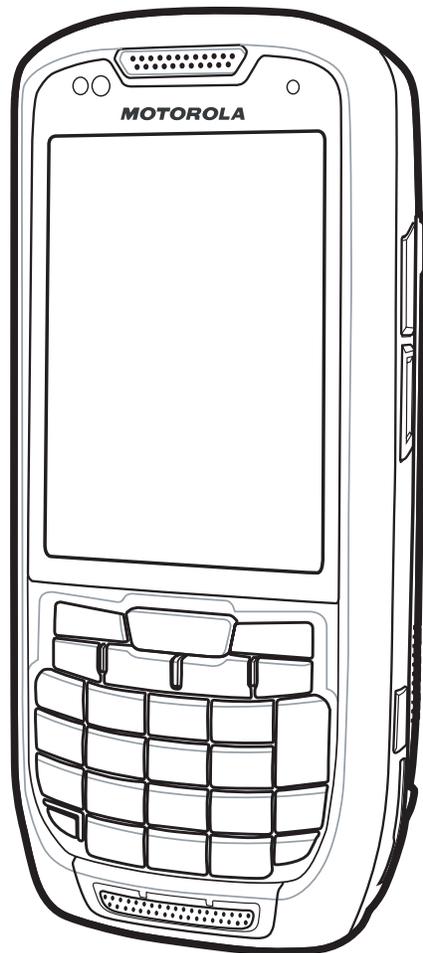


MC45 INTEGRATOR GUIDE



MC45
INTEGRATOR GUIDE

72E-164160-01

Rev. A

January 2013

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Revision History

Changes to the original guide are listed below:

Change	Date	Description
-01 Rev. A	1/2013	Initial Release

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Glossary

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ABOUT THIS GUIDE

Introduction

This *Integrator Guide* provides information about using the MC45 and accessories.



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

Documentation Set

The documentation set for the MC45 provides information for specific user needs, and includes:

- **MC45 Quick Start Guide** - describes how to get the MC45 up and running.
- **MC45 User Guide** - describes how to use the MC45.
- **MC45 Integrator Guide** - describes how to set up the MC45 and accessories.
- **MC45 Regulatory Guide** - provides all regulatory, service and EULA information for the MC45.
- **Enterprise Mobility Developer Kit (EMDK) Help File** - provides API information for writing applications.

Configurations

This guide covers the following configurations:

Configuration	Radios	Display	Memory	Data Capture	Operating System	Keypads
MC4587	WWAN: GSM/HSDPA	3.2" QVGA16 Bit Color	256 MB RAM/ 1 GB Flash	Camera	Microsoft Windows Embedded Handheld 6.5.3, Professional Edition	Numeric
MC4597	WLAN: 802.11a/b/g WWAN: GSM/HSDPA	3.2" QVGA16 Bit Color	256 MB RAM/ 1 GB Flash	1-D laser scanner or camera	Microsoft Windows Embedded Handheld 6.5.3, Professional Edition	Numeric

Software Versions

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

- Adaptation Kit Update (AKU) version
- OEM version
- Phone version
- Fusion version

AKU Version

To determine the Adaptation Kit Update (AKU) version:

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



The second line lists the operating system version and the build number. The last part of the build number represents the AKU number. For example, *Build 29102.5.3.12.13* indicates that the device is running AKU version 5.3.12.13.

OEM Version

To determine the OEM software version:

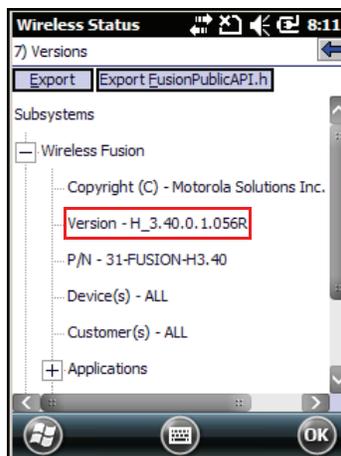
Tap **Start** > **Settings** > **System** folder > **System Info** icon > **System** tab.



Fusion Software

To determine the Fusion software version:

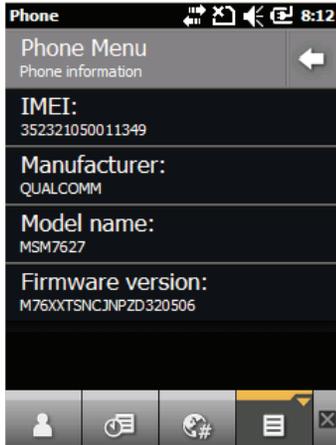
Tap **Start** > **Wireless Companion** icon > **Wireless Status** icon > **Versions**.



Phone Software

To determine the Phone software version:

Tap **Start > Phone >**  **> Phone information.**



Chapter Descriptions

Topics covered in this guide are as follows:

- [Chapter 1, Getting Started](#) provides information on MC45 configurations and accessories, charging the battery, and resetting.
- [Chapter 2, Accessories](#) describes the accessories available for the MC45 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 MC45 and a host computer.
- [Chapter 4, Application Deployment for Windows Embedded Handheld 6.5.3](#) provides information for provisioning and deploying applications to the MC45.
- [Chapter 5, Phone Setup](#) explains how to verify MC45 service on an Enhanced Data rates for wireless network and establish settings.
- [Chapter 6, Wireless Applications](#) describes how to configure the wireless LAN connection.
- [Chapter 7, Maintenance and Troubleshooting](#) includes instructions on cleaning and storing the MC45, and provides troubleshooting solutions for potential problems during MC45 operation.
- [Appendix A, Technical Specifications](#) includes tables listing the technical specifications for the MC45 and its accessories.
- [Appendix B, Software](#) provides registry settings for configuring Bluetooth software.

Notational Conventions

The following conventions are used in this document:

- “MC45” refers to all configurations of the MC45XX mobile computer.

- *Italics* are used to highlight the following:
 - chapters and sections in this and related documents
 - dialog box, window, and screen names
 - drop-down list and list box names
 - check box and radio button names
 - icons on a screen.
- **Bold** text is used to highlight the following:
 - 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.

Related Documents and Software

The following documents provide more information about the MC45.

- *MC45 Quick Start Guide*, p/n 72-164157-xx
- *MC45 Regulatory Guide*, p/n 72-164158-xx
- *MC45 User Guide*, p/n 72E-164159-xx
- *Enterprise Mobility Developer Kits (EMDKs)*, available at: <http://supportcentral.motorola.com>
- Latest ActiveSync software, available at: <http://www.microsoft.com>.

For the latest version of this guide and all guides, go to: <http://supportcentral.motorola.com>

Service Information

If you have a problem with your equipment, contact Motorola Solutions Global Customer Support for your region. Contact information is available at: <http://www.motorolasolutions.com/support>.

When contacting Motorola Solutions Global Customer support, please have the following information available:

- Serial number of the unit
- Model number or product name
- Software type and version number

Motorola responds to calls by email, telephone or fax within the time limits set forth in support agreements.

If your problem cannot be solved by Motorola Solutions Global Customer Support, you may need to return your equipment for servicing and will be given specific directions. Motorola 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.

If you purchased your Motorola business product from a Motorola business partner, contact that business partner for support.

CHAPTER 1 GETTING STARTED

Introduction

This chapter provides information about the MC45, accessories, charging the MC45, replacing the strap and powering on the MC45 for the first time.

Unpacking the MC45

Carefully remove all protective material from the MC45 and save the shipping container for later storage and shipping. Verify that you received the following equipment:

- MC45
- Lithium-ion battery
- Battery cover
- Tethered stylus
- Screen protector
- Regulatory Guide
- Quick Start Guide.

Inspect the equipment. If any equipment is missing or damaged, contact the Motorola Solutions Global Customer Support immediately. See [Service Information on page xvii](#) for contact information.

Getting Started

To start using the MC45 for the first time:

- Install microSD card (optional)
- Install the mini-SIM card
- Install the battery.
- Charge the MC45.

- Power on the MC45.
- Configure the MC45.

Charge the battery before or after it is installed. Use one of the spare battery chargers to charge the battery (out of the MC45), or one of the cradles to charge the battery installed in the MC45.

Installing a microSD card

The microSD card slot provides secondary non-volatile storage. The slot is located under the battery (see [Figure 1-1](#)). Refer to the documentation provided with the card for more information, and follow the manufacturer's recommendations for use.



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

To install the microSD card:

1. Slide the mini-SIM card holder to the right to unlock.
2. Lift the mini-SIM card holder.

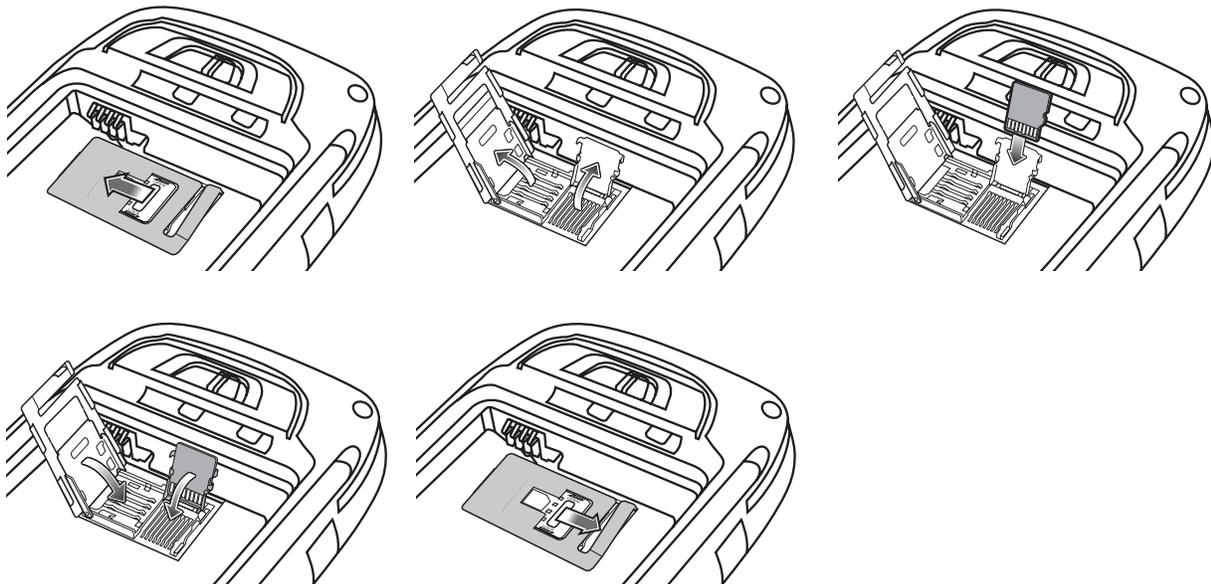


Figure 1-1 *microSD Card Installation*

3. Slide the microSD card holder down to unlock.
4. Lift up the microSD card holder.
5. Insert the card with the card contacts facing down and lower the microSD card holder.
6. Slide the microSD card holder up to lock.
7. Lower the mini-SIM card holder.
8. Slide the mini-SIM card holder to the left to lock.

To remove the microSD card:

1. Slide the microSD card holder down to unlock.
2. Lift the microSD card holder.

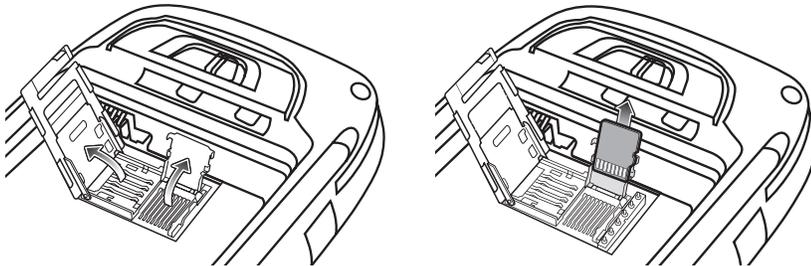


Figure 1-2 Card Removal

3. Remove the card from the card holder.
4. Lower the microSD card holder.
5. Slide the microSD card holder up to lock.

Installing the mini-SIM Card

- ✓ **NOTE** The MC45 does not support copying multiple contacts to some SIM cards. If an error message appears, see [Chapter 7, Maintenance and Troubleshooting](#) for more information.

GSM phone service requires a Subscriber Identification Module (SIM) card, or smart card. Obtain this card from your service provider. The card fits into the MC45 and can contain the following information:

- Mobile phone service provider account details.
- Information regarding service access and preferences.
- Contact information, which can be moved to **Contacts** on the MC45.
- Any additional services to which you have subscribed.

- ✓ **NOTE** For more information about SIM cards, refer to the service provider's documentation.

To install the mini-SIM card:

1. Slide the mini-SIM card holder to the right to unlock.
2. Lift the mini-SIM card holder.

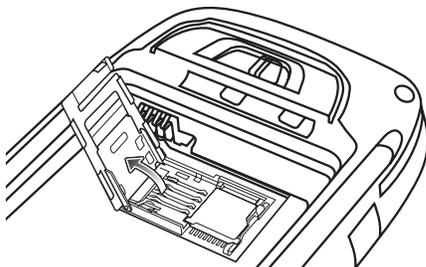


Figure 1-3 Lifting the mini-SIM Card Cover

3. Insert the mini-SIM card, as shown in [Figure 1-4](#), with the cut edge of the card facing out and the contacts facing down.

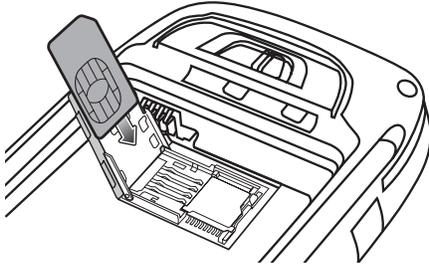


Figure 1-4 Inserting the mini-SIM Card

4. Lower the SIM card holder and slide it to the left to lock.
5. Install the battery. See [Installing the Battery on page 1-4](#) for more information.
6. After completing initial MC45 setup or after replacing a SIM card:
 - a. Press the red **Power** button.
 - b. Ensure **Phone** is on.
 - c. Make a call to verify cellular connection.

✓ **NOTE** For detailed information about WWAN activation and settings, see [Chapter 5, Phone Setup](#).

Installing the Battery

✓ **NOTE** When installing the battery for the first time out of the box, the back cover and battery are not installed.

To install the battery:

1. Insert the battery, bottom first, into the battery compartment in the back of the MC45.

✓ **NOTE** Position the battery correctly, with the battery gold charging contacts positioned on top of the gold charging pins in the MC45 battery compartment.

2. Press the battery down into the battery compartment.

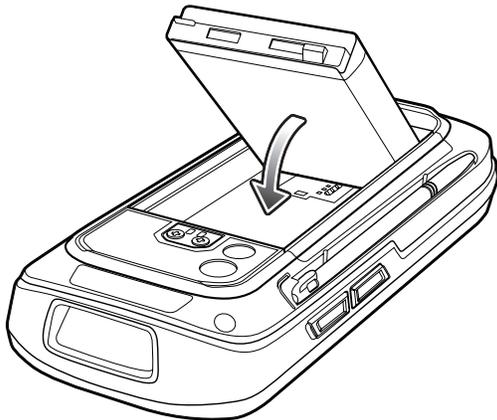


Figure 1-5 *Installing the battery*

3. With the battery cover latch open, insert the battery cover, top first, then press down on the bottom cover
4. Slide the battery cover latch to the right until the red dot is not visible.

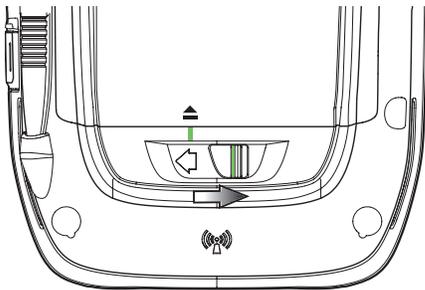


Figure 1-6 *Locking the battery cover latch*

5. Power up the MC45 by pressing the red **Power** button.

To remove the battery:

1. Press the red **Power** button for 3 seconds until a screen appears.

✓ **NOTE** If the MC45 is in **Suspend** mode, press the red **Power** button to wake the MC45.

2. Select the **Power Off** option to turn off the MC45.
3. Slide the battery cover latch to the left until the green indicators align with the eject icon and the red dot is visible. The battery cover ejects slightly.

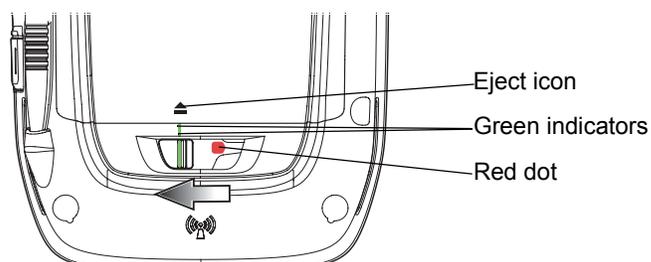


Figure 1-7 *Unlocking the battery cover latch*

4. Lift to remove battery cover.
5. Press down on the top of the battery and lift to remove.

Charging the Battery



CAUTION Ensure that you follow the guidelines for battery safety described in [Battery Safety Guidelines on page 7-3](#).

Charging the Battery

Before using the MC45 for the first time, charge the main battery until the green Charging/Battery Status LED remains lit (see [Table 1-2 on page 1-10](#) for charge status indications). To charge the MC45, use the USB Rapid Charge Cable or a cradle with the appropriate power supply. For information about the accessories available for the MC45, see [Chapter 2, Accessories](#).

To charge the battery, use either a USB Rapid Charge Cable or a cradle. For USB Rapid Charge Cable or cradle setup and charging procedures see [Chapter 2, Accessories](#).

- Single Slot Charge Cradle
- Multi Slot Universal Charge Only Cradle
- Vehicle Charge Cradle.

To charge the battery:

1. Connect the charging accessory to the appropriate power source.
2. Insert the MC45 into a cradle or attach to the USB Rapid Charge Cable and power supply. The MC45 begins charging. The Charging/Battery Status LED blinks green while charging, then turns solid green when fully charged. See [Table 1-1](#) for charging indications.
3. The 3080mAh battery fully charges in less than six hours at room temperature of approximately 25 °C (77°F). Charging time may vary at different temperatures.



NOTE The MC45 Battery Cover must be in place and closed properly for the MC45 to power on and charge the battery.

Charging/Battery
Status LED

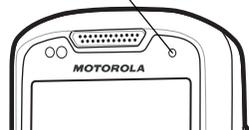


Figure 1-8 LED Indicators

Table 1-1 LED Charge Indications

Charging/Battery Status LED	Indication
Off	MC45 is not charging. MC45 is not inserted correctly in the cradle or connected to a power source. Cradle is not powered.
Slow Blinking Green (1 blink every 2 seconds)	MC45 is charging.
Solid Green	Charging complete.
Fast Blinking Red (2 blinks / second)	Charging error, e.g.: <ul style="list-style-type: none"> • Temperature is too low or too high. • Charging has gone on too long without completion (typically eight hours).

Charging Spare Batteries

See [Chapter 2, Accessories](#) for information on using accessories to change spare batteries.

Charging Temperature

Charge batteries in temperatures from 0°C to 40°C (32°F to 104°F). Charging is intelligently controlled by the MC45.

To accomplish this, for small periods of time, the MC45 or accessory alternately enables and disables battery charging to keep the battery at acceptable temperatures. The MC45 or accessory indicates when charging is disabled due to abnormal temperatures via its LED. See [Table 1-1](#).

Powering On the MC45

Press the **Power** button to turn on the MC45. If the MC45 does not power on perform a reset. See [Resetting the MC45 on page 1-8](#).

When turning the MC45 on for the first time, the splash screen displays for about a minute as the MC45 initializes its flash file system, then the calibration window appears. Note that these windows also appear upon reset.

Calibrating the Screen

✓ **NOTE** The Calibration screen can be accessed by pressing **Blue** key - **BKSP** key or tapping **Start > Settings > System > Screen > General > Align Screen** button.

To calibrate the screen so the cursor on the touch screen aligns with the tip of the stylus:

1. Remove the stylus from its holder on the back of the MC45.
2. Tap the screen to begin calibration.
3. Carefully press and briefly hold the tip of stylus on the center of each target that appears on the screen.
4. Repeat as the target moves around the screen.

Checking Battery Status

To check the charge status of the main battery or backup battery in the MC45, tap **Start > Settings > Power** icon to display the **Power** window.

First-time Network Activation

GSM/UMTS Activation

Network Activation

To activate on a GSM/UMTS network:

1. If an active SIM card was installed in the MC45, the MC45 performs the activation process.
2. The **Phone Network - GSM/UMTS Setup** dialog box displays.
3. Tap **Yes** and then **OK**. For some carriers, the MC45 resets.
4. If during start-up, no update connection settings message appears, tap **Start > Settings > Connections > Phone Network Setup** and tap **Update Connection Settings** button.
5. If the network is unsupported, a message appears with links for manually setting the data connection and MMS settings.

For detailed information for configuring the phone and activating on a different network, refer to [Chapter 5, Phone Setup](#).

Resetting the MC45

There are three reset functions, warm boot, cold boot and clean boot. A warm boot restarts the MC45 by closing all running programs. A cold boot also restarts the MC45, and also initializes some drivers. Data saved in flash memory or a memory card is not lost. A clean boot resets the MC45 to factory defaults.

Perform a warm boot first. If the MC45 still does not respond, perform a cold boot.

Performing a Warm Boot

Hold down the **Power** button for approximately five seconds. As soon as the menu screen pops up select **Warm Boot**.

Performing a Cold Boot

To perform a cold boot:

1. Simultaneously press the **Power** button and the 1 and 9 keys.
2. The MC45 initializes.

Performing a Clean Boot



CAUTION A clean boot should only be performed by an authorized system administrator. You must connect the MC45 to AC power during a clean boot.

Removing AC power from the MC45 during a clean boot may render the MC45 inoperable.

A clean boot resets the MC45 to the factory default settings. All data in the **Application** folder is retained. You must download the Clean Boot Package file from the Support Central web site (<http://supportcentral.motorola.com>) and install on the MC45.

To perform a clean boot:

1. Download the Clean Boot Package from the Support Central web site (<http://supportcentral.motorola.com>). Follow the instructions included in the package for installing the package onto the MC45.
2. Simultaneously press the **Power** button and the **1** and **9** keys.
3. Immediately, as soon as the device starts to boot and before the splash screen is visible, press and hold the right programmable button.



NOTE The right programmable button is mapped to **Camera** by default. The key can be remapped.

4. Insert the MC45 into a powered cradle.
5. The MC45 updates and then re-boots.
6. Calibrate the screen.

Waking the MC45

The wake-up conditions define what actions wake up the mobile computer after it has gone into suspend mode. The mobile computer can go into suspend mode by either pressing the Power button or automatically by Control Panel time-out settings. These settings are configurable and the factory default settings are shown in are subject to change/update. To change the wake-up conditions, tap **Start > Settings > Power > Wakeup**.

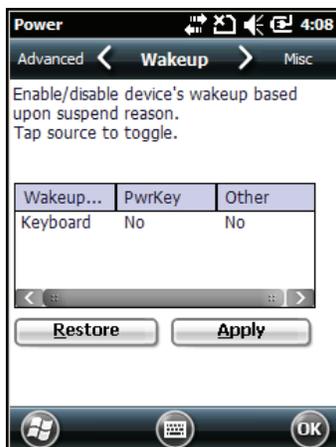


Figure 1-9 Power Wakeup Tab

These settings are configurable and the factory default settings are shown in [Table 1-2](#) are subject to change/update.

Table 1-2 *Wake-up Default Settings*

Condition for Wake-up	Power Button	Automatic Time-out
AC power is applied to the MC45.	No	Yes
The MC45 is inserted into a cradle.	Yes	Yes
The MC45 is removed from a cradle.	Yes	Yes
The MC45 is connected to a USB device.	No	Yes
The MC45 is disconnected from a USB device.	No	Yes
A key is pressed.	No	No
The screen is touched.	No	No
A Bluetooth device tries to communicate with the MC45.	Yes	Yes
Incoming phone call	Yes	Yes

CHAPTER 2 ACCESSORIES

Introduction

This chapter provides set up information for various accessories of the MC45. [Table 2-1](#) lists all accessories available for the MC45.

Table 2-1 MC45 Accessories

Accessory	Part Number	Description
Cradles		
Single Slot Charge Cradle	CRDMC45-1000CR	Charges the MC45 device.
Multi Slot Universal Charge Only Cradle	CRDUNIV-XX-5000R	Charges five MC45 devices simultaneously or four MC45 devices when configured with a Four Slot Battery Charger. Charger Cups and Power Supplies sold separately.
Multi Slot Universal Charge Only Cradle with five MC45 cups installed	CRDUNIV-45-5000R	Charges five MC45 devices simultaneously or four MC45 devices when configured with a Four Slot Battery Charger. Includes 5 Charger Cups. Power Supply sold separately.
Vehicle Charge Cradle	VCD45XX-1000R	Installs in a vehicle and charges the MC45 battery.
Chargers		
Four Slot Battery Charger	SAC45XX-4000CR	Charges four MC45 batteries simultaneously.
Cables		
Auto Charge Cable	VCA400-01R	Charges the MC45 using a vehicle's cigarette lighter.
DEX Cable	25-45793-01R	For use with electronic data exchange. For example, connecting MC45 to a vending machine.
USB Rapid Charge Cable	25-128458-01R	Charges the MC45 and provides USB communication with a host computer.

Table 2-1 MC45 Accessories (Continued)

Accessory	Part Number	Description
Miscellaneous		
Power Supply	PWRS-124306-01R	Provides power to the MC45 or Single Slot Charge Cradle using the USB Rapid Charge Cable.
	PWRS-14000-148C	Provides power to the Multi Slot Universal Charge Only Cradle or the Four Slot Battery Charger.
Spare 3080 mAh lithium-ion battery	BTRY-MCXX-3080-01R	Replacement 3080 mAh battery.
	BTRY-MCXX-3080-10R	Package of 10 replacement 3080 mAh batteries
	BTRY-MCBR-3080-01R	Replacement 3080 mAh battery for Brazil only.
MC45 Battery Door	KT-MC45-BTRYD-01R	Replacement battery door.
Mount Bracket	KT-UNIVLBRKT-01R	Mount bracket for rack or wall mounting of the Multi Slot Universal Charge Only Cradle.
Charger Cup	CUPMC45XX-1000R	Charger cup for the Multi Slot Universal Charge Only Cradle.
Blank Slot Cover	CUPUNICVR-5000R	Package of 5 blank slot covers for the Multi Slot Universal Charge Only Cradle charge slot.
Four Slot Battery Charger Cup Adapter	CUPUNIBTRY-1000R	Mounts the Four Slot Battery Charger onto the Multi Slot Universal Charge Only Cradle.
Handstrap	SG-MC45-STRAP-01R	Single pivot handstrap.
Soft Holster	SG-MC45-HLSTR-01R	Soft case holder for added protection.
Stylus with Tether Kit	KT-MC45-STYTH-10R	Replacement Stylus and Tether (10-pack)
micro USB adapter	ADP45XX-100R	Rugged micro USB adapter that connects to the MC45 micro USB port.
Screen Protector	KT-MC45-SCRNP-10R	Package of 10 screen protectors.

USB Rapid Charge Cable

Use the USB Rapid Charge cable to connect the MC45 to the power supply for charging or to a host computer for communication.

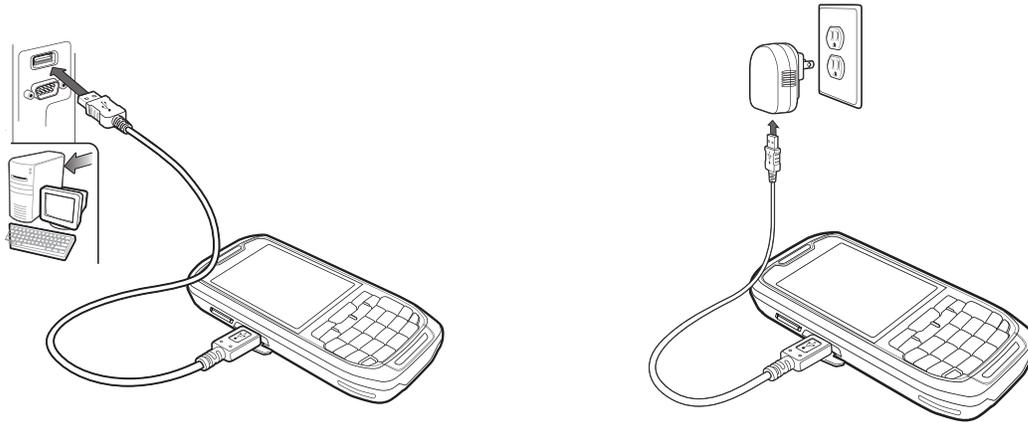


Figure 2-1 *USB Rapid Charge Cable*

Communication with Host Computer

To communicate with a host computer:

1. Ensure ActiveSync is installed and configured on the host computer. See [Chapter 3, ActiveSync](#) for more information.
2. Connect USB Rapid Charge cable to the microUSB port on the side of the MC45.
3. Connect the USB connector of the USB Rapid Charge Cable to the USB Port on the host computer.
4. The **USB Connect** dialog box appears.
5. Tap **ActiveSync RNDIS** or **ActiveSync Serial**.
6. Tap **Connect**.

Single Slot Charge Cradle

This section describes how to set up and use a Single Slot Charge Cradle with the MC45. The Single Slot Charge Cradle:

- Provides 5.0 VDC power for operating the MC45.
- Charges the MC45's battery.

Setup

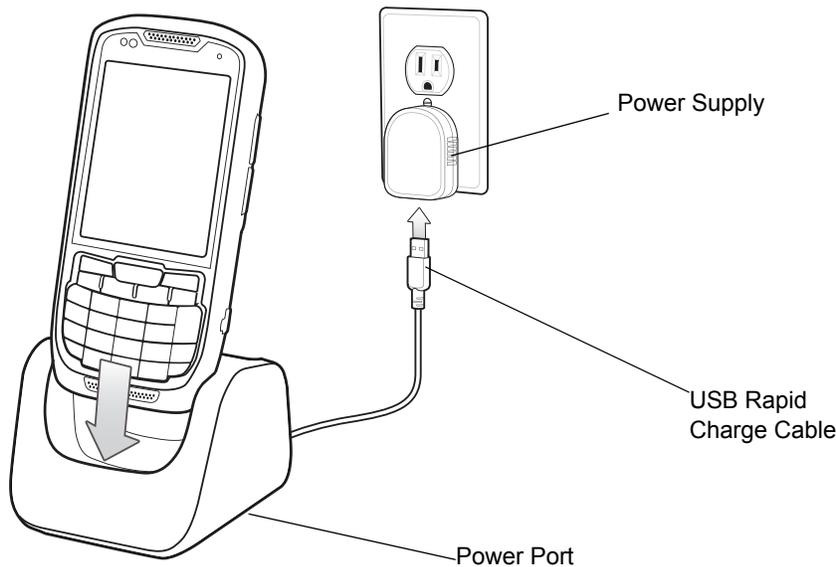


Figure 2-2 Single Slot Charge Cradle Power Connections

Charging the MC45 Battery

- ✓ **NOTE** Use the MC45 micro USB port when charging a completely depleted battery. See [Battery Charging on page 2-17](#) for more information.

Connect the cradle to the Power Supply as shown in [Figure 2-2](#). Insert the MC45 into the cradle slot to begin charging.

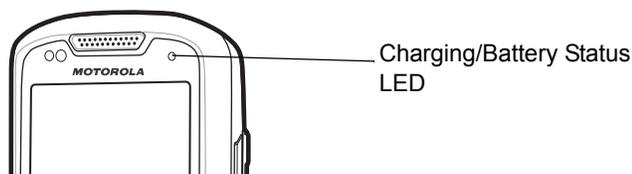


Figure 2-3 MC45 Battery Charging

Battery Charging Indicators

The MC45's LED indicates the status of the battery charging in the MC45. See [Table 2-2 on page 2-5](#) for charging status indications. The 3080mAh battery fully charges in less than six hours at room temperature of approximately 25 °C (77°F). Charging time may vary at different temperatures.

Charging Temperature

Charge batteries in temperatures from 0°C to 40°C (32°F to 104°F). Charging is intelligently controlled by the MC45.

To accomplish this, for small periods of time, the MC45 or accessory alternately enables and disables battery charging to keep the battery at acceptable temperatures. The MC45 or accessory indicates when charging is disabled due to abnormal temperatures via its LED. See [Table 2-2](#) for charging status indications.

Table 2-2 Battery LED Charging Indicators

Charging/Battery Status LED	Indication
Off	MC45 is not charging. MC45 is not inserted correctly in the cradle or connected to a power source. Cradle is not powered.
Slow Blinking Green (1 blink every 2 seconds)	MC45 is charging.
Solid Green	Charging complete.
Fast Blinking Red (2 blinks / second)	Charging error, e.g.: <ul style="list-style-type: none"> • Temperature is too low or too high. • Charging has gone on too long without completion (typically eight hours).

Multi Slot Universal Charge Only Cradle

This section describes how to set up a Multi Slot Universal Charge Only Cradle with the MC45.

The Multi Slot Universal Charge Only Cradle:

- Provides 12.0 VDC power for operating the MC45.
 - ✓ **NOTE** The Multi Slot Universal Charge Only Cradle is powered by up to two power supply for charging the mobile computers. The second power supply is used for future expansion.
 - Simultaneously charges up to five MC45s or four MC45s when configured with a Four Slot Battery Charger.
 - ✓ **NOTE** The Four Slot Battery Charger can be attached to the Multi Slot Universal Charge Only Cradle using a Battery Charger Cup Adapter. The cup adapter angles the Battery Charger so that the user can see the LED indicators easily.
- The Four Slot Battery Charger requires a separate power supply. See [Four Slot Battery Charger on page 2-13](#) for more information
- Optional Blank Slot Covers cover empty slots when not all slots are used. Any combination of cups and covers can be installed on the base.

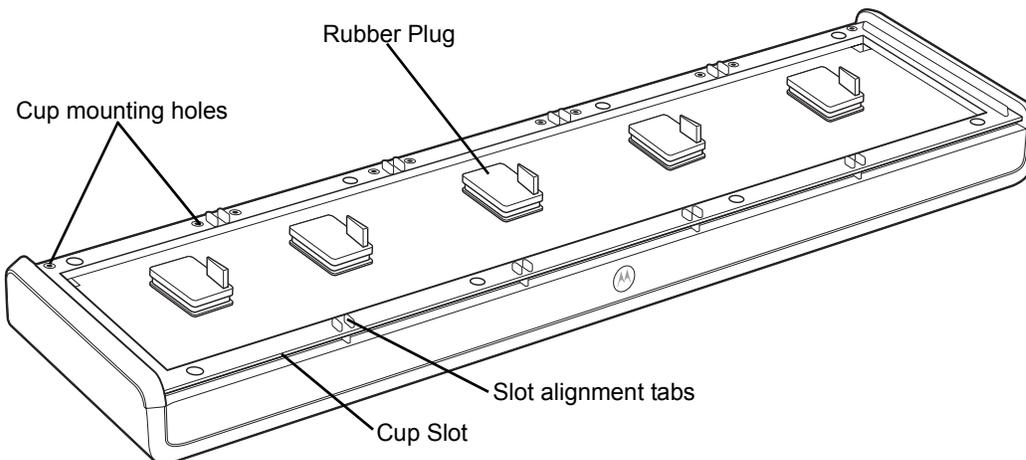


Figure 2-4 Multi Slot Universal Charge Only Cradle base

Setup

Cup Installation

- ✓ **NOTE** Remove power from the Multi Slot Universal Charge Only Cradle before installing cups.

To install the cups:

1. Remove the rubber plug from each slot.

2. Align the lip of the cup with the slot on the front of the cradle. Ensure that the cup is positioned within the Slot Alignment Tabs.
3. Slide the lip into the cup slot and rotate the cup until it is flat on the cradle base.
4. Using a Phillips screwdriver, secure the cup to the charger base using the two screws provided with the cup.

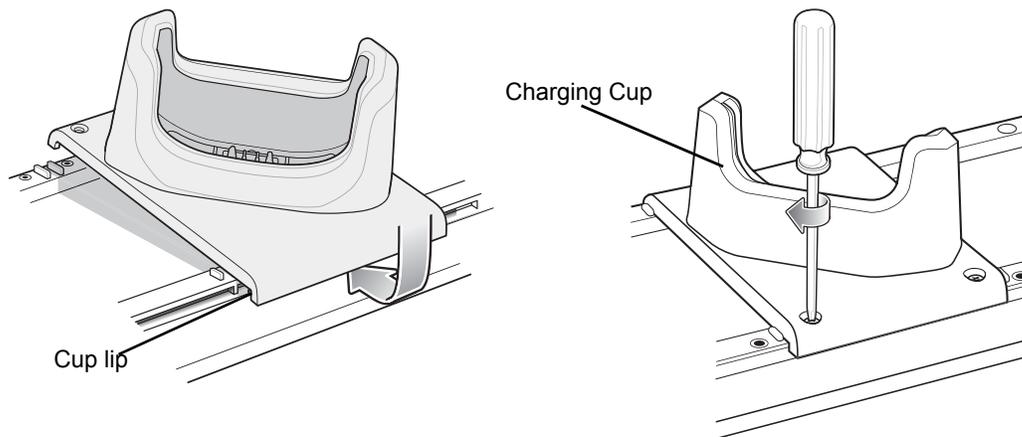


Figure 2-5 *Charger Cup installation*

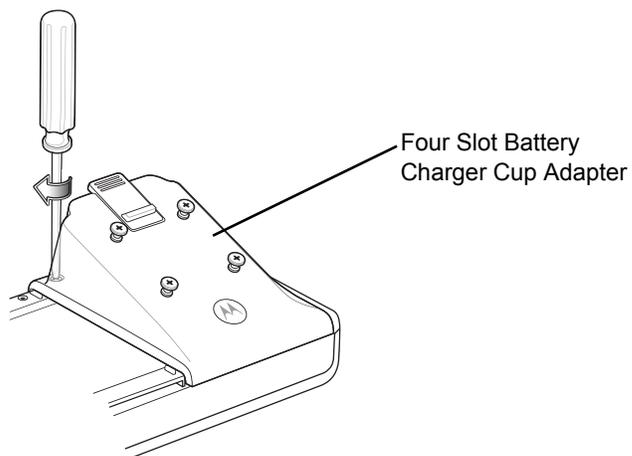


Figure 2-6 *Four Slot Battery Charger Cup Adapter installation*

5. Each slot on the cradle base must have a cup installed.
6. Repeat for each additional cup.

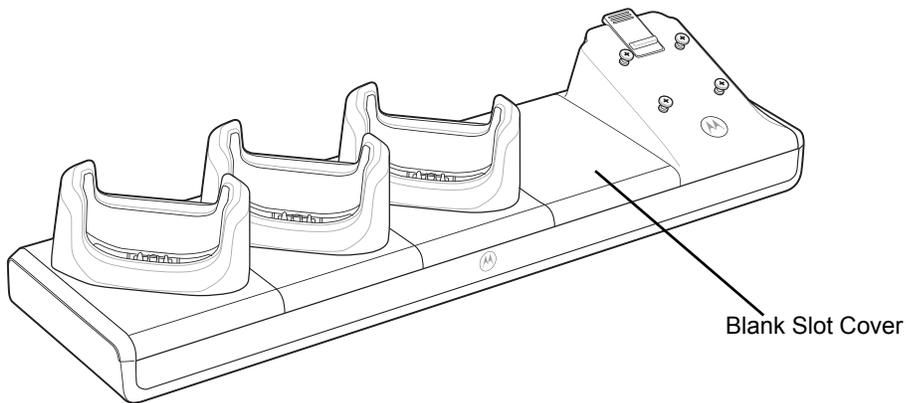


Figure 2-7 Multi Slot Universal Charge Only Cradle with Charger Cups and Four Slot Battery Charger Cup Adapter installed

Four Slot Battery Charger Installation

To install the Four Slot Battery Charger:

1. Align the four mounting holes on the bottom of the Four Slot Battery Charger with the four studs on the Four Slot Battery Charger Cup Adapter.
2. Place the Four Slot Battery Charger onto the Four Slot Battery Charger Cup Adapter and slide down until it locks into place.

Power Connection

Plug the power supply connector into the right power input jack on the back of the Multi Slot Universal Charge Only Cradle base. The left power input jack is used for future expansion.

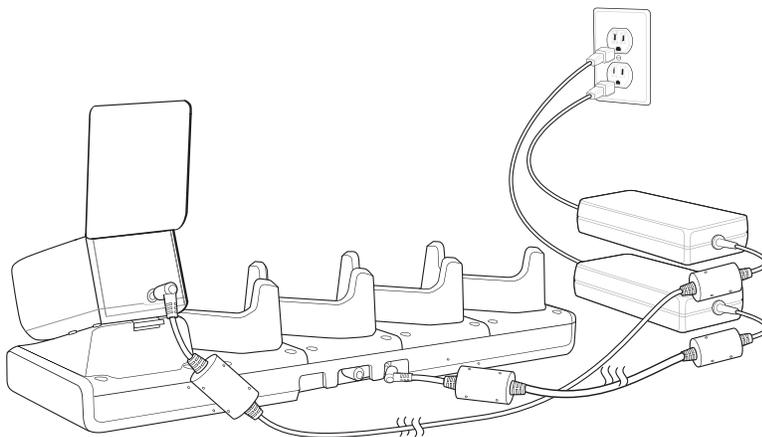


Figure 2-8 Multi Slot Universal Charge Only Cradle Power Connection

Charging Temperature

Charge batteries in temperatures from 0°C to 40°C (32°F to 104°F). Charging is intelligently controlled by the MC45.

To accomplish this, for small periods of time, the MC45 or accessory alternately enables and disables battery charging to keep the battery at acceptable temperatures. The MC45 or accessory indicates when charging is disabled due to abnormal temperatures via its LED. See [Table 2-2](#) for charging status indications.

Vehicle Charge Cradle



WARNING! Some countries prohibit the mounting of any electronic device in any location on the vehicle dashboard. Be sure to check with local laws acceptable mounting areas before installing the auto mounting kit.

Installation Reminders

- Do not mount the Vehicle Charge Cradle where it will obscure the driver's view of the road.
- Do not mount the Vehicle Charge Cradle near the driver seat air bag deployment area.

Install the vehicle mount on the surface of the vehicle that is reasonably flat and free of dirt and oil. Clean the mounting surface with a glass cleaner and a clean cotton cloth. Install the vehicle mount on the windshield or other flat car surface using the supplied mounting disc.

Windshield Installation

1. Fix the suction cup mount to the selected area with the suction lever facing up.

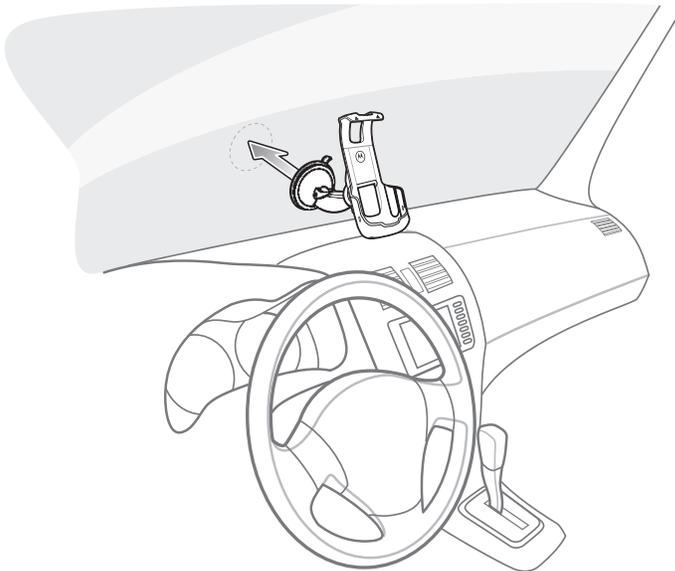


Figure 2-9 *Install on Windshield*

2. Flip the lever down to create a vacuum between the suction cup and the mounting surface.

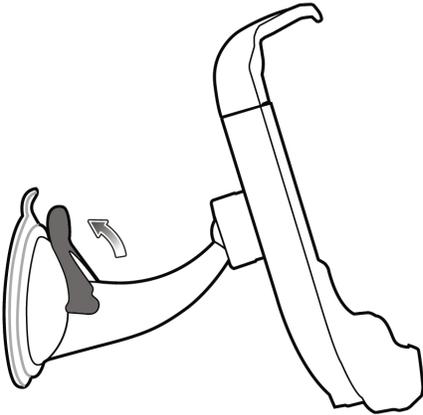


Figure 2-10 Move lever Toward Windshield

3. Make sure that the suction bond is strong enough before proceeding to the next step.

Install the MC45

To install the MC45 into the Vehicle Charge Cradle:

1. Place the MC45 top first into the cradle.
2. Push the MC45 back until it snaps into place.

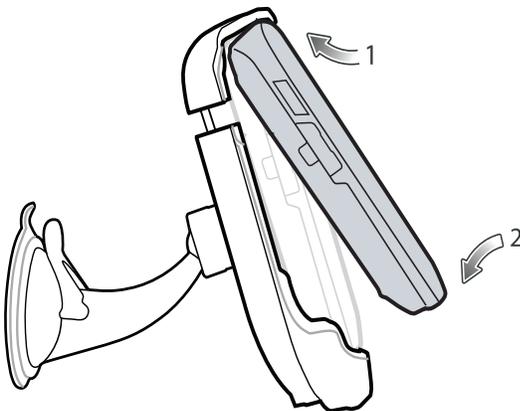


Figure 2-11 Insert MC45 into Vehicle Charge Cradle

3. Position the MC45 for best viewing.
4. Tighten the nuts to lock the cradle in place.

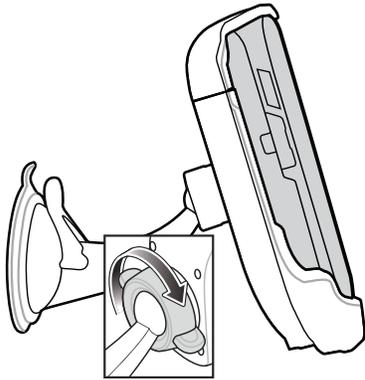


Figure 2-12 *Tighten Nut*

Charging the MC45 Battery

To charge the MC45 battery using the Vehicle Cradle:

1. Connect the micro USB connector of the Auto-Charger to the input power connector in the Vehicle Charge Cradle.

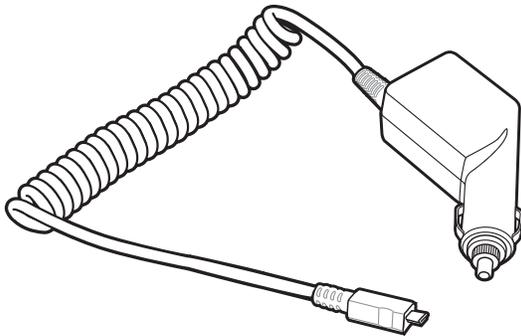


Figure 2-13 *Commercial Grade Auto Charger*

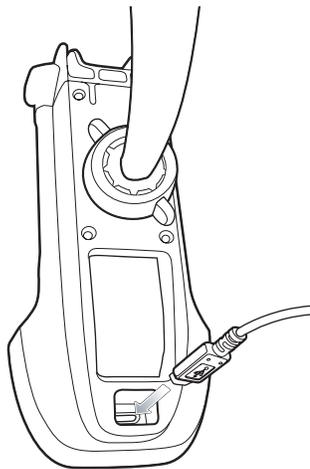


Figure 2-14 *Connect Auto Charge Cable to Vehicle Charge Cradle*

2. Connect the other end to the cigarette lighter socket. The LED indicator on MC45 flashes green indicating the MC45 is charging.



CAUTION Ensure the MC45 is fully inserted in the cradle. Lack of proper insertion may result in property damage or personal injury. Motorola Solutions Inc. is not responsible for any loss resulting from the use of the products while driving.

Removing the MC45

To remove the MC45 from the Vehicle Charge Cradle, lift the MC45 up and then remove from the bottom of the cradle.

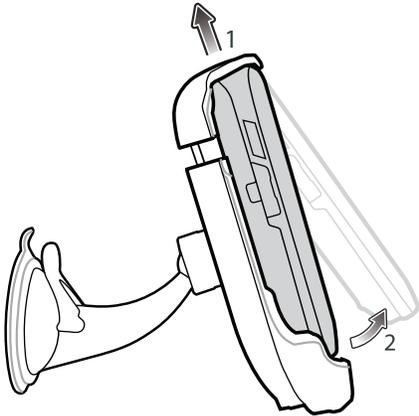


Figure 2-15 Removing the MC45

Battery Charging Indicators

The Vehicle Cradle charges the MC45 battery when connected to the vehicle's cigarette lighter socket using the Auto Charge Cable.

The MC45's LED indicates the status of the battery charging in the MC45. See [Table 2-2 on page 2-5](#) for charging status indications. The 3080mAh battery fully charges in less than six hours at room temperature of approximately 25 °C (77°F). Charging time may vary at different temperatures.

Four Slot Battery Charger

This section describes how to use the Four Slot Battery Charger to charge up to four MC45 spare batteries.

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.

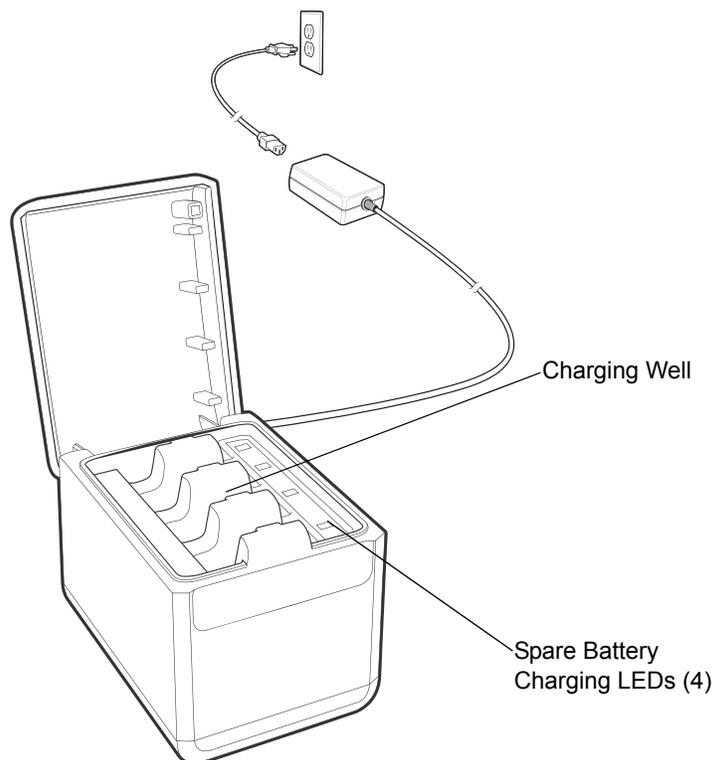


Figure 2-16 Four Slot Battery Charger

To remove the spare battery from the Four Slot Battery Charger:

1. Gently push the battery located in the spare battery charging well towards the back of the charger. The latch unlocks.
2. Remove the battery by pulling it upwards from the spare battery charging well.

✓ **NOTE** The Four Slot Battery Charger is compatible and charges the 3080mAh lithium-ion battery (p/n BTRY-MCXX-3080-01R, BTRY-MCXX-3080-10R and BTRY-MCBR-3080-01R).

Battery Charging Indicators

A LED indicator is provided for each battery charging well. See [Table 2-3](#) for charging status indications. The 3080mAh battery fully charges in less than six hours at room temperature of approximately 25 °C (77°F). Charging time may vary at different temperatures.

Charging Temperature

Charge batteries in temperatures from 0°C to 40°C (32°F to 104°F). Charging is intelligently controlled by the Four Slot Battery Charger.

To accomplish this, for small periods of time, the MC45 or accessory alternately enables and disables battery charging to keep the battery at acceptable temperatures. The MC45 or accessory indicates when charging is disabled due to abnormal temperatures via its LED. See [Table 2-3](#) for charging status indications.

Table 2-3 Spare Battery LED Charging Indicators

LED	Indication
Off	No spare battery in slot; spare battery not placed correctly; cradle is not powered.
Fast Blinking Red (2 blinks / second)	Charging error, e.g.: <ul style="list-style-type: none"> • Temperature is too low or too high. • Charging has gone on too long without completion (typically eight hours). • Check placement of spare battery.
Slow Blinking Green (1 blink every 2 seconds)	Spare battery is charging.
Solid Green	Charging complete.

micro USB Adapter

Use the micro USB Adapter to connect accessory devices (such as printers or USB flash drives) to the MC45. The micro USB Adapter connects the DEX cable to the MC45.

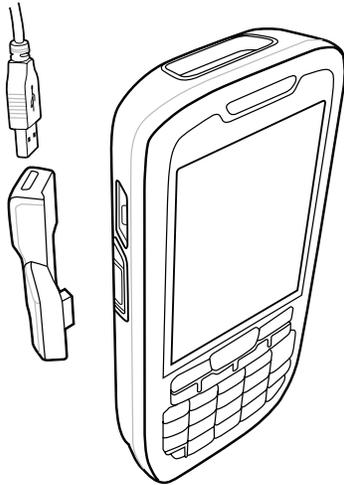


Figure 2-17 *micro USB Adapter Connection*



NOTE The micro USB Adapter can only be connected to the MC45 and not the Single Slot Charge Cradle.

The micro USB Adapter is intended to provide extension of the MC45 micro USB port. Use the micro USB Adapter to minimize mechanical wear and failures of the MC45.



CAUTION Do not connect a USB device that draws more than 100 mA. If a device that draws more than 100mA is connected, the MC45 displays a Warning dialog box. Remove the USB device from the micro USB Adapter.

Connect an accessory device's USB connector to the micro USB Adapter.



NOTE When connecting a USB Flash drive to the micro USB Adapter, the USB Flash Drive appears in **File Explorer** as **Hard Drive** under **My Device** folder.

Handstrap

The handstrap allows the MC45 to be worn safely around the palm of your hand. To install the handstrap:

1. Remove the 2 screws securing the existing tether plate from the MC45.
2. Untie the tether from the tether plate.
3. Tie the tether to the handstrap plate.
4. Install the handstrap plate to the MC45.

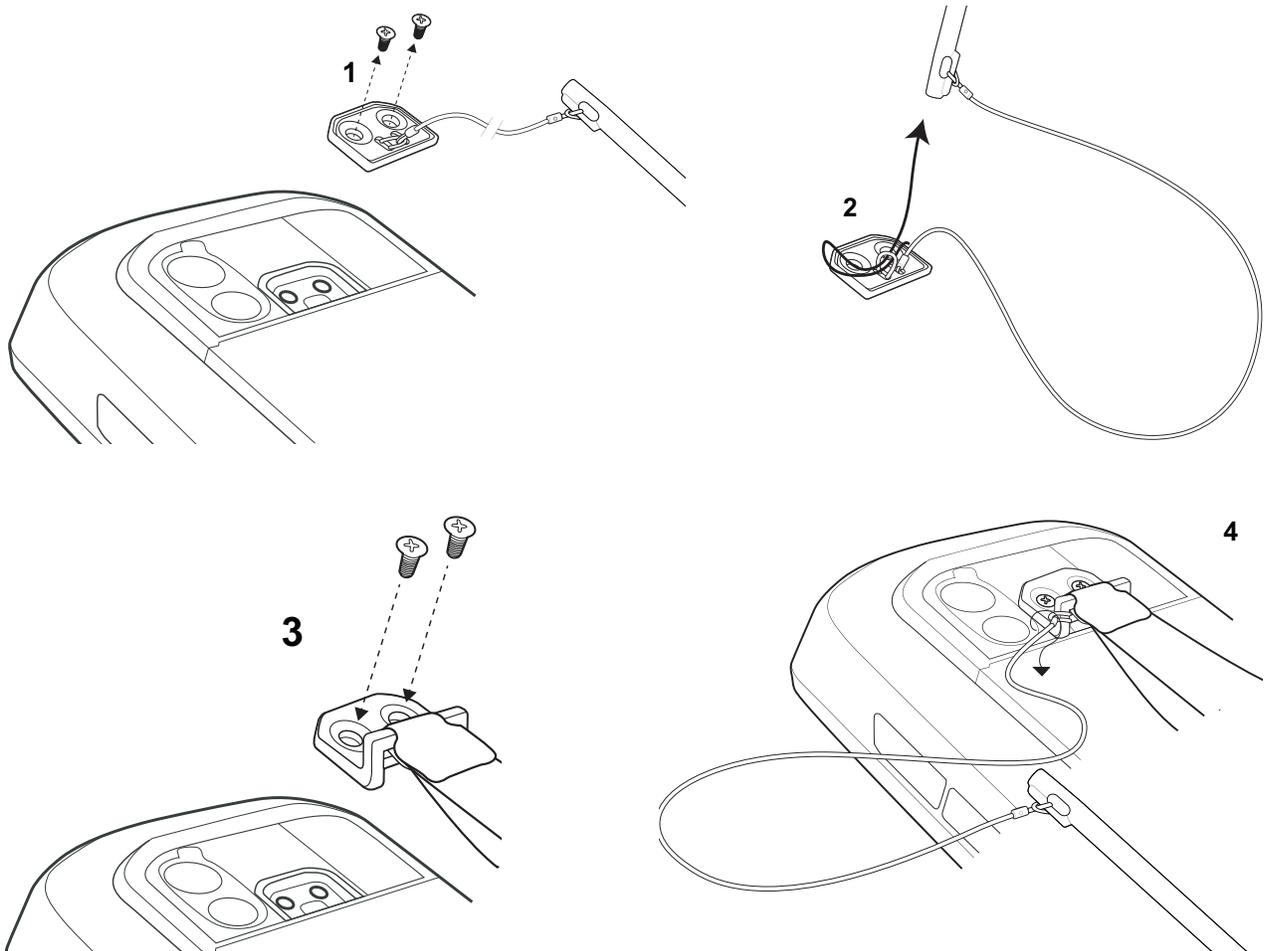


Figure 2-18 *Installing the Handstrap*

Cables

This section describes how to set up and use the cables. The cables are available with a variety of connection capabilities.

The following MC45 communication/charge cables are available:

- USB Rapid Charge Cable
- Auto charge cable
- DEX cable

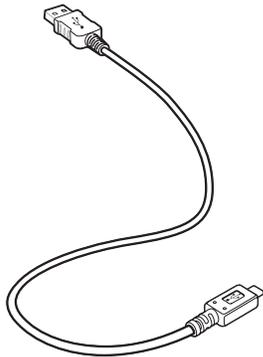


Figure 2-19 Cables (MC45 Connector)

The communication/charge cables:

- Provide the MC45 with operating and charging power.
- Synchronize information between the MC45 and a host computer. With customized or third party software, it can also synchronize the MC45 with corporate databases.
- Provide USB connection through the USB pass-through port for communication with a USB device, such as a host computer. For communication setup procedures, see [Communication Setup on page 2-18](#).

Setup

The MC45 communication/charge cables can connect with a USB device, such as power supply or host computer, through its micro USB port.

Battery Charging

The communication/charge cables can charge the MC45 battery and supply operating power.

To charge the MC45 battery:

1. Connect the communication/charge cable power input connector to the Motorola approved power source.
2. Connect the micro USB connector of the communication/charge cable to the MC45 micro USB port. The MC45 green Charge LED indicates the MC45 battery charging status. The 3080 mAh battery fully charges in less than six hours at room temperature of approximately 25 °C (77°F). Charging time may vary at different temperatures. See [Table 1-1 on page 1-7](#) for charging status indications.
3. When charging completes, remove the cable by gently pulling the MC45 and the cable apart.

LED Charge Indications

The Charge LED on the MC45 indicates battery charging status. See [Table 1-1 on page 1-7](#) for charging status indications.

Charging Temperature

Charge batteries in temperatures from 0°C to 40°C (32°F to 104°F). Charging is intelligently controlled by the MC45.

To accomplish this, for small periods of time, the MC45 or accessory alternately enables and disables battery charging to keep the battery at acceptable temperatures. The MC45 or accessory indicates when charging is disabled due to abnormal temperatures via its LED. See [Table 1-1 on page 1-7](#).

Communication Setup

To connect an MC45 communication/charge cable to a serial or USB device:

1. Connect the USB end of the MC45 communication/charge cable to the communication port of the device.
2. Connect the MC45 connector end of the cable to the MC45. For more information on communication setup procedures, see [Chapter 3, ActiveSync](#).

CHAPTER 3 ACTIVESYNC

Introduction

To communicate with various host devices, install Microsoft ActiveSync (version 4.5 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** When a mobile computer with Microsoft Windows Embedded Handheld 6.5.3 is connected to a host computer and an ActiveSync connection is made, the WLAN radio (if applicable) is disabled. 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 4.5 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 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 > ActiveSync** icon. The **ActiveSync** window appears.



Figure 3-1 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.

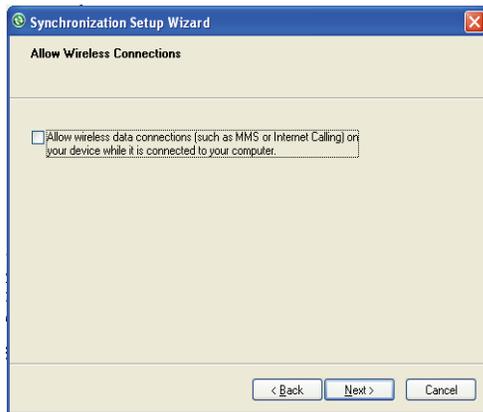


Figure 3-2 ActiveSync Window

✓ **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.

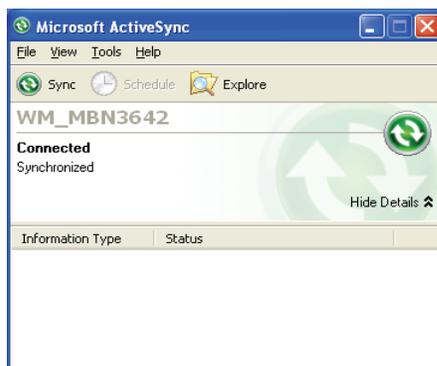


Figure 3-3 Connection Settings Window

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 Embedded Handheld 6.5.3 Device

✓ **NOTE** When a mobile computer with Windows Embedded Handheld 6.5.3 is connected to a host computer and an ActiveSync connection is made, the WLAN radio (if applicable) is disabled. This is a Microsoft security feature to prevent connection to two networks at the same time.

To synchronize with a Windows Embedded Handheld 6.5.3 device:

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

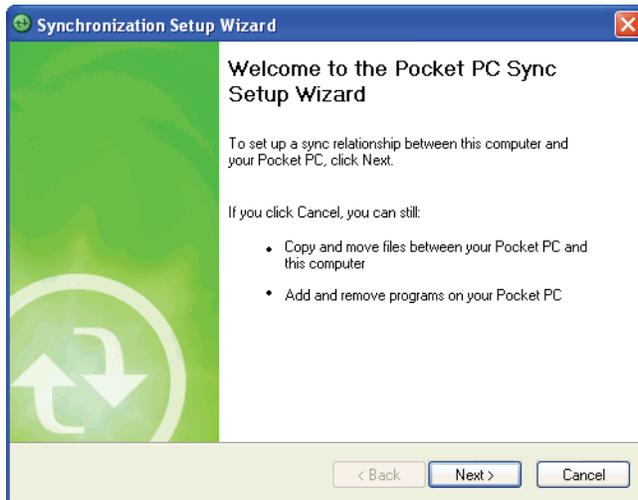


Figure 3-4 *Synchronization Setup Wizard Window*

2. Click **Next**.



Figure 3-5 *Synchronization Option Window*

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

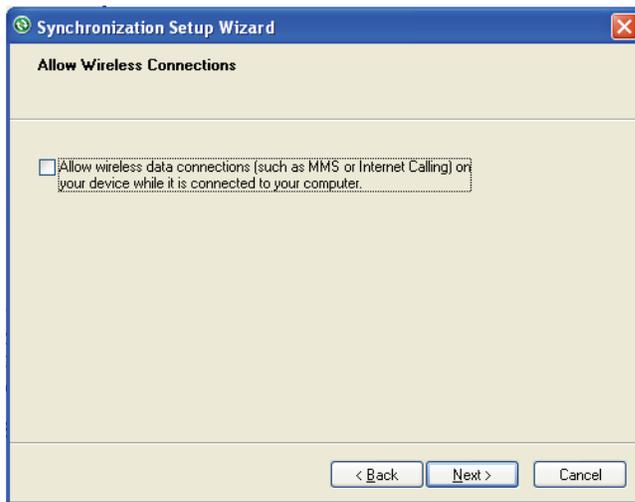


Figure 3-6 Allow Wireless Connection

4. Select the check box to allow wireless data connections on MC45 while it is connected to the host computer if applicable.
5. Click **Next**.

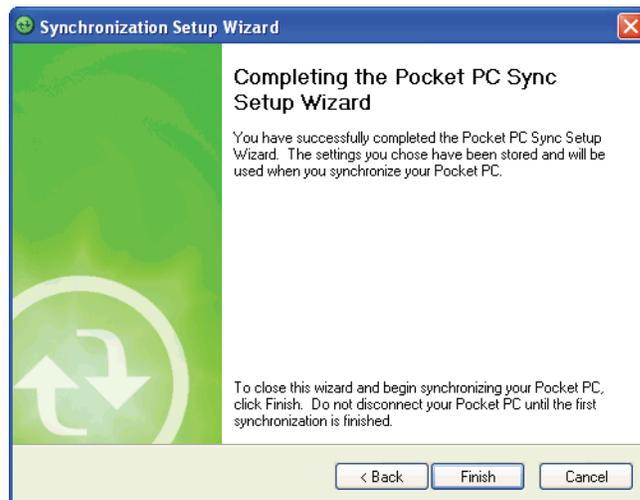


Figure 3-7 Wizard Complete Window

6. Click **Finish**.

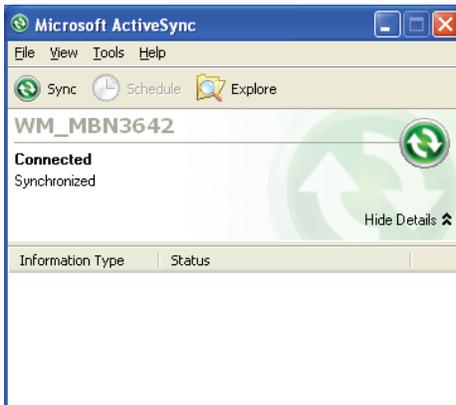


Figure 3-8 *ActiveSync Connected Window*

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 disconnected from the host computer.

- ✓ **NOTE** The first ActiveSync operation must be performed with a local, direct connection. Windows Embedded Handheld 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 FOR WINDOWS EMBEDDED HANDHELD 6.5.3

Introduction

This chapter describes new features in Windows Embedded Handheld 6.5.3 including new security features, how to package applications, and procedures for deploying applications onto the MC45.

Security

The MC45 implements 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 MC45.

- Trusted - All applications must be digitally signed by a certificate on the MC45.
- 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 Motorola's software certificate, they are assured that the package is authentic and that it was created by Motorola. By enforcing the use of digital signatures, users can also prevent malicious applications from executing on the MC45. For example, users can provision the MC45 to only execute “trusted” applications (digitally signed).

Motorola ships all Windows Embedded Handheld 6.5.3 based products in an “open” state, which means all signed and unsigned applications should work. However, customers can still reconfigure their MC45s 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 Embedded Handheld 6.5.3 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 Embedded Handheld 6.5.3, 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 to 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 6 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, Motorola ships with RAPI in the restricted mode. Certain tools, such

as RAPIConfig, may not work properly. Refer to the *Windows Embedded Handheld 6.5.3 Help* file for finding information on Remote API security policies.

Packaging

- ✓ **NOTE** Applications compiled for Windows Embedded Handheld 6.5.3 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 MC45. Package new applications and updates, such as new DLL files, as CAB files, then deploy them to Mobile 6 devices. Refer to the *Windows Embedded Handheld 6.5.3 Help* file for information on CAB files.

Deployment

To install applications onto the MC45, developers package the application and all required files into a CAB file, then load the file onto the MC45 using one of the following options:

- Microsoft ActiveSync 4.5 or higher
- Storage Card
- AirBEAM
- MSP
- Image Update (for updating the operating system).

Refer to the *Microsoft Windows Embedded Handheld 6.5.3 Help* file for information on CAB files.

Installation Using ActiveSync

To install an application package:

- Connect the MC45 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 MC45.
- Copy the CAB file from the host computer to the \temp directory on the MC45.
- On the MC45, navigate to the \temp directory.
- Tap on the application CAB file. The application installs on the MC45.

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 MC45. See [Installing a microSD card on page 1-2](#) for more information.
- On the MC45, open **File Explorer**.

- Open the *Storage Card* directory.
- Tap the package CAB file. The application installs on the MC45.

Installation Using AirBEAM

The AirBEAM Smart Client provides backward-compatible legacy AirBEAM functionality and backward-compatible legacy MSP 2.x Level 2 Agent functionality.

Refer to the AirBEAM Smart Windows CE Client Product Reference Guide, p/n 72-63060-xx, for instructions for AirBEAM Smart client.

MSP

The MSP 3 Client Software is a set of software components that come pre-installed on the MC45. The MSP 3 Client software consists of the following components:

The RD Client provides support for MSP 3 Staging functionality, provides support for the MSP 3 Legacy Staging process, and provides support for backward-compatible legacy MSP 2.x Legacy Staging functionality.

The MSP 3 Agent provides MSP 3 Provisioning functionality and Control functionality when used with MSP 3.2 Control Edition.

Refer to the Mobility Services Platform 3.2 User's Guide, p/n 72E-100158-xx, for instructions for using the Rapid Deployment and MSP 3 Agent clients.

Update Loader Image

Windows Embedded Handheld 6.5.3 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. Motorola distributes the update packages on the Support Central Web Site, <http://supportcentral.motorola.com>.

To update an operating system component, copy the update package to the MC45 using one of a variety of transports, including ActiveSync, an microSD memory card, AirBEAM or MSP.

Download Update Loader Package

1. Go to the Motorola Support Central web site, <http://supportcentral.motorola.com>
2. Download the appropriate update loader package to a host computer.
3. Locate the update loader package file on the host computer and un-compress the file into a separate directory.

ActiveSync

To install an update loader package using ActiveSync:

1. Connect the MC45 to a host computer using ActiveSync. See *Chapter 3, ActiveSync*, for more information.
2. In ActiveSync on the host computer, open **Explorer** for the MC45.
3. Copy all the update loader package files from the host computer to the \temp directory on the MC45.
4. On the MC45, navigate to the \temp directory.
5. Tap on the update loader file, **STARTUPDLRD.EXE**. The Update Loader application installs the update loader package on the MC45. A progress bar displays until the update completes.

6. The MC45 re-boots.
7. The calibration screen appears.

microSD Card

To install an update loader package using a microSD card:

1. Copy all the update loader package files to the root directory of a microSD card.
2. Install the microSD card into the MC45. See *Installing a microSD card on page 1-2* for installation instructions.
3. Connect the MC45 to AC power. See *Chapter 2, Accessories*.
4. Perform a cold boot.
5. Immediately, as soon as the device starts to boot and before the splash screen is visible, press and hold the right programmable button.
6. The Update Loader application looks for the update loader file in the root directory of the microSD card. When it finds the file, it loads the update loader package onto the MC45. A progress bar displays until the update completes.
7. The MC45 re-boots.
8. The calibration screen appears.

XML Provisioning

To configure the settings on an MC45, use XML provisioning. To install an XML provisioning file on the MC45, create a Cabinet Provisioning File (CPF). 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 MC45. The user receives an e-mail notification indicating success or failure.

XML provisioning provides the ability to configure various features of the MC45 (i.e., registry and file system). However, some settings require security privileges. To change registry settings via a CPF file, you must 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 *Microsoft Windows Embedded Handheld 6.5.3 Help* file, *Metabase Settings for Registry Configuration Service Provider* section, for the default role settings in Windows Embedded Handheld 6.5.3.

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 Embedded Handheld 6.5.3 Help* file and the *Windows Embedded Handheld 6.5.3 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 and rename it `_setup.xml`.) Ensure the file contains the required parameters for the operation. Refer to the *Microsoft Windows Embedded Handheld 6.5.3 Help* file for information.

2. In the Windows Embedded Handheld tools directory on the desktop computer (typically \Program Files\Windows CE Tools\wce500\Windows Mobile 6 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 MC45. Refer to the *Windows Embedded Handheld 6.5.3 Help* file for more information.

XML Provisioning vs. RegMerge and Copy File

Prior to Windows Embedded Handheld 6.5.3, Motorola used two drivers (RegMerge and CopyFiles) to update the registry and to copy files during a cold boot. With Windows Embedded Handheld 6.5.3, Motorola recommends using XML provisioning instead. RegMerge and CopyFiles are supported for backward compatibility but Motorola 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

Embedded Handheld 6.5.3 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 Embedded Handheld 6.5.3 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, Motorola 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 MC45 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 Embedded Handheld 6.5.3 protects all data and applications from power-related loss. Because Windows Embedded Handheld 6.5.3 mounts the entire file system and registry in persistent storage (rather than using RAM), MC45 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 650 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 96 MB (formatted).

Enterprise Mobility Developer Kits

The Motorola Enterprise Mobility Developer Kit (EMDK) family of products allows you to write applications that take advantage of the capture, move and manage capabilities of the MC45. Go to the Support Central (<http://supportcentral.motorola.com>) to download the appropriate developer kit.

CHAPTER 5 PHONE SETUP

Introduction

This chapter explains how to verify MC45 service on an Global System for Mobile communications (GSM) / Universal Mobile Telecommunications System (UMTS) wireless network and establish settings.

GSM/UMTS networks deliver mobile voice and data services, such as Short Message Service (SMS)/Text Messaging, with full roaming capabilities across the world. High-speed Downlink Packet Access (HSDPA) enabled networks offer Internet-based content and packet-based data services. This enables services such as internet browsing, e-mail on the move, powerful visual communications, multimedia messages, and location-based services.

When using the MC45 as a phone, services can include speed dialing, call tracking, voice mail, call forwarding, conference calling, and caller ID, depending on the type of service.

Also use the integrated phone as a modem to connect the MC45 to an ISP or work network. The GSM/UMTS enabled MC45 can connect to the Internet or work network using Cellular Line, or using the modem specified by the mobile phone service provider.

✓ **NOTE** Before using an MC45 on a wireless network, first select a provider, establish a voice and data-enabled service plan, and configure the MC45 (where applicable). Refer to the *MC45 User Guide* for information on how to use the phone and services.

Automatic Network Setup

See [First-time Network Activation on page 1-8](#) for information on activating the MC45 upon startup.

Manual Network Setup

To manually configure the MC45 for a GSM/UMTS network:

1. Install an active SIM card into the MC45. Refer to [Installing the mini-SIM Card on page 1-3](#).
2. Tap **Start > Settings > Connections > Phone Network Setup**.

3. On the **GSM/UMTS** tab, tap **GSM/UTMS Preference** and select:
 - **Auto (GSM & UMTS)** - Searches for either GSM or UMTS networks.
 - **GSM Only** - Searches for only GSM networks.
 - **UMTS Only** - Searches for only UMTS networks.
4. On the **GSM/UMTS** tab, tap **Active network selection mode** and select:
 - **Auto** - Selects the active GSM/UMTS network automatically
 - **Manual** - Lists all the available GSM/UMTS network and allows manual choice of network.
5. Tap the **Update Connection Settings** button.

✓ **NOTE** SIM cards of supported carriers automatically configure the data connection and MMS settings upon activation. Data connection and MMS settings for non-supported carriers must be manually configured. See Configuring a GSM Data Connection on page and refer to the *MC45 User Guide* for MMS set up information.

Tap the **Public Land Mobile Network (PLMN)** tab to display the PLMN list.

On the **PMLN** tab, tap the **Enter** button to add a new network to the PLMN list.

Tap **Store List** to save the PLMN list.

Configuring a Data Connection

✓ **NOTE** SIM cards of supported carriers automatically configure the data connection upon activation. Data connections for non-supported carriers must be manually configured.

A data connection allows Internet access across a wireless network.

To set up a new data connection:

1. Acquire an Access Point Name (APN) from the service provider.
2. Tap **Start > Settings > Connections** tab > **Connections** icon > **Tasks** tab.
3. Under **My ISP** select **Add a new modem connection**.
4. Enter a connection name in the **Enter a name for the connection** text box.
5. Select **Cellular Line (GPRS)** from the **Select a modem:** drop-down list.
6. Tap **Next**.
7. Enter the APN from the service provider in the **Access point name** text box.
8. Tap **Next**.
9. Enter a username in the User name text box, if required by the service provider.
10. Enter a password in the Password text box, if required by the service provider.
11. Enter a domain name in the Domain text box, if required by the service provider.
12. Tap **Finish**.
13. Tap **OK** to exit **Connections**.

Phone Settings

Use the **Phone Settings** window to customize settings, such as the ring type and ring tone for incoming calls, security options and other options depending on the type of service.

Sounds

Use the **Sounds** tab to customize ring type, ring tone, keypad tone.

Tap **Start > Settings > Personal > Phone > Sounds**.

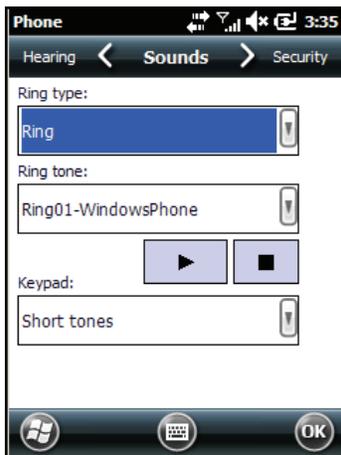


Figure 5-1 MC45 Phone Window - Sounds Tab

1. Select a ring type from the **Ring type:** drop-down list. The ring type changes the way the MC45 rings when it receives an incoming call. Regardless of the ring type selected, a dialog box appears on the MC45's display for incoming calls.
2. Select a ring tone for incoming calls from the **Ring tone:** drop-down list. To hear a sample of the selected ring tone, tap . Tap  to end the ring tone.

✓ **NOTE** To use custom .wav, .mid, or .wma files as ring tones, use ActiveSync on the host computer to copy the file to the /Windows/Rings/ folder on the MC45 and select the sound from the ring tone list.

3. Select a keypad tone from the **Keypad:** drop-down list. This selection determines the tone that sounds when entering a phone number on the keypad. Select **Short tones** or **Long tones** to specify the duration of the sound when you press a number on the keypad. Select **Off** to disable tones.

✓ **NOTE** Turning off sounds saves power and prolongs battery life.

Security

Enabling a PIN

Tap **Start > Settings > Personal > Phone > Security**.



NOTE Place emergency calls at any time, without requiring a PIN or a SIM card.



Figure 5-2 Security Tab

To require a PIN when using the phone:

1. Select the **Require PIN when the phone is used** check box.

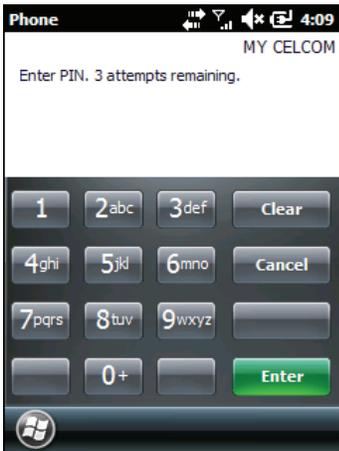


Figure 5-3 Enter PIN

2. Use the dialer keypad to enter a four to eight digit PIN.
3. Tap **Enter** to enable the PIN and return to the **Security** tab.

Changing a PIN



CAUTION If you enter an incorrect PIN, the message “SIM PIN incorrect: Try again” appears. After three consecutive incorrect attempts, the SIM card is blocked. The phone does not allow you to attempt to enter your PIN again and you must obtain a PIN Unblock Key from your service provider.

1. Tap **Change PIN**.
2. Use the dialer keypad to enter the current PIN.
3. Tap **Enter**.

4. Use the dialer keypad to enter a new four to eight digit PIN.
5. Tap **Enter**.
6. Reenter the new PIN for confirmation and tap **Enter**.
7. Tap **OK** to confirm the change

Disabling a PIN

1. Deselect the **Require PIN when phone is used** check box.
2. Use the dialer keypad to enter the current PIN.
3. Tap **Enter**.
4. Tap **OK** to confirm the change and exit settings.

Services

Use the *Services* tab to configure settings for subscribed phone services. For example, block certain types of incoming and/or outgoing calls ([page 5-5](#)), disclose the caller's identity when making outgoing calls ([page 5-6](#)), forward incoming calls to a different phone number ([page 5-6](#)), receive notification of incoming calls when a phone session is in use ([page 5-7](#)), and set up voice mail and short message service ([page 5-7](#)).

1. Tap **Start > Settings > Personal > Phone > Services** tab.

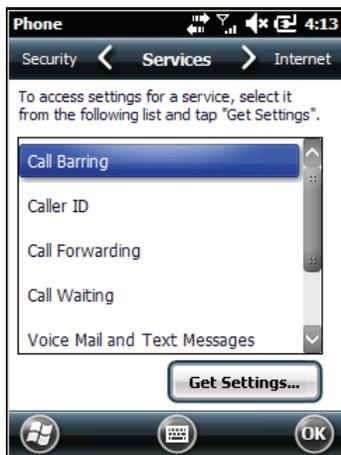


Figure 5-4 MC45 Phone Window - Services Tab

2. Select a service from the list and tap **Get Settings...**
3. Change services settings as follows.

Call Barring

Use call barring to block certain types of incoming and/or outgoing calls. Select the type of incoming and/or outgoing calls to block.

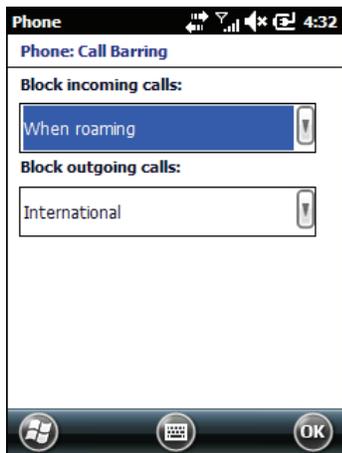


Figure 5-5 Call Barring

Caller ID

Enable caller ID to reveal the identity of the person making an outgoing call. Select the **Everyone** radio button to always display the caller ID. Select the **No one** radio button to prevent the caller's identity from appearing to others.

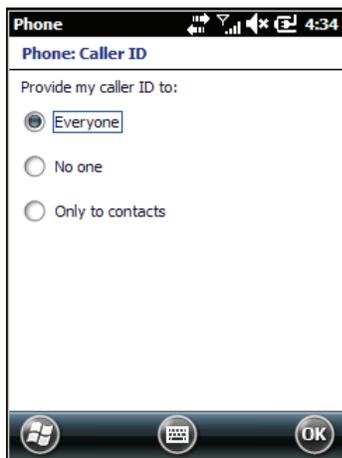


Figure 5-6 Caller ID

Call Forwarding

✓ **NOTE** Call Forwarding may not be available on all networks. Check with your service provider for availability.

Use call forwarding to forward incoming calls to a different phone number.

- To forward all calls to a different phone number:
 - select the **Forward all incoming phone calls** check box.
 - enter the phone number to receive forwarded calls in the **To:** text box.

- To forward incoming calls to a different phone number based on a specific situation, select one or more of the check boxes under **Forward phone calls only if:**
 - **No answer:** enter the phone number to receive forwarded calls only when the phone cannot be answered. Then select a time period from the **Forward after:** drop-down list. Options are 5, 10, 15, 20, 25, and 30 seconds.
 - **Unavailable:** enter the phone number to receive forwarded calls only when the phone is turned off or the user is unreachable.
 - **Busy:** enter the phone number to receive forwarded calls only when the line is busy.

Call Waiting

✓ **NOTE** Call Waiting may not be available on all networks. Check with your service provider for availability.

Call waiting notifies you of an incoming call when the phone is in a phone session. Select the **Notify me** radio button to enable call waiting. Select the **Do not notify me** radio button to disable call waiting.

Voice Mail and Text Messages

To use voice mail and send short messages, enter the voice mail and/or text message phone number in the appropriate text boxes.

Fixed Dialing

Use Fixed Dialing to restrict the phone to dial only the phone number(s) or area code(s) specified in a Fixed Dialing list.

1. Select **Fixed Dialing** and tap **Get Settings**.
2. Select the **Enable fixed dialing** check box.
3. To add a number to the list, tap **Menu > Add**.
4. Enter the phone number or area code to restrict and tap **Done**.
5. Repeat steps 3 and 4 to add more numbers, and tap **Done** twice when complete.
6. Enter **PIN2** and tap **Done**.

✓ **NOTE** PIN2 is buffered in the MC45 indefinitely after entry and will not be requested again until a reboot of the MC45 has been performed. Should PIN2 be required, then the user must perform a reboot of the MC45.

Internet

Use the **Internet** tab to configure Internet calling.

Select an option from the drop-down list.

Tap **OK**.

Services

Use the **Services** tab to set Broadcast Channels and GPS Privacy features.



Figure 5-7 Services tab

Broadcast Channels

Enable broadcast messages from local cell sites. These messages include emergency directions and information services.

GPS Privacy

Allows internet applications to use current location.

Hearing

Turn Teletypewriter (TTY) and Hearing Aide Compatibility (HAC) on or off.



Figure 5-8 Hearing Tab

CHAPTER 6 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. Before using the MC45 on a WLAN, the facility must be set up with the required hardware to run the wireless LAN and the MC45 must be configured. Refer to the documentation provided with the access points (APs) for instructions on setting up the hardware.

✓ **NOTE** 802.11d is enabled by default. When enabled, the AP must be configured the same in order to connect.

To configure the MC45, a set of wireless applications provide the tools to configure and test the wireless radio in the MC45. Refer to the *Wireless Fusion Enterprise Mobility Suite User Guide for Version X.XX* for information on configuring wireless profiles; where X.XX is the Fusion version. Go to <http://supportcentral.motorola.com> for the latest version of this guide. See *Software Versions on page xiv* to determine the Fusion version on the MC45.

Fusion Overview

The Fusion software contains applications with which to create wireless profiles. Each profile specifies the security parameters to use for connecting to a particular WLAN as identified by its ESSID. The Fusion software also allows the user to control which profile out of a set of profiles is used to connect. Other Fusion applications allow the user to monitor the status of the current WLAN connection and to invoke diagnostic tools for troubleshooting.

To access Fusion, tap the **Start** >  > **Wireless Launcher**.

Fusion Applications

Many of the items in the menu invoke one of the Fusion applications. These menu items and their corresponding applications are summarized below:

- Find WLANs – Invokes the Find WLANs application which displays a list of the WLANs active in your area. The **Wireless Application** menu on the task tray provides the following wireless applications:

- Manage Profiles – Invokes the Manage Profiles application (which includes the Profile Editor Wizard) to manage and edit your list of WLAN profiles.
- Manage Certs – Invokes the Certificate Manager application which allows you to manage certificates used for authentication.
- Manage PACs – Invokes the PAC Manager application which helps you manage the list of Protected Access Credentials used with EAP-FAST authentication.
- Options – Invokes the Options application which allows you to configure the Fusion option settings.
- Wireless Status – Invokes the Wireless Status application which allows you to view the status of the current wireless connection.
- Wireless Diagnostics – Invokes the Wireless Diagnostics application which provides tools with which to diagnose problems with the wireless connection.
- Log On/Off – Invokes the Network Login dialog which allows you to log on to a particular profile or to log off from the currently active profile.

Additional Wireless Launcher menu entries include:

- Enable/Disable Radio
- Hide Menu
- Exit.

Signal Strength Icon

The **Signal Strength** icon appears on the Home screen and in the task tray when using the Classic Home screen.



Figure 6-1 Home Screen



Figure 6-2 Classic Home Screen

The icon indicates the MC45's wireless signal strength as follows:

Table 6-1 Signal Strength Icons Descriptions

Icon	Status	Description
	Excellent signal strength	WLAN network is ready to use.
	Very good signal strength	WLAN network is ready to use.
	Good signal strength	WLAN network is ready to use.
	Fair signal strength	WLAN network is ready to use. Notify the network administrator that the signal strength is only "Fair".
	Poor signal strength	WLAN 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 WLAN network connection. Notify the network administrator.
	The WLAN radio is disabled.	The WLAN radio is disabled. To enable, choose Enable Radio from the Wireless Applications menu.
None	The Wireless Launcher application was exited.	The Wireless Launcher application has been closed. See the Fusion Functions paragraphs below for how to restart the Wireless Launcher .

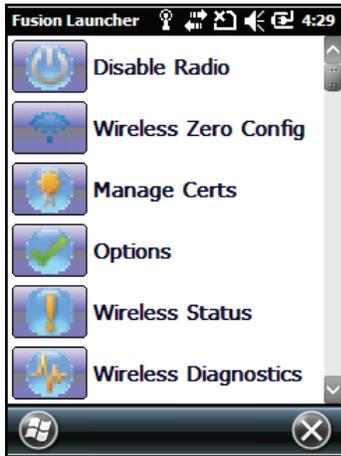


Figure 6-3 *Fusion Launcher Window*

Turning the WLAN Radio On and Off

To turn the WLAN radio off, tap the connection icon at the top of the screen and select **Wireless Manager**. Tap the Wi-Fi bar to turn off the radio.



Figure 6-4 *Disable Radio*

To turn the WLAN radio on, tap the connection icon at the top of the screen and select **Wireless Manager**. Tap the Wi-Fi bar to turn on the radio.



Figure 6-5 *Enable Radio*

CHAPTER 7 MAINTENANCE AND TROUBLESHOOTING

Introduction

This chapter includes instructions on cleaning and storing the MC45, and provides troubleshooting solutions for potential problems during MC45 operation.

Maintaining the MC45

For trouble-free service, observe the following tips when using the MC45:

- Do not scratch the screen of the MC45. When working with the MC45, 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 MC45 screen.
- A screen protector, p/n KT-MC45-SCRNP-10R, is applied to the MC45. Motorola recommends using this to minimize wear and tear. Screen protectors enhance the usability and durability of touch screen displays. Benefits include:
 - Protection from scratches and gouges
 - Durable writing and touch surface with tactile feel
 - Abrasion and chemical resistance
 - Glare reduction
 - Keeping the device's screen looking new
 - Quick and easy installation.
- The touch-sensitive screen of the MC45 is polycarbonate. Do not to drop the MC45 or subject it to strong impact.
- Protect the MC45 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 MC45 in any location that is dusty, damp, or wet.
- Use a soft lens cloth to clean the MC45. If the surface of the MC45 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.

Removing the Screen Protector

A screen protector is applied to the MC45. Motorola recommends using this to minimize wear and tear. Screen protectors enhance the usability and durability of touch screen displays.

To remove the screen protector, lift the corner using a thin plastic card, such as a credit card, then carefully lift it off the display.

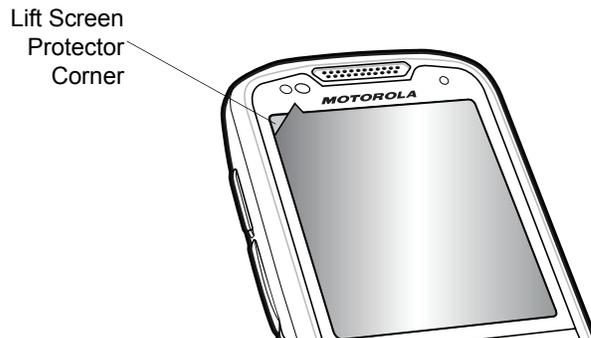


Figure 7-1 *Removing the Screen Protector*



CAUTION Do not use a sharp object to remove the protector. Doing so can damage the display.



NOTE Not using a screen protector can affect warranty coverage. To purchase replacement protectors, contact your local account manager or Motorola, Inc. These include screen protector installation instructions. Part number: KT-MC45-SCRNP-10R Screen Protector 10/pk.

Battery Safety Guidelines

- The area in which the units are charged should be clear of debris and combustible materials or chemicals. Particular care should be taken where the device is charged in a non commercial environment.
- Follow battery usage, storage, and charging guidelines found in the user's guide.
- Improper battery use may result in a fire, explosion, or other hazard.
- To charge the mobile device battery, the battery and charger temperatures must be between +32 °F and +104 °F (0 °C and +40 °C)
- Do not use incompatible batteries and chargers. Use of an incompatible battery or charger may present a risk of fire, explosion, leakage, or other hazard. If you have any questions about the compatibility of a battery or a charger, contact Motorola Solutions Global Customer Support.
- For devices that utilize a USB port as a charging source, the device shall only be connected to products that bear the USB-IF logo or have completed the USB-IF compliance program.
- To enable authentication of an approved battery, as required by IEEE 1725 clause 10.2.1, all batteries will carry a Motorola hologram. Do not fit any battery without checking it has the Motorola authentication hologram.
- Do not disassemble or open, crush, bend or deform, puncture, or shred.
- Severe impact from dropping any battery-operated device on a hard surface could cause the battery to overheat.
- Do not short circuit a battery or allow metallic or conductive objects to contact the battery terminals.
- Do not modify or remanufacture, attempt to insert foreign objects into the battery, immerse or expose to water or other liquids, or expose to fire, explosion, or other hazard.
- Do not leave or store the equipment in or near areas that might get very hot, such as in a parked vehicle or near a radiator or other heat source. Do not place battery into a microwave oven or dryer.
- Battery usage by children should be supervised.
- Please follow local regulations to promptly dispose of used re-chargeable batteries.
- Do not dispose of batteries in fire.
- Seek medical advice immediately if a battery has been swallowed.
- In the event of a battery leak, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with large amounts of water and seek medical advice.
- If you suspect damage to your equipment or battery, contact Motorola Solutions Global Customer Support to arrange for inspection.

Cleaning



WARNING! Avoid exposing this product to contact with hot oil or other flammable liquids. If such exposure occurs, unplug the device and clean the product immediately in accordance with these guidelines.



CAUTION Always wear eye protection.

Read warning label on compressed air and alcohol product before using.

If you have to use any other solution for medical reasons please contact Motorola for more information.

Materials Required

- Alcohol wipes
- Lens tissue
- Cotton tipped applicators
- Isopropyl alcohol
- Can of compressed air with a tube.

Cleaning the MC45

Housing

Using the alcohol wipes, wipe the housing including keys and in-between keys.

Display

The display can be wiped down with the alcohol wipes, but care should be taken not to allow any pooling of liquid around the edges of the display. Immediately dried the display with a soft, non-abrasive cloth to prevent streaking.

Scanner Exit Window

Wipe the scanner exit window periodically with a lens tissue or other material suitable for cleaning optical material such as eyeglasses.

Connector

1. Remove the main battery from mobile computer.
2. Close battery door.
3. Dip the cotton portion of the cotton tipped applicator in isopropyl alcohol.
4. Rub the cotton portion of the cotton tipped applicator back-and-forth across the connector on the bottom of the MC45. Do not leave any cotton residue on the connector.
5. Repeat at least three times.
6. Use the cotton tipped applicator dipped in alcohol to remove any grease and dirt near the connector area.
7. Use a dry cotton tipped applicator and repeat steps 4 through 6.



CAUTION Do not point nozzle at yourself and others, ensure the nozzle or tube is away from your face.

8. Spray compressed air on the connector area by pointing the tube/nozzle about ½ inch away from the surface.
9. Inspect the area for any grease or dirt, repeat if required.

Cleaning Cradle Connectors

To clean the connectors on a cradle:

1. Remove the DC power cable from the cradle.
2. Dip the cotton portion of the cotton tipped applicator in isopropyl alcohol.
3. Rub the cotton portion of the cotton tipped applicator along the pins of the connector. Slowly move the applicator back-and-forth from one side of the connector to the other. Do not let any cotton residue on the connector.
4. All sides of the connector should also be rubbed with the cotton tipped applicator.



CAUTION Do not point nozzle at yourself and others, ensure the nozzle or tube is away from your face.

5. Spray compressed air in the connector area by pointing the tube/nozzle about ½ inch away from the surface.
6. Ensure that there is no lint left by the cotton tipped applicator, remove lint if found.
7. If grease and other dirt can be found on other areas of the cradle, use lint free cloth and alcohol to remove.
8. Allow at least 10 to 30 minutes (depending on ambient temperature and humidity) for the alcohol to air dry before applying power to cradle.

If the temperature is low and humidity is high, longer drying time is required. Warm temperature and dry humidity requires less drying time.

Cleaning Frequency

The cleaning frequency is up to the customer's discretion due to the varied environments in which the mobile devices are used. They may be cleaned as frequently as required. However when used in dirty environments it may be advisable to periodically clean the scanner exit window to ensure optimum scanning performance.

Troubleshooting

MC45

Table 7-1 Troubleshooting the MC45

Problem	Cause	Solution
MC45 does not turn on.	Battery not charged.	Charge or replace the battery.
	Battery not installed properly.	Install the battery properly. See Installing the Battery on page 1-4 .
	System crash.	Perform a warm boot. If the MC45 still does not turn on, perform a cold boot. See Resetting the MC45 on page 1-8 .
Rechargeable battery did not charge.	Battery failed.	Replace battery. If the MC45 still does not operate, perform a warm boot, then a cold boot. See Resetting the MC45 on page 1-8 .
	MC45 removed from cradle while battery was charging.	Insert MC45 in cradle and allow to charge.
	Extreme battery temperature.	Battery does not charge if ambient temperature is below 0°C (32°F) or above 40°C (104°F).
Cannot see characters on display.	MC45 not powered on.	Press the red Power button.
During data communication, no data transmitted, or transmitted data was incomplete.	MC45 removed from cradle or disconnected from host computer during communication.	Replace the MC45 in the cradle, or reattach the communication cable and re-transmit.
	Incorrect cable configuration.	See the system administrator.
	Communication software was incorrectly installed or configured.	Perform setup. Refer to the <i>MC45 Integrator Guide</i> for details.
No sound.	Volume setting is low or turned off.	Adjust the volume.

Table 7-1 Troubleshooting the MC45 (Continued)

Problem	Cause	Solution
MC45 shuts off.	MC45 is inactive.	The MC45 turns off after a period of inactivity. If the MC45 is running on battery power, set this period from 1 to 5 minutes, in one-minute intervals. If the MC45 is running on external power, set this period to 1, 2, 5, 10, 15, or 30 minutes. Check the Power window by selecting Start > Settings > Power icon. Select the Advanced tab and change the setting for a longer delay before the automatic shutoff feature activates.
	Battery is depleted.	Recharge or replace the battery.
	Battery is not inserted properly.	Insert the battery properly. See <i>Installing the Battery on page 1-4</i> .
Tapping the window buttons or icons does not activate the corresponding feature.	Screen is not calibrated correctly.	Re-calibrate the screen. See <i>Calibrating the Screen on page 1-7</i> .
	The system is not responding.	Warm boot the system. See <i>Resetting the MC45 on page 1-8</i> .
A message appears stating that the MC45 memory is full.	Too many files stored on the MC45.	Delete unused memos and records. If necessary, save these records on the host computer (or use a microSD card for additional memory).
	Too many applications installed on the MC45.	Remove user-installed applications on the MC45 to recover memory. Select Start > Settings > System and tap the Remove Programs icon. Select the unused program and tap Remove .
MC45 keeps powering down to protect memory contents.	The MC45's battery is low.	Recharge or replace the battery. Configure the MC45 to conserve power.

Table 7-1 Troubleshooting the MC45 (Continued)

Problem	Cause	Solution
The MC45 does not accept data capture input.	Scanning application is not loaded.	Load a scanning application on the MC45. See the system administrator.
	Unreadable bar code.	Ensure the symbol is not defaced.
	Distance between exit window and bar code is incorrect.	Place the MC45 within proper scanning range.
	MC45 is not programmed for the bar code.	Program the MC45 to accept the type of bar code being scanned.
	MC45 is not programmed to generate a beep.	If the MC45 does not beep on a good decode, set the application to generate a beep on good decode.
	Battery is low.	If the scanner stops emitting a laser beam upon a trigger press, check the battery level. When the battery is low, the scanner shuts off before the MC45 low battery condition notification. Note: If the scanner is still not reading symbols, contact the distributor or Motorola.
Phone service is not available with SIM card installed.	SIM card might not be installed properly.	Re-install SIM card and ensure that it is seated properly. See <i>Installing the mini-SIM Card on page 1-3</i> .
Error message "SIM Error. Cannot save info to SIM" appears when copying contacts to a SIM card.	Feature not supported on some SIM cards.	If error appears while creating a new contact, add at least one number (e.g. 0) to the Work Phone field.
		If error appears while copying one contact, reboot the MC45. The contact appears on the SIM card after rebooting.
		If error appears while copying multiple contacts, copy one contact at a time and follow the above solution.
		Use Microsoft Outlook Exchange and ActiveSync to synchronize contacts with Microsoft Outlook on host computer.
MC45 cannot find any Bluetooth devices nearby.	Too far from other Bluetooth devices.	Move closer to the other Bluetooth device(s), within a range of 10 meters.
	The Bluetooth device(s) nearby are not turned on.	Turn on the Bluetooth device(s).
	The Bluetooth device(s) are not in discoverable mode.	Set the Bluetooth device(s) to discoverable mode. If needed, refer to the device's user documentation for help.

Single Slot Charge Cradle

Table 7-2 Troubleshooting the Single Slot Charge Cradle

Problem	Cause	Solution
LEDs do not light when MC45 is inserted.	Cradle is not receiving power.	Ensure the power cable is connected securely to both the cradle and to AC power.
	MC45 is not seated firmly in the cradle.	Remove and re-insert the MC45 into the cradle, ensuring it is firmly seated.
MC45 battery is not charging.	MC45 was removed from cradle or cradle was unplugged from AC power too soon.	Ensure cradle is receiving power. Ensure MC45 is seated correctly. Confirm battery is charging under Start > Settings > Power .
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	The MC45 is not fully seated in the cradle.	Remove and re-insert the MC45 into the cradle, ensuring it is firmly seated.
	Ambient temperature of the cradle is too warm.	Move the cradle to an area where the ambient temperature is between 0°C (32°F) and 35°C (95°F).
	Extreme battery temperature.	Battery does not charge if ambient temperature is below 0°C (32°F) or above 40°C (104°F).
During data communication, no data transmits, or transmitted data was incomplete.	MC45 removed from cradle during communications.	Replace MC45 in cradle and retransmit.
	Incorrect cable configuration.	See the system administrator.
	Communication software is not installed or configured properly.	Perform setup as described in Setup on page 2-4 .

Multi Slot Universal Charge Only Cradle

Table 7-3 Troubleshooting the Multi Slot Universal Charge Only Cradle

Problem	Cause	Solution
LEDs do not light when MC45 is inserted.	Cradle is not receiving power.	Ensure the power cable is connected securely to both the cradle and to AC power.
	MC45 is not seated firmly in the cradle.	Remove and re-insert the MC45 into the cradle, ensuring it is firmly seated.

Table 7-3 Troubleshooting the Multi Slot Universal Charge Only Cradle (Continued)

Problem	Cause	Solution
MC45 battery is not charging.	MC45 was removed from cradle or cradle was unplugged from AC power too soon.	Ensure cradle is receiving power. Ensure MC45 is seated correctly. Confirm battery is charging under Start > Settings > Power .
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	The MC45 is not fully seated in the cradle.	Remove and re-insert the MC45 into the cradle, ensuring it is firmly seated.
	Ambient temperature of the cradle is too warm.	Move the cradle to an area where the ambient temperature is between 0°C (32°F) and 35°C (95°F).
	Extreme battery temperature.	Battery does not charge if ambient temperature is below 0°C (32°F) or above 40°C (104°F).

Vehicle Charge Cradle

Table 7-4 Troubleshooting the Vehicle Charge Cradle

Problem	Cause	Solution
LEDs do not light up when MC45 is inserted	Cradle is not receiving power.	Ensure the power input cable is securely connected to the cradle's power port.
MC45 battery is not charging.	MC45 was removed from the cradle too soon.	Replace the MC45 in the cradle.
	Battery is faulty.	Replace the battery.
	MC45 is not placed correctly in the cradle.	Remove the MC45 from the cradle, and re-insert correctly. If the battery still does not charge, contact customer support. The MC45 battery charging LED slowly blinks amber when the MC45 is correctly inserted and charging.
	Ambient temperature of the cradle is too warm.	Move the cradle to an area where the ambient temperature is between 0°C (32°F) and 35°C (95°F).
	MC45 removed from cradle during communication.	Replace MC45 in cradle and retransmit.

Four Slot Battery Charger

Table 7-5 Troubleshooting the Four Slot Battery Charger

Problem	Cause	Solution
LEDs do not light when MC45 is inserted.	Charger is not receiving power.	Ensure the power cable is connected securely to both the charger and to AC power.
	MC45 battery is not seated firmly in the charger.	Remove and re-insert the MC45 battery into the charging well, ensuring it is firmly seated.
MC45 battery is 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 charging well correctly with the contacts facing down.
	Ambient temperature of the cradle is too warm.	Move the charger to an area where the ambient temperature is between 0°C (32°F) and 35°C (95°F).

Cables

Table 7-6 Troubleshooting the Cables

Problem	Cause	Solution
MC45 battery is not charging.	MC45 was disconnected from AC power too soon.	Connect the power cable correctly. Confirm main battery is charging under Start > Settings > Power .
	Battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	The MC45 is not fully attached to power.	Detach and re-attach the power cable to the MC45, ensuring it is firmly connected.
During data communication, no data transmits, or transmitted data was incomplete.	Cable was disconnected from MC45 during communications.	Re-attach the cable and retransmit.
	Incorrect cable configuration.	See the system administrator.
	Communication software is not installed or configured properly.	Perform setup as described in Communication Setup on page 2-18 .

APPENDIX A TECHNICAL SPECIFICATIONS

Technical Specifications

The following tables summarize the MC45's intended operating environment and technical hardware specifications.

MC45

Table A-1 MC45 Technical Specifications

Item	Description
Physical Characteristics	
Dimensions	Length: 14.2 cm (5.6 in.) Width: 6.6 cm (2.6 in.) Depth: 2.5 cm (1.0 in.)
Weight	247.4 g (8.73 oz)
Display	16 bit color 3.2" QVGA with backlight, TFT-LCD, 65K colors, 240 W x 320 L (QVGA size)
Touch Panel	Polycarbonate analog resistive touch
Backlight	LED backlight
Battery	Rechargeable Lithium Ion 3.7V, 3080 mAh battery
Expansion Slot	User accessible microSD slot with UHS-I SDHC support up to 32GB
Network Connections	USB 2.0 High Speed (host and client), WLAN, WWAN and Bluetooth
Notification	Vibrator and audible tone plus multi-color LED
Keypad Options	Numeric

Table A-1 MC45 Technical Specifications (Continued)

Item	Description
Audio	VoWWAN: handset mode with active noise reduction, speaker phone mode, Bluetooth wireless headset mode
Performance Characteristics	
CPU	600 MHz, ARM 11 processor, MSM 7627
Operating System	Microsoft® Windows Embedded Handheld™ 6.5.3 Professional Edition
Memory	256 MB RAM / 1GB Flash
Interface/Communications	USB 2.0
Output Power	USB: 5 VDC @ 100mA max.
User Environment	
Operating Temperature	-10°C to 50°C (14°F to 122°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Charging Temperature	32°F to 104°F / 0° C to 40° C
Humidity	5% to 95% non-condensing
Drop Specification	Multiple 1.5 m (5 ft.) drop per MIL-STD 810G Multiple 0.9 m (3 ft.) drop to concrete, over operating temperature range
Tumble	250, 0.5 m (1.5 ft.) tumbles with standard batteries installed; per applicable IEC tumble specifications
Electrostatic Discharge (ESD)	+/-15kVdc air discharge, +/-8kVdc direct discharge, +/-8kVdc indirect discharge
Sealing	IP64 per applicable IEC sealing specifications
Vibration	.04g2/Hz Random, Non-Operating, 1 hour duration per axis
Thermal Shock	-40°C to 70°C rapid transition
Wireless WAN Data and Voice Communications	
Radio	GSM and UMTS/HSDPA
Frequency Band	GSM – All Models Quad Band : 850 / 900 / 1800 / 1900 MHz UMTS/HSDPA – MC4597-A and MC4587-A : 2100 MHz UMTS/HSDPA – MC4597-B: 850 / 1900 MHz
GPS	Integrated, Autonomous and Assisted-GPS (A-GPS)
Wireless LAN Data and Voice Communications	
Radio	MC4597-A and MC4597-B: Tri-mode IEEE® 802.11a/b/g
Data Rates Supported	1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps

Table A-1 MC45 Technical Specifications (Continued)

Item	Description
Operating Channels	Chan 8-169 (5040 – 5845 MHz) Chan 1-13 (2412-2472 MHz) Chan 14 (2484 MHz) Japan only Actual operating frequencies depend on regulatory rules and certification agency
Security	WPA2, WEP (40 or 128 bit), TKIP, TLS, TTLS (MS-CHAP), TTLS (MS-CHAP v2), TTLS (CHAP), TTLS-MD5, TTLS-PAP, PEAP-TLS, PEAP (MS-CHAP v2), AES, LEAP, CCXv4 certified; FIPS 140-2 certified
Spreading Technique	Direct Sequence Spread Spectrum (DSSS) and Orthogonal Frequency Division Multiplexing (OFDM)
Antenna	Internal
Wireless PAN Data and Voice Communications	
Bluetooth	Class II, V2.0 with EDR
Data Capture Specifications	
Options	1D laser, color camera
Laser 1D Scanner (SE965) Specifications	
Optical Resolution	0.005 in. minimum element width
Roll	+/- 30° from vertical
Pitch Angle	+/- 65° from normal
Skew Tolerance	+/- 40° from normal
Ambient Light	Tolerant to typical artificial indoor and natural outdoor (direct sunlight) lighting conditions. Fluorescent, Incandescent, Mercury Vapor, Sodium Vapor, LED : 450 Ft Candles (4,844 Lux) Sunlight: 8000 Ft Candles (86,111 Lux)
Shock	2,000 +/- 5% G
Scan Rate	50 (+/- 6) scans/sec (bidirectional)
Scan Angle	46.5° (typical)
Laser Power	1.0 mW nominal
Camera Specifications	
Resolution	3.2 Mega pixel with auto focus and flash

Table A-2 *Data Capture Options*

Item	Description		
Camera Decode Capability	1-D Bar Codes		
	Codabar	Code 11	Code 39
	Code 93	Code 128	Chinese 2 of
	5		
	Coupon Code	Discrete 2 of 5	EAN 8
	EAN 13	Interleaved 2 of 5	ISBT 128
	Korean 3 of 5	MSI	RSS
	RSS 14	RSS Limited	RSS
	Expanded		
	Trioptic Code 29	UCC / EAN 128	UPCA
	UPCE	UPCE1	Web Code
	2-D Bar Codes		
	Australian Postal	Aztec	Composite
	AB		
	Composite C	Data Matrix	Dutch Postal
	Image	Japan Postal	Linked Aztec
	Macro Micro PRF	Micro PDF	Micro QR
	PDF	QR Code	Signature
	UK Postal	UK Intellimail	US Planet
	US Postnet		

Decode Zone

SE965

Figure A-1 shows the decode zone for the SE965. Typical values appear. Table lists the typical distances for selected bar code densities. The minimum element width (or “symbol density”) is the width in mils of the narrowest element (bar or space) in the symbol.

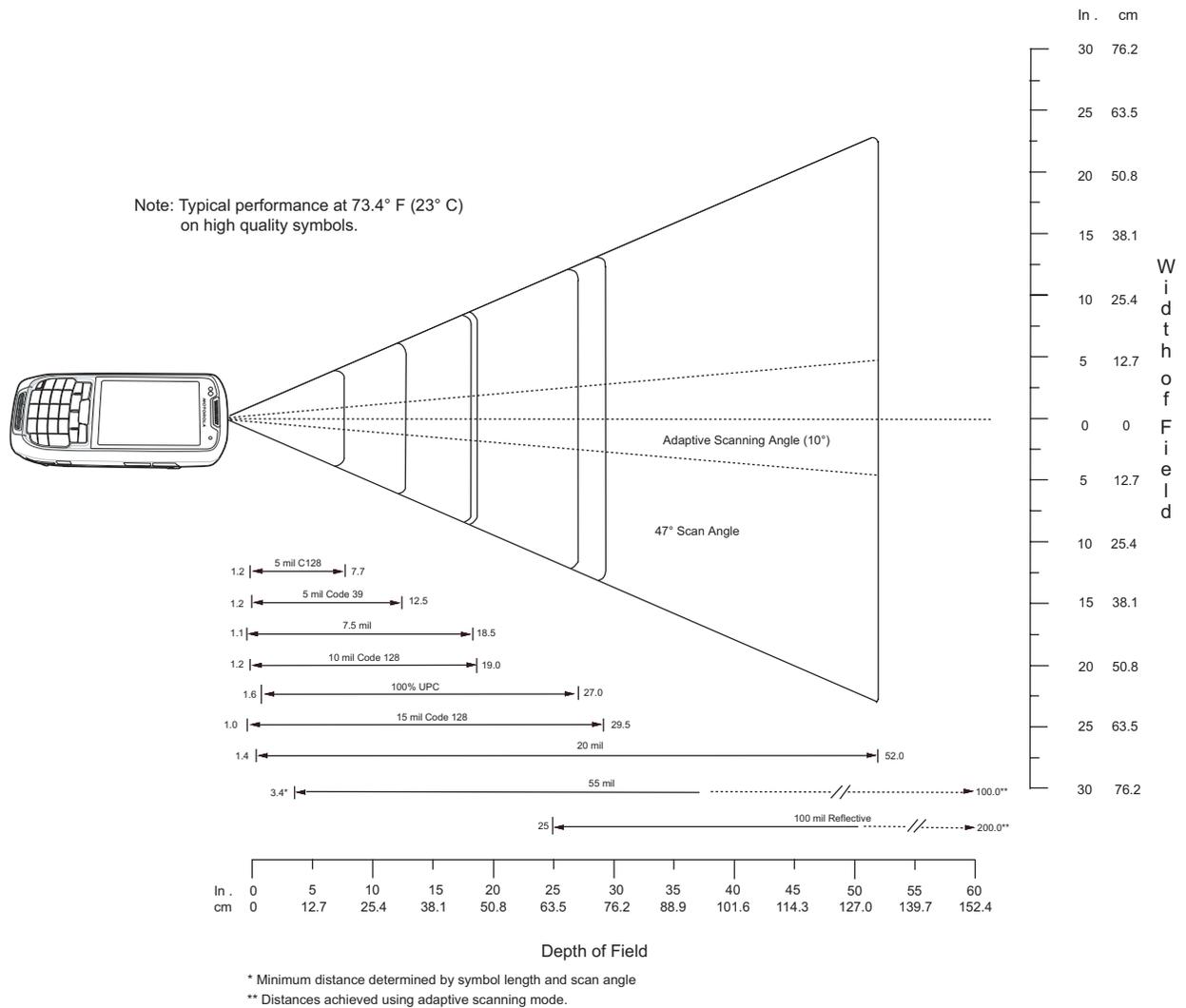


Figure A-1 SE965 Decode Zone

Table A-3 SE965 Decode Distances

Symbol Density/Bar Code Type	Bar Code Content/Contrast ^{NOTE 1}	Typical Working Ranges	
		Near	Far
5.0 mil Code 128	1234 80% MRD	1.20 in 3.05 cm	7.70 in 19.56 cm
5.0 mil Code 39; 2.5:1	ABCDEFGH 80% MRD	1.20 in 3.05 cm	12.50 in 31.75 cm
7.5 mil Code 39; 2.5:1	ABCDEF 80% MRD	1.10 in 2.79 cm	18.50 in 46.99 cm
10 mil Code 128	1234 80% MRD	1.20 in 3.05 cm Note 3	19.00 in 48.26 cm
13 mil 100% UPC	12345678905 90% MRD	1.60 in 4.06 cm	27.00 in 68.58 cm
15 mil Code 128	1234 80% MRD	1.00 in 2.54 cm Note 3	29.50 in 74.93cm
20 mil Code 39; 2.2:1	123 80% MRD	1.40 in 3.56 cm Note 3	52.00 in 132.08 cm
55 mil Code 39; 2.2:1	CD 80% MRD	3.40 in 8.64 cm Note 3	100.00 in 254.00 cm
100 mil Code 39; 3.0:1	123456 80% MRD	2 ft 60.96 cm Note 3	17 ft 518.16 cm

Notes:

1. CONTRAST measured as Mean Reflective Difference (MRD) at 650 nm.
2. Working range specifications at ambient temperature (23°C), Photographic quality symbols. pitch = 10°, roll = 0°, skew = 0°, ambient light < 150 ft-candles using Motorola or equivalent decoder.
3. Dependent on width of bar code.
4. Distances measured from front edge of chassis.
5. LED lighting with high AC ripple content can impact scanning performance.

MC45 Pin-Outs



Figure A-2 External Connector

Table A-4 External Connector Pin-Outs

Pin	Description
1	Cradle Power
2	Ground

MC45 Accessory Specifications

Single Slot Charge Cradle

Table A-5 Single Slot Charge Cradle

Feature	Description
Dimensions	Length: 9.6 cm (3.8 in.) Width: 8.30 cm (3.3 in.) Height: 6.8 cm (2.7 in.)
Weight	245 g (8.6 oz)
Input Power	5 VDC
Power Consumption	6 watts
Interface	USB
Operating Temperature	0°C to 40°C (32°F to 104°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Charging Temperature	0°C to 40°C (32°F to 104°F)
Humidity	5% to 95% non-condensing
Drop	76 cm (30.0 in.) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 15 kV air +/- 8 kV contact

Multi Slot Universal Charge Only Cradle

Table A-6 *Multi Slot Universal Charge Only Cradle Technical Specifications*

Feature	Description
Dimensions (Base only)	Length: 12.0 cm (4.7 in.) Width: 45.0 cm (17.7 in.) Height: 3.8 cm (1.5 in.) Height: 4.4 cm (1.7 in.) with 5 rubber caps
Dimensions (Base with 5 Charger Cups)	Length: 12.0 cm (4.7 in.) Width: 45.0 cm (17.7 in.) Height: 7.7 cm (3.0 in.)
Dimensions (Base with 4 Charger Cups and 1 Four Slot Battery Charger Cup Adapter)	Length: 12.0 cm (4.7 in.) Width: 45.0 cm (17.7 in.) Height: 7.7 cm (3.0 in.)
Weight (Base only)	910 g (32.10 oz) 930 g (32.80 oz) with 5 rubber caps
Weight (Base with 5 Charger Cups)	1190 g (41.98 oz)
Weight (Base with 4 Charger Cups and 1 Four Slot Battery Charger Cup Adapter)	1670 g (58.91 oz)
Input Power	12 VDC
Power Consumption (with 5 MC45s)	37.5 watts
Operating Temperature	0°C to 40°C (32°F to 104°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Charging Temperature	0°C to 40°C (32°F to 104°F)
Humidity	5% to 95% non-condensing
Drop	76 cm (30.0 in.) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 15 kV air +/- 8 kV contact

Four Slot Battery Charger

Table A-7 *Four Slot Battery Charger Technical Specifications*

Feature	Description
Dimensions	Length: 11.9 cm (4.7 in.) Width: 8.7 cm (3.4 in.) Height: 9.4 cm (3.7 in.)
Weight	366 g (12.91 oz)
Input Power	12 VDC
Power Consumption	30 watts
Operating Temperature	0°C to 40°C (32°F to 104°F)
Storage Temperature	-40°C to 70°C (-40°F to 158°F)
Charging Temperature	0°C to 40°C (32°F to 104°F)
Humidity	5% to 95% non-condensing
Drop	76 cm (30.0 in.) drops to vinyl tiled concrete at room temperature
Electrostatic Discharge (ESD)	+/- 15 kV air +/- 8 kV contact

APPENDIX B SOFTWARE

SMS8 Configuration

To set the primary local language for SMS messages:

Using a registry editor, navigate to the following:

[HKEY_LOCAL_MACHINE\Comm\Cellular\RIL\SMS\NLTables]

Edit the following key:

“LocalePrimaryLanguage” = dword:1

where:

dword:0 = None

dword:1 = Turkish

dword:2 = Spanish

dword:3 = Portuguese

Cache Disk Configuration

To enable or disable the use of cache disk:

Using a registry editor, navigate to the following:

[HKEY_LOCAL_MACHINE\Drivers\Builtin\RAMDisk]

Edit the following key:

“Size” = dword:4194304

where:

dword:0 = Cache disk size is 0.

dword:4194304 = Cache disk size is 4,194,304 bytes (4 MB)

Auto Reboot

To warm boot the MC45 in case of an ARM11 lockup.

Using a registry editor, navigate to the following:

[HKEY_LOCAL_MACHINE\Software\Motorola\AutoReboot]

Edit the following key:

“Enable” = dword:1

where:

dword:0 = disabled

dword:1 = enabled (default).

✓ **NOTE** The absence of a value shall default to “Enabled”.

Daily Reboot

To warm boot the MC45 at a specified time of day.

Using a registry editor, navigate to the following:

[HKEY_LOCAL_MACHINE\Software\Motorola\dailyReboot]

Edit the following key:

“dailyRebootTime” = XX:XX

where

XX:XX is a time from 00:00 (12:00 am) to 23:59 in 24 hours time format.

Edit the following key:

“Disable” = dword:1

where:

dword:0 = enabled

dword:1 = disabled (default).

✓ **NOTE** If this key is not present then the default is “Disabled”.

SMS Cell Broadcast

To locally enable or disable the Cell Broadcast feature. Cell Broadcast is one-to-many geographically focused service.

Using a registry editor, navigate to the following:

[HKEY_LOCAL_MACHINE\Software\Motorola\SMS_CB]

Edit the following key:

“Enable” = dword:1

where:

dword:0 = disabled

dword:1 = enabled (default).

- ✓ **NOTE** The absence of a value shall default to “Enabled”. Please reboot 2 times after setting the Enable registry to make sure the SMS Cell Broadcast setting takes effect. It has been observed that the power consumption in standby mode is higher on some networks(e.g: AT&T and AirTel/BGL) with SMS Cell Broadcast enabled. Disabling SMS Cell Broadcast will reduce the power consumption.

Auto WAN Configuration

Auto WAN configuration is enabled by default but can be disabled via registry key:

Using a registry editor, navigate to the following:

[HKEY_LOCAL_MACHINE\SOFTWARE\Symbol\WWANService]

Edit the following key:

“EnableAutoNetworkSelection”=dword:0

where:

dword:0 = Disable Auto WAN configuration

dword:1 = Enable Auto WAN configuration

- ✓ **NOTE** Auto WAN configuration can also be disabled by placing a file named “DisableAutoNetworkSelection” into the root directory of the SD Card. This SD Card must be present at boot up.

Multi Tap Timing

By default the multi tap timing when in alpha mode is set to 600 ms. In order to change the multi tap timing use the following registry key. Keep in mind that the timing is in milliseconds.

Using a registry editor, navigate to the following:

[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\keypad]

Edit the following key to the desired amount of delay in milliseconds between taps. Shown below is the setting for 600 ms in hexadecimal.

```
TripleKeyTiming=dword:00000258
```

Auto Focus Enhancement

The auto focus enhancement is disabled by default. With auto focus enabled, this enhancement will provide the user with visual feedback in the preview window while a picture is being taken.

```
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\keypad]
```

Edit the following key to the desired value if you want to enable or disable this enhancement.

```
"TriggerForFocusFlag"=dword:0
```

where:

dword:0 = disables auto focus enhancement

dword:1 = enables auto focus enhancement



NOTE There is a side effect to enabling this feature. There will be a focus event at the beginning of taking a video and at the end. When the video is played back one will only see the focus event that occurred at the end of the recording. To avoid this one only needs to disable auto focus while in Video Capture mode.

GLOSSARY

A

ActiveSync. ActiveSync is a data synchronization program developed by Microsoft for use with Windows Mobile operating systems.

AFH. Adaptive Frequency Hopping

AKU. (Adaptation Kit Update) Updates to the Windows Mobile operating system.

API. (Application Programming Interface) 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

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).

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.

Bluetooth. A wireless protocol utilizing short-range communications technology facilitating data transmission over short distances.

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.

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.

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

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.

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

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.

Cold Boot. A cold boot restarts the mobile computer and initializes some drivers.

D

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.

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

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.

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.

EMDK. Enterprise Mobility Developer's Kit.

ESD. Electro-Static Discharge

F

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

Flash Memory. Flash memory is nonvolatile, semi-permanent storage that can be electronically erased in the circuit and reprogrammed.

G

GPS (Global Positioning System). A satellite-based navigation system made up of a network of 24 satellites. GPS satellites circle the earth and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location.

H

Hard Reset. See **Cold Boot**.

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

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

High-Speed Downlink Packet Access (HSDPA). A 3G (third generation) mobile telephony communications protocol in the High-Speed Packet Access (HSPA) family, which allows networks based on Universal Mobile Telecommunications System (UMTS) to have higher data transfer speeds and capacity.

I

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.

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.

Internet Protocol Address. See **IP**.

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.

IEEE Address. See **MAC Address**.

Internet Protocol Address. See **IP**.

K

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

L

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 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

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.

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.

Mobile Computer. In this text, *mobile computer* refers to the MC45 wireless 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

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

NVM. Non-Volatile Memory.

O

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.

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.

R

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

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**.

S

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.

SDK. Software Development Kit

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

Soft Reset. See **Warm Boot**.

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

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

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.

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**.

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.

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.

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