310A326SCNRPWRLR8DA9F-R |
| Scanner, Powerscan, LR, 12’ Cbl, US | 8310A327SCNRPWRLR12DA9F<br>8310A327SCNRPWRLR12DA9F-R |
| Scanner, Powerscan, LR, Low Temp, 8’ Cbl | 8310A332SCNRL8D9FLT<br>(above part is ***not*** RoHS compliant) |
| Scanner, Powerscan, LR, Low Temp, 12’ Cbl | 8310A333SCNRL12D9FLT<br>(above part is ***not*** RoHS compliant) |
| Scanner, Powerscan, XLR, 8’ Cbl, WW | 8320A326SCNRPWRXLR8DA9F<br>8320A326SCNRPWRXLR8DA9F-R |
| Scanner, Powerscan, XLR, 12’ Cbl, US | 8320A327SCNRPWRXLR12DA9F<br>(above part is ***not*** RoHS compliant) |
| Scanner, Powerscan, XLR, Low Temp, 8’ Cbl | 8320A332SCNRX8D9FLT<br>(above part is ***not*** RoHS compliant) |
| Scanner, Powerscan, XLR, Low Temp, 12’ Cbl | 8320A333SCNRX12D9FLT<br>(above part is ***not*** RoHS compliant) |
| Scanner, LS3408 Fuzzy Logic SR, D9 Interface Cable, 8ft | 8510A326SCNRFZYDA9F<br>8510A326SCNRFZYDA9F-R |
| Scanner, LS3408 Extended Range, D9 Interface Cable, 8ft | 8520A326SCNRERDA9F-R |

# Chapter 2 Physical Description and Layout

## Hardware Configuration

## System Hardware

The VX5 hardware configuration is shown in the following figure.

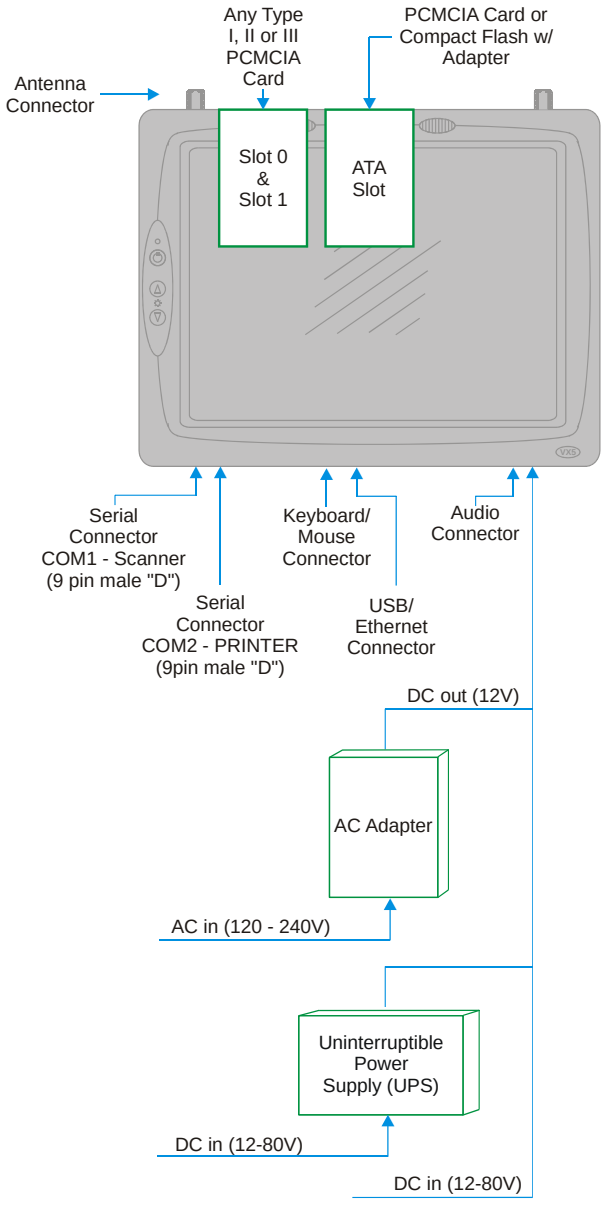



**Figure 2-1 VX5 Hardware Configuration**

## Central Processing Unit

The LXE VX5 contains an Intel Pentium III 933 MHz CPU.

## AT Compatible Core Logic

The LXE VX5 utilizes AT-compatible core logic. The VX5 supports the following I/O components:

- Two 9-pin RS-232 serial ports configured as:
  - COM 1 - 03F8h; IRQ4 (SCANNER port, labeled "COM1/SCANNER),
  - COM 2 - 02F8h; IRQ3 (PRINTER/PC port, labeled either "COM2" or " COM2/3")

  *Note: There is no COM3 port on a VX5.*
- Two CardBus slots (supporting Type I, II or III PCMCIA cards), accepts two (2) Type II cards or one (1) Type III card.
- One slot for ATA memory cards supporting PCMCIA or compact flash format, configured as secondary IDE.
- Primary IDE, usually an internal hard drive.
- LXE VMT or standard PS/2 keyboard (via a watertight connector).
- Two USB ports, conforming to USB 1.0 specifications
  - One external USB port via dongle cable
  - One internal USB port accessible by removing access panel cover.
- One audio jack providing monaural audio output.
- Ethernet port via dongle cable.

*Note: Using switches inside the user access panel, Pin 9 of COM1 and COM2 may be configured to provide 5 volts DC to power a barcode scanner or RI for serial transfer.*

## System Memory

Main system memory is 256 or 512MB SDRAM.

## Upper Memory Block

The upper memory area, or Upper Memory Block (UMB), consists of memory between 640KB and 1 MB. It occupies the address range A0000H – FFFFFH and includes the areas used to shadow various system software components.

## Flash BIOS

256KB of flash BIOS memory is included.

## Video Subsystem

The LXE VX5 video subsystem consists of a color TFT display. The video subsystem complies with the VESA VL bus standard. The resolution of this display is 800 by 600 pixels. This resolution complies with the SVGA graphics industry standard.

The AGP video controller uses a portion of the system memory. As installed in the VX5, the video controller uses about 2MB of system memory.

The display supports screen blanking to eliminate driver distraction when the vehicle is in motion. Please see "Technical Specifications – Screen Blanking Cable" later in this chapter and "Screen Blanking Service" in Chapter 3, "System Configuration" for details.

## Power Input

Vehicle power input for the VX5 is 12V to 80V DC nominal and is accepted without the need to perform any manual operation within the VX5.

If 12V to 60V DC power is not available – for example, in an office environment – an optional external Universal Input Power Supply can be used to convert AC wall power to an appropriate DC level. See "Power Supply", later in this chapter, sub-section titled "External Power Supply."

Power input is fused for protection and the fuse is externally accessible.

### Uninterruptible Power Supply

A DC uninterruptible power supply (UPS) battery is available to maintain power to the VX5 for a minimum of 15 minutes when vehicle power is not available (such as when a vehicle battery is being swapped).

### Backup Battery

The LXE VX5 has a permanent lithium battery installed to maintain time, date and BIOS setup information. The backup battery is not user serviceable and should last five years with normal use before it requires replacement.

*Note: This battery should only be changed by authorized service personnel.*

## PCMCIA Slots

Microsoft Windows Plug and Play operating system controls the CardBus/PCMCIA cards. These cards are hot swappable per the CardBus/PCMCIA specifications.

The ATA slot is not hot swappable. The VX5 must be powered down to insert or remove an ATA card.

## Power Management

The VX5 uses Microsoft Windows Power Management. The VX5 has two operating modes: Normal and Standby.

In Normal operating mode all systems are powered up and the video display is on. The RS-232 ports, any installed PCMCIA cards are active. However, Microsoft Windows also allows the display and hard disks to be shut down in normal mode to conserve energy.

The Standby mode shuts down many devices such as the display and hard drives. For complete details on the standby mode, please refer to the Microsoft Windows help screens.

# Physical Controls

## On/Off Switch

The power (on/off) switch is a push button switch located on the front control panel of the VX5. The switch is a momentary switch. If the VX5 is Off, pressing the power switch turns the VX5 On. If the VX5 is On, Windows determines the results of a power button press. For example, the VX5 may be configured to:

- Shut down
- Hibernate
- Ignore the power button press
- Ask user to choose.

Pressing and holding the power switch for several seconds forces a reboot.

The Status LED, located on the VX5 control panel is lit when the power is on:

- **Green** – VX5 is operating from vehicle power or AC power.
- **Solid Yellow** – VX5 is operating from the UPS, UPS battery is good.
- **Flashing Yellow** – VX5 is operating from the UPS, UPS battery is critically low.

*Note: Always turn the computer off prior to removing power cables.*

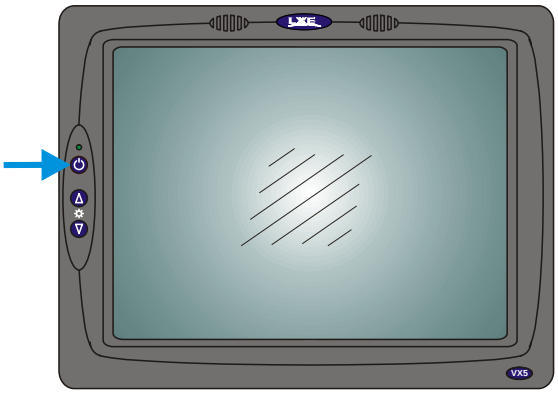


**Figure 2-2 The Power (On/Off) Switch**

The VX5 is designed for a controlled shutdown when using the power switch. A controlled shutdown first closes any open programs, and then shuts down the Windows operating system. DO NOT remove power from the VX5 without shutting down the VX5.

The VX5 shutdown may be initiated in any of the following ways:

- Selecting the "Shut Down" option from the Windows Start Menu.
- Selecting the "Shut Down" option from the Windows Task Manager. The Windows Task Manager is displayed by pressing Ctrl-Alt-Del.
- Momentarily pressing and releasing the power button. The VX5 behavior when the power button is pressed can be configured in the Windows Control Panel.
- Pressing and holding the power button for approximately five seconds. Any open programs and the Windows operating system are shut down before power off. Note that this option must be used to shut down when the operating system is not responding.

For more information on the Windows shutdown process, please refer to the Windows help function or commercially available Windows help guides.

## External Connectors

Most external connectors for the VX5 are located on the bottom of the unit.

- The Keyboard/Mouse connector accepts an LXE VMT keyboard or a dongle cable for a PS/2 keyboard and mouse.
- COM 1 connects to a serial barcode scanner cable.
- COM 2 connects to a serial printer or PC with the appropriate cables.
- The USB/Ethernet connector accepts a dongle cable providing a USB port and Ethernet port.
- Audio connects to a mono telephone headset/microphone.

*Note: Pin 9 of the COM ports can be switched between +5V and RI to change between a barcode scanner and a serial port printer or PC cable. See Chapter 3: "System Configuration" section titled "Serial Port Pin 9". The COM2 port is labeled either "COM2" or "COM2/3".*

Other external connectors are located as follows:

- Antenna connectors are located on the top of the VX5. VX5's can be configured for a single antenna or dual antennas.
- A USB port is available inside the access panel.

## Scanner Serial Connector (COM1)

The serial connector, with a SCANNER label, (configured as COM1) is industry-standard RS-232. The connector includes a PC/AT standard 9–pin "D" male connector. Jumpers on the system board control the function of pin 9. Pin 9 is capable of supplying +5 VDC at 0.4A (max) for an external bar code scanner. Refer to Chapter 3: "System Configuration" section titled "Serial Port Pin 9" for more information on configuring pin 9.

If COM1 is not being used for a scanner, it can also be used for screen blanking when the vehicle is in motion. Please see "Technical Specifications – Screen Blanking Cable" in the following section for more details.

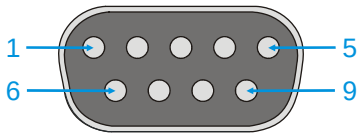



**Figure 2-3 Scanner Serial Connector (COM1)**

### Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | DCD | Data Carrier Detect – Input |
| 2 | RXD | Receive Data – Input |
| 3 | TXD | Transmit Data – Output |
| 4 | DTR | Data Terminal Ready – Output |
| 5 | GND | Signal/Power Ground |
| 6 | DSR | Data Set Ready – Input |
| 7 | RTS | Request to Send – Output |
| 8 | CTS | Clear to Send – Input |
| 9 | +5VDC<br>or<br>RI | Barcode Scanner Power – 400mA max (Default)<br>or<br>Ring Indicator – Input |
| Shell | CGND | Chassis Ground |

*Note: Pin 9 of the COM port can be switched between +5V and RI. See Chapter 3: "System Configuration" section titled "Serial Port Pin 9".*

## Printer/PC Serial Connector (COM2)

The COM2 serial connector, with either a “COM2” or a “COM2/3” label, is an industry-standard RS-232 9-pin “D” connector. The connector and its pin assignments are shown below.

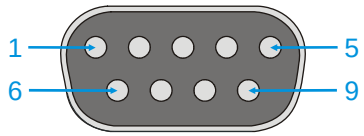



**Figure 2-4 The Printer/PC Serial Connector (COM2)**

### Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | DCD | Data Carrier Detect – Input |
| 2 | RXD | Receive Data – Input |
| 3 | TXD | Transmit Data – Output |
| 4 | DTR | Data Terminal Ready – Output |
| 5 | GND | Signal/Power Ground |
| 6 | DSR | Data Set Ready – Input |
| 7 | RTS | Request to Send – Output |
| 8 | CTS | Clear to Send – Input |
| 9 | RI<br>or<br>+5VDC | Ring Indicator – Input (default)<br>or<br>Bar Code Scanner Power – 400mA max |
| Shell | CGND | Chassis Ground |

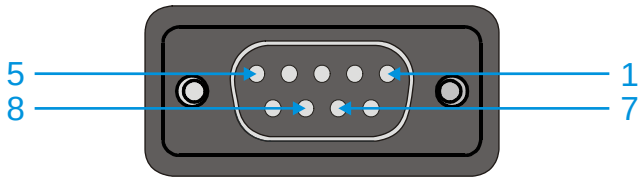
*Note: Pin 9 of the COM port can be switched between +5V and RI. See Chapter 3: “System Configuration” section titled “Serial Port Pin 9”.*

## Technical Specifications – Screen Blanking Cable

The customer must supply their own cable. The cable must be designed so that pin 7 (RTS – Request to Send Output) and pin 8 (Clear to Send Input) of a D9 female connector provide continuity only when the vehicle is stopped (for example, via a switch on the accelerator pedal of the fork truck). All other pins on the connector must be left unconnected. If pins 7 and 8 do not provide continuity (or the cable is removed), the VX5 screen remains blank.

### Serial cable:

Customer built cable with the following specifications:




### Pinout:

| DB9 female | Function |
|---|---|
| 1 | Not Used |
| 2 | Not Used |
| 3 | Not Used |
| 4 | Not Used |
| 5 | Not Used |
| 6 | Not Used |
| 7 | No signal when in motion,<br>Continuity to Pin 8 when stopped |
| 8 | No signal when in motion,<br>Continuity to Pin 7 when stopped |
| 9 | Not Used |

**Figure 2-5 Pinout – Screen Blanking Cable**

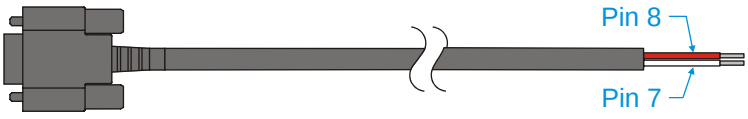



**Figure 2-6 Sample Cable for Screen Blanking**

Please refer to "Screen Blanking Utility" in Chapter 3, "System Configuration", for information on the screen blanking application.

## Keyboard/Mouse Connector

The VX5 external keyboard connector accepts:

- An LXE VMT keyboard with integrated pointing device
- An LXE VMT keyboard without integrated pointing device
- A dongle cable providing PS/2 connections for a standard PS/2 keyboard and mouse.

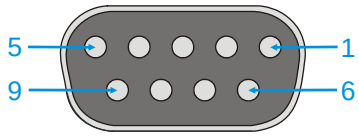



**Figure 2-7 VX5 Keyboard Connector and External Keyboard Cable Connector**

The +5V supply available from the connector is current limited at 400mA.

### Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | KBDAT_A | Keyboard Data |
| 2 | MSDAT_A | Mouse Data |
| 3 | – | Not Connected |
| 4 | MSCLK_A | Mouse Clock |
| 5 | DGND | System Ground |
| 6 | – | Not Connected |
| 7 | KBCLK_A | Keyboard Clock |
| 8 | /BL_ENABLE | Keyboard Backlight Enable |
| 9 | KDB_PWR | Keyboard Power, 5V |
| Shell | CGND | Chassis Ground |

## PS/2 Keyboard/Mouse Dongle Cable

The PS/2 keyboard/mouse dongle cable allows a standard PS/2 keyboard and/or mouse to be attached to the VX5. The PS/2 connectors on the dongle cable are labeled for keyboard and mouse.

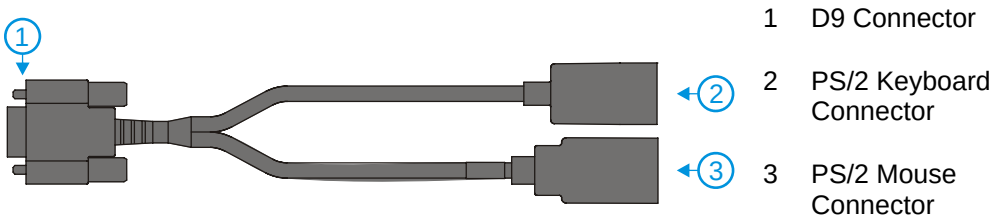



**Figure 2-8 VX5 PS/2 Keyboard/Mouse Dongle Cable**

### D9 Male Connector

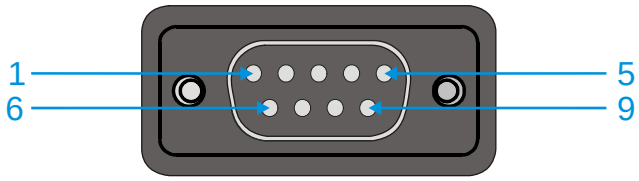



**Figure 2-9 D9 Male Connector**

### Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | KBDAT_A | Keyboard Data |
| 2 | MSDAT_A | Mouse Data |
| 3 | – | Not Connected |
| 4 | MSCLK_A | Mouse Clock |
| 5 | DGND | System Ground |
| 6 | – | Not Connected |
| 7 | KBCLK_A | Keyboard Clock |
| 8 | /BL_ENABLE | Keyboard Backlight Enable |
| 9 | KB_PWR | Keyboard Power, 5V |
| Shell | CGND | Chassis Ground |

## PS/2 Keyboard Connector

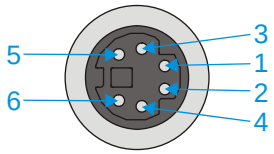



**Figure 2-10 PS/2 Keyboard Connector**

### Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | KBDAT_A | Keyboard Data |
| 2 | – | Not Connected |
| 3 | DGND | System Ground |
| 4 | KBD_PWR | Keyboard Power, 5V |
| 5 | KBCLK_A | Keyboard Clock |
| 6 | – | Not Connected |
| Shell | CGND | Chassis Ground |

## PS/2 Mouse

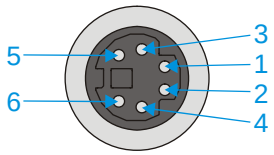



**Figure 2-11 PS/2 Mouse Connector**

### Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | MSDAT_A | Mouse Data |
| 2 | – | Not Connected |
| 3 | DGND | System Ground |
| 4 | KBD_PWR | Keyboard Power, 5V |
| 5 | MSCLK_A | Mouse Clock |
| 6 | – | Not Connected |
| Shell | CGND | Chassis Ground |

## Ethernet/USB Connector

The VX5 Ethernet/USB connector accepts a dongle cable that provides a USB port and an Ethernet port. The connector is shown below.

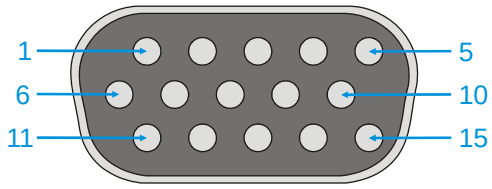



**Figure 2-12 VX5 USB Connector and External USB Adapter Cable Connector**

### Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | USB2N_A | USB D – |
| 2 | – | Not Connected |
| 3 | – | Not Connected |
| 4 | RXP | Receive + |
| 5 | RXN | Receive – |
| 6 | USB2P_A | USB D + |
| 7 | DGND | USB Power Return |
| 8 | – | Not Connected |
| 9 | RJ45_45 | RJ45, Pins 4 and 5 Connections |
| 10 | RJ45_78 | RJ45, Pins 7 and 8 Connections |
| 11 | 5V_USB_23 | USB Power, Current Limited |
| 12 | – | Not Connected |
| 13 | – | Not Connected |
| 14 | TXN | Transmit – |
| 15 | TXP | Transmit + |
| Shell | CGND | Chassis Ground |

## Ethernet/USB Dongle Cable

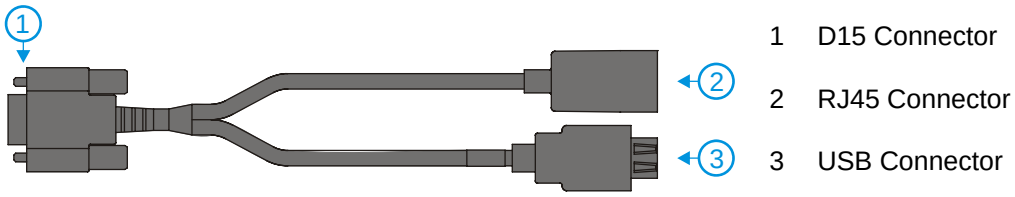



**Figure 2-13 VX5 Ethernet/USB Dongle Cable**

### D15 Female Connector

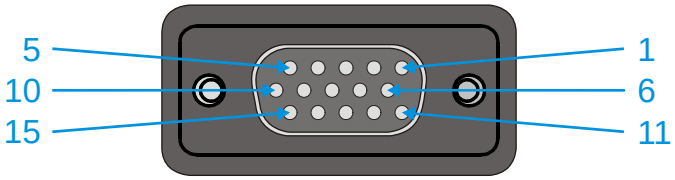



**Figure 2-14 D15 Female Connector**

### Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | USB2N_A | USB D – |
| 2 | – | Not Connected |
| 3 | – | Not Connected |
| 4 | RXP | Receive + |
| 5 | RXN | Receive – |
| 6 | USB2P_A | USB D + |
| 7 | DGND | USB Power Return |
| 8 | – | Not Connected |
| 9 | RJ45_45 | RJ45, Pins 4 and 5 Connections |
| 10 | RJ45_78 | RJ45, Pins 7 and 8 Connections |
| 11 | 5V_USB_23 | USB Power, Current Limited |
| 12 | – | Not Connected |
| 13 | – | Not Connected |
| 14 | TXN | Transmit – |
| 15 | TXP | Transmit + |
| Shell | CGND | Chassis Ground |

## USB Connector

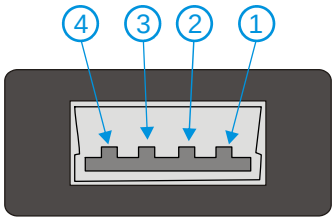



**Figure 2-15 Dongle Cable USB Port**

## Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | 5V_USB_23 | USB Power, Current Limited |
| 2 | USB2N_A | USD D – |
| 3 | USB2P_A | USB D + |
| 4 | DGND | USB Power Return |
| Shell | CGND | Chassis Ground |

## RJ45 Connector

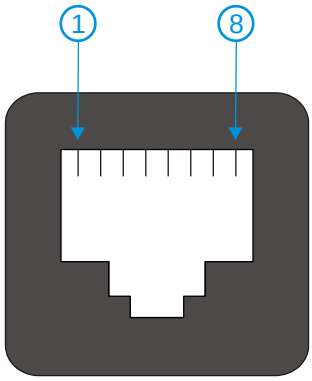



**Figure 2-16 Dongle Cable Ethernet Port**

## Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | TXP | Transmit + |
| 2 | TXN | Transmit – |
| 3 | RXP | Receive + |
| 4 | – | Not Connected |
| 5 | – | Not Connected |
| 6 | RXN | Receive – |
| 7 | – | Not Connected |
| 8 | – | Not Connected |

## Audio Connector

The VX5 audio connector accepts a headset with a 2.5mm plug, such as a mono telephone headset with microphone.

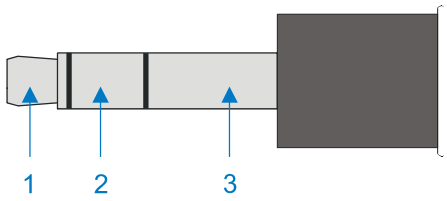



**Figure 2-17 VX5 Audio Jack for External Speaker or Headphones**

*Note: The VX5 is not configured for standard PC speakers.*

### Pinout

| Pin | Description |
|---|---|
| 1 | Microphone (Not connected in VX5) |
| 2 | Speaker |
| 3 | Ground |

## Power Supply Connector

Power is supplied to the VX5 through the power connector. Additionally this assembly provides a connection point for the vehicle's chassis ground to be connected internally to the conductive chassis of the computer.

The VX5 internal power supply can accept DC input voltages in the range of 12 to 80 Volts.

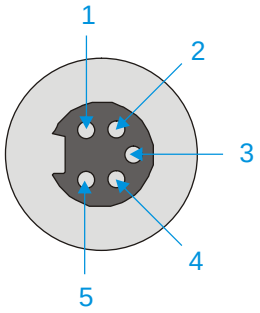



**Figure 2-18 The Power Connector**

### Pinout

| Pin | Signal |
|---|---|
| 1 | DC Positive (+) |
| 2 | UPS Battery Positive (+) |
| 3 | Chassis Ground |
| 4 | UPS Battery Negative (–) |
| 5 | DC Negative (–) |

## UPS Battery Pack Connectors

### Input

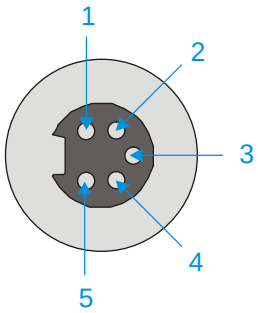



**Figure 2-19 The UPS Battery Pack Input Connector**

### Pinout

| Pin | Signal |
|---|---|
| 1 | DC Positive (+) |
| 2 | Not used |
| 3 | Chassis Ground |
| 4 | Not used |
| 5 | DC Negative (–) |

### Output

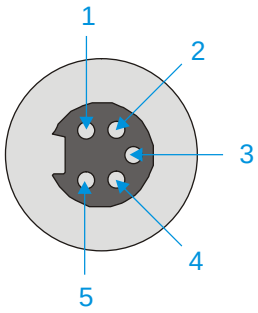



**Figure 2-20 The UPS Battery Pack Output Connector**

### Pinout

| Pin | Signal |
|---|---|
| 1 | DC Positive (+) |
| 2 | UPS Battery Positive (+) |
| 3 | Chassis Ground |
| 4 | UPS Battery Negative (–) |
| 5 | DC Negative (–) |

## UPS Battery Extension Cable Connectors

### Input

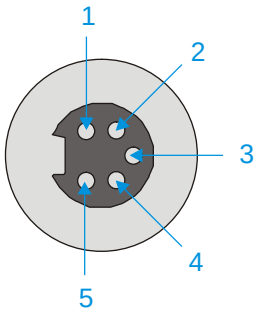



**Figure 2-21 The UPS Battery Extension Cable Input Connector**

### Pinout

| Pin | Signal |
|---|---|
| 1 | DC Positive (+) |
| 2 | UPS Battery Positive (+) |
| 3 | Chassis Ground |
| 4 | UPS Battery Negative (–) |
| 5 | DC Negative (–) |

### Output

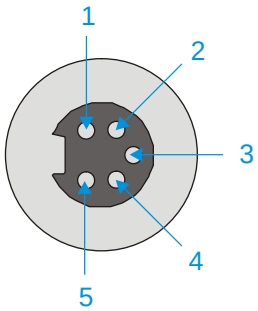


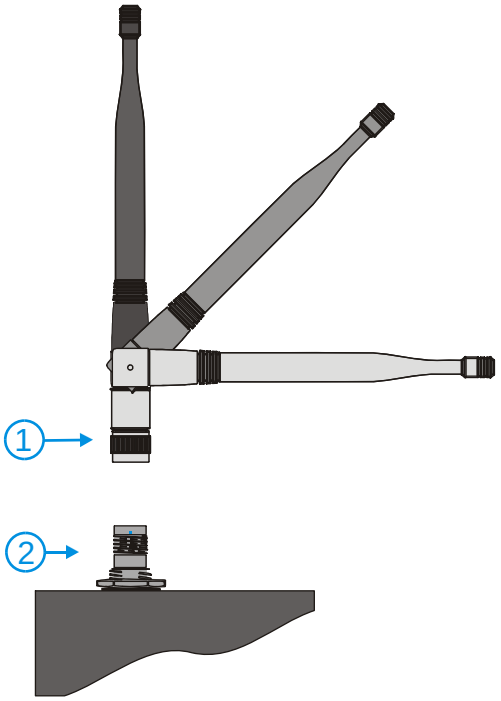

**Figure 2-22 The UPS Battery Extension Cable Output Connector**

### Pinout

| Pin | Signal |
|---|---|
| 1 | DC Positive (+) |
| 2 | UPS Battery Positive (+) |
| 3 | Chassis Ground |
| 4 | UPS Battery Negative (–) |
| 5 | DC Negative (–) |

## Antenna Connector

*Note: VX5's equipped with a radio require an external antenna. A VX5 without a radio does not use an antenna. Some VX5's may be equipped with a dual antenna option. For these VX5's, an external antenna must be connected to each antenna connector.*




1. Antenna
2. Antenna Connector

**Figure 2-23 2.4GHz Antennas**

### Spread Spectrum RF Antenna Connector Pin

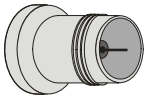


**Figure 2-24 RF Antenna SS Connector**

### Vehicle Remote Antenna Mount

The external antenna (or antennas) can be remotely mounted on the vehicle. Please refer to the "Vehicle Remote Mount Antenna Installation Sheet" for details.

## Internal USB Port

An internal USB port can be accessed by removing the access panel cover. This port conforms to USB 1.0 specifications.

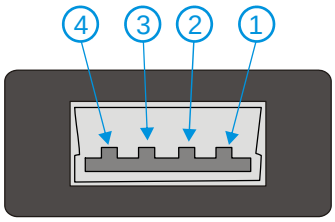



**Figure 2-25 Dongle Cable USB Port**

### Pinout

| Pin | Signal | Description |
|---|---|---|
| 1 | 5V_USB_23 | USB Power, Current Limited |
| 2 | USB2N_A | USD D – |
| 3 | USB2P_A | USB D + |
| 4 | DGND | USB Power Return |
| Shell | CGND | Chassis Ground |

## The Keyboards

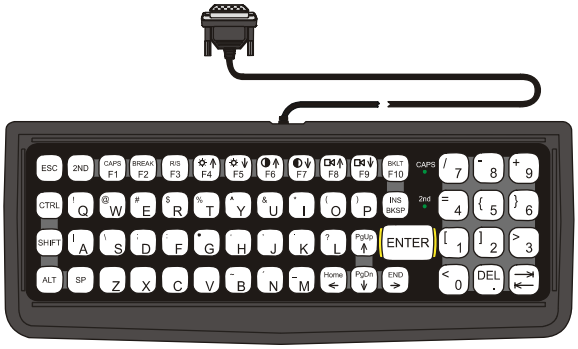
The following keyboard options are available for the VX5:

The LXE VMT keyboards are customized rugged keyboards, connected to the VX5 via a watertight connector. The keyboards are available in the following configurations:

- LXE VMT 95-key QWERTY keyboard with integrated pointing device – a customized rugged keyboard connected to the VX5 via a watertight connector.
- LXE VMT 60-key QWERTY keyboard – a customized rugged keyboard connected to the VX5 via a watertight connector
- A standard PS/2 keyboard via an adapter cable attached to the "Keyboard/MOUSE" port on the VX5. The adapter cable also provides a connector for a PS/2 mouse.
- A software keyboard, or virtual keyboard, can be displayed on the touch screen. The virtual keyboard can be used in place of, or in addition to, a physical keyboard.

For more details on each keyboard type, please refer to the appropriate section later in this chapter.

95 key with Integrated Pointing Device



60 key

**Figure 2-26 The LXE VMT Keyboards with Cable**

## The 95-key QWERTY Keyboard with Pointing Device

Designed for ease of use with Windows operating systems, the 95-key keyboard with pointing device connects via a cable to the keyboard port on the VX5. Additional Windows keys (the Windows logo key and the Application key) and an integrated pointing device are provided for ease of use with Windows operating systems.


**Figure 2-27 The 95-key QWERTY Keyboard**

### Key Maps

The 95-key keyboard supports all 104 keyboard functions (101 keyboard standard plus Windows keys) and includes an integrated pointing device and left and right mouse buttons. However, because the keyboard only has 95 keys, all functions are not visible (or printed on the keyboard). Therefore the VX5 keyboard supports what is called hidden keys -- keys that are accessible but not visible on the keyboard.

As with a standard keyboard, many keys are found in the Alphanumeric section as well as on the Numeric keypad (i.e. the 1 key is found on the numeric keypad and above the alpha characters on standard keyboards). However these keys send distinctly different scan codes when the keys are pressed. The hidden keys supported by the VX5 are listed in Appendix A, "Key Maps".

*Note: The 95-key keyboard does not have a 2nd key function.*

### NumLock and the VX5

For the 95-key keyboard, the NumLock key and the numeric keys are backlit **green** when NumLock is off. When NumLock is on, the backlight for the NumLock key and the numeric keys is **amber**.

### CapsLock, Scroll Lock and the VX5

For the 95-key keyboard, the CapsLock key is backlit **green** when CapsLock is off. When CapsLock is on, the backlight for the CapsLock key is **amber**.

The Scroll Lock key is backlit **green** when Scroll Lock is off. When Scroll Lock is on, the backlight for the Scroll Lock key is **amber**.

The default values for CapsLock and Scroll Lock are Off.

## Keyboard Backlight

The 95-key keyboard backlights each key with an LED. The keyboard backlight is manually controlled using the “backlight” key in the upper right hand corner of the keyboard. Pressing the backlight key cycles the keyboard backlight through the levels of backlight intensity:

- Off
- Maximum intensity
- Medium intensity
- Low intensity.

## The 60-key QWERTY Keyboard

The 60-key keyboard has 101 keyboard functions, including a numeric keyboard pad. Please refer to Appendix A, “Key Maps”, for keypress combinations.

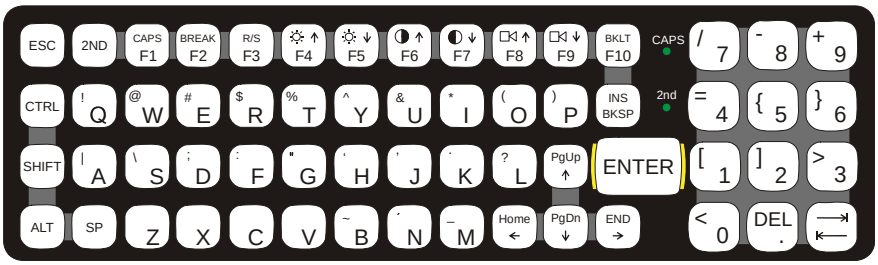



**Figure 2-28 The 60-key QWERTY Keyboard**

*Note: With the 60-key keyboard, the touchscreen MUST BE configured to recognize holding the <Ctrl> key then touching the screen as a right click. Please refer to “Configuring Right Click on the Touchscreen” in Chapter 3, “System Configuration” for more details.*

### IBM 3270 Keypad Overlay

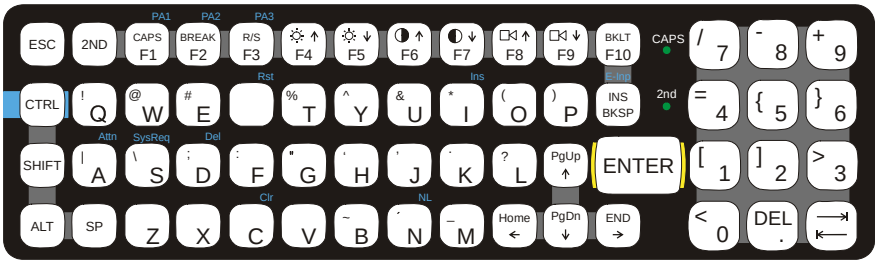



**Figure 2-29 IBM 3270 Specific Keypad**

The 60-key keypad is available with an IBM 3270 overlay designed to allow the user to enter terminal emulator commands when running LXE’s RFTerm® program.

### IBM 5250 Keypad Overlay

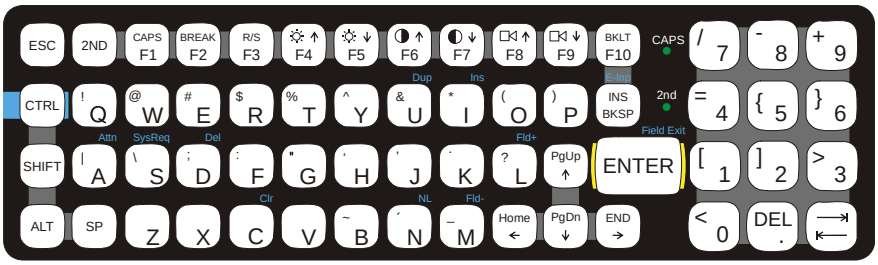



**Figure 2-30 IBM 5250 Specific Keypad**

The 60-key keypad is available with an IBM 5250 overlay designed to allow the user to enter terminal emulator commands when running LXE’s RFTerm® program.

## Key Maps

The 60-key keyboard supports all 101 keyboard functions. However, because the keyboard only has 60 keys, all functions are not visible (or printed on the keyboard). Therefore the VX5 keyboard supports what is called hidden keys -- keys that are accessible but not visible on the keyboard.

On standard keyboards many keys are found in the Alphanumeric section as well as on the Numeric keypad (i.e. the 1 key is found on the numeric keypad and above the alpha characters on standard keyboards). However these keys send distinctly different scan codes when the keys are pressed. The default codes for the VX5 number keys correspond to the numeric keypad on standard keyboards. In order to duplicate the codes sent when the alphanumeric key is pressed, the hidden keystroke must be used.

The hidden keys supported by the VX5 are listed in Appendix A, “Key Maps”.

## Unused Key Functions

There are several key functions on the 60-key keyboard that are not used on the VX5. These include:

- <2nd> <F3> – The Resume/Suspend function is not used as Microsoft Windows controls all power management modes.
- <2nd> <F4> and <2nd> <F5> – The Display Brightness functions are not used as the display brightness is adjusted by the buttons on the VX5 control panel.
- <2nd> <F6> and <2nd> <F7> – The Contrast functions are not used as the contrast is not adjustable on the TFT display on the VX5.
- <2nd> <F8> and <2nd> <F9> – The Volume control keys are not used as volume is adjusted via the Microsoft Windows Volume icon in the System Tray.
- <2nd> <F10> – Please see “Keyboard Backlight” later in this section for details on toggling the keyboard backlight.

## NumLock and the VX5

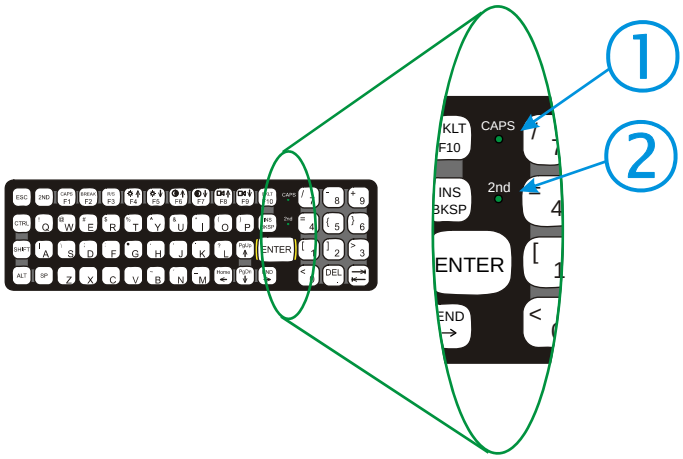
The 60-key keyboard does not have a NumLock indicator or key. NumLock can be toggled On or Off using the <2nd> <SHIFT> <F10> keypress sequence.

## Keyboard Backlight

The LXE keyboard keys are backlit with LEDs. The backlight is manually controlled using the <2nd> + <CTRL> + <F10> keypress sequence.

## Keyboard LEDs

The VX5 keyboard has three (2) LED indicators.




1. CapsLock Mode LED Indicator
2. Secondary Mode LED Indicator

**Figure 2-31 Keyboard LEDs**

## CAPS LED

This LED indicates the state of the keyboard CapsLock mode. If CapsLock is enabled this LED is illuminated green. When CapsLock is off, the LED is dark.

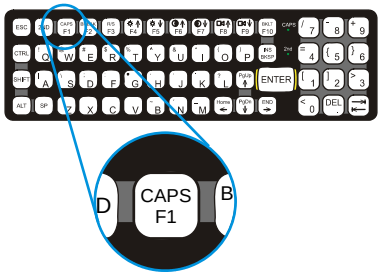



**Figure 2-32 The CapsLock Key**

Press <2nd> then <F1> to toggle CapsLock On and Off.

The default value of CapsLock is “Off”.

## Secondary Keys LED

The VMT keyboard is equipped with several secondary keys. These keys are identified by the superscripted text found on the keyboard keys. The secondary keys are accessible by using two (2) keystrokes: the <2nd> key followed by the superscripted key.

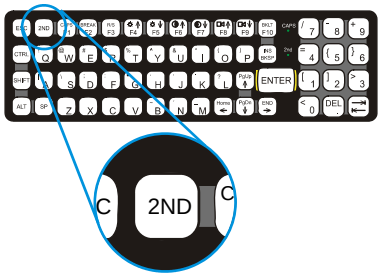



**Figure 2-33 The Secondary Key**

Once the <2nd> state is enabled (by pressing the <2nd> key) the Secondary Mode LED is illuminated and the <2nd> state is enabled until another key is pressed. The <2nd> key is toggled on with a <2nd> keypress and then immediately off with another <2nd> keypress.

**For example:**

Press <2nd> and <F1> to turn CapsLock on and off.

Press <2nd> and <↑> to initiate the PgUp command.

Press <2nd> and <Q> to type the "!" key.

Press <2nd> and <BkSp> to enter the Insert (Ins) mode.

## Control Keys

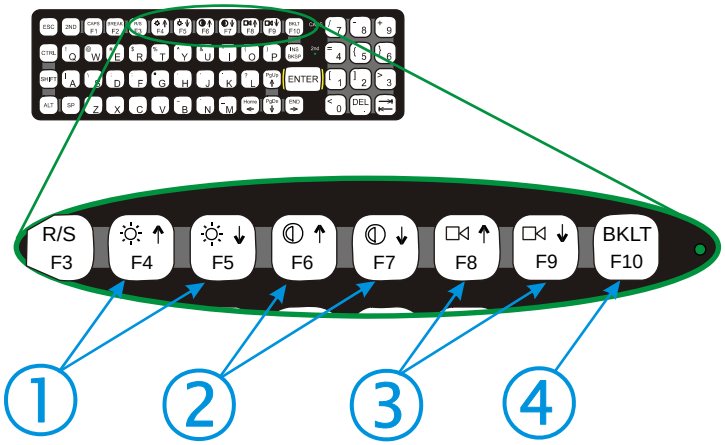
The VMT keyboard has several control keys. Because of the construction of the VX5 and the Microsoft Windows operating system, many of the Control Keys are not used on the VX5.

*Note: The 2nd functions of the <F4> and <F5>keys are not used as the display brightness is adjusted via the buttons on the control panel.*

*The 2nd functions of the <F6>, and <F7> keys are not used as the VX5 has TFT LCD screen with no provision for contrast adjustments.*

*The 2nd functions of the <F8> and <F9> keys are not used as the sound volume on the VX5 is controlled with the Sound icon in the Microsoft Windows System Tray.*

The <F10> key is used to toggle the backlight as part of the keypress sequence <2nd> + <CTRL> + <F10>. This key sequence immediately toggles the status of the keyboard backlight. Pressing <2nd> + <F10> has no effect on the keyboard backlight.




1. Display Brightness Control Keys (Not used)
2. Display Contrast Control Keys (Not used)
3. Speaker Volume Control Keys (Not used)
4. Backlight Control Key (See above)

**Figure 2-34 The VMT Keyboard Display Controls**

## General Windows Keyboard Shortcuts

Use the keyboard shortcuts in the chart below to navigate with any VX5 keyboard. These are standard keyboard shortcuts for Windows applications.

| Press these keys … | To … |
|---|---|
| CTRL + C | Copy |
| CTRL + X | Cut |
| CTRL + V | Paste |
| CTRL + Z | Undo |
| DELETE | Delete |
| SHIFT with any of the arrow keys | Select more than one item in a window or on the desktop, or select text within a document. |
| CTRL+A | Select all. |
| ALT+ESC | Cycle through items in the order they were opened. |
| CTRL+ESC | Display the Start menu. |
| ALT+Underlined letter in a menu name | Display the corresponding menu. |
| Underlined letter in a command name on an open menu | Carry out the corresponding command. |
| ESC | Cancel the current task. |

The touchscreen provides equivalent functionality to a mouse:

- A touch on the touchscreen is equivalent to a left mouse click.
- Many items can be moved by the "drag and drop" method, touching the desired item, moving the stylus across the screen and releasing the stylus in the desired location.
- A double stylus tap is equivalent to a double click.
- Right click is accomplished via the <Ctrl> key, either as pressing of the <Ctrl> key followed by a screen touch or holding the <Ctrl> key down flowed by a screen touch. Please refer to "Configuring Right Click on the Touchscreen" in Chapter 3, "System Configuration". Note that the 60-key keyboard only supports the holding the <Ctrl> key option.

## PS/2 Keyboard/Mouse

A standard PS/2 keyboard and mouse can be attached to the VX5 using the appropriate dongle cable. The dongle cable attaches to the VX5 and provides two PS/2 connectors, one labeled "Keyboard" and one labeled "Mouse". Please refer to documentation provided with the PS/2 keyboard and mouse for more information on their operation.

## Virtual Keyboard

The optional My-T-Soft® software provides a virtual keyboard on the touchscreen. To start the virtual keyboard, click on the My-T-Soft icon on the desktop or select **Start | Programs | My-T-Soft | My-T-Soft.**

The virtual keyboard provides several configuration options, including:

- Keyboard size
- QWERTY vs. ABCD
- Standard 101 key format vs. Windows 104 key format

For more information on configuring the virtual keyboard, click on **Start | Programs | My-T-Soft | My-T-Soft Setup**.

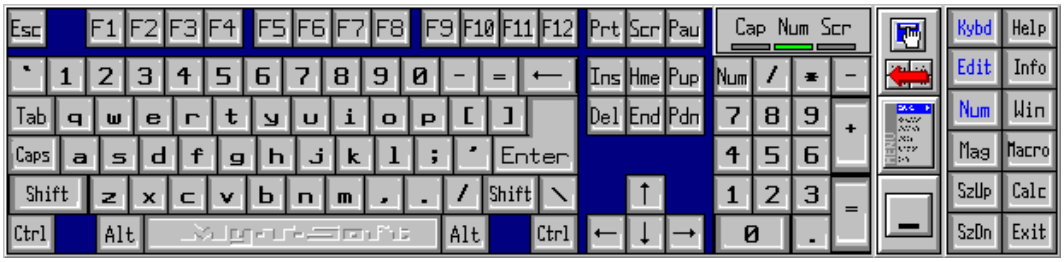



**Figure 2-35 Virtual Keyboard, Typical Configuration**

Virtual keyboards display the actual character the keypress outputs. For example, pressing the <Shift> key on the virtual keyboard toggles the characters displayed on the keys between upper and lower case.

*Note: When the virtual keyboard is displayed, the physical keyboard is still active, if attached. Therefore it is possible to input data from both keyboards.*

## The Display

The VX5 Display is a thin-film transistor display capable of supporting SVGA graphics modes. Display size is 800 x 600 pixels. The display covering is designed to resist stains. The touch screen allows signature capture and touch input.

The display supports screen blanking to eliminate driver distraction when the vehicle is in motion. Please see "Technical Specifications – Screen Blanking Cable" earlier in this chapter and "Screen Blanking Service" in Chapter 3, "System Configuration" for details.

## Cleaning the Display

Keep fingers and rough or sharp objects away from the display. If the glass becomes soiled or smudged, clean only with a standard household cleaner such as Windex® without vinegar or use Isopropyl Alcohol. Do not use paper towels or harsh-chemical-based cleaning fluids since they may result in damage to the glass surface. Use a clean, damp, lint-free cloth. Do not scrub optical surfaces. If possible, clean only those areas which are soiled. Lint/particulates can be removed with clean, filtered canned air.

## Touchscreen

The touch screen is a Resistive Panel with a scratch resistant finish that can detect touches by a stylus, and translate them into computer commands. In effect, it simulates a computer mouse. Only Delrin or plastic styluses should be used.

*Note: Always use the point of the stylus for tapping or making strokes on the display. Never use an actual pen, pencil or sharp object to write on the touch screen.*

An extra or replacement stylus may be ordered from LXE. See the "Accessories" section for the stylus part number.

Please refer to Chapter 3, "System Configuration" for more information on:

- Calibrating the touchscreen
- Disabling the touchscreen.

## Install/Remove Touchscreen Protective Film

LXE offers a replaceable touchscreen protective film to protect the touchscreen when the VX5 is used in an abrasive environment.

### How To Install Touchscreen Protective Film

1. Clean the touchscreen and protective film with a standard household cleaner such as Windex® without vinegar or use Isopropyl Alcohol. Do not use paper towels or harsh-chemical-based cleaning fluids since they may result in damage to the glass surface. Use a clean, damp, lint-free cloth. Do not scrub optical surfaces. If possible, clean only those areas which are soiled. Lint/particulates can be removed with clean, filtered canned air.
2. Center the protective film over the touchscreen. The anti-glare side **must be facing outward**. Do not cut or trim the protective film.
3. The protective film is approximately 1/10" (2.54mm) larger than the touchscreen at the centers of the edges.
4. Slide the protective film so that the one of the edges of the film can be slid between the touchscreen and display housing when the protective film is re-centered on the touchscreen. Repeat for the other three edges, ensuring the protective film is centered over the touchscreen when finished.

When necessary, the film can be cleaned with Windex or an equivalent cleaner as described above.

### How to Remove Touchscreen Protective Film

The protective film can be removed by sliding the film in one direction until the edge clears. Lift up on the edge of the film so it does not slide between the touchscreen and housing when slid back. Repeat until all edges are free and remove the protective film.

## Factory Default Settings

| | |
|---|---|
| Boot Sequence (devices searched in this order) | Removable Devices (i.e. USB floppy drive), Hard Drive, CD-ROM Drive, Network Boot (i.e. PXE) |
| Legacy Floppy (A and B) | Disabled |
| Primary and Secondary Master and Slave drives | Auto |
| Display POST Messages | Disabled |
| Show Summary Screen | Disabled |
| Power Supply | ATX |
| Power Savings | Disabled |
| Onboard LAN RPL BIOS | Disabled |

For more information on the default settings, please refer to Chapter 3, "System Configuration".

## PCMCIA/CardBus and ATA Slots

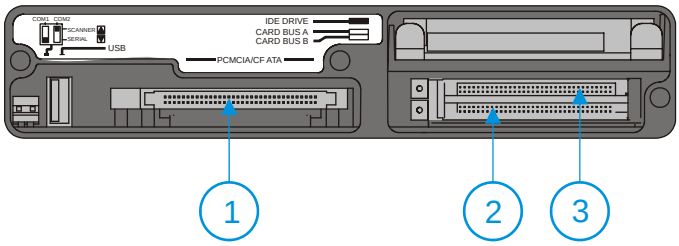
The VX5 has two PCMCIA/CardBus slots and one ATA slot. The PCMCIA slots are stacked on top of each other and located on the right hand side of the opening. The ATA is located on the left hand side of the opening.

The PCMCIA slots support the Personal Computer Memory Card International Association (PCMCIA) 2.1 standards. The upper slot is designated as Slot 0 and the lower slot is designated as Slot 1.

Slot 0 accepts Type I or II PCMCIA cards. If a radio card is used, it must be installed in Slot 0 to prevent damage to the internal radio cables. LXE supports only Type II 2.4GHz Spread Spectrum radios.

Slot 1 accepts Type I, II or III PCMCIA cards. A Type III card can be used only when no card is installed in Slot 0.

The left slot is used for ATA memory cards, either PCMCIA or Compact Flash (CF) format via a PCMCIA adapter. The left slot is connected to the secondary IDE interface.




1. ATA PCMCIA Slot (Left)
2. Slot 1 (Lower Right)
3. Slot 0 (Upper Right)

**Figure 2-36 The PCMCIA and ATA Slots**

## PCMCIA Slots

Slot 0 and 1 PCMCIA Card Management is handled by Microsoft Windows. The PCMCIA cards are Plug and Play devices and can be “hot swapped”. For more details, refer to the Windows help screens or refer to the documentation delivered with the PCMCIA card.

## PCMCIA Pinout

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | GND | 35 | 12V_RF_POWER |
| 2 | D3 | 36 | -CDI |
| 3 | D4 | 37 | D11 |
| 4 | D5 | 38 | D12 |
| 5 | D6 | 39 | D13 |
| 6 | D7 | 40 | D14 |
| 7 | -CE1 | 41 | D15 |
| 8 | A10 | 42 | -CE2 |
| 9 | -OE | 43 | n.c. or VS1# |
| 10 | A11 | 44 | -IORD |
| 11 | A9 | 45 | -IOWR |
| 12 | A8 | 46 | A17 |
| 13 | A13 | 47 | A18 |
| 14 | A14 | 48 | A19 |
| 15 | -WE | 49 | A20 |
| 16 | RDY/-IREQ | 50 | A21 |
| 17 | SLOT_VCC | 51 | SLOT_VCC |
| 18 | SLOT-VPP | 52 | SLOT_VPP |
| 19 | A16 | 53 | A22 |
| 20 | A15 | 54 | A23 |
| 21 | A12 | 55 | A24 |
| 22 | A7 | 56 | A25 |
| 23 | A6 | 57 | n.c. or VS2# |
| 24 | A5 | 58 | RESET |
| 25 | A4 | 59 | -WAIT |
| 26 | A3 | 60 | -INPACK |
| 27 | A2 | 61 | -REG |
| 28 | A1 | 62 | BVD2/-SPKR |
| 29 | A0 | 63 | BDV1/-STSCHG |
| 30 | D0 | 64 | D8 |
| 31 | D1 | 65 | D9 |
| 32 | D2 | 66 | D10 |
| 33 | WP/A_-IOIS16 | 67 | -CD2 |
| 34 | GND | 68 | GND |

## Install PCMCIA Cards

*Equipment Needed:* Phillips No. 1 screwdriver and a Torque wrench capable of measuring to 9±1 inch pounds (1.016±.11 N/m).

*Note: The example below details installing a 2.4GHz radio card. Installation of other PCMCIA cards is similar, except there is no antenna.*

## Install the 2.4GHz PCMCIA Radio

| | |
|---|---|
| ***Caution***  | *The LXE Model VX5 Vehicle Mount Computer is specifically for use with LXE Model Numbers 4830, 6726 and 6816 2.4GHz Type II PCMCIA radios. Substitution of other PCMCIA radios will void the FCC, Industry Canada and other international radio certifications for the Model VX5 Vehicle Mount Computer and is strictly prohibited.* |

1. Turn the VX5 off and detach the power cable.

2. Loosen the three (3) Phillips head screws securing the access panel cover so the cover can be removed. The screws are a captive part of the cover and cannot be removed.

   Partially insert the 2.4GHz Type II PCMCIA Radio into Slot 0 (the upper right slot).

***Caution***  Slot 0 MUST BE used for the radio card. Installing a radio card in Slot 1 can result in pinching or other damage to the internal antenna cable.

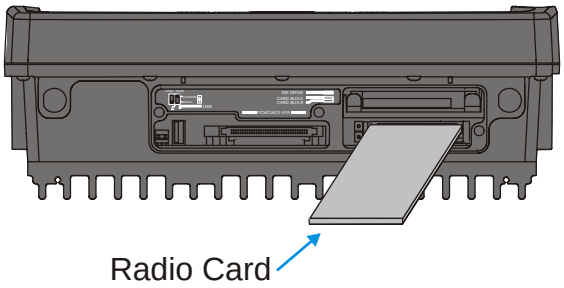



**Figure 2-37 Inserting the 2.4GHz Type II PCMCIA Radio**

*Note: The tethered access panel cover is not shown in the illustration above.*

3. Before completely inserting the 2.4GHz Radio, connect the Antenna Cable to the 2.4GHz Radio, using the port(s) indicated below:

### Summit CF Radio Card

The Summit CF radio is installed on a PCMCIA adapter. Hold the radio card with the antenna ports facing down. Connect the antenna cable(s) as follows:

- Summit radio with single antenna – Connect antenna cable to Main port. Auxiliary port is not used.
- Summit radio with dual antennas – Connect antenna cables to both Main and Auxiliary ports.

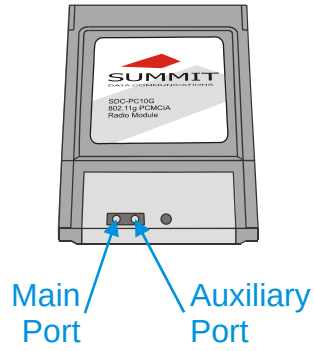



**Figure 2-38 Summit Antenna Cable Connections**

### Cisco Radio Card

- Cisco radio with single antenna – Connect antenna cable to right port, as shown below.
- Cisco radio with dual antennas – Connect antenna cables to both ports.

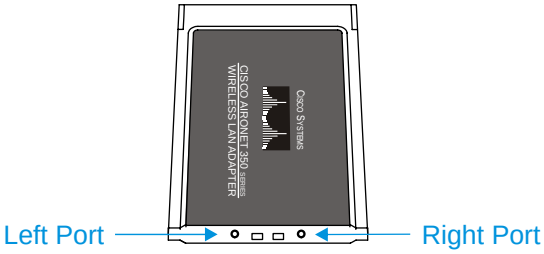



**Figure 2-39 Cisco Antenna Cable Connections**

### Symbol 11Mb Radio Card

- Symbol 11Mb radio with single antenna – Connect antenna cable to left port, as shown below.
- Symbol 11Mb radio with dual antennas – Connect antenna cables to both ports.

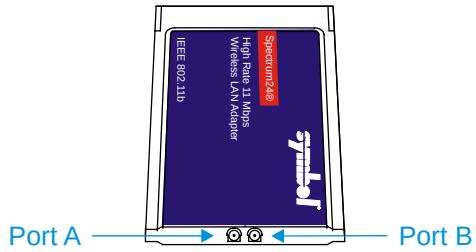



**Figure 2-40 Symbol 11Mb Antenna Cable Connections**

4. Now complete the insertion of the 2.4GHz Type II PCMCIA Radio into Slot 0. Non-radio cards can be inserted into either Slot 0 or Slot 1.

   *Note: When this process is complete, reattach the access cover screws using a torque wrench capable of measuring to 9±1 inch pounds (1.016±.11 N/m). The screws must be fastened to 9 inch pounds each. The screws require a Phillips size 1 driver head.*

5. Re-connect the power cord/cable and turn the VX5 on.

## ATA Slot

The ATA slot is connected to the secondary IDE controller. The slot accepts a PCMCIA card or a compact flash card via a PCMCIA adapter. The VX5 must be powered down before inserting or removing an ATA card.

Only ATA memory cards may be used in these slots. No other types of PCMCIA or compact flash cards may be used in the ATA slots. The ATA slots do not provide for "hot swapping" of cards.

### Install an ATA Card

1. Turn the VX5 off and detach the power cable.
2. Loosen the three (3) Phillips head screws securing the access panel cover so the cover can be removed. The screws are a captive part of the cover and cannot be removed.
3. Insert the card into the ATA slot. This slot accepts an ATA PCMCIA card or a compact flash ATA card in a PCMCIA adapter.

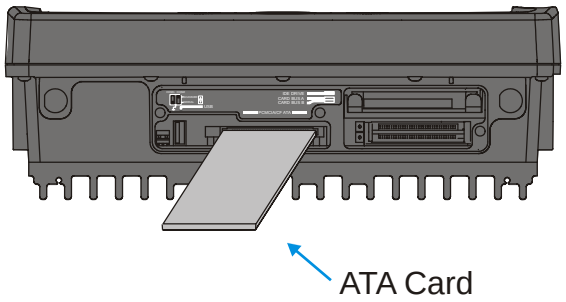



**Figure 2-41 Inserting the ATA Card**

*Note: The tethered access panel cover is not shown in the illustration above.*

*Note: When this process is complete, reattach the access cover screws using a torque wrench capable of measuring to 9±1 inch pounds (1.016±.11 N/m). The screws must be fastened to 9 inch pounds each. The screws require a Phillips size 1 driver head.*

4. Re-connect the power cord/cable and turn the VX5 on.
5. Review the BIOS settings to ensure the ATA card is recognized as the secondary drive.

## Power Supply

AC to DC power input for the VX5 is delivered via an optional external power supply. See "External Power Supply".

Vehicle power input for the VX5 is 12V to 80V DC nominal and is accepted without the need to perform any manual operation within the VX5. See "Vehicle 12-80VDC Direct Connection." An optional uninterruptible power supply (UPS) battery can be used with the vehicle DC power supply.

Power input is fused for protection and the fuse is externally accessible on the VX5.

## External Power Supply


1. AC Input Cable (US only)
2. DC Output Cable

**Figure 2-42 Optional Power Supply Cable**

**In North America, this unit is intended for use with a UL Listed ITE power supply with output rated 12 – 80 VDC, minimum 75 W. Outside North America, this unit is intended for use with an IEC certified ITE power supply with output rated 12 – 80 VDC, minimum 75 W.**

The external power supply may be connected to either a 120V, 60Hz supply or, outside North America, to a 230V, 50Hz supply, using the appropriate detachable cordset. In all cases, connect the external AC supply to a properly grounded source of supply provided with maximum 15 Amp overcurrent protection (10 Amp for 230V circuits).

*Note: Instructions for using this configuration are contained in "VX5 User's Guide" section titled "Installation".*

## Specifications

| Feature | Specification |
|---|---|
| Dimensions | 3.40” x 5.87” x 2.00” |
| Weight | <3.0 pounds |
| Input Power Switch | None |
| Power “ON” Indicator | None |
| Input Fusing | None |
| Input Voltage | 90VAC min - 264VAC max |
| Input Frequency | 47 - 63 Hz |
| Input Surge Current | 50 Amps max @ 264VAC input |
| Input Connector | Standard IEC input power cord (included with US units only) |
| Output Connector | 3 pin female connector |
| Output Voltage | +24VDC |
| Output Voltage Tolerance | +/- 8%, measured at the end of the output power cable |
| Output Current | 0 Amps min, 1.87 Amps max |
| Safety and Emissions Compliance | FCC, Part 15, Radio Frequency Devices, Class B.<br>EN 55022<br>UL1950 and IEC 950 |

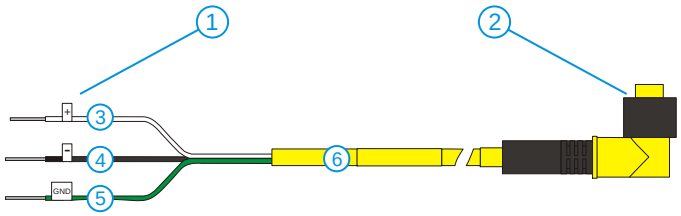
## Environmental Specifications

The AC to DC adapter will withstand the following environmental characteristics:

| Feature | Specification |
|---|---|
| Operating Temperature | see VX5 Environmental Specifications |
| Storage Temperature | see VX5 Environmental Specifications |
| Humidity | Operates in a relative humidity of:<br>5 – 95% (non-condensing) |
| ESD Immunity | Per IEC 801-1 |

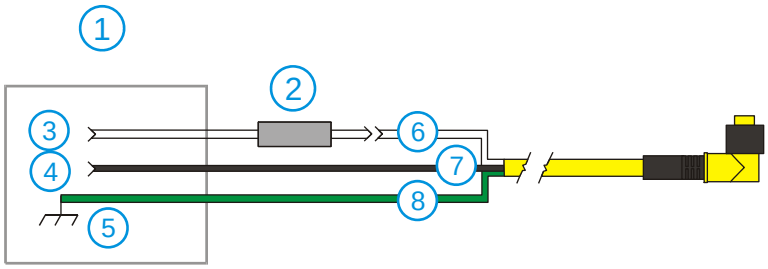
## Vehicle 12-80VDC Direct Connection

*Note: Instructions for using this configuration are contained in "VX5 User's Guide" section titled "Installation".*




1. To Vehicle Battery
2. To Vehicle Mounted Device or UPS Battery Pack
3. White (DC+)
4. Black (DC-)
5. Green (GND)
6. 12 – 80 VDC

**Figure 2-43 Direct Vehicle Power Connection Cable (12 Ft.)**




1. Vehicle Electrical System
2. 5 Amp Slow Blow Fuse
3. DC +
4. DC -
5. Vehicle Chassis
6. Red / White
7. Red /Black
8. Green

**Figure 2-44 Connecting the Power Cable to the Vehicle**

*Note: Correct electrical polarity is required for safe and proper installation. Connecting the cable to the VX5 with the polarity reversed will cause the VX5's fuse to be blown. See the following table for wire color-coding specifics.*

Wiring color codes for LXE supplied DC input power cabling:

| Vehicle Supply | | Wire Color |
|---|---|---|
| +12 - 80VDC | (DC +) | White |
| Return | (DC -) | Black |
| Vehicle Chassis | (GND) | Green |

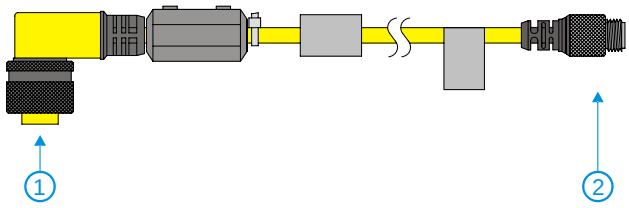
**Figure 2-45 Vehicle Connection Wiring Color Codes**

## VX5 Input Power Specifications

| Feature | Specification |
|---|---|
| DC Input Voltage | 12 - 80 VDC |
| Input Current | 3.5 Amps |
| Input Fuse | 10A Time Delay |
| Input Power Switch | SPST 6 Amp 125VDC |

## Power Adapter Cable

LXE offers an adapter cable (part no. 9000A077CBLPWRADPTR) to adapt certain VX1, VX2 or VX4 DC power supplies to the VX5. Please read and follow all cautions in the "VX5 User's Guide" to determine if your present power supply can be used with the VX5.




1. VX5 Connector
2. VX1/2/4 Power Supply Connector

**Figure 2-46 Power Adapter Cable, VX1/2/4 to VX5**

| | |
|---|---|
| ***Caution:*** | For use only with VX1/2/4 DC power cables with yellow colored cable containing 18AWG wires.<br>Do not use this cable with VX1/2/4 DC power cables with gray colored cable containing 22AWG wires. These power cables must be replaced with a VX5/6/7 power cable. |
| ***Caution:*** | When a DC power cable that is eight feet or longer is in a 12V application, there may be an excessive voltage drop over the longer cable. If this occurs, a new power cable is required. |
| ***Caution:*** | Do not use this adapter with AC power supplies originally designed for the 1380, 1390, VX1, VX2 or VX4. These power supplies do not have sufficient power for the VX5. |

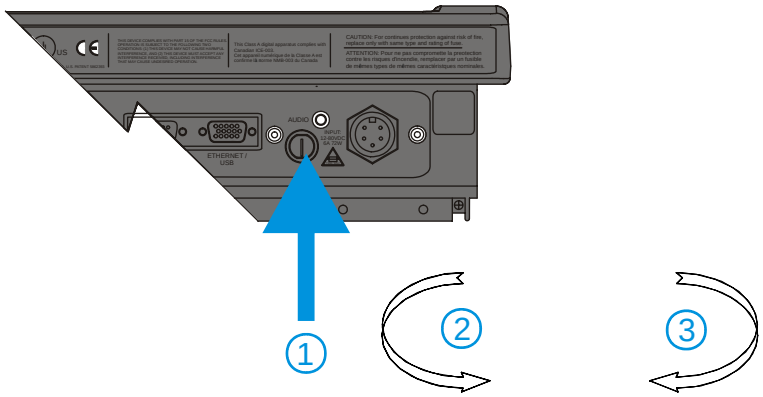
## CMOS Battery

The LXE VX5 has a permanent 190 mAh Lithium battery installed to maintain time, date and CMOS setup information. The lithium battery is not user serviceable and should last five years with normal use before it requires replacement.

*Note: This battery should only be changed by authorized service personnel.*

## Fuse

The VX5 uses a 100V, 10A time delay (slow blow), high current interrupting rating fuse that is externally accessible and user replaceable. Should it need replacement, replace with same size, rating and type of fuse – Littlefuse 0234010 or Optifuse MSC-10A (5x20mm).




1. Fuse
2. Twist in this direction to remove
3. Twist in this direction to insert

**Figure 2-47 Fuse Replacement**

***Caution:*** **Fuse has voltage on it even when power is off. Always disconnect input power before changing fuse.**

# Chapter 3 System Configuration

## Introduction

Like any personal computer, there are many aspects to the setup and configuration of the VX5. Much of the setup and configuration of the VX5 is dependent upon the optional features (both hardware and software) installed on the computer. Since the VX5 uses the Microsoft Windows Plug and Play operating system, much of the hardware setup is automatic. The examples found in this chapter are to be used as samples only; the configuration of your specific computer may vary. The following sections provide a general reference for the configuration of the VX5 and its optional features.

Please refer to commercially available Microsoft Windows user guides or to Windows on-line Help application for more information on Windows' options for system configuration.

## BIOS Setup

LXE installs Microsoft Windows on the VX5 before shipping. The default BIOS parameters are configured at that time. In most cases, it is unnecessary to modify the BIOS parameters.

Generally, it is only necessary to enter the BIOS setup to change the boot order of the drives.

*Note: Some BIOS parameters described in this section may not be available on all VX5's.*

| | |
|---|---|
| ***Caution:***  | *Be very careful when using this utility to modify BIOS Setup parameters. The VX5 may generate unexpected results when incorrect or conflicting parameter values are entered. Selecting incorrect or invalid options may require the VX5 to be returned to LXE for repairs.*<br><br>*The parameters should only be modified by Information Services personnel or the system administrator.* |

*Note: Make sure there is an uninterrupted power supply connected to the VX5* ***before*** *accessing BIOS Setup.*

## Windows Management Instrumentation

VX5 BIOS includes support for Windows Management Instrumentation (WMI). The information displayed by selecting **Programs | Accessories | System Tools | System Information** from the Windows Start Menu identifies the System Manufacturer as "LXE Inc." and the System Model as "VX5".

Windows Management Instrumentation (WMI) is a component of the Microsoft Windows operating system and is the Microsoft implementation of Web-Based Enterprise Management (WBEM). WBEM is an industry initiative to develop a standard technology for accessing management information in an enterprise environment. WMI uses the Common Information Model (CIM) industry standard to represent systems, applications, networks, devices, and other managed components. You can use WMI to automate administrative tasks in an enterprise environment.

Windows Management Instrumentation (WMI) is a component of the Microsoft Windows operating system that provides management information and control in an enterprise environment. By using industry standards, managers can use WMI to query and set information on desktop systems, applications, networks, and other enterprise components. Developers can use WMI to create event monitoring applications that alert users when important incidents occur.

In order to get specific system attributes to return valid data is very simple. The values are pulled from the SMBIOS data structure. The following attributes are populated with LXE specific information:

Within the **Win32_ComputerSystemProduct** class

**Caption = "Computer System Product"**
**Description = "Computer System Product"**
**IdentifyingNumber = *this field is populated by the Kontron Serial number, if available. If not available, this field contains a 'serial number not available message'.***
**Name = "VX5" [This is equivalent to the Model Number]**
**Vendor = LXE Inc [This is equivalent to the Make Number]**

Within the **Win32_SystemEnclosure**

**ChassisTypes = 8 (Note that some applications may display "portable", which is equivalent to the value 8)**
**Manufacturer = LXE Inc**

## Identifying BIOS Revision

The VX5 is available with two different BIOS revisions. The appropriate BIOS is determined by the VX5's internal components and is loaded on the VX5 during manufacture. The BIOS should not be reflashed with a different version.

The BIOS is identified by one of the following strings:

- MOD8R901
- LXE0R100

The string is displayed during the boot process as:

```
Kontron(R) BIOS Version <xxxxxxxx>
```

where xxxxxxxx is equal to one of the values above.

Additionally, the LXE0R100 BIOS is identified on the BIOS screens with "LXE0" displayed in the upper left corner of the BIOS screen and "R100" displayed in the upper right. The MOD8R901 BIOS does not have the version displayed on the BIOS screens.

Unless otherwise noted, BIOS parameters in the following sections are present in both BIOS revisions.

## Accessing the BIOS Setup

When you turn the VX5 on, the unit starts to boot. Watch the bootup sequence and when the following is displayed:

```
Press F2 to Enter Setup
```

Press the [F2] key.

*Note: The "Press F2 to Enter Setup" message may be disabled in the BIOS. The F2 key still has the same function when the display of the message is disabled.*

BIOS Setup has six menus: Main, Advanced, Security, Power, Boot and Exit.

## Using the Keypad

The set of keypad commands used to select menu items and parameters, as well as modify parameter values is as follows:

| Action | Keypress |
|---|---|
| Exit a menu | Esc |
| Activate Help Screen | F1 |
| Modify parameter value | Space key or alpha-numeric key |
| Move to next parameter | Enter or Arrow Key |
| Move from menu to menu | Arrow key |

*Note: Refer to Appendix A "Key Maps" for other key press sequences.*

## BIOS Setup Default Values by Option

### BIOS Revision LXE0R100

| Menu Option | Menu / Section | Default Value |
|---|---|---|
| Boot | Boot Device Priority | 1: IDE 0 (hard drive), 2: IDE 1, 3: IDE 2, 4: IDE 3, 5: IDE CD, 6: USB KEY, 7: USB CDROM, 8: (in this order) |
| Onboard LAN RPL ROM | Boot | Disabled |
| Power Savings | Power | Disabled |
| Power Supply | Power | ATX |
| Rpt Delay | Advanced / Keyboard | 1/2 sec |
| Rpt Rate | Advanced / Keyboard | 30 /sec |
| Dark Boot | Boot | Disabled (displays diagnostic screen during boot) |
| Summary | Boot | Disabled |

### BIOS Revision MOD8R901

| Menu Option | Menu / Section | Default Value |
|---|---|---|
| Boot | Boot Device Priority | Removable Devices (i.e. USB floppy drive), Hard Drive, CD-ROM drive, Network boot (i.e. PXE) in this order |
| Onboard LAN RPL ROM | Boot | Disabled |
| Power Savings | Power | Disabled |
| Power Supply | Power | ATX |
| Rpt Delay | Advanced / Keyboard | 1/2 sec |
| Rpt Rate | Advanced / Keyboard | 30 /sec |
| Dark Boot | Boot | Disabled (displays diagnostic screen during boot) |
| Summary | Boot | Disabled |

### Notes:

- Settings are saved temporarily as each parameter activity screen is closed. Changes are saved to CMOS RAM when Exit With Save is selected and the BIOS setup program closes.
- Changed parameter values take effect when the VX5 reboots upon exiting BIOS Setup. If the VX5 does not automatically reboot upon exit, please reboot the VX5.
- Many items, like Power Savings and Keyboard repeat rate/delay may be configured via the Microsoft Windows Control panel.

## Main Menu Options

To edit parameters, use the up and down arrow key to move from parameter to parameter.

Use the space key or an alpha-numeric key to modify a parameter value.

Press F1 to activate the help screen. Then use the panning function to move around the help screen. Press ESC to close the help screen.

Use the left and right arrow keys to move from menu to menu.

Press the ESC key or key sequence to go directly to the Exit Menu.

When changes have been made, press an arrow key to go to another parameter or menu or press ESC to go to the Exit Menu.

| Menu Option | Default Value |
|---|---|
| System Time | |
| System Date | |
| Legacy Diskette (A: and B:) | Disabled |
| Primary Master | Auto |
| Primary Slave | Auto |
| Secondary Master | Auto |
| Secondary Slave | Auto |
| Memory Shadow | --- |
| Memory Cache | --- |
| System Memory | 640KB |
| Extended Memory | 252928KB |
| BIOS Date (LXE0R100 only) | 09/14/06 |

Settings are saved temporarily as each parameter activity screen is closed. Changes are saved to CMOS RAM when "Save and Exit" is selected and the BIOS Setup program closes.

Changed and saved parameter values take effect after the VX5 is rebooted.

*Note: The secondary drive is either an ATA Compact Flash or ATA PCMCIA card. Please refer to "ATA Secondary Drive" later in this chapter for more information.*

### Legacy Diskette (A and B)

This option is used to indicate if a floppy disk drive is attached to the VX5. The VX5 does not have a provision for a standard floppy drive; however, a USB floppy may be attached to the USB interface cable.

```
Values:
    Disabled          No floppy drive present.

    360KB 5¼″         The option chosen will depend
    1.2MB 5¼″         on the drive attached.  Most
    720KB 3½″         common are 1.44MB 3½″ drives.
    1.44/125MB 3½″
    2.88MB 3½″

Default:          Disabled
```

## Primary and Secondary Master and Slave Drives

Use this option to indicate the type of disk drive installed in the VX5.

Values:

| | |
|---|---|
| Auto | Auto-detects the hard drive installed, if any. |
| User | User enters parameters of the installed hard drive. |
| 1-39 | Select hard drive from pre-determined types. |
| CD-ROM | A CD-ROM is installed here. |
| ATAPI Removable | A removable disk drive is installed. |

Default: Auto

*Note: The secondary drive is the enabled ATA slot on the side of the VX5. This drive may be either a PCMCIA or Compact Flash (via PCMCIA adapter) ATA drive. Please see "ATA Secondary Drive" later in this chapter for more details.*

## Advanced Menu Options

The Advanced Menu contains several sections – Advanced Chipset Control, PCI Configuration, Keyboard Features, and I/O Device Configuration.

To edit parameters, use the up and down arrow key to move from parameter to parameter.

Use the space key or an alpha-numeric key to modify a parameter value.

Press F1 to activate the help screen then use the arrow keys to scroll through the help screen. Press ESC to close the help screen.

Use the left and right arrow keys to move from menu to menu.

Press the ESC key or key sequence to go directly to the Exit Menu.

| Menu Option | Default Value |
|---|---|
| Advanced Chipset Control | --- |
| PNP OS Installed | No |
| Reset Configuration Data | No |
| Secured Setup Configuration | Yes |
| PCI Configuration | --- |
| PS/2 Mouse | Auto Detect |
| Keyboard Features | --- |
| I/O Device Configuration | --- |
| Hardware Monitor | --- |
| Large Disk Access Mode | DOS |
| Halt On Errors | Yes |

Settings are saved temporarily as each parameter activity screen is closed. Changes are saved to CMOS RAM when "Save and Exit" is selected and the BIOS Setup program closes.

Changed and saved parameter values take effect after the VX5 is rebooted.

### Advanced Chipset Control

Parameters in this menu have been selected for best performance from your VX5. Changes are not recommended.

### PCI Configuration

Parameters in this menu have been selected for best performance from your VX5. Changes are not recommended.

## Keyboard Features

### NumLock

*Note: Some VX5 keyboards do not have a NumLock indicator or key. For these keyboards, NumLock may be toggled using the <2nd> <SHIFT> <F10> keypress sequence.*

Use this option to set NumLock at boot time. When NumLock is On, the keypad is locked in numeric mode. When NumLock is Off the numeric keys are inoperable.

Whether NumLock at Boot is Off or On, no LED is illuminated on the VX5.

```
Values:         Auto, On, Off
Default:        Auto
```

### Keyclick

Enables the click on a keypress.

```
Values:         Enabled, Disabled
Default:        Disabled
```

## I/O Device Configuration

### Local Bus IDE Adapter

This parameter enables the onboard IDE adapter.

Available with BIOS revision LXE0R100 only.

Values:

| | |
|---|---|
| Disabled | No PCI IDE device enabled. |
| Primary | Primary PCI IDE enabled. |
| Secondary | Secondary PCI IDE enabled. |
| Both | Both Primary and Secondary PCI IDE devices enabled. |

Default: Both

### Serial Port (A and B)

These parameters determine if the integrated serial port is active.

Values:

| | |
|---|---|
| Disabled | Port is not active. |
| Enabled | User must define port by specifying base I/O address and interrupt. |
| Auto | BIOS or OS configured. |
| OS Cntrl | Controlled by OS |

Default: Auto

*Note: To switch pin-9 of the port between RI and +5v, it is necessary to change jumpers on the system board. See "Serial Port Pin 9" later in this chapter.*

### Onboard LPT

These parameters determine if the integrated parallel port is active.

Values:

| | |
|---|---|
| Disabled | Port is not active. |
| Enabled | User must define port by specifying base I/O address and interrupt. |
| Auto | BIOS or OS configured. |
| OS Cntrl | Controlled by OS |

Default: Disabled

*Note: There is no parallel port (LPT1) on a VX5. Disabling the LPT1 port allows IRQ7 to be used by other devices.*

### USB Port / USB Host Controller

These parameters determine if the USB port is active.

Available with BIOS revision MOD8R901 only.

```
Values:         Enabled, Disabled
Default:        Enabled
```

*Note: The USB adapter cable must be attached to the VX5 to use the USB port.*

### USB BIOS Legacy Support

Enables support for USB keyboard and mice.

```
Values:         Enabled, Disabled
Default:        Enabled
```

*Note: To boot from a USB floppy, USB BIOS Legacy Support must be enabled.*

### OnChip USB 2 device

Enables support for USB Ports 2 - 3.

Available with BIOS revision LXE0R100 only.

```
Values:         Enabled, Disabled
Default:        Enabled
```

### Onboard Legacy Audio

Enables support for legacy audio devices.

Available with BIOS revision LXE0R100 only.

```
Values:         Enabled, Disabled
Default:        Enabled
```

### Sound Blaster

Enables and configures the Sound Blaster device, only available when legacy audio devices are supported.

Available with BIOS revision LXE0R100 only.

```
Values:         Enabled, Disabled
Default:        Enabled
```

When Enabled, The Base I/O address, Interrupt and 8-bit DMA channel must be specified.

### MPU-401

Enables and configures the MPU-401 device, only available when legacy audio devices are supported.

Available with BIOS revision LXE0R100 only.

```
Values:         Enabled, Disabled
Default:        Disabled
```

When Enabled, The MPU I/O address must be specified.

## Security

This menu can be used to set security features as desired.

## Power

BIOS power management is disabled in the VX5. Microsoft Windows handles all power management.

## Boot

### Floppy Check

This parameter determines if the floppy drive is verified on boot. Disabling provides a faster boot.

```
Values:         Enabled, Disabled
Default:        Disabled
```

### Summary Screen

This parameter determines if the summary screen should be displayed on bootup. Disabling provides a faster boot.

```
Values:         Enabled, Disabled
Default:        Disabled
```

### Quickboot Mode

This parameter determines if certain tests should be skipped during boot. Enabling provides a faster boot.

```
Values:         Enabled, Disabled
Default:        Enabled
```

### Dark Boot

This parameter prevents diagnostic output to the screen during boot.

```
Values:         Enabled, Disabled
Default:        Enabled
```

### Onboard LAN PXE ROM

Enables remote boot BIOS extensions for the onboard LAN controller (Ethernet port). PXE stands for Pre-eXecution Environment.

Available with BIOS revision LXE0R100 only.

```
Values:         Enabled, Disabled
Default:        Disabled
```

## Boot Device Priority

### BIOS Revision LXE0R100

The bootable devices are listed in the order they are searched.

Boot Priority Order

1: IDE 0 (hard drive)

2: IDE 1

3: IDE 2

4: IDE 3

5: IDE CD

6: USB KEY

7: USB CDROM

8:

Excluded From Boot Order

USB FDC

USB HDD

USB ZIP

USB LS120

PCI BEV

PCI SCSI

Bootable Add-in Cards

Legacy Network Card

This is the default boot order delivered with your VX5. Valid functions are:

- Highlight a device and press <+> to move it up the list of devices.
- Highlight a device and press <-> to move it down the list of devices.
- Highlight a device in the Excluded list and press <X> to enable it and place it in the Boot Priority list.
- Highlight a device in the Boot Priority list and press <X> to enable it and place it in the Excluded list.

### BIOS Revision MOD8R901

The bootable devices are listed in the order they are searched.

```
   Removable Devices
+  Hard Drive
   ATAPI CD-ROM Drive
   Network Boot
```

Any item listed with a "+" contains an expandable list of devices. Highlight the item and press the <Enter> key to expand the list.

```
   Removable Devices
-  Hard Drive
       Secondary Master
       Bootable Add-In Cards
       Primary Master
   ATAPI CD-ROM Drive
   Network Boot
```

This is the default boot order delivered with your VX5. Valid functions are:

- Highlight a device and press <+> to move it up the list of devices.
- Highlight a device and press <-> to move it down the list of devices.
- <Enter> expands an item with a "+" and contracts an item with a "-".
- <2nd>+<Shift>+<1> disables or enables a device. Any disabled device is displayed with an "!".

*Note: Hard drives in the boot order listing may be identified by the manufacturer name. In those cases, the (PM) or (SM) listed after the drive name identifies the drive as Primary Master or Secondary Master.*

## Onboard LAN RPL ROM

Enables remote boot BIOS extensions for the onboard LAN controller (Ethernet port). RPL stands for Remote Program Load.

Available with BIOS Revision MOD8R901 only.

```
Values:        Enabled, Disabled
Default:       Disabled
```

## Exit Menu Options

To edit parameters, use the up and down arrow key to move from parameter to parameter.

Press F1 to activate the help screen then use the panning function to move around the help screen. Press ESC to close the help screen.

Use the left and right arrow keys to move from menu to menu.

Press the ESC key or key sequence to go directly to the Exit Menu.

As changes are made to Setup values, the values can be saved or discarded. The next time the VX5 is turned on or rebooted, the saved values take effect.

### Exit Saving Changes

Use this option to immediately save current Setup settings to CMOS RAM and into the Flash Boot Device (FBD).

When "Save and Exit" is highlighted, press <Enter> to save. When the saving process is complete, the VX5 reboots with the current values.

### Exit Discarding Changes

Use this option when any current changes made to Setup parameters are to be ignored. The parameters revert to their state when Setup was entered.

When this option is highlighted, press <Enter> and the boot process continues. The system reboots with unchanged values.

### Load Setup Defaults

This option is used to reset the Setup values to the original, default values that were set at the factory, before suppliers or end users made changes.

The next time the VX5 is turned on or rebooted, those saved values are in effect. Save this change by selecting "Save and Exit."

### Discard Changes

Use this option to immediately restore CMOS RAM and update the current Setup settings from the Flash Boot Device.

Save this change by selecting "Save and Exit."

### Save Changes

Used to save BIOS Setup changes without rebooting. The changed parameters are in effect the next time the VX5 is powered on or rebooted.

Reboot by selecting either "Exit w/o Save" or "Save and Exit."

## Serial Port Pin 9

Pin 9 of the serial ports may be configured to provide RI or +5V using DIP switches accessible by removing the access cover:

- Pin 9 must be set to +5V if an external serial scanner is to be attached. This is the default setting for COM1 and provides 400mA maximum.
- Pin 9 must be set to RI if a serial printer or PC cable is to be used with the port. This is the default setting for COM2.

*Note: COM2 is labeled either "COM2" or "COM2/3".*

*Equipment Needed:* Phillips No. 1 screwdriver, a Torque wrench capable of measuring to 9±1 inch pounds (1.016 ±.11 N/m).

*Note: Torquing tool is not supplied by LXE.*

1. Turn the VX5 off and remove the power supply before opening the access cover located on the top of the VX5.

2. Loosen the three (3) Phillips screws securing the access cover so the cover can be removed. The screws are a captive part of the cover and cannot be removed.

3. Remove the access cover. The cover is tethered to the VX5 to prevent loss.

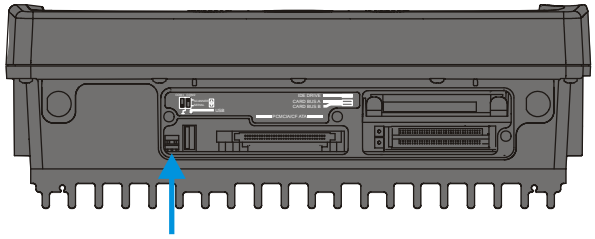


**Figure 3-1 DIP Switch Location**

*Note: The tethered access panel cover is not shown in the illustration above.*

4. Refer to the legend above the DIP switches. There are two DIP switches, one for COM1 and one for COM2. When a DIP switch is in the Up position, the COM port pin 9 is configured for a scanner (+5V). When a DIP switch is in the Down position, the COM port pin 9 is configured for RI.

5. After setting the DIP switches to the desired position, reattach the access cover screws using a torque wrench capable of measuring 9±1 inch pounds (1.016±.11 N/m). The three screws must be fastened to 9 inch pounds each. The screws require a Phillips size 1 driver head.

## VMT Keyboard Backlighting

### 95-key Keyboard

This LXE keyboard has keys that are backlit with LEDs. The backlight is manually controlled using the "backlight" key in the upper right hand corner of the keyboard. Pressing the backlight key cycles the backlight through the levels of backlight intensity:

- Off
- Maximum intensity
- Medium intensity
- Low intensity.

### 60-key Keyboard

This LXE keyboard has LEDs that illuminate the individual keys. The keyboard backlight may be toggled manually by pressing <2nd> + <CTRL> + <F10>. This key sequence immediately changes the state of the keyboard backlight as follows:

- Turns the backlight Off if it is currently On.
- Turns the backlight On if it is currently Off.

## Microsoft Windows Setup and Configuration

Options for the VX5 include Windows 2000 Professional and Windows XP Professional preinstalled. If your VX5 was ordered with no Operating System, please see "VX5 Delivered with No OS" later in this chapter.

*Note: The VX5 System Tools CD-ROM (LXE Part No. VX5A477DRIVERS) contains files that may be used during Microsoft Windows setup and Configuration. Please refer to the section detailing the contents of this CD later in this chapter.*

## Microsoft Windows License Agreement (First Boot)

If your VX5 is shipped with a Microsoft Windows operating system pre-installed, it is necessary to complete the Windows licensing/registration screens when starting the VX5 for the first time. To complete this information, you need the Microsoft Windows software/product key that was included with the VX5.

*Note: If you are installing a Microsoft Windows operating system on a VX5 delivered with no OS, you may be prompted for the Windows software or product key and registration information either during installation or upon first boot.*

### Microsoft Windows 2000

The Microsoft Windows software key is a 25 digit key included with the VX5.

The first screen prompts for the name (individual or corporation) to which Microsoft Windows is registered. After the information is entered, press or click on the "Next" button.

The second screen displays Microsoft's licensing agreement. Review the agreement and indicate if you wish to accept the agreement.

*Note: If you do not accept the agreement, Microsoft Windows does not continue to load.*

The next screen asks for the software key. Enter the key exactly as it is displayed on the decal.

*Note: If you ordered multiple VX5's, a separate key code decal is included for each VX5. Each key code is to be used on only one VX5. Be sure to store the key codes in a safe place.*

Pressing "Next" finishes the licensing/registration process.

As Microsoft Windows starts for the first time, you are asked to verify the time and time zone. Make any necessary changes and Windows finishes its setup and starts for the first time.

### Microsoft Windows XP

When Microsoft Windows XP is started by the user for the first time (known as the "out of the box experience"), a series of questions is presented. The product key (printed on a decal attached to the VX5) must be entered. The series of prompts and responses allow the user to configure Microsoft Windows XP on the VX5 according to the user's needs.

During this process it is normal for the "New Hardware Wizard" window to appear. When the wizard appears and asks for the Ethernet device driver, select "OEMxxx.INF" (where xxx is a series of numbers, such as OEM123.INF) from the list of available drivers and click Next. When prompted, click Finish to complete the installation of the Ethernet device.

If you are installing a Summit radio, the wizard window may appear for the radio driver. If prompted to search Windows Update for the device driver, select "No, not this time" and click Next. Then click Next and Finish when prompted.

If you are installing a Symbol radio, the wizard window may appear for the radio driver. Click Next and then Finish when prompted.

Proceed with the remainder of the boot process.

## Drive C Directory Structure

The drive C: directory structure is the same for all media types. Microsoft Windows is installed in the \Windows or \WINNT directory. The default directory depends on the version installed. In addition, Microsoft Windows creates other directories and several subdirectories. For more information on the directories Microsoft Windows uses, please refer to commercially available Windows reference guides.

Depending on the option ordered, drive C: may be:

- a 40 or 80 GB rotating drive
- a 2 or 4 GB flash drive
- a 2 or 4 GB PCMCIA card
- a user installed drive (a VX5 with the "no hard drive" option)

Please refer to the invoice or packing list if there are any questions about the configuration of your VX5.

**ATTENTION: On a VX5 with a flash drive, powering off the VX5 before a write (to disk) function has completed, may result in the corruption of the flash drive.**

## Software Loaded on Drive C

The software loaded on the VX5 computer consists of:

- BIOS
- Microsoft Windows 2000 Professional or Windows XP Professional
- device drivers
- radio software
- touchscreen software
- RFTerm® software.

*Note: If your VX5 was ordered with the no OS option, please refer to "VX5 with No OS", later in this chapter.*

The software installed on the VX5 is summarized below.

*Note: Due to the complex directory structure and System Registry under Microsoft Windows, software should not be removed manually. Instead use the Add/Remove Programs icon in the Windows Control Panel.*

### Microsoft Windows

Microsoft Windows is installed in the \Windows (or \WINNT) subdirectory, which is the Windows default. In addition, Windows places files in other directories and subdirectories during installation. For more information, please refer to commercially available Windows user guides.

### Device Drivers

Device drivers are included for all installed hardware options, such as the display, touchscreen, radios, Ethernet port, etc. For more information on Microsoft Windows device drivers, please refer to commercially available Windows guides.

### Radio Software

If a radio is ordered with a VX5, the VX5 is delivered with the radio software installed. Because the VX5 is uses a Microsoft Windows operating system, the radio installation includes Windows device drivers.

### Touchscreen Software

Fujitsu Touch Panel software is installed for calibrating the VX5's touchscreen. Please see "Touch Screen Calibration" later in this chapter for more information.

### RFTerm® Software

RFTerm allows users to connect to applications running on IBM 3270, AS/400 and VT hosts from an LXE Microsoft Windows based mobile computer over a wireless TCP/IP data network.

## Microsoft Windows Configuration

After the system files are processed, Microsoft Windows begins to load. Windows maintains a System Registry and INI files. Standard Windows configuration options apply to the VX5. Configuration options are located in either the System Tray or the Control Panel:

- The System Tray contains icons for adjusting the time, date or volume level.
- The Control Panel contains icons for many other configuration options, such as Power Management, PC Cards, etc.
- The Control Panel icons are also used to add, delete or modify hardware installed on the VX5.

Please refer to Microsoft Windows help screens or commercially available Windows guides for more information on configuration options in Windows.

# Touchscreen

## Calibrating the Touchscreen

Although the touch screen is installed and calibrated at the factory, users may make adjustments to it by using the Fujitsu Touch Panel on the Microsoft Windows Programs menu. To calibrate the touchscreen, select **Start | Programs | Fujitsu Touch Panel (USB) | Touch Screen Calibration Utility**.

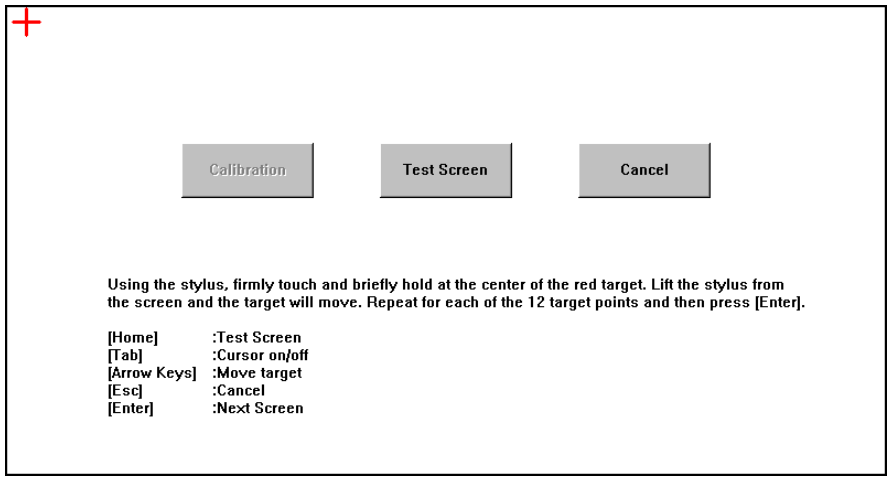



**Figure 3-2 Touchscreen Calibration, Targets**

The calibration utility displays a red cross on the screen. Touch the center of the cross with the stylus and hold for a few seconds. Release and repeat with the next cross. After all twelve locations have been touched, either press <Enter> or click the Calibration button.

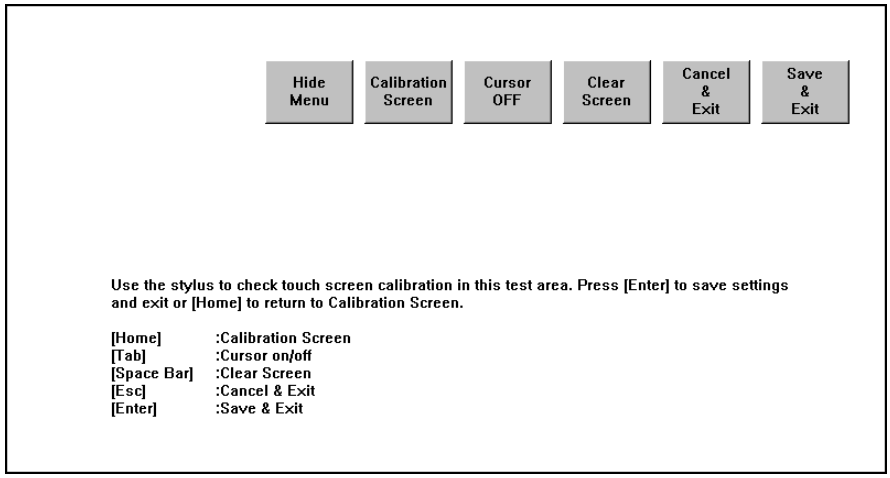



**Figure 3-3 Touchscreen Calibration, Save and Exit**

To save the new calibration settings, click on the Save & Exit button or press <Enter>.

To discard the new calibration settings, click Cancel & Exit or press <Esc>.

## Configuring Right Click on the Touchscreen

The Fujitsu Touch Panel configuration is accessed from the Programs section of the Microsoft Windows Start menu. Use this utility to configure the "right click" behavior of the touch screen.

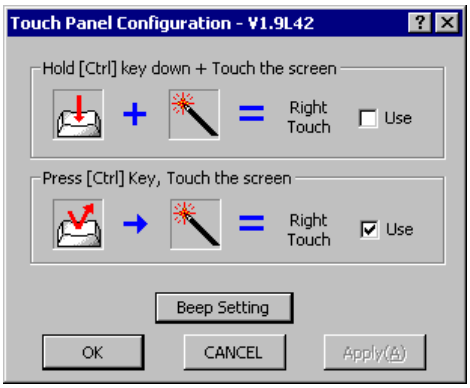



**Figure 3-4 Touch Panel Configuration**

The touch screen right click behavior can be configured as followed:

- Holding the <Ctrl> key and then touching the screen if the first option is selected
- A screen touch after the <Ctrl> key is pressed if the second option is selected.

*Note: Because the <Ctrl> key is a "sticky key" on the 60-key keyboard, the first option must be used with this keyboard. Once the <Ctrl> key is pressed on the 60-key keyboard, the <Ctrl> key stays active (and every screen touch is treated as a right click) until another key is pressed on the keyboard.*

## Disabling the Touch Screen

If desired, the touchscreen can be disabled in the Windows control panel. Once disabled, the touchscreen remains disabled until it is enabled again.

To disable the touchscreen, access the Windows control panel and click on **System | Hardware | Device Manager | Human Interface Devices**. Under the Human Interface Devices there is a listing for Fujitsu Touch Panel (USB). Right click on this listing and select Disable from the menu.

To enable the touchscreen, follow the same process, selecting Enable from the right click menu.

## Network Configuration

There are two networking options available for the VX5:

- 2.4GHz wireless radios
- Ethernet (RJ-45) connector.

## 2.4 GHz Wireless Radios

Please refer to Chapter 4, "Wireless Network Configuration" for details on configuring the 2.4 GHz wireless radio cards.

## Ethernet Connector

When the VX5 is networked using the Ethernet connector, the VX5's networking options are set via the Microsoft Windows Control Panel. The same networking configuration options are available as in a standard PC.

For more information on configuring the Microsoft Windows network settings, please refer to the Windows Help feature or commercially available Windows networking literature.

## Screen Blanking Utility

The VX5 can be configured to blank the display when the vehicle to which it is mounted is moving. When configured properly, the screen blanking feature provides a tamper resistant method to blank the vehicle screen. The screen blanking feature consists of a Windows application and a customer supplied cable connected to one of the COM ports on the VX5. Properly configured, the VX5 display is visible only when the cable provides a signal that the vehicle has stopped.

Screen blanking is available on VX5's with:

- Microsoft® Windows® 2000 or XP Professional operating systems.
- VX5 Screen Blanking Application.
- Microsoft .NET Framework Version 1.1 or later.

*Note: The .NET Framework is included in the LXE VX5 Windows XP software load. Customers with Windows 2000 and customers who load their own Windows operating system must download and install the .NET Framework from Microsoft's web site.*

## Step 1 – Build a Loopback Cable Assembly

The customer must supply their own cable. The cable must be designed so that pin 7 (RTS – Request to Send Output) and pin 8 (Clear to Send Input) of a D9 female connector provide continuity only when the vehicle is stopped (for example, via a switch on the accelerator pedal of the fork truck). All other pins on the connector must be left unconnected. If pins 7 and 8 do not provide continuity (or the cable is removed), the VX5 screen remains blank.

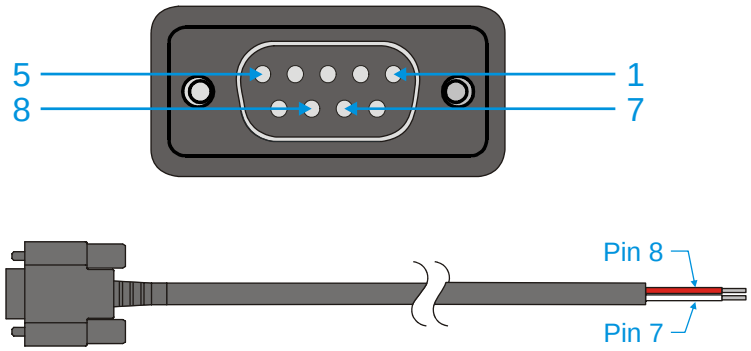



**Figure 3-5 Loop Back Cable**

The cable can be hooked to either the COM1 or COM2 port. The COM port used must be selected during "Step 3 - Configuring the Screen Control Service".

## Step 2 – Uninstall Screen Control Service

*Note: Earlier versions of the screen blanking utility ran as a Windows service. If an earlier version is installed on the VX5, it must be removed before installing the current version.*

To uninstall the service, from a command prompt type:

```
C:\WINDOWS\Microsoft.NET\Framework\v1.1.xxxx\InstallUtil /u
     ScreenCtrlService.exe
```

Where xxxx is the minor revision of the installed .NET framework.

## Step 3 – Install the Screen Control Application

For the VX5, display blanking is handled by the screen control application.

**IMPORTANT:** The proper loopback serial cable assembly must be attached prior to installation. Failure to attach the cable renders the VX5 inoperable until the cable is attached.

1. The user installing the utility must have administrator privileges. Locate VX5ScreenBlanking_Setup.msi in the C:\LXE_Files\Applications. Double click to launch the installer.
2. Verify the loopback cable is attached to the desired serial port.
3. Review the license agreement and click "I Agree" to proceed with the installation. If you do not agree to the terms, the installation is cancelled.
4. Be sure to select "Everyone" as illustrated below to ensure screen blanking is activated for all VX5 users.

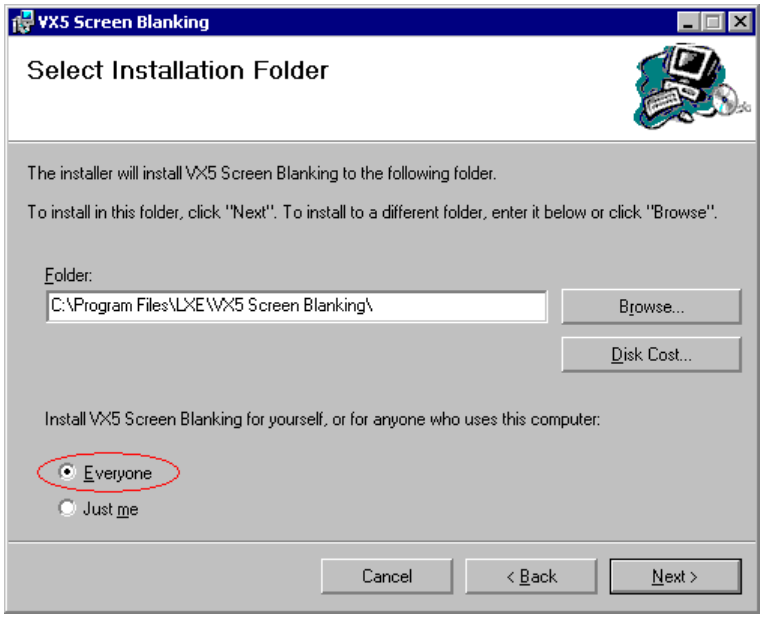



**Figure 3-6 Screen Blanking Installation**

5. The default values for the Screen Blanking Utility are to use COM2 with a 3 second delay. If this is acceptable, reboot when prompted. Otherwise, follow the steps in "Configuring the Screen Control Application" then reboot.

## Step 3 – Configuring the Screen Control Application

To configure the screen blanking application to use a different COM port or delay, follow these steps.

1. Open a command window and change to the installation directory. The default directory is

   ```
   C:\Program Files\LXE\VX5 Screen Blanking
   ```

2. Enter the following command:

   ```
   VX5ScreenBlank.exe /c
   ```

3. Change the settings as desired.

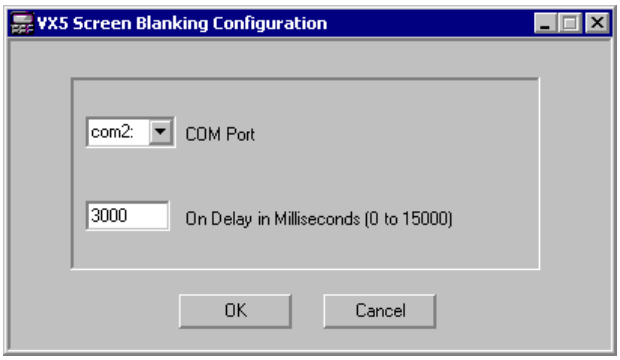



**Figure 3-7 Screen Blanking Configuration**

4. Click OK after the appropriate changes are made. When you click OK a message indicates you must log out and log back on for the settings to take effect. If you have not rebooted after the initial installation, you must reboot now.

## Operation

Since the screen control application was set up by a user with Administrator privileges (or privileges higher than the general user), general users of the VX5 must not have sufficient privileges to disable or uninstall the program. This prevents a general user from defeating the screen control application.

Operation of the VX5 is affected while the screen is blank. Keyboard input is disabled and the display backlight is off. Input from the keypad, touchscreen or other device **DOES NOT** wake up the display. The display only wakes up when the VX5 receives the signal that the vehicle has stopped and the delay timer has expired.

## Error and Status logging

The Screen Control utility creates an event log **ScreenBlankingLog** which contains status and error messages related to this service. To access the log, select **Start** | **Control Panel** | **Administrative Tools** | **Event Viewer**. Then select **ScreenBlankingLog** from the left pane as shown below:

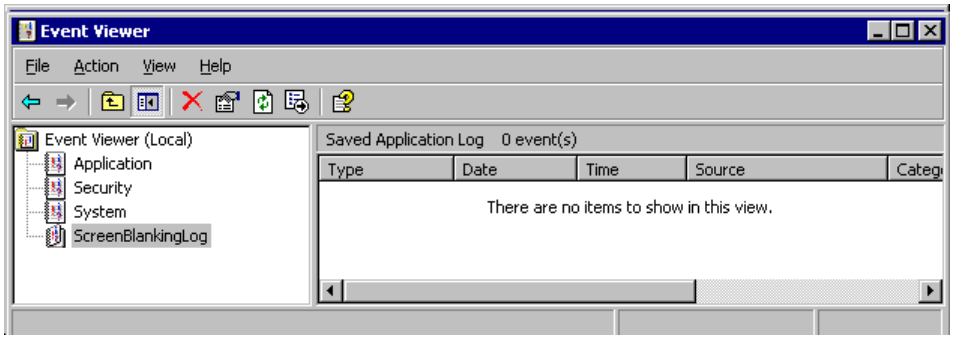



**Figure 3-8 Screen Control Event Log**

In the example above, the service has not yet reported any events. If the list includes an error, click on the error for more details.

## Uninstalling the Application

To uninstall the Screen Blanking application, select **Start** | **Control Panel** | **Add or Remove Programs** and select VX5 Screen Blanking

## VX5 Delivered with No Hard Drive

### How To Install 2.5" IDE Hard Drive

1. Turn the VX5 off and remove the power supply before opening the access cover located on the top of the VX5.
2. Loosen the three (3) Phillips head screws securing the access cover so the cover can be removed. The screws are a captive part of the cover and cannot be removed.
3. Slide the Hard Drive Sled (or bracket) out of the VX5.

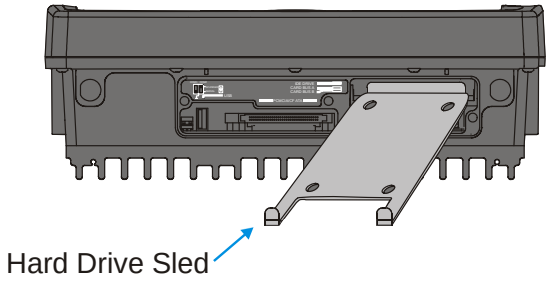



**Figure 3-9 Hard Drive Sled**

*Note: The tethered access panel cover is not shown in the illustration above.*

4. Attach the hard drive to the hard drive sled, using 4 M3x4 flat head screws inserted through the holes in the bottom of the hard drive sled. Torque to 8.0±1 in/lb (0.9±.11 N/m). The VX5 accepts 2.5" IDE flash or rotating hard drives.
5. Insert the hard drive into the VX5. Slide the assembly into the opening from which the empty bracket was removed. Do not slide it all the way in.
6. Connect the hard drive cable to the connector pins on the back of the hard drive. Make sure the cable is centered correctly on the connector pins. Do not attempt to place the hard drive cable over the jumper pins.

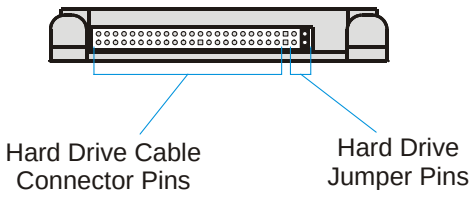



**Figure 3-10 Hard Drive Connector Pins**

7. Insert the hard drive assembly the rest of the way into the VX5.
8. Reinstall the access panel cover, torquing the screws to 9±1 inch pounds (1.016±.11 N/m). The screws require a Phillips size 1 driver head.
9. If the VX5 displays a message such as "operating system not found" during the first boot with the new hard drive, it may be necessary to reboot. The error may be eliminated with a reboot. If the error persists, please review the BIOS settings for the primary hard drive. Also check the hard drive documentation for the proper jumper settings.

## VX5 Delivered with No OS

*Note: This section applies only to a VX5 ordered with no OS installed.*

If the 'no Operating System (OS)' option was chosen when ordering the VX5, two possible options for installing the OS are detailed in this section:

- Install the OS using Norton Ghost™.
- Install the OS over the network.

Additionally, a Microsoft Windows image can be created on a hard drive before it is installed in the VX5. See "VX5 Delivered with No Hard Drive" earlier in this chapter for information on installing a hard drive in the VX5.

*Note: It is assumed that the OS to be installed is Microsoft Windows.*

It is necessary to make changes to the BIOS when using either of these options to install an OS. Please refer to "BIOS Setup" earlier in this chapter for more details.

The VX5 System Tools CD (LXE Part No. VX5A477DRIVERS) contains device drivers that are necessary when installing Microsoft Windows on a VX5 delivered with no OS. The device drivers contained on this CD need to be available during the Windows installation/configuration. For example, the drivers can be copied to a location where they can be accessed via network or USB floppy. Please see the section detailing the contents of this CD-ROM later in this chapter.

After installing Microsoft Windows, please refer to "Microsoft Windows Setup and Configuration" earlier in this chapter.

## Installing Microsoft Windows with Norton Ghost

The requirements and process for using Norton Ghost depend on the version of Microsoft Windows to be installed on the VX5.

### Microsoft Windows 2000

To use the Norton Ghost utility to install an OS, there must be a blank drive connected to the Primary IDE and a Compact Flash or ATA drive with a ghost image connected to the Secondary IDE.

*Note: This procedure can also be used with Microsoft Windows NT. For NT versions of Windows, the image must be created on the same type of computer as the destination computer where the OS is to be used. Differences in hardware may keep NT from booting after it is loaded on the destination computer.*

#### Hardware Required

- A PC where the original image will be produced.
- A Micro drive, PCMCIA ATA flash drive or Compact Flash drive that is at least 10MB larger than the ghost image.

#### Software Required

- Norton Ghost 2002 or newer
- Microsoft Windows image

### How To Install Microsoft Windows 2000

1. With the primary hard drive installed in the VX5, insert a bootable Compact Flash or PCMCIA ATA drive into the secondary IDE slot. This drive should contain the ghost image and the Norton Ghost utility 2002 or newer.
2. Boot the VX5 and enter the BIOS by pressing F2.

   *Note: Refer to "BIOS Setup" earlier in this chapter for more information on the BIOS changes made during this process.*
3. Select **Advanced** | **I/O Device Configuration** and ensure that the Local Bus Adapter is set to "Both".
4. Press <Esc> to return to the main menu.
5. Select **Boot** | **Boot Device Priority** and make sure the Secondary IDE device is first in the boot order.
   - Press <Enter> while "Hard Drive" is highlighted to expand the listing
   - Highlight the Secondary IDE device in the listing and press <2nd> <+> until it is listed before the Primary hard drive.
6. Save any changes made and allow the VX5 to boot.
7. Follow the instructions for the version of Ghost you are using to copy the ghost image from the Secondary IDE to the Primary IDE drive.
8. Once the image has been copied, power the VX5 down and remove the secondary drive.
9. Restart the VX5 and edit the BIOS to return the Primary IDE to the top of the boot order.
10. Save the change and reboot the VX5.
11. After the VX5 boots, verify that the image has been transferred and the unit is operating correctly.

*Note: You may wish to review the "Microsoft Windows Setup and Configuration" section, earlier in this chapter, to set up Windows as desired.*

## Microsoft Windows XP

To use the Norton Ghost utility to install an OS, there must be a blank drive connected to the Primary IDE and a Compact Flash or ATA drive with a ghost image connected to the Secondary IDE.

*Note: This procedure can also be used with Microsoft Windows NT.*

### Hardware Required

- A PC where the original image will be produced.
- A Micro drive, PCMCIA ATA flash drive or Compact Flash drive that is at least 10MB larger than the ghost image.
- TEAC USB floppy drive or equivalent bootable USB floppy drive.

  *Note: Not all USB floppy drives are bootable devices.*

### Software Required

- Norton Ghost 2002 or equivalent
- Microsoft Windows image

### How To Install Microsoft Windows XP

To install Microsoft Windows XP using Ghost 2002 or newer, a Ghost boot floppy is required. You will also need the Ghost license number from the Ghost program that made the Windows XP image. To make the Ghost floppy:

1. From Microsoft Windows, start the Ghost 2002 Boot Wizard.
2. Choose "Boot Disk with CD/R"
3. Connect the USB floppy drive to the VX5.
4. Boot the VX5 and enter the BIOS by pressing F2.

   *Note: Refer to "BIOS Setup" earlier in this chapter for more information on the BIOS changes made during this process.*

5. Select **Advanced** | **I/O Device Configuration** and ensure that the USB Controller and USB Legacy Support are enabled.
6. Press <Esc> to return to the main menu.
7. Select **Boot** | **Boot Device Priority** and make sure that "Removable Devices" is listed first in the boot order.
8. Save any changes and exit the BIOS setup.
9. Insert the Ghost floppy in USB floppy drive and allow the VX5 to boot from the floppy.
10. Follow the directions to transfer the Microsoft Windows XP image to the VX5 hard drive.

    *Note: Do not restart the VX5 with Microsoft Windows running until you are ready to perform the "Out of box experience" process detailed earlier in this chapter. Please refer to "Microsoft Windows License Agreement" for more details.*

11. Restart the VX5 and edit the BIOS to return the Primary IDE to the top of the list (to boot into Microsoft Windows).
12. Save the change and reboot the VX5.
13. After the VX5 boots, verify that the image has been transferred and the unit is operating correctly.

*Note: You may wish to review the "Microsoft Windows Setup and Configuration" section, earlier in this chapter, to set up Windows as desired.*

# Installing Microsoft Windows Over a Network

## Using a PCMCIA Network Card

This section details installing the operating system over the network. This procedure assumes the VX5 has a formatted blank hard drive installed as the Primary IDE drive. You will also need software to enable the PCMCIA slot in which the Ethernet card will reside. For this example, that software will be Enabler that is delivered with the Socket LP-E Ethernet card.

### Hardware Required

- Socket LP-E network card or equivalent.

  *Note: Bus cards will not fit into the PCMCIA slots.*

- TEAC USB floppy drive or equivalent bootable USB floppy drive.

  *Note Not all USB floppy drives are bootable devices.*

- USB adapter cable for VX5.

### Software Required

- Bootable Microsoft Windows diskette.
- Software to enable PCMCIA slot.

  *Note: Enable is included with the Socket LP-E Ethernet card.*

- Software needed to connect to your network (ie: ETHDRV.EXE, TCP.EXE, LSL.COM, odipkt.COM)

### How To Install Microsoft Windows 2000 or XP

1. Create a bootable diskette.
2. Copy the utility to enable the PCMCIA slot and any files needed to connect to your network to the bootable diskette. A sample list of files to be included on the bootable diskette is included later in this section.
3. Edit all required files to allow the Ethernet card to become active. A list of sample files used in this process is provided later in this section.

   *Note: Different cards and different utilities may require different settings.*

4. Connect the hardware listed above to the VX5.
5. Boot the VX5 and enter the BIOS by pressing F2.

   *Note: Refer to "BIOS Setup" earlier in this chapter for more information on the BIOS changes made during this process.*

6. Select **Advanced** | **I/O Device Configuration** and ensure that the USB Controller and USB Legacy Support are enabled.
7. Press <Esc> to return to the main menu.
8. Select **Boot** | **Boot Device Priority** and make sure that "Removable Devices" is listed first in the boot order.
9. Save any changes made and exit the BIOS.
10. Insert the floppy drive and allow the VX5 to boot.

11. After connecting to the network, perform all necessary installations.
12. Restart the VX5 and edit the BIOS to return the primary IDE to the top of the boot order.
13. Save the change and reboot the VX5.
14. After the VX5 boots, verify that all software is installed and the unit is operating correctly.

*Note: You may wish to review the "Microsoft Windows Setup and Configuration" section, earlier in this chapter, to set up Windows as desired.*

### Files on Bootable Diskette

*Note: The files included on the boot disk shown below are examples only. The files contained on your bootable diskette and the directory structure may vary depending on the network card and software used.*

**Directory of A:**

```
COMMAND.COM
NET.CFG              (See example file below)
AUTOEXEC.BAT         (See example file below)
CONFIG.SYS           (See example file below)
HIMEM.SYS
DIR.TXT
EDIT.EXE
ATTRIB.EXE
FDISK.EXE
XCOPY.EXE
FORMAT.COM
QBASIC.EXE
SOCKETLP             <DIR>
```

**Directory of A:\SOCKETLP**

```
CIRRFIX.EXE
DRIVER.LST
ENABLELP.EXE
ETHDRV.EXE
FTP.EXE
IPSTAT.EXE
LSL.COM
NE2000.COM
NE2000.INS
NET.CFG
ODIPKT.COM
PCTCP.INI
PING.EXE
SKTID.EXE
TCP.EXE
TFTP.EXE
```

### *Sample Files for Installation Procedure*

*Note: The example files shown below are examples only. Your files may differ depending on the Ethernet card used.*

#### NET.CONFIG

```
Link Driver NE2000
    Port 340
    Int 7

; Remove the semi-colon in front of the frame type you will use.
; This frame type must match what the NetWare server is using.
; FRAME Ethernet_802.2
; FRAME Ethernet_802.3
; FRAME Ethernet_SNAP
FRAME Ethernet_II

NetWare DOS Requester
    FIRST NETWORK DRIVE = F

; If you know the name of your preferred server, remove the
; semi-colon below and enter the preferred server name after
; the equal sign.
;preferred server =
```

#### CONFIG.SYS

```
DEVICE=HIMEM.SYS /testmem:off
FILES=30
BUFFERS=20

DEVICE=a:\socketlp\enablelp.exe   membase=0xE8000   messages=enabled
socket=1

LASTDRIVE=Z
```

#### AUTOEXEC.BAT

```
@echo off

cd\socketlp
LSL
ne2000
odipkt
SET PCTCP=a:\socketlp\pctpc.ini
ethdrv.exe
```

## Using the Ethernet Port

This section provides only a general overview of the PXE boot and RIS service. For complete details, the user should consult Microsoft's documentation for PXE and RIS. This information is available on Microsoft's web site, www.microsoft.com.

Microsoft Remote Installation Services (RIS) can be used to install a Microsoft Windows operating system on a VX5 delivered with no OS. RIS uses DHCP based boot technology known as Preboot eXecution Environment (PXE).

### Requirements

- A PC with Microsoft Windows 2000 Server with the following services:
  - Remote Installation Services (RIS)
  - Domain Name Systems (DNS)
  - Dynamic Host Configuration Protocol (DHCP) server
  - Active Directory.
- A Microsoft Windows 2000 or XP image to download to VX5 computers.
- A VX5 configured for PXE boot located on the same physical network as the server PC.

**How To Install Microsoft Windows 2000 or XP**

1. Connect the VX5 to the network by inserting a network cable in the Ethernet port.
2. Boot the VX5 and enter the BIOS by pressing F2.

   *Note: Refer to "BIOS Setup" earlier in this chapter for more information on the BIOS changes made during this process.*
3. Select **Boot** and change "Onboard LAN RPL ROM" to enabled.
4. Press <Esc> to return to the main menu.
5. Select **Boot** | **Boot Device Priority** and make sure that "Network boot" is listed first in the boot order.
6. Save any changes made and exit the BIOS.
7. Allow the VX5 to boot.
8. When the message is displayed, press F12 to connect to the RIS server.
9. When the file transfer is complete, reboot the VX5 and enter the BIOS by pressing F2.
10. Set "Onboard LAN RPL ROM" to disabled. Return primary IDE to the top of the boot order list.
11. Save any changes made and exit the BIOS.
12. After the VX5 boots, verify that the image has been transferred and the unit is operating correctly.

## Installing Microsoft Windows From a CD

This section details installing the Microsoft Windows XP operating system from a CD-ROM. This procedure assumes the VX5 has a formatted blank hard drive installed as the Primary IDE drive.

### Hardware Required

- VX5 computer with at least 10GB of free space on the hard drive
- Ethernet/USB dongle cable
- External USB CD–ROM drive

  *Note: The following drives have been tested to work with the VX5:*
  - IOMEGA CD-RW 52x24x52x USB 2.0 external drive, model number CDRW55292EXT
  - TDK veloCD 5201ue 52x24x48x USB 2.0 external drive, model number UE-5201B
  - HP DVDwriter model number dvd300e

### Software Required

- Microsoft Windows XP Professional installation CD
- LXE VX5 Driver CD, part no. VX5A477DRIVERS.

#### How To Install Microsoft Windows XP

1. Plug the CD drive into the USB connector on the end of the Ethernet/USB dongle cable.
2. Turn the VX5 on and press the F2 key when prompted to enter setup.

   *Note: Refer to "BIOS Setup" earlier in this chapter for more information on the BIOS changes made during this process.*
3. Select **Boot | Boot Device Priority** and change the boot sequence to the following order: CD ROM, Hard Drive, Floppy Drive in that order.
4. Before exiting BIOS, insert the Windows XP Professional CD into the CD drive.
5. Exit and save BIOS changes.
6. During the reboot, watch for the message "Press any key to boot from the CD" and press any key.

   *Note: This message appears for a short time only. If no key is pressed before the message disappears, the VX5 must be rebooted.*
7. This starts the Windows XP setup routine. Complete the installation answering the questions appropriately.
8. Install LXE drivers using the LXE VX5 Drivers CD.

## The VX5 Drivers CD-ROM

The VX5 Drivers CD-ROM (LXE Part No. VX5A477DRIVERS) contains files that may be necessary for configuration of the VX5 computer. It is recommended that the device drivers listed below (as appropriate for your VX5 radio type and operating system) be available during Microsoft Windows installation and configuration. Since the VX5 does not have a CD-ROM drive, the device drivers can be copied to a floppy and accessed via a USB floppy drive. The device drivers can also be copied to a location on the network if a network connection is used to install the Windows OS.

After Microsoft Windows is installed, device drivers contained on the CD can be used to update default Windows device drivers, if necessary.

For more information on installing or updating Microsoft Windows device drivers, please refer to the Windows Help feature or commercially available Windows documentation.

The files on the CD are organized as follows:

### \Radio_drvs\Summit\WinXP

*Note: Do not install the radio card before the drivers are installed. The driver installation prompts for the radio card to be inserted at the applicable time.*

This directory contains the radio software for the Summit radio. Click on the .msi file to install the radio driver and Summit Client Utility. Follow the onscreen directions for the installation.

*Note: The Summit driver is only available for Windows XP.*

### \Radio_drvs\Cisco

*Note: Do not install the radio card before the drivers are installed. The driver installation prompts for the radio card to be inserted at the applicable time.*

**\Win2K** – This directory contains the radio driver and radio firmware for the VX5 with a Cisco radio and Microsoft Windows 2000 operating system. Click on the IWSetup.exe icon and follow the on screen direction for the driver.

**\WinXP** – This directory contains the radio driver and radio firmware for the VX5 with a Cisco radio and Microsoft Windows XP operating system. Click on the IWSetup.exe icon and follow the on screen direction for the driver.

### \Radio_drvs\Symbol

*Note: Do not install the radio card before the drivers are installed. The driver installation prompts for the radio card to be inserted at the applicable time.*

**\Win2K** – This directory contains the radio driver and radio firmware for the VX5 with a Symbol radio and Microsoft Windows 2000 operating system. Click on the Setup.exe icon and follow the on screen direction for the driver.

**\WinXP** – This directory contains the radio driver and radio firmware for the VX5 with a Symbol radio and Microsoft Windows XP operating system. Click on the Setup.exe icon and follow the on screen direction for the driver.

### \Win_2K

Contains drivers for use with the Microsoft Windows 2000 operating system:

**\TouchScreen** – Provides the touchscreen driver used on the VX5. The drivers are loaded by running FTSETUP.EXE.

**\Display** – This file provides an update to the display driver.

**\Cardbus –** Provides a driver for the Cardbus controller under Windows 2000.

**\Audio –** Provides an update to the audio driver for use with the sound card.

**\Ethernet –** Provides drivers to support the on-board Ethernet port.

**\Wav_files –** Contains .WAV files designed for the VX5's speaker frequency range.

### \Win_XP

Contains drivers for use with the Microsoft Windows XP operating system:

**\TouchScreen** – Provides the touchscreen driver used on the VX5. The drivers are loaded by running FTSETUP.EXE.

**\Display** – This file provides an update to the display driver.

**\Audio –** Provides an update to the audio driver for use with the sound card.

**\Ethernet –** Provides drivers to support the on-board Ethernet port.

**\Wav_files** – Contains .WAV files designed for the VX5's speaker frequency range.

## Wavelink Avalanche Enabler Configuration

*Note: The Enabler is only available for VX5's equipped with a Microsoft Windows XP operating system.*

LXE VX5 computers manufactured before October 2006 must have their drivers and system files upgraded before they can use the Avalanche Enabler functions. Please contact an LXE representative for details on upgrading the mobile device baseline.

**If the user is NOT using Wavelink Avalanche to manage their mobile device, the Enabler should not be installed on the VX5.**

## Wavelink Avalanche and the Cisco ACU

For the Enabler to control the wireless settings on the Windows XP unit, the Cisco Aironet Utility must be manually disabled once the enabler has received settings from the Management Console. This is done by launching the Cisco ACU and accessing the "Select Profile" tab. From there, select the option "Use Another Application to Configure My Wireless Settings". When the VX5 is rebooted, the Avalanche Enabler will be controlling the wireless settings.

Network parameter configuration is supported for:

- IP address: DHCP or static IP
- RF network SSID
- DNS hosts (primary, secondary, tertiary)
- Subnet mask

## Briefly . . .

The Wavelink Avalanche Enabler installation file is loaded on the mobile device by LXE; however, the device is not configured to launch the installation file automatically. The installation application must be run manually the first time Avalanche is used. After the installation application is manually run, a reboot is necessary for the Enabler to begin normal performance. Following this reboot, the Enabler will by default be an auto-launch application. This behavior can be modified by accessing the Avalanche Update Settings panel through the Enabler Interface.

## Enabler Install Process

- Doubletap the Avalanche Enabler EXE file in the C:\Wavelink folder. The filename is wle_VX5_3_50_04.EXE.
- Reboot the VX5.

## Enabler Uninstall Process

To remove the LXE Avalanche Enabler from a VX5, use the Add/Remove Programs option from the Windows Control Panel.

## Stop the Enabler Service

To stop the Enabler from monitoring for updates from the Avalanche MC Console:

1. Open the Enabler Settings Panels by tapping the Avalanche icon on the desktop.
2. Select **File** | **Settings**. Enter the password.
3. Select the Startup/Shutdown tab.
4. Select the "Do not monitor or launch Enabler" parameter to prevent automatic monitoring upon startup.
5. Select Stop Monitoring for an immediate shutdown of all enabler update functionality upon exiting the user interface.
6. Click the OK button to save the changes.
7. Reboot the device if necessary.

## Update Monitoring Overview

There are three methods by which the Enabler on an LXE device can communicate with the Mobile Device Server running on the host machine.

- Wired via a serial cable between the Mobile Device Server and the VX5 (only COM1 is supported for this connection on the VX5).
- Wired via a USB connection, using ActiveSync, between the Mobile Device Server and the mobile device.
- Wirelessly via the 2.4GHz network card and an access point

After installing the Enabler on the mobile unit, a reboot is required for the Enabler to begin normal functionality. Following a mobile device reboot, the Enabler searches for an Agent, first by polling all available serial ports and then over the wireless network. The designation of the mobile device to the Avalanche Manager is VX5.

The Enabler running on the LXEVX5 will attempt to access only COM1. "Agent not found" will be reported if the agent is not located or a serial port is not present or available.

The wireless connection is made using the default network interface on the mobile device therefore the device must be actively communicating with the network for this method to succeed. If an Agent or Management Console is found, the Enabler will automatically attempt to apply all wireless and network settings from the active profile. The Enabler will also automatically download and process all available packages.

## Mobile Device Wireless and Network Settings

Once the connection to the Mobile Device Server is established, the Enabler will attempt to apply all network and wireless settings contained in the active profile. The success of the application of settings is dependent upon the local configuration of control parameters for the Enabler. These local parameters cannot be overridden from the Avalanche Mobility Center Console.

The default Enabler adapter control setting are:

- Manage network settings – enabled
- Use Avalanche network profile – enabled
- Manage wireless settings – enabled for VX5

To configure the Avalanche Enabler management of the network and wireless settings:

1. Open the Enabler Settings Panels by tapping the Avalanche icon on the desktop.
2. Select **File** | **Settings**. Enter the password.
3. Select the Adapters tab.
4. Choose settings for the "Use Manual Settings" parameter.
5. Choose settings for "Manage Network Settings", "Manage Wireless Settings" and "Use Avalanche Network Profile".
6. Click the OK button to save the changes.
7. Reboot the device.

The designation of the mobile device to the Avalanche Manager is VX5.

See Also: "Using Wavelink Avalanche on LXE Windows Computers".

## Enabler Configuration

Avalanche Icon

The Enabler user interface application is launched by clicking:

either the Avalanche icon on the desktop or Taskbar

or

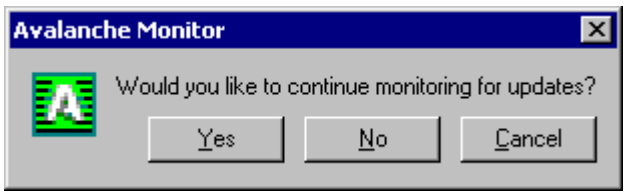
selecting Avalanche from the Programs menu.

The opening screen presents the user with the connection status and a navigation menu.


**Figure 3-11 Avalanche Enabler Opening Screen**

| File | View | Help |
|---|---|---|
| Connect | Updates | Adapter Status |
| Abort | Programs | About |
| Settings | Icons | |
| Exit | List | |
| | Details | |
| | Launchable | |
| | Installed | |
| | Postponed | |
| | Rejected | |
| | All Packages | |

## File Menu Options

| | |
|---|---|
| Connect | The Connect option under the File menu allows the user to initiate a manual connection to the Mobile Device Server. The connection methods, by default, are wireless and COM connections. Any updates available will be applied to the mobile device immediately upon a successful connection. |
| Abort | Stop transmission. |
| Settings | The Settings option under the File menu allows the user to access the control panel to locally configure the Enabler settings. The Enabler control panel is, by default, password protected. The default password is **system.** The password is not case-sensitive. |
| Exit | The Exit option is password protected. The default password is **leave.** The password is not case-sensitive.<br><br>If changes were made on the Startup/Shutdown tab screen, then after entering the password, tap OK and the following screen is displayed:<br><br>  <br><br>Change the option if desired. Tap the X button to cancel Exit. Tap the OK button to exit the Avalanche applet. |

## Avalanche Update Settings

**Access: Start | Avalanche | File | Settings**

Use these menu options to setup the Avalanche Enabler on the mobile device. LXE recommends changing and then saving the changes (reboot) before connecting to the network.

Alternatively, the Mobile Device Server on can be disabled until needed (refer to the *Wavelink Avalanche Mobility Center User's Guide*. for details).

## Menu Options

| Settings Tab | Function |
|---|---|
| Connection | Enter the IP Address or host name of the Mobile Device Server. Set the order in which serial ports or RF are used to check for the presence of the Mobile Device Server. |
| Execution | *Unavailable in this release.* |
| Update | Set options for updates and synchronizing clock with Mobile Device Server. |
| Startup/Shutdown | Set options for Enabler program startup or shutdown. |
| Display | Set up the Windows display at startup, on connect and during normal mode. The settings can be adjusted by the user. |
| Shortcuts | Add, delete and update shortcuts to user-allowable applications. |
| Adapters | Enable or disable network and wireless settings. Select an adapter and switch between the Avalanche Network Profile and manual settings. |
| Status | View the current adapter signal strength and quality, IP address, MAC address, SSID, BSSID and Link speed. The user cannot edit this information. |

## Connection

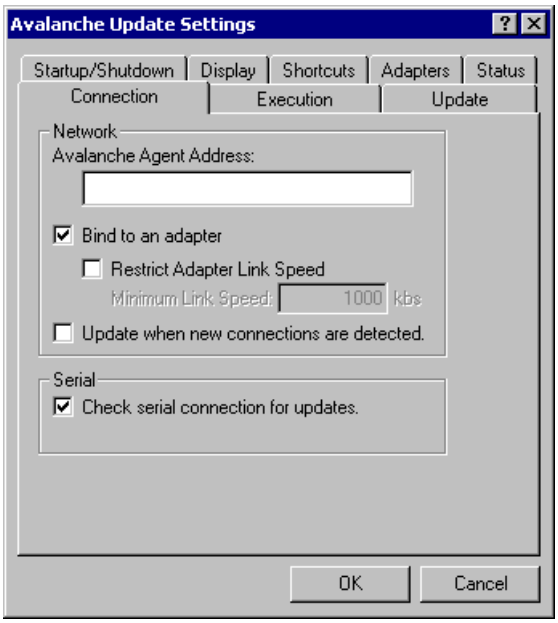



**Figure 3-12 Connection Options**

| | |
|---|---|
| Avalanche Agent Address | Enter the IP Address or host name of the Mobile Device Server assigned to the mobile device. |
| Check Serial Connection | Indicates whether the Enabler should first check for serial port connection to the Mobile Device Server before checking for a wireless connection to the Mobile Device Server. |

## Execution

Note the dimmed options on this panel. This menu option is designed to manage downloaded applications for automatic execution upon startup.

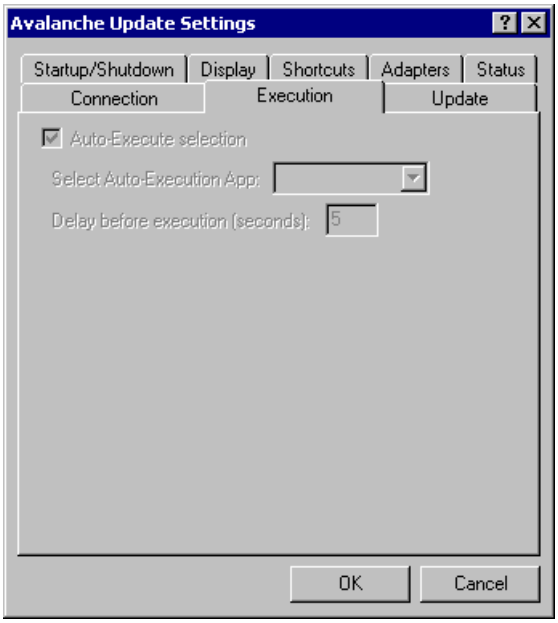



**Figure 3-13 Execution Options (Dimmed)**

| | |
|---|---|
| Auto-Execute Selection | An application that has been installed with the Avalanche Mobility Center Console system can be run automatically following each boot. |
| Select Auto-Execute App | The drop-down box provides a list of applications that have been installed by the Avalanche Mobility Center Console. |
| Delay before execution | Time delay before launching Auto-Execute application. |

## Server Contact

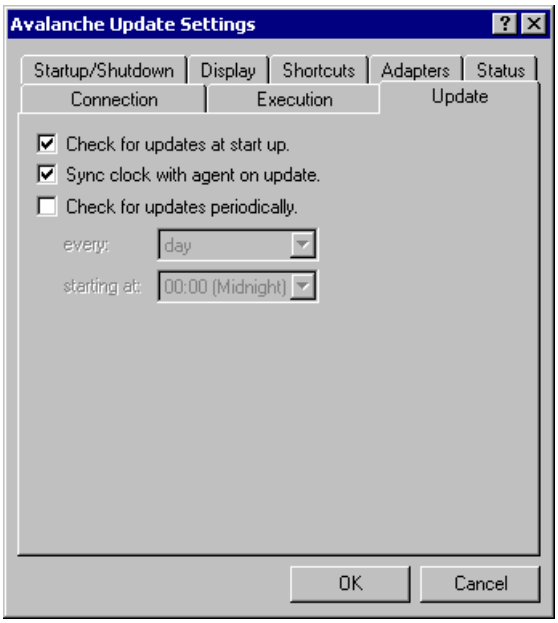



**Figure 3-14 Server Contact Options**

| | |
|---|---|
| Check for updates at start up | Connect to the Mobile Device Server when the Enabler is accessed. |
| Sync Clock | Reset the time on the mobile computer based on the time on the Mobile Device Server. |
| Check for updates periodically | Allows the administrator to configure the Enabler to contact the Mobile Device Server and query for updates at a regular interval beginning at a specific time. |

## Startup/Shutdown


**Figure 3-15 Startup / Shutdown Options**

| | |
|---|---|
| Do not monitor or launch utility | When the device boots, do not launch the Enabler application and do not attempt to connect to the Mobile Device Server. |
| Monitor for updates | Attempt to connect to the Mobile Device Server and process any updates that are available. Do not launch the Enabler application. |
| Monitor and launch update utility | Attempt to connect to the Mobile Device Server and process any updates that are available. Launch the Enabler application. |
| Program Shutdown (Continue or Stop monitoring) | The system administrator can control whether the Enabler continues to monitor the Mobile Device Server for updates once the Enabler application is exited. |

## Display

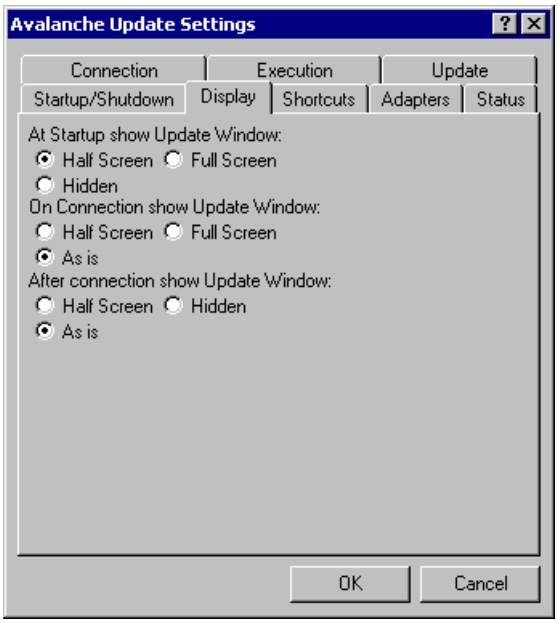



**Figure 3-16 Window Display Options**

### Update Window Display

The user interface for the Enabler can be configured to dynamically change based on the status of the connection with the Mobile Device Server.

| | |
|---|---|
| At startup | Half screen, Hidden or Full screen. Default is Half screen. |
| On connect | As is, Half screen, full screen, Locked full screen. Default is As is. |
| Normal | Half screen, Hidden or As is. Default is As is. |

## Shortcuts

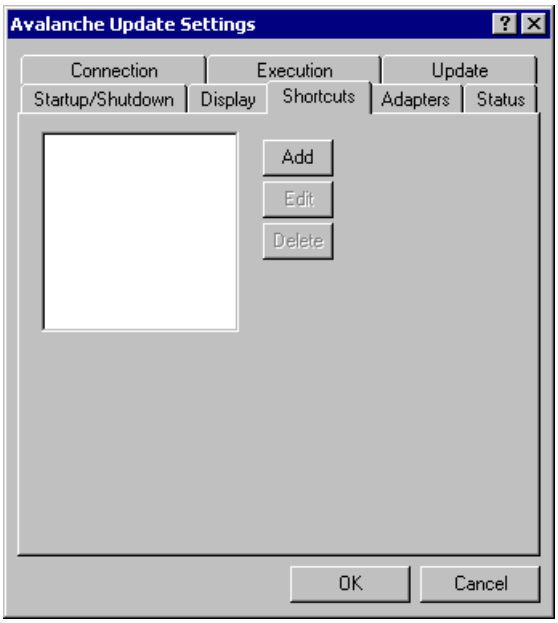



**Figure 3-17 Application Shortcuts**

Configure shortcuts to other applications on the mobile device. Shortcuts are viewed and activated in the Programs panel. This limits the user's access to certain applications when the Enabler is controlling the mobile device display.

## Adapters

*Note: LXE recommends the user review the network settings configuration utilities and the default values in Chapter 4 before setting All Adapters to Enable in the Adapters applet.*

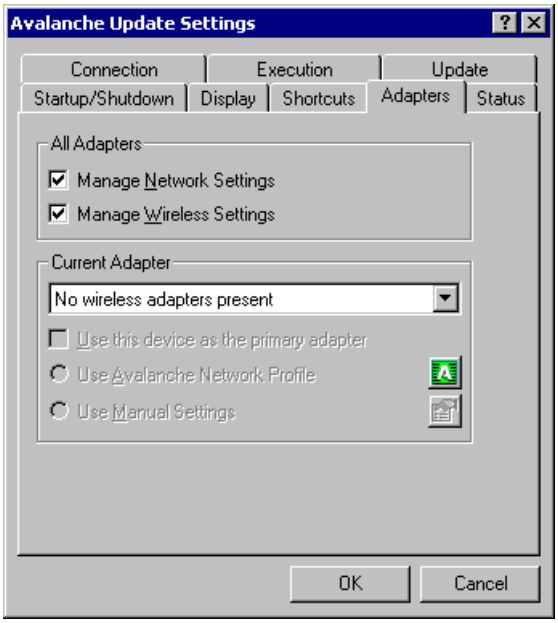
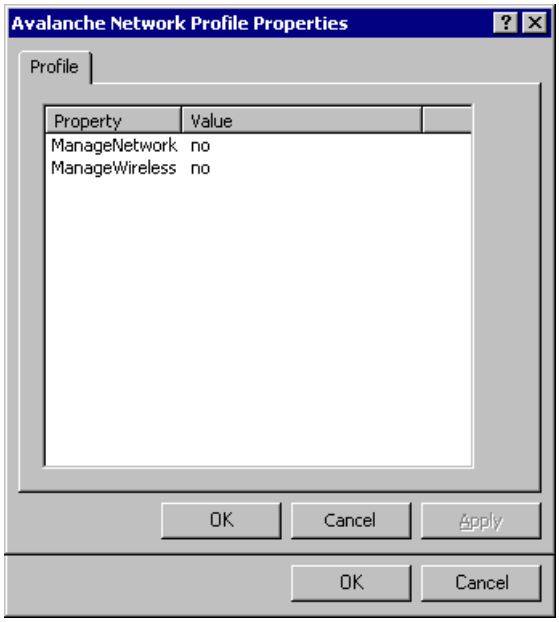


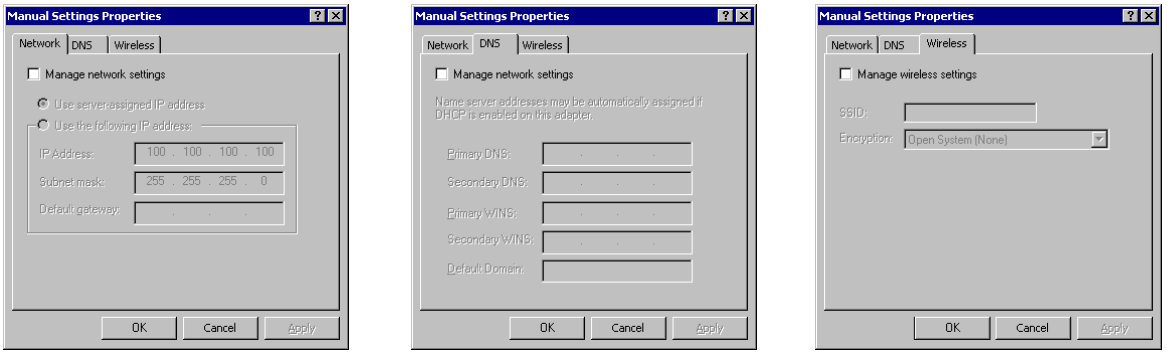

**Figure 3-18 Adapters Options – Network**

| | |
|---|---|
| Manage Network Setting | When enabled, the Enabler will control the network settings. This parameter cannot be configured from the Avalanche Mobility Center Console and is enabled by default. |
| Manage Wireless Settings | When enabled, the Enabler will control the wireless settings. This parameter cannot be configured from the Avalanche Mobility Center Console and is disabled by default. |
| Current Adapter | Lists all network adapters currently installed on the mobile device. |
| Primary Adapter | Indicates if the Enabler is to attempt to configure the primary adapter (active only if there are multiple network adapters). |
| Use Avalanche Network Profile | The Enabler will apply all network settings sent to it by the Avalanche Mobility Center Console. |

| | |
|---|---|
| Avalanche Icon  | Selecting the Avalanche Icon will access the Avalanche Network Profile tab which will display current network settings.   **Figure 3-19 Avalanche Network Profile Displayed** |
| Use Manual Settings | When enabled, the Enabler will ignore any network or wireless settings coming from the Avalanche Mobility Center Console and use only the network settings on the mobile device. |
| Properties Icon | Selecting the Properties icon displays the Manual Settings Properties dialog applet. From here, the user can configure Network, DNS and Wireless parameters using the displays shown below: |

*Note: A reboot may be required after enabling or disabling these options.*

**Network** **DNS** **Wireless**




**For descriptions of these Enabler parameters, refer to Chapter 4 "Wireless Network Configuration".**

**Figure 3-20 Manual Settings Properties Panels**

When you download a profile that is configured to manage network and wireless settings, the Enabler will not apply the manage network and wireless settings to the adapter unless the global **Manage wireless settings** and **Manage network settings** options are enabled on the Adapters panel (see Figure titled *Adapters Options – Network*).

Until these options are enabled, the network and wireless settings are controlled by the third-party software associated with these settings.

## Status

The Status panel displays the current status of the mobile device network adapter selected in the drop down box. Note the availability of the Windows standard Refresh button. When tapped, the signal strength, signal quality and link speed are refreshed for the currently selected adapter. It also searches for new adapters and may cause a slight delay to refresh the contents of the drop-down menu.

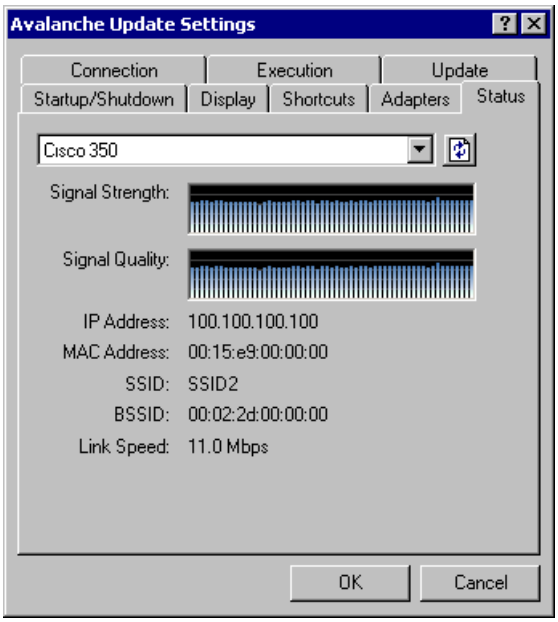



**Figure 3-21 Status Display**

Link speed indicates the speed at which the signal is being sent from the adapter to the mobile device. Speed is dependent on signal strength.

# Chapter 4 Wireless Network Configuration

## Introduction

*Note: This chapter is only applicable to wireless network configuration. If an Ethernet cable provides the network connection, please refer to "Network Configuration" in Chapter 3, "System Configuration".*

The VX5 radios rely on Microsoft Windows network configuration via the Windows Control Panel and configuration software that depends on the type of radio installed in the VX5. The VX5 has all necessary radio software and drivers installed before it is shipped. The radio software includes a configuration utility and a status monitor or diagnosis utility.

For information on network configuration under Microsoft Windows, please refer to commercially available Windows networking guides, Windows on-line help screens or Windows network troubleshooter.

The VX5 computer is available with Summit 802.11 b/g or Cisco or Symbol 802.11b radios. The radio can be configured for no encryption, WEP encryption or WPA security (N/A with Symbol radio).

Certificates are necessary for many of the WPA authentications. Please refer to the "Certificates" section at the end of this chapter for more information on generating and installing certificates.

Please refer to the table below for the security options supported for each radio type.

| Security Options Supported | Radio Type | | |
|---|---|---|---|
| | Summit | Cisco | Symbol |
| None | Yes | Yes | Yes |
| WEP | Yes | Yes | Yes |
| LEAP | Yes | Yes | Yes |
| WPA-PSK | Yes | Yes | No |
| WPA/LEAP | Yes | Yes | No |
| PEAP-MSCHAP | Yes | Yes | No |
| PEAP-GTC | Yes | Yes | No |
| EAP-TLS | Yes | Yes | No |
| EAP-FAST | Yes | No | No |

*Notes:*

*Summit radio is available with Microsoft Windows XP Operating system only.*

*While the Summit SCU does not support EAP-TLS, the Summit radio may be used with the Windows Wireless Zero Config utility for EAP-TLS.*

*WPA for Cisco radio is available with Windows XP operating system only, SP2 recommended.*

## Use Windows to Configure Wireless Settings

Unless otherwise directed in the following instructions, make sure Windows is NOT used to configure wireless network settings. Select the Network Connection icon in the Windows Control panel. Right click on the wireless network icon and select Properties.

"Use Windows to configure my wireless network settings" must remain unchecked for the SCU (Summit), ACU (Cisco) or Mobile Companion (Symbol) to control the wireless network configuration.

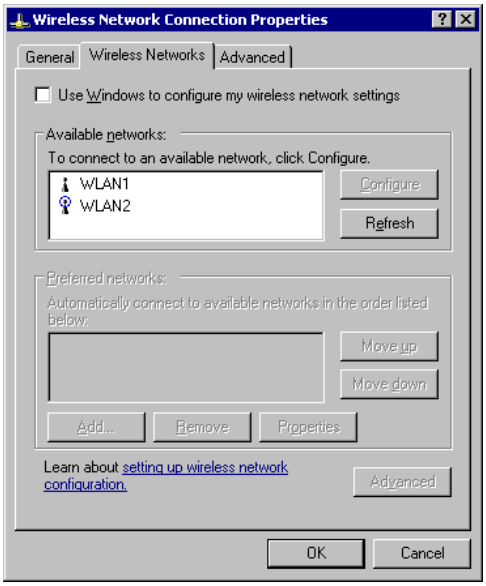



**Figure 4-1 Windows Wireless Network Properties**

## Summit Radio

| | |
|---|---|
|  | Please refer to the "LXE Security Primer" to prepare the Authentication Server and Access Point for VX5 communication. |
|  Date/Time | It is important that all dates are correct on mobile computers when using any type of certificate. Certificates are date sensitive and if the date is not correct authentication will fail. |

The Summit radio is an 802.11g radio, capable of both 802.11b and 802.11g data rates. This radio supports no encryption, WEP, LEAP or WPA (PEAP-MSCHAP, PEAP-GTC, WPA/LEAP and WPA-PSK). EAP-TLS is supported with the Windows Wireless Zero Config utility.

## Summit Client Utility

**Access:** **Start | Programs | Summit | SCU *or* SCU Icon on Desktop**

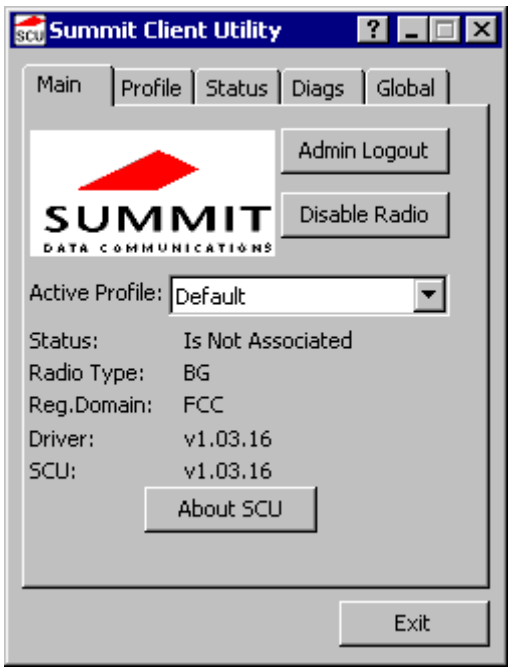



**Figure 4-2 Summit Client Utility**

The **Main** tab provides information, admin login and active profile selection.

Profile specific parameters are found on the **Profile** tab. The parameters on this tab can be set to unique values for each profile.

The **Status** tab contains information on the current connection.

The **Diags** tab provides utilities to troubleshoot the radio.

Global parameters are found on the **Global Settings** tab. The values for these parameters apply to all profiles.

## Help

Help is available by clicking the **?** icon in the title bar on most SCU screens.

## Summit Tray Icon

The Summit tray icon  provides access to the SCU and a visual indicator of radio status.

The Summit tray icon is displayed when:

- The Summit radio is installed and active
- The Windows Zero Config utility is not active
- The Tray Icon setting is On

Click the icon to launch the SCU.

Use the tray icon to view the radio status:

 The radio is not currently associated or authenticated to an Access Point

 The signal strength for the currently associated/authenticated Access Point is -80 dBm or weaker

 The signal strength for the currently associated/authenticated Access Point is stronger than -80dBm but not stronger than -60 dBm

 The signal strength for the currently associated/authenticated Access Point is stronger than -60 dBm but not stronger than -40 dBm

 The signal strength for the currently associated/authenticated Access Point is stronger than -40 dBm

## Wireless Zero Config Utility and the Summit Radio

- The WZC utility has an icon in the toolbar that looks like networked computers with a red X through them, indicating that Wireless Zero Config application is enabled but the connection is inactive at this time (the VX5 is not connected to a network).
- You can use either the Wireless Zero Configuration Utility or the Summit Client Utility to connect to your network. LXE recommends using the Summit Client Utility to connect to your network for all methods except EAP-TLS. The Wireless Zero Configuration Utility cannot control the complete set of security features of the radio.

Select **ThirdPartyConfig** in the Active Profile drop down list as the active profile. The Summit Client Utility passes control to Wireless Zero Config and the WZC Wireless Information control panel.

Next select **Start** | **Control Panel** | **Network Connections**. Click the Wireless connection and then click the **Properties** button. Next select the **Wireless Network** tab. Make sure the

Make sure "Use Windows to configure my wireless network settings" is checked. Use the options in the Wireless Zero Config panels to setup radio and security settings.

To switch back to Summit Client radio control, uncheck "Use Windows to configure my wireless network settings". Start the SCU and select any other profile in the drop down list, except ThirdPartyConfig. Radio control is passed to the SCU.

*Note: Wireless Zero Config must be used for EAP-TLS authentication.*

## Main Tab

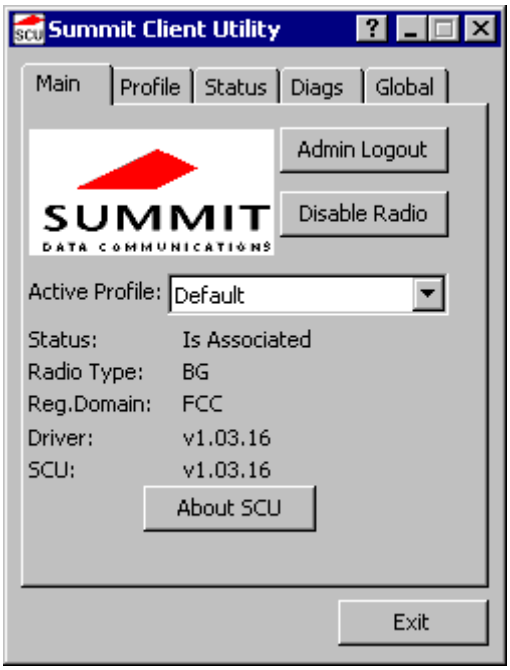



**Figure 4-3 SCU – Main Tab**

The Main tab displays information about the radio including:

- SCU (Summit Client Utility) version
- Driver version
- Regulatory Domain
- Copyright Info may be accessed by clicking the About SCU button
- Active Profile – Select from the profiles created using the Profile tab.
- Status of the radio (Down, Associated, Authenticated, etc).

The **Disable/Enable Radio** button does not work in this revision. Clicking this button has no effect.

The **Admin Login** button provides access to editing radio parameters as well as adding, renaming and deleting profiles. Profile and Global parameters may only be edited after entering the Admin Login password. The Active Profile may be changed without logging in. Once logged in, the button label changes to **Admin Logout**. The admin is also automatically logged out when the SCU is exited.

## Admin Login

To login to Admin mode, click the Admin login button.


**Figure 4-4 Admin Password Entry**

Enter the Admin password and press OK. If the password is incorrect, an error message is displayed. The default password is SUMMIT.

*Note: The password is case sensitive!*

The Admin password can be changed on the Global Settings tab.

The end user can:

- Turn radio On/Off on the Main tab
- Select active Profile on the Main tab
- View the current parameter settings for the profiles on the Profile tab
- View the global parameter settings on the Global Settings tab.
- The current connection details on the Status tab
- Radio status, software versions and regulatory domain on the Main tab
- Access additional troubleshooting features on the Diags tab.

After Admin login, the use can also:

- Create, edit, rename and delete profiles on the Profile tab
- Edit global parameters on the Global Setting tabs.

## Profile Tab

*Note: If the Admin password is not entered, the user can view the profile parameter settings but cannot make any changes. The buttons on this tab are grayed out if the user is not logged in.*

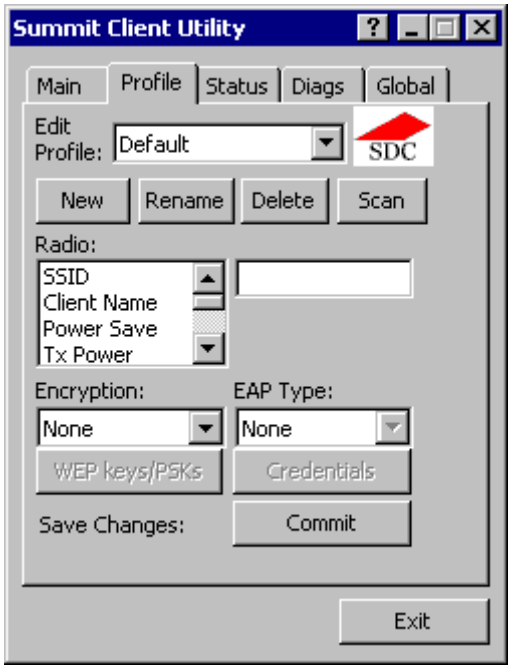



**Figure 4-5 SCU – Profile Tab**

When logged in as an Admin (see the Main tab), use the Profile tab to manage profiles:

- **Rename** – Gives the profile a new, unique name. If the new name is not unique, an error message is displayed and the profile is not renamed.
- **Delete** – Deletes the profile. The current active profile cannot be deleted. In that case, an error message is displayed and the profile is not deleted.
- **New** – Creates a new profile with the default settings (see the table below) and prompts for a name. The name must be unique. If not, an error message is displayed and the profile is not created.
- **Commit** – Ensures that the profile settings made on this screen are saved in the profile.

When not logged in, the parameters can be viewed, but cannot be changed.

## Parameters

**IMPORTANT** – Remember to click the **Commit** button after making changes to ensure the changes are saved.

### Config

A string of 1 to 32 alphanumeric characters, name of the Profile

Default: Default

### SSID

A string of up to 32 alphanumeric characters, the Service Set Identifier (SSID) of the WLAN to which the radio connects

Default: Blank

### Client Name

A string of up to 16 characters – Name assigned to the radio and the device using the radio. The client name may be passed to networking radio devices, e.g. Access Points.

Default: Blank

### Power Save

Power save mode.

Options: CAM = Constantly Awake Mode, power save off
Maximum = Maximum power saving mode
Fast = Fast power saving mode

Default: Fast

### Tx Power

Desired transmit power.

Options: Maximum = Max power for current regulatory domain
50, 30, 10 or 1 mW

Default: Maximum

### Bit Rate

Options: Auto = Rate negotiated automatically with the AP
1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48 or 54 Mbit

Default: Auto

### Radio Mode

Specify 802.11g and/or 802.11b when communicating with AP.

Options: B rates only
BG Rates Full
G rates only
BG optimized

Default: BG optimized

### Auth Type

802.11 authentication type used when associating with AP

Options: Open
Shared key
LEAP

Default: Open

*Note: Set the Auth Type radio parameter is set to "Open" for all configurations unless using LEAP (not WPA) and the AP is configured for network EAP only. In this case, set the Auth Type radio parameter to "LEAP".*

### EAP Type

Extensible Authentication Protocol (EAP) type used for 802.1x authentication to AP

Options: None
LEAP
EAP-FAST
PEAP-MSCHAP
PEAP-GTC

Default: None

*Note: The EAP type chosen determines if the* **Credentials** *button is active. Available entries on the Credentials pop up window vary by EAP type chosen.*

### Encryption

Type of encryption used to protect transmitted data.

Options: None
Manual WEP
Auto WEP
WPA PSK
WPA TKIP
WPS2 PSK
WPA2 AES
CCKM TKIP
CKIP Manual
CKIP Auto

Default: None

*Note: The Encryption type chosen determines if the* **WEP/PSK Keys** *button is active. Available entries on the pop up window vary by encryption type chosen.*

**IMPORTANT** – The settings for Auth Type, EAP Type and Encryption depend on the security type chosen. Please refer to "Summit Wireless Security", later in this chapter, to determine the proper settings for the security type implemented on the wireless LAN.

## Status Tab

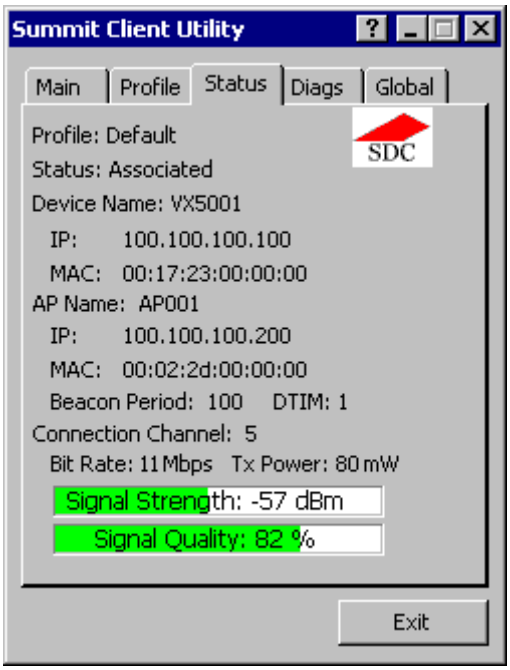



**Figure 4-6 SCU – Status Tab**

This screen provides information on the radio:

- The profile being used
- The client name, IP address and MAC address
- The status of the radio card (down, associated, authenticated, etc.)
- The name, IP address and MAC address of the Access Point (AP) maintaining the connection to the network
- Signal strength (changes with network activity)
- Channel currently being used for wireless traffic
- Current transmit power in mW
- Bit rate in Mbit.

There are no user entries on this screen.

*Note: After completing radio configuration, it is a good idea to review this screen to verify the radio has associated (no encryption, WEP) or authenticated (LEAP, any WPA), as indicated above.*

## Diags Tab

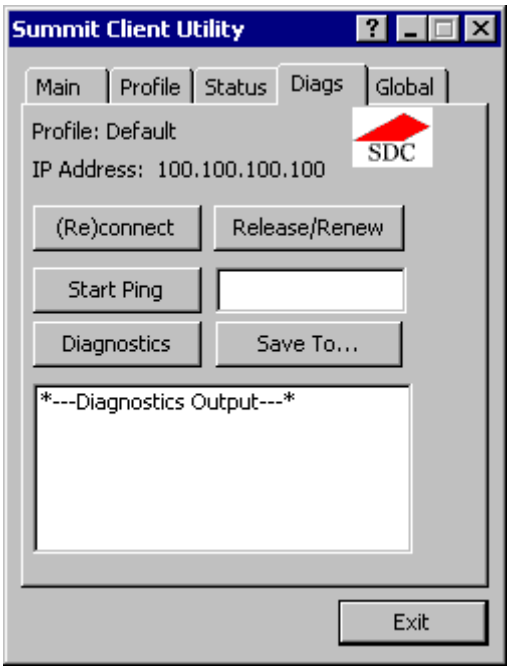



**Figure 4-7 SCU – Diags Tab**

The Diags screen can be used for troubleshooting network traffic and radio connectivity issues.

- **(Re)connect** – Use this button to apply (or reapply) the current profile and attempt to associate or authenticate to the wireless LAN. All activity is logged in the Diagnostic Output box on the lower part of the screen.
- **Diagnostics** – Also attempts to (re)connect to the wireless LAN. However, this option provides more data in the Diagnostic Output box than the (Re)connect option. This data dump includes radio state, profile settings, global settings, and a list of broadcast SSID APs. (Not available in this release)
- **Start Ping** – Start a continuous ping to the IP address specified in the text box to the right of this button. Once the button is clicked, the ping begins and the button label changes to **Stop Ping**. Clicking the button ends the ping. The ping also ends when any other button on this screen is clicked or the user browses away from the Diags tab. The results of the ping are displayed in the Diagnostic Output box.
- **Release/Renew** – Obtain a new IP address through release and renew. All activity is logged in the Diagnostic Output box. If a fixed IP address has been assigned to the radio, this is also noted in the Diagnostic Output box. Note that the current IP address is displayed above this button.

## Global Settings Tab

The parameters on the global settings tab can be changed when an Admin is logged on. Without the admin login, the current values for the parameters can be viewed, but they cannot be edited.

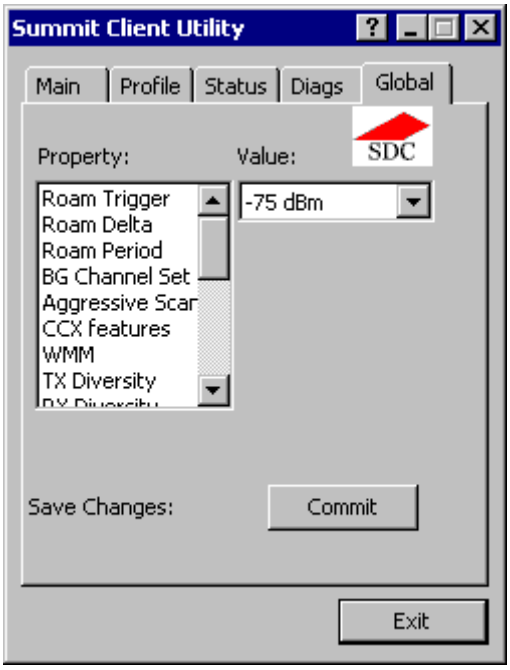



**Figure 4-8 SCU – Global Settings Tab**

## Parameters

**IMPORTANT** – Remember to click the **Commit** button after making changes to ensure the changes are saved.

After changes are made to the Global parameters, one of the following actions must be performed:

- The VX5 must be rebooted
- The radio must be ejected and reinserted
- The radio must be disabled and then re-enabled in the Windows Control Panel.

*Note: Custom parameter options – LXE does not support the parameter Custom option. The parameter value is displayed as "Custom" when the operating system registry has been edited to set the Summit parameter to a value that is not available from the parameter's drop down list. Selecting Custom from the drop down list has no effect. Selecting any other value from the drop down list will overwrite the "Custom" value set in the registry.*

### Roam Trigger

If signal strength is less than this trigger value, the radio looks for a different AP with a stronger signal.

Options: -50, -55, -60, -65, -70, -75 dBm,
Custom (see Note above)

Default: -65 dBm

### Roam Delta

Amount by which the new AP's signal strength must exceed the current AP's signal strength before roaming is attempted.

Options: 5, 10, 15, 20, 25, 30, 35 dBm,
Custom (see Note above)

Default: 10 dBm

### Roam Period

The amount of time, after association or a roam scan with no roam, that the radio collects Received Signal Strength Indication (RSSI) scan data before a roaming decision is made.

Options: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60 sec,
Custom (see Note above)

Default: 10 seconds

### BG Channel Set

Defines the 2.4GHz channels to be scanned for an AP when the radio is contemplating roaming..

Options: Full (all channels)
1, 6, 11 (the most commonly used channels)
1, 7, 13 (For ETSI and TELEC radios only)
Custom (see Note above)

Default: Full

### Aggressive Scan

When set to On and the current connection to an AP becomes weak, the radio scans for available APs more aggressively. Aggressive scanning work with standard scanning (set through Roam Trigger, Roam Delta and Roam Period). Aggressive scanning should b set to On unless there is significant co-channel interference because of overlapping APs on the same channel .

Options: On, Off

Default: On

### CCX Features

Use of Cisco Compatible Extensions (CCX) radio management and AP specified maximum transmit power features.

Options: On, Off

Default: Off

### WMM

Use of Wi-Fi Multimedia extensions.

Options: On, Off

Default: Off

### TX Diversity

How to handle antenna diversity when transmitting packets to AP.

Options: Main only = Main antenna only
Aux only = Aux antenna only
On = Use diversity

Default: On

| | |
|---|---|
|  | For a VX5 with a single external antenna use **Main Only**. For a VX5 with dual external antennas use **On**. |

### RX Diversity

How to handle antennas diversity when receiving packets from AP.

Options: Main Only = use main antenna only
Aux Only = use aux. antenna only
On-start on Main = On startup use main antenna
On-start on Aux = On startup use aux antenna

Default: On-start on Main

| | |
|---|---|
|  | For a VX5 with a single external antenna use **Main Only**. For a VX5 with dual external antennas use **On-start on main**. |

### Frag Thresh

If the packet size (in bytes) exceeds the specified number of bytes set in the fragment threshold, the packet is fragmented (sent as several pieces instead of as one block). Use a low setting in areas where communication is poor or where there is a great deal of radio interference.

Options: 256 to 2346

Default: 2346

### RTS Thresh

If the packet size exceeds the specified number of bytes set in the Request to Send (RTS) threshold, an RTS is sent before sending the packet. A low RTS threshold setting can be useful in areas where many client devices are associating with the Access Point.

Options: 0 to 2347

Default: 2347

### LED

The LED on the radio card is not visible to the user when the radio card is installed in a sealed mobile device.

Options: On, Off

Default: Off

### Tray Icon

Determines if the Summit icon is displayed in the system tray.

Options: On, Off

Default: On

### Hide Password

If On, the Summit Client Utility masks passwords as they are typed and when they are viewed.

Options: On, Off

Default: Off

### Admin Password

A string of up to 64 alphanumeric characters that must be entered when the Admin Login button is tapped. If Hide Password is On, the password is masked when typed in the Admin Password Entry text box. The password is Case Sensitive.

Default: SUMMIT

*Note: Password is case sensitive.*

### Auth Timeout

Specifies the number of seconds the Summit software waits for an EAP authentication request to succeed or fail. If the authentication credentials are stored in the active profile and the authentication times out, the association fails. If the authentication credentials are not stored in the active profile and the authentication times out, the user is reprompted to enter the credentials.

Options: An integer from 3 to 60

Default: 8

### Certs Path

A valid directory path, of up to 64 characters, where Root CA certificates for EAP authentication (PEAP/MSCHAP, PEAP/GTC) are stored.

LXE suggests ensuring the directory path currently exists before assigning the path in this parameter.

Default: \Files\Summit\certs

### Ping Payload

Maximum amount of data to be transmitted on a ping.

Options: 32, 64, 128, 256, 512, 1024 bytes

Default: 32

### Ping Timeout ms

The amount of time, in milliseconds, that a device will be continuously pinged. The Stop Ping button can be tapped to end the ping process ahead of the ping timeout.

Options: 0 to 30,000 ms

Default: 5000

### Ping Delay ms

The amount of time, specified in milliseconds, between each ping.

Options: 0 to 30,000 ms

Default: 1000

## Sign-On vs. Stored Credentials

When using wireless security that requires a user name and password to be entered, the Summit Client Utility offers two choices:

- The Username and Password may be entered on the Credentials screen. If this method is selected, anyone using the device can access the network.
- The Username and Password are left blank on the Credentials screen. When the device attempts to connect to the network, a sign on screen is displayed. The user must enter the Username and Password at that time to authenticate.

### How to: Use Stored Credentials

1. After completing the other entries in the profile, click on the **Credentials** button.
2. Enter the **Username** and **Password** on the Credentials screen and click the **OK** button.
3. Click the **Commit** button.
4. For LEAP, WPA/LEAP and EAP-FAST with automatic PAC provisioning, configuration is complete.
5. Access the Credentials screen again. Make sure the **Validate server** checkbox is checked fro PEAP-MSCHAP and PEAP-GTC.
6. Make sure the certificate or manually created PAC has been copied to the directory specified in the Certs Path global variable.
7. For EAP-FAST with manual PAC provisioning, enter the PAC Filename and Password.
8. For PEAP-MSCHAP and PEAP-GTC enter the CA certificate filename.
9. Click the **OK** button then the **Commit** button.
10. Verify the device is authenticated by reviewing the Status tab. When the device is property configured, the Status tab indicates the device is Authenticated and the method used.

*Notes: More details are provided in the appropriate Summit Wireless Security section following in this chapter.*

*If invalid credentials are entered into the stored credentials, the authentication will fail. No error message is displayed and the user is not prompted to enter valid credentials.*

**How to: Use Sign On Screen**

1. After completing the other entries in the profile, click on the **Credentials** button. Leave the Username and Password blank. No entries are necessary on the Credentials screen for LEAP, WPA/LEAP or EAP-FAST using automatic PAC provisioning.
2. Make sure the **Validate server** checkbox is checked fro PEAP-MSCHAP and PEAP-GTC.
3. Make sure the certificate or manually created PAC has been copied to the directory specified in the Certs Path global variable.
4. For EAP-FAST with manual PAC provisioning, enter the PAC Filename and Password.
5. For PEAP-MSCHAP and PEAP-GTC enter the CA certificate filename.
6. Click the **OK** button then the **Commit** button.
7. When the device attempts to connect to the network, a sign-on screen is displayed.
8. Enter the **Username** and **Password**. Click the **OK** button.

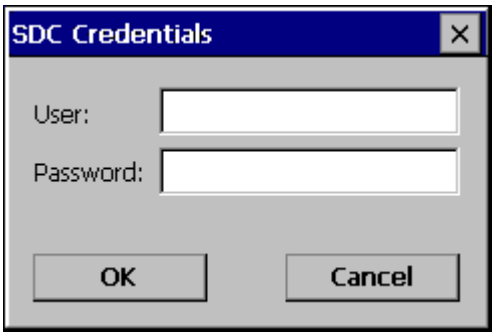



**Figure 4-9 Sign-On Screen**

9. Verify the device is authenticated by reviewing the **Status** tab. When the device is property configured, the Status tab indicates the device is Authenticated and the method used.
10. The sign-on screen is displayed after a reboot for each of the listed protocols.

*Note: Complete details are provided in the appropriate Summit Wireless Security section following in this chapter.*

*If a user enters invalid credentials and clicks* **OK**, *the device associates but does not authenticate. The user is again prompted to enter credentials.*

*If the user clicks the* **Cancel** *button, the device does not associate. The user is not prompted again for credentials until the device is rebooted, the radio is disabled then enabled, the* **Reconnect** *button on the Diags tag is clicked or the profile is modified and the* **Commit** *button is clicked.*

## Summit Wireless Security

Use the instructions in this section to complete the entries on the **Profile** tab according to the type of wireless security used by the network. The instructions that follow are the minimum required to successfully connect to a network. Your system may require more parameters than are listed in these instructions. Please see your system administrator for complete information about your network and its wireless security requirements.

To begin the configuration process:

- On the Main tab, click the **Admin Login** button and enter the password.
- LXE recommends editing the default profile with the parameters for your network. Select the Default profile from the pull down menu.

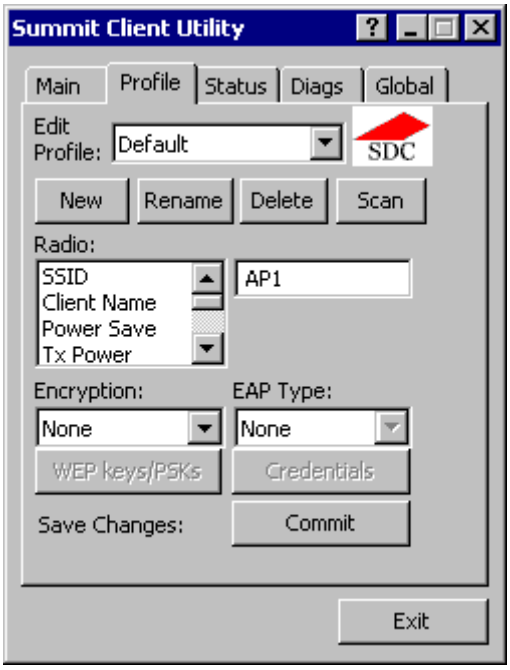



**Figure 4-10 Default Profile**

- Make any desired parameter changes as described in the applicable following section determined by network security type and click the **Commit** button to save the changes.

Be sure to click the **Commit** button after all changes have been made.

## No Security

To connect to a wireless network with no security, make sure the following profile options are used:

- Enter the SSID of the Access Point assigned to this profile
- Set EAP Type to None
- Set Encryption to None
- Set Auth Type to Open

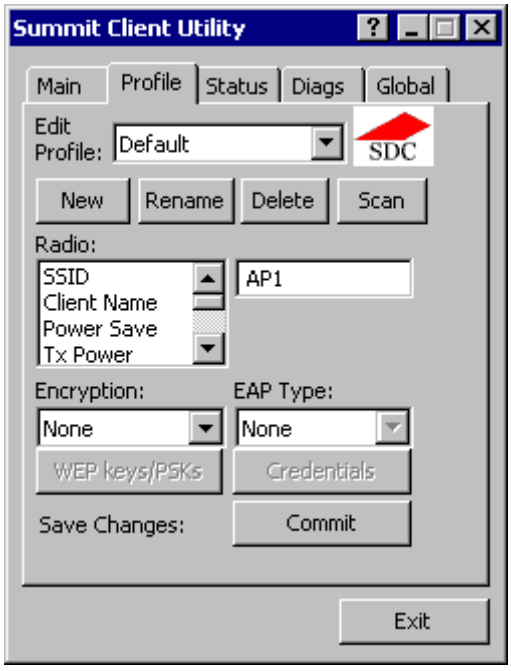



**Figure 4-11 No Security**

Once configured, click the **Commit** button. Ensure the correct Active Profile is selected on the Main tab. The SCU Main tab shows the device is associated after the radio connects to the network.

## WEP

To connect using WEP, make sure the following profile options are used.

- Enter the SSID of the Access Point assigned to this profile
- Set EAP Type to None
- Set Encryption to Manual WEP
- Set Auth Type to Open


**Figure 4-12 WEP Encryption**

Click the **WEP keys/PSKs** button.

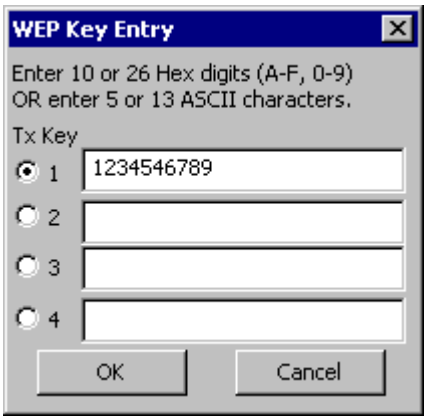



**Figure 4-13 WEP Keys**

Valid keys are 10 (for 40 bit encryption) or 26 (for 128 bit encryption) hexadecimal characters. Enter the key(s) and click **OK**.

Once configured, click the **Commit** button. Ensure the correct Active Profile is selected on the Main tab. The SCU Main tab shows the device is associated after the radio connects to the network.

## LEAP without WPA Authentication

To use LEAP (without WPA) make sure the following profile options are used:

- Enter the SSID of the Access Point assigned to this profile
- Set EAP Type to LEAP
- Set Encryption to Auto WEP
- Set Auth Type as follows:
  - If the Cisco/CCX certified AP is configured for open authentication, set the Auth Type radio parameter to Open.
  - If the AP is configured for network EAP only, set the Auth Type radio parameter to LEAP.

Please see “WPA/LEAP” later in this section to configure the radio for WPA LEAP.


**Figure 4-14 LEAP Configuration**

Please review “Sign-On vs. Stored Credentials”, earlier in this chapter.

To use Stored Credentials, click on the **Credentials** button. No entries are necessary for Sign-On Credentials as the user will be prompted for the Username and Password when connecting to the network.

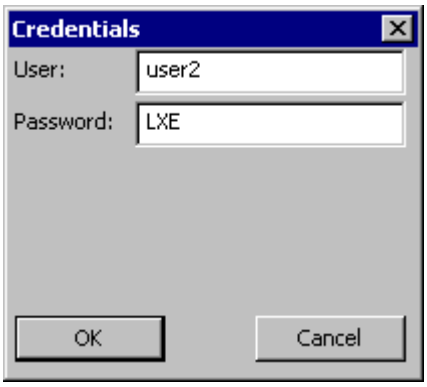



**Figure 4-15 LEAP Credentials**

Enter the Domain\Username (if the Domain is required), otherwise enter the Username. Enter the password and click **OK**.

Once configured, click the **Commit** button. Ensure the correct Active Profile is selected on the Main tab. The SCU Main tab shows the device is associated after the radio connects to the network.

## PEAP/MSCHAP

To use PEAP/MSCHAP, make sure the following profile options are used.

- Enter the SSID of the Access Point assigned to this profile
- Set EAP Type to PEAP-MSCHAP
- Set Encryption to WPA TKIP
- Set Auth Type to Open

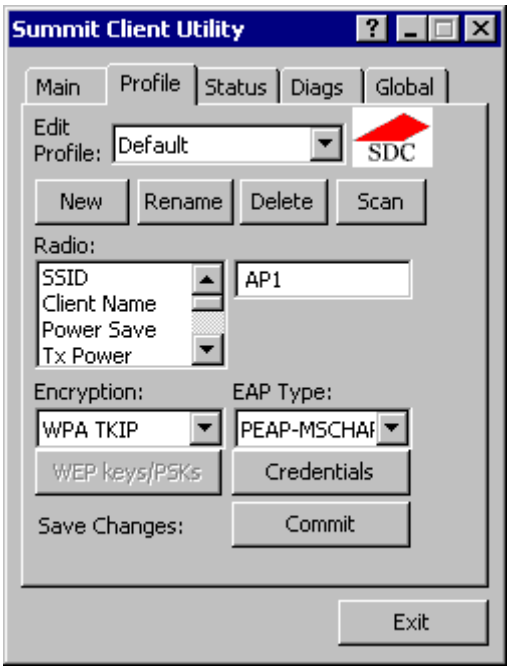



**Figure 4-16 PEAP/MSCHAP**

Please review “Sign-On vs. Stored Credentials”, earlier in this chapter.

Click the **Credentials** button.

- No entries except the CA Certificate Filename are necessary for Sign-On Credentials as the user will be prompted for the User Name and Password when connecting to the network.
- For Stored Credentials, User, Password and the CA Certificate Filename must be entered.

Enter these items as directed below.

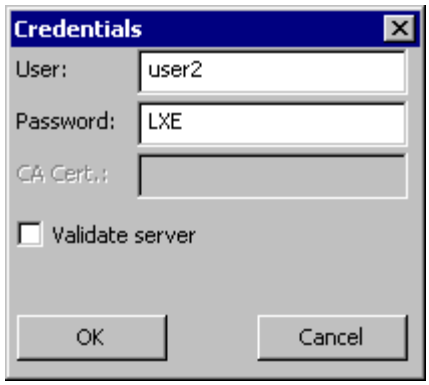



**Figure 4-17 PEAP/MSCHAP Credentials**

Enter the Domain\Username (if the Domain is required), otherwise enter the Username.

Enter the password.

Leave the CA Certificate File Name blank for now.

Click **OK** then click **Commit**. Ensure the correct Active Profile is selected on the Main tab.

Once successfully authenticated, copy the CA certificate into the directory specified in the Certs Path global variable. Return to the Credentials screen and check the **Validate server** checkbox.

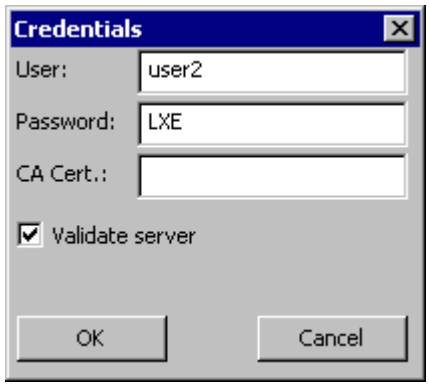



**Figure 4-18 PEAP/MSCHAP Certificate Filename**

Enter the filename of the certificate.

Click **OK** then click **Commit**.

The device should be authenticating the server certificate and using PEAP/MSCHAP for the user authentication.

For information on generating a Root CA certificate, please see “Root CA Certificate” later in this chapter.

*Note: The date must be properly set on the device to authenticate a certificate.*

## PEAP/GTC

To use PEAP/GTC, make sure the following profile options are used.

- Enter the SSID of the Access Point assigned to this profile
- Set EAP Type to PEAP-GTC
- Set Encryption to WPA TKIP
- Set Auth Type to Open

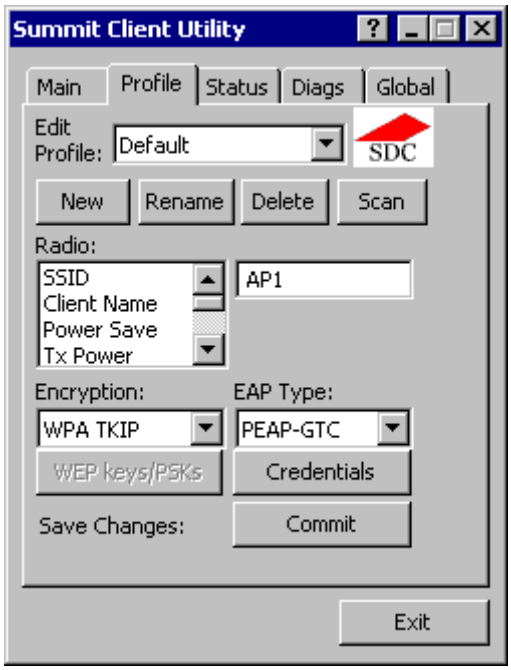



**Figure 4-19 PEAP/GTC**

Please review "Sign-On vs. Stored Credentials", earlier in this chapter.

Click the **Credentials** button.

- No entries except the CA Certificate Filename are necessary for Sign-On Credentials as the user will be prompted for the User Name and Password when connecting to the network.
- For Stored Credentials, User, Password and the CA Certificate Filename must be entered.

Enter these items as directed below.

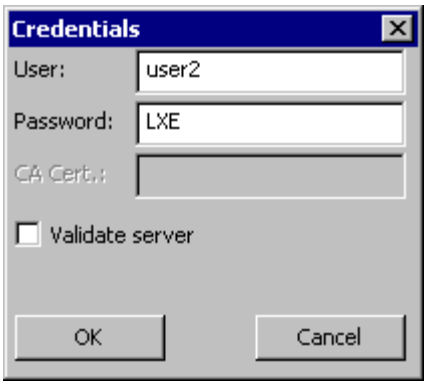



**Figure 4-20 PEAP/GTC Credentials**

Enter the Domain\Username (if the Domain is required), otherwise enter the Username.

Enter the password.

Leave the CA Certificate File Name blank for now.

Click **OK** then click **Commit**. Ensure the correct Active Profile is selected on the Main tab.

Once successfully authenticated, copy the CA certificate into the directory specified in the Certs Path global variable. Return to the Credentials screen and check the **Validate server** checkbox.

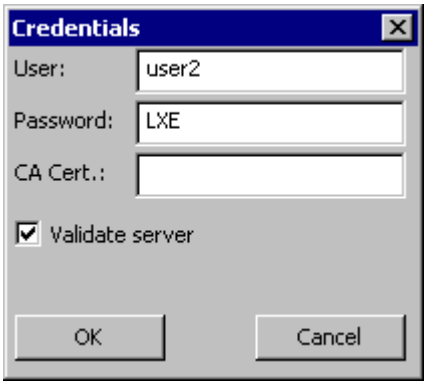



**Figure 4-21 PEAP/GTC Certificate Filename**

Enter the filename of the certificate.

Click **OK** then click **Commit**.

The device should be authenticating the server certificate and using PEAP/MSCHAP for the user authentication.

For information on generating a Root CA certificate, please see “Root CA Certificate” later in this chapter.

*Note: The date must be properly set on the device to authenticate a certificate.*

## WPA/LEAP

To use WPA/LEAP, make sure the following profile options are used.

- Enter the SSID of the Access Point assigned to this profile
- Set EAP Type to LEAP
- Set Encryption to WPA TKIP
- Set Auth Type to Open

Please see “LEAP” earlier in this section to configure the radio for LEAP without WPA.

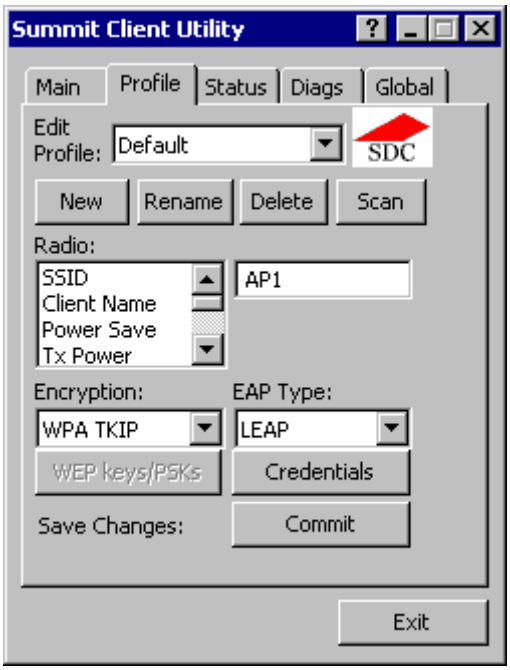



**Figure 4-22 WPA/LEAP**

Please review “Sign-On vs. Stored Credentials”, earlier in this chapter.

To use Stored Credentials, click on the **Credentials** button. No entries are necessary for Sign-On Credentials as the user will be prompted for the Username and Password when connecting to the network.

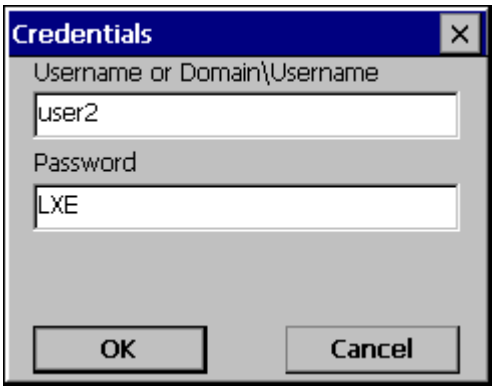



**Figure 4-23 WPA/LEAP Credentials**

Enter the Domain\Username (if the Domain is required), otherwise enter the Username.

Enter the password.

Click **OK** then click **Commit**. Ensure the correct Active Profile is selected on the Main tab. The SCU Main tab shows the device is associated after the radio connects to the network.

## EAP-FAST

To use EAP-FAST, make sure the following profile options are used.

- Enter the SSID of the Access Point assigned to this profile
- Set EAP Type to EAP-FAST
- Set Encryption to WPA TKIP
- Set Auth Type to Open

The SCU supports EAP-FAST with automatic or manual PAC provisioning. With automatic PAC provisioning, the user credentials, whether entered on the saved credentials screen or the signon screen, are sent to the RADIUS server. The RADIUS server must have auto provisioning enabled to send the PAC provisioning credentials to the client device. Please refer to the "LXE Security Primer" for more information on the RADIUS server configuration.

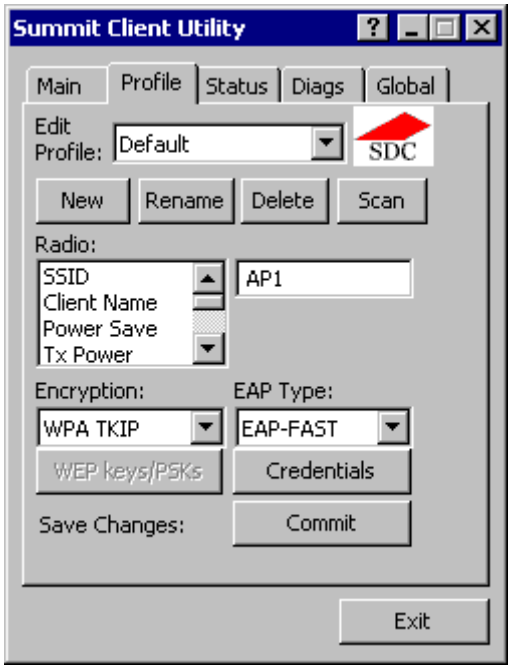



**Figure 5-24 EAP-FAST Configuration**

For automatic PAC provisioning, once a username/password is authenticated, the PAC information is stored on the computer. The same username/password must be used to authenticate each time. See the note on the next page for more details.

For manual PAC provisioning, the PAC filename and Password must be entered.

Please review "Sign-On vs. Stored Credentials", earlier in this chapter.

The entries on the Credentials screen are determined by the type of credentials (stored or sign on) and the type of PAC provisioning (automatic or manual).

Click on the **Credentials** button.

To use Stored Credentials, click on the **Credentials** button. No entries are necessary for Sign-On Credentials with automatic PAC provisioning as the user will be prompted for the Username and Password when connecting to the network.

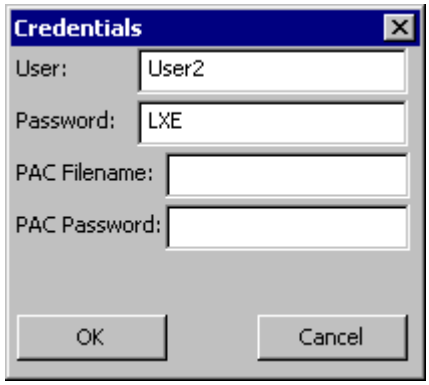



**Figure 5-25 EAP-FAST Credentials**

To use Sign-On credentials:

- Do not enter a User and Password as the user will be prompted for the Username and Password when connecting to the network.

To use Stored Credentials:

- Enter the Domain\Username (if the Domain is required), otherwise enter the Username.
- Enter the password.

To use Automatic PAC Provisioning:

- No additional entries are required.

To use manual PAC Provisioning:

- Enter the PAC Filename and PAC Password.
- The PAC file must be copied to the directory specified in the Certs Path global variable. The PAC file must not be read only.

Tap **OK** then tap **Commit**. Ensure the correct Active Profile is selected on the Main tab. The SCU Main tab shows the device is associated after the radio connects to the network.

*Note: When using Automatic PAC Provisioning, once authenticated, there is a file stored in the \System directory with the PAC credentials. If the username is changed, that file must be deleted. The filename is* ***autoP.00.pac****.*

## WPA PSK

To connect using WPA/PSK, make sure the following profile options are used:

- Enter the SSID of the Access Point assigned to this profile
- Set EAP Type to None
- Set Encryption to WPA PSK
- Set Auth Type to Open


**Figure 4-26 WPA/PSK Encryption**

Click **WEP keys/PSKs** button.

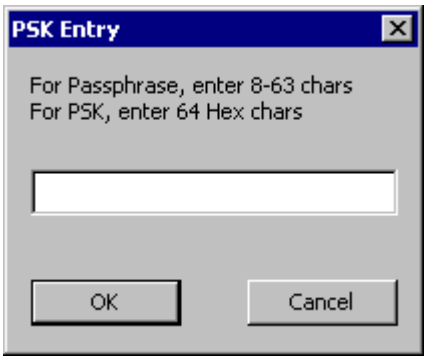



**Figure 4-27 PSK Entry**

This value can be 64 hex characters or an 8 to 63 byte ASCII value. Enter the key and click **OK**.

Once configured, click the **Commit** button. Ensure the correct Active Profile is selected on the Main tab. The SCU Main tab shows the device is associated after the radio connects to the network.

## EAP-TLS for Summit

EAP-TLS requires the Summit active profile be set to ThirdPartyConfig on the Main tab. For more details, please see "Wireless Zero Config Utility and the Summit Radio", earlier in this chapter.

Use the flowing instructions for the Microsoft Wireless Network Configuration Utility to enable EAP-TLS.

To start configuring the wireless connection, click on the icon in the system tray.

**Figure 4-28 Wireless Network System Tray Icon**

The **Wireless Network Connection** screen appears.

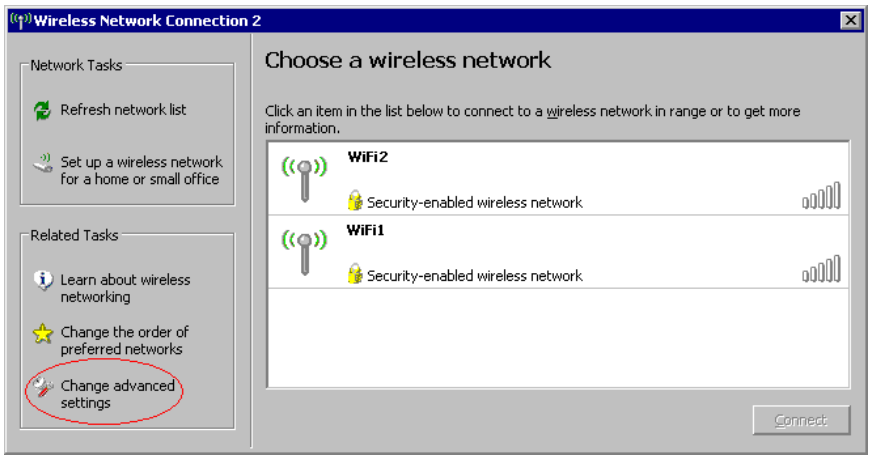



**Figure 4-29 Wireless Network Connections**

Click the **Change advanced settings** link.

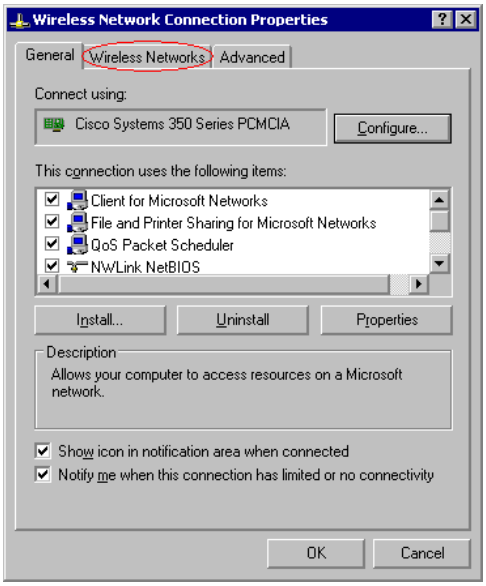



**Figure 4-30 Connection Properties, General Tab**

To configure the wireless radio networks, click the **Wireless Networks** tab.

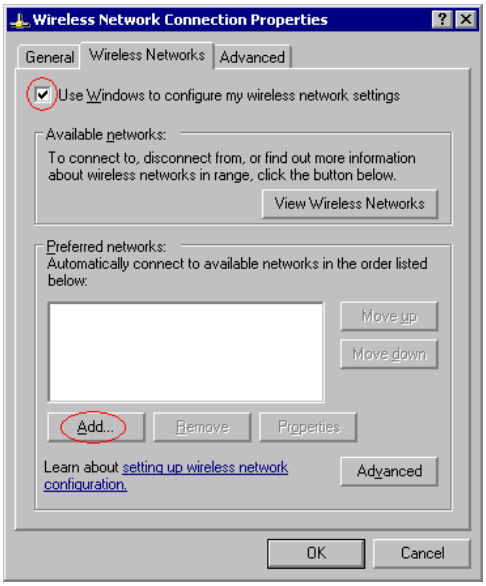



**Figure 4-31 Connection Properties, Wireless Networks Tab**

Make sure the **Use Windows to configure my wireless network settings** box is checked. WPA/LEAP is the exception and this box should not be checked when using WPA/LEAP.

To add a new wireless network click the **Add** button.

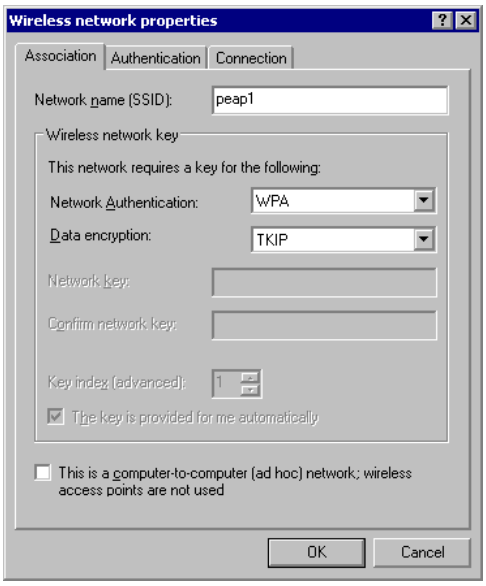



**Figure 4-32 Wireless Network Properties, Association Tab**

Enter the SSID in the **Network Name (SSID)** text box.

Select **WPA** from the **Network Authentication** pull down list. Select **TKIP** from the **Data Encryption** pull down list.

To configure authentication, click the **Authentication** tab at the top of the screen.

## EAP-TLS Configuration

To authenticate using the EAP-TLS protocol you will need a user certificate with the private key. Once you have the user certificate, run the certificate installer from the control panel. The Microsoft supplicant is used. It does not matter if the Cisco supplicant is installed or not.

*Note: It is important that all dates are correct on the VX5 computers when using any type of certificate. Certificates are date sensitive and if the date is not correct authentication may fail.*

## User Certificate

If the VX5 was used to request the user certificate, it may have been installed by the CA. To check if a correct user certificate is installed:

1. Navigate to **Start | Run** and type mmc.
2. Select **File | Add/Remove Snap-in**.
3. Click the **Add** button.
4. Click **Certificates**, click the **Add** button and choose **My User Account**.
5. Click **Finish | Close | OK**.
6. Expand Certificates – Current User and Personal
7. Click **Certificates**
8. The user certificate is shown in the right pane, if installed.

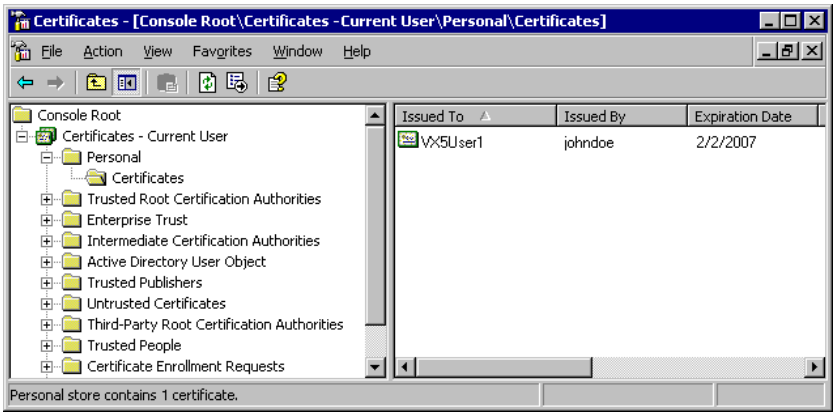



**Figure 4-33 Certificates**

If there is no user certificate refer to "Installing a Root CA Certificate" earlier in this chapter.

## Setting EAP/TLS Parameters

Set the Wireless Network Connection Properties per instructions in "Wireless Network Configuration" earlier in this chapter.

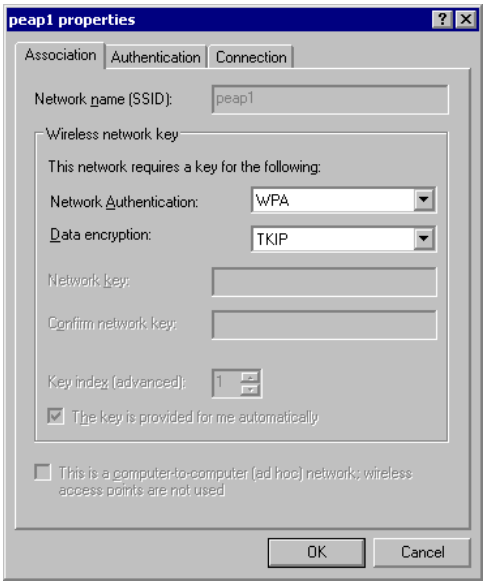



**Figure 4-34 Wireless Network Association**

Click the **Authentication** tab.

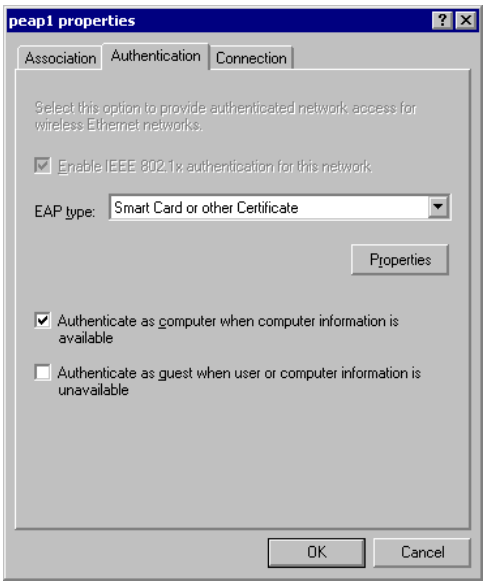



**Figure 4-35 Wireless Network Authentication**

Choose **Smart Card or other Certificate** in the **EAP type** drop down box.

Make sure the **Authenticate as computer when computer information is available** check box is checked. Make sure the **Authenticate as guest when user or computer is unavailable** check box is not checked.

Click the **Properties** button.

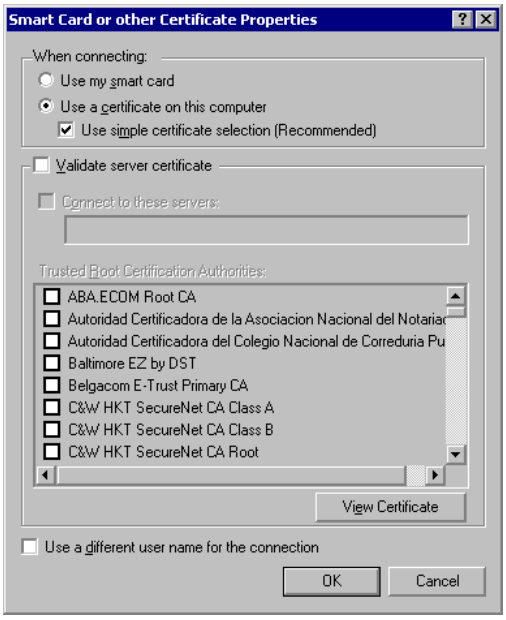



**Figure 4-36 Smart Card or Certificate Properties**

Click the **Use a certificate on this computer** button and check **Use simple certificate selection** box, as shown above.

Do not check the **Validate server certificate** box. This allows the user to be authenticated as the first step.

When the user certificate successfully authenticates, come back to this screen and check the **Validate server certificate** box, as described in the next section.

Click the **OK** button to dismiss the configuration screens.

When the radio re-connects the user should be authenticated with the user certificate.

If the user does not authenticate check the user certificate and the date on the computer again.

## Validating the Server Certificate

Navigate to the Authentication tab of the Wireless Network Settings screen as described in "Wireless Network Connections".

Click the **Properties** button.

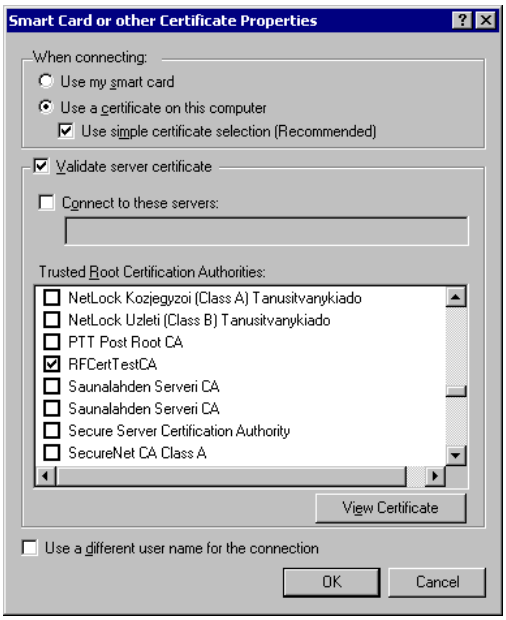



**Figure 4-37 Validating Server Certificate**

Check the **Validate server certificate** box.

Choose the root CA name in the **Trusted Root Certification Authorities** list box.

Uncheck the **Connect to these servers** box.

Click **OK** to dismiss the configuration screens.

The radio re-starts with the new parameters and validates the server CA certificate.

Finally navigate back to the properties configuration screen and check the **Connect to these servers** box.

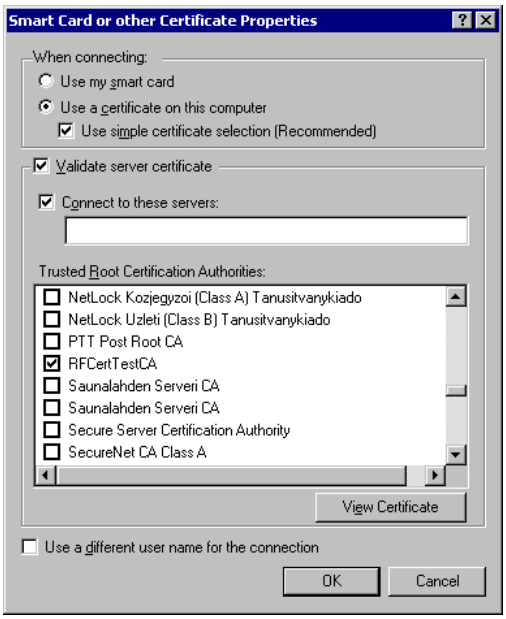



**Figure 4-38 Connect to Servers**

Type the exact name of the ACS server certificate if known. If it is unknown leave the text field blank.

Click **OK** to dismiss the configuration screens.

The radio will re-start with the new parameters and validate the server certificate.

A message box will appear asking if the server certificate is the correct certificate as shown below.


**Figure 4-39 Validate Servers Confirmation**

Click **OK** and the VX5 fills in the correct name of the server certificate in the text field left blank above.

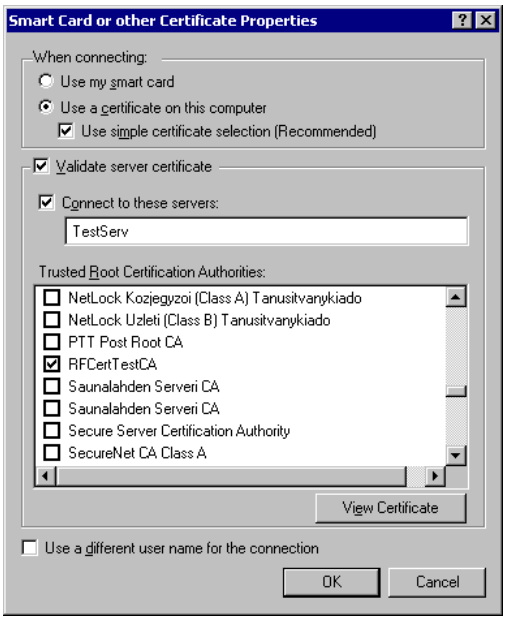



**Figure 4-40 Connect to Server**

# Cisco Radio

## Configuration

*Note: For more information on configuring the Cisco radio, select the "Help" item from the menu bar or click on the "Help" icon. For details on ACU features not described in this section, please refer to the online help.*

To access the configuration utility, select **Programs** | **Cisco Aironet** | **Aironet Client Utility (ACU)** from the Microsoft Windows Start menu.


**Figure 4-41 Cisco Aironet Client Utility**

If profiles have already been created, a profile can be selected by clicking on the Select Profile icon.

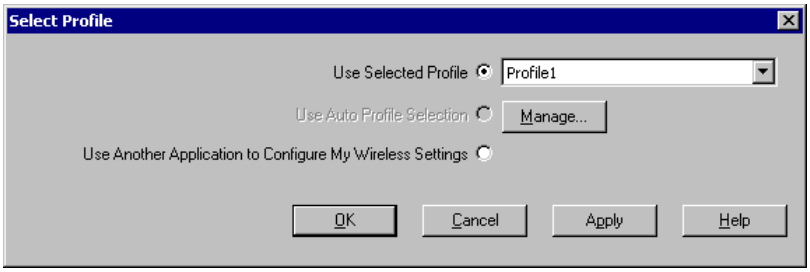



**Figure 4-42 Cisco Profile Selection Screen**

There are two ways to select an active profile:

- Select "Use Selected Profile" and specify the profile name to use.
- Select "Use Auto Profile Selection". A profile is selected from the profiles set up to be included in auto selection. The name of the selected profile is displayed in the text box. If the network adapter loses association for more than 10 seconds (default), then another profile marked for auto selection is chosen. As long as the adapter remains associated or reassociates within 10 seconds (default), the selected profile does not change. To change profiles, you must use the "Use Selected Profile" option.

If using automatic profile selection, click on the Manage button to access the profile selection management screen. Highlight an available profile name and click **<<Add** to add it to the auto selection list. To remove a profile from automatic selection, highlight the profile name and click **Remove**>>.

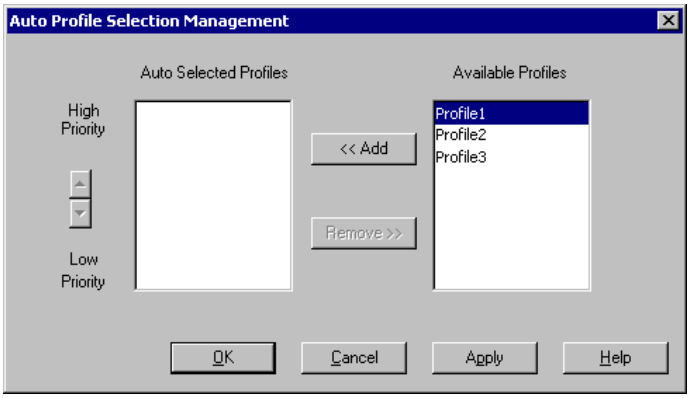



**Figure 4-43 Cisco Profile Selection Management Screen**

More details on the Profile Manager are available in Cisco's online help.

To create a new profile, access the Profile Manager screens by selecting **Commands** | **Profile Manager** or clicking on the "Profile Manager" icon.

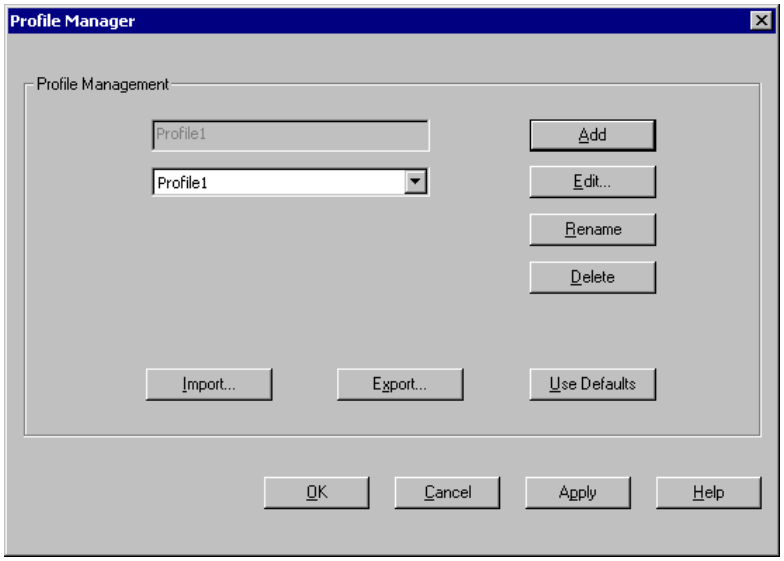



**Figure 4-44 Cisco Profile Manager Screen**

To add a new profile:

- Click the "Add" button
- Enter the profile name and press enter
- Complete the Properties screens for the profile (later in this section)
- Click "OK" or "Apply" to save your profile.

*Note: If the profile is configured to use LEAP, it must have a saved username and password to be included in auto profile selection.*

You can also edit, rename or apply default values to a profile by selecting the profile name and clicking the appropriate button.

You can use the Import/Export buttons to backup profiles or transfer profiles between computers:

- Import a profile from a selected drive/directory, such as a floppy.
- Export a profile to a selected drive/directory, such as a floppy.

## Profile Properties Screens

The Properties screen shows the name of the profile in parenthesis. Each Properties screen contains a specific group of parameters:

- **System Parameters** – Parameters to configure the adapter for the network.
- **RF Network** – Parameters controlling the transmission and receiving of RF data.
- **Advanced (Infrastructure)** – Parameters controlling operation in an infrastructure network.
- **Advance (Ad Hoc)** – Parameters controlling operation in an Ad Hoc (peer-to-peer) network.
- **Network Security** – Parameters controlling association, authentication and encryption.

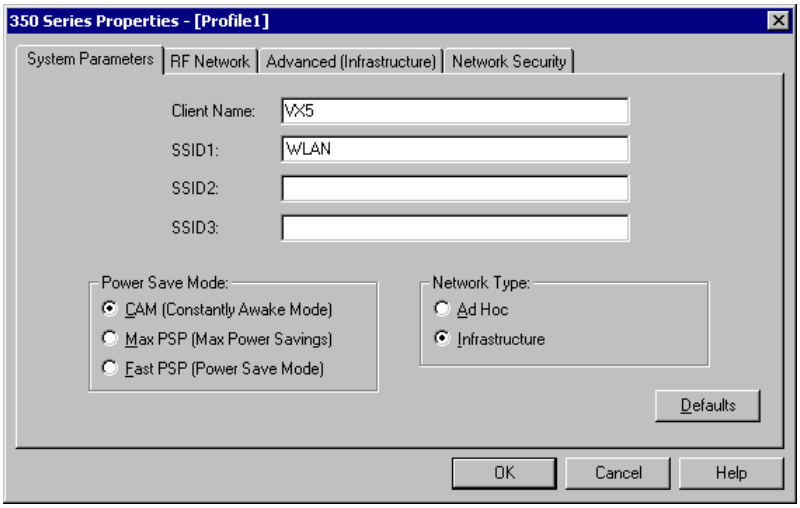



**Figure 4-45 Cisco Properties – System Parameters**

The System Parameters tab allows you to set:

- **Client Name** – The assigned station name in the table of connected devices. Used for easier identification than the MAC address. Default is “”.
- **SSID 1-3** – The Service Set Identifier, which must match the SSID of any Access Points that you wish to communicate with. Up to three SSIDs may be specified. The SSID is case sensitive. The default is “” which enables the station to connect to any available network.
- **Power Save Mode –** The default is CAM (Constant Awake Mode), which provides the fastest response, but uses the most power. Max PSP provides for maximum power savings, but may cause delays in transmission. Fast PSP provides a compromise between the other settings.
- **Network type –** The default is Infrastructure. Infrastructure mode is used to connect to a wired network, such as an Ethernet, via access points. Ad hoc mode is used to connect two or more computers in a small temporary network.

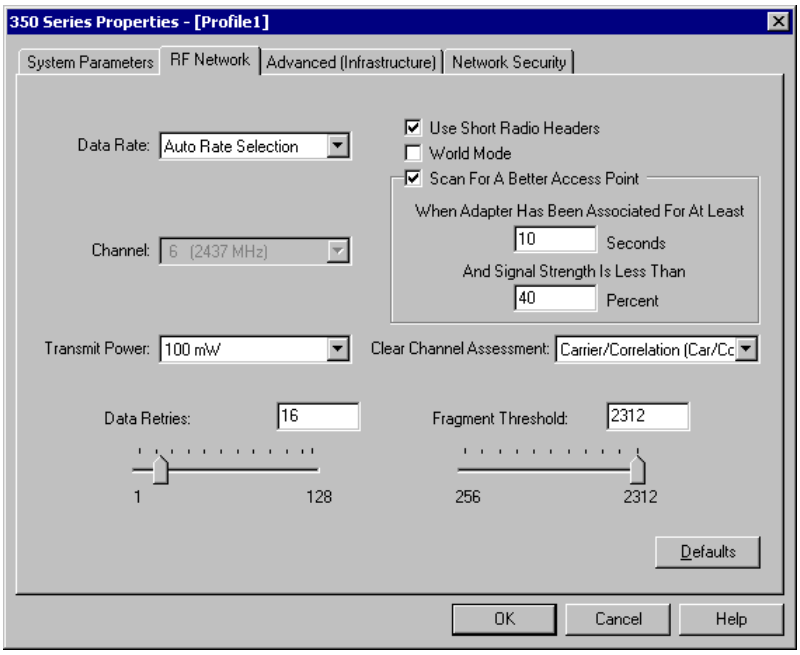



**Figure 4-46 Cisco Properties – RF Network**

The RF Network Tab allows you to set:

- **Data Rate** – The higher the transmit rate, the greater the throughput, but the range is decreased. Auto Rate Selection uses the highest transmit rate whenever possible, but uses the slower rates as necessary. Auto Rate Select is the default.
- **Use Short Radio Headers** – Selecting this checkbox allows the adapter to use short radio headers. If any clients associated with an access point are using long headers, then all clients must use long headers even when this box is checked. Short radio headers improve throughput performance. Long radio headers ensure compatibility with clients and access points that do not support short headers. The default is to use short radio headers.
- **World Mode** – Selecting this checkbox enables the adapter to adopt the maximum power level and frequency range of the access point to which it is associated (provided the Access Point is configured for World Mode). This parameter is available only in Infrastructure mode. The default is disabled.
- **Scan For A Better Access Point** – When selected, if the associated Access Point's signal becomes low, this option allows the adapter to search for a better Access Point and switch to that Access Point. The default is selected. The time period of association before scanning and the signal strength can be configured. LXE recommends 10 seconds for the association time before scanning and 40% for the signal strength.
- **Channel** – The default is 6. The channel selected must match the Access Point (Infrastructure mode) or the other computers (Ad Hoc mode).
- **Transmit Power** – The default is 100 mW. Higher transmit power drains batteries faster.
- **Data Retries** – The number of times a packet is to be resent if the transmission is not successful. The default is 16.

- **Fragment Threshold** – The threshold above which a packet is split up. Only the affected part of a fragmented message must be resent if a problem occurs. However, smaller fragment size slows transmission. The default is 2312.

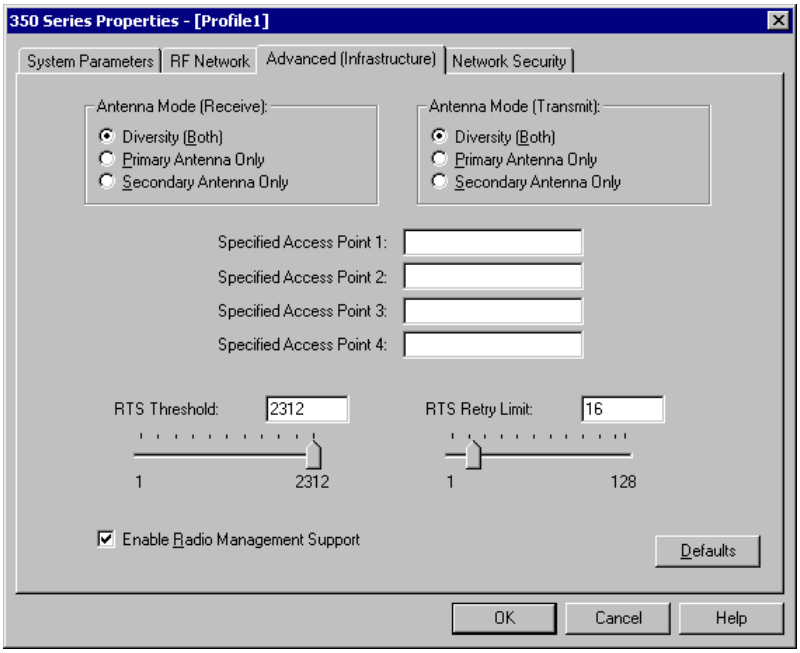



**Figure 4-47 Cisco Properties – Advanced (Infrastructure)**

Advanced (infrastructure) Tab allows you to set:

- **Antenna Mode (Receive and Transmit)** – The default is Diversity (Both). When this mode is selected, the radio uses the stronger signal from the two antenna ports. If only one antenna port is used, select the appropriate option.
- **Specified Access Point (1-4)** – When an Access Point is specified (by MAC address) the radio attempts to connect with it first. If the specified Access Point is not found, the radio then attempts to connect to any other Access Point. The default is ““.
- **RTS Threshold** – The size of data packet for which the low-level RF protocol issues an RTS packet. Smaller packets use more bandwidth, but allow for faster recovery from interference or data collisions. The default is 2312.
- **RTS Retries** – The number of times the radio re-sends the RTS packet if a CTS is not received. The default is 16.

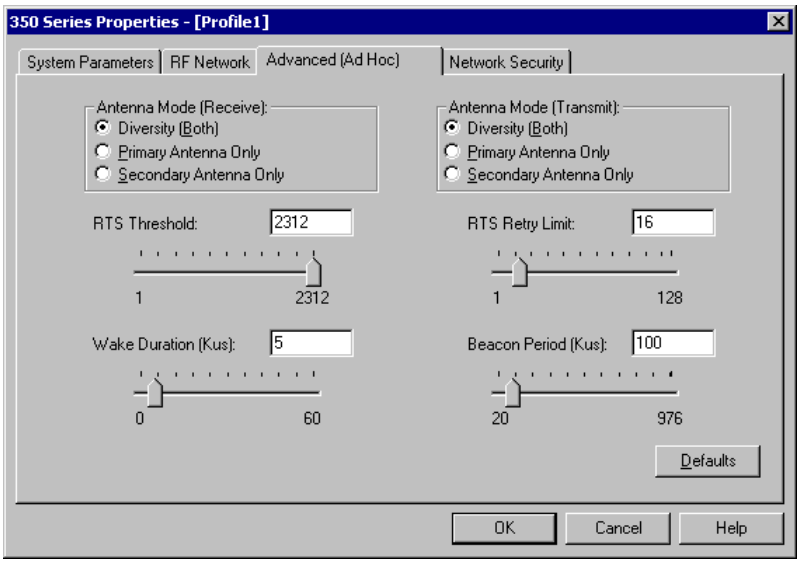



**Figure 4-48 Cisco Properties – Advanced (Ad Hoc)**

Advanced (Ad Hoc) Tab allows you to set:

- Please see the figure titled “Cisco Properties - Advanced (Infrastructure)” for descriptions of parameters not mentioned below.
- **Wake Duration** – Specifies the amount of time after a beacon that the adapter stays awake to receive a traffic indicator message, which is sent to keep the adapter awake until the next beacon.
- **Beacon Period** – Specifies the duration between beacons, which are used to help clients find each other in Ad Hoc mode.

## Encryption

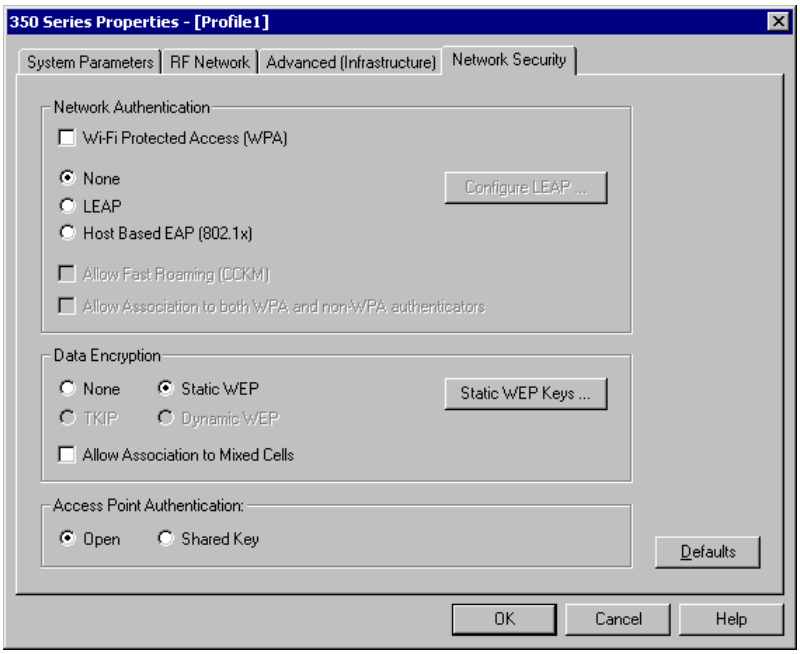



**Figure 4-49 Cisco Properties – Network Security**

The Network Security Tab allows you to set several security features. First, select the **Network Security Type.** Valid options include:

- Select "None" in the top two boxes for no security.
- Select "None" and check "Static WEP" to use static WEP. Click the **Static WEP Keys…** button to configure the keys.
- Select "LEAP" and click on **Configure LEAP…** to use LEAP.

## Static WEP

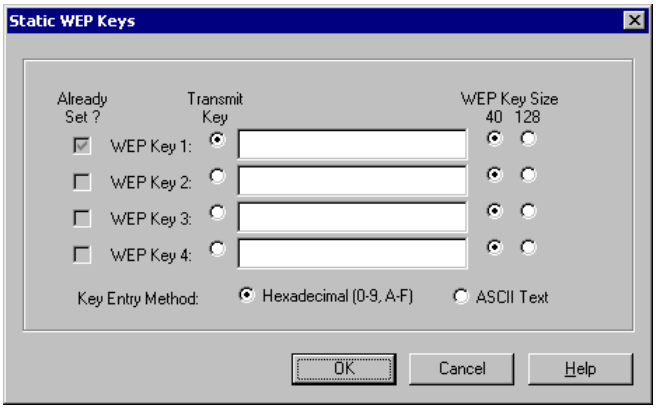



**Figure 4-50 Cisco Properties – Static WEP**

To enter a static WEP key:

- Select “Hexadecimal” or “ASCII Text”.
  - Hexadecimal – the WEP key contains hexadecimal characters (0-9, A-F).
  - ACII Text – the WEP key contains ASCII text, including alpha characters, numbers and punctuation marks.
- Select 40 or 128 Key size.
  - 40 bit keys consist of 10 hexadecimal or 5 ASCII text characters.
  - 128 bit keys consist of 26 hexadecimal or 13 ASCII text characters.
- When setting more than one WEP key, the keys must be assigned in the same order on all devices.
- Click on “Transmit Key” to the left of the key used to transmit packets. Only one WEP key can be selected as the transmit key.

When a WEP Key has been set, the Already Set box is checked and the WEP key is not displayed on screen.

## LEAP

*Note: To use LEAP with WPA, please see LEAP/WPA Configuration later in this chapter.*

To enable LEAP, select LEAP from the Network Security Type Box. Then click the **Configure LEAP…** button. When LEAP is selected, Static WEP is disabled and Dynamic WEP is enabled automatically. The LEAP Settings screen is displayed.

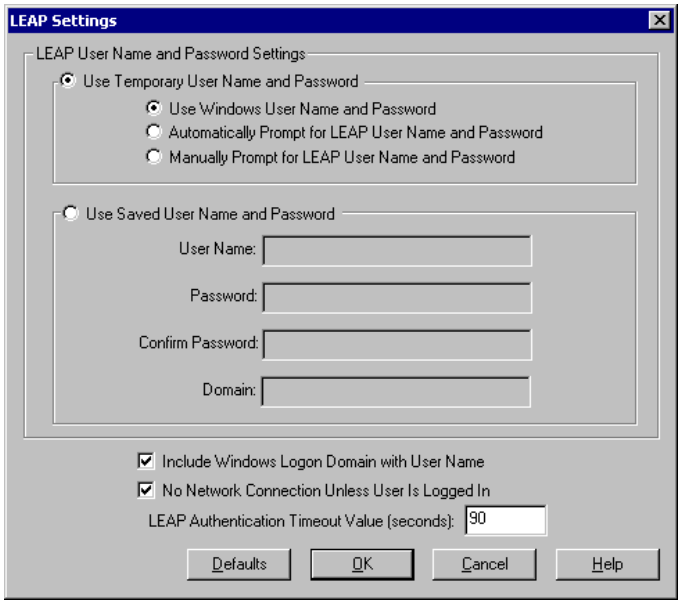



**Figure 4-51 Cisco Properties – LEAP Settings**

LEAP allows a Temporary or Saved User Name and Password. The Temporary User Name and Password can be set as follows:

- Use the Windows User Name and Password and start authentication automatically.
- Automatically prompt for the User Name and Password and start LEAP authentication automatically.
- Manually start the LEAP authentication process, which prompts for the User Name and Password.

The Saved User Name and Password is set as follows:

- Enter a user name and password.
- Re-enter the password
- Specify a domain name, if desired.

Additional options include:

- Include Windows Logon Domain with user Name – Used to pass the Windows login domain along with the user name in an environment with multiple domains.
- No Network Connection Unless User is Logged In – Forces the client adapter to disassociate after you log off so another user cannot access the network without entering a user name and password.

- LEAP Authentication Timeout Value – The amount of time (in seconds) before a LEAP Authentication is considered failed. An error message is then displayed. The range is 10 to 300 seconds. The default is 90.

## Diagnostics

To access the configuration utility, select **Commands** | **Link Status Meter** or click on the "Link Status Meter" icon.

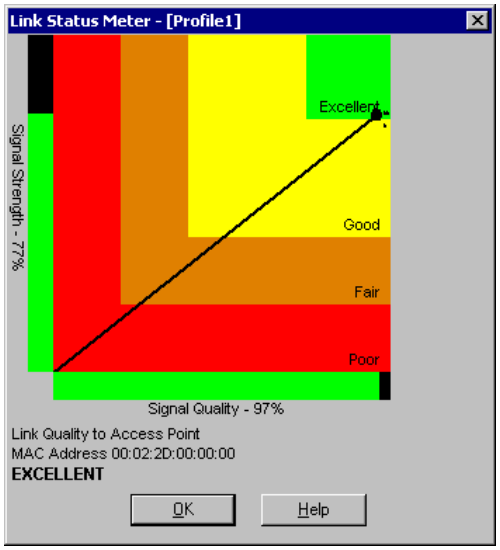



**Figure 4-52 Cisco Link Status Meter**

The Link Status Meter shows the name of the associated Access Point, if a name has been assigned. The MAC address of the Access Point is also shown.

Scales ranging from 0 to 100% rate both the received signal strength and quality. The meter shows. The Link Quality is based on the strength and quality of the signal:

- Over 75% - Excellent
- Over 40% - Good
- Over 20% - Fair
- Under 20% - Poor

If a problem is suspected, load the Aironet Client Utility as described in the previous section. The "Commands" menu contains several items that may be useful:

- Statistics – Both receive and transmit statistics are displayed
- Status – List values for radio parameters and displays information about the current Link Quality.
- Link Test – Tests the performance of the radio with an Access Point (specified by IP Address).
- Site Survey – Monitors the signal strength, beacons received, link speed and link quality.

## Updating Firmware

Cisco firmware can be updated manually or automatically.

- To manually update the radio card's firmware, click on the Load Firmware icon on the main Cisco screen. Browse to the location of the desired firmware.
- To automatically load new firmware when a new radio driver is installed, click on the Preferences icon on the main Cisco screen. Make sure the checkbox for "Automatically load new firmware when NDIS driver is updated" is checked.

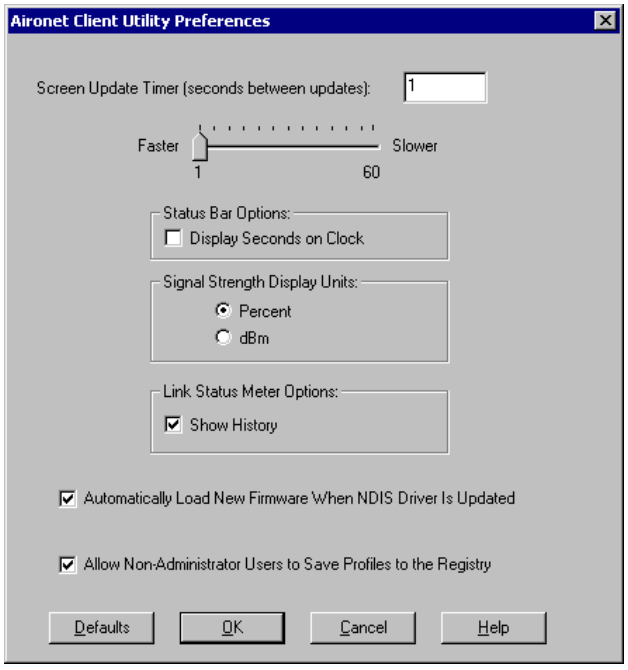



**Figure 4-53 Cisco Preferences**

## WPA for the Cisco Radio

| | |
|---|---|
|  | Wi-Fi Protected Access (WPA) is only available on VX5's equipped with the Microsoft Windows XP operating system.<br><br>LXE recommends the VX5 have Windows XP Service Pack 2 (SP2) installed. Although Microsoft patch #Q815485 also provides WPA functionality with previous versions of Windows XP, this version was not tested by LXE. All configuration examples shown in this section are from a VX5 with SP2 installed. |

| | |
|---|---|
|  | Please refer to the "LXE Security Primer" to prepare the Authentication Server and Access Point for VX5 communication. |

### System Requirements

To support Wi-Fi Protected Access (WPA), the VX5 must be equipped as follows:

- Windows XP SP2
- Cisco 350 radio card

The LXE VX5 computer supports WPA and all authentications. The Microsoft supplicant and Cisco supplicants are used separately or together to provide support for the different authentications.

WPA support was added to Microsoft XP with SP2. Prior to SP2 there was a patch available that would add WPA support. This document will show configuration of Windows XP with SP2 installed. Most of the configuration is done with the Microsoft Wireless Configuration tool. However for WPA/GTC the Cisco supplicant (ACU) must be installed and configured to allow Microsoft to configure the Cisco radio. Additionally WPA/LEAP requires the Cisco supplicant and configuration tool.

## Installing Radio drivers

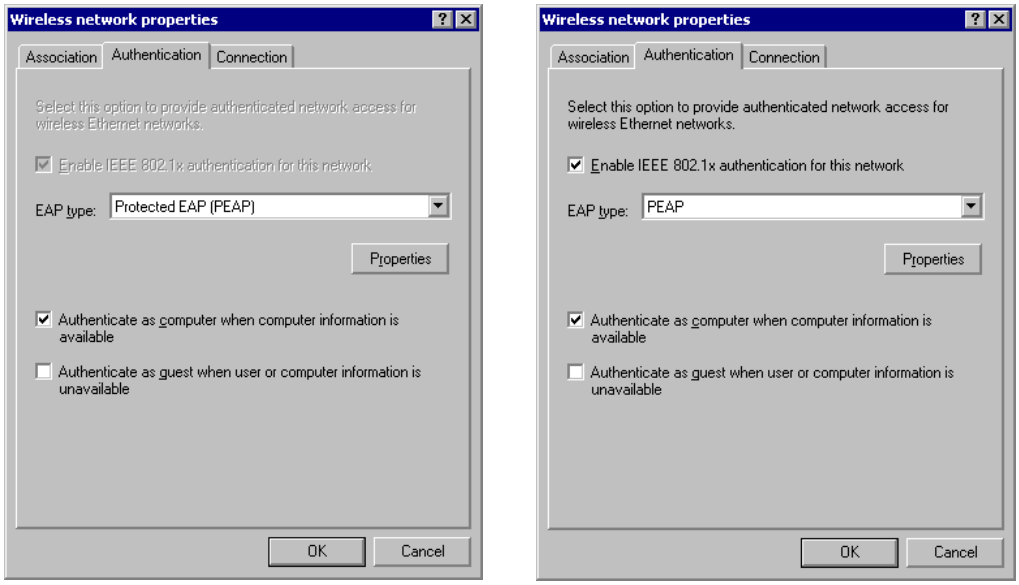
How much of the LXE released Cisco drivers/tools should be installed depends on what authentication protocol is to be configured.

- Cisco PEAP should not be installed if using PEAP/MSCHAP.
- Cisco PEAP must be installed if using PEAP/GTC.
- For all other authentications (LEAP, EAP-TLS, WPA-PSK) it does not matter if Cisco PEAP is installed or not.

To determine if Cisco PEAP is installed or to change the installation, follow the instructions below.

## Checking for the Cisco PEAP Supplicant

With a Cisco radio installed open the Wireless network properties as described in "Wireless Network Configuration", earlier in this chapter. With the Authentication tab selected check the text in the EAP type drop down box. Refer to the following figures to determine if Cisco PEAP is installed.




Cisco PEAP Not Installed  Cisco PEAP Installed

**Figure 4-54 Determining Cisco Installed Components**

If the Cisco installation is correct, continue with the authentication configuration. If it is not correct, continue with the next section.

## Installing/Uninstalling the Cisco PEAP Supplicant

To install or uninstall Cisco PEAP navigate to **Start | Control Panel | Add Remove Programs** on the VX5 computer.

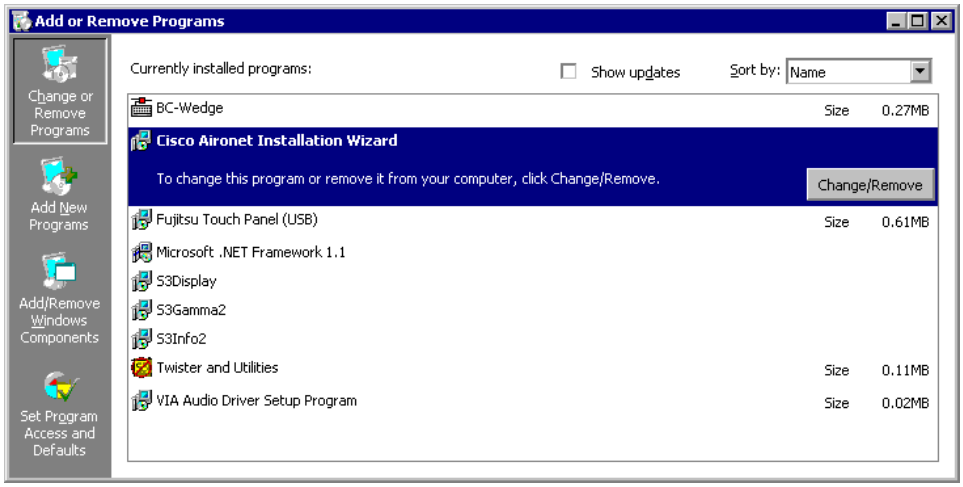



**Figure 4-55 Access Cisco Installation Wizard**

Choose the **Cisco Aironet Installation Wizard**.

Click the **Change/Remove** button.

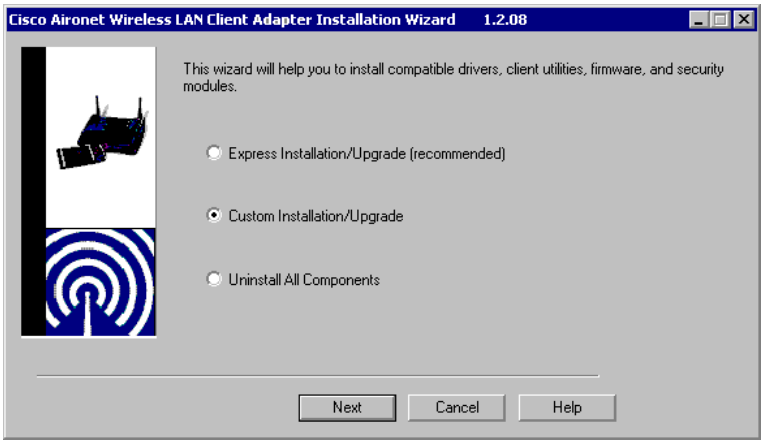



**Figure 4-56 Cisco Installation Wizard**

To install Cisco PEAP, click the **Custom Installation/Upgrade** button.

To uninstall Cisco PEAP click the **Uninstall All Components** button. Once everything is uninstalled, re-install the driver without Cisco PEAP.

Click the **Next** button.

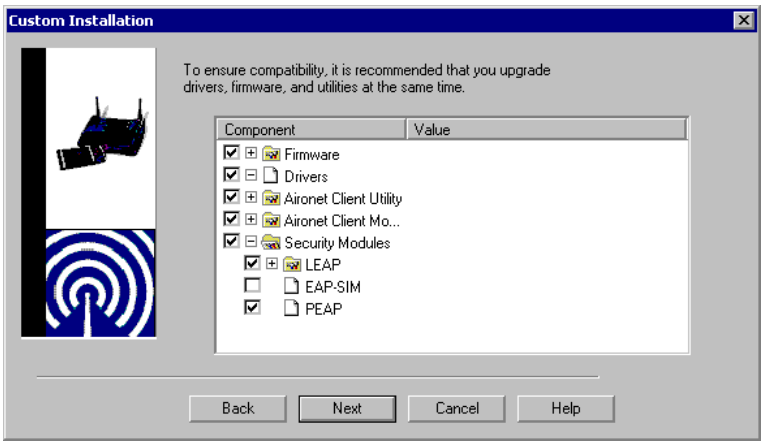



**Figure 4-57 Cisco Component Installation**

To install Cisco PEAP:

- Expand the **Security Modules** and check the **PEAP** box.

To install without Cisco PEAP:

- Expand the **Security Modules** and uncheck the **PEAP** box.

Click the next button until the supplicant loads.

Once the new supplicant installs or uninstalls you will be prompted to reboot the VX5.

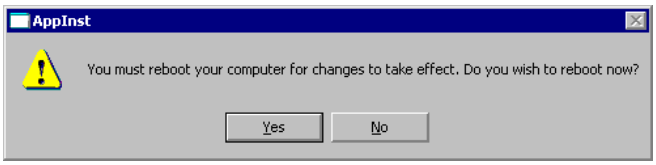



**Figure 4-58 Reboot Prompt**

## Wireless Network Configuration Utility

Use the flowing instructions for the Microsoft Wireless Network Configuration Utility for all authentication protocols except WPA/LEAP.

To start configuring the wireless connection, click on the icon in the system tray.

**Figure 4-59 Wireless Network System Tray Icon**

The **Wireless Network Connection** screen appears.

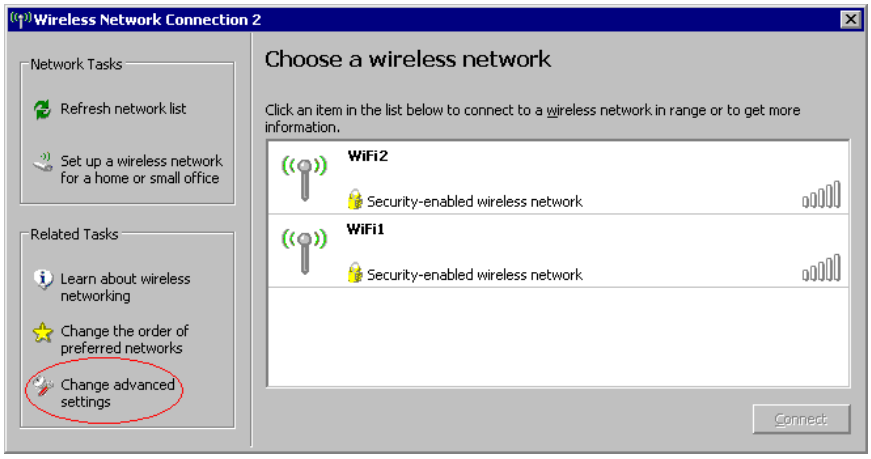



**Figure 4-60 Wireless Network Connections**

Click the **Change advanced settings** link.

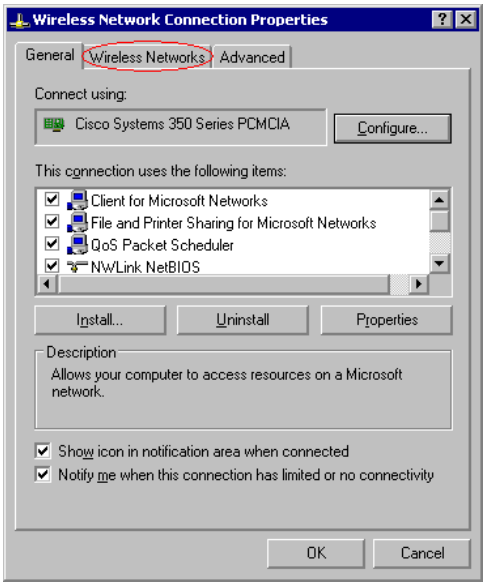



**Figure 4-61 Connection Properties, General Tab**

To configure the wireless radio networks, click the **Wireless Networks** tab.

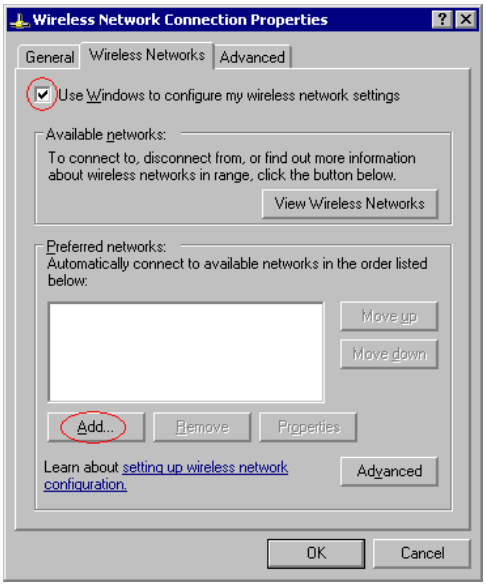



**Figure 4-62 Connection Properties, Wireless Networks Tab**

Make sure the **Use Windows to configure my wireless network settings** box is checked. WPA/LEAP is the exception and this box should not be checked when using WPA/LEAP.

To add a new wireless network click the **Add** button.

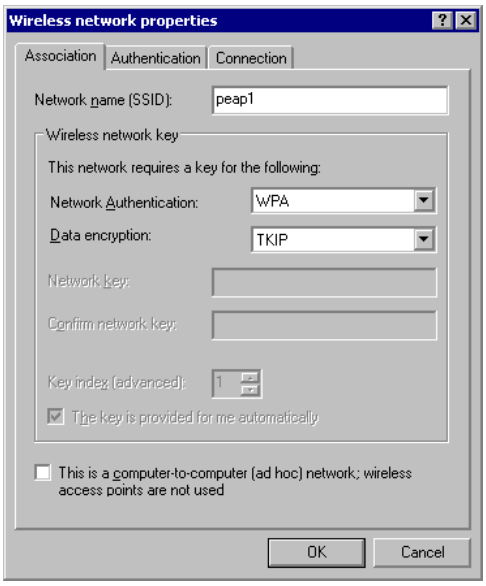



**Figure 4-63 Wireless Network Properties, Association Tab**

Enter the SSID in the **Network Name (SSID)** text box.

Select **WPA** from the **Network Authentication** pull down list. For WPA/PSK see "WPA PSK Configuration", later in this chapter.

Select **TKIP** from the **Data Encryption** pull down list.

To configure authentication, click the **Authentication** tab at the top of the screen.

To continue with the authentication process, please refer to the appropriate section, later in this chapter, for the desired authentication protocol:

- "PEAP/MS-CHAP Configuration"
- "PEAP/GTC Configuration"
- "WPA/LEAP Configuration"
- "EAP-TLS Configuration"
- "WPA/PSK Configuration"

## PEAP/MS-CHAP Configuration

The Microsoft supplicant authenticates a user with the PEAP/MS-CHAP protocol. For this protocol, install the Cisco radio driver only (no tools installed).

*Note: It is possible to use Microsoft version of PEAP with Cisco installed but this section shows how to configure MS PEAP without Cisco PEAP installed.*

## Configuring the PEAP/MS-CHAP Supplicant

With the radio parameters configured (see "Wireless Network Configuration" earlier in this chapter), click the **Authentication** tab.

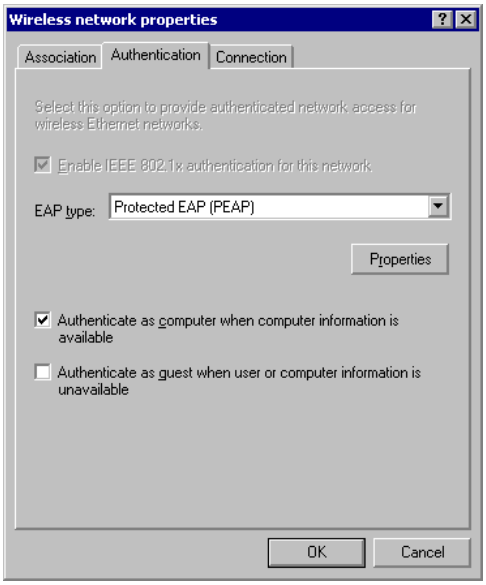



**Figure 4-64 Wireless Network Properties, Authentication Tab**

Set the **EAP type** to **Protected EAP (PEAP)**. If the text is not exactly as shown, see "Installing/Uninstalling the Cisco PEAP Supplicant" to uninstall the Cisco PEAP supplicant.

Click the **Properties** button.

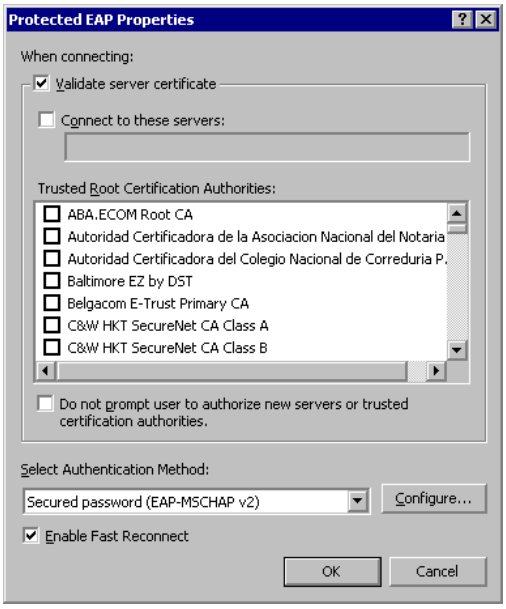



**Figure 4-65 PEAP Properties**

When first configuring and authenticating, do not check **Validate server certificate**. When the server certificate is not validated, this allows the user authentication to be tested. When user authentication is tested and working, come back to this screen and check **Validate server certificate**.

Using the **Select Authentication Method** drop down box choose **Secured password (EAP-MSCHAP v2)**.

Check the **Enable Fast Reconnect** box at the bottom of the screen.

Click the **Configure…** button for the MSCHAP configuration.

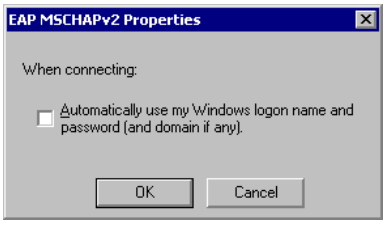



**Figure 4-66 MSCHAP Properties**

Configure this box depending on what username and password are used to login to Windows XP and the user credentials for the MSCHAP authentication.

Left unchecked, the VX5 will prompt for a User Name and Password.

Click the **OK** buttons back to the **Wireless Network Properties** screen.

The login screen appears for logging into the wireless network.

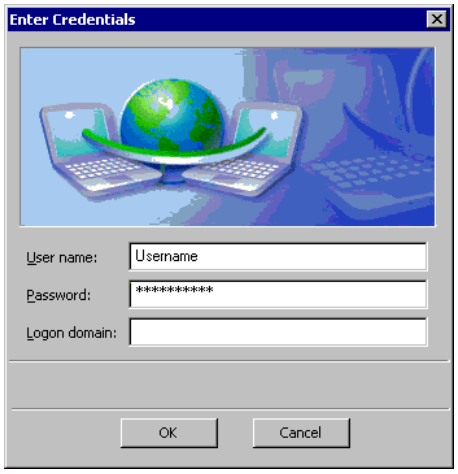



**Figure 4-67 Login Screen**

## Server Authentication

To validate the server certificate install the root CA certificate. For instructions, please see "Installing a Root CA Certificate", earlier in this chapter.

Navigate to the Wireless Network Properties configuration screen.

Click the **Authentication** tab then the **Properties** button.

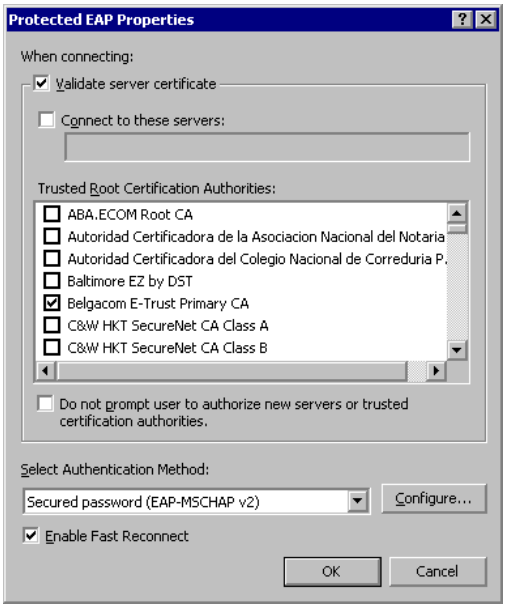



**Figure 4-68 PEAP Properties**

Check the **Validate server certificate** and the root CA in the list box **Trusted Root Certificate Authorities**.

Do not check the **Connect to these servers** box.

This will authenticate the root CA only and not the RADIUS server.

If validating the RADIUS server is required check the **Connect to these servers** box and type the exact name of the ACS server certificate.

If that is not known check the box, but leave the text field empty.

Click **OK** to dismiss the configuration boxes.

When the radio connects with the new configuration parameters, a connection message is displayed.

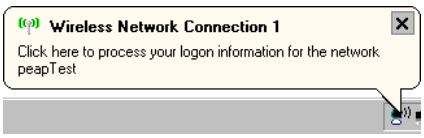



**Figure 4-69 Connection Message Box**

Click the message box to process your logon.


**Figure 4-70 Server Certificate Validation**

The server sends its certificate and the VX5 displays a message asking if this certificate is the correct one.

If this is the correct certificate click the **OK** button.

This puts the correct certificate name in the text box for the Protected EAP Properties screen as shown below.

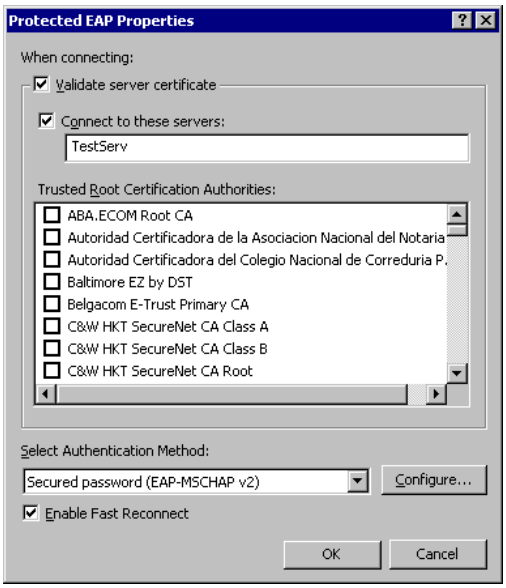



**Figure 4-71 PEAP Properties and Server Name**

Now the ACS certificate is being validated and configuration is complete.

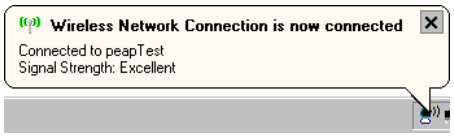



**Figure 4-72 Network Connected Box**

When the radio connects with the new parameters, the Network Connected message box is displayed.

## PEAP/GTC Configuration

To configure PEAP/GTC (Cisco PEAP) the Cisco PEAP supplicant must be installed. See "installing Radio Drivers" earlier in this chapter to check for the Cisco PEAP supplicant and install if required. This supplicant is from Cisco and licensed to be used only with a Cisco radio.

## Configuring the PEAP/GTC Supplicant

Even though the Cisco tools (ACU) are installed, the Microsoft supplicant is used to configure the radio parameters. The Cisco ACU must be configured to allow the Microsoft configuration tools to set the wireless network settings.

Open the Cisco ACU and click the **Set profile** button.

Click the **Use Another Application to Configure My Wireless Settings** button.

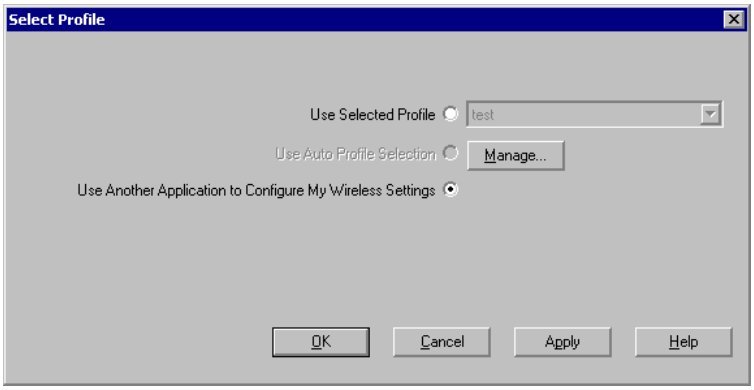



**Figure 4-73 Cisco ACU Profile Selection Screen**

Click **OK**.

Configure the Wireless settings per "Wireless Network Configuration", earlier in this chapter.

Click the **Authentication** tab.

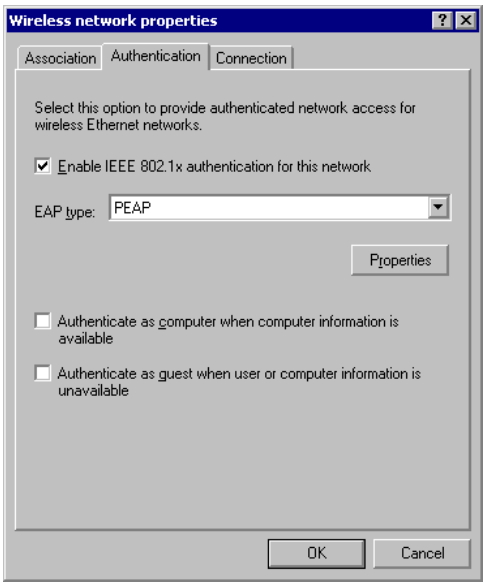



**Figure 4-74 Authentication Properties**

Set **EAP type** drop down box to **PEAP**.

Click the **Properties** button.

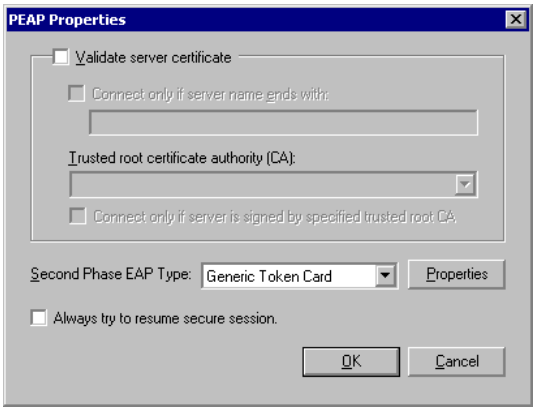



**Figure 4-75 PEAP Properties**

It is recommended to authenticate a user then to validate the server after user authentication is successful.

Uncheck the **Validate server certificate** box.

In the **Second Phase EAP Type** drop down box, choose **Generic Token Card**.

Uncheck **Always try to resume secure session** box. If checked, this will not authenticate a user when they sign in if the previous authentication is still valid in the ACS server.

Click the **Properties** button.


**Figure 4-76 Generic Token Card Properties**

Click the **One Time Password** button.

Check **Support Hardware Token** to support the RSA SecurID hardware token.

Click **OK** to dismiss all configuration screens.

When the radio re-connects a **One Time Password** sign-on screen will appear.

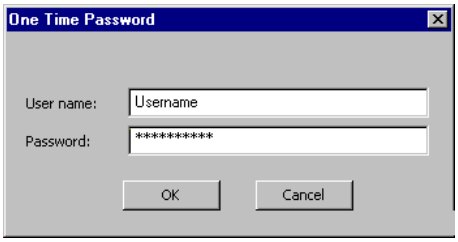



**Figure 4-77 One Time Password**

Enter the RSA user name and the one time password (OTP) from the hardware token and click **OK**.

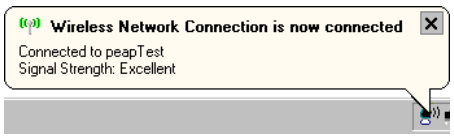



**Figure 4-78 Wireless Network Connected Message**

## Validate Server Certificate

Install the Root CA or trusted CA that issued the ACS server certificate. Please see "Installing a Root CA Certificate" earlier in this chapter for instructions.

Navigate to the **Wireless Network Settings** screen.

Click the **Authentication** tab then the **PEAP Properties** box.

Check the **Validate server certificate** box.

From the drop down box choose the CA Root certificate.

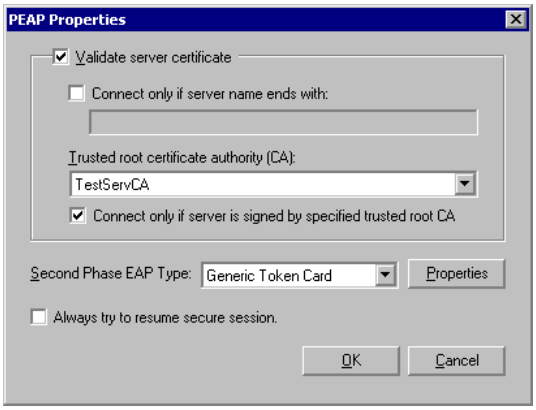



**Figure 4-79 PEAP Properties Certificate Authority**

Check the **Connect only if server is signed by specified root CA** box.

Click **OK** to dismiss the configuration screens.

The root CA will be validated only when the radio re-connects with the new wireless parameters in this configuration.

To validate the ACS server certificate navigate back to screen sown below.

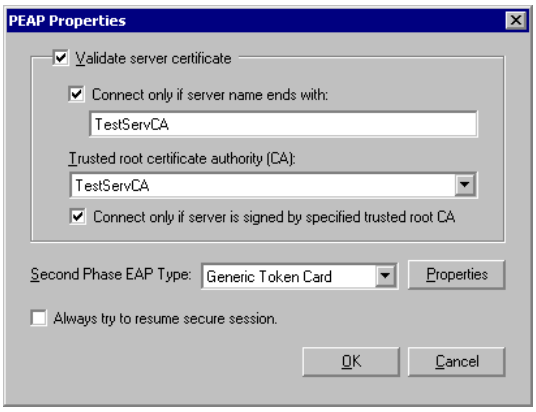



**Figure 4-80 ACS Server Verification**

Check the **Connect only if server name ends with** box.

Enter the name of the server certificate if known.

If it is not known leave the text field blank.

When the radio connects with these parameters, the server sends the server certificate and a message displays asking if this is correct.

If it is correct click **Yes** and the text field will be filled in automatically.

## WPA/LEAP Configuration

LEAP is a Cisco proprietary authentication protocol and is not supported by the Microsoft supplicant. To configure the VX5 for WPA/LEAP use the Cisco ACU installed during normal installation of the Cisco radio driver.

## Cisco ACU

Start the Cisco ACU by clicking the icon on the desktop or navigate to **Start | Programs | Cisco | ACU**.

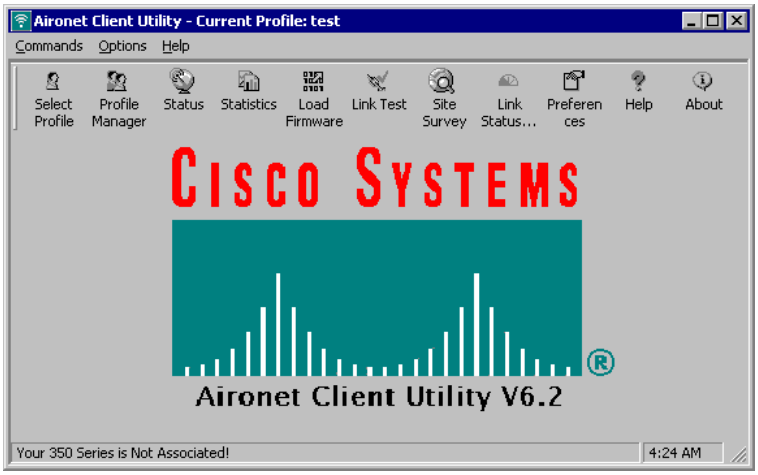



**Figure 4-81 Cisco ACU**

Click on the **Profile Manager** icon.

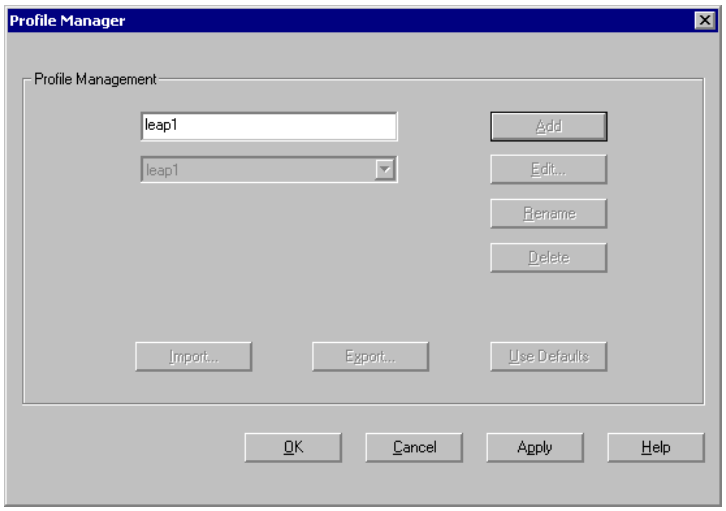



**Figure 4-82 Cisco Profile Manager**

Type a profile name in the text box and click the **Add** button.

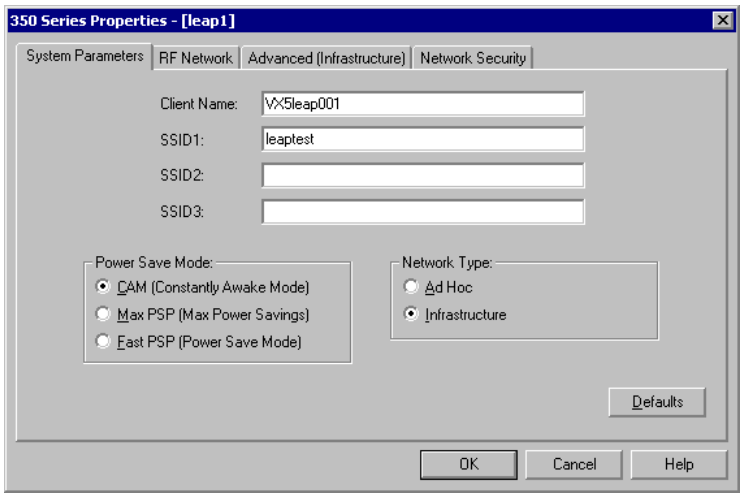



**Figure 4-83 System Parameters**

Enter a Client Name. You should use a unique name for each VX5.

Type the SSID in the text field **SSID1**.

Click the **Network Security** tab at the top of the screen.

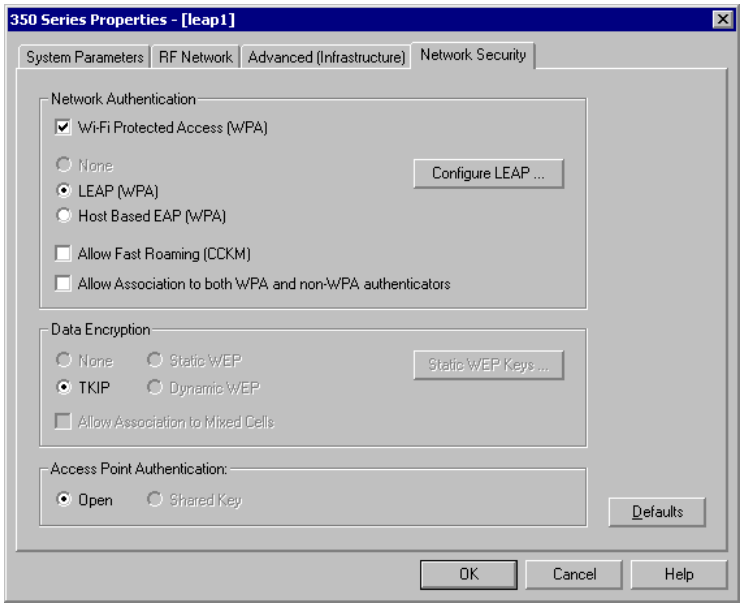



**Figure 4-84 Network Security**

Check the **Wi-Fi Protected Access (WPA)** box.

**TKIP** and **Open** will automatically be checked and the other options grayed out when WPA is checked.

Click the **LEAP (WPA)** button.

Click the **Configure LEAP** button.

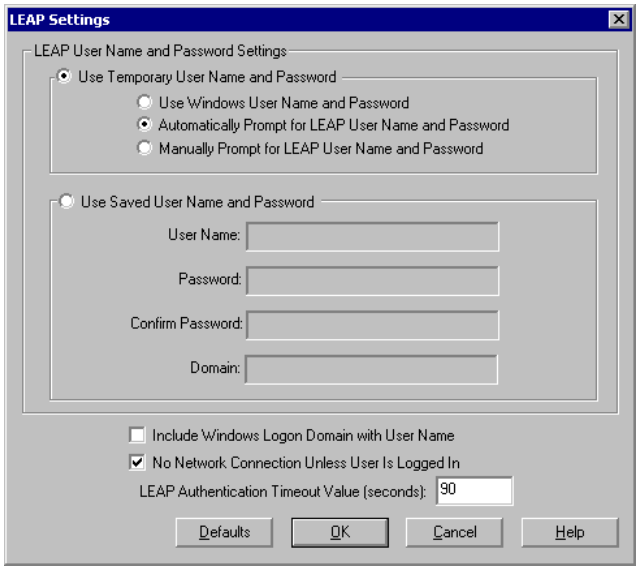



**Figure 4-85 LEAP Settings**

To automatically prompt the user for a username and password click the **Use Temporary User Name and Password** and **Automatically Prompt for LEAP User Name and Password** buttons.

Depending on the network, you may have to uncheck the **Include Windows Logon Domain with User name** box.

Click **OK**.

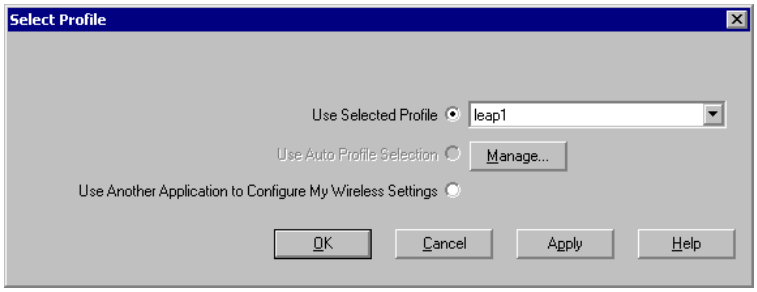



**Figure 4-86 Select Profile**

Click the **Select Profile** icon from the main ACU screen.

Click the **Use Selected Profile** button.

Use the drop down box to choose the profile just configured.

Click **OK**.

The VX5 will associate and then display the sign on screen.

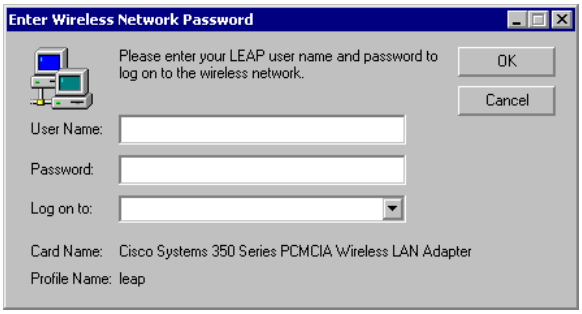



**Figure 4-87 LEAP User Name and Password**

A sign on status box will display.

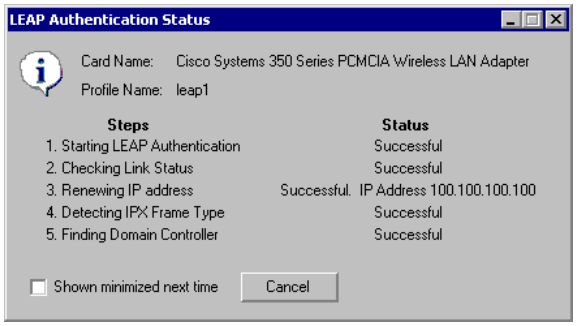



**Figure 4-88 Sign On Status**

Once connected, click the **Status** icon at the main ACU screen to show the configuration of the VX5.


**Figure 4-89 Cisco Status**

## EAP-TLS Configuration

To authenticate using the EAP-TLS protocol you will need a user certificate with the private key. Once you have the user certificate, run the certificate installer from the control panel. The Microsoft supplicant is used. It does not matter if the Cisco supplicant is installed or not.

*Note: It is important that all dates are correct on the VX5 computers when using any type of certificate. Certificates are date sensitive and if the date is not correct authentication may fail.*

## User Certificate

If the VX5 was used to request the user certificate, it may have been installed by the CA. To check if a correct user certificate is installed:

1. Navigate to **Start | Run** and type mmc.
2. Select **File | Add/Remove Snap-in**.
3. Click the **Add** button.
4. Click **Certificates**, click the **Add** button and choose **My User Account**.
5. Click **Finish | Close | OK**.
6. Expand Certificates – Current User and Personal
7. Click **Certificates**
8. The user certificate is shown in the right pane, if installed.

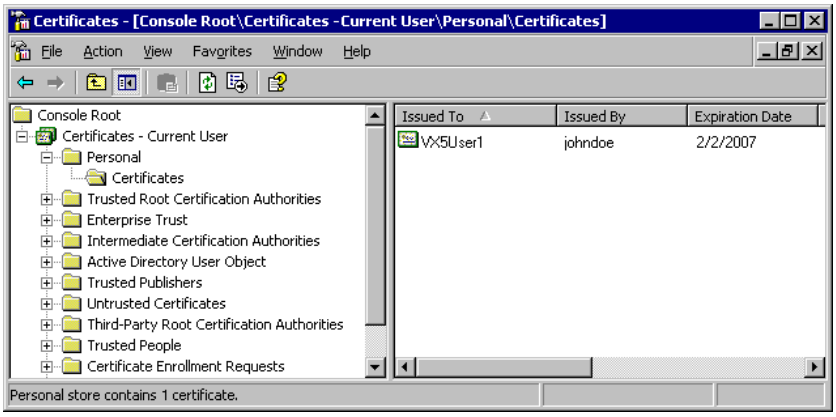



**Figure 4-90 Certificates**

If there is no user certificate refer to "Installing a Root CA Certificate" earlier in this chapter.

## Setting EAP/TLS Parameters

Set the Wireless Network Connection Properties per instructions in "Wireless Network Configuration" earlier in this chapter.

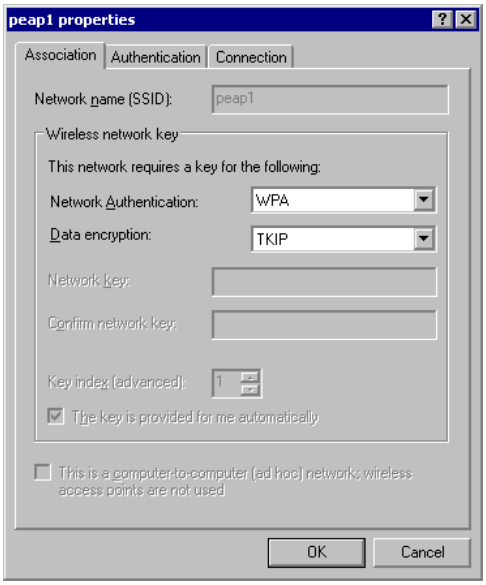



**Figure 4-91 Wireless Network Association**

Click the **Authentication** tab.

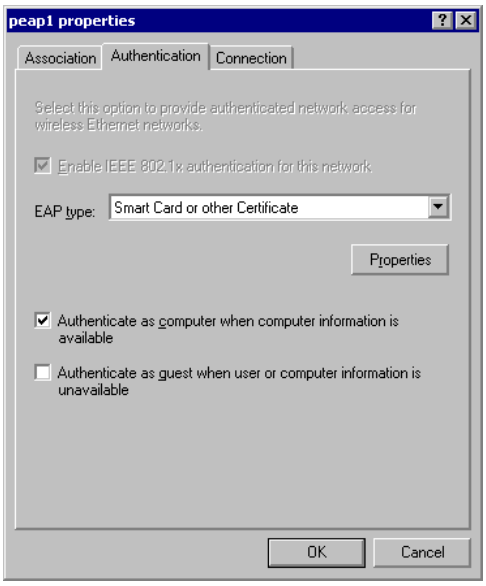



**Figure 4-92 Wireless Network Authentication**

Choose **Smart Card or other Certificate** in the **EAP type** drop down box.

Make sure the **Authenticate as computer when computer information is available** check box is checked. Make sure the **Authenticate as guest when user or computer is unavailable** check box is not checked.

Click the **Properties** button.

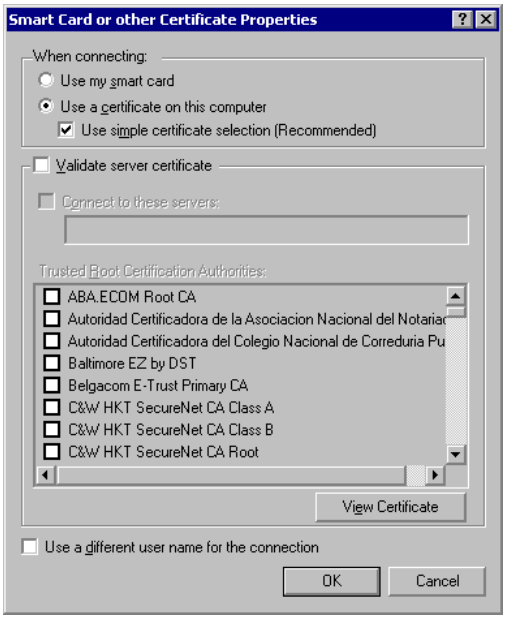



**Figure 4-93 Smart Card or Certificate Properties**

Click the **Use a certificate on this computer** button and check **Use simple certificate selection** box, as shown above.

Do not check the **Validate server certificate** box. This allows the user to be authenticated as the first step.

When the user certificate successfully authenticates, come back to this screen and check the **Validate server certificate** box, as described in the next section.

Click the **OK** button to dismiss the configuration screens.

When the radio re-connects the user should be authenticated with the user certificate.

If the user does not authenticate check the user certificate and the date on the computer again.

## Validating the Server Certificate

Navigate to the Authentication tab of the Wireless Network Settings screen as described in "Wireless Network Connections".

Click the **Properties** button.

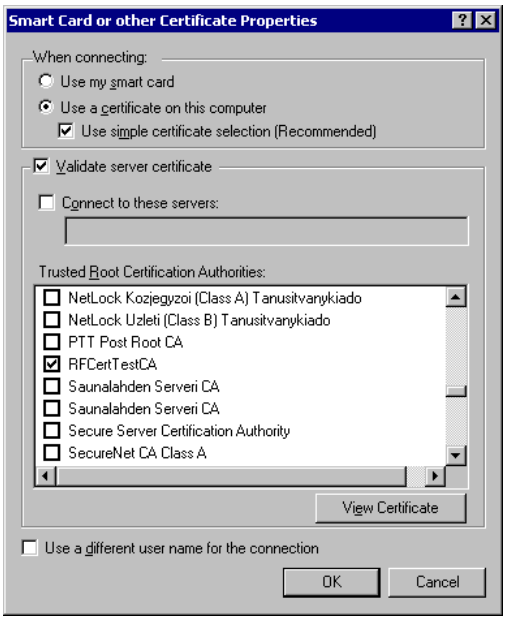



**Figure 4-94 Validating Server Certificate**

Check the **Validate server certificate** box.

Choose the root CA name in the **Trusted Root Certification Authorities** list box.

Uncheck the **Connect to these servers** box.

Click **OK** to dismiss the configuration screens.

The radio re-starts with the new parameters and validates the server CA certificate.

Finally navigate back to the properties configuration screen and check the **Connect to these servers** box.

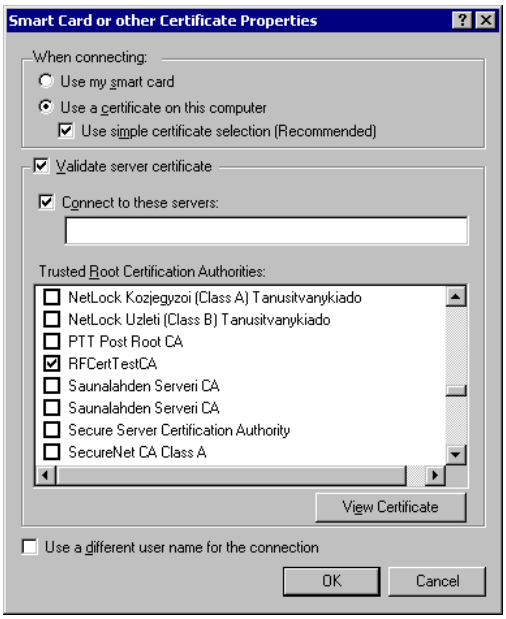



**Figure 4-95 Connect to Servers**

Type the exact name of the ACS server certificate if known. If it is unknown leave the text field blank.

Click **OK** to dismiss the configuration screens.

The radio will re-start with the new parameters and validate the server certificate.

A message box will appear asking if the server certificate is the correct certificate as shown below.


**Figure 4-96 Validate Servers Confirmation**

Click **OK** and the VX5 fills in the correct name of the server certificate in the text field left blank above.

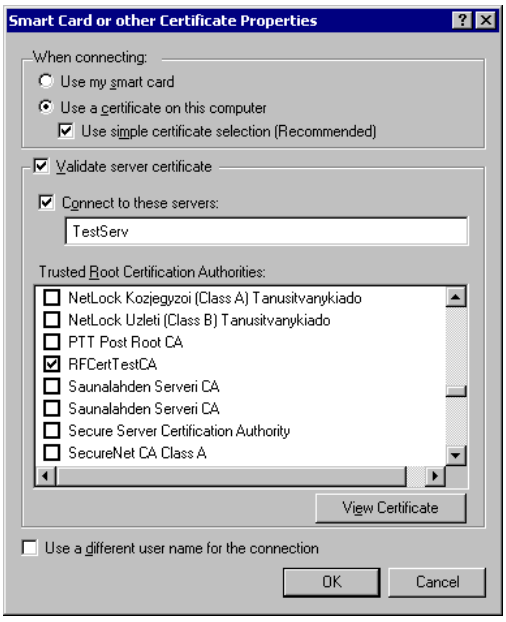



**Figure 4-97 Connect to Server**

## WPA PSK Configuration

Configure the Wireless Network Settings as described in “Wireless Network Configuration”, earlier in this chapter.

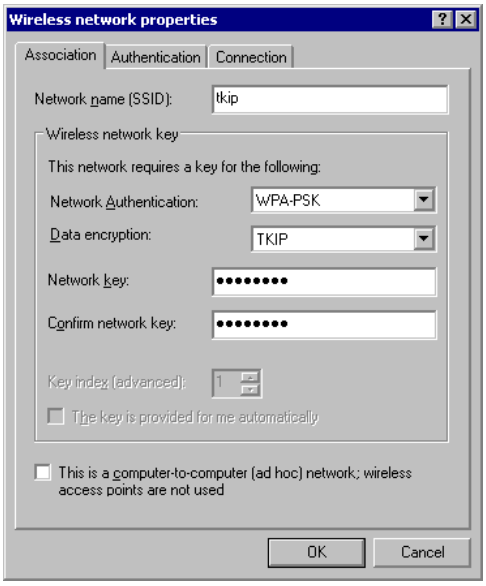



**Figure 4-98 Wireless Properties Association**

Change the **Network Authentication** to **WPA-PSK**.

Enter an ASCII network key in the **Network key** text field.

Enter the same key in the **Confirm network key** text field.

There is no server authentication when using WPA-PSK, so no additional configuration is needed.

# Symbol Radio

## Configuration

*Note: For more information on configuring the Symbol radio, click the "?" button available on every Symbol screen.*

Symbol radio configuration screens can be accessed by right clicking (60-key keyboard : press <Ctrl> key then touch the screen) on the Symbol icon in the Windows system tray. Select WLAN profiles from the menu to configure the radio.

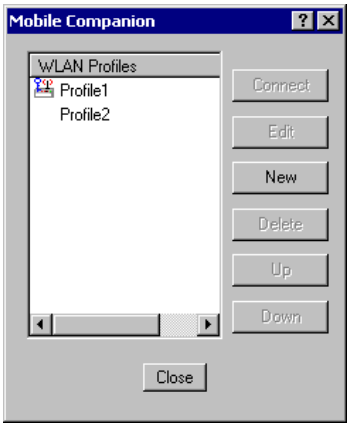



**Figure 4-99 Symbol WLAN Profiles**

The first screen of the Mobile Companion shows any existing profiles. Profiles can also be edited or deleted. The Up and Down buttons move the highlighted profile up or down in the list. The order of the profiles (as displayed in the list) corresponds to the order in which the profiles are searched if association with the current profile is lost.

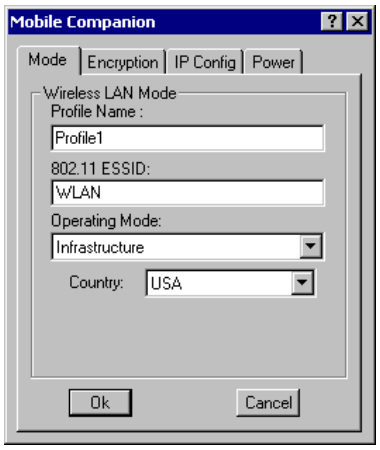



**Figure 4-100 Symbol Profile – Mode**

The Mode screen provides for the entry of the following information:

- The name of the profile
- **ESS ID** – Enter a network card ESS ID in this field. This string can be a maximum of 32 characters and identifies the wireless local area network. The ESS ID of the card is required to match the Access Point ESS ID if the card is to communicate with the access point.
- **Operating Mode** – Select Infrastructure to allow the radio to communicate with an Access Point. Select AdHoc to allow the radio to communicate with other radios in a peer-to-peer network. The default is Infrastructure.
- Use the Country pulldown to select the country of operation. When this is selected, the radio uses the country code information compatible with the country code of the access point. Select worldwide if the radio is used with a non-Symbol (or pre AP-4131 model Symbol access point).

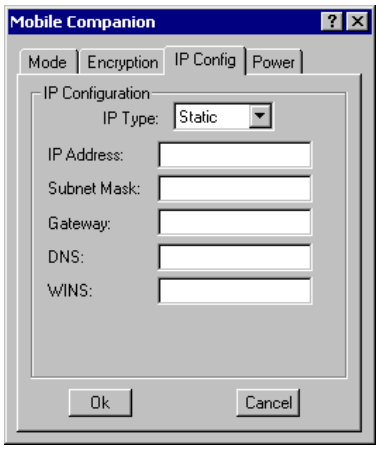



**Figure 4-101 Symbol Profile – IP Configuration**

Use this screen to select between a dynamically assigned IP address (DHCP) or a static address. If a static IP address is selected the following entries are also available on this screen:

- IP Address
- Subnet Mask
- Gateway
- DNS
- WINS

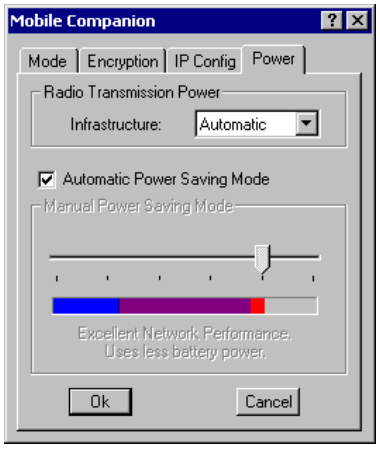



**Figure 4-102 Symbol Profile – Power**

Use this screen to set the power management properties of the radio card. If automatic power saving mode is not desired, uncheck the checkbox and adjust the sliding scale as desired. The leftmost position uses the least power, but at the expense of network performance. The rightmost position provides the best network performance, but consumes the most power.

## Encryption (WEP)

The Symbol profile contains several choices for data encryption.

*Note: The card and the Access Point are required to use the same encryption to associate and transmit data. If the Access Point is set to Open System and the card is set to 40-bit or 128-bit encryption, no association (and therefore no data transfer) can occur. Likewise no association occurs if the card is set to Open System and the Access Point is set to 40-bit or 128-bit encryption.*

*If the Access Point is set to 40-bit and the card is set to 128-bit encryption, the Access Point and card associate, but do not transmit data.*

On the Encryption screen, select the desired encryption type:

- **Open System** – Select Open System if no packet encryption is desired. Click the OK button to enable this option.
- **40-bit Shared Key algorithm** – Select 40-bit encryption, enter a 10 hex digit key in the boxes (there are two five-digit boxes per key) and click the OK button to enable 40-bit encryption. Use the Reset Keys button to clear any entered keys.


**Figure 4-103 Symbol Profile – 40 bit Encryption**

- **128-bit shared Key algorithm** – Select 128-bit encryption, enter a 26 hex digit key in the boxes and click the OK button to enable 128-bit encryption. Use the Reset Keys button to clear any entered keys. The 128-key encryption provides greater security over the 40-key encryption.

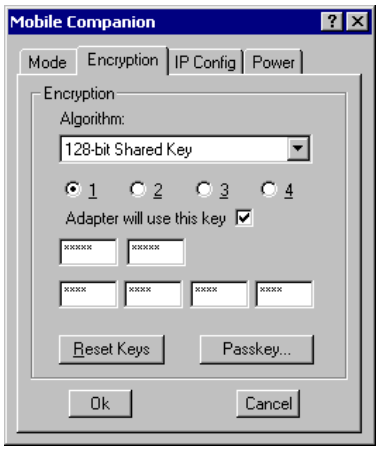



**Figure 4-104 Symbol Profile – 128 bit Encryption**

Up to four keys may be specified for each type of encryption. Selecting the "Adapter will use this key" checkbox for one key deselects all other keys.

The Reset Keys button resets the keys to factory default values.

*Note: The hex digits are visible after the key is set. After the key values are set for the network, the digits are replaced with asterisks (*).*

If the access point is using a passkey, then the active profile must use one too. The passkey is a plain text representation of the WEP keys, providing an easy way to enter WEP data without remembering the entire WEP key.

## Diagnostics

The diagnostics can be accessed by either left clicking the Symbol icon in the Windows system tray or by right clicking and selecting Status from the menu.

*Note: The menu also contains a Find WLAN option. This option displays available wireless LANs.*

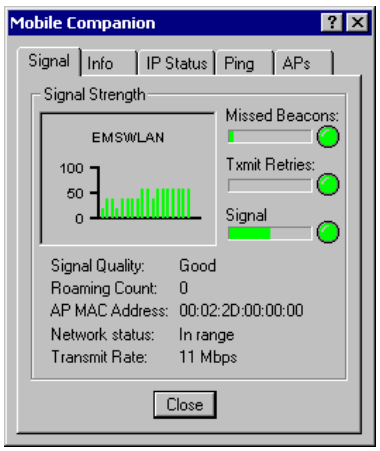



**Figure 4-105 Symbol Status – Signal**

This screen displays the following information:

- A real time graph of the signal strength
- The missed beacons graph displays the amount of beacons broadcast by the access point missed by the receiver. Missed beacons are represented by a green indicator. If the indicator is red, the association with the access point could be jeopardized by the amount of missed beacons. It may be better to associate with a different access point.
- The transmit retries graph represents the number of data packets retransmitted by the radio. Fewer retries indicate a better signal and this condition is represented by a green indicator. If the indicator is red, associating with a different access point may reduce the number of retries and improve the signal.


**Figure 4-106 Symbol Status – Information**

This screen displays information about the adapter. The version information section displays the country and version numbers of the symbol hardware, software and firmware.

The current status section displays information about the profile currently being used.

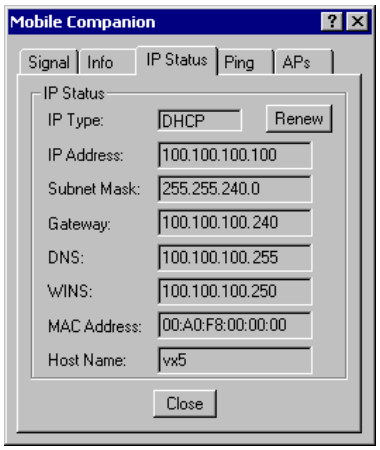



**Figure 4-107 Symbol Status – IP Status**

This screen displays the IP information for the radio.

*Note: This screen is read only and cannot be changed by the user. To change IP settings, use the configuration screen covered earlier in this chapter.*

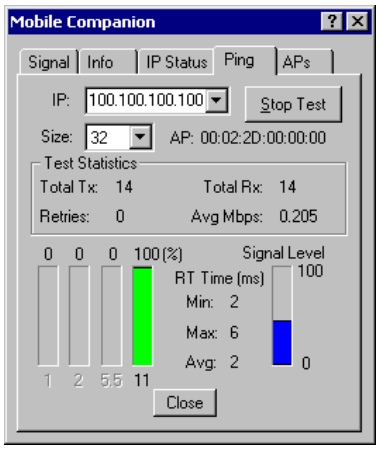



**Figure 4-108 Symbol Status – Ping Test**

The ping test can be used to test the radio's ability to send and receive packets to another device, such as an access point. To start the test, enter the IP address of the desired network device (or select it from the pull down list) and select the packet size. Click the **Start Test** button. The statistics section displays the send and receive statistics. The lower part of the screen displays the signal level and the percentage of the data transmitted at the indicated rate (1, 2, 5.5 or 11Mb).

To stop the test, click the **Stop Test** button.

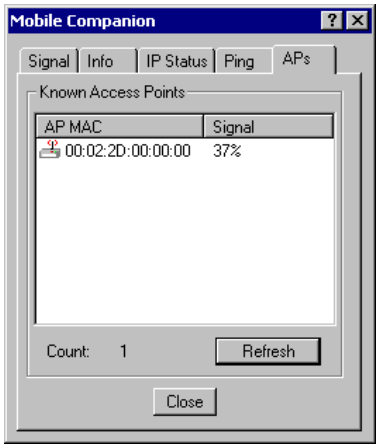



**Figure 4-109 Symbol Status – AP's**

This screen displays all AP's known to the radio card and their signal strength.

Roaming can be controlled by right clicking on the icon to the left of the MAC address of the AP. After right clicking on the icon, select "Set Mandatory" to prohibit the radio from associating with a different access point. When this option is selected, an M appears above the icon.

Selecting "Set Roaming" allows the radio to associate with any access point with a better signal.

*Note: These setting are temporary. They are not saved to the registry.*

The available WLAN networks can be displayed by right clicking on the Symbol icon in the Task Bar and selecting Available WLANs from the menu.

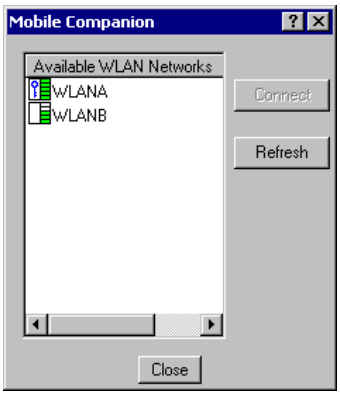



**Figure 4-110 Symbol – Available WLANs**

The signal strength of the WLAN is indicated from one bar (weakest) to five bars (strongest). Encrypted networks are indicated with a “key” icon.

## Updating Firmware

Symbol radio firmware is automatically updated when the radio driver is updated.

# Certificates

## Root CA Certificate

| | |
|---|---|
|  | Please refer to the “LXE Security Primer” for more information on obtaining and installing certificates. |

The easiest way to get the root CA certificate is to use a browser to navigate to the CA. To request the root CA certificate, open a browser to

http://<CA IP address>/certsrv.

Sign into the CA with any username and password.

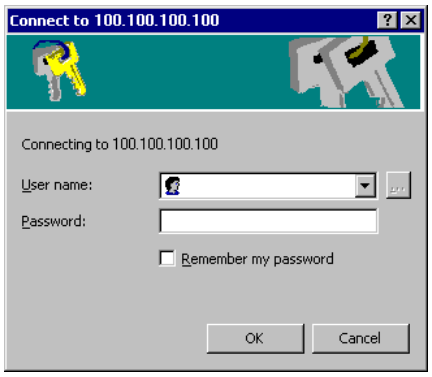



**Figure 4-111 Logon to Certificate Authority**

Click the link for **Download a CA certificate**.

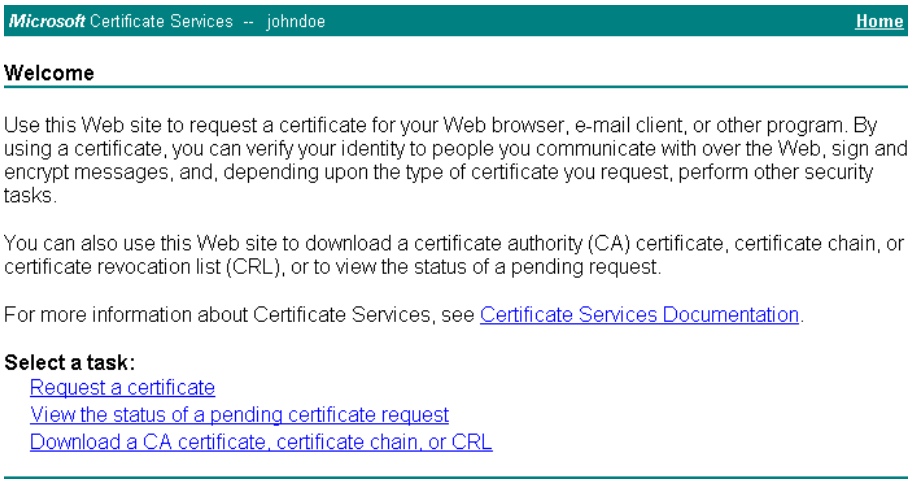



**Figure 4-112 Certificate Services Welcome Screen**

To install directly click **the install this CA certificate chain** link.

To download the CA certificate click the **Download CA certificate** link.

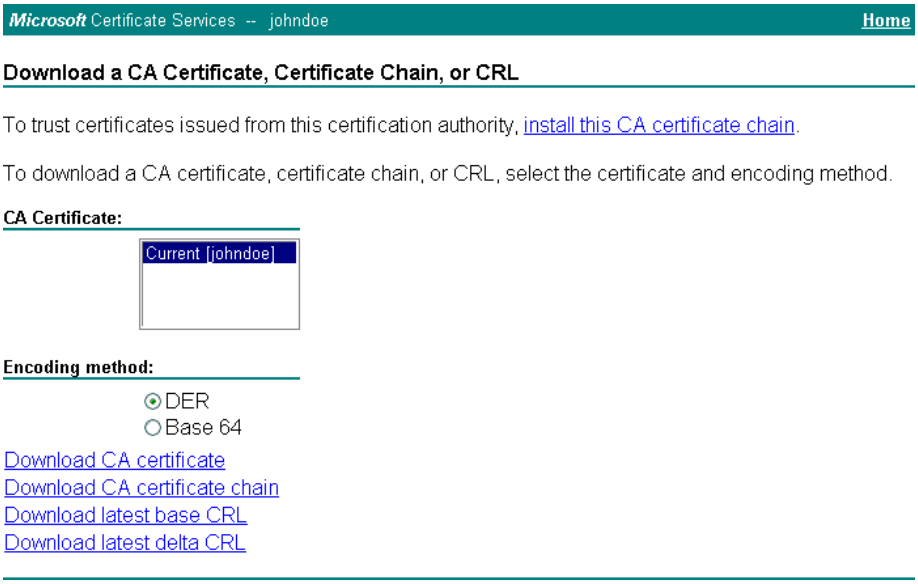



**Figure 4-113 Download CA Certificate Screen**


**Figure 4-114 File Download Confirmation**

Click the save button and save the certificate.

Make sure to keep track of the name and location of the certificate.

Copy the file to the computer to install the certificate and use the installer. Double clicking the certificate file installs the certificate. The figure below shows the Windows XP box when the certificate is double clicked. Click the **Install Certificate** button and follow the directions to install.

A message may appear when the certificate is about to install confirming that you want to install the certificate.

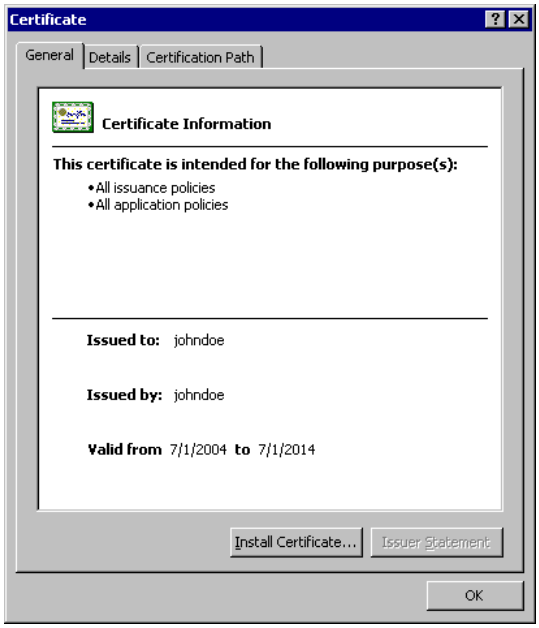



**Figure 4-115 Certificate Install**

Once the certificate is installed, return to the proper authentication section, earlier in this chapter.

## User Certificate

To authenticate using the EAP-TLS protocol you will need a user certificate with the private key. Once you have the user certificate, run the certificate installer from the control panel. The Microsoft supplicant is used. It does not matter if the Cisco supplicant is installed or not.

*Note: It is important that all dates are correct on the VX5 computers when using any type of certificate. Certificates are date sensitive and if the date is not correct authentication may fail.*

If the VX5 was used to request the user certificate, it may have been installed by the CA. To check if a correct user certificate is installed:

1. Navigate to **Start | Run** and type mmc.
2. Select **File | Add/Remove Snap-in**.
3. Click the **Add** button.
4. Click **Certificates**, click the **Add** button and choose **My User Account**.
5. Click **Finish | Close | OK**.
6. Expand Certificates – Current User and Personal
7. Click **Certificates**
8. The user certificate is shown in the right pane, if installed.

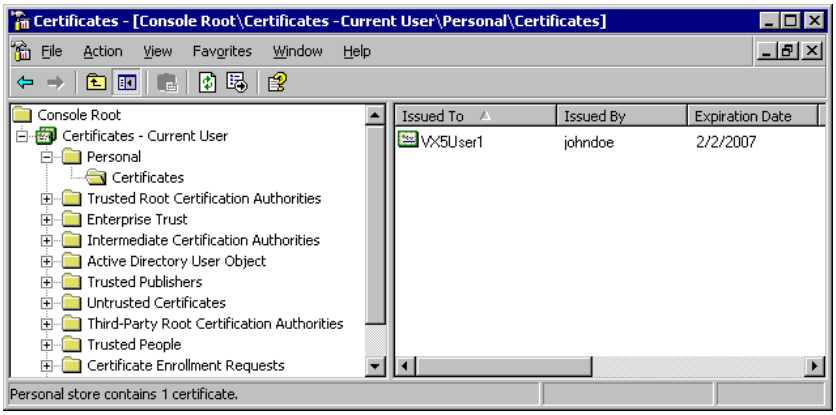



**Figure 4-116 Certificates**

If there is no user certificate refer to "Installing a Root CA Certificate" earlier in this chapter.

## Troubleshooting

When troubleshooting a radio problem, keep in mind that the problem may originate in one or more of the following areas:

- Microsoft Windows network configuration
- Hardware setup and configuration
- Software configuration
- WEP or WPA configuration.

Possible areas to check include:

- Review Microsoft Windows on-line help or commercially available reference guides for more information on Windows networking.
- Verify that radio settings match those of the desired Access Point (where appropriate).
- Review the settings in the radio software and use the diagnostics built into the radio software.

Unless otherwise directed, make sure Windows is NOT used to configure wireless network settings. Select the Network Connection icon in the Windows Control panel. Right click on the wireless network icon and select Properties.

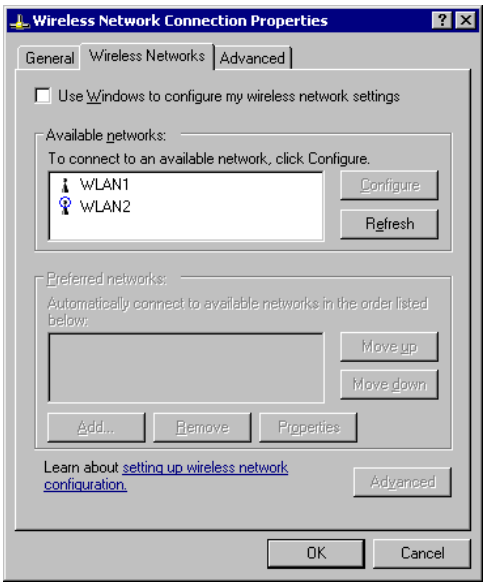



**Figure 4-117 Windows Wireless Network Properties**

Make sure the "Use Windows to configure my wireless network setting" checkbox IS NOT checked when using WEP. If using WPA and the Microsoft supplicant, this box MUST be checked.

# Chapter 5 Troubleshooting

## Problem Determination Tips

Use the tips in this chapter as a guide. They include solutions to the simplest problems as well as things to observe when trying to diagnose more serious problems.

Consider the following:

- If a problem occurs while you're working, stop immediately. If you continue, you may lose data and destroy problem-related information.
- Observe what is happening. Write down what the computer and any optional devices are doing as well as what actions you took immediately before the problem occurred.
- Consider the simplest solution first. Ask yourself logical questions and consider alternatives.
- Is the computer plugged in? Are all the cables attached correctly?
- Which part of the system is operating erratically? Keyboard? Disk/Flash Drive? Barcode Scanner? Radio? Display? Each produces different symptoms.
- What program and/or optional devices are you using?
- What appears on the screen? Do you see any messages or random characters? Look up any messages in the documentation for your software, (e.g. Microsoft Windows, etc.)
- Are any LEDs illuminated? Which ones?
- Do you hear any beeps? How many? Are they long or short?
- Is the computer making any unusual noises?
- See if you can cause the problem to occur again. This may help you understand the source of the problem and will help you describe the problem if you must call for technical assistance.
- Make sure you are operating under the specified environmental conditions discussed in "Appendix C Technical Specifications"?

Use the troubleshooting procedures that follow these tips and, if necessary, perform any diagnostic procedures that may apply.

Based on the answers to the previous questions and suggestions, try to narrow the problem down to one of the following areas:

- Startup Problems
- Hardware Problems - (i.e. power source, keyboard, display, hard drive, PCMCIA cards, optional devices, etc.)
- Radio Problems
- Software Related problems
- Memory

The following sections provide more detailed troubleshooting information about each of these areas.

## Startup Problems

This section lists some of the configuration error messages that may appear at system startup and their possible solutions.

*Note: If you press the power switch and the VX5 remains off, refer to the "Power Source" section of this chapter.*

| Problem | Solution |
|---|---|
| VX5 computer stops working and locks up each time you start it. | There may be a problem with a Microsoft Windows driver. To recover from this error, follow the steps in the "Bypassing Microsoft Windows Startup" section of this chapter. |
| The VX5 displays the "Non-System disk or disk error" message. | Make sure the VX5 is booting from the proper drive. To recover from this error, follow the steps in the "Verifying Boot Order" section of this chapter. |
| The VX5 displays either "CMOS time and date not set" or "Real time clock failure" messages. | There may be a problem with the CMOS battery. Follow the steps in the "Setting System Time and Date" section of this chapter. |

## Bypassing Microsoft Windows Startup

When using a Microsoft Windows operating system, you may want to bypass the configuration files or load Windows with a minimum number of drivers. The Windows Start Up Menu Allows several choices that aid in diagnosing a problem. To access the start-up menu:

1. Turn on the VX5.
2. Press and hold the <F5> key.
3. When the Windows Start Up Menu appears, select the desired choice:
    1. Normal
    2. Logged (\BOOTLOG.TXT)
    3. Safe mode
    4. Step-by-step confirmation
    5 Command prompt only
    6. Safe mode command prompt only

When you choose Safe Mode, you may notice differences in the way your system behaves. For instance, some device drivers are not loaded, the display resolution may be changed and system prompts and path have default values.

Step by step confirmation allows you to process or skip individual line items in your start up files.

Please refer to Microsoft Windows on line help or commercially available Windows guides for more information on operating Windows in safe mode and performing diagnostic and troubleshooting routines.

## Verifying Boot Order

1. During bootup, the <F2> key may be pressed to enter BIOS Setup. Turn on the VX5. Press <F2> immediately.
2. The BIOS Setup Main Menu is displayed. Move the highlight to the Boot Menu.
3. Select "Boot Device Priority" by pressing the <Down Arrow> to highlight it.
4. Verify that the desired drive is listed first. In most cases this will be "Hard Drive".
5. If more than one drive is listed under "Hard Drive" verify the desired drive is listed first.
6. Any device listed with a "!" in front of the name will NOT be searched for a boot record.
7. Use the <+> key to move an item up in the boot order and the <-> key to move an item down the list. Press <SHIFT> + <2nd> + <1> to enable or disable a device on the search list.

If the error continues you may need to reformat the C: drive and restore the system from backup.

## Setting System Time and Date

1. If the VX5 is not already powered up, turn it on.
2. During bootup the <F2> key may be pressed to enter BIOS Setup. Press <F2> immediately.
3. At the BIOS Setup Main Menu, move the highlight to the Time parameter.
4. Type the desired entry and then press the <Tab> key to move from hours to minutes to seconds. The colons are automatically added by the system.
5. Press the <Down Arrow> to move to the Date parameter.
6. Type the desired entry and then press the <Tab> key to move from month to day to year. The backslashes are automatically added by the system.
7. Press <Esc> until you reach the Exit menu.
8. Select "Save and Exit" to save the changes. Press <Enter>.

If the VX5 does not automatically reboot, turn the VX5 off and then on again.

## Hardware Problems

This section lists possible solutions to some common problems with hardware.

## Power Source

The VX5 receives power from either an AC-DC adapter or a vehicle battery. Power source problems are usually interrelated. For example, a malfunctioning AC-DC adapter or vehicle battery will not power the computer.

| ATTENTION |
| --- |
| *Using the wrong AC adapter or DC converter could damage the VX5. LXE assumes no liability for damage to the VX5 or adapter/converter caused by using the wrong adapter/converter.* |

The following table provides solutions to common power source problems:

| Problem | Solution |
| --- | --- |
| The computer won't start. | Make sure you've attached the power cord properly and that you have the power switch in the On position.<br><br>Make sure the wall outlet (for AC-DC adapter) is working or the vehicle battery is charged.<br><br>Check fuse and replace if blown.<br><br>Make sure the vehicle battery is connected properly to the VX5 power cable. |

If you cannot find the source of the problem, consult LXE. Please refer to "Contacting LXE."

## Keyboard

The following table provides solution to common keyboard problems:

| Problem | Solution |
|---|---|
| Get an unexpected character or function when pressing some keys. | Reboot the machine to return to its original setting. If the problem continues refer to the key map found in Appendix A "Key Maps" for correct key combinations. |
| The <2nd> key on the keyboard remains active and does not toggle on and off when another key is pressed. | Press the <SP> key or an arrow key to release the <2nd> state. If the problem continues, contact LXE Customer Support department.<br>*Note: The 95-key keyboard does not have 2nd key functionality.* |
| The keyboard locked and you cannot use <Ctrl> + <Alt> + <Del> to reboot. | Flip the power switch off and then on to restart the computer. |

## Display

| Problem | Solution |
|---|---|
| The display is unreadable. | Verify the Display setting in the Microsoft Windows Control panel. The display settings should be set to High Color (16 bit) and 800 by 600 pixel resolution.<br>*Note: It may be necessary to reboot in Safe Mode to change the display settings if the screen is unreadable. See "Bypassing Microsoft Windows Startup" earlier in this chapter.* |

## Hard Disk Drive

If you have problems with the hard disk drive, run the Microsoft Windows scandisk utility. This utility analyzes the directories, files and File Allocation Tables (FAT).

Windows 2000/XP path: **My Computer | Local Disk | Properties | Tools | Error checking** then click the Check now button. If the scandisk utility does not report any errors and the hard disk still has problems, contact LXE Technical Support.

For information on running the scandisk utility, refer to the Windows help files.

## PCMCIA Cards

| Problem | Solution |
|---|---|
| You are having trouble accessing data on a PCMCIA card or some of the data appears to be missing. | Run the scandisk utility, which analyzes the directories, files and the File Allocation Table (FAT) on the card. |
| The scandisk utility reports no errors and you're still experiencing problems. | Can you access the PCMCIA card? Try to view the contents of the folders. If the folder doesn't display all the files stored in the folder, recovering data is unlikely. |
| Data files are damaged or corrupted. | Refer to your software documentation for file recovery procedures. Many software packages automatically create backup files or restore points. |

## Memory Conflicts

Microsoft Windows controls memory management. If you experience a problem with memory management, please refer to Windows help files or a commercially available Windows guide. If a particular program causes the memory error, refer to the documentation for that program.

## IRQ Assignments

The VX5 has 16 IRQs, numbered 0 through 15, many of which are already assigned as follows:

| IRQs | Device(s) Windows 2000 | Device(s) Windows XP |
|---|---|---|
| IRQ0 | Timer Output | Timer Output |
| IRQ1 | Keyboard | Keyboard |
| IRQ2 | Programmable Interrupt Controller | Programmable Interrupt Controller |
| IRQ3 | Serial Port COM2 [2] | Serial Port COM2 [2] |
| IRQ4 | Serial Port COM1 | Serial Port COM1 |
| IRQ5 | Not Used | Not Used |
| IRQ6 | Not Used | Not Used |
| IRQ7 | Cisco Radio Card | Summit Radio Card<br>Symbol Radio Card |
| IRQ8 | Real Time Clock | Real Time Clock |
| IRQ9 | PCI to USB Controller | PCI to USB Controller<br>Cisco Radio Card |
| IRQ10 | Reserved (default PC Card events) | Reserved (default PC Card events) |
| IRQ11 | PCMCIA controller<br>Symbol Radio Card | PCMCIA controller |
| IRQ12 | Not Used | Not used |
| IRQ13 | Numeric data processor | Numeric data processor |
| IRQ14 | Primary IDE Controller | Primary IDE Controller |
| IRQ15 | Not used | Secondary IDE Controller |

*Note: Please note that the IRQ assignments may change if additional hardware is added.*

If additional hardware is added and no IRQs are available, it may be necessary to disable certain devices in the BIOS to free up IRQs for the new hardware.

### IRQ usage Notes:

- Serial ports (COM1 or COM2) may be disabled in the BIOS or via Windows freeing up the specified IRQ for other uses.
- When the parallel port is disabled, IRQ7 is available for the radio. The parallel port is disabled by default. However, some radios may use IRQ9 instead of IRQ7.

[2] COM2 is labeled “COM2/3”.

## Optional Devices

This section provides information on solving problems related to optional devices.

*Note: Make sure the VX5 is powered on before you turn on any powered optional devices.*

To help determine which device is causing the problem:

- Check that all connecting cables are correctly and firmly attached. Loose cables can cause erroneous or intermittent signals. You may need to inspect connecting cables for loose wires, and check connectors for loose pins.
- Isolate the problem. Look in the Microsoft Windows Control panel System icon for devices displaying a "?" or an "!". Check the properties for these devices or delete these devices and reinstall them.
- Device Configuration. The smooth operation of the system depends on the interaction of all devices, programs and features. Is the device Plug and Play or is configuration necessary?
- Device driver. Make sure the correct driver is installed for the device, based on the version of Microsoft Windows operating system you are using. Check the documentation for the device or the device manufacturer's website for an updated driver.

For information adding or deleting devices or updating drivers, please refer to Windows Help screens or commercially available Windows guides.

The following table provides some solutions to common configuration problems:

| Problem | Solution |
|---|---|
| You connected a device and the device isn't operating properly. | Verify Microsoft Windows recognizes the device by checking the System icon in the Control Panel. Check for a problem with the device driver or a hardware conflict. |
| You connected an external device and the computer isn't operating properly. | Check all cables and connectors. Try a different cable.<br><br>If the VX5 was on when the device was attached, reboot the VX5. |

# Radio and Network Problems

## 2.4 GHz Wireless Network

Wireless radio and network problems may be divided into two general categories:

- Microsoft Windows networking problems
- Configuration of radio card/network

All VX5 radios include utilities to aid in diagnosing transmission problems. Please refer to Chapter 4, "Wireless Network Configuration" for details on using the diagnostic features. Chapter 4 also includes a "Troubleshooting" section. Please review the information there if experiencing troubles with the 2.4 GHz network.

*Note: Make sure Windows is NOT used to configure wireless network settings when using WEP. Instructions can be found in the "Troubleshooting" section of Chapter 4, "Wireless Network Configuration".*

If you are experiencing a Microsoft Windows networking problem, please refer to Windows on-line help or commercially available Windows networking guides for more information.

## Ethernet Connection

Verify the network cable connections. If problems persist, please refer to Microsoft Windows on-line help or commercially available Windows networking guides for more information.

## Software Related Problems

Consider the following:

- If an error message appears while you are using a software package, check the software documentation first. It usually includes a troubleshooting section or summary of error messages. If you cannot find the error message in the software documentation, look for the message in the Microsoft Windows Help.
- Some software may be incompatible with other software already installed. If the problem continues, contact the manufacturer of the software program.
- Make sure the software is compatible with the Microsoft Windows version you are using.
- Be sure you have enough memory and hard disk space to meet the software requirements.

## Determining Software Revision

The Gnumber of the LXE loaded Windows image on the VX5 can be read in the system registry Use the Microsoft Registry Editor (REGEDIT.EXE) and browse to the following key:

```
HKEY_LOCAL_MACHINE\SOFTWARE\LXE\VX5
```

The value for `VX5GNUM` is the Gnumber of the LXE loaded Windows image.

| | |
|---|---|
| ***Caution***  | Incorrectly editing the registry may severely damage your system. You should back up any valued data on the computer before making changes to the registry. LXE recommends only qualified personnel make registry changes. |

# System Testing

## Power On Self Test (POST)

Each time the computer is turned on (or is rebooted using <Ctrl> + <Alt> + <Del>), a series of comprehensive hardware tests are performed. These tests are called the Power On Self Test, or POST. The POST exercises the following hardware components:

- CPU flags and registers
- DRAM
- Cache RAM
- DMA
- Timers
- Interrupts
- Extended/expanded memory
- Video memory and controller
- Keyboard controller

### POST Error Messages

The following table lists the POST error messages for the VX5. If problems persist, contact LXE's Customer Support.

*0200 Failure Fixed Disk*

**Possible Cause**
The fixed disk is not properly identified in BIOS.

**Action**
Run Setup. Choose "Auto" or enter the correct user parameters for the disk drive.

*0210 Stuck Key*

**Possible Cause**
A key is stuck on the keyboard.

**Action**
Turn the power off, and then back on again. If the problem persists, try a different keyboard or contact LXE's Customer Support.

*0211 Keyboard Error*

**Possible Cause**
Keyboard is not working.

**Action**
Check keyboard connection. Test with another keyboard. Keyboard or cable may be faulty.

*0212 Keyboard Controller Failed*

**Action**
Contact LXE's Customer Support.

*0213 Keyboard locked – Unlock key switch*

**Action**
Contact LXE's Customer Support.

*0220 Monitor type does not match CMOS*

**Action**
Run Setup and verify monitor settings.

*0230 Shadow RAM Failed at offset: nnnn*

**Action**
Contact LXE's Customer Support.

*0231 System RAM Failed at offset: nnnn*

**Action**
Contact LXE's Customer Support.

*0250 System battery is dead – Replace and run Setup*

**Action**
Contact LXE's Customer Support for CMOS battery replacement.

*0251 System CMOS checksum bad – Default Configuration Used*

**Action**
CMOS has been corrupted. The VX5 is loading with default settings. Run Setup to modify values.

*0260 System timer error*

**Action**
Contact LXE's Customer Support.

*0270 Real time clock error*

**Action**
Contact LXE's Customer Support.

*0280 Previous boot incomplete – Default configuration used*

**Action**
The default BIOS values will be loaded. Run setup to change the values.

*0281 Memory Size found by POST differed from CMOS*

**Action**
Run BIOS Setup utility.

*02B0/02B1 Diskette Drive A/B error*

**Possible Cause**
Diskette drive is present but does not match BIOS setting.

**Action**
Check connections and run BIOS Setup.

*02B2/02B3 Incorrect Drive A/B type – Run Setup*

**Action**
Run the BIOS Setup utility.

*02D0 System cache error – Cache disabled*

**Action**
Contact LXE's Customer Support.

*02F0 CPU ID:*

**Possible Cause**
Contact LXE's Customer Support.

*02F4 EISA CMOS not writeable*

**Possible Cause**
Cannot write BIOS to CMOS.

**Action**
Contact LXE's Customer Support.

*02F5 DMA Test Failed*

**Possible Cause**
Cannot write to DMA (Direct Memory Access) registers..

**Action**
Contact LXE's Customer Support.

*02F6 Software NMI failed*

**Possible Cause**
Cannot generate software NMI (Non-Maskable Interrupt).

**Action**
Contact LXE's Customer Support.

*02F7 Fail-Safe Timer NMI Failed*

**Possible Cause**
Server BIOS2 test error: Fail-safe timer takes too long.

**Action**
Contact LXE's Customer Support.

## POST Informational Messages

The following table lists the POST informational messages for the VX5.

| Message | Meaning |
|---|---|
| nnn kB System RAM Passed | The amount of base memory that tested successfully. |
| nnn kB Extended RAM Passed | The amount of extended memory that tested successfully. |
| nnn kB Cache/Shadow RAM Passed | The amount of system cache or shadow RAM tested successfully. |
| UMB upper limit segment address: nnn | Displays the address of the limit of Upper Memory Blocks. |
| Video BIOS shadowed | The video BIOS has successfully been copied to shadow RAM. |
| System BIOS shadowed | The system BIOS has successfully been copied to shadow RAM. |
| Fixed Disk n | Fixed disk *n* (0 – 3) identified. |
| Press the <F1> key to continue | This message indicates that an error was found during POST. Pressing the <F1> key allows the system to attempt to boot. |
| Press <F2> to enter Setup | Optional prompt displayed during POST. If the message is suppressed, pressing <F2> still enters Setup. |
| Entering SETUP…. | Starting the Setup program. |

## If You Need Further Assistance

If you have followed these recommendations and are still having problems, you may need additional technical assistance. This section contains the steps to take as you prepare to ask for help.

## Before You Call

Since some problems you experience may be related to the operating system or software, it is important to investigate other sources of assistance first. Try the following before contacting LXE.

- Review the troubleshooting information in commercially available Microsoft Windows documentation.
- If the problem occurs while running software applications loaded after your purchase of the VX5, consult the software documentation for troubleshooting suggestions. Contact the software company's technical support department for assistance.

If you still need assistance refer to "Contacting LXE".

# Appendix A  Key Maps

## 95-key Keypad with Pointing Device


**Figure A-1  95-Key VMT QWERTY Keyboard**

The key map table that follows lists the commands used for the VX5.  Note that since the VX5 uses a Microsoft Windows operating system, no DOS Terminal Emulation keypress sequences are provided.

## Key Map 101-Key Equivalencies

There are ten hidden keys on the 95-key keyboard.  Each of these hidden keys is accessed by pressing the <Fn> key plus another key.

| To get this key | Press These Keys and Then |
|---|---|
| Insert | Fn + 0 on the number pad |
| Home | Fn + 7 on the number pad |
| Page Up | Fn + 9 on the number pad |
| Delete | Fn + . on the number pad |
| End | Fn + 1 on the number pad |
| Page Down | Fn + 3 on the number pad |
| Up Arrow | Fn + 8 on the number pad |
| Left Arrow | Fn + 4 on the number pad |
| Down Arrow | Fn + 2 on the number pad |
| Right Arrow | Fn + 6 on the number pad |

*Note:  The 95-key keyboard does not have a 2nd key function.*

## 60-key Standard Keypad

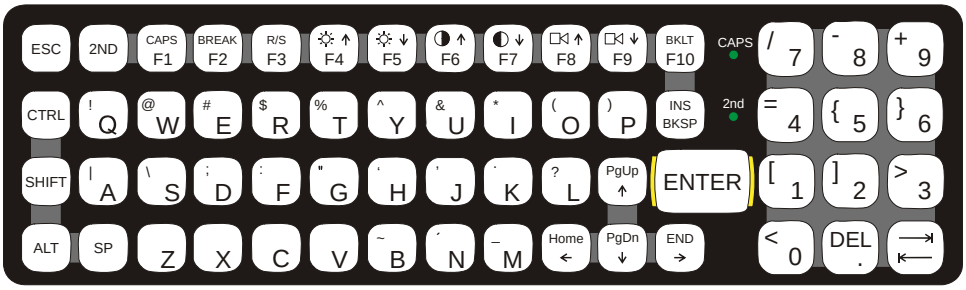



**Figure A-2 60-Key VMT QWERTY Keyboard**

The key map table that follows lists the commands used when running LXE's VX5.

When running LXE's RFTerm program, please refer to the RFTerm Reference Guide for equivalent keys and keypress sequences:

## Key Map 101-Key Equivalencies

When using a sequence of keys that includes the 2nd key, press the 2nd key first then the rest of the key sequence.

This keyboard does not have a NumLock indicator. NumLock is enabled by default in BIOS. NumLock may be toggled On or Off using the <2nd> <SHIFT> <F10> keypress sequence. To change NumLock status at boot, it is necessary to access the BIOS. Please refer to "BIOS Setup" in Chapter 3, "System Configuration". When NumLock is off, only the numeric 0 through 9 and DOT keys are affected. All other keymaps are unchanged.

When the computer boots with a VMT keyboard, the default condition of Caps (or CapsLock) is Off. The Caps (or CapsLock) condition can be set toggled with a <2nd>+<F1> key sequence. The CAPS LED on the VMT keyboard is illuminated when CapsLock is On.

| To get this key | Press These Keys and Then | | | | | Press this key |
|---|---|---|---|---|---|---|
| | 2nd | Shift | Ctrl | Alt | CapsLock | |
| Increase Brightness [3] | x | | | | | F4 |
| Decrease Brightness [3] | x | | | | | F5 |
| Increase Contrast [4] | x | | | | | F6 |
| Decrease Contrast [4] | x | | | | | F7 |
| Increase Volume [5] | x | | | | | F8 |
| Decrease Volume [5] | x | | | | | F9 |

[3] The Brightness Adjustment keys have no function. Brightness is adjusted via the buttons on the VX5 control panel.

[4] The Contrast Adjustment keys have no function because the VX5 is equipped with a TFT display that has no provision for these adjustments.

[5] The Volume Control keys have no function as the volume control is adjusted via the Windows System Tray Volume icon.

| To get this key | Press These Keys and Then | | | | | Press this key |
|---|---|---|---|---|---|---|
| | 2nd | Shift | Ctrl | Alt | CapsLock | |
| Keyboard Backlight [6] | x | | x | | | F10 |
| Suspend/Resume [7] | x | | | | | F3 |
| 2nd | | | | | | 2nd |
| Shift | | | | | | Shift |
| Alt | | | | | | Alt |
| Ctrl | | | | | | Ctrl |
| Esc | | | | | | Esc |
| Space | | | | | | Sp |
| Enter | | | | | | Enter |
| Enter (numeric) | x | | | | | Enter |
| CapsLock (Toggle) | x | | | | | F1 |
| Back Space | | | | | | Ins/BkSp |
| Tab | | | | | | Tab |
| BackTab | x | | | | | Tab |
| Ctrl-Break [8] | x | | x | | | F2 |
| Pause | x | | | | | F2 |
| Up Arrow | | | | | | Up Arrow |
| Down Arrow | | | | | | Down Arrow |
| Right Arrow | | | | | | Right Arrow |
| Left Arrow | | | | | | Left Arrow |
| Insert | x | | | | | Ins/BkSp |
| Delete (numeric) | x | | | | | DOT |
| Home | x | | | | | Left Arrow |
| End | x | | | | | Right Arrow |
| Page Up | x | | | | | Up Arrow |
| Page Down | x | | | | | Down Arrow |
| Right Shift | x | x | | | | F7 |
| Right Alt | x | x | | | | F8 |
| Right Ctrl | x | x | | | | F9 |
| ScrollLock | x | x | | | | F4 |
| NumLock | x | x | | | | F10 |
| F1 | | | | | | F1 |
| F2 | | | | | | F2 |
| F3 | | | | | | F3 |

[6] The Keyboard Backlight key is used in <2nd> + <CTRL> + <F10> key sequence. Refer to "VMT Keyboard Backlighting" in Chapter 4, "System Configuration".

[7] The Suspend/Resume key has no function as Windows Power Management controls all power management modes on the VX5.

[8] Press <Ctrl> then <2nd> then <F2> to produce Ctrl-Break.

| To get this key | Press These Keys and Then | | | | | Press this key |
|---|---|---|---|---|---|---|
| | 2nd | Shift | Ctrl | Alt | CapsLock | |
| F4 | | | | | | F4 |
| F5 | | | | | | F5 |
| F6 | | | | | | F6 |
| F7 | | | | | | F7 |
| F8 | | | | | | F8 |
| F9 | | | | | | F9 |
| F10 | | | | | | F10 |
| F11 | x | x | | | | F1 |
| F12 | x | x | | | | F2 |
| a | | | | | | A |
| b | | | | | | B |
| c | | | | | | C |
| d | | | | | | D |
| e | | | | | | E |
| F | | | | | | F |
| g | | | | | | G |
| h | | | | | | H |
| I | | | | | | I |
| j | | | | | | J |
| k | | | | | | K |
| l | | | | | | L |
| m | | | | | | M |
| n | | | | | | N |
| o | | | | | | O |
| p | | | | | | P |
| q | | | | | | Q |
| r | | | | | | R |
| s | | | | | | S |
| t | | | | | | T |
| u | | | | | | U |
| v | | | | | | V |
| w | | | | | | W |
| x | | | | | | X |
| y | | | | | | Y |
| z | | | | | | Z |
| A | | | | | x | A |
| B | | | | | x | B |
| C | | | | | x | C |
| D | | | | | x | D |
| E | | | | | x | E |

| To get this key | Press These Keys and Then | | | | | Press this key |
|---|---|---|---|---|---|---|
| | 2nd | Shift | Ctrl | Alt | CapsLock | |
| F | | | | | x | F |
| G | | | | | x | G |
| H | | | | | x | H |
| I | | | | | x | I |
| J | | | | | x | J |
| K | | | | | x | K |
| L | | | | | x | L |
| M | | | | | x | M |
| N | | | | | x | N |
| O | | | | | x | O |
| P | | | | | x | P |
| Q | | | | | x | Q |
| R | | | | | x | R |
| S | | | | | x | S |
| T | | | | | x | T |
| U | | | | | x | U |
| V | | | | | x | V |
| W | | | | | x | W |
| X | | | | | x | X |
| Y | | | | | x | Y |
| Z | | | | | x | Z |
| 1 (alpha) | x | x | | | | 1 |
| 2 (alpha) | x | x | | | | 2 |
| 3 (alpha) | x | x | | | | 3 |
| 4 (alpha) | x | x | | | | 4 |
| 5 (alpha) | x | x | | | | 5 |
| 6 (alpha) | x | x | | | | 6 |
| 7 (alpha) | x | x | | | | 7 |
| 8 (alpha) | x | x | | | | 8 |
| 9 (alpha) | x | x | | | | 9 |
| 0 (alpha) | x | x | | | | 0 |
| DOT (alpha) | x | | | | | K |
| 1 (numeric) | | | | | | 1 |
| 2 (numeric) | | | | | | 2 |
| 3 (numeric) | | | | | | 3 |
| 4 (numeric) | | | | | | 4 |
| 5 (numeric) | | | | | | 5 |
| 6 (numeric) | | | | | | 6 |
| 7 (numeric) | | | | | | 7 |
| 8 (numeric) | | | | | | 8 |

| To get this key | Press These Keys and Then | | | | | Press this key |
|---|---|---|---|---|---|---|
| | 2nd | Shift | Ctrl | Alt | CapsLock | |
| 9 (numeric) | | | | | | 9 |
| 0 (numeric) | | | | | | 0 |
| DOT (numeric) | | | | | | DOT |
| < | x | | | | | 0 |
| [ | x | | | | | 1 |
| ] | x | | | | | 2 |
| > | x | | | | | 3 |
| = | x | | | | | 4 |
| { | x | | | | | 5 |
| } | x | | | | | 6 |
| / (numeric) | x | | x | | | 7 |
| / (alpha) | x | | | | | 7 |
| - (numeric) | x | | x | | | 8 |
| - (alpha) | x | | | | | 8 |
| + (numeric) | x | | x | | | 9 |
| + (alpha) | x | | | | | 9 |
| * (numeric) | x | | | | | I |
| * (alpha) | x | | x | | | I |
| : (colon) | x | | | | | D |
| ; (semicolon) | x | | | | | F |
| ? | x | | | | | L |
| ` | x | | | | | N |
| _ (underscore) | x | | | | | M |
| , (comma) | x | | | | | J |
| ‘ (apostrophe) | x | | | | | H |
| ~ (tilde) | x | | | | | B |
| \ | x | | | | | S |
| \| | x | | | | | A |
| “ | x | | | | | G |
| ! | x | | | | | Q |
| @ | x | | | | | W |
| # | x | | | | | E |
| $ | x | | | | | R |
| % | x | | | | | T |
| ^ | x | | | | | Y |
| & | x | | | | | U |
| ( | x | | | | | O |
| ) | x | | | | | P |

## IBM 3270 Keypad Ovelay

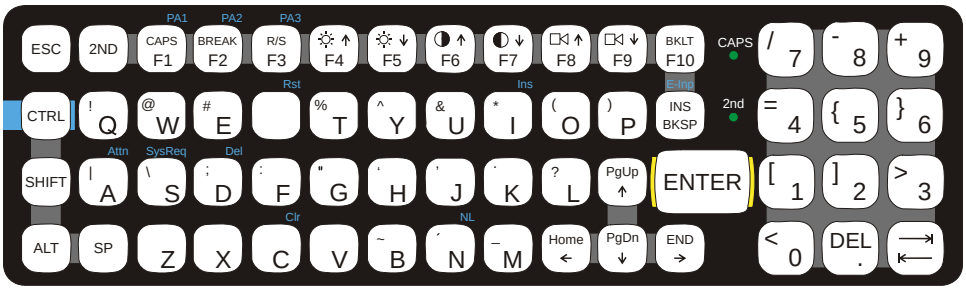



**Figure A-3 IBM 3270 Specific Keypad**

The 60-key keypad is available with an IBM 3270 overlay designed to allow the user to enter terminal emulator commands when running LXE's RFTerm program. When running this program please refer to the following reference guide for equivalent keys and keypress sequences:

- RFTerm Reference Guide

## IBM 5250 Keypad Overlay

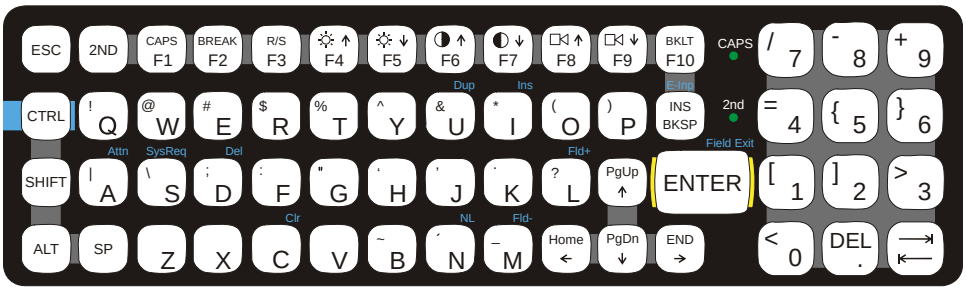



**Figure A-4 IBM 5250 Specific Keypad**

The 60-key keypad is available with an IBM 5250 overlay designed to allow the user to enter terminal emulator commands when running LXE's RFTerm program. When running this program please refer to the following reference guide for equivalent keys and keypress sequences:

- RFTerm Reference Guide

# Appendix B  Technical Specifications

## Physical Specifications

| Features | | Specification | Comments |
|---|---|---|---|
| CPU | | 933MHz PIII | |
| Memory | BIOS Flash | 1 MB BIOS Flash | |
| | RAM | 256 or 512MB SDRAM | |
| Display | Controller | SVGA compatible controller | |
| | Type | TFT | |
| Mass Storage [9] | Rotating | 40 or 80 GB | Available storage options may vary based on date of manufacture and other VX5 options. |
| | Compact Flash | 2 or 4 GB (LT) | |
| | PCMCIA | 2 or 4 GB (LT) | |
| PCMCIA/CardBus Interface | | Two (2) CardBus Slots:  Accepts Type I, II and III PCMCIA cards. | Compatible with the PCMCIA version 2.1 standard. |
| External Connectors/ Interfaces | | Two (2) external RS-232C serial ports: COM1 and COM2<br>Two (1) Type A USB Port<br>One (1) Ethernet Port | 9-pin “D” (male) connectors<br>Internal and via adapter cable<br>RJ-45 via adapter cable |
| Power Connector | | 12-80V DC input power | 5-pin connector |
| Power Switch | | Sealed power switch | |
| Beeper | | Minimum loudness greater than 95dBm at 10 cm in front of unit | |
| Dimensions | | Length:  12.2 in (30.98 cm)<br>Width:  9.5 in (24.13 cm)<br>Depth:  4.3 in (10.92 cm) | |

[9] Available storage options may vary based on date of manufacture and other VX5 options.

| Features | | Specification | Comments |
|---|---|---|---|
| Battery for CMOS | | Internal lithium Battery | |
| External Power Supply | AC Adapter | 120-240VAC to 12VDC | |

## Environmental Specifications

The VX5 will withstand the following environmental characteristics and has been tested in accordance with applicable sections of MIL-STD-810E.

| Feature | Specification |
|---|---|
| Altitude | Operational to 10,000 ft. (3048 meters) |
| Operating Temperature | Standard temperature version:<br>0 °C to +50 °C (+32 °F to +122 °F)<br>Extended temperature option:<br>Startup: -20 °C to +50 °C (-4 °F to +122 °F)<br>Operating: -30 °C to +50 °C (-22 °F to +122 °F) |
| Storage Temperature | Standard temperature version:<br>-30°C to +60 °C (-22 °F to +140 °F)<br>Extended temperature version:<br>-40 °C to +60 °C (-40 °F to +140 °F) |
| Water, Sand and Dust | IP66 per IEC60529 |
| Humidity | 10-90% Non-condensing at 40°C (104°F) |
| Vibration | Bounce loose cargo for 0.5 hour duration. Common carrier transportation, transit face. |
| ESD | 15 kV |
| Shock | 75G, 5msec duration, 100 shock impacts |

## Display Specifications

| Characteristic | | Specification |
|---|---|---|
| Type | TFT | SVGA |
| Resolution | | 800 X 600 pixels (25 lines x 80 characters) |
| Cell Size | | 8 x 16 pixels<br>(8 x 8 also supported – 25 lines x 80 chars) |
| Dot Dimensions | | .30mm x .30mm |
| Display Dimensions | | 280mm x 218mm x 11mm (11.0” x 8.6” x 0.4”) |
| Viewing Area | | 249mm x 187.5mm (9.8” x 7.38”) |
| Active Display Area | | 246mm x 184.5mm (9.7” x 7.26”) |

## UPS Battery Pack Specifications

| Feature | Specification |
|---|---|
| Altitude | Operational to 10,000 ft. (3048 meters) |
| Operating Temperature | -30 °C to +50 °C (-22 °F to +122 °F) |
| Storage Temperature | -40 °C to +70 °C (-40 °F to +158 °F) |
| Water, Sand and Dust | IP66 per IEC60529 |
| Humidity | 10-90% Non-condensing at 40°C (104°F) |
| Vibration | Bounce loose cargo for 0.5 hour duration. Common carrier transportation, transit face. |
| ESD | 15 kV |

# Radio Specifications

## Summit CF 2.4GHz

| | |
|---|---|
| Bus Interface: | Compact Flash via a PCMCIA adapter |
| Radio Frequencies: | 2.4 - 2.4897 GHz IEEE 802.11b 802.11g DSSS OFDM |
| RF Data Rates: | 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, 54 Mbps |
| RF Power Level: | 64 mW (18 dBm) |
| Channels | 11 US, 13 Europe, 13 Japan |
| Operating Temperature | see VX7 Environmental Specifications |
| Storage Temperature | see VX7 Environmental Specifications |
| Connectivity: | Novell, TCP/IP, Ethernet, ODI |

## PCMCIA Cisco 2.4GHz Type II

| | |
|---|---|
| Bus Interface: | PCMCIA 2.0, Type II slot |
| Radio Frequencies: | 2.4 - 2.4835 GHz IEEE 802.11b DS SS |
| RF Data Rates: | 11 Mbps |
| RF Power Level: | 100 mW |
| Channels | 11 US, 13 Europe, 4 France, 1 Japan |
| Operating Temperature | see VX5 Environmental Specs |
| Storage Temperature | see VX5 Environmental Specs |
| Connectivity: | Novell, TCP/IP, Ethernet, ODI |

## PCMCIA Symbol 11Mb 2.4GHz Type II

| | |
|---|---|
| Bus Interface: | PCMCIA 2.0, Type II slot |
| Radio Frequencies: | 2.4 - 2.5 GHz IEEE 802.11b DS SS |
| RF Data Rates: | 11 Mbps maximum |
| RF Power Level: | 100 mW |
| Channels | 11 US, 13 Europe, 4 France, 1 Japan |
| Operating Temperature | see VX5 Environmental Specs |
| Storage Temperature | see VX5 Environmental Specs |
| Connectivity: | Novell, TCP/IP, Ethernet, ODI |

# Revision History

### Revision A: Initial Release, March 2004

### Revision B: September 2004

| Section | Explanation |
|---|---|
| Chapter 1 – Introduction | Added 8500 Series Tethered Scanners to Accessories. Updated Accessories listing effective July 2004.<br>Revised "Components" section due to new COM2 labeling. |
| Chapter 2 – Physical Description and Layout | Revised "AT Compatible Core Logic", "General Windows Keyboard Shortcuts", "The On/Off Switch", "The 95-key QWERTY Keyboard with Pointing Device", "Printer/PC Serial Connector (COM2)" and "Install the 2.4GHz Type II PCMCIA Card".<br>Added "Install/Remove Touchscreen Protective Film" section.<br>Added IBM 3270 and IBM 5250 overlay information to "The 60-key QWERTY Keyboard" section. |
| Chapter 4 – System Configuration | Revised "The VX5 Drivers CD-ROM" and "Serial Port Pin 9". |
| Chapter 5 – RF Network Configuration | Revised Figure 4-6, Cisco Properties - RF Network.<br>Revised Symbol Radio "Configuration" section. |
| Chapter 6 – Troubleshooting | Added footnotes on COM2 labeling to "IRQ Assignments". |
| Appendix A – Key Maps | Added IBM 3270 and IBM 5250 overlay information to "The 60-key QWERTY Keyboard" section. |
| Appendix B – Technical Specifications | Revised "Display Specifications". |

### Revision C: February 2005

| Section | Explanation |
|---|---|
| Front Page | Updated LXE logo and date. |
| Chapter 1 – Introduction | Added VX1/2/4 Power Adapter Cable to VX5/6/7 Series to Accessories list. |
| Chapter 3 – Power Supply | Added section for VX1/2/4 Power Adapter Cable. |
| Chapter 5 – RF Network Configuration | Revised “Troublehooting” section.<br>Revised “LEAP” section. Information on LEAP is now included in the “WPA for VX5” section.<br>Added “WPA for the VX5”. |
| Chapter 6 – Troubleshooting | Revised “2.4 GHz Wireless Network” section. |
| Appendix B – Technical Specifications | Revised “Physical Specifications”. |

### Revision D: March 2006

| Section | Explanation |
|---|---|
| Notices | Updated copyrights and trademarks. |
| Entire Manual | Updated illustrations as necessary to reflect 2005 LXE logo. |
| Chapter 1 – Introduction | Revised “Overview” section. |
| Chapter 2 – Physical Description and Layout | Revised “Install the 2.4GHz Type II PCMCIA Radio”. |
| Chapter 3 – Power Supply | Revised “VX5 Input Power Specifications”. |
| Appendix B – Technical Specifications | Added “Revision History” to appendix. |

### Revision E: November 2006

| Section | Explanation |
|---|---|
| Notices | Updated copyrights and trademarks. |
| Chapter 2 – Physical Description and Layout | Revised the following sections: “Video Subsystem”, “Serial Scanner Connection (COM1)” and “Printer/PC Serial Connection (COM2)”.<br>Added information that was previously included in Chapter 3, “Power Supply”. |
| Chapter 3 – Power Supply | Deleted chapter. This information is now included in Chapter 2, “Physical Description and Layout”. |
| Chapter 4 – System Configuration | Renamed to Chapter 3, “System Configuration”.<br>Added new sections: “Screen Blanking Service”, “Identifying BIOS Revision” and “Wavelink Avalanche Enabler (Optional)”.<br>Revised “BIOS Setup” section. |
| Chapter 5 – RF Network Configuration | Renamed to Chapter 4, “Wireless Network Configuration”.<br>Updated “Encryption” section for Cisco radio.<br>Divided chapter into sections by radio type, Cisco and Symbol, plus a separate section for certificates. |
| Chapter 6 – Troubleshooting | Renamed to Chapter 5, “Troubleshooting”. |

### Revision F: October 2007

| Section | Explanation |
|---|---|
| Notices | Updated copyrights and trademarks. |
| Chapter 2 – Physical Description and Layout | Revised “Vehicle 12-80VDC Power Connection” with updated graphic.<br>Revised “Install the 2.4GHz PCMCIA radio” for Summit. |
| Chapter 3 – System Configuration | Renamed and revised section “Screen Blanking Service” to “Screen Blanking Utility”.<br>Revised “Microsoft Windows License Agreement (First Boot)” and “The VX5 Drivers CD-ROM” for Summit. |
| Chapter 4 – RF Network Configuration | Added section for Summit radio. |

### Revision G: December 2007

| Section | Explanation |
|---|---|
| Chapter 1 – Introduction | Added footnote to “Overview” section. |
| Chapter 3 – System Configuration | Revised “Drive C Directory Structure”.<br>Revised “Wavelink Avalanche Enabler Configuration” for Avalanche Mobility Center. |
| Appendix B – Technical Specifications | Revised “Physical Specifications”. |

# Index

## D



## E



## F



## G



## H

## I



## K



## L



## M



## N

## O



## P



## Q



## R



## S

## T



## U



## V



## W