MC50 with Windows® Mobile 5.0

Integrator Guide

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72E-89351-02

Revision A

April 2015

Revision History

Changes to the original manual are listed below:

Change	Date	Description
-01 Rev A	5/2007	Initial Release.
-02 Rev A	4/2015	Zebra re-branding.

Table of Contents

Introduction

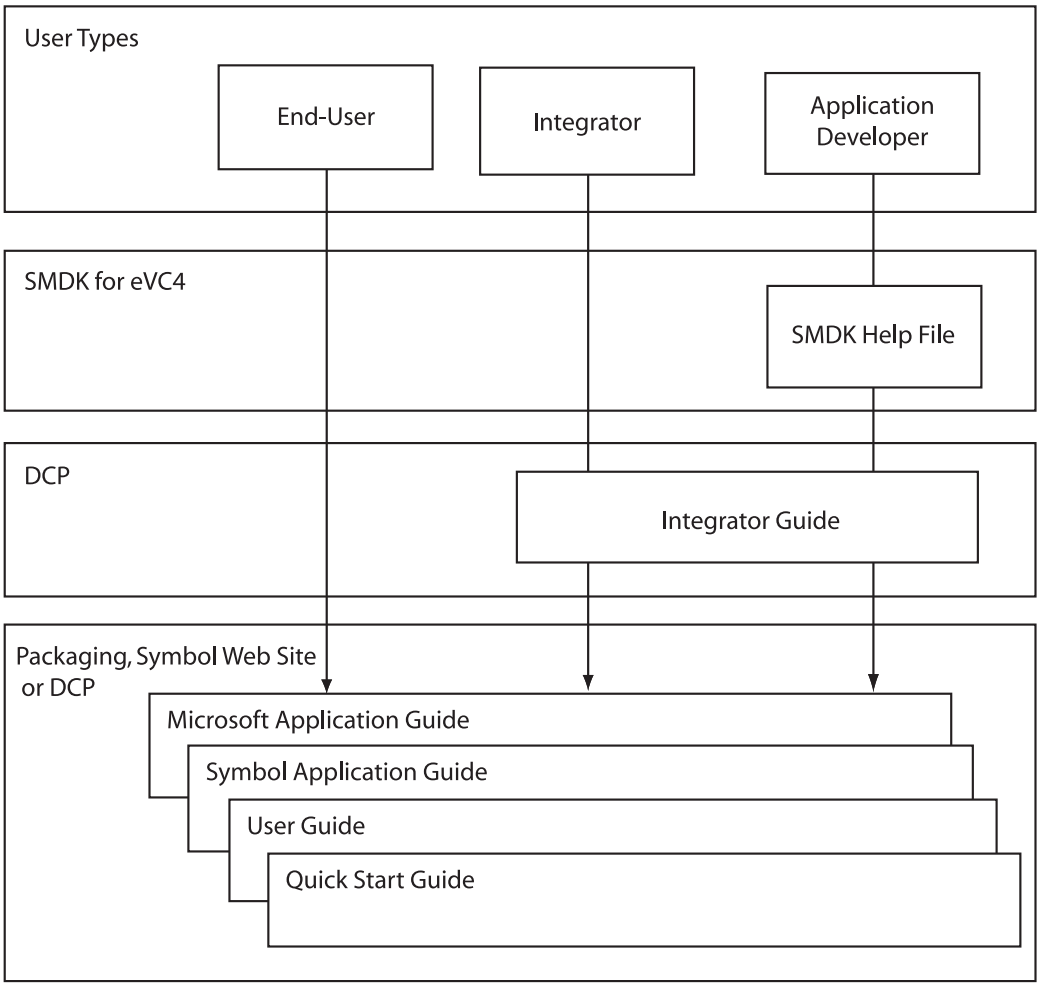
This *Integrator Guide* provides information about setting up and configuring MC50 with Windows Mobile 5.0 mobile computers and accessories.

NOTE Screens and windows pictured in this guide are samples and can differ from actual screens.

Documentation Set

The documentation for the MC50 is divided into guides that provide information for specific user needs.

- **Microsoft® Applications User Guide** - describes how to use Microsoft-developed applications.
- **Application Guide** - describes how to use Zebra-developed applications.
- **MC50 User Guide** - describes how to use the MC50 mobile computer.
- **MC50 Integrator Guide** - describes how to set up MC50 product accessories and how to install software.
- **API Help File** - provides API information for writing applications for the MC50.



Configurations

Depending on device configuration, the MC50 includes the following features:

- **Operating System:** Microsoft Windows Mobile 5.0
- **Memory Configuration:** 64 MB ROM/64 MB RAM
- **Display:** 3.5” QVGA transflective color touchscreen
- **Keypads:** Navigation (PDA-style) or QWERTY
- **Data Capture:** 1-dimensional bar code scanning via linear CMOS, 1-dimensional and 2-dimensional bar code imaging, or image capture via camera
- **Radio:** 802.11b wireless LAN (WLAN).

Software Versions

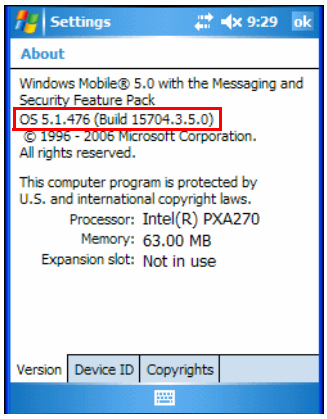
This guide covers various software configurations and references are made to operating system or software versions for:

- Adaptation Kit Update (AKU) version
- Fusion version.

AKU Version

To determine the Adaptation Kit Update (AKU) version:

Tap **Start** > **Settings** > **System** tab > **About** icon > **Version** tab.

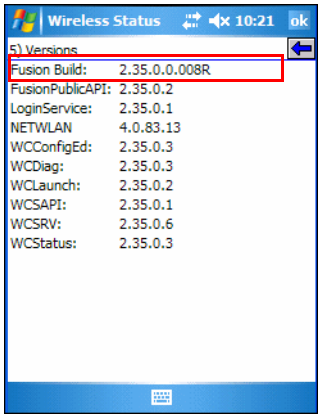


This tab lists the operating system version and the build number. The last part of the build number represents the AKU number. For example, *Build 15704.3.5.0* indicates that the device is running AKU version *3.5.0*.

Fusion Software

To determine the Fusion software version:

Tap **Wireless Strength** icon > **Wireless Status** > **Versions**.



Chapter Descriptions

Topics covered in this guide are as follows:

- Chapter 1, Getting Started describes the accessories available for the mobile computer and how to set up power connections and battery charging capabilities, where applicable.
- Chapter 2, Accessories describes the accessories available for the MC50 and how to set up power connections and battery charging capabilities, where applicable.
- Chapter 3, ActiveSync provides instructions on installing ActiveSync and setting up a partnership between the mobile computer and a host computer.
- Chapter 4, Application Deployment describes new features in Windows Mobile 5.0 including new security features, how to package applications, and procedures for deploying applications onto the mobile computer.
- Chapter 5, Wireless Applications describes how to configure the wireless connection.
- Chapter 6, Maintenance & Troubleshooting, includes instructions on cleaning and storing the mobile computer, and provides troubleshooting solutions for potential problems during mobile computer operation.
- Appendix A, Technical Specifications includes a table listing the technical specifications for the mobile computer.
- Appendix B, Keypad Maps contains keypad maps for keypad configurations.

Notational Conventions

The following conventions are used in this document:

- “Mobile computer” refers to any Zebra hand-held computer.
- *Italics* are used to highlight chapters and sections in this and related documents
- **Bold** text is used to highlight the following:
  - dialog box, window and screen names
  - drop-down list and list box names
  - check box and radio button names
  - icons on a screen.
  - key names on a keypad
  - button names on a screen.
- Bullets (•) indicate:
  - action items
  - lists of alternatives
  - lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

NOTE This symbol indicates something of special interest or importance to the reader. Failure to read the note will not result in physical harm to the reader, equipment or data.

CAUTION This symbol indicates that if this information is ignored, the possiblity of data or material damage may occur.

WARNING! **This symbol indicates that if this information is ignored the possibility that serious personal injury may occur.**

Related Documents and Software

The following documents provide more information about the MC50 mobile computers.

- *MC50 Quick Start Poster*, p/n 72-67793-xx
- *MC50 Regulatory Guide*, p/n 72-67863-xx
- *MC50 User Guide*, p/n 72E-68195-xx
- *Microsoft® Applications User Guide*, p/n 72-68197-xx
- *Application Guide*, p/n 72-65258-xx
- *Symbol Mobility Developer Kits (SMDKs),* available at:http://www.zebra.com/support.
- ActiveSync software, available at: http://www.microsoft.com.

For the latest version of this guide and all guides, go to: http://www.zebra.com/support.

Service Information

If you have a problem with your equipment, contact Zebra Support for your region. Contact information is available at: http://www.zebra.com/support. If you purchased your business product from a Zebra business partner, contact that business partner for support.

Before contacting, have the model number and serial number at hand. If your problem cannot be solved by Zebra Support, you may need to return your equipment for servicing and will be given specific directions.

Zebra is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

Chapter 1

Getting Started

Introduction

This chapter provides information about the mobile computer, accessories, charging the mobile computer, and resetting the mobile computer.

Unpacking the Mobile Computer

Carefully remove all protective material from around the mobile computer and save the shipping container for later storage and shipping. Verify that the equipment listed below is included:

- mobile computer
- stylus, in the stylus silo
- hand strap
- soft case
- Regulatory Guide
- *Quick Start Guide* (poster).

Depending on the configuration ordered, the mobile computer package can also include:

- standard or extra capacity battery
- AC adaptor
- communication/charging cable
- power supply
- US line cord
- headset
- desktop cradle.

Inspect the equipment. If any equipment is missing or damaged, contact the Zebra Global Customer Interaction Center immediately. See *Service Information on page xv* for contact information.

Accessories

The following accessories are available:

Table 1-1 *MC50 Accessories*

Accessory	Description
Single Slot USB Cradle	Charges the mobile computer main battery and a spare battery, and synchronizes the mobile computer with a host computer through a USB connection.
Four Slot USB Cradle	Charges up to four mobile computers, and synchronizes the mobile computer with a host computer through a USB connection.
Four Slot Ethernet Cradle	Charges up to four mobile computers, synchronizes the mobile computer with a host computer through an Ethernet connection, and networks the mobile computer via an Ethernet hub.
Four Slot Spare Battery Charger	Charges up to four mobile computer spare batteries.
Magnetic Stripe Reader (MSR)	Snaps on to the mobile computer and adds magstripe reading capabilities.
Rigid Carrying Case	Provides added protection for the mobile computer.
Headset	For audio playback in noisy environments.
Cable Adapter Module (CAM)	Snap-on required to connect the following cables to the mobile computer:
AC line cord (country-specific) and power supply	Used with the CAM to charge the mobile computer.
Auto charge cable	Used with the CAM to charge the mobile computer using a vehicle's power port.
USB cable	Used with the CAM to add USB communication capabilities.
Universal Battery Charger Adapter	Adapts the UBC for use with MC50 batteries.
Software	*Symbol Mobility Developer Kits (SMDKs),* available at: http://developer.zebra.com.

MC50 Sample Applications

To download Mobile 5.0 sample applications that assist in application development, visit http://www.zebra.com/support.

Copy the sample applications CAB file to the MC50's **Temp** directory, and tap the file to install. To access the sample applications, tap **Start** > **Programs** > **Samples** icon. Refer to the *Application Guide*, p/n 72-65258-xx for information on using the applications.

Getting Started

Before using the mobile computer for the first time:

- install the main battery
- charge the main battery and backup battery
- start the mobile computer
- configure the mobile computer.

Charge the main battery before or after it is installed. Use one of the spare battery chargers to charge the main battery (out of the mobile computer), or one of the cradles to charge the main battery installed in the mobile computer.

Installing and Removing the Main Battery

Installing the Main Battery

Before using the mobile computer, install the battery:

1. If the Battery Lock Switch is not unlocked, use the stylus to slide the switch to the left to unlock it. A red dot appears on the switch.
2. Insert the main battery into the back of the mobile computer as show in *Figure 1-1*.
3. Press the battery down into the battery compartment until the battery release slides into place.

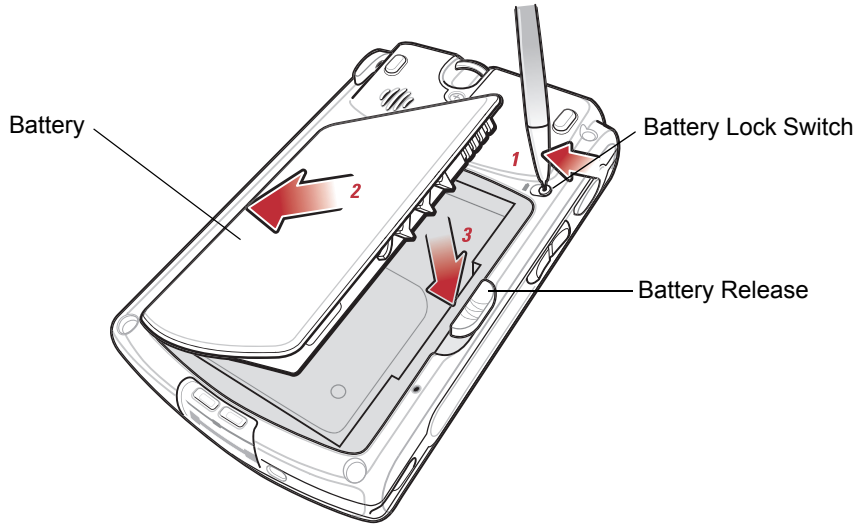


Figure 1-1 *Inserting the Battery*

NOTE Ensure the battery is positioned correctly, placing the battery charging contacts on top of the charging contacts in the battery compartment.

4. Using the stylus, slide the Battery Lock Switch to the right to lock it.

Removing the Main Battery

To remove the main battery:

1. Press the power button to suspend the mobile computer.
2. Using the stylus, slide the Battery Lock Switch to the left to unlock it. A red dot appears on the switch.
3. Slide the battery release down, and pull the battery up and out of the mobile computer.

Charging the Battery

Charging the Main Battery and Memory Backup Battery

Before using the mobile computer for the first time, charge the main battery until the amber charge status LED remains lit (see *Table 1-2 on page 1-5* for charge status indications). To charge the mobile computer, use a cradle or the CAM with a charging cable.

The mobile computer is equipped with a memory backup battery which automatically charges from the fully-charged main battery. When using the mobile computer for the first time, the backup battery requires approximately 24 hours to fully charge. This is also true any time the backup battery is discharged, which occurs when the main battery is removed for several hours. The backup battery retains data in memory for at least 30 minutes when the mobile computer's main battery is removed. When the mobile computer reaches a very low battery state, the combination of main battery and backup battery retains data in memory for at least 72 hours.

NOTE Do not remove the main battery within the first 15 hours of use. If the main battery is removed before the backup battery is fully charged, data can be lost.

Use the following accessories to charge batteries:

- Cradles: The mobile computer and spare batteries slip into a cradle for battery charging. For detailed cradle setup and charging procedures see:
  - *Single Slot USB Cradle on page 2-4*.
  - *Four Slot Ethernet Cradle on page 2-13*
  - *Four Slot Ethernet Cradle on page 2-13*.
- Cable Adapter Module (CAM): The CAM snaps on to the mobile computer to provide charging capability, when used with one of the accessory charging cables. For detailed setup and charging procedures see *Cable Adapter Module on page 2-22*.
- Chargers: The mobile computer’s spare battery charging accessories are used to charge batteries that are removed from the mobile computer. For detailed spare battery charging accessories setup and charging procedures see:
  - *Single Slot USB Cradle on page 2-4*
  - *Four Slot Spare Battery Charger on page 2-18*
  - *Universal Battery Charger (UBC) Adapter on page 2-25*.

To charge the main battery in the mobile computer using a cradle or the CAM with a charging cable:

1. Ensure the accessory used to charge the main battery is connected to the appropriate power source (see *Chapter 2, Accessories* for setup information).
2. Insert the mobile computer into a cradle or attach the CAM.
3. The mobile computer begins charging. The Charge LED is amber while charging, then turns green when fully charged.

The standard battery fully charges in approximately 3.5 hours and the extended capacity battery fully charges in approximately seven hours.

Table 1-2 *Mobile Computer LED Charge Indicators*

LED	Indication
Green	Main battery is fully charged.
Amber	Charging main battery.
Flashing Amber	Error in charging; check cable connections.

Calibrating the Battery

The MC50 battery requires periodic calibration to maintain an accurate calibration of the battery's gas gauge. To calibrate the battery, deplete the battery completely from a full charge condition. Zebra recommends performing this once a week.

Charging Spare Batteries

Use one of the following accessories to charge spare batteries:

- Single Slot USB Cradle
- Four Slot Spare Battery Charger
- UBC Adapter.

To charge a spare battery:

1. Ensure the accessory used to charge the spare battery is connected to the appropriate power source (see *Chapter 2, Accessories* for setup information).
2. Insert the spare battery into the accessory’s spare battery charging slot with the charging contacts on the battery aligned with the charging pins in the charging slot, and gently press down on the battery to ensure proper contact.

   The battery begins charging. The amber charge LED on the accessory lights to show the charge status. See *Chapter 2, Accessories* for charging indications for the accessory.

In the single slot cradle, the standard battery fully charges in 3.5 hours and the extended capacity battery fully charges in approximately seven hours. Using other accessories, the standard battery fully charges in 2.5 hours and the extended capacity battery fully charges in approximately six hours.

Resetting the Mobile Computer

There are two reset functions, warm boot and cold boot. A warm boot restarts the mobile computer by closing all running programs. A cold boot also restarts the mobile computer, and also resets the clock. Data saved in flash memory or a memory card is not lost.

Perform a warm boot first. If the mobile computer still does not respond, perform a cold boot.

Performing a Warm Boot

Press the reset button on the back of the mobile computer with the stylus.

Performing a Cold Boot

Hold down the **Power** and right **Scan/Action** buttons, then press and release the reset button located below the battery release on the back of the mobile computer. Release the **Power** and right **Scan/Action** buttons.

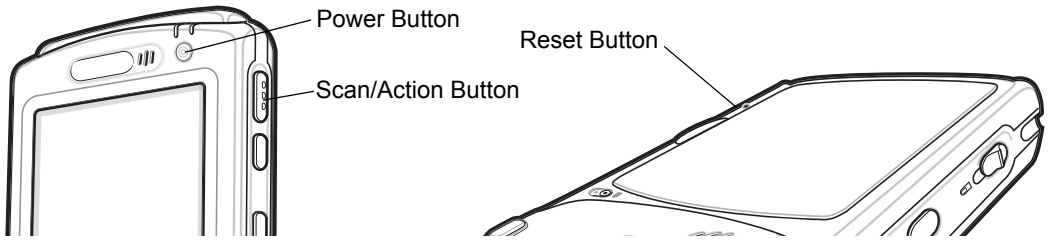


Figure 1-2 *Boot Buttons*

Performing a Clean Boot

CAUTION Only an authorized system administrator should perform a clean boot.

You must connect the mobile computer to AC power during a clean boot. Removing AC power from the mobile computer during a clean boot may render the mobile computer inoperable.

A clean boot resets the mobile computer to the factory default settings. All data in the **Application** folder is retained. To perform a clean boot, download the Clean Boot Package from Support Central. Follow the instructions included in the package to install and run the package on the mobile computer.

Installing the Windows Mobile 5.0 Operating System

To upgrade the Pocket PC 2003 operating system to the Mobile 5.0 operating system:

1. Download the upgrade zip file, available for purchase, to a desktop computer.
2. Cold boot the MC50. See *Performing a Cold Boot on page 1-6*.

3. Tap **Start > Settings > System** tab > **Memory** icon > **Main** tab.

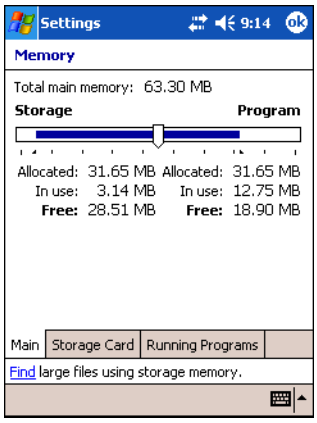


Figure 1-3 *Memory Window - Main Tab*

4. Move the slider to to the left to allocate approximately 40 MB of memory for programs. Ensure the slider does not move back to the right, which can occur if you allocate more than 40 MB for programs.
5. Tap **ok**.
6. Warm boot the MC50. See *Performing a Warm Boot on page 1-6*.
7. Verify that the MC50 maintained the memory allocation set before the warm boot. If not, repeat steps 2 through 4.
8. Extract all files from the zip archive and copy them to an SD card.
9. Insert the SD card into the MC50. See *Multi Media Card (MMC) / Secure Device (SD) Card on page 2-3* for instructions.
10. Place the MC50 into a cradle with AC power applied.
11. Use File Explorer to navigate to the **Storage Card** folder. To open File Explorer, tap **Start > Programs > File Explorer**.
12. Tap the mc50_update.lnk file to initiate the upgrade. The upgrade takes approximately 10 minutes.

CAUTION Do not remove the mobile computer from the cradle or remove power during the upgrade.

Locking the Keypad

Use the Keypad Lock switch to lock the keypad so that keys are not accidently pressed. Note that when locked, the mobile computer does not respond to keypad input.

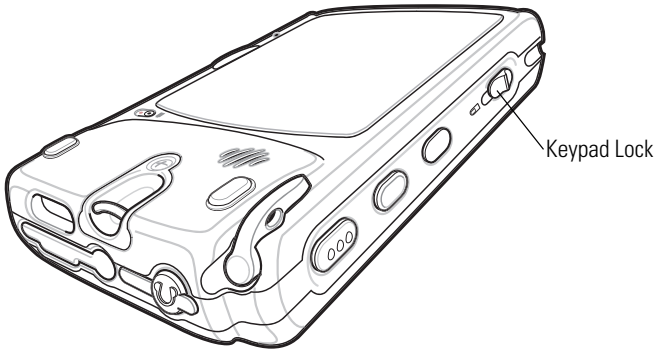


Figure 1-4 *Function Buttons*

Move this switch up to lock the keypad. Move the switch down to free the keypad for use.

Chapter 2

Accessories

Introduction

MC50 accessories provide a variety of product support capabilities. Accessories include cradles, Magnetic Stripe Reader (MSR) and Cable Adapter Module (CAM) snap-ons, four-slot spare battery charger, headset, Multimedia Card (MMC), Secure Device (SD) card, and Universal Battery Charger (UBC) adapter.

Cradles

- Single Slot USB cradle charges the mobile computer main battery and a spare battery. It also synchronizes the mobile computer with a host computer through a USB connection.
- Four Slot USB cradle charges the mobile computer main battery. It also synchronizes the mobile computer with a host computer through a USB connection.
- Four Slot Ethernet cradle charges the mobile computer main battery and connects the mobile computer with an Ethernet network.

Miscellaneous

- Four Slot Spare Battery Charger charges up to four mobile computer spare batteries.
- Headset can be used in noisy environments.
- Multimedia Card or Secure Digital (SD) Card provides secondary non-volatile storage.
- UBC adapter adapts the UBC for use with MC50 batteries.

Snap-on Modules

- MSR snaps on to the mobile computer and adds magstripe read capabilities.
- CAM snaps on to the mobile computer and connects cables to the mobile computer for battery charging and synchronizing the mobile computer with a host computer through a USB connection.

  The CAM uses the cables listed below:
  - AC line cord (country-specific) and power supply, charges the mobile computer.
  - Auto charge cable, charges the mobile computer using a vehicle’s cigarette lighter.
  - USB cable, adds USB communication capabilities.

Headset

Use the headset to communicate via Voice-over-IP (VoIP) or for audio playback. To connect the headset, remove the plug from the headset jack at the top of the mobile computer and insert the headset connector. Contact a Zebra representative for compatible headsets.

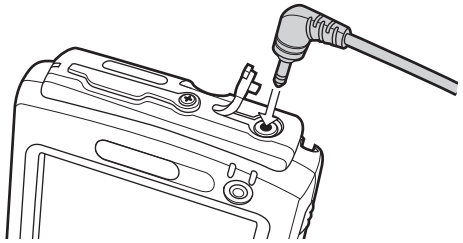


Figure 2-5 *Headset Connection*

Multi Media Card (MMC) / Secure Device (SD) Card

The MMC/SD card slot provides secondary non-volatile storage. The slot is located at the top of the mobile computer (see Figure 2-5).

A variety of third-party cards can be used in the mobile computer for storage, Bluetooth connection, Voice-over-IP, and other functions. Refer to the documentation provided with the card for more information, and follow the manufacturer's recommendations for use.

NOTE SD cards are inter-operable with MMC cards; both can be used in MC50 mobile computers.

CAUTION Follow proper ESD precautions to avoid damaging the MMC/SD. Proper ESD precautions include, but are not limited to, working on an ESD mat and ensuring that the operator is properly grounded.

To insert the MMC/SD:

1. Power off the mobile computer.
2. Remove the card cover at the top of the mobile computer by removing the screw and lifting the cover out of the slot.
3. If a card is already installed, press the card in to release it, then remove it.
4. Insert the new card with the card contacts aligning with the contacts in the MMC/SD housing, until you feel a click.

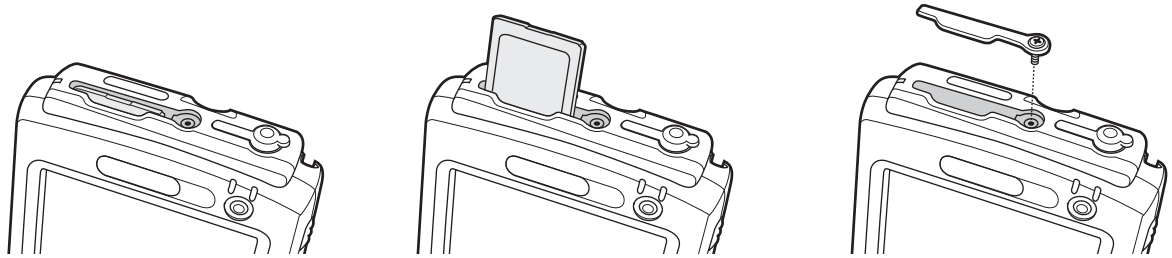


Figure 2-6 *MMC/SD Card Insertion*

5. Replace the housing cover and secure with the screw.

Single Slot USB Cradle

This section describes how to set up and use a Single Slot USB cradle with the mobile computer. For USB communication setup procedures see *Chapter 3, ActiveSync*.

The Single Slot USB Cradle:

- Provides 5.4 VDC power for operating the mobile computer.
- Synchronizes information between the mobile computer and a host computer. (With customized or third party software, it can also synchronize the mobile computer with corporate databases.) See *Chapter 3, ActiveSync* for information on setting up a partnership between the mobile computer and a host computer.
- Charges the mobile computer's battery.
- Charges a spare battery.

NOTE Use only an approved power supply (p/n 50-14000-147) output rated 5.4 Vdc and minimum 3A. The power supply is certified to EN60950 with SELV outputs. Use of alternative power supply will invalidate any approval given to this device and may be dangerous.

HINWEIS Benutzen Sie nur eine genehmigte Stromversorgung (Teilenr. 50-14000-147) mit einer Ausgangsleistung von 5.4 V (Gleichstrom) und mindestens 3A. Die Stromversorgung ist nach EN60950 für die Verwendung in SELV-Stromkreisen zertifiziert. Bei Verwendung eines anderen Netzteils werden alle für das Gerät gewährten Genehmigungen außer Kraft gesetzt, und der Betrieb kann gefährlich sein.

Setup

NOTE The cradle requires a dedicated port on the host.

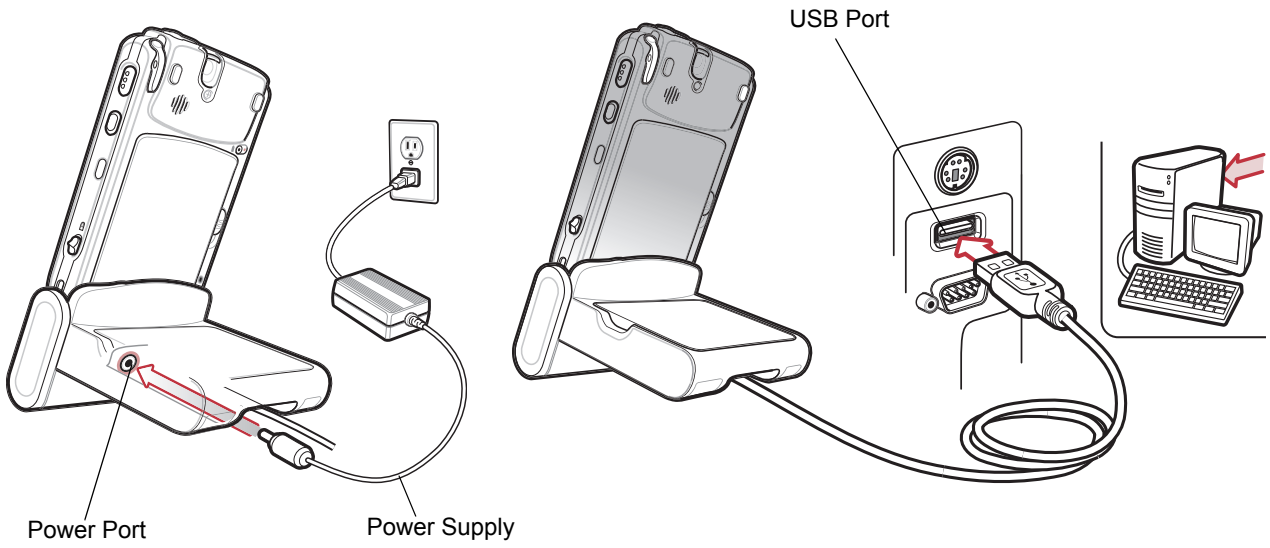


Figure 2-7 *Single Slot Cradle Power and USB Connections*

Charging the Mobile Computer Battery

Connect the cradle to power, or to the host computer using the USB connection.

Insert the mobile computer into the mobile computer slot to begin charging.

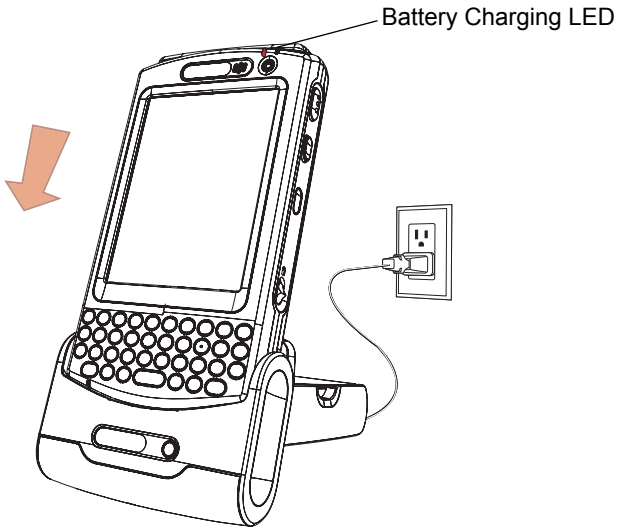


Figure 2-8 *Mobile Computer Battery Charging*

Charging the Spare Battery

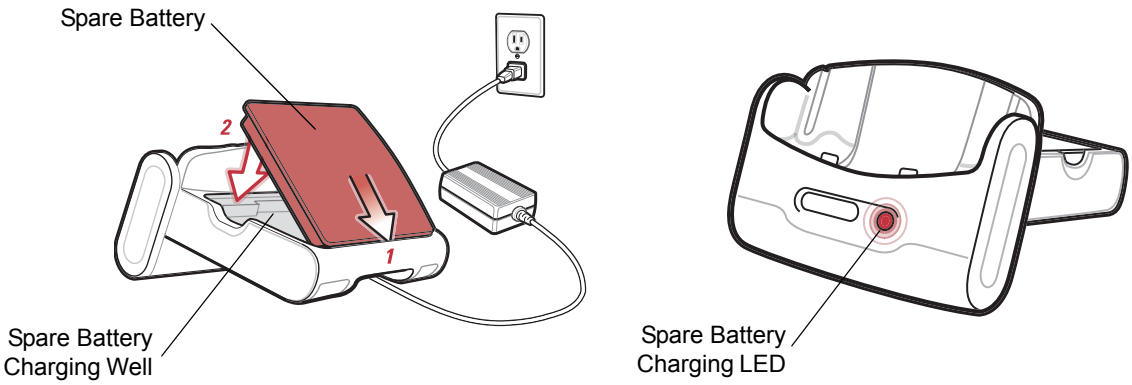


Figure 2-9 *Spare Battery Charging*

Battery Charging Indicators

The Single Slot USB Cradle charges the mobile computer's main battery and a spare battery simultaneously.

The mobile computer's charge LED indicates the status of the battery charging in the mobile computer. See *Table 1-2 on page 1-5* for charging status indications.

The spare battery charging LED on the cradle indicates the status of the spare battery charging in the cradle. See *Table 2-3 on page 2-6* for charging status indications.

The standard battery fully charges in approximately 3.5 hours and the extended capacity battery fully charges in approximately seven hours.

Table 2-3 *Spare Battery LED Charging Indicators*

Spare Battery LED (on cradle)	Indication
Off	No spare battery in slot; spare battery not placed correctly; cradle is not powered.
Solid Amber	Spare battery is charging.
Flashing Amber	Error in charging; check placement of spare battery.
Solid Green	Spare battery is fully charged.

Four Slot USB Cradle

This section describes how to set up and use a Four Slot USB cradle with the mobile computer. For cradle communication setup procedures see, *Chapter 3, ActiveSync*.

The Four Slot USB cradle:

- Provides 12 VDC power for operating the mobile computer.
- Enables data communication between the mobile computer (up to four) and a host computer, using a USB connection.
- Synchronizes information between the mobile computer and a host computer. (With customized or third party software, it can also synchronize the mobile computer with corporate databases.)
- Simultaneously charges up to four batteries in the mobile computer.

NOTE Use only an approved power supply (p/n 50-14000-148) output rated 12 Vdc and minimum 3.33A. The power supply is certified to EN60950 with SELV outputs. Use of alternative power supply will invalidate any approval given to this device and may be dangerous.

HINWEIS Benutzen Sie nur eine genehmigte Stromversorgung (Teilenr. 50-14000-148) mit einer Ausgangsleistung von 12 V (Gleichstrom) und mindestens 3.33A. Die Stromversorgung ist nach EN60950 für die Verwendung in SELV-Stromkreisen zertifiziert. Bei Verwendung eines anderen Netzteils werden alle für das Gerät gewährten Genehmigungen außer Kraft gesetzt, und der Betrieb kann gefährlich sein.

Setup

Connect the USB cradle to a power source and to a USB port on the host device.

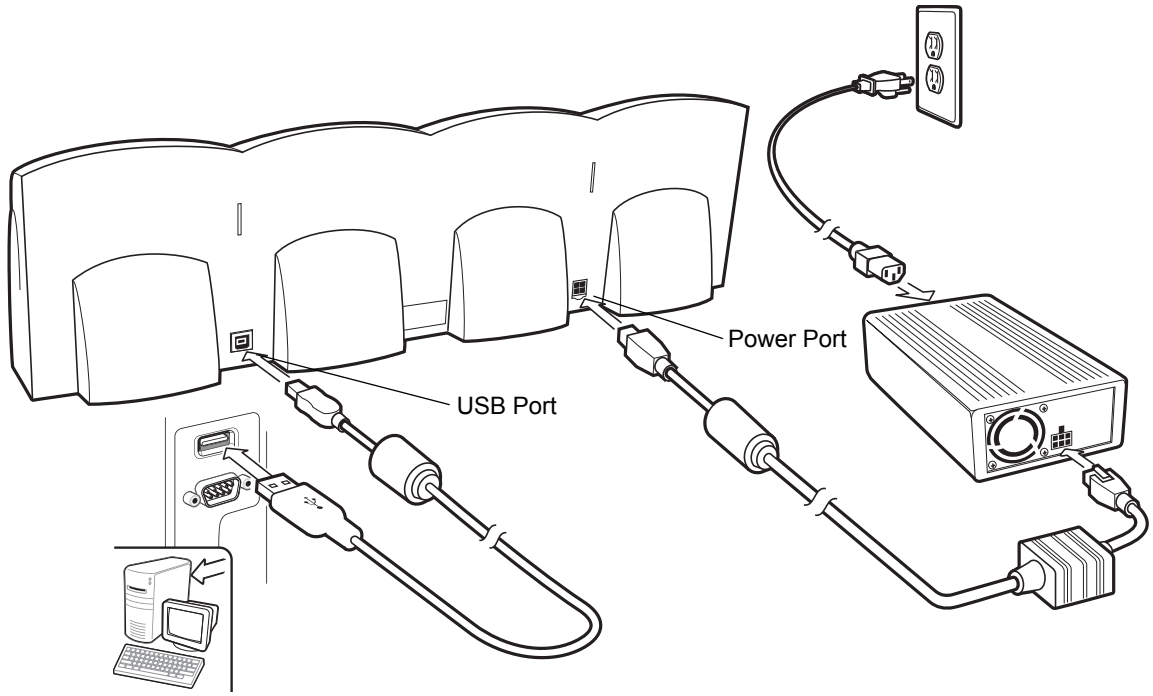


Figure 2-10 *Four Slot USB Cradle Connection*

UConnect

UConnect software enables automatic synchronization of every mobile computer inserted in the Four-Slot USB cradle.

Installing UConnect

Install UConnect in one of two ways:

- Download individual UConnect files to the Application partition of the mobile computer.
- Copy a .CAB file to the mobile computer and launch the file.

To install UConnect via downloading individual files:

1. Download the UConnect files from http://www.zebra.com/support to the host computer.
   a. On http://www.zebra.com/support, select **Software Downloads**.
   b. Select **Mobile Computers**.
   c. Select **MC50**.
   d. Select **Four-Slot USB Cradle Drivers for MC50w vx.x**, then download the .zip file to the development computer.
2. Unzip the file. Copy the files to the Application partition of the mobile computer.

3. Perform a hard reset.

The Connect.reg file contains information on customizing UConnect's startup settings.

To install UConnect via the .CAB file:

1. Download the UConnect .CAB file from http://www.zebra.com/support, to the host computer.
2. Copy the file from the host computer to the mobile computer.
3. On the mobile computer, navigate to the .CAB file and double-tap the file.
4. Follow the screen prompts to install.

With this method, the .CAB file does not install the .cpy and .reg files.

Once installed, UConnect launches automatically upon mobile computer startup. Each mobile computer must first form an ActiveSync partnership with a host computer for UConnect to successfully manage synchronization.

Configuring UConnect

To customize default settings for UConnect, create a .reg file that overrides UConnect's initial default settings. Refer to UConnect.reg, included with UConnect, for information on setting custom hard reset and default settings.

To customize UConnect temporarily (until the next hard reset):

1. Tap  in the mobile computer's command bar to display the **SysTray** menu.

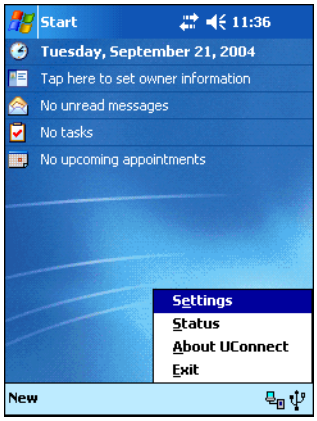


Figure 2-11 *UConnect SysTray Menu*

2. Tap **Settings**.

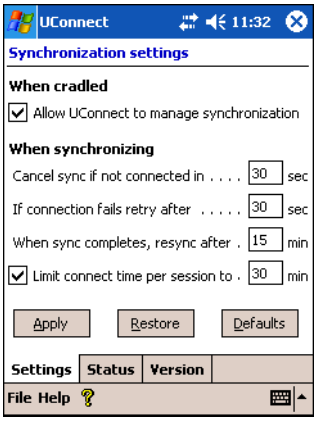


Figure 2-12 *UConnect Settings Window*

3. Select the **Allow UConnect to manage synchronization** check box to allow UConnect to control docking events and schedule synchronization sessions. UConnect launches ActiveSync when a mobile computer is inserted in the cradle to synchronize the mobile computer and the host computer. If another inserted mobile computer is synchronizing, UConnect reschedules synchronization based on the connection retry interval setting.

   Deselect this check box to restore control of cradle events to ActiveSync. This may be necessary when temporarily connecting to a non-partnered host computer as a guest.

4. In the **Cancel sync if not connected in** text box, enter the maximum time in seconds (between 5 and 120), that UConnect waits for a connection to occur when starting a synchronization session. If UConnect cannot connect to the host computer within this time, it cancels the session and reschedules based on the connection retry interval setting. The default value is 15 seconds.

5. In the **If connection fails retry after** text box, enter the number of seconds (between 30 and 9999) that UConnect waits before attempting another synchronization after a failed or lost connection. The default value is 30 seconds.

6. In the **When sync completes, resync after** text box, enter the number of minutes (between 10 and 999) that UConnect waits after successful synchronization before scheduling another session. The default value is 15 minutes.

7. Select the **Limit connect time per session to** check box to specify the maximum number of minutes that UConnect waits for a synchronization session to complete successfully. Then enter the number of minutes (between 10 and 999) in the text box. The default value is enabled, 30 minutes.

   If UConnect does not receive a synchronization complete notification from ActiveSync within this time, UConnect disconnects from the host computer to allow recovery in instances where ActiveSync on the host computer or mobile computer cannot complete synchronization.

8. Tap **Apply** to apply UConnect setting changes.

   Tap **Restore** to discard UConnect setting changes and return to the previous settings.

   Tap **Defaults** to restore the default settings. Then tap **Apply** to apply the default settings.

Manually Synchronizing

To synchronize a mobile computer immediately without waiting for a scheduled synchronization, tap **File > Sync Now**. Note that this option is not active if the mobile computer is not in the cradle, or if synchronization is already in progress.

Closing UConnect

To hide the UConnect user interface without exiting UConnect, tap .

To exit UConnect and transfer control of docking events and synchronization to ActiveSync, tap **File** > **Exit**.

UConnect Status

To view the status of UConnect events, tap > **Status**. The **Status** window displays the following information.

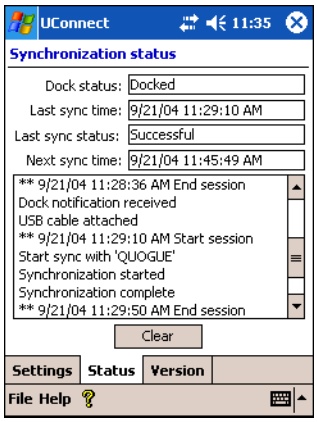


Figure 2-13 *UConnect Status Window*

- The **Dock status:** field indicates the current docked status of the mobile computer.
- The **Last sync time:** field indicates the date and time the last synchronization session started. If UConnect has not performed synchronization, **None** appears. Use this field to determine if successful synchronization occurred since the last time the mobile computer was docked.
- The **Last sync status:** field indicates the status of the most recent or currently active synchronization session. Possible values are:
  - **Successful:** The last synchronization session completed successfully.
  - **Waiting for connection:** Synchronization started and UConnect is waiting for the connection with the host to complete.
  - **In progress:** Synchronization started and UConnect is waiting for a synchronization complete notification from ActiveSync.
  - **Failed: Cable detached:** Synchronization failed because the mobile computer is not inserted or the USB cable is detached.
  - **Failed: No connection:** UConnect could not establish a connection to the host computer.
  - **Failed: Connection lost:** Connection to the host was lost before synchronization completed.
  - **Failed: Connect time exceeded:** Synchronization did not complete within the maximum time allowed per session.

  - **Failed: No reason:** Synchronization failed for an unknown reason.
- The **Next sync time:** field indicates the date and time of the next scheduled synchronization session. If UConnect is disabled, the mobile computer is not inserted, or a session is in progress, **N/A** appears.
- The synchronization history field displays information about docking events and synchronization session status. This field can list up to 100 lines of synchronization history, and can be used to view the status of previous synchronization sessions.
- Tap **Clear** to erase the contents of the synchronization history list box.

Charging

Insert the mobile computer into a slot to begin charging.

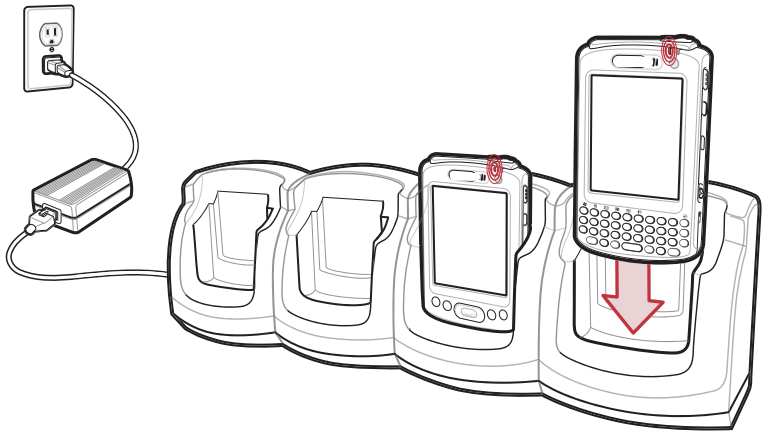


Figure 2-14 *Mobile Computer Battery Charging*

Battery Charging Indicators

The mobile computer's charge LED shows the status of the battery charging in the mobile computer. See *Table 1-2 on page 1-5* for charging status indications.

The standard battery fully charges in approximately 3.5 hours and the extended capacity battery fully charges in approximately seven hours.

Four Slot Ethernet Cradle

This section describes how to set up and use a Four Slot Ethernet cradle with the mobile computer. For cradle communication setup procedures see, *Chapter 3, ActiveSync*.

The Four Slot Ethernet cradle:

- Provides 12 VDC power for operating the mobile computer.
- Enables data communication between the mobile computer (up to four) and a host computer, using an Ethernet connection.
- Synchronizes information between the mobile computer and a host computer.
- Connects the mobile computer (up to four) to an Ethernet network.
- Simultaneously charges up to four batteries in the mobile computer.

NOTE Use only an approved power supply (p/n 50-14000-148) output rated 12 Vdc and minimum 3.33A. The power supply is certified to EN60950 with SELV outputs. Use of alternative power supply will invalidate any approval given to this device and may be dangerous.

HINWEIS Benutzen Sie nur eine genehmigte Stromversorgung (Teilenr. 50-14000-148) mit einer Ausgangsleistung von 12 V (Gleichstrom) und mindestens 3.33A. Die Stromversorgung ist nach EN60950 für die Verwendung in SELV-Stromkreisen zertifiziert. Bei Verwendung eines anderen Netzteils werden alle für das Gerät gewährten Genehmigungen außer Kraft gesetzt, und der Betrieb kann gefährlich sein.

Setup

Connect the Ethernet cradle to a power source and to an Ethernet hub or a port on the host device.

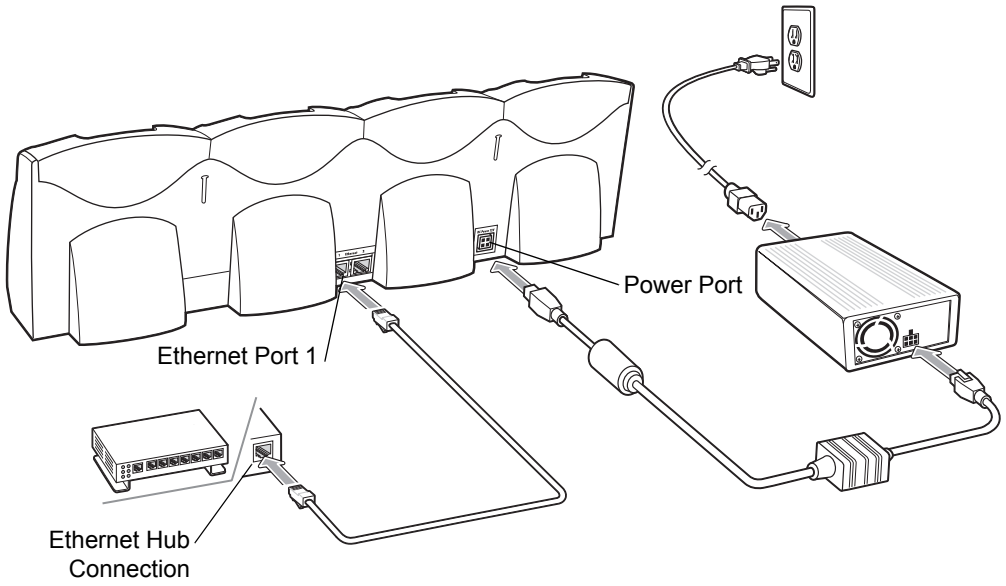


Figure 2-15 *Four Slot Ethernet Cradle Connection*

Daisychaining Cradles

Daisychain up to four Ethernet cradles to connect several cradles to an Ethernet network.

To daisychain more than one cradle:

1. Connect power to each cradle to daisychain, as shown in *Setup on page 2-13*.
2. Connect an Ethernet cable to Port 1 of the first cradle as shown in *Setup on page 2-13*.
3. Connect a second Ethernet cable between Port 2 of the first cradle, and Port 1 of the second.
4. Connect up to two more cradles as described in Step 3.

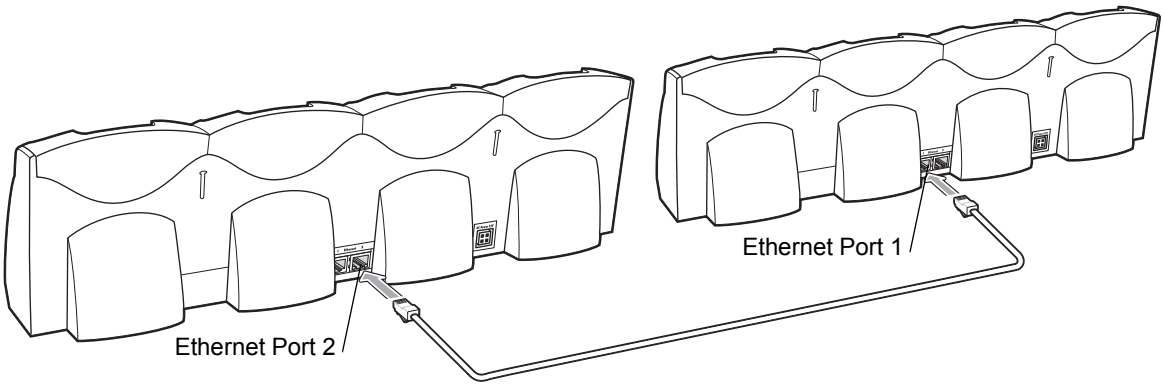


Figure 2-16 *Daisychaining Four Slot Ethernet Cradles*

Bandwidth Considerations when Daisychaining

Each cradle added to the daisychain impacts the bandwidth provided to the inserted mobile computers, particularly when the mobile computers attempt to send and receive at data rates that exceed the bandwidth provided to the chain (typically 100 Mbps). If a mobile computer in a daisychained cradle does not use its bandwidth, that bandwidth is allocated to other inserted mobile computers.

Table 2-4 shows available bandwidth, based on 100 Mpbs, for the maximum number of daisychained cradles, with each attempting transmission at the maximum data rate.

Table 2-4 *Daisychaining Bandwidth*

Daisychained Cradles	Bandwidth Provided to Cradle (Mbit/sec)	Inserted Mobile Computer's Share of Bandwidth
Cradle 1	100,000,000	20,000,000
Cradle 2	20,000,000	4,000,000
Cradle 3	4,000,000	800,000
Cradle 4	800,000	160,000
Cradle 5	160,000	32,000
Cradle 6	32,000	6,400
Cradle 7	6,400	1,280

Ethernet Cradle Drivers

The MC50 includes Ethernet cradle drivers that initiate automatically when you place the mobile computer in a properly connected Four Slot Ethernet cradle. After inserting the MC50, configure the Ethernet connection:

1. Tap **Start** > **Settings** > **Connections** tab > **Network Cards** icon. The **Configure Network Adapters** window appears.

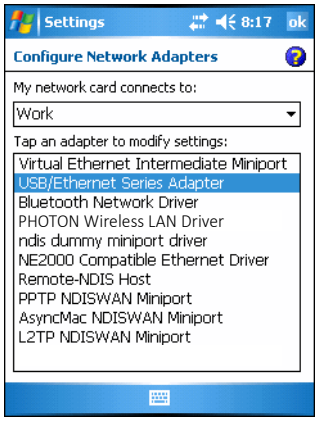


Figure 2-17 *Configure Network Adapters Window*

2. In the **My network card connects to:** drop-down list, select the appropriate connection.
3. In the **Tap an adapter to modify settings:** list, select **USB/Ethernet Series Adapter**.

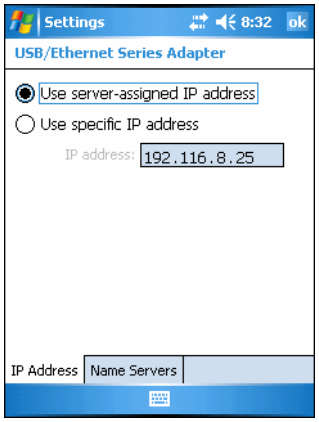


Figure 2-18 *IP Address Tab*

4. In the **IP address** window, select the appropriate radio button:
   - **Use server-assigned IP address**

     or
   - **Use specific IP address**. Enter the IP address, Subnet mask, and Default gateway, as needed.
5. Tap the **Name Servers** tab.

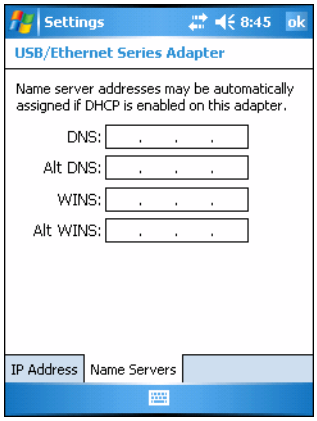


Figure 2-19 *Name Servers Tab*

6. Enter the appropriate DNS, Alt DNS, WINS, and Alt WINS server addresses.
7. Tap **ok**.

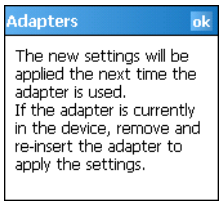


Figure 2-20 *Adapters Dialog Box*

8. Tap **ok** to confirm the setup.
9. Tap **ok** to exit.

Charging

Insert the mobile computer into a slot to begin charging.

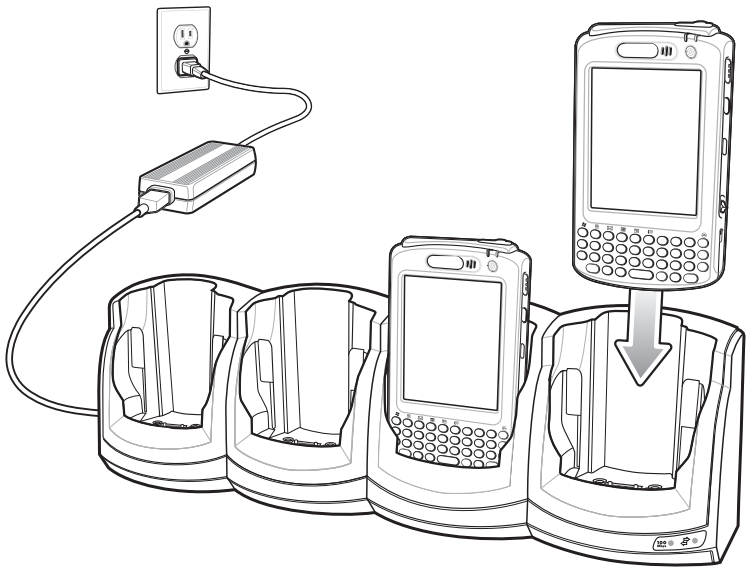


Figure 2-21 *Mobile Computer Battery Charging*

Battery Charging Indicators

The mobile computer's charge LED shows the status of the battery charging in the mobile computer. See *Table 1-2 on page 1-5* for charging status indications.

The standard battery fully charges in approximately 3.5 hours and the extended capacity battery fully charges in approximately seven hours.

Four Slot Spare Battery Charger

This section describes how to set up and use the Four Slot Spare Battery Charger to charge up to four MC50 spare batteries.

NOTE Use only an approved power supply (p/n 50-14000-148) output rated 12 Vdc and minimum 3.33A. The power supply is certified to EN60950 with SELV outputs. Use of alternative power supply will invalidate any approval given to this device and may be dangerous.

HINWEIS Benutzen Sie nur eine genehmigte Stromversorgung (Teilenr. 50-14000-148) mit einer Ausgangsleistung von 12 V (Gleichstrom) und mindestens 3.33A. Die Stromversorgung ist nach EN60950 für die Verwendung in SELV-Stromkreisen zertifiziert. Bei Verwendung eines anderen Netzteils werden alle für das Gerät gewährten Genehmigungen außer Kraft gesetzt, und der Betrieb kann gefährlich sein.

Spare Battery Charging

1. Connect the charger to a power source.
2. Insert the spare battery into a spare battery charging well and gently press down on the battery to ensure proper contact.

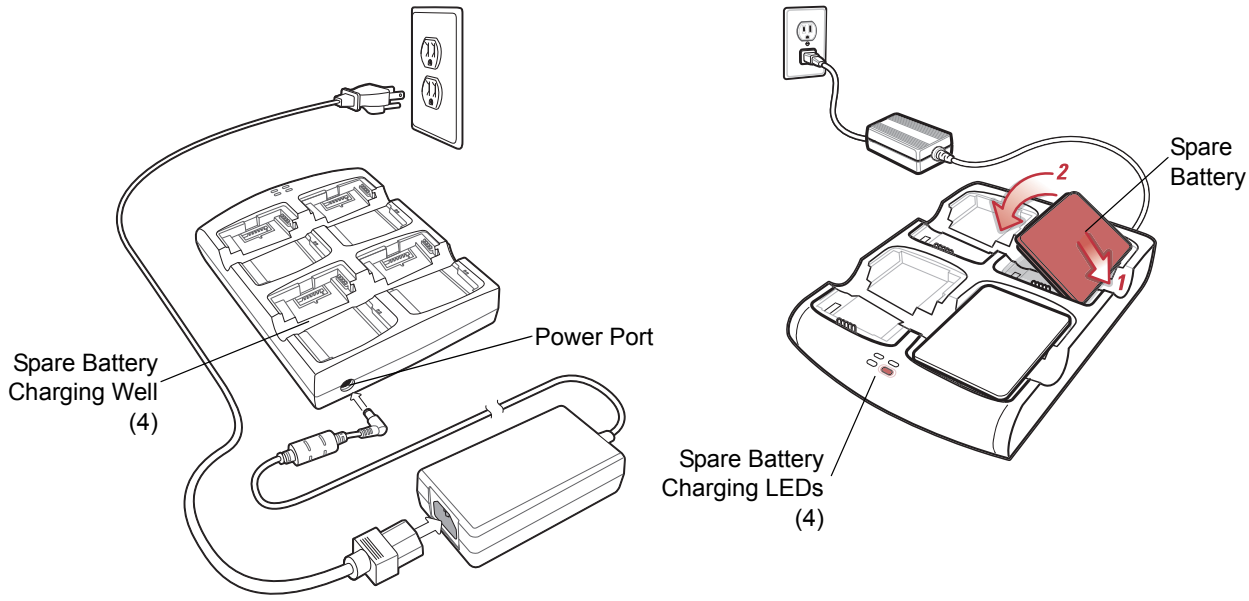


Figure 2-22 *Four Slot Spare Battery Charger*

Battery Charging Indicators

An amber LED is provided for each battery charging well. See *Table 2-5* for charging status indications. The standard battery fully charges in approximately 2.5 hours and the extended capacity battery fully charges in approximately six hours.

Table 2-5 *Spare Battery LED Charging Indicators*

LED	Indication
Off	No spare battery in slot; spare battery not placed correctly; cradle is not powered.
Fast Blinking Amber	Error in charging; check placement of spare battery.
Slow Blinking Amber	Spare battery is charging.
Solid Amber	Charging complete.

Magnetic Stripe Reader (MSR)

This section describes how to set up and use the snap-on MSR with the mobile computer. The MSR snaps on to the bottom of the mobile computer and can be easily removed when not in use.

When attached to the mobile computer, the MSR allows the mobile computer to capture data from magnetic stripe cards. To download MSR data capture software, visit http://www.zebra.com/support.

Attaching and Removing

To attach, slide the MSR onto the bottom of the mobile computer and secure by snapping the arms into the mobile computer housing.

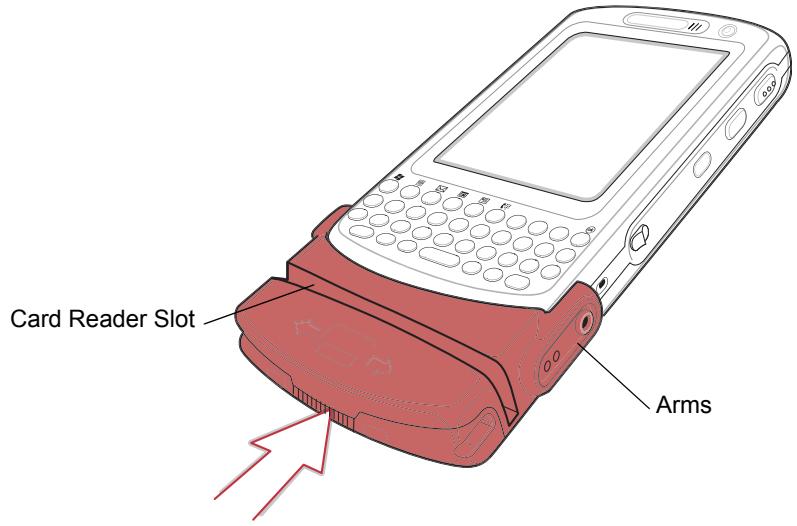


Figure 2-23 *MSR Installation*

To remove the MSR open the arms and pull the MSR from the mobile computer.

Using the MSR

The *MSR3000* sample application illustrates how an application should handle MSR inputs (refer to the *Applications User's Guide*).

To use the MSR:

1. Attach the MSR to the mobile computer.
2. Power on the mobile computer.
3. Tap **Start** > **Programs** > **Samples** icon > **MSR** icon to start the sample application.
4. Swipe the magnetic stripe card through the MSR, with the magnetic stripe on the card facing down. Swipe the card in either direction, from left to right or from right to left. For best results, gently press down on the card while swiping to ensure contact with the bottom of the reader.

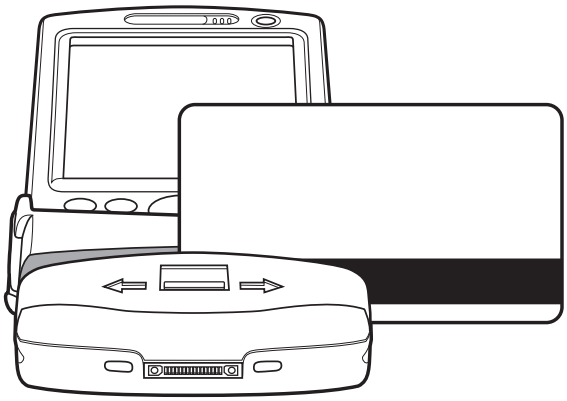


Figure 2-24 *Magnetic Stripe Card Swiping*

Cable Adapter Module

This section describes how to set up and use the snap-on CAM with the mobile computer. The CAM snaps on to the bottom of the mobile computer and can be easily removed when not in use.

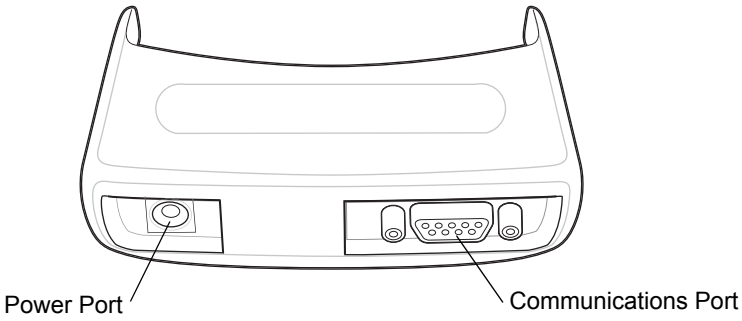


Figure 2-25 *Cable Adapter Module*

When attached to the mobile computer, the CAM:

- Provides power for operating the mobile computer, with the appropriate power connection.
- Provides Ethernet connection through the Ethernet port for communication with an Ethernet device, such as a host computer or Ethernet hub. For communication setup procedures, see *Chapter 3, ActiveSync*.
- Charges the mobile computer's battery, when used with the appropriate power supply.

NOTE Use only an approved power supply (p/n 50-14000-147) output rated 5.4 Vdc and minimum 3A. The power supply is certified to EN60950 with SELV outputs. Use of alternative power supply will invalidate any approval given to this device and may be dangerous.

HINWEIS Benutzen Sie nur eine genehmigte Stromversorgung (Teilenr. 50-14000-147) mit einer Ausgangsleistung von 5.4 V (Gleichstrom) und mindestens 3A. Die Stromversorgung ist nach EN60950 für die Verwendung in SELV-Stromkreisen zertifiziert. Bei Verwendung eines anderen Netzteils werden alle für das Gerät gewährten Genehmigungen außer Kraft gesetzt, und der Betrieb kann gefährlich sein.

Attaching and Removing

To attach, slide the CAM onto the bottom of the mobile computer, until it snaps into place.

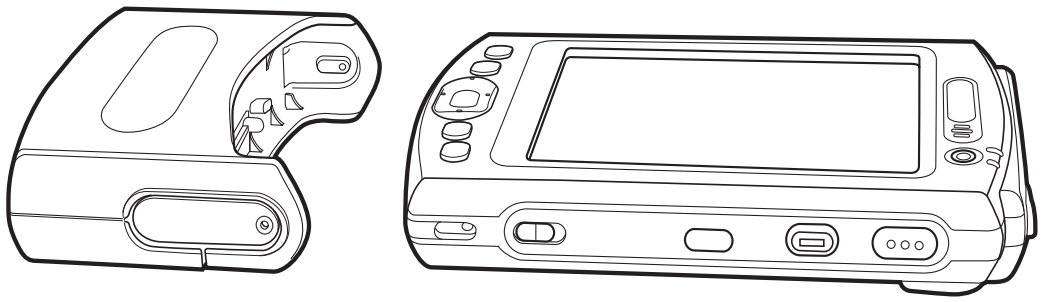


Figure 2-26 *CAM Installation*

To remove the CAM pull the CAM from the mobile computer.

NOTE Remove the CAM from the bottom of the mobile computer before using a cradle for charging and communication.

Battery Charging

To charge the mobile computer's battery through the CAM, attach the CAM to the mobile computer, then connect the power supply to the CAM. The mobile computer begins charging.

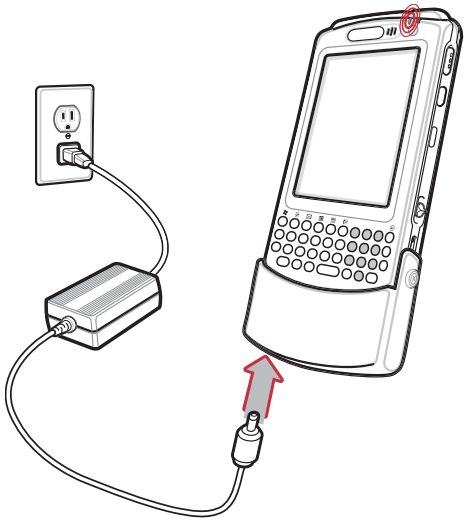


Figure 2-27 *CAM Power Connection*

The mobile computer's charge LED shows the status of the battery charging in the mobile computer. See *Table 1-2 on page 1-5* for charging status indications. The standard battery fully charges in approximately 3.5 hours and the extended capacity battery fully charges in approximately seven hours.

USB Connection

The CAM can connect to and communicate with a USB device, such as a host computer, through its data port. See *Chapter 3, ActiveSync* for the host computer communication setup procedure.

To connect the CAM to a USB device, connect one end of the data cable to the data port on the CAM and the other end to the USB port on the device.

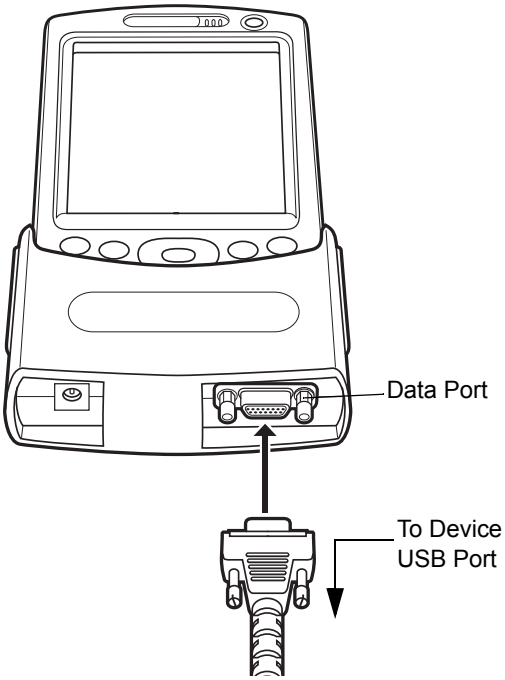


Figure 2-28 *CAM USB Connection*

Universal Battery Charger (UBC) Adapter

This section describes how to use the UBC adapter to charge a spare battery.

Use the UBC with a power supply as a standalone spare battery charger, or with the four station UBC2000 to simultaneously charge up to four spare batteries. For additional information about the UBC2000, see the *UBC 2000 Universal Battery Charger Product Guide* (p/n 70-33188-xx).

✓ ***NOTE*** Use only an approved power supply (p/n 50-14000-147) output rated 5.4 Vdc and minimum 3A. The power supply is certified to EN60950 with SELV outputs. Use of alternative power supply will invalidate any approval given to this device and may be dangerous.

✓ ***HINWEIS*** Benutzen Sie nur eine genehmigte Stromversorgung (Teilenr. 50-14000-147) mit einer Ausgangsleistung von 5.4 V (Gleichstrom) und mindestens 3A. Die Stromversorgung ist nach EN60950 für die Verwendung in SELV-Stromkreisen zertifiziert. Bei Verwendung eines anderen Netzteils werden alle für das Gerät gewährten Genehmigungen außer Kraft gesetzt, und der Betrieb kann gefährlich sein.

Setup

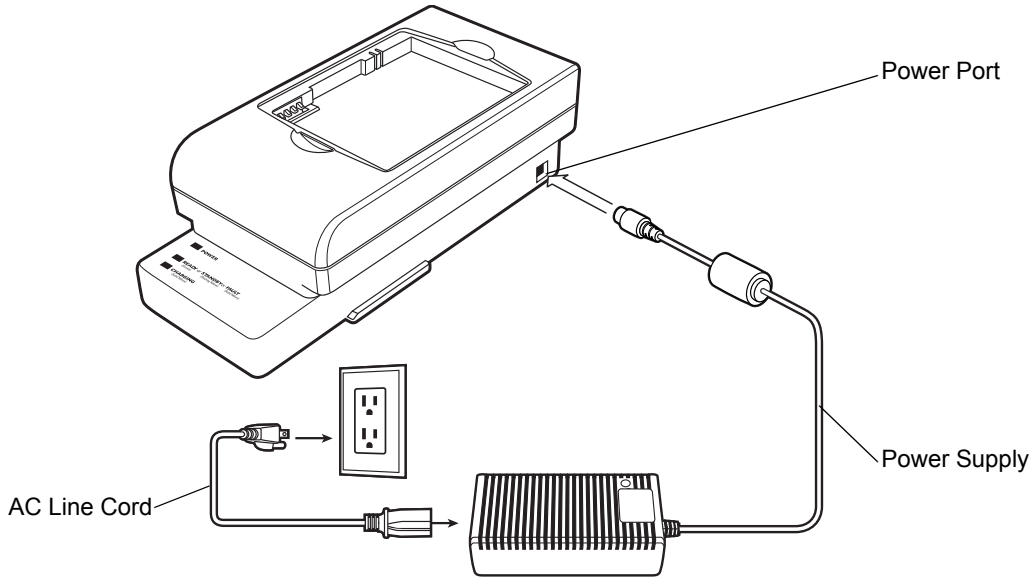


Figure 2-29 *UBC Adapter Power Connection*

Battery Insertion and Removal

Insert the battery into the battery well with the charging contacts on the battery aligning with the charging pins on the adapter, and gently press down on the battery to ensure proper contact.

To remove the battery, press the battery release and lift battery out of the well.

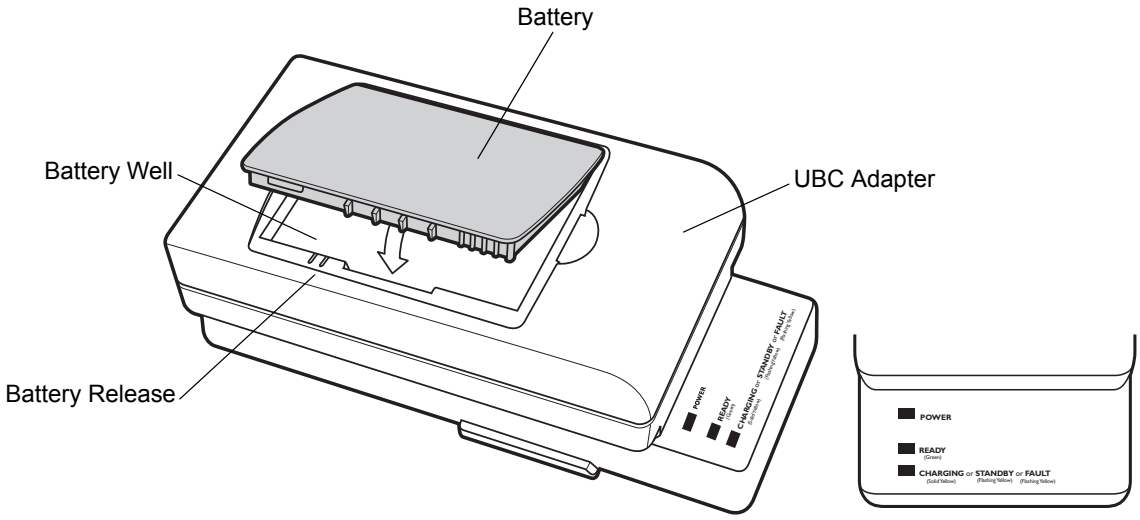


Figure 2-30 *UBC Adapter*

Battery Charging Indicators

To charge a spare battery using the UBC adapter, connect the power supply to the UBC (see *Universal Battery Charger (UBC) Adapter on page 2-25*), then insert the spare battery. The spare battery begins charging.

The UBC's charge LEDs show the status of the battery charging in the adapter. *Table 2-6* shows battery charging status indications. The standard battery fully charges in approximately 2.5 hours and the extended capacity battery fully charges in approximately six hours.

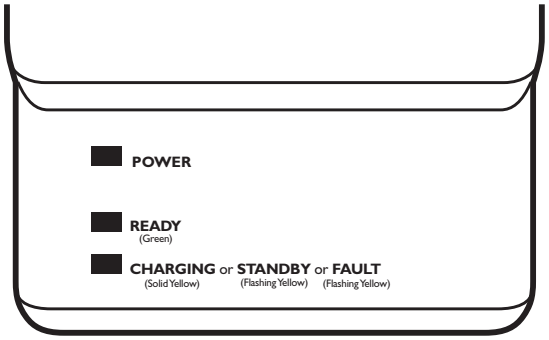


Figure 2-31 *UBC Adapter LEDs*

Table 2-6 *UBC Adapter Charge LED Status Indications*

LED	Indication	Description
POWER	Red	Power is connected to the UBC Adapter.
READY	Green	Charging complete.

Table 2-6 *UBC Adapter Charge LED Status Indications*

LED	Indication	Description
CHARGING or STANDBY or FAULT	Yellow	Normal charge.
	Flashing Yellow	The battery was deeply discharged and is being trickle charged to bring the voltage up to the operating level. After operating level voltage is achieved the battery charges normally.
	Flashing Yellow	Charging error, check placement of mobile computer/spare battery.

Introduction

To communicate with various host devices, install Microsoft ActiveSync (version 4.1 or higher) on the host computer. Use ActiveSync to synchronize information on the mobile computer with information on the host computer. Changes made on the mobile computer or host computer appear in both places after synchronization.

NOTE Making an ActiveSync connection between the mobile computer and a host computer disables the WLAN radio (if applicable). This is a Microsoft security feature to prevent connection to two networks at the same time.

ActiveSync software:

- Allows working with mobile computer-compatible host applications on the host computer. ActiveSync replicates data from the mobile computer so the host application can view, enter, and modify data on the mobile computer.
- Synchronizes files between the mobile computer and host computer, converting the files to the correct format.
- Backs up the data stored on the mobile computer. Synchronization is a one-step procedure that ensures the data is always safe and up-to-date.
- Copies (rather than synchronizes) files between the mobile computer and host computer.
- Controls when synchronization occurs by selecting a synchronization mode, e.g., set to synchronize continually while the mobile computer is connected to the host computer, or set to only synchronize on command.
- Selects the types of information to synchronize and control how much data is synchronized.

Installing ActiveSync

To install ActiveSync on the host computer, download version 4.1 or higher from the Microsoft web site at http://www.microsoft.com. Refer to the installation included with the ActiveSync software.

Mobile Computer Setup

NOTE Microsoft recommends installing ActiveSync on the host computer before connecting the mobile computer.

The mobile computer can be set up to communicate either with a serial connection or a USB connection. *Chapter 2, Accessories* provides the accessory setup and cable connection information for use with the mobile computer. The mobile computer communication settings must be set to match the communication settings used with ActiveSync.

1. On the mobile computer tap **Start** > **Programs** > **ActiveSync** icon. The **ActiveSync** window appears.

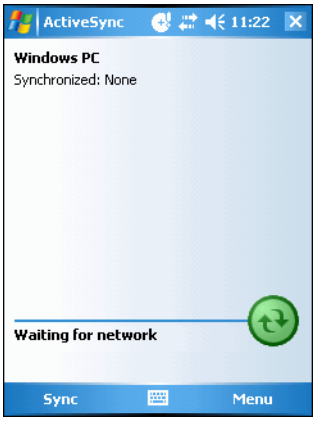


Figure 3-32 *ActiveSync Window*

2. Tap **Menu** > **Connections**.
3. Select the connection type from the drop-down list.
4. Tap **OK** to exit the **Connections** window and tap **OK** to exit the **ActiveSync** window.
5. Proceed with installing ActiveSync on the host computer and setting up a partnership.

Setting Up an ActiveSync Connection on the Host Computer

To start ActiveSync:

1. Select **Start** > **Programs** > **Microsoft ActiveSync** on the host computer. The **ActiveSync** window displays.

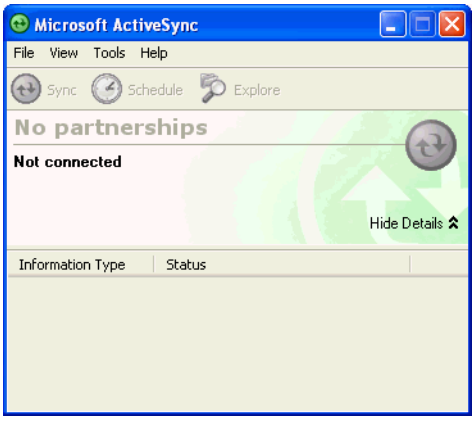


Figure 3-33 *ActiveSync Window*

NOTE Assign each mobile computer a unique device name. Do not try to synchronize more than one mobile computer to the same name.

2. In the **ActiveSync** window, select **File** > **Connection Settings**. The **Connection Settings** window appears.

Figure 3-34 *Connection Settings Window*

3. Select the appropriate check box for the type of connection used.
4. Select the **Show status icon in Taskbar** check box.
5. Select **OK** to save any changes made.

Synchronization with a Windows Mobile 5.0 Device

NOTE Making an ActiveSync connection between the mobile computer and a host computer disables the WLAN radio (if applicable). This is a Microsoft security feature to prevent connection to two networks at the same time

To synchronize with a Windows Mobile 5.0 device:

1. If the **Get Connected** window does not appear on the host computer, select **Start** > **All Programs** > **Microsoft ActiveSync**.

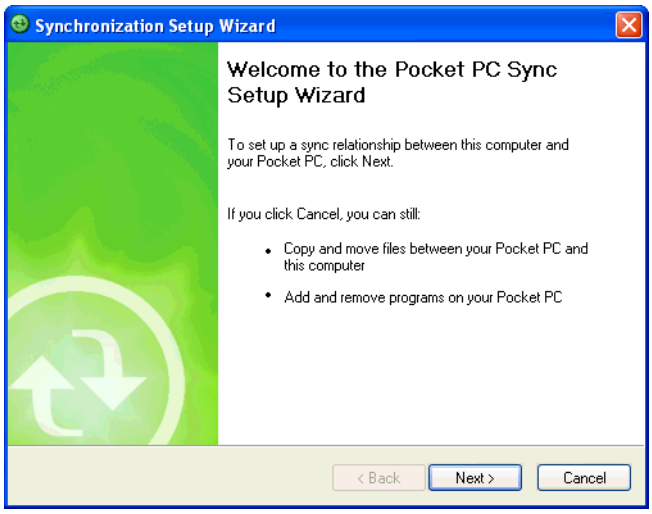


Figure 3-35 *Synchronization Setup Wizard Window*

2. Click **Next**.

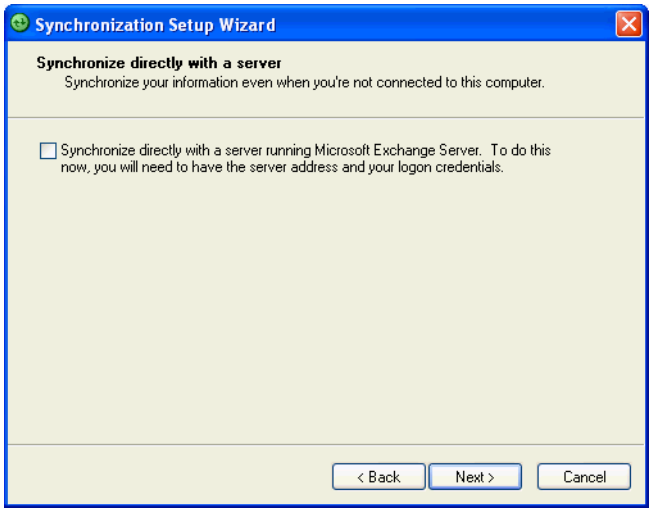


Figure 3-36 *Synchronization Directly With a Server Window*

3. Select the check box to synchronize with a server running Microsoft Exchange.

4. Click **Next**.

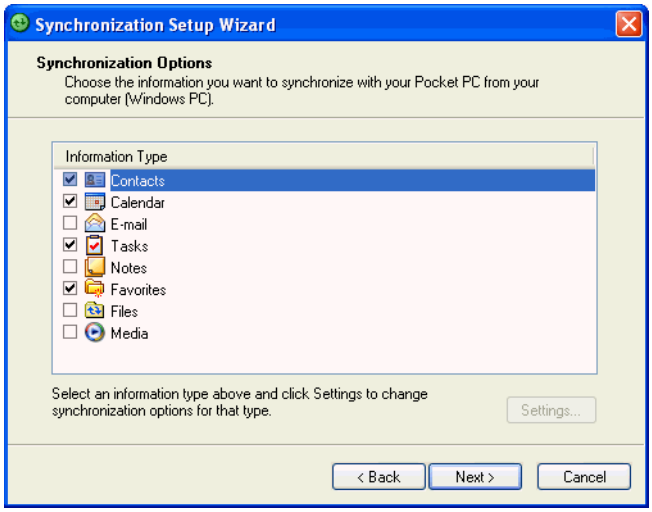


Figure 3-37 *Synchronization Option Window*

5. Select the appropriate settings and click **Next**.

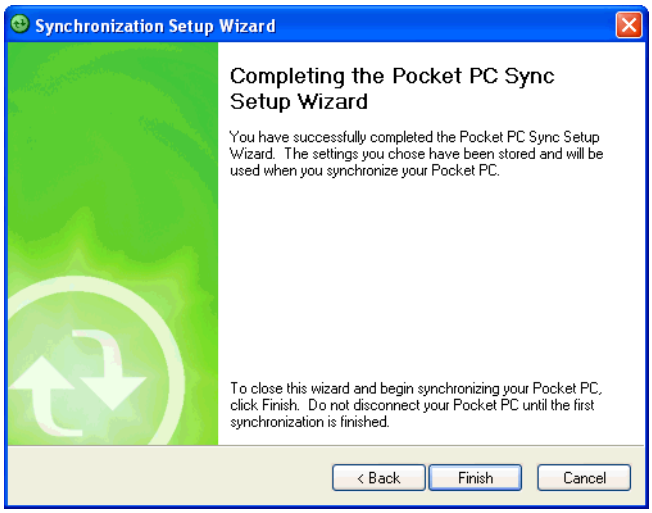


Figure 3-38 *Wizard Complete Window*

6. Click **Finish**.

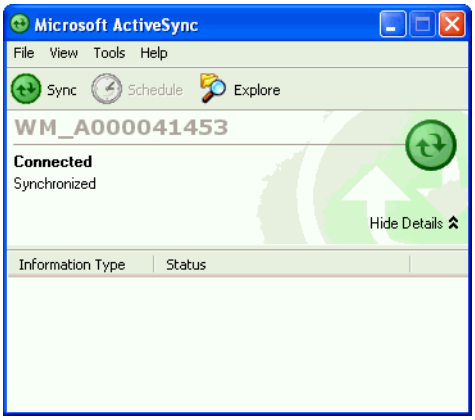


Figure 3-39 *ActiveSync Connected Window*

During the first synchronization, information stored on the mobile computer is copied to the host computer. When the copy is complete and all data is synchronized, the mobile computer can be disconnect from the host computer.

✓ ***NOTE*** The first ActiveSync operation must be performed with a local, direct connection. Windows Mobile retains partnerships information after a cold boot.

For more information about using ActiveSync, start ActiveSync on the host computer, then see ActiveSync Help.

Chapter 4 Application Deployment

Introduction

This chapter describes new features in Windows Mobile 5.0 including new security features, how to package applications, and procedures for deploying applications onto the mobile computer.

Security

The MC50 mobile computers implement a set of security policies that determine whether an application is allowed to run and, if allowed, with what level of trust. To develop an application, you must know the security configuration of the device, and how to sign an application with the appropriate certificate to allow the application to run (and to run with the needed level of trust).

Application Security

Application security controls the applications that can run on the mobile computer.

- Trusted - All applications must be digitally signed by a certificate on the mobile computer.
- Prompted - User is prompted to allow unsigned applications to run.
- Open - All applications run.

Developers can include their own certificates and provision the device to “trusted.”

Digital Signatures

Digital signatures provide a way to authenticate the author of EXEs, DLLs, and packages. Digitally signed applications give users confidence that an application comes from where they think it comes from. For example, if an end-user downloads an update package from the internet that is digitally signed with Zebra's software certificate, they are assured that the package is authentic and that it was created by Zebra. By enforcing the use of digital signatures, users can also prevent malicious applications from executing on the mobile computer. For example, users can provision the mobile computer to only execute “trusted” applications (digitally signed).

Zebra ships all Windows Mobile 5.0 based products in an “open” state, which means all signed and unsigned applications should work. However, customers can still reconfigure their mobile computers to operate in the “trusted” mode. This means that only applications signed with a certificate from the Privileged Execution Trust Certificate Store can run.

To support the broadest number of deployments, third-party software developers should perform the following when releasing software for a Windows Mobile 5.0 devices:

- Sign all their EXEs & DLLs with their private key
- Provide the corresponding public certificate to end-users so that it can be installed into Privileged Execution Trust Certificate Store.

If the software is installed via a .CAB file, developer should also:

- Sign the .CAB file with their private key
- Provide the corresponding public certificate to end-users so that it can be installed into SPC Certificate Store.

Locking Down a Mobile Computer

Like most configuration options in Windows Mobile 5.0, security settings are set via XML provisioning. For example, to enforce the “trusted” model and only allow applications signed with a privileged certificate to run, use the following provisioning document:

```
<wap-provisioningdoc>
    <characteristic type=“SecurityPolicy”>
            <!-- Disallow unsigned apps -->
            <parm name=“4102” value=“0”/>

            <!-- No Prompt -->
            <parm name=“4122” value=“1”/>
    </characteristic>
</wap-provisioningdoc>
```

For more information on various security options, refer to the Security Policy Settings topic in the latest Windows Mobile documentation.

Installing Certificates

Use XML provisioning to query and delete certificates from certificate stores. To add a new certificate the Privileged Execution Trust Certificate Store, use the following sample provisioning document:

```
<wap-provisioningdoc>
        <characteristic type="CertificateStore">
        <characteristic type="Privileged Execution Trust Authorities">
        <characteristic type="657141E12FA45786F6A57CA6464032D4B3A55475">
                <parm name="EncodedCertificate" value="
                This is sample text. This is sample text. This is sample text. This is sample text.
                This is sample text. This is sample text. This is sample text. This is sample text.
                This is sample text. This is sample text. This is sample text. This is sample text. ="/>
        </characteristic>
        </characteristic>
        </characteristic>
</wap-provisioningdoc>
```

To create your own provisioning document with real certificate information:

1. Obtain a certificate from a security provider such as VeriSign.
2. Double-click on the certificate file (.CER) to open it.
3. Click on the **Details** tab and locate the **Thumbprint** field.
4. Copy the contents of the **Thumbprint** field and replace the value in the XML example above.
5. Click the **Copy to File…** button.
6. Click **Next** to start the Certificate Export Wizard.
7. Select **Base-64 encoded X.509 (.CER)** and then click **Next**.
8. Set the File Name to CertOutput.xml and click **Next**.
9. Click **Finish** to export the certificate.
10. Open the exported file, CertOutput.xml, in a text editor (i.e., NotePad).
11. Copy the contents of the file (excluding the first line, last line, and CR/LF) and replace the value of the *"EncodedCertificate"* parameter in the xml example above.

Device Management Security

You can control access to certain device settings and security levels, such as installing applications and changing security settings. Refer to the *Windows Mobile Version 5.0 Help* file for information on device management security.

Remote API Security

The Remote API (RAPI) enables applications that run on a desktop to perform actions on a remote device. RAPI provides the ability to manipulate the file system on the remote device, including the creation and deletion of files and directories. By default, Zebra ships with RAPI in the restricted mode. Certain tools, such as RAPIConfig, may not work properly. Refer to the *Windows Mobile Version 5.0 Help* file for finding information on Remote API security policies.

Packaging

NOTE Applications compiled for Windows Mobile 5.0 are not backward-compatible with previous versions.

Packaging combines an application's executable files into a single file, called a package. This makes it easier to deploy and install an application to the mobile computer. Package new applications and updates, such as new DLL files, as CAB files, then deploy them to Windows Mobile 5.0 devices. Refer to the *Microsoft Windows Mobile 5.0 Help* file for information on CAB files.

Deployment

To install applications onto the mobile computer, developers package the application and all required files into a CAB file, then load the file onto the mobile computer using one of the following options:

- Microsoft ActiveSync 4.1 or greater
- Storage Card
- AirBEAM
- Image Update (for updating the operating system).

Refer to the *Microsoft Windows Mobile 5.0 Help* file for information on CAB files.

Installation Using ActiveSync

To install an application package:

- Connect the mobile computer to a host computer using ActiveSync. See *Chapter 3, ActiveSync* for more information.
- Locate the package file on the host computer.
- In ActiveSync on the host computer, open *Explorer* for the mobile computer.
- Copy the CAB file from the host computer to the \temp directory on the mobile computer.
- On the mobile computer, navigate to the \temp directory.
- Tap on the application CAB file. The application installs on the mobile computer.

Installation Using Storage Card

To install an application package:

- Copy the package CAB file to a storage card using an appropriate storage card reader.
- Install the storage card into the mobile computer. See *Multi Media Card (MMC) / Secure Device (SD) Card on page 2-3* for more information.
- On the mobile computer, open **File Explorer**.
- Open the **Storage Card** directory.
- Tap the package CAB file. The application installs on the mobile computer.

Installation Using AirBEAM

See *AirBEAM Smart on page 4-17* for information on AirBEAM.

Image Update

Windows Mobile 5.0 contains an Image Update feature that updates all operating system components. All updates are distributed as update packages. Update packages can contain either partial or complete updates for the operating system. Zebra distributes the update packages on the Zebra Developer Web Site, http://developer.zebra.com.

To update an operating system component, copy the update package to the mobile computer using one of a variety of transports, including ActiveSync, an SD memory card, or Zebra AirBEAM. Then, initiate the update using one of the following methods:

- Double-tap the package file in **File Explorer** (similar to extracting a CAB file)
- Perform a special boot sequence that initiates the update.
- Use AirBEAM.

NOTE The mobile computer must have at least 5 MB of free space to perform an OS update.

To initiate an update:

1. Go to Support Central at http://www.zebra.com/support.
2. Download the appropriate update package.
3. Copy the update package to either the \temp directory on the mobile computer, or to a storage card.
4. Connect the mobile computer to AC power. See *Chapter 2, Accessories*.
5. Press the primary battery release on the mobile computer to partially eject the battery from the mobile computer.
6. While the battery is partially released, simultaneously press and release the left scan trigger and the **Power** button.

NOTE After you insert the battery you have 2 seconds to press the trigger or left scan button.

7. Push the battery to fully re-insert it in the mobile computer. One audible click can be heard as the battery is fully inserted.
8. Press and hold the left scan button.
9. Connect the mobile computer to AC power using the CAM or insert the mobile computer into a powered cradle.
10. The Update Loader application first looks for a file on a storage card. If it does not find it, it looks in the \temp directory.

    When it finds the appropriate file, it loads the package onto the mobile computer. A progress bar displays until the update completes.
11. The mobile computer re-boots.
12. The calibration screen appears.

NOTE When initiating an update via a boot sequence, the update loader looks for updates first on the root of an installed SD card and then in the \temp folder on the mobile computer's persistent storage volume. A response file, pkgs.lst, indicates which files to update. In most cases, Zebra provides this pkgs.lst file with the update and you should only modify it when updating a splash screen partition. See *Creating a Splash Screen* for more information.

Creating a Splash Screen

Use a bitmap file to create a customized splash screens for the mobile computer. Use Image Update with a bitmap file, rather than a package file, to update the splash screen.

To create a custom splash screen:

1. Create a .bmp file using a graphic program with the following specifications:
   - Size: 240 x 296.
   - Colors: 8 bits per pixel (256 colors) for color displays.
2. Modify the bitmap file and save.

To load the splash screen on the mobile computer:

1. Create a text file named pkgs.lst which contains the name of the bmp file. For example, *mysplash.bmp*.
2. Copy the bmp file and the pkgs.lst file to one of the following:
   - SD card root directory
   - mobile computer's \temp directory
   - mobile computer's \Windows directory.
3. If using an SD card, insert the SD card into the mobile computer.
4. Perform a cold boot.
5. Press the trigger or side scan button for 5 seconds while booting to invoke the Update Loader and install the splash screen.

XML Provisioning

To configure the settings on a mobile computer XML provisioning should be used. To install an XML provisioning file on the mobile computer, create a Cabinet Provisioning File (CPF) file. A CPF file is similar to a CAB file and contains just one file: _setup.xml. Like a CAB file, the CPF extension is associated with WCELoad.EXE. Opening a CPF extracts the XML code and uses it to provision and configure the mobile computer. The user receives an e-mail notification indicating success or failure.

XML Provisioning provides the ability to configure various features of the mobile computer (i.e., registry and file system). However, some settings require security privileges. To change registry settings via a CPF file, you need to have certain privileges (roles). Some registry keys require you to simply be an *Authenticated User*, while other registry keys require you to be a *Manager*. Refer to the Windows Mobile 5.0 Help file, *Metabase Settings for Registry Configuration Service Provider* section, for the default role settings in Windows Mobile 5.0.

For those registry settings that require the *Manager* role, the CPF file must be signed with a privileged certificate installed on the device. Refer to the *Microsoft Windows Mobile 5.0 Help* file and the *Windows Mobile 5.0 SDK* for instructions and sample test certificates.

Creating an XML Provisioning File

To create a .cpf file:

1. Create a valid provisioning XML file named _setup.xml using an XML editor or the tools supplied with Visual Studio 2005. (For example, use the SampleReg.xml sample created in the *RegMerge* section below and rename it _setup.xml.) Ensure the file contains the required parameters for the operation. Refer to the *Microsoft Windows Mobile 5.0 Help* file for information.
2. In the Windows Mobile 5.0 tools directory on the desktop computer (typically \Program Files\Windows CE Tools\wce500\Windows Mobile 5.0 Pocket PC SDK\Tools), run the Makecab.exe utility, using the following syntax to create a .cpf file from the _setup.xml file:

   MakeCab.exe /D COMPRESS=OFF _setup.xml myOutCpf

   ✓ ***NOTE*** COMPRESS=OFF is required for backward compatibility with Pocket PC.

3. Optionally, use the Authenticode tools to sign the .cpf file.
4. Tap the filename to install.
5. Certain applications and settings require a cold boot to take affect. In these cases, cold boot the mobile computer. Refer to the *Windows Mobile Version 5.0 Help* file for more information.

XML Provisioning vs. RegMerge and CopyFiles

Prior to Windows Mobile 5.0, Zebra used two drivers (RegMerge and CopyFiles) to update the registry and to copy files during a cold boot. With Windows Mobile 5.0, Zebra recommends using XML provisioning instead. RegMerge and CopyFiles are supported for backward compatibility but Zebra may eliminate support in the future. The following sections provide examples of how RegMerge and CopyFiles were used, and how to perform the same function using XML provisioning.

RegMerge

RegMerge.dll is a built-in driver that allows updating the registry during a clean boot. RegMerge runs very early in the boot process and looks for registry files (.reg files) in certain Flash File System folders (i.e., \Application) during a clean boot. It then merges the registry changes into the system registry located in RAM.

The following example uses RegMerge to set a registry key:

SampleReg.reg

```
[HKEY_LOCAL_MACHINE\Hardware\DeviceMap\Backlight]
“BacklightIntensity”=dword:00000036
```

The following example uses XML provisioning to perform the same task:

SampleReg.xml

```
<wap-provisioningdoc>
    <characteristic type=“Registry”>
        <characteristic type=“HKLM\Hardware\DeviceMap\Backlight”>
            <parm name=“BacklightIntensity” value=“54” datatype=“integer” />
        </characteristic>
    </characteristic>
</wap-provisioningdoc>
```

CopyFiles

CopyFiles copies files from one folder to another on a clean boot. During a clean boot CopyFiles looks for files with a .CPY extension in the root of the Application FFS partition. These files are text files containing the source and destination for the desired files to copy, separated by “>”.

The following example uses CopyFiles to copy a file from the \Application folder to the \Windows folder:

SampleCpy.cpy

```
\Application\example.txt  > \Windows\example.txt
```

The following example uses XML provisioning to perform the same task:

SampleCpy.xml

```
<wap-provisioningdoc>
    <characteristic type="FileOperation">
        <characteristic type="\Windows" translation="filesystem">
            <characteristic type="MakeDir"/>
            <characteristic type="example.txt" translation="filesystem">
                <characteristic type="Copy">
                    <parm name="Source" value="\Application\example.txt" translation="filesystem"/>
                </characteristic>
            </characteristic>
        </characteristic>
    </characteristic>
</wap-provisioningdoc>
```

Storage

Windows Mobile 5.0 contains three types of file storage:

- Random Access Memory (RAM)
- Persistent Storage
- Application folder.

Random Access Memory

Executing programs use RAM to store data. Data stored in RAM is lost upon a warm boot. RAM also included a volatile file storage area called *Cache Disk*.

Volatile File Storage (Cache Disk)

Windows Mobile 5.0 memory architecture uses persistent storage for all files, registry settings, and database objects to ensure data is retained even after a power failure. Persistent storage is implemented using Flash memory technology which is generally slower than volatile RAM memory. In certain situations the speed of the operation is more important than the integrity of the data. For these situations, Zebra has provided a small volatile File Storage volume, accessed as the *Cache Disk* folder. Disk operations to the *Cache Disk* folder are much faster than to any of the persistent storage volumes, but data is lost across warm boots and power interruptions. Note that a backup battery powers RAM memory, including the *Cache Disk*, when you remove the main battery for a short period of time.

The mobile computer uses the *Cache Disk* for temporary data that can be restored from other sources, for example, for temporarily "caching" HTML web pages by a browser or generating formatted files to send to a printer. Both situations benefit from the increased speed of the cache disk, but you can restore the data if needed.

DO NOT use the *Cache Disk* as a method to improve application performance. Analyze applications that perform slower in persistent storage to optimize disk access. Common areas for optimization include

minimizing the number of reads and writes to a file, removing unneeded debug logging, and minimizing file flushing or closing files.

Persistent Storage

Windows Mobile 5.0 protects all data and applications from power-related loss. Because Windows Mobile 5.0 mounts the entire file system and registry in persistent storage (rather than using RAM), MC50 devices provide a reliable storage platform even in the absence of battery power.

Persistent storage provides application developers with a reliable storage system available through the standard file system and registry APIs. Persistent storage is optimized for large reads and writes; therefore, applications reading and writing data in large chunks tend to outperform those applications reading and writing small blocks of data. Data in persistent storage is lost upon a clean boot.

Persistent storage contains all the directories under the root directory except for Application, Cache Disk, and Storage Card (if a storage card is installed). Persistent storage is approximately 60 MB (formatted).

Application Folder

The Application folder is a super-persistent storage that is persistent even after a clean boot. Accessing data in the Application folder is slower than accessing persistent storage. The Application folder is used for deployment and device-unique data. For example, network profiles can be stored in the Application folder so that connection to the network is available after a cold boot. The Application folder is approximately 20 MB (formatted).

System Configuration Manager

Symbol Configuration Manager (SCM) is a utility that runs on the development computer and is used to create configuration files. These files, when deployed to a mobile computer, set configuration parameters for that device. The configurable options for a mobile computer are defined in an XML file that is available on Support Central for that mobile computer. SCM is also available on Support Central.

SCM eliminates the potential user errors that occur when manually editing registry settings.

File Types

SCM uses three types of files:

- Symbol Configuration Template (.SCT) files are XML files that define the configurable parameters for a device.
- Registry Configuration Service Provider XML files for device provisioning.
- CAB Provisioning Format (.CPF) file which is a .CAB archive that contains the provisioning XML. This file is downloaded to the mobile computer and merged upon a clean boot.

User Interface

SCM's user interface consists of a tree control on the left side of the window which displays all the configuration categories, and a data grid table on the right which displays all the configurable controls for the selected category. *Figure 4-1* shows the main window for a device's .sct file.

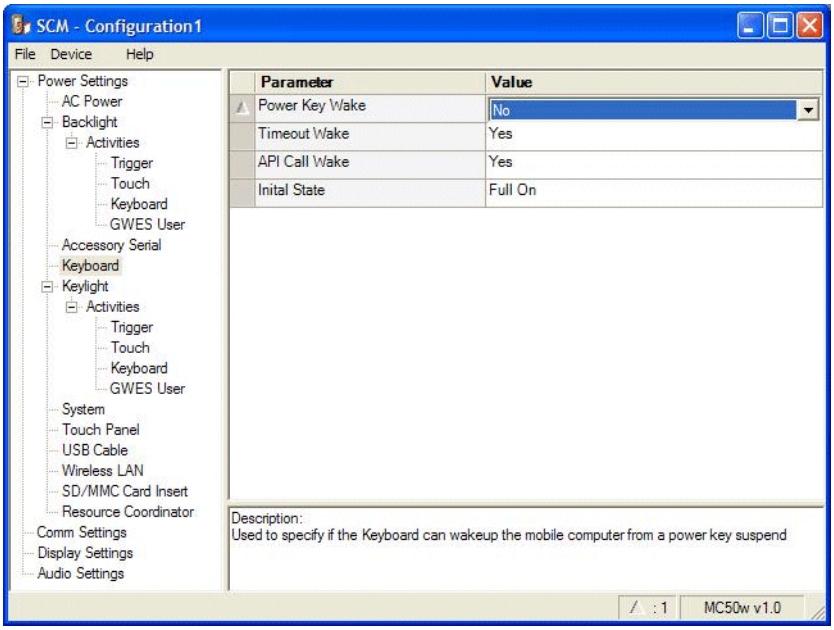


Figure 4-1 *Main SCM Window*

Menu Functions

Use the main menu to access the program functionality described in *Table 4-1*.

Table 4-1 *SCM Menu Functions*

Menu Item	Description
File Menu	
Open Config File	Open a saved configuration file (.SCD).
Save Config Changes	Save changes to the currently loaded configuration file.
Restore All Defaults	Restore all parameter values to the default state. The default values are stored in a Symbol Configuration template file (i.e., MC70w.sct).
Export Changes to .xml	Export the changed parameter values to an XML file.
Export Changes to .cpf	Export the changed parameter values to an CPF file.
Export all to .xml	Export all the parameter values to an XML file.
Export all to .cpf	Export all the parameter values to an CPF file.
Exit	Exit Symbol Configuration Manager.
Device Menu	
Device type	Change the current device type template. Each template (available from Support Central) must reside in the SCM directory.
Help Menu	
About	Display the **About** dialog which shows the application version.

Parameter State Indicators

The first column of the data table displays parameter state indicators. The state indicators display one of the states in *Table 4-2* for a particular parameter:

Table 4-2 *Parameter Status Indicators*

Icon	Indicator	Description
	Modified	This parameter was changed from its initial factory setting.
	Invalid	This parameter is not valid for the selected device type. This can occur when a configuration file for one type of device is loaded and the device type is changed using the **Device** menu. Values marked “invalid” are not included in an exported.

Window Status Bar

The SCM status bar found on the bottom right corner of the window contains the items in *Table 4-3* from left to right:

Table 4-3 *Window Status Bar Items*

Status Bar Item	Description
Invalid Count	Number of parameters not valid for the selected device.
Modified Count	Number of parameters modified from the factory defaults.
Device Type	Device type - version.

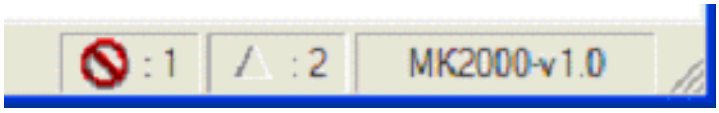


Figure 4-2 *Sample Status Bar*

The sample status bar in *Figure 4-2* shows that the current configuration file contains 1 Invalid Parameter and 2 Modified Parameters.

File Deployment

The CPF file created by the SCM export function must be deployed to the mobile computer.

1. Optionally, use the Authenticode tools to sign the .cpf file.
2. Make the .cpf file read-only, then copy it to the mobile computer.
3. Tap the filename to install.
4. Certain applications and settings require a cold boot to take affect. In these cases, cold boot the mobile computer. Refer to the *Windows Mobile Version 5.0 Help* file for more information.

Rapid Deployment Client

The Rapid Deployment (RD) Client facilitates software downloads to a mobile computer from a Mobility Services Platform (MSP) Console's FTP server. The MSP Console is a web-based interface to the wireless infrastructure monitoring and management tools provided by the MSP Lite or MSP Enterprise server.

When software packages are transferred to the FTP server, the mobile computer on the wireless network can download them. The location of software packages are encoded in RD bar codes. When the mobile computer scans a bar code(s), the software package(s) is downloaded from the FTP server to the mobile computer. Multiple mobile computers can scan a single RD bar code.

NOTE For detailed information about the MSP Console, MSP Lite/MSP Enterprise servers and creating RD bar codes, refer to the *MSP User Guide*.

Rapid Deployment Window

The **Rapid Deployment** window displays bar code scan status and provides features for resetting and exiting the application.

To access the **Rapid Deployment** window tap **Start** > **Rapid Deployment Client** or **Start** > **Programs** > **Rapid Deployment Client** icon.

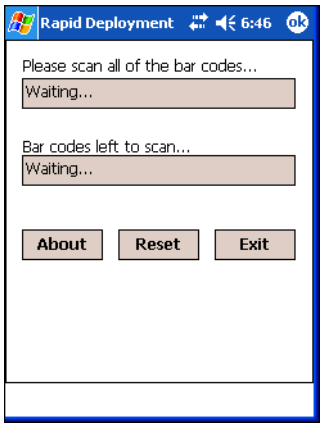


Figure 4-3 *Rapid Deployment Window*

Table 4-4 *Rapid Deployment Window*

Text Box/Button	Description
Please scan all of the bar codes...	Displays the status of a scanned bar code. **Waiting** - indicates the mobile computer is ready to scan a bar code. **OK** - indicates the mobile computer successfully scanned a bar code. (The Indicator LED bar on the mobile computer turns green and a beep sounds). If there are no bar codes left to scan, the **Rapid Deployment Configuring** window displays.
Bar codes left to scan...	Displays a list of any remaining bar codes to scan (1-D bar codes only). When all required bar codes are scanned successfully, the **Rapid Deployment Configuring** window displays.
About	Displays the **Rapid Deployment Client Info** window.
Reset	Removes any previously scanned data.
Exit	Closes the application. A confirmation window displays. Tap **Yes** to exit or **No** to return to the **Rapid Deployment** window. Note: Exiting the application prior to scanning all required bar codes discards any scanned data collected up to that point.

Scanning RD Bar Codes

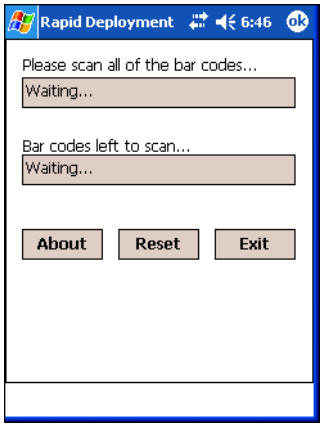
When the mobile computer scans and successfully decodes a single or multiple RD bar codes, the data encoded in the bar code can:

- Reset the mobile computer's connection profile. A connection profile is a set of Wireless Application parameters that the mobile computer uses to access the wireless network.
- Initiate downloads of one or more software packages from an FTP server to the mobile computer.

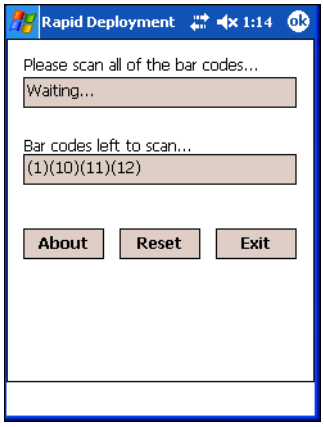
NOTE Currently, RD only recognizes AirBEAM software packages. See *AirBEAM Smart on page 4-17* for more information.

To scan an RD bar code:

1. Obtain the appropriate RD bar code(s) from the MSP Administrator.
2. Launch the RD application on the mobile computer. The **Rapid Deployment** window displays.



Ready to Scan
No Bar Codes Left to Scan



Ready to Scan
Bar Codes Left to Scan are Listed

Figure 4-4 *Rapid Deployment Window*

3. Scan the appropriate bar code(s) to complete the configuration and/or download.
   a. A PDF417 bar code (2-D bar code) can contain all download data in a single bar code. In this case, only one bar code may be required to scan.
   b. Multi-part linear bar codes (1-D bar codes) can require scanning several bar codes. Scan these bar codes in any order. The text box under **Bar codes left to scan...** shows the remaining bar codes to scan (see *Figure 4-4*).
4. After successfully scanning all appropriate bar codes, the mobile computer connects to the server and the **Rapid Deployment Configuring** window displays while network settings are configured.

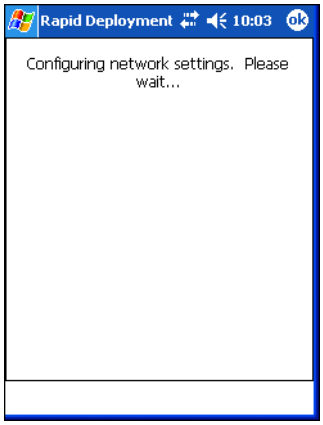


Figure 4-5 *Rapid Deployment Window - Configuring*

NOTE If the mobile computer cannot connect to the server, it continues to retry until you cancel (exit) the application. If failure to connect to the server persists, see the MSP Administrator.

When configuration is complete:

- The **Today** screen displays.
- A new Wireless profile is created on the mobile computer from the data encoded in the scanned bar code(s). See *Chapter 5, Wireless Applications* for more information about wireless profiles.
- The designated package(s) are downloaded from the FTP server.

AirBEAM Smart

The AirBEAM Smart product allows specially designed software packages to be transferred between a host server and Zebra wireless handheld devices. Before transfer, AirBEAM Smart checks and compares package versions, so that only updated packages are loaded.

AirBEAM Smart resides on radio-equipped client devices and allows them to request, download, and install software, as well as to upload files and status data. A single communications session performs both file download and upload. The ability to transfer software over a radio network can greatly reduce the logistical efforts of client software management.

In an AirBEAM Smart system, a network-accessible host server acts as the storage point for the software transfer. The AirBEAM Smart Client uses the industry standard FTP or TFTP file transfer protocols to check the host system for updates and, if necessary, to transfer updated software.

NOTE For more information about AirBEAM Smart, refer to the *AirBEAM® Smart Windows® CE Client Product Reference Guide* (p/n 72-63060-xx).

AirBEAM Package Builder

In a typical distributed AirBEAM system, software to be transferred is organized into packages. In general, an AirBEAM package is a set of files that are assigned attributes both as an entire package and as individual component files. The package is assigned a version number and the transfer occurs when an updated version is available.

An AirBEAM package can optionally contain developer-specified logic to be used to install the package. Installation logic is typically used to update client device flash images or radio firmware. Examples of common AirBEAM packages would include packages for custom client application software, radio firmware, and AirBEAM Smart Client software.

Once these packages are built, they are installed on the host server for retrieval by the handheld device. Use the AirBEAM Package Builder utility to define, generate, and install AirBEAM packages to a server. The packages are then loaded from the server onto a client device equipped with an AirBEAM Smart Client executable.

For instructions on how to define, generate, and install AirBEAM packages to the server, refer to the *AirBEAM Package Builder Product Reference Guide*, p/n 72-55769-xx.

AirBEAM Smart Client

The AirBEAM Smart Client resides on the handheld mobile computer. It is configured with the server access information, the names of the packages to be downloaded and other controlling parameters. When the AirBEAM Smart Client is launched, the device connects to the specified FTP server and checks the packages it is configured to look for. If the package version was updated, the client requests the transfer.

AirBEAM License

The AirBEAM Smart Client is a licensed software product. A license key file stored on the client device enables the AirBEAM Smart Client's version synchronization functionality. Build the license key file into AirBEAM Smart Client's image, or download it in a special AirBEAM package.

The AirBEAM license key file contains a unique key and a customer specific banner that appears when the AirBEAM Smart Client version synchronization logic is invoked.

Configuring the AirBEAM Smart Client

1. Tap **Start** > **Programs** > **AirBEAM Client**. The **AirBEAM Smart** window appears.
2. Tap **File** > **Configure**. The **AirBEAM** configuration window appears.

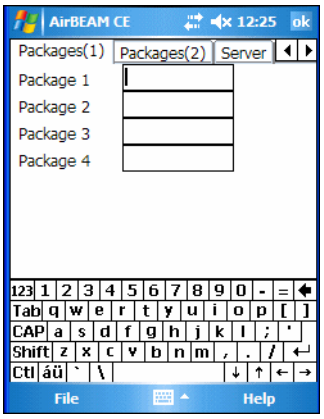


Figure 4-6 *AirBEAM Configuration Window*

Use the configuration window to view and edit AirBEAM Smart Client configurations. This dialog box has seven tabs that you can modify - **Packages(1)**, **Packages(2)**, **Server, Misc(1)**, **Misc(2)**, **Misc(3),** and **Misc(4)**.

Packages(1) Tab

Use this tab to specify the package name of the first four of eight packages to load during the AirBEAM synchronization process. The specified package name must correspond to a package available on the specified package server.

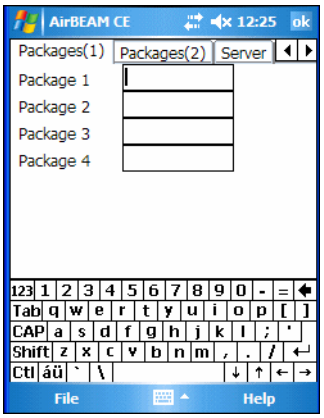


Figure 4-7 *Package (1) Tab*

Table 4-5 *Package (1) Tab*

Field	Description
Package 1	Package name of the first of eight packages. This is an optional field.
Package 2	Package name of the second of eight packages. This is an optional field.
Package 3	Package name of the third of eight packages. This is an optional field.
Package 4	Package name of the fourth of eight packages. This is an optional field.

NOTE Do not enter inadvertent trailing spaces on the **Packages(1)** tab. Information entered in these fields are case and space sensitive.

Packages(2) Tab

Use this tab to specify the package name of the last four of eight packages to load during the AirBEAM synchronization process. The specified package name must correspond to a package available on the specified package server.

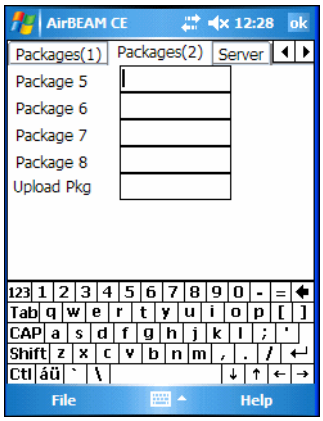


Figure 4-8 *Package (2) Tab*

Table 4-6 *Package (2) Tab*

Field	Description
Package 5	Package name of the fifth of eight packages. This is an optional field.
Package 6	Package name of the sixth of eight packages. This is an optional field.
Package 7	Package name of the seventh of eight packages. This is an optional field.
Package 8	Package name of the eighth of eight packages. This is an optional field.
Upload Pkg	Package name of a package to be processed for “upload files” during the AirBEAM synchronization process. The specified package name must correspond to a package available on the specified package server. This is an optional field.

NOTE Do not enter inadvertent trailing spaces on the **Packages(2)** tab. Information entered in these fields are case and space sensitive.

Server Tab

Use this tab to specify the configurations of the server to which the client connects during the package synchronization process.

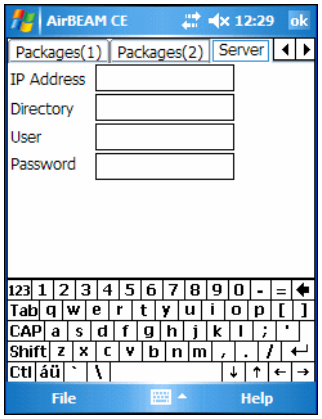


Figure 4-9 *Server Tab*

Table 4-7 *Server Tab*

Field	Description
IP Address	The IP Address of the server. It may be a host name or a dot notation format.
Directory	The directory on the server that contains the AirBEAM package definition files. All AirBEAM package definition files are retrieved from this directory during the package synchronization process.
User	The FTP user name that is used during the login phase of the package synchronization process.
Password	The FTP password that corresponds to the FTP user specified in the **User** field. The specified password is used during the login phase of the package synchronization process.

NOTE Do not enter inadvertent trailing spaces on the **Server** tab. Information entered in these fields are case and space sensitive.

Misc(1) Tab

Use this tab to configure various miscellaneous features.

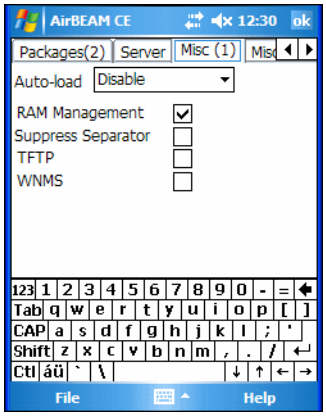


Figure 4-10 *Misc(1) Tab*

Table 4-8 *Misc(1) Tab*

Field	Description
Auto-load	Use this drop-down list to specify how to invoke the AirBEAM Smart Client when the client device is rebooted. Options are: **Disable**: the AirBEAM Smart Client is not invoked automatically during the boot sequence. **Interactive**: the AirBEAM Smart Client is invoked during the boot sequence and begins package synchronization. The **Synchronization Dialog** box appears and you must tap **OK** when the process completes. **Non-interactive**: the AirBEAM Smart Client is invoked during the boot sequence and begins package synchronization. The **Synchronization Dialog** box appears, but you don't have to tap **OK** when the process completes. The **Synchronization Dialog** box closes automatically. **Background**: the AirBEAM Smart Client is invoked automatically during the boot sequence. The package synchronization process starts automatically. Nothing is displayed while the synchronization process is occurring.
RAM Management	This check box specifies whether the automatic RAM management is enabled during package synchronization. Enable this to invoke RAM management logic when there is not enough free disk space to download a package. The RAM management logic attempts to remove any discardable AirBEAM packages resident on the client.

Table 4-8 *Misc(1) Tab*

Field	Description
Suppress Separator	This check box specifies whether to suppress the automatic insertion of a file path separator character when the client generated server package definition file names. When enabled, the parameter also disables appending .apd to the package. This feature is useful for AS/400 systems, in which the file path separator character is a period. Enabling this feature appends the server directory (Directory) and package name (Package 1, Package 2, Package 3, and Package 4) “as is” when building the name for the server package definition file. When this feature is disabled, a standard file path separator is used to separate the server directory (Directory) and package name (Package 1, Package 2, Package 3, and Package 4) when building the name for the server package definition file. In addition, an .apd extension is appended automatically.
TFTP	This check box specifies whether to use the TFTP protocol to download files. By default, the AirBEAM Smart Client uses the FTP protocol.
WNMS	This check box specifies whether the AirBEAM Smart Client uploads a WNMS information file at the end of each version synchronization.

Misc(2) Tab

Use this tab to configure various miscellaneous features.

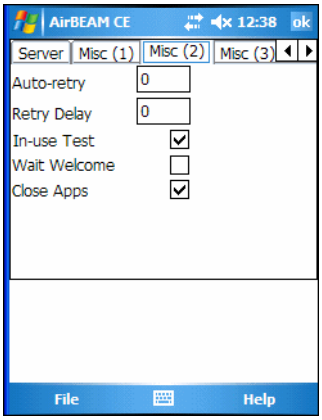


Figure 4-11 *Misc(2) Tab*

Table 4-9 *Misc(2) Tab*

Field	Description
Auto-retry	Use this field to specify whether the AirBEAM Smart Client automatically retries if synchronization fails. If this feature is enabled, the AirBEAM Smart Client displays a pop-up dialog indicating the retry attempt. The pop-up dialog appears for the number of seconds specified in the **Retry Delay** field. Values for this field are: **-1**: the AirBEAM Smart Client automatically retries indefinitely. **0**: the AirBEAM Smart Client does not automatically retry. **-0**: the AirBEAM Smart Client automatically retries up to the number of times specified.
Retry Delay	This field specifies the amount of time, in seconds, that the AirBEAM Smart Client delays before automatically retrying after a synchronization failure.
In-use Test	This check box specifies whether the AirBEAM Smart Client tests to determine if a file is in use before downloading. If the **In-use Test** feature is enabled, the AirBEAM Smart Client downloads a temporary copy of any files that are in use. If any temporary in-use files are downloaded the AirBEAM Smart Client automatically resets the client to complete copying the in-use files. If the **In-use Test** feature is disabled, the synchronization process fails (-813) if any download files are in use.
Wait Welcome	This check box specifies whether the AirBEAM Smart Client waits for the WELCOME windows to complete before automatically launching the synchronization process after a reset.
Close Apps	This check box specifies whether the AirBEAM Smart Client automatically attempts to close non-system applications prior to resetting the mobile unit. If enabled the AirBEAM Smart Client sends a WM_CLOSE message to all non-system applications before resetting the mobile unit. This feature offers applications the opportunity to prepare (i.e., close open files) for the pending reset.

Misc(3) Tab

Use this tab to configure various miscellaneous features.

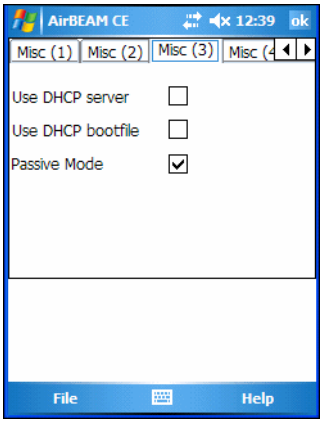


Figure 4-12 *Misc(3) Tab*

Table 4-10 *Misc(3) Tab*

Field	Description
Use DHCP server	This check box control specifies whether the AirBEAM Smart Client uses the DHCP response option 66 to specify the IP address of the FTP/TFTP server. If enabled, special RF network registry settings are required to force the DHCP server to return the **TFTP server name** field (option 66). The special RF network registry settings are included, but commented out, in the radio network registry initialization files (essid_xxxx_yy.reg).
Use DHCP bootfile	This check box control specifies whether the AirBEAM Smart Client uses the DHCP response option 67 to specify the Package and Package 1 parameters. If enabled, special RF network registry settings are required to force the DHCP server to return the **Bootfile name** field (option 67). The special RF network registry settings are included, but commented out, in the radio network registry initialization files (essid_xxxx_yy.reg).

Misc(4) Tab

Use this tab to configure various miscellaneous features.

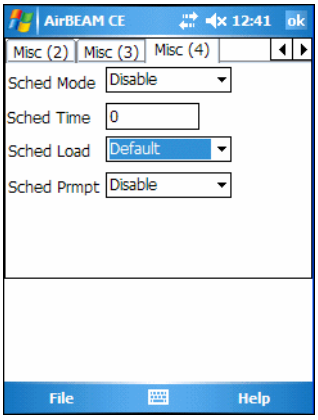


Figure 4-13 *Misc(4) Tab*

Table 4-11 *Misc(4) Tab*

Field	Description
Sched Mode	Specifies whether (and how) the scheduled mode is enabled. If enabled, schedule mode causes the AirBEAM synchronization process to occur periodically. The selections are: **Disable** - The schedule mode is disabled. **Fixed time** - The schedule mode is enabled. The AirBEAM synchronization will be launched once per day at the time specified in the Sched Time setting. The synchronization will be launched every day Sched Time minutes past midnight. **Fixed period** - The schedule mode is enabled. The AirBEAM synchronization will be launched at a period by the Sched Time setting. The synchronization will be launched every Sched Time minutes.
Sched Time	This edit control specifies, in minutes, the period for the schedule mode. The Sched Mode setting specifies how the Sched Time value is used.
Sched Load	This drop-down menu specifies the load mode to be used for scheduled synchronization, if enabled. The selections are: **Default** - Specifies that the load mode specified in the Auto-load setting is to be used for scheduled synchronization sessions. **Interactive** - The Synchronization Dialog displays when a scheduled synchronization session occurs. The user is required to press the OK button to dismiss the dialog. **Non-interactive** - The Synchronization Dialog displays when a scheduled synchronization session occurs. The dialog is automatically dismissed when the synchronization is complete, unless an error occurs. If an error occurs the user is required to press the OK button to dismiss the dialog. **Background** - Nothing is displayed when the scheduled synchronization sessions occur.
Sched Prmpt	Specifies whether the AirBEAM client prompts the user when updates are available in schedule mode. The settings are: **Disable** - Updated packages are automatically downloaded. The user is not prompted. **Alert** - Updated packages are not automatically downloaded. The user is prompted to warm boot the device to initiate the package downloads. **Launch** - Updated packages are not automatically downloaded. The user is prompted to start the package download. The user can defer the package download by responding no to the prompt. The MAXNOPRESS registry setting can be used to limit the number of times the user can defer the update. **Confirm** - Updated packages are not automatically downloaded. This value behaves the same as the Launch value, except that the user is required to confirm an additional prompt before the download starts.

Synchronizing with the Server

When synchronization begins, the AirBEAM Smart Client attempts to open an FTP session using the AirBEAM Smart Client configuration. Once connected, the client processes the specified packages. Packages are loaded only if the server version of a given package is different from the version loaded on the client. When upload completes, the AirBEAM Smart Client closes the FTP session with the server.

The AirBEAM Smart Client can launch an FTP session with the server either manually, when initiated by the user, or automatically.

Manual Synchronization

1. Configure the AirBEAM Smart Client. See *Configuring the AirBEAM Smart Client on page 4-18*.
2. From the main **AirBEAM CE** window, tap **File** > **Synchronize**. Once connected, the **AirBEAM Synchronize** window appears.

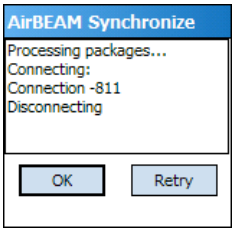


Figure 4-14 *AirBEAM Synchronize Window*

- The Status List displays messages that indicate the synchronization progress.
- Tap **OK** to return to the Main Menu. This button remains inactive until synchronization completes.
- Tap **Retry** to restart synchronization. This button is active only if there is an error during synchronization.

Automatic Synchronization

To configure the AirBEAM Smart Client to launch automatically, use the **Misc(1)** preference tab (see *Misc(1) Tab on page 4-22*). When setting automatic synchronization, use the **Auto-load** drop-down list to specify how to invoke the AirBEAM Smart Client when the client device reboots. See *Misc(1) Tab on page 4-22* for instructions on enabling Auto Sync.

AirBEAM Staging

The AirBEAM Smart staging support simplifies the process of staging custom or updated operating software onto mobile devices directly from manufacturing. The staging support is part of the AirBEAM Smart CE Client integrated in the mobile computer.

The AirBEAM Smart support defaults the AirBEAM Client configuration to a known set of values and launches the AirBEAM Smart package download logic. A staging environment, including an RF network, FTP server, and AirBEAM packages must be set up. Ideally, set up a staging network and server to match the default AirBEAM Staging client configuration.

Invoke the AirBEAM Smart staging utility from the **Application** directory (tap **Start** > **Programs** > **File Explorer** > **Windows**).

The AirBEAM Staging support provides several benefits:

- Loading many devices simultaneously over the RF network.
- A simple single dialog user interface used to quickly start the software installation process.

Symbol Mobility Developer Kits

The Symbol Mobility Developer Kit (SMDK) family of products allows you to write applications that take advantage of the capture, move and manage capabilities of Zebra mobile computers. Go to Support Central at http://developer.zebra.com to download the appropriate developer kit.

Chapter 5

Wireless Applications

Introduction

Wireless Local Area Networks (LANs) allow mobile computers to communicate wirelessly and send captured data to a host device in real time. The MC50 mobile computer supports the IEEE 802.11a, 802.11b and 802.11g standards. Before using the mobile computer on a WLAN, the facility must be set up with the required hardware to run the wireless LAN and the mobile computer must be configured. Refer to the documentation provided with the access points (APs) for instructions on setting up the hardware.

To configure the mobile computer, a set of wireless applications provide the tools to configure and test the wireless radio in the mobile computer. The **Wireless Application** menu on the task tray provides the following wireless applications:

- Wireless Status
- Wireless Diagnostics
- Find WLANs
- Manage Profiles
- Options
- Enable/Disable Radio (Windows Mobile 5.0 only)
- Log On/Off.

Tap the **Signal Strength** icon to display the **Wireless Applications** menu.

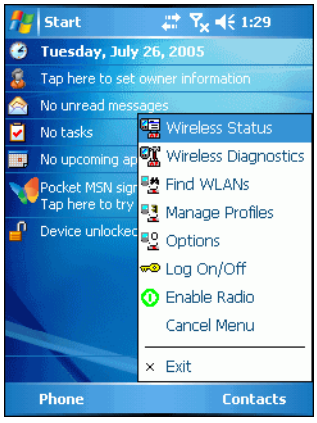


Figure 5-1 *Wireless Applications Menu*

Signal Strength Icon

The **Signal Strength** icon in the task tray indicates the mobile computer's wireless signal strength as follows:

Table 5-1 *Wireless Applications Icons, Signal Strength Descriptions*

Icon	Status	Action
	Excellent signal strength	Wireless LAN network is ready to use.
	Very good signal strength	Wireless LAN network is ready to use.
	Good signal strength	Wireless LAN network is ready to use.
	Fair signal strength	Wireless LAN network is ready to use. Notify the network administrator that the signal strength is only "Fair".
	Poor signal strength	Wireless LAN network is ready to use. Performance may not be optimum. Notify the network administrator that the signal strength is "Poor".
	Out-of-network range (not associated)	No wireless LAN network connection. Notify the network administrator.
	No wireless LAN network card detected	No wireless LAN network card detected or radio disabled. Notify the network administrator.

Turning the WLAN Radio On and Off

To turn the WLAN radio off tap the **Signal Strength** icon and select **Disable Radio**.

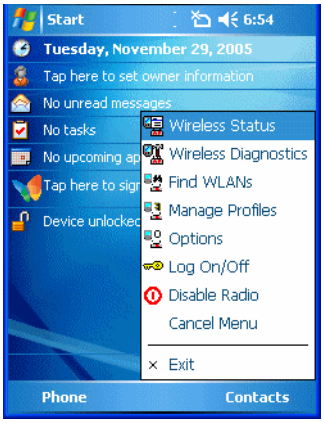


Figure 5-2 *Disable Radio*

To turn the WLAN radio on tap the **Signal Strength** icon and select **Enable Radio**.

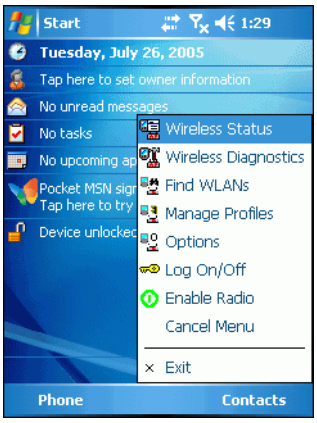


Figure 5-3 *Enable Radio*

Find WLANs Application

Use the **Find WLANs** application to discover available networks in the vicinity of the user and mobile computer. To open the **Find WLANs** application, tap the **Signal Strength** icon > **Find WLANs**. The **Find WLANs** window displays.

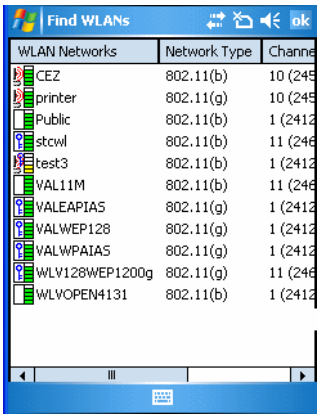


Figure 5-4 *Find WLANs Window*

NOTE The **Find WLANs** display is limited to 32 items (ESSIDs or MAC addresses). A combination of up to 32 ESSIDs/APs may be displayed.

Manually enter valid ESSIDs not displayed in the **Find WLANs** window. See *Figure 4-5 on page 4-6*.

The **Find WLANs** list displays:

- WLAN Networks - Available wireless networks with icons that indicate signal strength and encryption type. The signal strength and encryption icons are described in Table 4-1 and Table 4-3.
- Network Type - Type of network.
- Channel - Channel on which the AP is transmitting.
- Signal Strength - The signal strength of the signal from the AP.

Table 5-2 *Signal Strength Icon*

Icon	Description
	Excellent signal
	Very good signal
	Good signal
	Fair signal
	Poor signal
	Out of range or no signal

Table 5-3 *Encryption Icon*

Icon	Description
	No encryption. WLAN is an infrastructure network.
	WLAN is an Ad-Hoc network.
	WLAN access is encrypted and requires a password.

Tap-and-hold on a WLAN network to open a pop-up menu which provides two options: **Connect** and **Refresh**. Select **Refresh** to refresh the WLAN list. Select **Connect** to create a wireless profile from that network. This starts the **Profile Editor Wizard** which allows you to set the values for the selected network. After editing the profile, the mobile computer automatically connects to this new profile.

Profile Editor Wizard

Use the **Profile Editor Wizard** to create a new profile or edit an existing profile. If editing a profile, the fields reflect the current settings for that profile. If creating a new profile, the known information for that WLAN network appears in the fields.

Navigate through the wizard using the **Next** and **Back** buttons. Tap **X** to quit. On the confirmation dialog box, tap **No** to return to the wizard or tap **Yes** to quit and return to the **Manage Profiles** window. See *Manage Profiles Application on page 5-21* for instructions on navigating the **Profile Editor Wizard**.

Profile ID

In the **Profile ID** dialog box in the **Profile Editor Wizard**, enter the profile name and the ESSID.

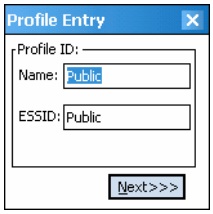


Figure 5-5 *Profile ID Dialog Box*

Table 5-4 *Profile ID Fields*

Field	Description
Name	The name and (WLAN) identifier of the network connection. Enter a user friendly name for the mobile computer profile used to connect to either an AP or another networked computer. Example: The Public LAN.
ESSID	The ESSID is the 802.11 extended service set identifier. The ESSID is 32-character (maximum) string identifying the WLAN, and must match the AP ESSID for the mobile computer to communicate with the AP.

NOTE Two profiles with the same user friendly name are acceptable but not recommended.

Tap **Next.** The **Operating Mode** dialog box displays.

Operating Mode

Use the **Operating Mode** dialog box to select the operating mode (Infrastructure or Ad-Hoc) and the country location.

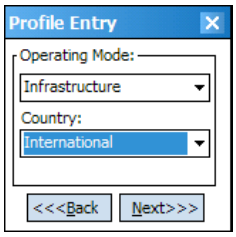


Figure 5-6 *Operating Mode Dialog Box*

Table 5-5 *Operating Mode Fields*

Field	Description
Operating Mode	Select **Infrastructure** to enable the mobile computer to transmit and receive data with an AP. Infrastructure is the default mode. Select **Ad Hoc** to enable the mobile computer to form its own local network where mobile computers communicate peer-to-peer without APs using a shared ESSID.
Country	**Country** determines if the profile is valid for the country of operation. Use the **Country** drop-down list to select the country of operation for the adapter. This feature ensures that the adapter is using country code information compatible with the country code data that the associated access point uses. Choose **International** to automatically use the country of the associated access point. Otherwise select the correct country of operation.

Tap **Next**. If **Ad-Hoc** mode was selected the **Ad-Hoc** dialog box displays. If **Infrastructure** mode was selected the **Authentication** dialog box displays. See *Authentication on page 4-9* for instruction on setting up authentication.

Ad-Hoc

Use the **Ad-Hoc** dialog box to select the required information to control **Ad-Hoc** mode. This dialog box does not appear if you selected **Infrastructure** mode. To select Ad-Hoc mode:

1. Select a channel number from the **Channel** drop-down list. The default is **Channel 1 (2412 MHz)**.

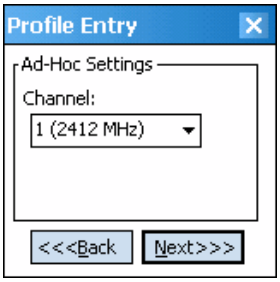


Figure 5-7 *Ad-Hoc Settings Dialog Box*

2. Tap **Next**. The **Encryption** dialog box displays. See *Encryption on page 4-17* for encryption options.

Authentication

Use the **Authentication** dialog box to configure authentication. If you selected **Ad-Hoc** mode, you can only select **None** because Ad-Hoc authentication is not supported.

Select an authentication type from the drop-down list and tap **Next**. Selecting **PEAP** or **TTLS** displays the **Tunneled** dialog box. Selecting **None**, **TLS**, or **LEAP** displays the **Encryption** dialog box. See *Encryption on page 4-17* for encryption options. *Table 5-6* lists the available authentication options.

Figure 5-8 *Authentication Dialog Box*

Table 5-6 *Authentication Options*

Authentication	Description
None	Default setting when authentication is not required on the network.
EAP TLS	Select this option to enable EAP TLS authentication. EAP TLS is an authentication scheme through IEEE 802.1x. It authenticates users and ensures only valid users can connect to the network. It also restricts unauthorized users from accessing transmitted information by using secure authentication certificates.

Table 5-6 *Authentication Options (Continued)*

Authentication	Description
PEAP	Select this option to enable PEAP authentication. This method uses a digital certificate to verify and authenticate a user's identity.
LEAP	Select this option to enable LEAP authentication, which is based on mutual authentication. The AP and the connecting mobile computer require authentication before gaining access to the network.
TTLS	Select this option to enable TTLS authentication.

Tunneled Authentication

Use the **Tunneled Authentication** dialog box to select the tunneled authentication options. There are different selections available for PEAP or TTLS authentication.

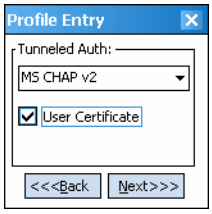


Figure 5-9 *Tunneled Authentication Dialog Box*

To select a tunneled authentication type:

1. Select a tunneled authentication type from the drop-down list. See *Table 5-7* and *Table 5-8*.
2. Select the **User Certificate** check box if a certificate is required. If you selected the TLS tunnel type that requires a user certificate, the check box is already selected.
3. Tap **Next**. The **Installed User Certificates** dialog box appears.

Table 5-7 lists the PEAP tunneled authentication options.

Table 5-7 *PEAP Tunneled Authentication Options*

PEAP Tunneled Authentication	Description
MS CHAP v2	Microsoft Challenge Handshake Authentication Protocol version 2 (MS CHAP v2) is a password-based, challenge-response, mutual authentication protocol that uses the industry-standard Message Digest 4 (MD4) and Data Encryption Standard (DES) algorithms to encrypt responses. The authenticating server challenges the access client and the access client challenges the authenticating server. If either challenge is not correctly answered, the connection is rejected. MS CHAP v2 was originally designed by Microsoft as a PPP authentication protocol to provide better protection for dial-up and virtual private network (VPN) connections. With Windows XP SP1, Windows XP SP2, Windows Server 2003, and Windows 2000 SP4, MS CHAP v2 is also an EAP type.
TLS	EAP TLS is used during phase 2 of the authentication process. This method uses a user certificate to authenticate.

Table 5-8 lists the TTLS tunneled authentication options.

Table 5-8 *TTLS Tunneled Authentication Options*

TTLS Tunneled Authentication	Description
CHAP	Challenge Handshake Authentication Protocol (CHAP) is one of the two main authentication protocols used to verify the user name and password for PPP Internet connections. CHAP is more secure than PAP because it performs a three way handshake during the initial link establishment between the home and remote machines. It can also repeat the authentication anytime after the link is established.
MS CHAP	Microsoft Challenge Handshake Authentication Protocol (MS CHAP) is an implementation of the CHAP protocol that Microsoft created to authenticate remote Windows workstations. MS CHAP is identical to CHAP, except that MS CHAP is based on the encryption and hashing algorithms used by Windows networks, and the MS CHAP response to a challenge is in a format optimized for compatibility with Windows operating systems.
MS CHAP v2	MS CHAP v2 is a password based, challenge response, mutual authentication protocol that uses the industry standard Message Digest 4 (MD4) and Data Encryption Standard (DES) algorithms to encrypt responses. The authenticating server challenges the access client and the access client challenges the authenticating server. If either challenge is not correctly answered, the connection is rejected. MS CHAP v2 was originally designed by Microsoft as a PPP authentication protocol to provide better protection for dial-up and virtual private network (VPN) connections. With Windows XP SP1, Windows XP SP2, Windows Server 2003, and Windows 2000 SP4, MS CHAP v2 is also an EAP type.
PAP	Password Authentication Protocol (PAP) has two variations: PAP and CHAP PAP. It verifies a user name and password for PPP Internet connections, but it is not as secure as CHAP, since it works only to establish the initial link. PAP is also more vulnerable to attack because it sends authentication packets throughout the network. Nevertheless, PAP is more commonly used than CHAP to log in to a remote host like an Internet service provider.
MD5	Message Digest-5 (MD5) is an authentication algorithm developed by RSA. MD5 generates a 128-bit message digest using a 128-bit key, IPSec truncates the message digest to 96 bits.

User Certificate Selection

If you checked the **User Certificate** check box on the **Tunneled Authentication** dialog box or if **TLS** is the selected authentication type, the **Installed User Certificates** dialog box displays. Select a certificate from the drop-down list of currently installed certificates before proceeding. The selected certificate's name appears in the drop-down list. If the required certificate is not in the list, install it.

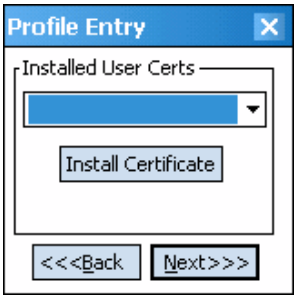


Figure 5-10 *Installed User Certificates Dialog Box*

User Certificate Installation

To install a user certificate (EAP TLS only) and a server certificate for EAP TLS and PEAP authentication:

1. Tap **Install Certificate**. The **Credentials** dialog box appears.

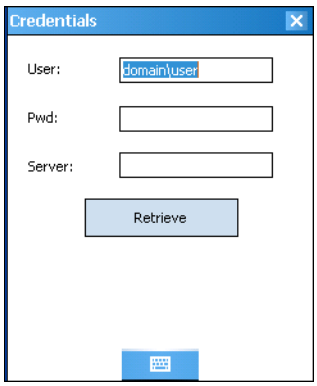


Figure 5-11 *Credentials Dialog Box*

2. Enter the **User:**, **Pwd:** (password), and **Server:** information in their respective text boxes.
3. Tap **Retrieve**. A **Progress** dialog indicates the status of the certificate retrieval.
4. Tap **ok** to exit.

After the installation completes, the **Installed User Certs** dialog box displays with the certificate available in the drop-down list for selection.

NOTE To successfully install a user certificate, the mobile computer must already be connected to a network from which the server is accessible.

Server Certificate Selection

If you select the **Validate Server Certificate** check box, a server certificate is required. Select a certificate on the **Installed Server Certificates** dialog box. An hour glass may appear as the wizard populates the existing certificate list. If the required certificate is not listed, install it:

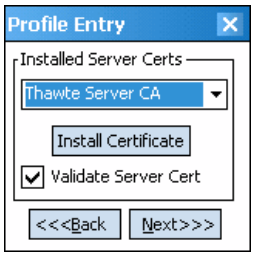


Figure 5-12 *Installed Server Certificates Dialog Box*

1. Tap the **Install Certificate** button. A dialog lists the currently loaded certificate files found in the default directory, with the default extension.

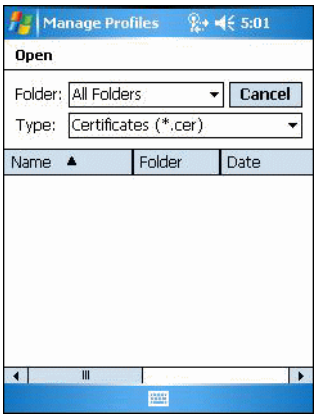


Figure 5-13 *Browse Server Certificates*

2. Use the **Folder:** drop-down list to browse to the certificate.
3. If necessary, use the **Type:** drop-down list to select a different certificate extension.
4. Select a certificate in the list to install it.

Credential Cache Options

If you selected any of the password-based authentication types, you can select different credential caching options. These options specify when the network credential prompts appear: at connection, on each resume, or at a specified time.

Entering the credentials directly into the profile permanently caches the credentials. In this case, the mobile computer does not require user login. If a profile does not contain credentials entered through the configuration editor, you must log in to the mobile computer before connecting.

Caching options only apply on credentials entered through the login dialog box.

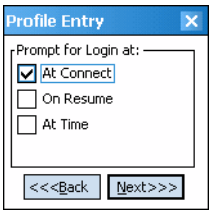


Figure 5-14 *Prompt for Login at Dialog Box*

If the mobile computer does not have the credentials, you are prompted to enter a username and password. If the mobile computer has the credentials (previous entered via a login dialog box), it uses these credentials unless the caching options require the mobile computer to prompt for new credentials. If you entered the credentials via the profile, the mobile computer does not prompt for new credentials. Table 4-9 lists the caching options.

Table 5-9 *Cache Options*

	Description
At Connect	Select this option to prompt for credentials whenever the WCS tries to connect to a new profile. Deselect this to use the cached credentials to authenticate. If the credentials are not cached, you are prompted to enter credentials. This option only applies when logged in.
On Resume	Selecting this reauthenticates an authenticated user when a suspend/resume occurs. Once reauthenticated, the user is prompted for credentials. If the user does not enter the same credentials that were entered prior to the suspend/resume within three attempts, the user is disconnected from the network. This option only applies when logged in.
At Time	Select this option to perform a local verification on an authenticated user at a specified time. The time can be an absolute time or a relative time from the authentication, and should be in at least 5 minute intervals. Once the time has passed, the user is prompted for credentials. If the user does not enter the correct credentials within three attempts, the user is disconnected from the network. This option only applies when logged in.

Entering credentials applies these credentials to a particular profile. Logging out clears all cached credentials. Editing a profile clears all cached credentials for that profile.

The following authentication types have credential caching:

- EAP TLS
- PEAP
- LEAP
- TTLS.

Selecting the **At Time** check box displays the **TIme Cache Options** dialog box.

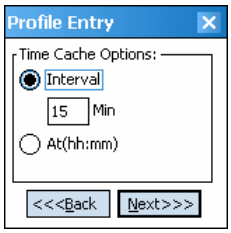


Figure 5-15 *Time Cache Options Dialog Box*

1. Tap the **Interval** radio button to check credentials at a set time interval.
2. Enter the value in minutes in the **Min** box.
3. Tap the **At (hh:mm)** radio button to check credentials at a set time.
4. Tap **Next**. The **At Time** dialog box appears.

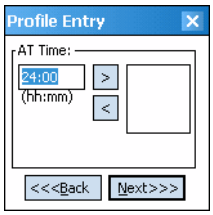


Figure 5-16 *At Time Dialog Box*

5. Enter the time using the 24 hour clock format in the **(hh:mm)** box.
6. Tap **>** to move the time to the right. Repeat for additional time periods.
7. Tap **Next**. The **User Name** dialog box displays.

User Name

The user name and password can be entered (but is not required) when the profile is created. When a profile authenticates with credentials that were entered in the profile, caching rules do not apply. Caching rules only apply on credentials that are entered through the login dialog box.

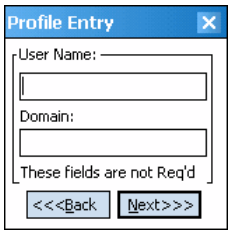


Figure 5-17 *Username Dialog Box*

Password

Use the **Password** dialog box to enter a password. If EAP/TLS is the selected authentication type, the password is not required and the field is disabled.

Figure 5-18 *Password Dialog Box*

1. Enter a password in the **Password** field.
2. Select the **Advanced ID** check box, if advanced identification is required.
3. Tap **Next.** The **Encryption** dialog box displays. See *Encryption on page 4-17*.

Advanced Identity

Use the **Advanced ID** dialog box to enter the 802.1X identity to supply to the authenticator. This value can be 63 characters long and is case sensitive. In TTLS and PEAP, it is recommended entering the identity *anonymous* (rather than a true identity) plus any desired realm (e.g., anonymous@myrealm). A user ID is required before proceeding.

NOTE When authenticating with a Microsoft IAS server, do not use advanced identity.

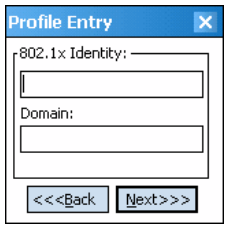


Figure 5-19 *Advanced Identity Dialog Box*

Tap **Next**. The **Encryption** dialog box displays.

Encryption

Use the **Encryption** dialog box to select an encryption type. The drop-down list includes encryption types available for the selected authentication type. See Table 4-11 for these encryption types.

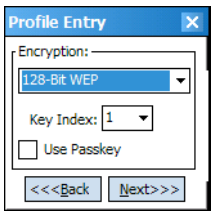


Figure 5-20 *Encryption Dialog Box*

Table 5-10 *Encryption Options*

Encryption	Description
Open	Select *Open* (the default) when no data packet encryption is needed over the network. Selecting this option provides no security for data transmitting over the network.
40-Bit WEP	Select 40-Bit WEP to use 40-bit key length WEP encryption. WEP keys are manually entered in the edit boxes. Only the required number of edit boxes for a key length is displayed (10 Hex digit value for 40-bit keys). Use the **Key Index** drop-down list to configure the four WEP keys. The adapter uses the selected key. Note: The default Hex digit keys are visible any time they are used. As a security precaution after setting the key values for the network, the digits are replaced with asterisks * in the encryption key fields. If the associated AP uses an optional passkey, the active adapter WLAN profile must use one as well. The passkey is a plain text representation of the WEP keys displayed in the encryption dialog box. The passkey provides an easy way to enter WEP key data without having to remember the entire 40-bit (10 character) Hex digit string.
128-Bit WEP	Select 128-Bit WEP to use 128-bit key length WEP encryption. WEP keys are manually entered in the edit boxes. Only the required number of edit boxes for a key length is displayed (26 Hex digit value for 128-bit keys). Use the **Key Index** drop-down list to configure the four WEP keys. The adapter uses the selected key. Note: The default Hex digit keys are visible any time they are used. As a security precaution after setting the key values for the network, the digits are replaced with asterisks * in the encryption key fields. If the associated AP uses an optional passkey, the active adapter WLAN profile must use one as well. The passkey is a plain text representation of the WEP keys displayed in the encryption dialog box. The passkey provides an easy way to enter WEP key data without having to remember the entire 128-bit (26 character) Hex digit string.
TKIP	Select this option to use Wireless Protected Access (WPA) via TKIP. Manually enter the shared keys in the passkey field. Tap **Next** to display the passkey dialog box. Enter an 8 to 63 character string.

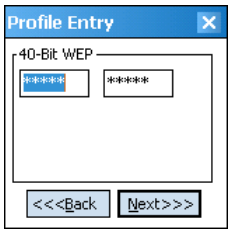
Table 5-11 *Encryption / Authentication Matrix*

	Encryption		
Authentication	**Open**	**WEP**	**TKIP**
None	Yes	Yes	Yes
EAP TLS	No	Yes	Yes
PEAP	No	Yes	Yes
LEAP	No	Yes	Yes
TTLS	No	Yes	Yes

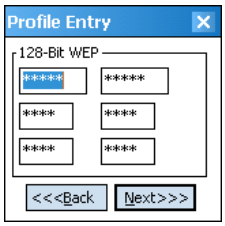
Key Entry Page

If you select either **40-Bit WEP** or **128-Bit WEP**, and set Authentication to **None**, the wizard proceeds to the key entry dialog box unless the **Use Passkey** check box was selected in the **Encryption** dialog box (see *Figure 4-21 on page 4-17*). To enter the key information:

1. Enter the 40-bit or 128-bit keys into the fields.
2. Tap **Next**.



40-Bit WEP Keys Dialog Box



128-Bit WEP Keys Dialog Box

Figure 5-21 *40-Bit and 128-Bit WEP Keys Dialog Boxes*

Passkey Dialog

When you select **None** as an authentication and **WEP** as an encryption, you can choose to enter a passkey by checking the **Use PassKey** check box. The user is prompted to enter the passkey. For WEP, the **Use PassKey** checkbox is only available if the authentication is **None**.

When you select **None** as an authentication and **TKIP** as an encryption, you must enter a passkey. The user cannot enter a passkey if the encryption is **TKIP** and the authentication is anything other than **None**.

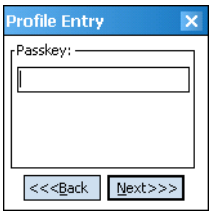


Figure 5-22 *Passkey Dialog Box*

Tap **Next**. The **IP Address Entry** dialog box displays.

IP Address Entry

Use the **IP Address Entry** dialog box to configure network address parameters: IP address, subnet, gateway, DNS, and WINS.

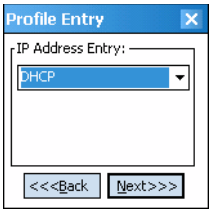


Figure 5-23 *IP Address Entry Dialog Box*

Table 5-12 *IP Address Entry*

Encryption	Description
DHCP	Select Dynamic Host Configuration Protocol (**DHCP**) from the **IP Address Entry** drop-down list to obtain a leased IP address and network configuration information from a remote server. DHCP is the default setting for the mobile computer profile. When DHCP is selected, the IP address fields are read-only.
Static	Select **Static** to manually assign the IP, subnet mask, default gateway, DNS, and WINS addresses the mobile computer profile uses.

Select either **DHCP** or **Static** from the drop-down list and tap **Next**. Selecting **Static IP** displays the **IP Address Entry** dialog box. Selecting **DHCP** displays the **Transmit Power** dialog box.

Use the **IP Address Entry** dialog box to enter the IP address and subnet information.

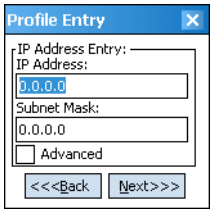


Figure 5-24 *Static IP Address Entry Dialog Box*

Table 5-13 *Static IP Address Entry Fields*

Field	Description
IP Address	The Internet is a collection of networks with users that communicate with each other. Each communication carries the address of the source and destination networks and the particular machine within the network associated with the user or host computer at each end. This address is called the IP address (Internet Protocol address). Each node on the IP network must be assigned a unique IP address that is made up of a network identifier and a host identifier. Enter the IP address as a dotted-decimal notation with the decimal value of each octet separated by a period, for example, 192.168.7.27.
Subnet Mask	Most TCP/IP networks use subnets to manage routed IP addresses. Dividing an organization's network into subnets allows it to connect to the Internet with a single shared network address, for example, 255.255.255.0.

Select the **Advanced** check box, then tap **NEXT** to display the **Advanced Address Entry** dialog box. Enter the Gateway, DNS, and WINS address. Tap **NEXT** without selecting the **Advanced** check box to display the **Transmit Power** dialog box.

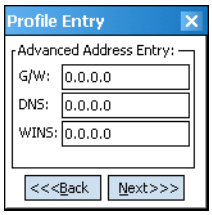


Figure 5-25 *Advanced Address Entry Dialog Box*

The IP information entered in the profile is only used if you selected the **Enable IP Mgmt** check box in the **Options** > **System Options** dialog box (*System Options on page 4-38*). If you didn't select this, the IP information in the profile is ignored and the IP information entered in the Microsoft interface applies.

Table 5-14 *IP Config Advanced Address Entry Fields*

Field	Description
G/W	The default gateway forwards IP packets to and from a remote destination.
DNS	The Domain Name System (DNS) is a distributed Internet directory service. DNS translates domain names and IP addresses, and controls Internet email delivery. Most Internet services require DNS to operate properly. If DNS is not configured, Web sites cannot be located and/or email delivery fails.
WINS	WINS is a Microsoft® Net BIOS name server. WINS eliminates the broadcasts needed to resolve computer names to IP addresses by providing a cache or database of translations.

Tap **Next**. The **Transmit Power** dialog box displays.

Transmit Power

The **Transmit Power** drop-down list contains different options for Ad-Hoc and Infrastructure mode. Automatic (i.e., use the current AP settings) and Power Plus (use higher than the current AP settings) are available for **Infrastructure** mode.

Adjusting the radio transmission power level enables the user to expand or confine the transmission area with respect to other wireless devices that could be operating nearby. Reducing coverage in high traffic areas improves transmission quality by reducing the amount of interference in that coverage area.

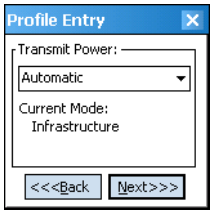


Figure 5-26 *Transmit Power Dialog Box (Infrastructure Mode)*

Table 5-15 *Transmit Power Dialog Box (Infrastructure Mode)*

Field	Description
Automatic	Select **Automatic** (the default) to use the AP power level.
Power Plus	Select **Power Plus** to set the mobile computer transmission power one level higher than the level set for the AP.

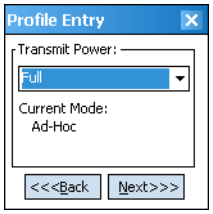


Figure 5-27 *Transmit Power Dialog Box (Ad-Hoc Mode)*

Table 5-16 *Power Transmit Options (Ad-Hoc Mode)*

Field	Description
Full	Select **Full** power for the highest transmission power level. Select **Full** power when operating in highly reflective environments and areas where other devices could be operating nearby, or when attempting to communicate with devices at the outer edge of a coverage area.
30 mW	Select **30 mW** to set the transmit power level to 30 mW.
15 mW	Select **15 mW** to set the transmit power level to 15 mW.
5 mW	Select **5 mW** to set the transmit power level to 5 mW.
1 mW	Select **1 mW** for the lowest transmission power level. Use this level when communicating with other devices in very close proximity, or in instances where you expect little or no radio interference from other devices.

Tap **Next** to display the **Battery Usage** dialog box.

Battery Usage

Use the **Battery Usage** dialog box to select power consumption of the wireless LAN. There are three settings available: CAM, Fast Power Save, and MAX Power Save. Battery usage cannot be configured in Ad-Hoc profiles.

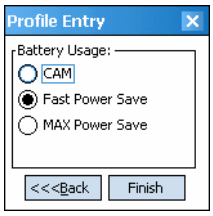


Figure 5-28 *Battery Usage Dialog Box*

NOTE Power consumption is also related to the transmit power settings.

Table 5-17 *Battery Usage Options*

Field	Description
CAM	Continuous Aware Mode (**CAM**) provides the best network performance, but yields the shortest battery life.
Fast Power Save	**Fast Power Save** (the default) performs in the middle of CAM and MAX Power Save with respect to network performance and battery life.
MAX Power Save	**Max Power Save** yields the longest battery life while potentially reducing network performance. In networks with minimal latency, Max Power Save performs as well as Fast Power Save, but with increased battery conservation.

Manage Profiles Application

The **Manage Profiles** window provides a list of user-configured wireless profiles. Define up to 32 profiles at any one time. To open the **Manage Profiles** window, tap the **Signal Strength** icon > **Manage Profiles**.

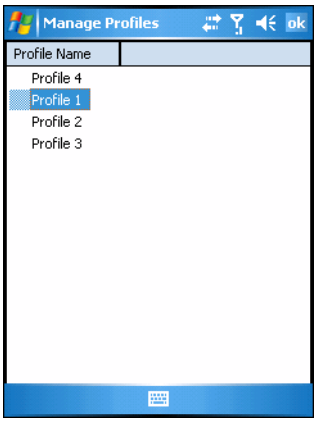


Figure 5-29 *Manage Profiles Window*

Icons next to each profile identify the profile's current state.

Table 5-18 *Profile Icons*

Icon	Description
No Icon	Profile is not selected, but enabled.
	Profile is disabled.
	Profile is cancelled. A cancelled profile is disabled until a connect or login function is performed through the configuration editor.
	Profile is in use and describes an infrastructure profile not using encryption.
	Profile is in use and describes an infrastructure profile using encryption.
	Profile is in use and describes an ad-hoc profile not using encryption.
	Profile is in use and describes an ad-hoc profile using encryption.
	Profile is not valid in the device current operating regulatory domain.

The profiles are listed in priority order for use by the automatic roaming feature. Change the order by moving profiles up or down. To edit existing profiles, tap and hold one in the list and select an option from the menu to connect, edit, disable (enable), or delete the profile. (Note that the **Disable** menu item changes to **Enable** if the profile is already disabled.)

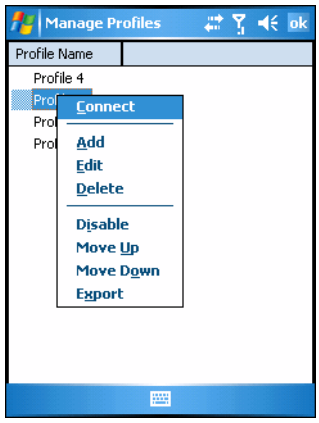


Figure 5-30 *Manage Profiles Context Menu*

Changing Profiles

A completed profile is a set of configuration settings that can be used in different locations to connect to a wireless network. Create different profiles to have pre-defined operating parameters available for use in various network environments. When the **WLAN Profiles** window displays, existing profiles appear in the list.

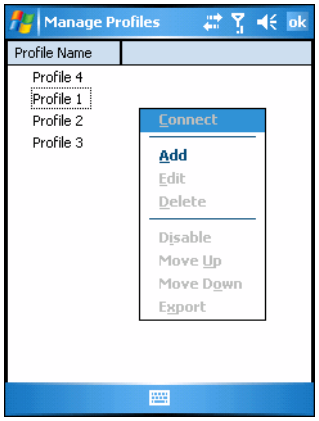


Figure 5-31 *Manage Profiles*

Tap and hold a profile and select **Connect** from the pop-up menu to set this as the active profile. Once selected, the mobile computer uses the authentication, encryption, ESSID, IP Config, and power consumption settings configured for that profile.

Editing a Profile

Tap and hold a profile and select **Edit** from the pop-up menu to display the **Profile Wizard** where you can set the ESSID and operating mode for the profile. Use the **Profile Wizard** to edit the profile power consumption and security parameters. *See Profile Editor Wizard on page 4-6*.

Creating a New Profile

To create new profiles from the **Manage Profiles** window, tap-and-hold anywhere in this window.

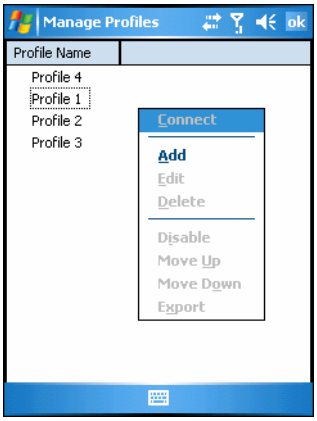


Figure 5-32 *Manage Profiles - Add*

Select **Add** to display the **Profile Wizard** wherein you can set the profile name and ESSID. Set security, network address information, and power consumption level for the new profile.

Deleting a Profile

To delete a profile from the list, tap and hold and select **Delete** from the pop-up menu. A confirmation dialog box appears.

Ordering Profiles

Tap and hold a profile from the list and select **Move Up or Move Down** to order the profile. If the current profile association is lost, the mobile computer attempts to associate with the first profile in the list, then the next, until it achieves a new association.

NOTE Profile Roaming must be enabled.

Export a Profile

To export a profile to a registry file, tap and hold a profile from the list and select **Export** from the pop-up menu. The **Save As** dialog box displays with the **Application** folder and a default name of WCS_PROFILE{*profile GUID*}.reg (Globally Unique Identifier).

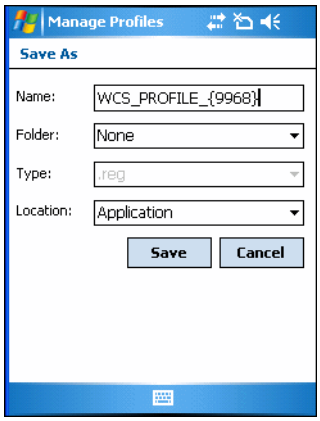


Figure 5-33 *Save As Dialog Box*

If required, change the name in the **Name** field and tap **Save**. A confirmation dialog box appears after the export completes.

Wireless Status Application

To open the **Wireless Status** window, tap the **Signal Strength** icon > **Wireless Status**. The **Wireless Status** window displays information about the wireless connection.

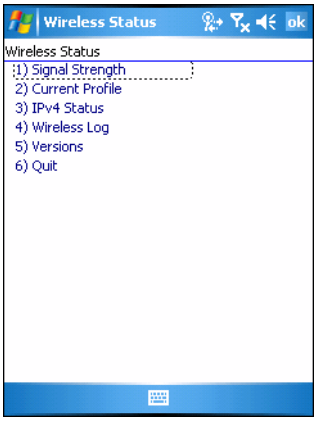


Figure 5-34 *Wireless Status Window*

The **Wireless Status** window contains the following options. Tap the option to display the option window.

- Signal Strength - provides information about the connection status of the current wireless profile.
- Current Profile - displays basic information about the current profile and connection settings.

- IPv4 Status - displays the current IP address, subnet, and other IP related information assigned to the mobile computer.
- Wireless Log - displays a log of important recent activity, such as authentication, association, and DHCP renewal completion, in time order.
- Versions - displays software, firmware, and hardware version numbers.
- Quit - exits the **Wireless Status** window.

Option windows contain a back button  to return to the main **Wireless Status** window.

Signal Strength Window

The **Signal Strength** window provides information about the connection status of the current wireless profile including signal quality, missed beacons, and transmit retry statistics. The BSSID address (shown as *AP MAC Address*) displays the AP currently associated with the connection. In Ad-Hoc mode, the AP MAC Address shows the BSSID of the Ad-Hoc network. Information in this window updates every 2 seconds.

To open the **Signal Status** window, tap **Signal Strength** in the **Wireless Status** window.

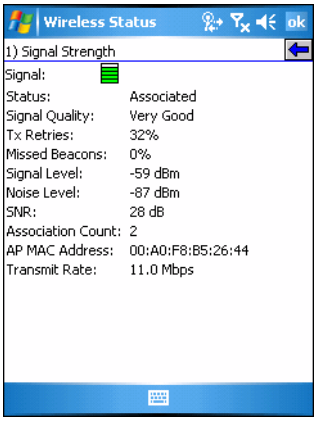


Figure 5-35 *Signal Strength Window*

After viewing the **Signal Strength** window, tap the back button to return to the **Wireless Status** window.

Table 5-19 *Signal Strength Status*

Field	Description
Signal	Displays the Relative Signal Strength Indicator (RSSI) of the signal transmitted between the AP and mobile computer. As long as the Signal Quality icon is green the AP association is not jeopardized. If the icon is red (poor signal), an association with a different AP could be warranted to improve the signal. The signal strength icon changes depending on the signal strength.
	 Excellent Signal
	 Very Good Signal
	 Good Signal
	 Fair Signal
	 Poor Signal
	 Out of Range (no signal)
	 The radio card is off or there is a problem communicating with the radio card.
Status	Indicates if the mobile computer is associated with the AP.
Signal Quality	Displays a text format of the Signal icon.
Tx Retries	Displays a percentage of the number of data packets the mobile computer retransmits. The fewer transmit retries, the more efficient the wireless network is.
Missed Beacons	Displays a percentage of the amount of beacons the mobile computer missed. The fewer transmit retries, the more efficient the wireless network is. Beacons are uniform system packets broadcast by the AP to keep the network synchronized.
Signal Level	The AP signal level in decibels per milliwatt (dBm).
Noise Level	The background interference (noise) level in decibels per milliwatt (dBm).
SNR	The access point/mobile computer Signal to Noise Ratio (SNR) of signal strength to noise (interference) in decibels per milliwatt (dBm).
Association Count	Displays the number of APs the mobile computer connects to while roaming.
AP MAC Address	Displays the MAC address of the AP to which the mobile computer is connected.
Transmit Rate	Displays the current rate of the data transmission.

Current Profile Window

The **Current Profile** window displays basic information about the current profile and connection settings. This window updates every two seconds.

To open the **Current Profile** window, tap **Current Profile** in the **Wireless Status** window.

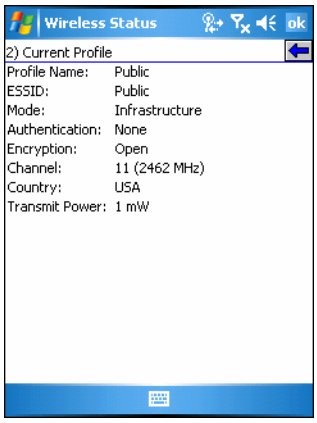


Figure 5-36 *Current Profile Window*

Table 5-20 *Current Profile Window*

Field	Description
Profile Name	Displays the current profile name the mobile computer uses to communicate with the AP.
ESSID	Displays the current profile ESSID name.
Mode	Displays the current profile mode, either Infrastructure or Ad-Hoc.
Authentication	Displays the current profile's authentication type.
Encryption	Displays the current profile's encryption type.
Channel	Displays the current profile's channel setting.
Country	Displays the current profile's country setting.
Transmit Power	Displays the radio transmission power level.

IPv4 Status Window

The **IPv4 Status** window displays the current IP address, subnet, and other IP related information assigned to the mobile computer. It also allows renewing the address if the profile is using DHCP to obtain the IP information. Tap **Renew** to initiate a full DHCP discover. The **IPv4 Status** window updates automatically when the IP address changes.

To open the **IPv4 Status** window, tap **IPv4 Status** in the **Wireless Status** window.

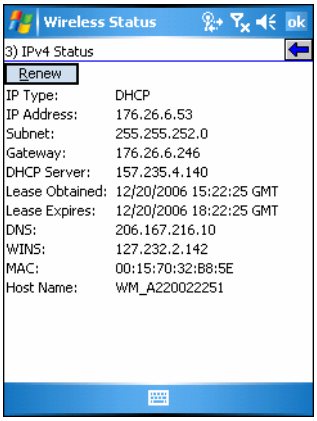


Figure 5-37 *IPv4 Status Window*

Table 5-21 *IPv4 Status Fields*

Field	Description
IP Type	Displays the IP type for the current profile: **DHCP** or **Static**. If the IP type is DHCP, leased IP address and network address data appear for the mobile computer. If the IP type is Static, the values displayed were input manually in the **IP Config** tab on page 4-19.
IP Address	Displays the mobile computer's IP address. The Internet is a collection of networks with users that communicate with each other. Each communication carries the address of the source and destination networks and the particular machine within the network associated with the user or host computer at each end. This address is called the IP address. Each node on the IP network must be assigned a unique IP address that is made up of a network identifier and a host identifier. The IP address as a dotted-decimal notation with the decimal value of each octet separated by a period, for example, 192.168.7.27.
Subnet	Displays the subnet address. Most TCP/IP networks use subnets to manage routed IP addresses. Dividing an organization's network into subnets allows it to connect to the Internet with a single shared network address, for example, 255.255.255.0.
Gateway	Displays the gateway address. A gateway forwards IP packets to and from a remote destination.
DCHP Server	The Domain Name System (DNS) is a distributed Internet directory service. DNS translates domain names and IP addresses, and controls Internet e-mail delivery. Most Internet services require DNS to operate properly. If DNS is not configured, Web sites cannot be located or e-mail delivery fails.
Lease Obtained	Displays the date that the IP address was obtained.
Lease Expires	Displays the date that the IP address expires and a new IP address is requested.

Table 5-21 *IPv4 Status Fields (Continued)*

Field	Description
DNS	Displays the IP address of the DNS server.
WINS	WINS is a Microsoft Net BIOS name server. WINS eliminates the broadcasts needed to resolve computer names to IP addresses by providing a cache or database of translations.
MAC	An IEEE 48-bit address is assigned to the mobile computer at the factory to uniquely identify the adapter at the physical layer.
Host Name	Displays the name of the mobile computer.

Wireless Log Window

The **Wireless Log** window displays a log of recent activity, such as authentication, association, and DHCP renewal completion, in time order. Save the log to a file or clear the log (within this instance of the application only). The auto-scroll feature automatically scrolls down when new items are added to the log.

To open the **Wireless Log** window, tap **Wireless Log** in the **Wireless Status** window. The **Wireless Log** window displays.

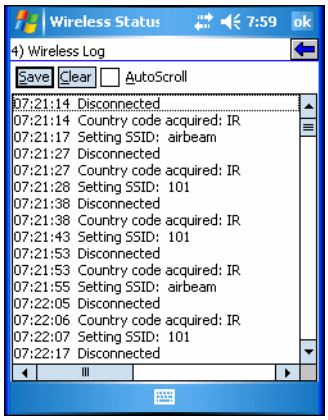


Figure 5-38 *Wireless Log Window*

Saving a Log

To save a Wireless Log:

1. Tap the **Save** button. The **Save As** dialog box displays.
2. Navigate to the desired folder.
3. In the **Name** filed, enter a file name and then tap **OK**. A text file is saved in the selected folder.

Clearing the Log

To clear the log, tap **Clear**.

Versions Window

The **Versions** window displays software, firmware, and hardware version numbers. This window only updates when it is displayed. There is no need to update constantly. The content of the window is determined at runtime, along with the actual hardware and software to display in the list. Executable paths of the software components on the list are defined in registry, so that the application can retrieve version information from the executable. “File not found” appears if the executable cannot be found at the specified path.

To open the **Versions** window, tap **Versions** in the **Wireless Status** window.

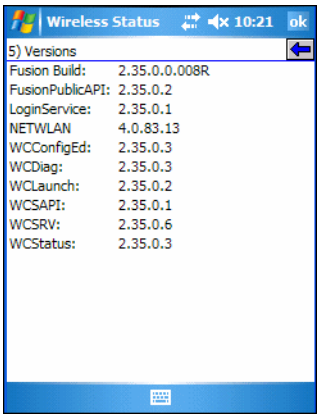


Figure 5-39 *Versions Window*

The window displays software version numbers for the following:

- Fusion Build
- Fusion Public API
- LoginService
- NETWLAN
- WCConfigEd
- WCDiag
- WCLaunch
- WCSAPI
- WCSRV
- WCStatus.

Wireless Diagnostics Application

The **Wireless Diagnostics** application window provides links to perform ICMP Ping, Trace Routing, and Known APs. To open the **Wireless Diagnostics** window, tap the **Signal Strength** icon > **Wireless Diagnostics**.

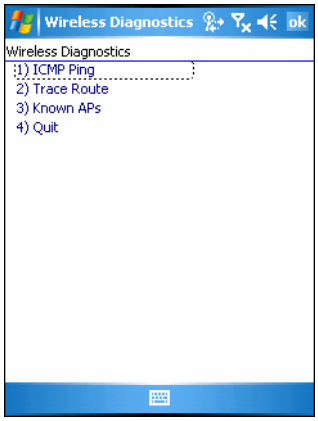


Figure 5-40 *Wireless Diagnostics Window*

The **Wireless Diagnostics** window contains the following options. Tap the option to display the option window.

- ICMP Ping - tests the wireless network connection.
- Trace Route - tests a connection at the network layer between the mobile computer and any place on the network.
- Known APs - displays the APs in range using the same ESSID as the mobile computer.
- Quit - Exits the **Wireless Diagnostics** window.

Option windows contain a back button  to return to the **Wireless Diagnostics** window.

ICMP Ping Window

The **ICMP Ping** window allows testing a connection at the network layer (part of the IP protocol) between the mobile computer and an AP. Ping tests only stop when you tap the **Stop Test** button, close the **Wireless Diagnostics** application, or if the mobile computer switches between infrastructure and ad-hoc modes.

To open the **ICMP Ping** window, tap **ICMP Ping** in the **Wireless Diagnostics** window.

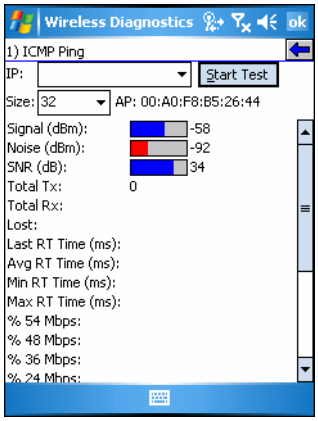


Figure 5-41 *ICMP Ping Window*

To perform an ICMP ping:

1. In the **IP** field, enter an IP address or select an IP address from the drop-down list.
2. From the **Size** drop-down list, select a size value.
3. Tap **Start Test**. The ICMP Ping test starts. Information of the ping test displays in the appropriate fields.

Trace Route Window

Trace Route traces a packet from a computer to a host, showing how many hops the packet requires to reach the host and how long each hop takes. The **Trace Route** utility identifies where the longest delays occur.

The **Trace Route** window allows testing a connection at the network layer (part of the IP protocol) between the mobile computer and any place on the network.

To open the **Trace Route** window, tap **Trace Route** in the **Wireless Diagnostics** window.

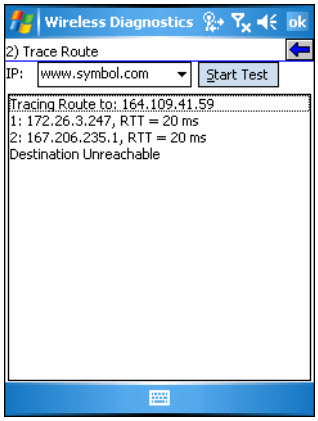


Figure 5-42 *Trace Route Window*

Enter an IP address or a DNS Name in the IP combo box, and tap **Start Test**. The IP combo box should match the information shown in the **ICMP Ping** window's IP combo box. When starting a test, the trace route attempts to find all routers between the mobile computer and the destination. The Round Trip Time (RTT) between the mobile computer and each router appears, along with the total test time. The total test time may be longer than all RTTs added together because it does not only include time on the network.

Known APs Window

The **Known APs** window displays the APs in range using the same ESSID as the mobile computer. This window is only available in **Infrastructure** mode. To open the **Known APs** window, tap **Known APs** in the **Wireless Diagnostics** window.

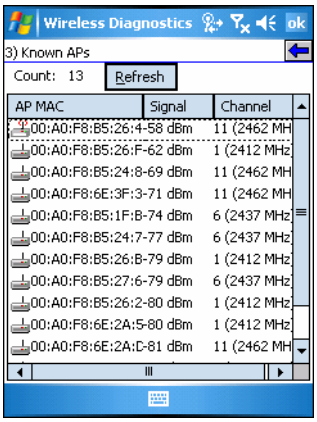


Figure 5-43 *Known APs Window*

See *Table 5-22* for the definitions of the icons next to the AP.

Table 5-22 *Current Profile Window*

Icon	Description
	The AP is the associated access point, and is set to mandatory.
	The AP is the associated access point, but is not set to mandatory.
	The mobile computer is not associated to this AP, but the AP is set as mandatory.
	The mobile computer is not associated to this AP, and AP is not set as mandatory.

Tap and hold on an AP to display a pop-up menu with the following options: **Set Mandatory** and **Set Roaming**.

Select **Set Mandatory** to prohibit the mobile computer from associating with a different AP. The letter *M* displays on top of the icon. The mobile computer connects to the selected AP and never roams until:

- You select **Set Roaming**
- The mobile computer roams to a new profile
- The mobile computer suspends
- The mobile computer resets (warm or cold).

Select **Set Roaming** to allow the mobile computer to roam to any AP with a better signal. These settings are temporary and never saved to the registry.

Tap **Refresh** to update the list of the APs with the same ESSID. The highest signal strength value is 32.

Options

Use the wireless **Option** dialog box to select one of the following operation options from the drop-down list:

- Operating Mode Filtering
- Regulatory
- Band Selection
- System Options
- Change Password
- Export.

Operating Mode Filtering

The **Operating Mode Filtering** options cause the Find WLANs application to filter the available networks found.

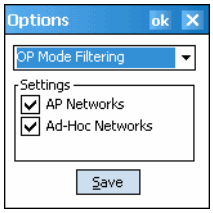


Figure 5-44 *OP Mode Filtering Dialog Box*

The **AP Networks** and **Ad-Hoc Networks** check boxes are selected by default.

Table 5-23 *OP Mode Filtering Options*

Field	Description
AP Networks	Select the **AP Networks** check box to display available AP networks and their signal strength within the **Available WLAN Networks** (see *Find WLANs Application on page 4-5*). These are the APs available to the mobile computer profile for association. If this option was previously disabled, refresh the **Available WLAN Networks** window to display the AP networks available to the mobile computer.
AD-Hoc Networks	Select the **Ad-Hoc Networks** check box to display available peer (adapter) networks and their signal strength within the **Available WLAN Networks**. These are peer networks available to the mobile computer profile for association. If this option was previously disabled, refresh the **Available WLAN Networks** window to display the Ad Hoc networks available to the mobile computer.

Tap **Save** to save the settings or tap **X** to discard any changes.

Band Selection

Band Selection identifies the frequency bands scanned when finding WLANs on a 802.11 standard networks.

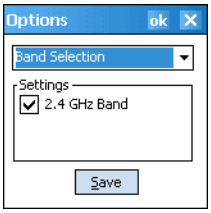


Figure 5-45 *Band Selection Dialog Box*

Table 5-24 *Band Selection Options*

Field	Description
2.4GHz Band	The **Find WLANs** application list includes all networks found in the 2.4 GHz band (802.11b and 802.11g).

Tap **Save** to save the settings or tap **X** to discard any changes.

System Options

Use **System Options** to set miscellaneous system setting.

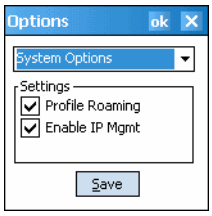


Figure 5-46 *System Options Dialog Box*

Table 5-25 *System Options*

Field	Description
Profile Roaming	Configures the mobile computer to roam to the next available WLAN profile when it moves out of range of the current WLAN profile.
Enable IP Mgmt	Enables the Wireless Companion Services to handle IP address management. The Wireless Companion Service configures the IP based on what is configured in the network profile. Deselect this to manually configure the IP in the standard Windows IP window. Enabled by default.

Change Password

Use **Change Password** to require a password before editing a profile. This allows pre-configuring profiles and prevents users from changing the network settings. The user can use this feature to protect settings from a guest user. By default, the password is not set.

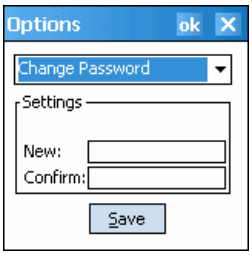


Figure 5-47 *Change Password Window*

To create a password for the first time, leave the **Current:** text box empty and enter the new password in the **New:** and **Confirm:** text boxes. Tap **Save**.

To change an existing password, enter the current password in the **Current:** text box and enter the new password in the **New:** and **Confirm:** text boxes. Tap **Save**.

To delete the password, enter the current password in the **Current:** text box and leave the **New:** and **Confirm:** text boxes empty. Tap **Save.**

NOTE Passwords are case sensitive and can not exceed 160 characters.

Export

NOTE Exporting options enables settings to persists after clean boot. See *Persistence on page 5-38* for more information.

Use **Export** to export all profiles to a registry file, and to export the options to a registry file.

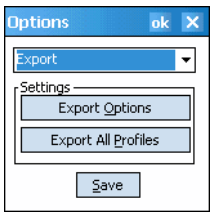


Figure 5-48 *Options - Export Dialog Box*

To export options:

1. Tap **Export Options**. The **Save As** dialog box displays.

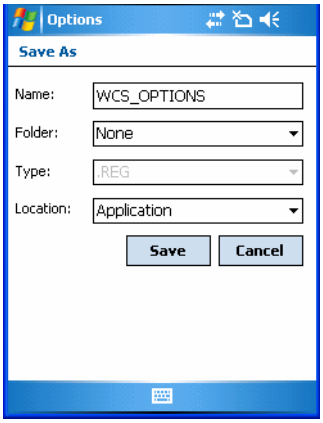


Figure 5-49 *Export Options Save As Dialog Box*

2. Enter a filename in the **Name:** field. The default filename is WCS_OPTIONS.REG.
3. Tap **Save**.

To export all profiles:

1. Tap **Export All Profiles**. The **Save As** dialog box displays.

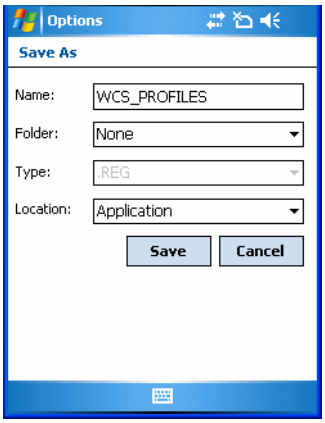


Figure 5-50 *Export All Profiles Save As Dialog Box*

2. Enter a filename in the **Name:** field. The default filename is WCS_PROFILES.REG.
3. In the **Folder:** drop-down list, select the desired folder.
4. Tap **Save**.

Selecting **Export All Profiles** saves the current profile. This information is used to determine which profile to connect with after a warm boot or cold boot.

Persistence

Export options and profiles to provide clean boot persistence. Save the exported registry files in the **Application** folder to use them on a clean boot and restore previous profile and option settings.

Currently, only server certificates can be saved for persistence. To save server certificates for persistence, save the certificate files in the folder **Application** to install the certificates automatically on a clean boot.

NOTE User certificates cannot be saved for clean boot persistence at this time.

Log On/Off Application

When the user launches the *Log On/Off* application, the mobile computer may be in two states; the user may be logged onto the mobile computer by already entering credentials through the login box, or there is no user logged on. Each of these states have a separate set of use cases and a different look to the dialog box, such as the sample below.

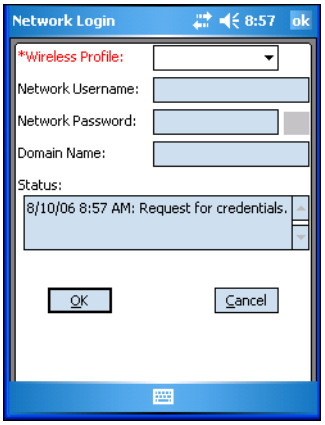


Figure 5-51 *Wireless Network Login Dialog Box*

User Already Logged In

If already logged into the mobile computer, the user can launch the login dialog box for the following reasons:

- To connect to and re-enable a cancelled profile. To do this:
  - Launch the **Network Login** dialog.
  - Select the cancelled profile from the **Wireless Profile** list.
  - Log in to the profile.

NOTE Alternatively, use the Profile Editor Wizard to re-enable cancelled profiles, and choose to connect to the cancelled profile. Logging in as a new user also re-enables cancelled profiles.

- To log off the mobile computer to prevent another user from accessing the current user's network privileges.
- To quickly log off the mobile computer and allow another user to log into the mobile computer.

No User Logged In

If no user is logged into the mobile computer, launch the login dialog box and log in to access user profiles.

The **Login** dialog box varies if it is:

- Launched by WCS, because the service is connecting to a new profile that needs credentials.
- Launched by WCS, because the service is trying to verify the credentials due to credential caching rules.
- Launched by a user, when a user is logged in.

- Launched by a user, when no user is logged in.

Table 5-26 *Log On/Off Options*

Field	Description
Wireless Profile Field	When launching the login application, the **Wireless Profile** field lists all the wireless profiles that require credentials. This includes profiles that use EAP TLS, PEAP, LEAP, and EAP-TTLS.
Profile Status Icon	The profile status icon (next to the profile name) shows one of the following states: The selected profile is cancelled. The selected profile is enabled but is not the current profile. The profile is the current profile (always the case for WCS Launched).
Network Username and Password Fields	The **Network Username** and **Network Password** fields are used as credentials for the profile selected in the **Wireless Profile** field. Currently these fields are limited to 159 characters.
Mask Password Checkbox	The **Mask Password** checkbox determines whether the password field is masked (i.e., displays only the '*' character) or unmasked (i.e., displays the entered text). Check the box to unmask the password. Uncheck the box to mask the password (the default).
Status Field	The **Status** field displays status that is important to the login dialog. If the user opens the dialog and needs to prompt for credentials for a particular profile, it can use the **Status** field to let the user know that the network is held because the password dialog is open.

- Tap **OK** to send the credentials through WCS API. If there are no credentials entered, a dialog box indicates which field was not entered.
- The **Log Off** button only appears when a user is already logged on. When you tap the **Log Off** button, select one of three options:
  - **Log Off** logs off the current user and closes the login dialog box.
  - **Switch Users** logs off the current user and re-initializes the login dialog box to appear when there is no user logged on.
  - **Cancel** closes the logoff dialog box and displays the login dialog box.
- When the user is logged off, the mobile computer only roams to profiles that do not require credentials or profiles created with the credentials entered into the profile.
- The **Cancel** button closes the dialog without logging into the network. If the WCS launched the login dialog rather than the user, tapping **Cancel** displays a warning that the cancel disables the current profile. If you still choose to cancel the login, the profile is cancelled. Cancelling a profile suppresses it until a user re-enables it or a new user logs onto the mobile computer.

Registry Settings

Use a registry key to modify some of the parameters. The registry path is:

HKLM\SOFTWARE\Symbol Technologies, Inc.\Configuration Editor

Table 5-27 *Registry Parameter Settings*

Key	Type	Default	Description
CertificateDirectory	REG_SZ	\\Windows	The default directory to find certificates.
EncryptionMask	REG_DWORD	0x0000001F	Defines the supported encryption types. This is a bitwise mask with each bit corresponding to an encryption type. 1 = Type is supported 0 = Type is not supported Bit Number — Encryption Type 0 — None 1 — 40-Bit WEP 2 — 128-Bit WEP 3 — TKIP

Chapter 6

Maintenance & Troubleshooting

Introduction

This chapter includes instructions on cleaning and storing the mobile computer, and provides troubleshooting solutions for potential problems during mobile computer operation.

Maintaining the Mobile Computer

For trouble-free service, observe the following tips when using the mobile computer:

- Do not scratch the screen of the mobile computer. When working with the mobile computer, use the supplied stylus or plastic-tipped pens intended for use with a touch-sensitive screen. Never use an actual pen or pencil or other sharp object on the surface of the mobile computer screen.

  Zebra recommends using a screen protector, p/n KT-67525-01.
- The mobile computer is not water and dust resistant. Do not expose it to rain or moisture for an extended period of time. In general, treat the mobile computer as a pocket calculator or other small electronic instrument.
- The touch-sensitive screen of the mobile computer is glass. Do not to drop the mobile computer or subject it to strong impact.
- Protect the mobile computer from temperature extremes. Do not leave it on the dashboard of a car on a hot day, and keep it away from heat sources.
- Do not store or use the mobile computer in any location that is dusty, damp, or wet.
- Use a soft lens cloth to clean the mobile computer. If the surface of the mobile computer screen becomes soiled, clean it with a soft cloth moistened with a diluted window-cleaning solution.
- Periodically replace the rechargeable battery to ensure maximum battery life and product performance. Battery life depends on individual usage patterns.
- The MC50 battery requires periodic calibration to maintain an accurate calibration of the battery's gas gauge. To calibrate the battery, deplete the battery completely from a full charge condition. Zebra recommends performing this once a week.

Troubleshooting

Mobile Computer

Table 6-1 *Troubleshooting the Mobile Computer*

Problem	Cause	Solution
Mobile computer does not turn on.	Lithium-ion battery not charged.	Charge or replace the lithium-ion battery in the mobile computer.
	Lithium-ion battery not installed properly.	Ensure battery is installed properly. See *Installing and Removing the Main Battery on page 1-3*.
	System crash.	Perform a warm boot. If the mobile computer still does not turn on, perform a cold boot. See *Resetting the Mobile Computer on page 1-6*.
Rechargeable lithium-ion battery did not charge.	Battery failed.	Replace battery. If the mobile computer still does not operate, try a warm boot, then a cold boot. See *Resetting the Mobile Computer on page 1-6*.
	Mobile computer removed from cradle while battery was charging.	Insert mobile computer in cradle and begin charging. The standard battery requires approximately 3.5 hours and the extended capacity battery requires approximately seven hours to charge.
Cannot see characters on display.	Mobile computer not powered on.	Press the **Power** button.
During data communication, no data was transmitted, or transmitted data was incomplete.	Mobile computer removed from cradle or unplugged from host computer during communication.	Replace the mobile computer in the cradle, or reattach the CAM data cable and re-transmit.
	Incorrect cable configuration.	See the System Administrator.
	Communication software was incorrectly installed or configured.	Perform setup as described in *Chapter 3, ActiveSync*.
Mobile computer does not emit sound.	Volume setting is low or turned off.	Increase the volume using the volume buttons on the side of the mobile computer.

Table 6-1 *Troubleshooting the Mobile Computer (Continued)*

Problem	Cause	Solution
Mobile computer turns itself off.	Mobile computer is inactive.	The mobile computer turns off after a period of inactivity. This period can be set from 1 to 5 minutes, in one-minute intervals. Check the *Power* window by selecting **Start > Settings > System** tab **> Power icon > Advanced** tab. Change the setting for a longer delay before the automatic shutoff feature activates.
	Battery is not inserted properly.	Insert the battery properly. See *Installing and Removing the Main Battery on page 1-3*.
	Battery is depleted.	Recharge or replace the battery.
	Battery has exhausted its usable life.	Replace the battery.
	Battery's gas gauge has lost calibration.	Re-calibrate the battery. See *Calibrating the Battery on page 1-5*.
Pressing keys or buttons does not activate the corresponding feature.	Keypad is locked.	Place the keypad lock switch into the unlocked position.
Tapping the window buttons or icons does not activate the corresponding feature.	LCD screen not aligned correctly.	Re-calibrate the screen. Tap **Start** > **Settings** > **System** > **Screen** icon, then tap the **Align Screen** button.
	The system is not responding.	Warm boot the system. See *Resetting the Mobile Computer on page 1-6*.
A message appears stating that the mobile computer memory is full.	Too many files stored on the mobile computer.	Delete unused memos and records. If necessary, save these records on the host computer.
	Too many applications installed on the mobile computer.	Remove unused installed applications from the mobile computer to recover memory. Select **Start** > **Settings** > **System** tab and tap the **Remove Programs** icon. Select the unused program and tap **Remove.**

Table 6-1 *Troubleshooting the Mobile Computer (Continued)*

Problem	Cause	Solution
The mobile computer does not accept scan input. (Does not apply to camera configurations.)	Scanning application is not loaded.	Verify that the mobile computer is loaded with a scanning application. See the System Administrator.
	Unreadable bar code.	Ensure the symbol is not defaced.
	Distance between exit window and bar code is incorrect.	Ensure mobile computer is within proper scanning range.
	Mobile computer is not programmed for the bar code type.	Ensure the mobile computer is programmed to accept the type of bar code scanned.
	Mobile computer is not programmed to generate a beep.	If a beep on a good decode is expected and a beep is not heard, check that the application is set to generate a beep on good decode.
	Battery is low.	If the scanner stops emitting a laser beam or aiming pattern upon a trigger press, check the battery level. When the battery is low, the scanner shuts off before the mobile computer low battery condition notification. Note: If the scanner is still not reading symbols, contact the distributor or Zebra.

Four Slot Spare Battery Charger

Table 6-2 *Troubleshooting the Four Slot Spare Battery Charger*

Symptom	Possible Cause	Action
Battery not charging.	Battery was removed from the charger or charger was unplugged from AC power too soon.	Re-insert the battery in the charger or re-connect the charger's power supply.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	Battery contacts not connected to charger.	Verify that the battery is seated in the battery well correctly with the contacts facing down.

Single Slot USB Cradle

Table 6-3 *Troubleshooting the Single Slot USB Cradle*

Symptom	Possible Cause	Action
LEDs do not light when mobile computer or spare battery is inserted.	Cradle is not receiving power.	Ensure the power cable is connected securely to both the cradle and to AC power.
	Mobile computer is not seated firmly in the cradle.	Remove and re-insert the mobile computer into the cradle, ensuring it is firmly seated.
	Spare battery is not seated firmly in the cradle.	Remove and re-insert the spare battery into the charging slot, ensuring it is firmly seated.
Mobile computer battery is not charging.	Mobile computer was removed from cradle or cradle was unplugged from AC power too soon.	Ensure cradle is receiving power. Ensure mobile computer is seated correctly. Confirm main battery is charging under **Start** > **Settings** > **System** > **Power**. The standard battery requires approximately 3.5 hours and the extended capacity battery requires approximately seven hours to charge.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	The mobile computer is not fully seated in the cradle.	Remove and re-insert the mobile computer into the cradle, ensuring it is firmly seated.
Spare battery is not charging.	Battery not fully seated in charging slot.	Remove and re-insert the spare battery into the cradle, ensuring it is firmly seated.
	Battery inserted incorrectly.	Re-insert the battery so the charging contacts on the battery align with the contacts on the cradle.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
During data communication, no data was transmitted, or transmitted data was incomplete.	Mobile computer removed from cradle during communication.	Replace mobile computer in cradle and retransmit.
	Incorrect cable configuration.	See the system administrator.
	Communication software improperly configured.	Perform setup as described in *Chapter 3, ActiveSync*.

Four Slot USB and Ethernet Cradles

Table 6-4 *Troubleshooting the Four Slot USB and Ethernet Cradles*

Symptom	Cause	Solution
Communication Status LED does not light up.	Mobile computer is not inserted correctly in the cradle.	Remove, then reinsert the mobile computer securely.
	Cradle is not receiving power.	Ensure the power supply is securely connected to both the cradle and AC power.
Battery is not charging.	Mobile computer removed from the cradle too soon.	Replace the mobile computer in the cradle. The standard battery requires approximately 3.5 hours and the extended capacity battery requires approximately seven hours to charge. Tap **Start > Settings > System > Power** to view battery status.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	Mobile computer is not inserted correctly in the cradle.	Remove the mobile computer and reinsert it correctly. Verify charging is active. Tap **Start** > **Settings** > **System** > **Power** to view battery status.
Attempt by the mobile computer to ActiveSync failed.	Mobile computer removed from the cradle while the LED was blinking green.	Wait one minute and reinsert the mobile computer in the cradle. This allows the cradle to attempt another synchronization.
	ActiveSync on the host computer has not yet closed the previous ActiveSync session.	Wait one minute and reinsert the mobile computer in the cradle. This allows the cradle to attempt another synchronization.
	Incorrect cable configuration.	Ensure the correct cable (USB or Ethernet) is used with the cradle.
	Communication software improperly configured.	Perform setup as described in *Chapter 3, ActiveSync*.
During communication, no data was transmitted, or transmitted data was incomplete.	Mobile computer removed from cradle during communication.	Replace mobile computer in cradle and retransmit.
	Mobile computer has no active connection.	An icon is visible in the status bar if a connection is active.

Cable Adapter Module

Table 6-5 *Troubleshooting the Cable Adapter Module*

Symptom	Possible Cause	Action
Mobile computer battery is not charging.	CAM was removed from mobile computer or CAM was unplugged from AC power too soon.	Ensure CAM is attached correctly and receiving power. Confirm main battery is charging under **Start** > **Settings** > **System** > **Power**. The standard battery requires approximately 3.5 hours and the extended capacity battery requires approximately seven hours to charge.
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	CAM is not fully attached to the mobile computer.	Reattach CAM to the mobile computer.
During data communication, no data was transmitted, or transmitted data was incomplete.	CAM removed from mobile computer during communication.	Reattach CAM to mobile computer and retransmit.
	Incorrect cable configuration.	See the System Administrator.
	Communication software is not installed or configured properly.	Perform setup as described in *Chapter 3, ActiveSync*.

Magnetic Stripe Reader

Table 6-6 *Troubleshooting the Magnetic Stripe Reader*

Symptom	Possible Cause	Action
MSR does not read card.	MSR removed from mobile computer during card swipe.	Reattach MSR to mobile computer and reswipe the card.
	Faulty magnetic stripe on card.	See the System Administrator.
	MSR application is not installed or configured properly.	Ensure the MSR application is installed on the mobile computer. Ensure the MSR application is configured correctly.

Technical Specifications

Technical Specifications

The following table summarizes the mobile computer's intended operating environment and technical hardware specifications.

Table A-1 *MC50 Technical Specifications*

Feature	Description
Dimensions with standard battery:	
Navigation Keypad, 1D Scanning	4.75 in. L x 3.00 in. W x 1.12 in. D (12.07 cm L x 7.62 cm W x 2.84 cm D)
Navigation Keypad, 1D & 2D Imaging	4.75 in. L x 3.00 in. W x 1.16 in. D (12.07 cm L x 7.62 cm W x 2.95 cm D)
Navigation Keypad, Camera	4.75 in. L x 3.00 in. W x 0.95 in. D (12.07 cm L x 7.62 cm W x 2.41 cm D)
QWERTY Keypad, 1D Scanning	5.4 in. L x 3.00 in. W x 1.12 in. D (13.71 cm L x 7.62 cm W x 2.84 cm D)
QWERTY Keypad, 1D & 2D Imaging	5.4 in. L x 3.00 in. W x 1.16 in. D (13.71 cm L x 7.62 cm W x 2.95 cm D)
QWERTY Keypad, Camera	5.4 in. L x 3.00 in. W x 0.95 in. D (13.71 cm L x 7.62 cm W x 2.41 cm D)
Dimensions with extended capacity battery:	
Navigation Keypad, 1D Scanning	4.75 in. L x 3.00 in. W x 1.12 in. D (12.07 cm L x 7.62 cm W x 2.84 cm D)
Navigation Keypad, 1D & 2D Imaging	4.75 in. L x 3.00 in. W x 1.16 in. D (12.07 cm L x 7.62 cm W x 2.95 cm D)
Navigation Keypad, Camera	4.75 in. L x 3.00 in. W x 1.05 in. D (12.07 cm L x 7.62 cm W x 2.67 cm D)
QWERTY Keypad, 1D Scanning	5.4 in. L x 3.00 in. W x 1.12 in. D (13.71 cm L x 7.62 cm W x 2.84 cm D)

Table A-1 *MC50 Technical Specifications (Continued)*

Feature	Description
QWERTY Keypad, 1D & 2D Imaging	5.4 in. L x 3.00 in. W x 1.16 in. D (13.71 cm L x 7.62 cm W x 2.95 cm D)
QWERTY Keypad, Camera	5.4 in. L x 3.00 in. W x 1.05 in. D (13.71 cm L x 7.62 cm W x 2.67 cm D)
Weight with standard battery:	
Navigation Keypad, 1D Scanning	6.8 oz (192.8 g)
Navigation Keypad, 1D & 2D Imaging	7.2 oz (204.1 g)
Navigation Keypad, Camera	6.9 oz (195.6 g)
QWERTY Keypad, 1D Scanning	7.2 oz (204.1 g)
QWERTY Keypad, 1D & 2D Imaging	7.6 oz (215.5 g)
QWERTY Keypad, Camera	7.3 oz (207.0 g)
Weight with extended capacity battery:	
Navigation Keypad, 1D Scanning	8.3 oz (235.3 g)
Navigation Keypad, 1D & 2D Imaging	8.7 oz (246.6 g)
Navigation Keypad, Camera	8.4 oz (238.1 g)
QWERTY Keypad, 1D Scanning	8.7 oz (246.6 g)
QWERTY Keypad, 1D & 2D Imaging	9.1 oz (258.0 g)
QWERTY Keypad, Camera	8.8 oz (249.5 g)
Display	3.5” QVGA transflective color
Touch Panel	Resistive touch
Main Battery	Standard: Rechargeable Lithium-Ion 3.7 V 1560 mAh Extended Capacity: Rechargeable Lithium-Ion 3.7 V 3600 mAh
Backup Battery	Provides 30 minutes backup at room temperature; 5 minutes at temperature extremes
Processor	Intel® XScale™ PXA270
Operating Platform	Microsoft® Windows® Mobile 5.0
Memory	64 MB RAM/ 64 MB ROM
Interface	RS-232, USB Client
Expansion Slot	SD/MMC user accessible (SDIO) Options: scanner, camera, memory cards, Bluetooth radio

Table A-1 *MC50 Technical Specifications (Continued)*

Feature	Description
Keypad Options	Navigation keypad QWERTY keypad
Optional Scan Engine 1-D Decode Capability	Code 39, Code 128, Code 93, Codabar, Interleaved 2 of 5, Discrete 2 of 5, MSI, UPC/EAN family (EAN-8, EAN-13, EAN-128, UPC-A, UPC-E, UPC/EAN supplementals)
Optional Imaging 1-D and 2-D Decode Capability	Code 39, Code 128, Code 93, Codabar, Code 11, Interleaved 2 of 5, Discrete 2 of 5, MSI, UPC/EAN family (EAN-8, EAN-13, EAN-128, UPC-A, UPC-E, UPC/EAN supplementals), Coupon Code, Code 39 Trioptic, Composite Code, PDF417, Micro PDF417, GS1 DataBar Expanded, GS1 DataBar Limited, GS1 DataBar-14, Data Matrix, Maxi Code, QR Code, US Postnet, US Planet, UK 4-state, Australian 4-state, Canadian 4-state, Japanese 4-state, Dutch Kix
Optional Scan Engine Scanning Specifications	Print Contrast: Minimum 35% absolute dark/light reflectance measured at 675 nm. Ambient Light Requirements: Sunlight (max.): 8,000 ft. candles / 86,112 lux Ambient Light (min.): 0.5 ft. candles / 5 lux (color temperature: ~5,000K)
Optional Imaging 1-D and 2-D Scanning Specifications	Ambient Light Requirements (Sunlight): 9,000 ft. candles / 96,900 lux
Printer Support	Zebra: QL320, QL420, Cameo family, Encore 3 and 4 inch Monarch: 9460 O'Neill: MF2T, MF4T, VMP2000 AIT: PT4000
Environmental	
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-13° to 140° F (-25° to 60° C)
Charging Temperature	32° to 104° F (0° to 40° C)
Humidity	5% to 95% non-condensing
Electrostatic Discharge (ESD)	+/- 8 kV air +/- 4 kV contact
802.11b (WLAN)	
WLAN connectivity	IEEE 802.11b
Antenna	Internal
Bluetooth	Supports commercially available SD Bluetooth cards

Table A-1 *MC50 Technical Specifications (Continued)*

Feature	Description
Security	LEAP, PEAP, WEP (40/128 bit), WPA-PSK, TKIP, EAP/TLS, FIPS 140-2, CCX
Accessories	
Cradles	Single-Slot USB: charging and USB communication Four-Slot USB: charging and USB communication Four-Slot Ethernet: charging and Ethernet communication
Chargers	Four-Slot Spare Battery Charger: charges four spare batteries simultaneously UBC Adapter: adapts the UBC for use with MC50 spare batteries
Magstripe Reader (MSR)	Adds magstripe reading capabilities. Magnetic stripe format: ANSI, ISO, AAMVA, CA DMV, user-configurable generic format Swipe speed: 5 to 50 in. /127 to 1270 mm/sec, bi-directional
Cable Adapter Module (CAM)	Accommodates AC line cord and autocharge cable for charging, and USB cable for communication
Miscellaneous	Headset: for use in noisy environments SDIO Card: provides secondary non-volatile storage

MC50 Accessory Specifications

Table A-2 *Single-Slot USB Cradle Technical Specifications*

Feature	Description
Dimensions	4.3 in. L x 2.3 in. W x 3.2 in. H (10.92 cm L x 5.84 cm W x 8.13 cm H)
Weight	6.9 oz (196 g)
Power	5.4 V +/- 5%
Interface	USB
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Charging Temperature	32° to 104° F (0° to 40° C)
Humidity	5% to 95% non-condensing
Drop	30.0 in. (76.2 cm) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 8 kV air +/- 4 kV contact

Table A-3 *Four-Slot USB Cradle Technical Specifications*

Feature	Description
Dimensions	18.0 in. L x 4.0 in. H x 5.0 in. D (45.72 cm H x 10.16 cm W x 12.7 cm D)
Weight	2.38 lb (1079 g)
Power	12 V
Interface	USB
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Charging Temperature	32° to 104° F (0° to 40° C)
Humidity	5% to 95% non-condensing
Drop	30.0 in. (76.2 cm) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 8 kV air +/- 4 kV contact

Table A-4 *Four-Slot Ethernet Cradle Technical Specifications*

Feature	Description
Dimensions	3.34 in. H x 12.6 in. W x 2.83 in. D (8.48 cm H x 32.00 cm W x 7.19 cm D)
Weight	2.38 lb (1079 g)
Power	12 V
Interface	Ethernet
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Charging Temperature	32° to 104° F (0° to 40° C)
Humidity	5% to 95% non-condensing
Drop	30.0 in. (76.2 cm) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 8 kV air +/- 4 kV contact

Table A-5 *Four-Slot Spare Battery Charger Technical Specifications*

Feature	Description
Dimensions	8.25 in. L x 6.0 in. W x 1.7 in. H (20.96 cm L x 15.24 cm W x 4.32 cm H)
Weight	13.6 oz (386 g)
Power	12 V
Operating Temperature	32° to 104° F (0° to 40° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Charging Temperature	32° to 104° F (0° to 40° C)
Humidity	5% to 95% non-condensing
Drop	30.0 in. (76.2 cm) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 8 kV air +/- 4 kV contact

Table A-6 *UBC Adapter Technical Specifications*

Feature	Description
Dimensions	6.1 in. L x 2.9 in. W x 2.3 in. H (15.49 cm L x 7.37 cm W x 5.84 cm H)
Weight	5.2 oz (147 g)
Power	5.4 VDC
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Charging Temperature	32° to 104° F (0° to 40° C)
Humidity	5% to 95% non-condensing
Drop	30.0 in. (76.2 cm) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 8 kV air +/- 4 kV contact

Table A-7 *Magstripe Reader (MSR) Technical Specifications*

Feature	Description
Dimensions	2.3 in. L x 3.14 in. W x 1.1 in. H (5.82 cm L x 7.98 cm W x 2.79 cm H)
Weight	1.7 oz (48 g)
Interface	Serial with baud rate up to 19,200
Format	ANSI, ISO, AAMVA, CA DMV, user-configurable generic format
Swipe Speed	5 to 50 in. (127 to 1270 mm) /sec, bi-directional
Decoders	Generic, Raw Data
Mode	Buffered, unbuffered
Track Reading Capabilities	Tracks 1 and 3: 210 bpi Track 2: 75 and 210 bpi, autodetect
Operating Temperature	32° to 122° F (0° to 50° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Humidity	5% to 95% non-condensing
Drop	4 ft. (1.22 m) drops to concrete
Electrostatic Discharge (ESD)	+/- 8 kV air +/- 4 kV contact

Table A-8 *Cable Adapter Module (CAM) Technical Specifications*

Feature	Description
Dimensions	2.4 in. L x 3.2 in. W x 0.97 in. H (6.10 cm L x 8.13 cm W x 2.46 cm H)
Weight	1.5 oz (43 g)
Power	5.4 VDC
Interface	Accommodates AC line cord and autocharge cable for charging, and USB cable for communication
Operating Temperature	-13° to 122° F (-25° to 50° C)
Storage Temperature	-40° to 158° F (-40° to 70° C)
Humidity	5% to 95% non-condensing

COM Port Definitions

Table A-9 *MC50 External COM Connector Definitions*

COM Port	Definition
COM1	Scanner
COM2	Available
COM3	IRComm
COM4	Raw IrDA
COM5	External Connector
COM6	Available
COM7	Available
COM8	Available
COM9	Available

Pin-Outs

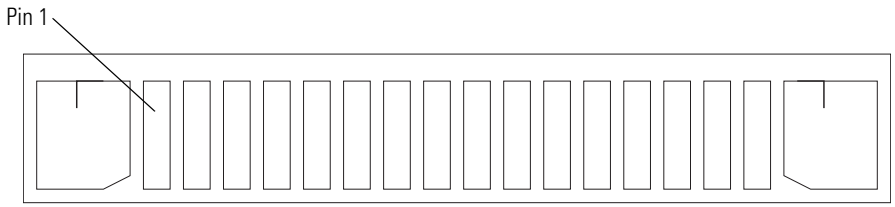


Figure A-1 *External Connector*

Table A-10 *External Connector Pin-Outs*

Pin	Description
1	Power Gnd
2	Not connected
3	Not connected
4	USB_D-
5	USB_D+
6	USB_Gnd
7	USB_Vbus
8	USB_ID
9	RS232_TXD
10	RS232_RXD
11	RS232_RTS
12	RS232_CTS
13	RS232_DTR
14	RS232_DSR
15	External_5.0V
16	External DC In

Keypad Maps

Introduction

This appendix contains the keypad map for the keypad configurations of the mobile computer. Each key is listed in the table with its value, depending on the state of the keypad.

Example

As shown below, when the  key is pressed on the keypad, the default state displays the letter ‘q’. Press the Shift key first to product [illegible].

Table B-11 *Keypad Map*

Key	Default State	Shift/Caps State	Blue Key State	Orange Key State	VK Code (Decimal)	ASCII Value (Decimal)
	q				81	113
		Q			160+81	81
			Start		-	-
				&	160+55	35

In addition to key values, VK codes and ASCII values are listed for each key, where applicable.

Keypads

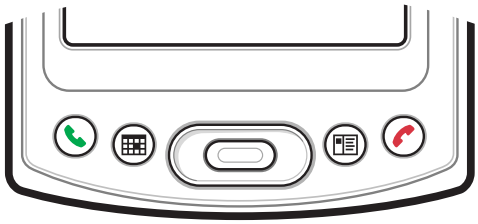
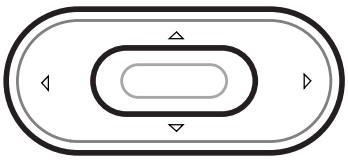


Figure B-2 *Navigation Keypad*

Table B-12 *Navigation Keypad Functionality*

Key	Default State	VK Code (Decimal)	ASCII Value (Decimal)
	Call	App 1	App 1
		-	-
	Calendar	App 2	App 2
		-	-
	Contacts	App 3	App 3
		-	-
	End Call	App 4	App 4
		-	-
	Navigation	-	-
	Select	-	-

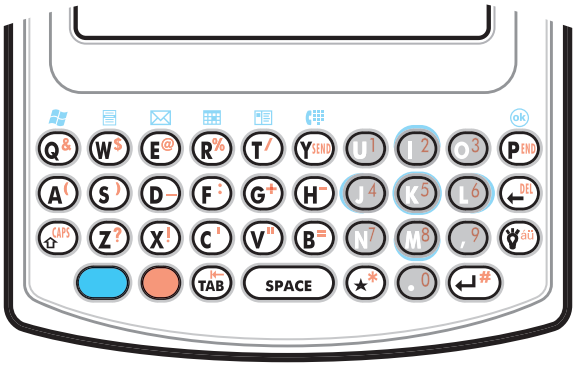


Figure B-3 *QWERTY Keypad*

Table B-13 *QWERTY Keypad Functionality*

Key	Default State	Shift/Caps State	Blue Key State	Orange Key State	VK Code (Decimal)	ASCII Value (Decimal)
Q&	q				81	113
		Q			160+81	81
			Start Menu		-	-
				&	160+55	35
W$	w				87	119
		W			160+87	87
			Menu		-	-
				$	160+52	36
E@	e				69	101
		E			160+69	69
			Messaging		-	-
				@	160+50	64
R%	r				82	114
		R			160+82	82
			Calendar		-	-
				%	160+53	37

Table B-13 *QWERTY Keypad Functionality (Continued)*

Key	Default State	Shift/Caps State	Blue Key State	Orange Key State	VK Code (Decimal)	ASCII Value (Decimal)
	t				84	116
		T			160+84	84
			Contacts		-	-
				/	191	47
	y				89	121
		Y			160+89	89
			Phonepad		198	198
				SEND	114	-
	u				85	117
		U			160+85	85
					-	-
				1	49	49
	i				73	105
		I			160+73	73
			Up Arrow		132	-
				2	50	50
	o				79	111
		O			160+79	79
					-	-
				3	51	51
	p				80	112
		P			160+80	80
			OK/Close		-	-
				END	115	-
	a				65	97
		A			160+65	65
					-	-
				(	-	-

Table B-13 *QWERTY Keypad Functionality (Continued)*

Key	Default State	Shift/Caps State	Blue Key State	Orange Key State	VK Code (Decimal)	ASCII Value (Decimal)
	s				83	115
		S			160+83	83
					-	-
				)	48	41
	d				68	100
		D			160+68	68
					-	-
				_	189	95
	f				70	102
		F			160+70	70
					-	-
				:	186	58
	g				71	103
		G			160+71	71
					-	-
				+	187	43
	h				72	104
		H			160+72	72
					-	-
				-	189	45
	j				74	106
		J			160+74	74
			Left Arrow		37	-
				4	52	52
	k				75	107
		K			160+75	75
			Select		13	-
				5	53	53

Table B-13 *QWERTY Keypad Functionality (Continued)*

Key	Default State	Shift/Caps State	Blue Key State	Orange Key State	VK Code (Decimal)	ASCII Value (Decimal)
	l				76	108
		L			160+76	76
			Right Arrow		39	-
				6	54	54
	Backspace				8	8
					-	-
					-	-
				Delete	46	46
	Shift				16	-
					-	-
					-	-
				CAPS	-	-
	z				90	122
		Z			160+90	90
					-	-
				?	191	63
	x				88	120
		X			160+88	88
					-	-
				!	49	33
	c				67	99
		C			160+67	67
					-	-
				‘	-	39
	v				86	118
		V			160+86	86
					-	-
				“	222	34

Table B-13 *QWERTY Keypad Functionality (Continued)*

Key	Default State	Shift/Caps State	Blue Key State	Orange Key State	VK Code (Decimal)	ASCII Value (Decimal)
	b				66	98
		B			160+66	66
					-	-
				=	187	61
	n				78	110
		N			160+78	78
					-	-
				7	55	55
	m				77	109
		M			160+77	77
			Down Arrow		40	-
				8	56	56
	, (comma)				188	44
		<			188	60
					-	-
				9	57	57
	Backlight				-	-
					-	-
					-	-
				áü/Sym	122	-
	TAB				9	9
					-	-
					-	-
				Back Tab	160+9	9
	Star				-	-
					-	-
					-	-
				*	56	42

Table B-13 *QWERTY Keypad Functionality (Continued)*

Key	Default State	Shift/Caps State	Blue Key State	Orange Key State	VK Code (Decimal)	ASCII Value (Decimal)
	.				190	46
		>			160+190	62
					-	-
				0	48	48
	Return (Enter)				13	13
					-	-
					-	-
				#	160+51	35

Glossary

Numeric

802.11/802.11b. A radio protocol that may be used by the Zebra Spectrum24 radio card. Zebra radio cards that use the 802.11 protocol also have an ESS_ID.

A

Access Point. Access Point (AP) refers to Zebra's Spectrum24 Ethernet Access Point. It is a piece of communications equipment that manages communications between the host computer system and one or more wireless terminals. An AP connects to a wired Ethernet LAN and acts as a bridge between the Ethernet wired network and IEEE 802.11 interoperable radio-equipped mobile units, such as a mobile computer. The AP allows a mobile user to roam freely through a facility while maintaining a seamless connection to the wired network.

AirBEAM® Manager. AirBEAM® Manager is a comprehensive wireless network management system that provides essential functions that are required to configure, monitor, upgrade and troubleshoot the Spectrum24® wireless network and its components (including networked mobile computers). Some features include event notification, access point configuration, diagnostics, statistical reports, auto-discovery, wireless proxy agents and monitoring of access points and mobile units.

AirBEAM® Smart Client. . AirBEAM® Smart Client is part of Zebra's AirBEAM® suite, which also includes AirBEAM® Safe and AirBEAM® Manager. The AirBEAM® Smart Client system uses the network accessible host server to store software files that are to be downloaded to the mobile computers. The AirBEAM® Smart Client provides the mobile computers with the "smarts" to request software from the host. It allows them to request, download and install software, as well as to upload files and status data. The AirBEAM® Smart Client uses the industry standard FTP or TFTP file transfer protocols to check the host system for updates, and if necessary, to transfer updated software. Most often, AirBEAM® Smart Client is used with wireless networks, but any TCP/IP connection can be used. For more information, refer to the AirBEAM® Smart Windows® CE Client Product Reference Guide (p/n 72-63060-xx).

AP. See Access Point.

Aperture. The opening in an optical system defined by a lens or baffle that establishes the field of view.

API. An interface by means of which one software component communicates with or controls another. Usually used to refer to services provided by one software component to another, usually via software interrupts or function calls

Application Programming Interface. See API.

ASCII. American Standard Code for Information Interchange. A 7 bit-plus-parity code representing 128 letters, numerals, punctuation marks and control characters. It is a standard data transmission code in the U.S.

Autodiscrimination. The ability of an interface controller to determine the code type of a scanned bar code. After this determination is made, the information content is decoded.

B

Bar. The dark element in a printed bar code symbol.

Bar Code. A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a bar code symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format. See Symbology.

Bar Code Density. The number of characters represented per unit of measurement (e.g., characters per inch).

Bar Height. The dimension of a bar measured perpendicular to the bar width.

Bar Width. Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.

Bit. Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

Bits per Second (bps). Bits transmitted or received.

Boot or Boot-up. The process a computer goes through when it starts. During boot-up, the computer can run self-diagnostic tests and configure hardware and software.

bps. See Bits Per Second.

Byte. On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory is used to store one ASCII character.

C

CDRH. Center for Devices and Radiological Health. A federal agency responsible for regulating laser product safety. This agency specifies various laser operation classes based on power output during operation.

CDRH Class 1. This is the lowest power CDRH laser classification. This class is considered intrinsically safe, even if all laser output were directed into the eye's pupil. There are no special operating procedures for this class.

CDRH Class 2. No additional software mechanisms are needed to conform to this limit. Laser operation in this class poses no danger for unintentional direct human exposure.

Character. A pattern of bars and spaces which either directly represents data or indicates a control function, such as a number, letter, punctuation mark, or communications control contained in a message.

Character Set. Those characters available for encoding in a particular bar code symbology.

Check Digit. A digit used to verify a correct symbol decode. The scanner inserts the decoded data into an arithmetic formula and checks that the resulting number matches the encoded check digit. Check digits are required for UPC but are optional for other symbologies. Using check digits decreases the chance of substitution errors when a symbol is decoded.

Codabar. A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters: (- $: / , +).

Code 128. A high density symbology which allows the controller to encode all 128 ASCII characters without adding extra symbol elements.

Code 3 of 9 (Code 39). A versatile and widely used alphanumeric bar code symbology with a set of 43 character types, including all uppercase letters, numerals from 0 to 9 and 7 special characters (- . / + % $ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.

Code 93. An industrial symbology compatible with Code 39 but offering a full character ASCII set and a higher coding density than Code 39.

Code Length. Number of data characters in a bar code between the start and stop characters, not including those characters.

Cold Boot. A cold boot restarts the mobile computer and erases all user stored records and entries.

COM Port. Communication port; ports are identified by number, e.g., COM1, COM2.

Continuous Code. A bar code or symbol in which all spaces within the symbol are parts of characters. There are no intercharacter gaps in a continuous code. The absence of gaps allows for greater information density.

Cradle. A cradle is used for charging the terminal battery and for communicating with a host computer, and provides a storage place for the terminal when not in use.

D

DCP. See Device Configuration Package.

Dead Zone. An area within a scanner's field of view, in which specular reflection may prevent a successful decode.

Decode. To recognize a bar code symbology (e.g., UPC/EAN) and then analyze the content of the specific bar code scanned.

Decode Algorithm. A decoding scheme that converts pulse widths into data representation of the letters or numbers encoded within a bar code symbol.

Decryption. Decryption is the decoding and unscrambling of received encrypted data. Also see, Encryption and Key.

Depth of Field. The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.

Device Configuration Package. The Device Configuration Package provides the Product Reference Guide (PRG), flash partitions, Terminal Configuration Manager (TCM) and the associated TCM scripts. With this package hex images that represent flash partitions can be created and downloaded to the mobile computer.

DHCP. (Dynamic Host Configuration Protocol) Software that automatically assigns IP addresses to client stations logging onto a TCP/IP network. Similar to BOOTP, but also permits the leasing of an IP address. It eliminates having to manually assign permanent IP addresses. DHCP software typically runs in servers and is also found in network devices such as routers that allow multiple users access to the Internet.

DHCP Server. A server in the network or a service within a server that assigns IP addresses.

Discrete 2 of 5. A binary bar code symbology representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.

Discrete Code. A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.

DNS Server. The Control Panel allows you to set the IP address for a DNS Server, if used. This allows users to use server names, rather than IP addresses. It is set on the Network tab of the Control Panel.

Domain Name. The Control Panel allows you to set a Domain Name for the DNS Server, if used (*e.g.*, zebra.com). It is set on the Network tab of the Control Panel.

DOS. Disk Operating System. This is basic software that allows you to load and use software applications on your computer. Also see NetID.

DRAM. Dynamic random access memory.

E

EAN. European Article Number. This European/International version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.

Element. Generic term for a bar or space.

Encoded Area. Total linear dimension occupied by all characters of a code pattern, including start/stop characters and data.

Encryption. Encryption is the scrambling and coding of data, typically using mathematical formulas called algorithms, before information is transmitted over any communications link or network. A key is the specific code used by the algorithm to encrypt or decrypt the data. Also see, Decryption and Key.

ENQ (RS-232). ENQ software handshaking is also supported for the data sent to the host.

ESD. Electro-Static Discharge

ESN. Electronic Serial Number. The unique hardware number associated with a cellular device, which is transmitted to the system when the device communicates witht he celllular system.

ESS_ID. Extended Service Set Identifier, defines the coverage area. Prior to the release of the 802.11 specification the ESS_ID was called the Net_ID or Network Identifier. For terminals using Spectrum24 radios with the 802.11 protocol, an ESS_ID allows facilities to limit which Access Points a mobile computer can communicate with. It is set on the Network tab of the Control Panel. The terminal can only communicate with Spectrum24 Access Points that have matching ESS_IDs.

Ethernet. Ethernet communication port. Allows a wired interface to a radio network.

F

File Transfer Protocol (FTP). A TCP/IP application protocol governing file transfer via network or telephone lines. See TCP/IP.

Flash Disk. An additional megabyte of non-volatile memory for storing application and configuration files.

Flash Memory. Flash memory is responsible for storing the system firmware and is non-volatile. If the system power is interrupted the data is not be lost.

Frequency Hopping. The use of a random sequence of frequency channels to achieve spread spectrum compliance. Stations that use frequency hopping change their communications frequency at regular intervals. A hopping sequence determines the pattern at which frequencies are changed. Messages take place within a hop. See Hopping Sequence and Spread Spectrum.

FTP. See File Transfer Protocol.

G

Gateway Address. An IP address for a network gateway or router. A mobile computer may be part of a subnet as specified by its IP address and Netmask. It can send packets directly to any node on the same subnet. If the destination node is on a different subnet, then the terminal sends the packet to the gateway first. The gateway determines how to route the packet to the destination subnet. This field is an option used by networks that require gateways.

H

Hard Reset. See Cold Boot.

Hopping Sequence. A set of random frequencies designed to minimize interference with other sets of random frequencies. A hopping sequence determines the pattern with which a station that uses frequency hopping changes its communications frequency. See Frequency Hopping.

Host Computer. A computer that serves other terminals in a network, providing such services as computation, database access, supervisory programs and network control.

Hz. Hertz; A unit of frequency equal to one cycle per second.

I

IDE. Intelligent drive electronics. Refers to the solid-state hard drive type.

IEC. International Electrotechnical Commission. This international agency regulates laser safety by specifying various laser operation classes based on power output during operation.

IEC (825) Class 1. This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 120 seconds of laser operation within any 1000 second window and an automatic laser shutdown if the scanner's oscillating mirror fails.

IEEE Address. See MAC Address.

Imaging Scanning. Mobile computers with an integrated imager use digital camera technology to take a digital picture of a bar code, store the resulting image in memory and execute state-of-the-art software decoding algorithms to extract the data from the image.

Input/Output Ports. I/O ports are primarily dedicated to passing information into or out of the terminal’s memory. Series 9000 mobile computers include Serial and USB ports.

Intercharacter Gap. The space between two adjacent bar code characters in a discrete code.

Interleaved 2 of 5. A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar/spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

Interleaved Bar Code. A bar code in which characters are paired together, using bars to represent the first character and the intervening spaces to represent the second.

Internet Protocol Address. See IP.

I/O Ports. interface The connection between two devices, defined by common physical characteristics, signal characteristics, and signal meanings. Types of interfaces include RS-232 and PCMCIA.

IOCTL. Input/Output Control.

IP. Internet Protocol. The IP part of the TCP/IP communications protocol. IP implements the network layer (layer 3) of the protocol, which contains a network address and is used to route a message to a different network or subnetwork. IP accepts “packets” from the layer 4 transport protocol (TCP or UDP), adds its own header to it and delivers a “datagram” to the layer 2 data link protocol. It may also break the packet into fragments to support the maximum transmission unit (MTU) of the network.

IP Address. (Internet Protocol address) The address of a computer attached to an IP network. Every client and server station must have a unique IP address. A 32-bit address used by a computer on a IP network. Client workstations have either a permanent address or one that is dynamically assigned to them each session. IP addresses are written as four sets of numbers separated by periods; for example, 204.171.64.2.

IPX/SPX. Internet Package Exchange/Sequential Packet Exchange. A communications protocol for Novell. IPX is Novell’s Layer 3 protocol, similar to XNS and IP, and used in NetWare networks. SPX is Novell's version of the Xerox SPP protocol.

IS-95. Interim Standard 95. The EIA/TIA standard that governs the operation of CDMA cellular service. Versions include IS-95A and IS-95B. See CDMA.

K

Kerberos. Kerberos is a network authentication protocol. It is designed to provide strong authentication for client/server applications by using secret-key cryptography. A free implementation of this protocol is available from the Massachusetts Institute of Technology. Kerberos is available in many commercial products as well.

Key. A key is the specific code used by the algorithm to encrypt or decrypt the data. Also see, Encryption and Decrypting.

L

LAN. Local area network. A radio network that supports data communication within a local area, such as within a warehouse of building.

LASER. Light Amplification by Stimulated Emission of Radiation.The laser is an intense light source. Light from a laser is all the same frequency, unlike the output of an incandescent bulb. Laser light is typically coherent and has a high energy density.

Laser Diode. A gallium-arsenide semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.

Laser Scanner. A type of bar code reader that uses a beam of laser light.

LCD. See Liquid Crystal Display.

LED Indicator. A semiconductor diode (LED - Light Emitting Diode) used as an indicator, often in digital displays. The semiconductor uses applied voltage to produce light of a certain frequency determined by the semiconductor's particular chemical composition.

Light Emitting Diode. See LED.

Liquid Crystal Display (LCD). A display that uses liquid crystal sealed between two glass plates. The crystals are excited by precise electrical charges, causing them to reflect light outside according to their bias. They use little electricity and react relatively quickly. They require external light to reflect their information to the user.

M

MAC Address (also called IEEE Address). Spectrum24® devices, like other Ethernet devices, have unique, hardware-encoded MAC (also called IEEE addresses). MAC addresses determine the device sending or receiving data. The MAC address is a 48-bit number written as six hexadecimal bytes separated by colons.

MC. Mobile Computer.

MDN. Mobile Directory Number. The directory listing telephone number that is dialed (generally using POTS) to reach a mobile unit. The MDN is usually associated with a MIN in a cellular telephone -- in the US and Canada, the MDN and MIN are the same value for voice cellular users. International roaming considerations often result in the MDN being different from the MIN.

MIL. 1 mil = 1 thousandth of an inch.

MIN. Mobile Identification Number. The unique account number associated with a cellular device. It is broadcast by the cellular device when accessing the cellular system.

Misread (Misdecode). A condition which occurs when the data output of a reader or interface controller does not agree with the data encoded within a bar code symbol.

Mobile Computer. In this text, *mobile computer* refers to the Zebra Series 9000 wireless portable computer. It can be set up to run as a stand-alone device, or it can be set up to communicate with a network, using wireless radio technology.

N

NetBeui. A non-routable LAN protocol that is an extension to NetBIOS. Used for IBM's OS/2-based LAN Manager and Microsoft's LAN Manager and Windows for Workgroups.

NetID. For terminals using Spectrum24 radios with the Spring protocol, a NetID allows facilities to limit which Access Points a mobile computer can communicate with. It is set on the Network tab of the Control Panel. The terminal can only communicate with Spectrum24 Access Points that have matching NetIDs. Also see ESS_ID.

Nominal. The exact (or ideal) intended value for a specified parameter. Tolerances are specified as positive and negative deviations from this value.

Nominal Size. Standard size for a bar code symbol. Most UPC/EAN codes are used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).

NVM. Non-Volatile Memory.

O

ODI. See Open Data-Link Interface.

Open Data-Link Interface (ODI). Novell's driver specification for an interface between network hardware and higher-level protocols. It supports multiple protocols on a single NIC (Network Interface Controller). It is capable of understanding and translating any network information or request sent by any other ODI-compatible protocol into something a NetWare client can understand and process.

Open System Authentication. Open System authentication is a null authentication algorithm.

P

PAN. . Personal area network. Using Bluetooth wireless technology, PANs enable devices to communicate wirelessly. Generally, a wireless PAN consists of a dynamic group of less than 255 devices that communicate within about a 33-foot range. Only devices within this limited area typically participate in the network.

Parameter. A variable that can have different values assigned to it.

Percent Decode. The average probability that a single scan of a bar code would result in a successful decode. In a well-designed bar code scanning system, that probability should approach near 100%.

PING. (Packet Internet Groper) An Internet utility used to determine whether a particular IP address is online. It is used to test and debug a network by sending out a packet and waiting for a response.

Print Contrast Signal (PCS). Measurement of the contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a bar code symbol to be scannable. PCS = (RL - RD) / RL, where RL is the reflectance factor of the background and RD the reflectance factor of the dark bars.

Programming Mode. The state in which a scanner is configured for parameter values. See Scanning Mode.

Q

Quiet Zone. A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.

QWERTY. A standard keyboard commonly used on North American and some European PC keyboards. "QWERTY" refers to the arrangement of keys on the left side of the third row of keys.

R

RAM. Random Access Memory. Data in RAM can be accessed in random order, and quickly written and read.

Reflectance. Amount of light returned from an illuminated surface.

Resolution. The narrowest element dimension which is distinguished by a particular reading device or printed with a particular device or method.

RF. Radio Frequency.

ROM. Read-Only Memory. Data stored in ROM cannot be changed or removed.

Router. A device that connects networks and supports the required protocols for packet filtering. Routers are typically used to extend the range of cabling and to organize the topology of a network into subnets. See Subnet.

RS-232. An Electronic Industries Association (EIA) standard that defines the connector, connector pins, and signals used to transfer data serially from one device to another.

S

Scan Area. Area intended to contain a symbol.

Scanner. An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are:

1. Light source (laser or photoelectric cell) - illuminates a bar code.

2. Photodetector - registers the difference in reflected light (more light reflected from spaces).

3. Signal conditioning circuit - transforms optical detector output into a digitized bar pattern.

Scanning Mode. The scanner is energized, programmed and ready to read a bar code.

Scanning Sequence. A method of programming or configuring parameters for a bar code reading system by scanning bar code menus.

SDK. Software Development Kit

Self-Checking Code. A symbology that uses a checking algorithm to detect encoding errors within the characters of a bar code symbol.

Shared Key. Shared Key authentication is an algorithm where both the AP and the MU share an authentication key.

SMDK. Symbol Mobility Developer’s Kit.

Soft Reset. See Warm Boot.

Space. The lighter element of a bar code formed by the background between bars.

Spectrum24. Zebra's frequency-hopping, spread spectrum cellular network.

Specular Reflection. The mirror-like direct reflection of light from a surface, which can cause difficulty decoding a bar code.

Spread Spectrum. A technique for uniformly distributing the information content of a radio signal over a frequency range larger than normally required for robust transmission of data. Spreading the signal without adding additional information adds significant redundancy, which allows the data to be recovered in the presence of strong interfering signals such as noise and jamming signals. The primary advantage of spread spectrum technology is its ability to provide robust communications in the presence of interfering signals.

Spring Radio Protocol. A radio protocol that may be used by the Zebra Spectrum24 radio card. Zebra Radio cards that use the Spring protocol also have an Net ID.

Start/Stop Character. A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.

STEP. Symbol Terminal Enabler Program.

Subnet. A subset of nodes on a network that are serviced by the same router. See Router.

Subnet Mask. A 32-bit number used to separate the network and host sections of an IP address. A custom subnet mask subdivides an IP network into smaller subsections. The mask is a binary pattern that is matched up with the IP address to turn part of the host ID address field into a field for subnets. Default is often 255.255.255.0.

Substrate. A foundation material on which a substance or image is placed.

Symbol. A scannable unit that encodes data within the conventions of a certain symbology, usually including start/stop characters, quiet zones, data characters and check characters.

Symbol Aspect Ratio. The ratio of symbol height to symbol width.

Symbol Height. The distance between the outside edges of the quiet zones of the first row and the last row.

Symbol Length. Length of symbol measured from the beginning of the quiet zone (margin) adjacent to the start character to the end of the quiet zone (margin) adjacent to a stop character.

Symbology. The structural rules and conventions for representing data within a particular bar code type (e.g. UPC/EAN, Code 39, PDF417, etc.).

T

TCP/IP. (Transmission Control Protocol/Internet Protocol) A communications protocol used to internetwork dissimilar systems. This standard is the protocol of the Internet and has become the global standard for communications. TCP provides transport functions, which ensures that the total amount of bytes sent is received correctly at the other end. UDP is an alternate transport that does not guarantee delivery. It is

widely used for real-time voice and video transmissions where erroneous packets are not retransmitted. IP provides the routing mechanism. TCP/IP is a routable protocol, which means that all messages contain not only the address of the destination station, but the address of a destination network. This allows TCP/IP messages to be sent to multiple networks within an organization or around the world, hence its use in the worldwide Internet. Every client and server in a TCP/IP network requires an IP address, which is either permanently assigned or dynamically assigned at startup.

Telnet. A terminal emulation protocol commonly used on the Internet and TCP/IP-based networks. It allows a user at a terminal or computer to log onto a remote device and run a program.

Terminal. See Mobile Computer.

Terminal Emulation. A “terminal emulation” emulates a character-based mainframe session on a remote non-mainframe terminal, including all display features, commands and function keys. The MC9000 Series supports Terminal Emulations in 3270, 5250 and VT220.

TFTP. (Trivial File Transfer Protocol) A version of the TCP/IP FTP (File Transfer Protocol) protocol that has no directory or password capability. It is the protocol used for upgrading firmware, downloading software and remote booting of diskless devices.

Tolerance. Allowable deviation from the nominal bar or space width.

Transmission Control Protocol/Internet Protocol. See TCP/IP.

Trivial File Transfer Protocol. See TFTP.

U

UDP. User Datagram Protocol. A protocol within the IP protocol suite that is used in place of TCP when a reliable delivery is not required. For example, UDP is used for real-time audio and video traffic where lost packets are simply ignored, because there is no time to retransmit. If UDP is used and a reliable delivery is required, packet sequence checking and error notification must be written into the applications.

UPC. Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which is any of four widths. The standard symbology for retail food packages in the United States.

V

Visible Laser Diode (VLD). A solid state device which produces visible laser light.

W

Warm Boot. A warm boot restarts the mobile computer by closing all running programs. All data that is not saved to flash memory is lost.

WEP. Wired Equivalent Privacy, is specified by IEEE for encryption and decryption of RF (wireless) communications.

WEP Encryption. (Wired Equivalent Privacy encryption) The conversion of data into a secret code for transmission over a public network. The original text, or plaintext, is converted into a coded equivalent called ciphertext via an encryption algorithm. The ciphertext is decoded (decrypted) at the receiving end and turned back into plaintext. The encryption algorithm uses a key, which is a binary number that is typically from 40 to 128 bits in length. The greater the number of bits in the key (cipher strength), the more possible key combinations and the longer it would take to break the code. The data is encrypted, or “locked,” by combining the bits in the key mathematically with the data bits. At the receiving end, the key is used to “unlock” the code and restore the original data.

Wireless Local Area Network (WLAN). See LAN.

WNMP. (Wireless Network Management Protocol) This is Zebra’s proprietary MAC layer protocol used for inter access point communication and other MAC layer communication.

WNMS (renamed to AirBEAM® Manager). See AirBEAM® Manager.

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