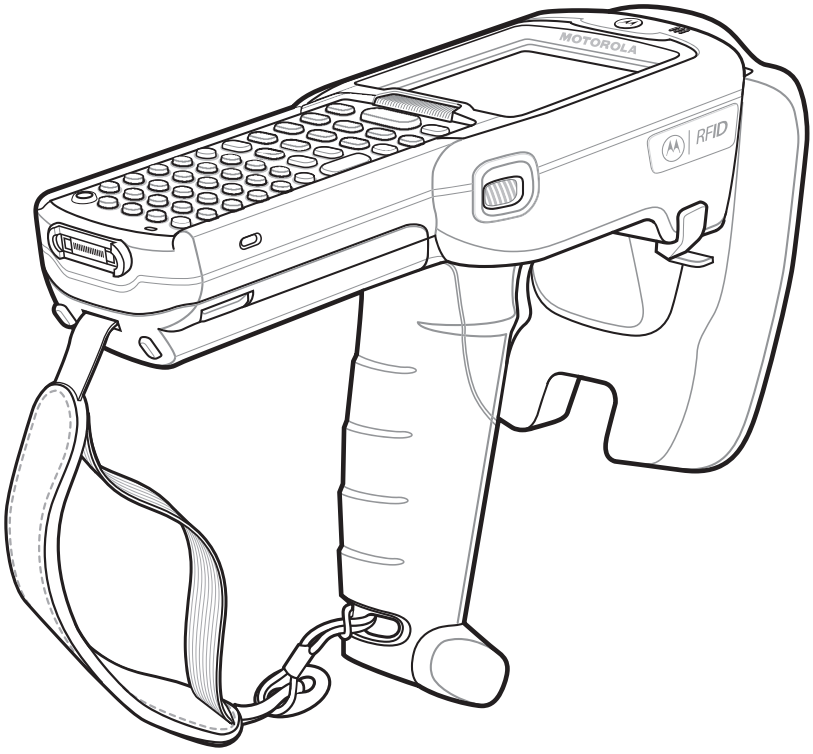
MC319Z RFID Mobile Computer

Integrator Guide



MC319Z RFID Mobile Computer Integrator Guide

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Motorola Solutions, Inc.
One Motorola Plaza
Holtsville, New York 11742-1300
http://www.motorola.com/enterprisemobility

Warranty

For the complete Motorola hardware product warranty statement, go to:
http://www.motorola.com/enterprisemobility/warranty.

Revision History

Changes to the original manual are listed below:

Change	Date	Description
-01 Rev A	1/2011	Initial release

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About This Guide

Introduction

This *MC319Z RFID Integrator Guide* provides the unique set up and operating procedures for the MC319Z RFID mobile computers. This guide is intended as a supplement to the *MC3000 Integrator Guide*, p/n 72E-68900-xx. Procedures common to MC3000 products are addressed in the *MC3000 Integrator Guide.*

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

Configurations

All MC319Z models support the following features:

- Windows Mobile 6.5 Platform
- 128 MB RAM / 1 GB Flash
- 48-key alphanumeric keypad
- Color display
- WLAN 802.11 a/b/g radio
- Bluetooth

This guide covers the following configurations:

Configuration	Country Support	Power	Data Capture
MC319Z-GL4H24E0W	Worldwide	1 W	Laser, RFID
MC319Z-GL4H24E0E	Europe	0.5 W	Laser, RFID
MC319Z-GI4H24E0W	Worldwide	1 W	Imager, RFID
MC319Z-GI4H24E0E	Europe	0.5 W	Imager, RFID

Chapter Descriptions

Topics covered in this guide are as follows:

- *Chapter 1, Getting Started* provides an overview of RFID technology and components and a description of the MC319Z RFID mobile computer and features.
- *Chapter 2, Updating the Mobile Computer* describes how to update the device image and radio firmware.
- *Chapter 3, LLRP Functionality* includes information on configuring the LLRP Server Module and reading tags.
- *Chapter 4, RFID Sample Application [TBD]* provides information on the RFID sample application and how to use it to assist in custom application development.
- *Chapter 6, Troubleshooting* describes MC319Z RFID mobile computer troubleshooting procedures.
- *Appendix A, Technical Specifications* includes the technical specifications for the reader.
- *Appendix B, RFID APIs* provides a reference for information on supported RFID APIs.

Notational Conventions

The following conventions are used in this document:

- “Mobile computer” or “reader” refers to the MC319Z RFID mobile computer.
- *Italics* are used to highlight the following:
  - Chapters and sections in this and related documents
  - Dialog box, window, links, software names, and screen names
  - Drop-down list, columns and list box names
  - Check box and radio button names
  - Icons on a screen
- **Bold** text is used to highlight the following:
  - Dialog box, window and screen names
  - Drop-down list and list box names
  - Check box and radio button names
  - Icons on a screen
  - Key names on a keypad
  - Button names on a screen
- Bullets (•) indicate:
  - Action items
  - Lists of alternatives
  - Lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

Related Documents and Software

The following documents provide more information about the reader.

- *MC319Z RFID Mobile Computer Quick Start Guide*, p/n 72-71347-xx
- *MC319Z RFID Mobile Computer Regulatory Guide*, p/n 72-68903-xx
- *MC3000 Mobile Computer User Guide*, p/n 72E-68899-xx
- *MC3000 Mobile Computer Integrator Guide*, p/n 72E-68900-xx
- *Microsoft Applications for Windows Mobile 6 User Guide*, p/n 72E-108299-xx
- *Application Guide for Motorola Enterprise Mobility Devices*, p/n 72E-68902-xx
- *Wireless Fusion Enterprise Mobility Suite User Guide for Version 2.55*, p/n 72E-107170-01
- *Mobility Services Platform 3.2 User's Guide*, p/n 72E-100158-xx
- *MC319Z RFID Enterprise Mobility Developer Kit*

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 Enterprise Mobility support for your region. Contact information is available at: http://www.motorola.com/enterprisemobility/contactsupport.

When contacting Enterprise Mobility 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 e-mail, telephone or fax within the time limits set forth in service agreements.

If your problem cannot be solved by Motorola Enterprise Mobility 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 Enterprise Mobility business product from a Motorola business partner, please contact that business partner for support.

Chapter 1 Getting Started

Introduction

This chapter provides an overview of RFID technology and components, and describes the MC319Z RFID mobile computer and its features.

RFID Technology Overview

RFID (Radio Frequency Identification) is an advanced automatic identification (Auto ID) technology that uses radio frequency signals to identify *tagged* items. An RFID tag contains a circuit that can store data. This data may be pre-encoded or can be encoded in the field. The tags come in a variety of shapes and sizes.

To read a tag the mobile computer sends out radio frequency waves using its integrated antenna. This RF field powers and charges the tags, which are tuned to receive radio waves. The tags use this power to modulate the carrier signal. The reader interprets the modulated signal and converts the data to a format for computer storage. The computer application translates the data into an understandable format.

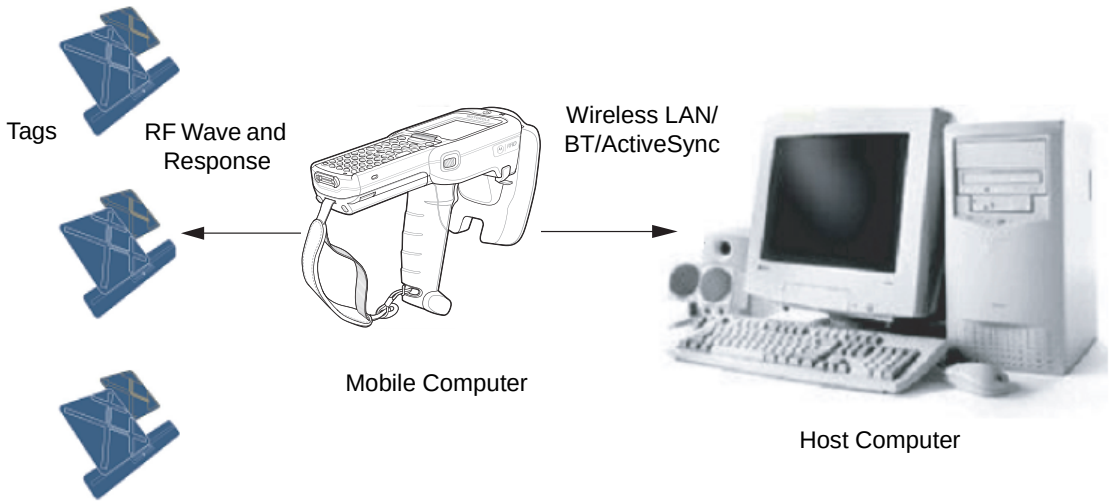

Figure 1-1 *RFID System Elements*

RFID Components

Motorola RFID solutions offer low cost, long read range, and a high read rate. These features provide real time end-to-end visibility of products and assets in the factory, distribution center, retail outlet, or other facility. The MC319Z RFID system consists of the following components:

- Silicon-based RFID tags that attach to retail products, vehicles, trailers, containers, pallets, boxes, etc.
- An integrated antenna that supports applications such as item level tracking and asset tracking.
- An embedded radio module that powers and communicates with tags for data capture and provides host connectivity for data migration.

Tags

Tags contain embedded chips that store unique information. Available in various shapes and sizes, tags, often called **transponders**, receive and respond to data requests. Tags require power to send data.

There are several categories of tags based on the protocol they support, read/write memory, and power options:

- Active RFID tags are powered by internal light-weight batteries, and also use these batteries to broadcast radio waves to the reader.
- Semi-passive RFID tags are also powered by internal light-weight batteries, but draw broadcasting power from the reader.
- Passive RFID tags are powered by a reader-generated RF field. These tags are much lighter and less expensive than active tags, and are typically applied to less expensive goods.

Antenna

Antennas transmit and receive radio frequency signals.

Radio Module

The radio module communicates with the tags and transfers the data to a host computer. It also provides features such as filtering, CRC check, and tag writing. The MC319Z RFID mobile computer supports standard RFID tags as described by EPCGlobal™ Class 1 Gen2 protocol.

MC319Z RFID Mobile Computer

The Motorola MC319Z RFID mobile computer includes an intelligent C1G2 UHF RFID reader with RFID read performance that provides real-time, seamless EPC-compliant tags processing. MC319Z RFID mobile computers are designed for indoor inventory management and asset tracking applications, and can host third-party, customer-driven embedded applications. Features include:

- ISO 18000-6C standard (EPC Class 1 Gen 2)
- Read, write, kill, lock, block write/block erase, permalock, and perma tag functionality
- 48-key alphanumeric keypad
- 3” color display
- Orientation-insensitive integrated external antenna
- Laser-based bar code reader - reads 1D bar codes
- Windows® Mobile 6.1
- WLAN 802.11 a/b/g wireless connectivity
- Application-specific setup for ease of installation
- Low Level Reader Protocol (LLRP)
- Sample application and support for custom or third-party applications
- RFID API support
- Event and tag management support

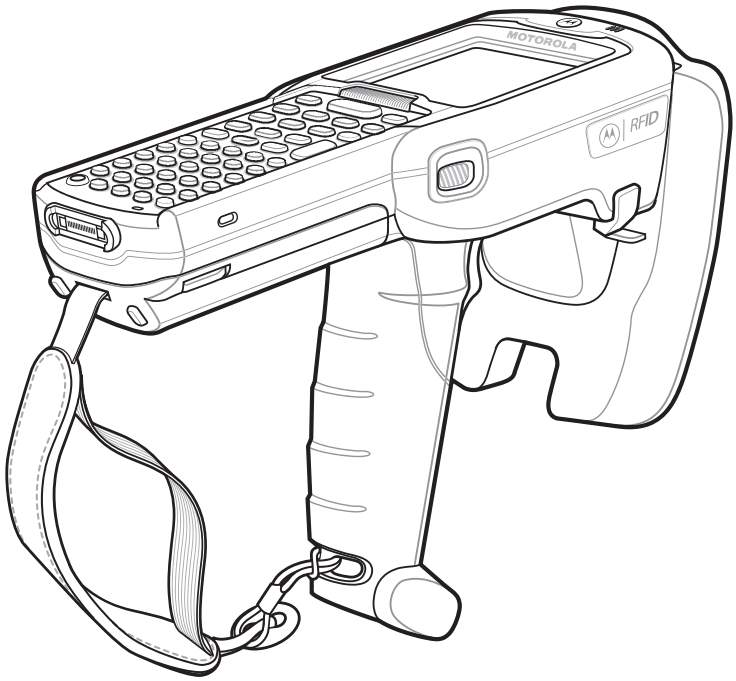

Figure 1-2 *MC319Z RFID Mobile Computer*

The MC319Z RFID mobile computer provides a wide range of features that enable implementation of complete, high-performance, intelligent RFID solutions.

NOTE The MC319Z RFID mobile computer supports a 2x battery only; do not use a 1x battery. The Four-Slot Cradle does not accommodate the MC319Z RFID mobile computer.

Due to component tolerances, some users may experience undesired behavior when using battery part number 55-060112-xx. If the unit turns off without proper warning messages during heavy use, use battery 55-002152-xx (p/n 82-127909-xx).

MC319Z RFID Mobile Computer Parts

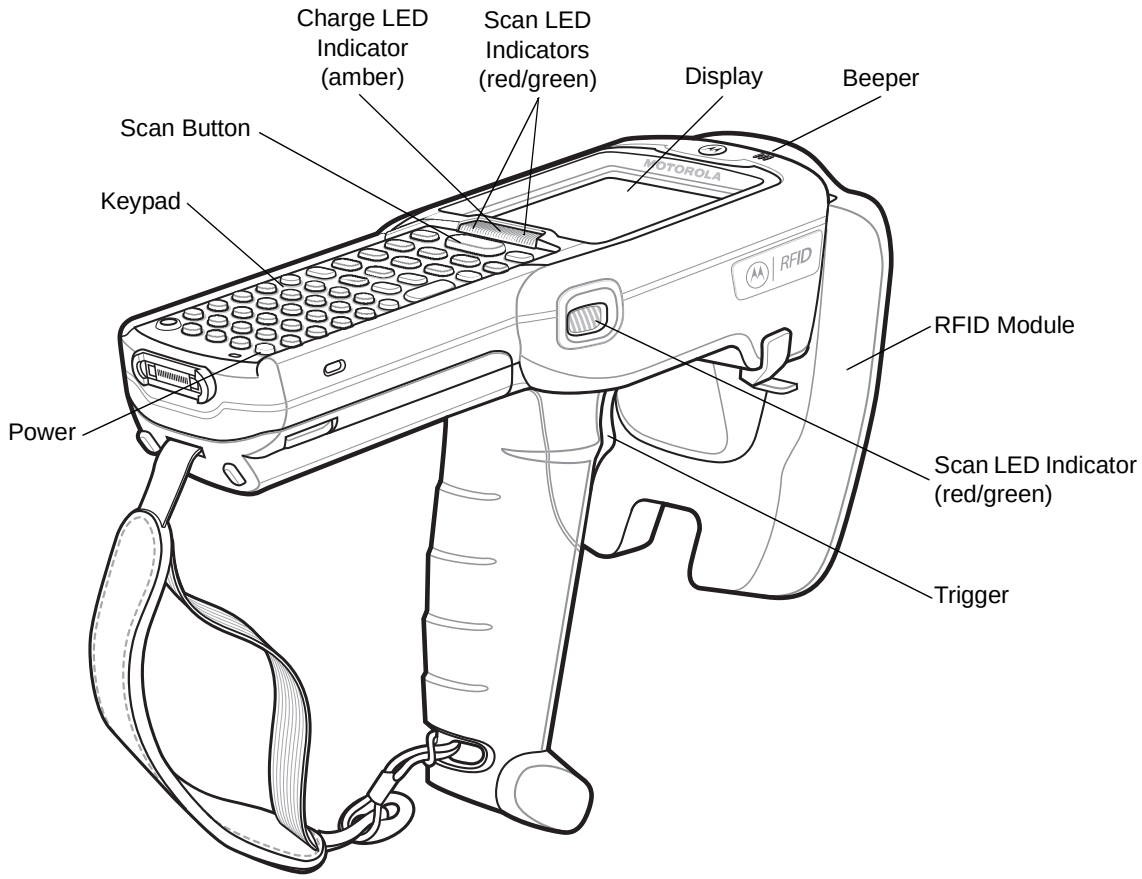

Figure 1-3 *MC319Z RFID Mobile Computer Parts*

MC319Z RFID Mobile Computer LEDs

The mobile computer LEDs indicate charging and reader status as described in *Table 1-1*.

Table 1-1 *LED Status Indicators*

LED	Indication
Charging Indicators	
Off	Mobile computer not placed correctly in the cradle; cable not connected correctly; charger is not powered.
Fast Blinking Amber	Error in charging; check placement of mobile computer.
Slow Blinking Amber	Mobile computer is charging.
Solid Amber	Charging complete. Note: When the battery is initially inserted in the mobile computer, the amber LED flashes once if the battery power is low or the battery is not fully inserted.

Reading Tags

To read RFID tags:

1. Remove the MC319Z from AC power and ensure the LLRP icon is green.

   NOTE When connected to power, the mobile computer cannot read RFID tags.

2. Use an RFID reader application to enable tag reading. For a sample application, browse to the MC319Z **Application** directory and select **RFIDSample3Plus.exe**. See *Chapter 4, RFID Sample Application [TBD]*.
3. Aim the mobile computer at the tag, oriented horizontally or vertically depending on the tag orientation. The distance between the tag and the antenna is the approximate read range.
4. Press the trigger or tap the on-screen **Read** command within the application to interrogate all RFID tags within the radio frequency (RF) field of view and capture data from each new tag found. Release the trigger or tap the **Stop Read** command to stop interrogating tags.

Chapter 2 Updating the Mobile Computer

Introduction

This chapter describes how to update the device image and radio firmware.

Updating the Device Image

Windows Mobile contains an Image Update feature that updates all operating system components. Motorola distributes all updates as update packages on the Support Central Web Site http://www.motorola.com/enterprisemobility/support. These packages contain either partial or complete updates for the operating system.

To update an operating system component, copy the update package to the mobile computer using ActiveSync, AirBEAM, or MSP.

Downloading an Update Loader Package

1. Download the appropriate update loader package from the Motorola Support Central web site http://www.motorola.com/enterprisemobility/support to a host computer.
2. Locate the update loader package file on the host computer and un-compress the file into a separate directory:
   - **30XXw61RFIDSC*xxxxx*.zip** for updating via ActiveSync
   - **30XXw61RFIDAB*xxxxx*.zip** for updating via AirBEAM

Updating Images via ActiveSync

To install an update loader package using ActiveSync:

1. Insert the mobile computer into the cradle and connect the cradle to AC power.
2. Connect the mobile computer to the host computer using ActiveSync.
3. In ActiveSync on the host computer, open **Explorer** for the mobile computer.
4. Copy the contents of **30XXw61MenUPR10903\UpdateLoader** (the files only, not the folder) into the **\Storage Card** folder on the mobile computer.

5. On the mobile computer, navigate to the **\Storage Card** folder and tap the program **STARTUPDLDR.EXE**. The update takes approximately 10 minutes. Do not remove AC power during this time.
6. Copy the contents of **30XXw61RFIDPkg*XXXX*** (the files only, not the folder) into the **\Storage Card** folder on the mobile computer.
7. Remove the mobile computer from the cradle or AC power if fully charged.
8. On the mobile computer, navigate to the **\Storage Card** folder and tap the program **RFIDSetup.exe**

The device boots after the installation. Note that the RFID LLRP application disconnects when the mobile computer is charging, and re-connects when the mobile computer is removed from AC power.

Updating Images via AirBEAM

Install the AirBEAM package files within **30XXw61RFIDAB*xxxxx*.zip** in sequence:

1. **30XXw61MenUPR*XXXXX*.apf**
2. **30XXw61RFIDPkg*XXXX*.apf**

30XXw61RFIDPkg*XXXX*.apf executes silently and the mobile computer boots after installation, which takes approximately 7-10 seconds. Refer to the *MC3000 Integrator Guide* for more information on AirBEAM.

NOTE If you exit LLRP via the icon menu, to restart it use **File Explorer** on the mobile computer to navigate to **\Application\LLRP** and tap the **MobileLLRP.exe** application.

Updating the RFID Firmware

Use the RFID_FLASH utility to update the firmware for the RFID radio. Motorola distributes the firmware and OEM update files on the Support Central Web Site http://www.motorola.com/enterprisemobility/support.

CAUTION When upgrading the firmware, Motorola recommends placing the mobile computer in a cradle with external AC power connected. An interruption in the firmware update, e.g., due to loss of power, can render the RFID module inoperable.

Downloading Firmware Files

1. Download the firmware update files from the Motorola Support Central web site http://www.motorola.com/enterprisemobility/support to a host computer.
2. Connect the mobile computer to the host computer using ActiveSync.
3. In ActiveSync on the host computer, open **Explorer** for the mobile computer.
4. Copy the firmware file and the OEM data file into the **\Application** folder on the mobile computer.

Updating the Firmware and OEM Data Using the RFID_FLASH Utility

1. On the mobile computer, navigate to the **\Application** folder and tap the program **RFID_FLASH**.

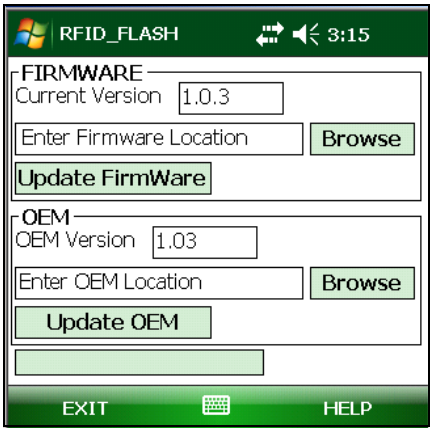

Figure 2-1 *RFID_FLASH Window*

2. Tap **Browse** in the **Firmware** section of the window.
3. In the **Open** window, select the firmware file.

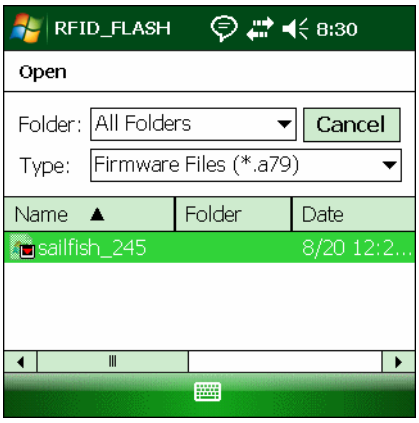

Figure 2-2 *Selecting the Firmware File*

4. Tap **Update Firmware** and wait until the progress bar completes.

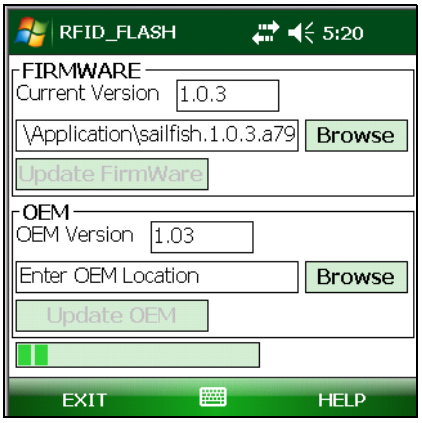

Figure 2-3 *Starting Firmware Update*

NOTE When updating the firmware data file, the mobile computer displays a progress bar. This bar may indicate some progress, then move quickly to complete.

5. Tap **Browse** in the **OEM** section of the window.

6. In the **Open** window, select the OEM data file.

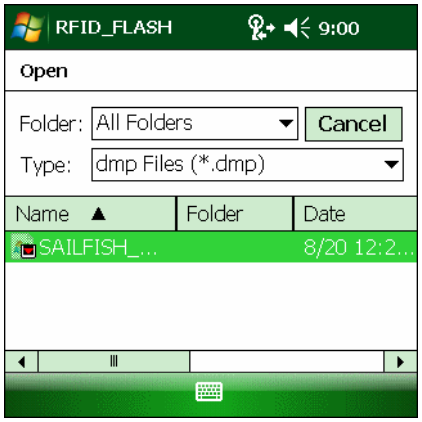

Figure 2-4 *Selecting the OEM File*

7. Tap **Update OEM** to start the update. Wait until the progress bar completes and **OEM LOADED** appears.

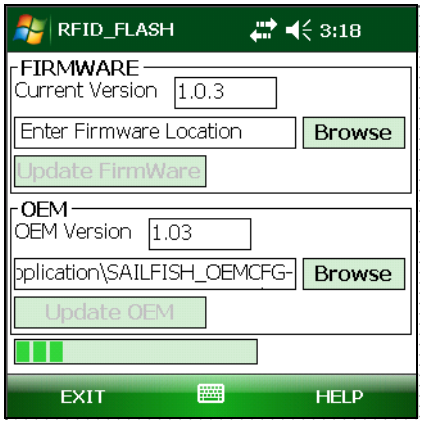

Figure 2-5 *Updating OEM*

Chapter 3 LLRP Functionality

Introduction

Low Level Reader Protocol (LLRP) is an RFID server application that runs in the background on the mobile computer. The LS icon in the system tray represents LLRP. This chapter includes information on using and configuring the LLRP Server Module.

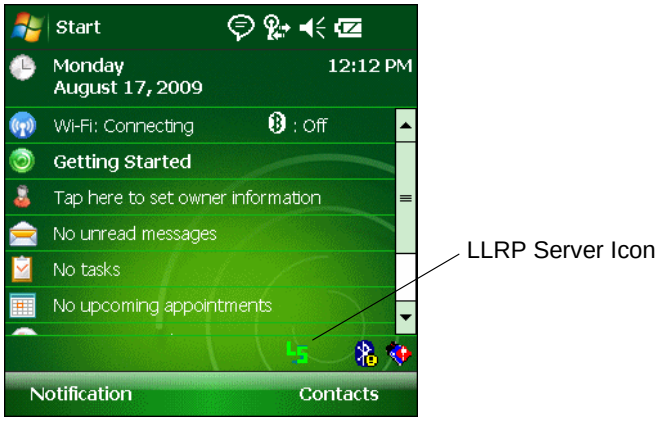

Figure 3-1 *LLRP Icon*

LLRP Icons

The LLRP icon indicates radio status as described in *Table 3-1*.

Table 3-1 *LLRP Icon Indicators*

Icon	Icon State	Indication
	Green	LLRP is enabled.
	Crossed icon	No radio connection or radio disconnected.
	Yellow	Radio is reading at a reduced power level than set due to a cold or degraded battery.
	Red	Radio is unable to read, even at a reduced power level, due to a battery condition.

LLRP Menu

Tap the LLRP icon to display the option menu shown in *Figure 3-2*.

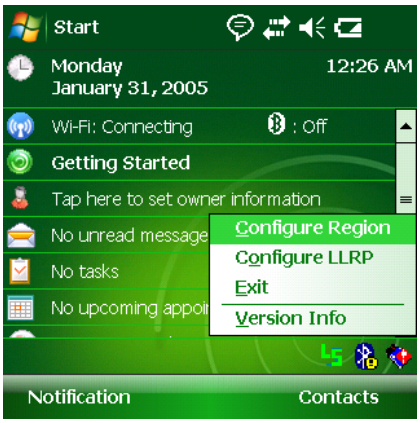

Figure 3-2 *LLRP Menu*

Configure Region

Upon Startup

After upgrading the mobile computer, the following window appears on startup.

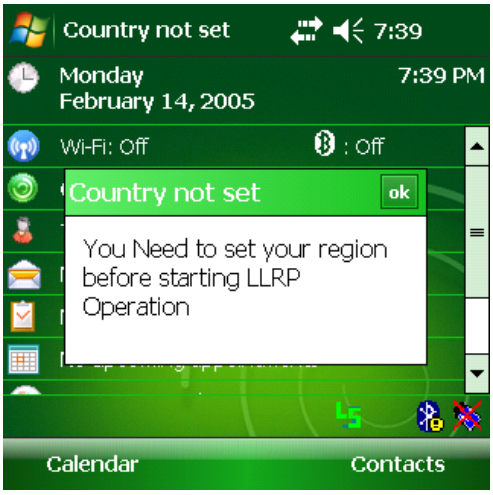

Figure 3-3 *Country Not Set Window*

1. Tap **ok**. When no country is selected, the **Configure regions settings** window appears.

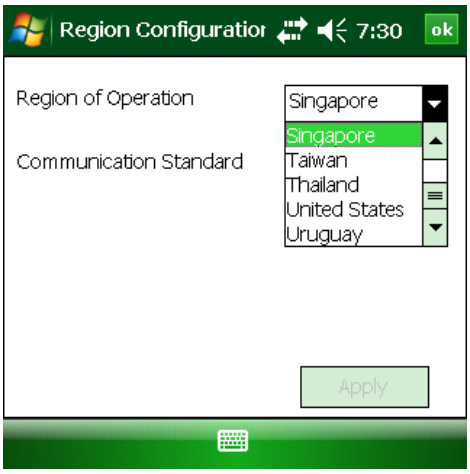

Figure 3-4 *Configure Region Settings Window*

2. Select the region of operation and communication standard as allowed by the regulatory standards of that country/region from the drop-down menus. The following warning message appears.

Figure 3-5 *Region Selection Warning Message*

3. Tap **Yes** to confirm. A window appears indicating success.

Figure 3-6 *Region Selection Success Window*

After Startup

If not done at startup, set the regulatory region using the LLRP icon menu:

1. Tap the LLRP icon, then tap **Configure Region**.

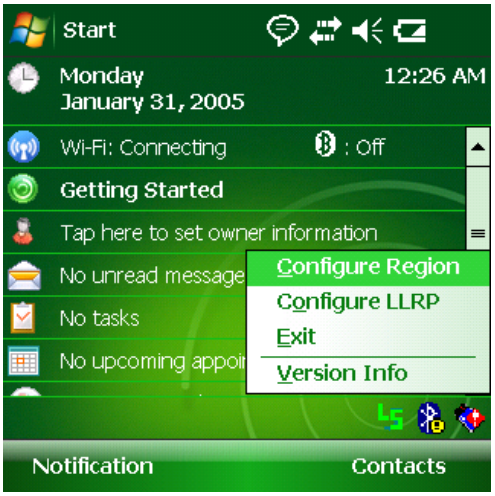

Figure 3-7 *Configure Region Option*

2. Select a region from the **Region of Operation** drop-down in the following window.

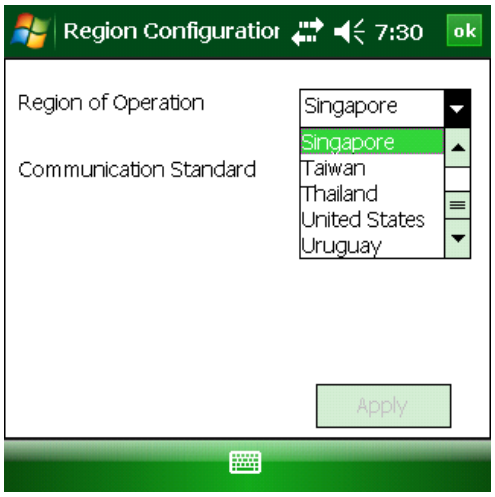

Figure 3-8 *Configure Region Settings Window*

3. Tap **Yes** on the warning window that appears. A confirmation window appears.

Figure 3-9 *Region Selection Success Window*

4. Tap **ok**.

Configure LLRP

LLRP is in Server Mode by default. To configure LLRP to operate in Client Mode:

1. Tap the LLRP icon, then tap **Configure LLRP**.

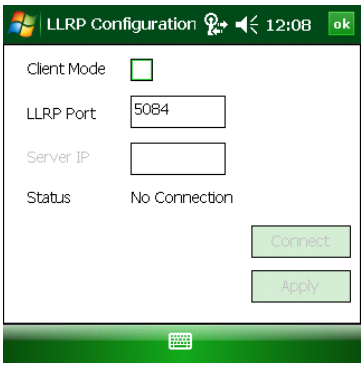

Figure 3-10 *LLRP Configuration Window*

2. Select the **Client Mode** check box.
3. In the **LLRP Port** field, enter the port number on which the server waits for the LLRP client to communicate. The default is 5084.
4. In the **Server IP** field, enter the server IP for the remote host to which LLRP communicates as a client.
5. Tap **Apply**.
6. Tap **ok** to close the window.

Version Information

To view software version information for the LLRP application, tap the LLRP icon, then tap **Version Info**.

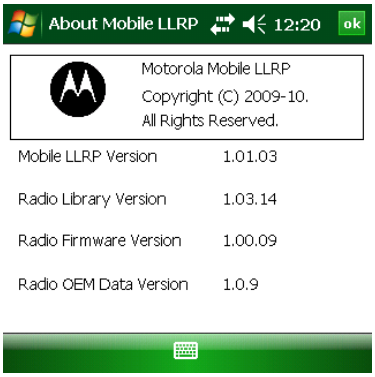

Figure 3-11 *LLRP Versions Window*

This window displays the LLRP server application version, RFID library version, radio firmware version, and radio OEM data version.

NOTE The version information in *Figure 3-11* may differ from the information on the actual mobile computer screen. Also, downloading data using LLRP scripts or the RFID_FLASH application updates the version information.

Exit LLRP

Tap the LLRP icon, then tap **Exit** to close the LLRP application.

To restart LLRP after exiting, use **File Explorer** to browse to the **\Application\LLRP** folder and tap the LLRP executable (MobileLLRP.exe).

LLRP Registry Entries

RFID (LLRP) does not run when the MC319Z is charging. Developers who require using the cradle with RFID enabled can select Developer Mode by modifying a registry entry.

- **User Mode** - In this default mode, placing the mobile computer in the cradle (with charging on) disables LLRP and the LLRP icon indicates that it is disconnected. Placing the mobile computer on AC power charges the device and disables LLRP. Removing AC power reconnects LLRP.
- **Developer Mode** - Selecting Developer Mode disables charging and the developer can place the mobile computer in the cradle for debugging and development. The device remains in Developer Mode regardless of whether it is charging until re-enabling User Mode.

To select Developer Mode via registry:

1. Edit the file **params.reg** in the **\Application** folder. To do this, copy the file to the PC, or use a word editor on the mobile computer.
2. Set the **DevMode** registry entry value to 1:

   [HKEY_LOCAL_MACHINE\SOFTWARE\Symbol\RFID\LLRP]

   "DevMode"=dword:00000001
3. Tap on the modified file and select **Yes** to merge the registry.
4. Warm boot the device by holding down the **7**, **9**, and **Power** keys.
5. Restart LLRP (if it is not already running).

To change back to user mode, repeat this procedure, setting **DevMode** to **0**.

LLRP checks AC power every five seconds and takes the appropriate action based on whether or not it is in User Mode.

Chapter 4 RFID Sample Application [TBD]

[DEMO APPLICATION TBD]

Introduction

Application developers can use the RFID sample application RFIDSample3Plus.exe for an overview of how the application works and to assist in custom application development.

The mobile computer can read, write, lock, kill, and program Gen2 tags. Each tag contains the EPC number (64 or 96 bits), CRC, and kill code. The mobile computer can also collect data by decoding in-range EPC Gen2 RFID tags.

Initiating the read command within the sample application causes the mobile computer to interrogate all RFID tags within the radio frequency (RF) field of view. The reader captures data from each new tag and adds it to the list box in the **EPC ID** window. Select **Stop Read** to stop interrogating tags.

Launching the RFID Sample Application

Remove the mobile computer from AC power and enable LLRP, then use **File Explorer** on the mobile computer to navigate to the **Application** folder. Select **RFIDSample3Plus.exe** to start the sample application.

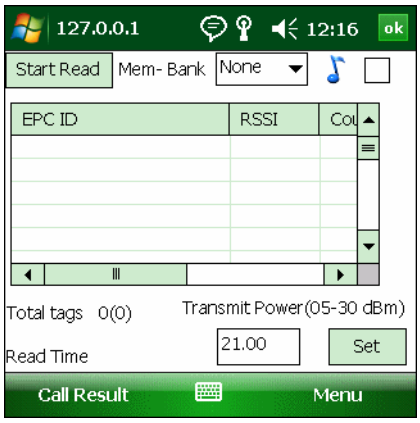

Figure 4-1 *RFID Sample Application Window*

NOTE The version numbers displayed in this window are examples. Actual version numbers are based on the versions of the files on the device.

- Tap **Menu** to select the menu options. See *Sample Application Menu Options on page 4-3*.
- Tap the **Start Read** button to initiate the tag read. Tap **Stop Read** to terminate tag reading. See *Reading Tags on page 4-14*.
- Use the **Mem Bank** drop-down to select a tag memory bank to read. The default memory bank is EPC (**None**). Other options are **TID**, **Reserved**, and **User**.
- Tap the note icon to generate an audio notification (beep) when the reader finds a new tag in the field of view.

Sample Application Menu Options

The **Menu** options include:

- Configuration options
- Operations options
- Reader management options
- About

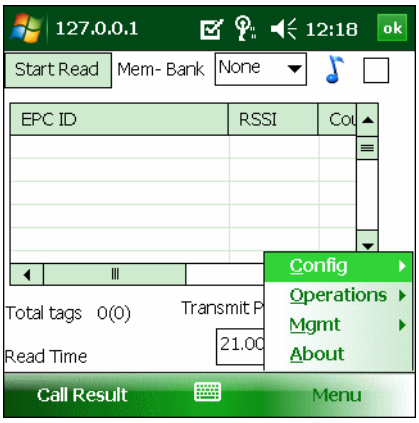

Figure 4-2 *Sample Application Menu*

Configuration Menu Options

The **Config** menu includes the following options:

- Connection information
- Configuration options
- Capabilities
- Reset Factory defaults
- Exit

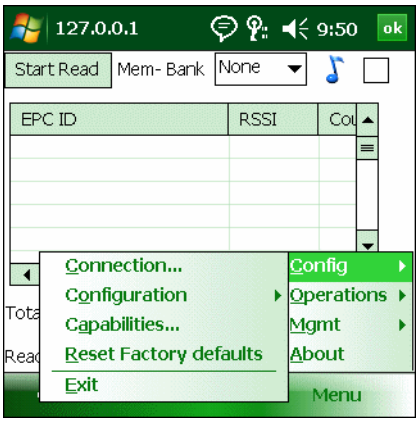

Figure 4-3 *Configuration Menu*

Connection

Select **Config > Connection** to display the reader IP and port number.

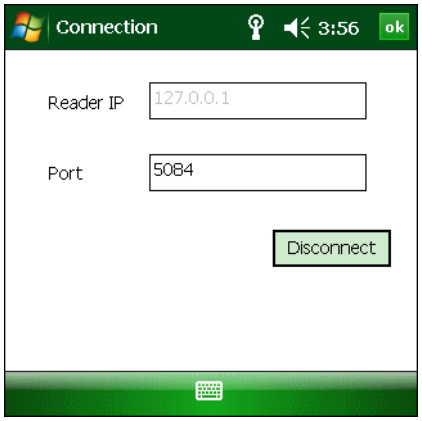

Figure 4-4 *Connection Window*

Select **Disconnect** to disconnect the reader.

Antenna

Select **Config > Configuration > Antenna** to configure the antenna.

Figure 4-5 *Antenna Configuration Window*

This window includes the following fields:

- **Antenna** - Selecting an antenna ID updates the configuration values in the other fields.
- **Receive Sensitivity(dB)** - Lists the reader-supported values for the selected antenna.
- **Transmit Power** - Lists the reader-supported values for the selected antenna.
- **Hop Index** - Updates the Hop Frequency list with its corresponding frequencies.
- **Apply** - Select to apply the configuration changes.

Singulation

Select **Config > Configuration > Singulation** to set the options for identifying an individual tag in a multiple-tag environment.

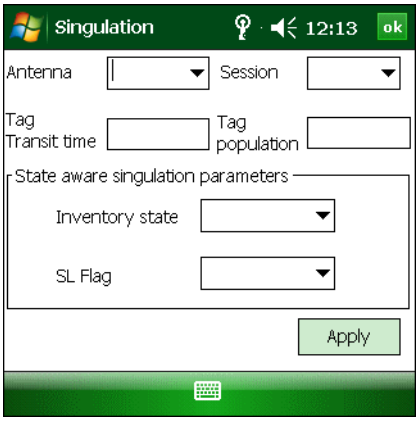

Figure 4-6 *Singulation Window*

This window includes the following fields:

- **Antenna** - Selecting an antenna ID updates the configuration values in the other fields.
- **Session** - The session number for the inventory operation.
- **Tag Transmit Time** - The time in milliseconds that the tag typically remains in the RF field of the antenna.
- **Tag Population** - The approximate tag population in the RF field of the antenna.
- **Inventory State** - Select a tag of state A or B.
- **SL Flag**
- **Apply** - Select to apply the configuration changes.

Capabilities

Select **Config > Capabilities** to retrieve the capabilities of the connected reader.

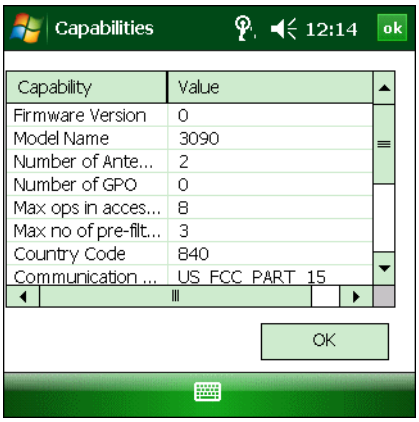

Figure 4-7 *Capabilities Window*

Select **OK** to close the window.

Reset Factory Defaults

Select **Config > Reset Factory Defaults** to restore the default reader configuration.

Operations Menu Options

The **Operations** menu options include:

- Tag Storage Settings
- Filter options
- Access options
- Trigger settings
- Antenna information

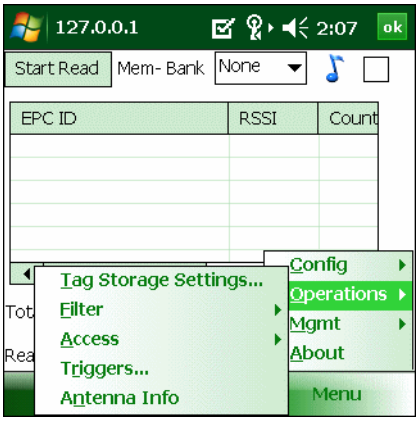

Figure 4-8 *Operations Menu*

Tag Storage Settings

Select **Operations > Tag Storage Settings** to change the tag storage settings.

Figure 4-9 *Tag Storage Window*

This window includes the following fields:

- **Max tag count** - The maximum number of tags to store in the DLL.
- **Max tag ID length** - The maximum tag length.

- **Max size of memory bank** - Storage to allocate for the memory bank's data.
- **Apply** - Select to apply the configuration changes.

Filter Settings

Use the sample application's filter settings to set filters for tag reading. The application supports up to two pre-filters and two post-filters. By default, the window displays the latest filter information. Add or delete the filter by selecting **Use Filter**.

Pre-Filter

To select pre-filter settings, select **Operations > Filter > Pre-Filter**.

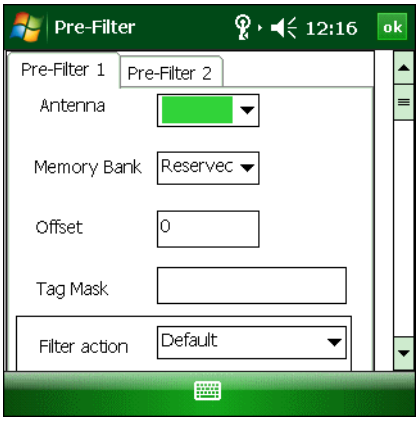

Figure 4-10 *Pre-Filter Window*

This window includes the following fields:

- **Antenna** - Selecting an antenna ID updates the configuration values in the other fields.
- **Memory Bank** - Select the memory bank.
- **Offset** - The first (msb) bit location of the specified memory bank against which to compare the tag mask.
- **Tag Mask** - The pattern against which to compare the specified memory bank.
- **Filter action** - Select the required filter action. For more information, refer the Gen2 specification available at http://www.epcglobalinc.org/standards/.

Post-Filter

To select post-filter settings, select **Operations > Filter > Post-Filter**.

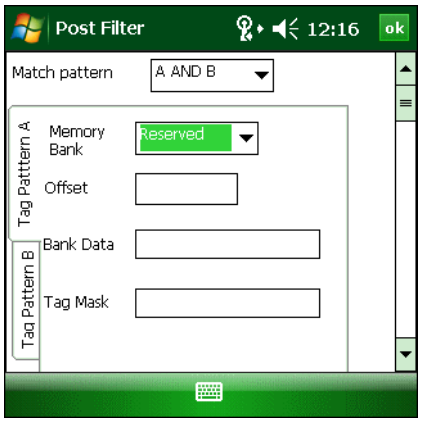

Figure 4-11 *Post Filter Window*

This window includes the following fields:

- **Match Pattern** - Select the tag pattern to match (A, B, both, or neither).
- **Memory Bank** - Select the memory bank.
- **Offset** - The first (msb) bit location of the specified memory bank against which to compare the tag mask.
- **Bank Data**
- **Tag Mask** - The pattern against which to compare the specified memory bank.

Access Filter

To select filter settings to apply to tags, select **Operations > Filter > Access Filter**.

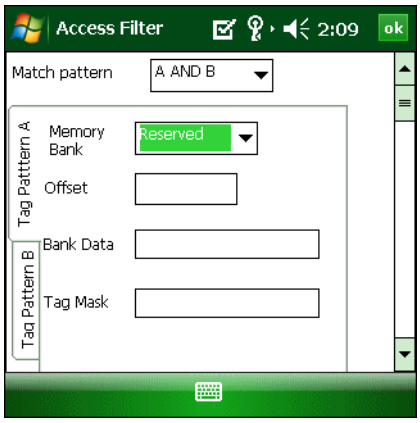

Figure 4-12 *Post Filter Window*

See *Post-Filter* for descriptions of the window fields.

Access

Select **Operations > Access** to select from a menu of access parameters to set for tags, or tap and hold a tag in the list to open a context menu with similar options in order to set operation parameters for that tag.

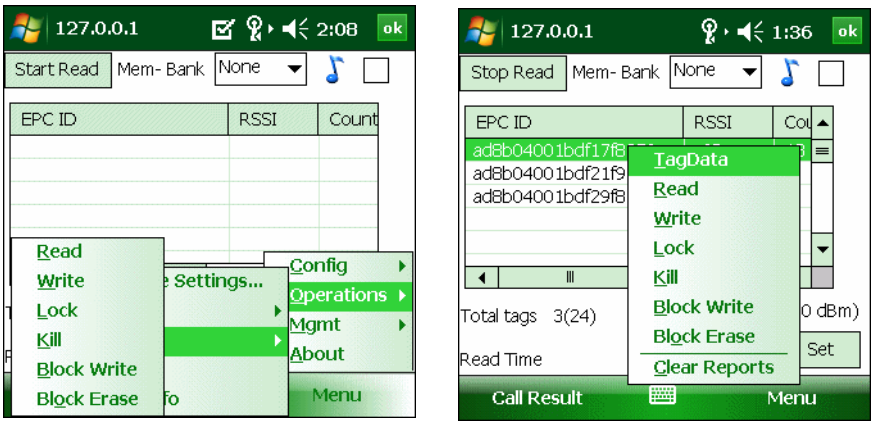

Figure 4-13 *Access and Context Menus*

Selecting an option from the context menu applies the operation to the single tag selected. Selecting an option from the **Access** menu updates the tag data for multiple tags in the main window.

Select an option from the **Access** or context menu to set access parameters and the access filter.

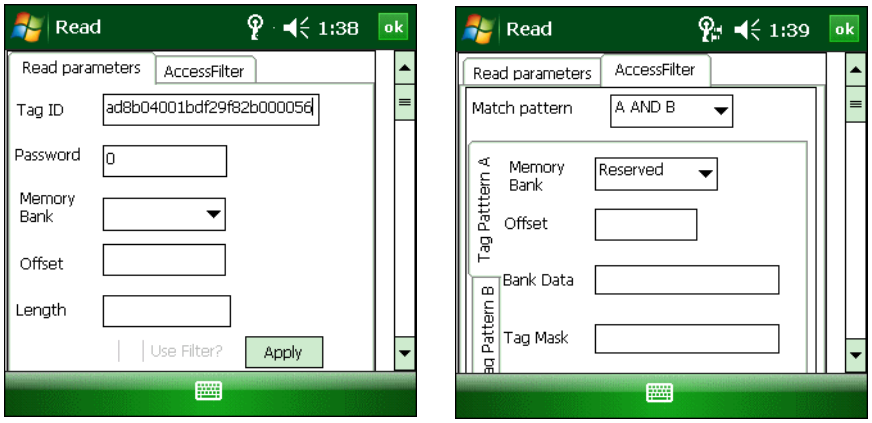

Figure 4-14 *Read and Access Filter Windows*

Windows are similar to the **Read** window in *Figure 4-14* for the menu options **Write**, **Lock**, **Kill**, **Block Write,** and **Block Erase**. Set options as required in the various parameter windows. Not all windows include all options.

- **Tag ID** - The name of the selected tag.
- **Password** - Set a password before performing any access operation (except **Kill**).
- **Memory Bank** - Select the memory bank. Options are:
  - Reserved
  - EPC
  - TID
  - User
- **Offset** - Offset of the first word to read from the selected memory bank.

- **Length** - Tag/data length.
- **Write Data** - The data to write to the selected tag (**Write** window only).
- **Lock Privilege** - Access options for the selected tag (**Write** window only):
  - None - The can not change the lock privilege of the particular memory bank.
  - Read_Write - The user can read and write to the tag.
  - Perma_Lock - Permanent lock.
  - Perma_Unlock - Permanent unlock.
  - Unlock - The user can unlock the tag for writing.
- **Access Filter** - Select this tab to set access filter parameters. See *Post-Filter on page 4-8* for more information.

Triggers

Select **Operations > Triggers...** to set start and stop triggers. Selecting the type of trigger from the **Trigger** drop-down menu updates the window with that trigger's applicable parameters.

Figure 4-15 *Triggers Window*

Antenna Information

Select **Operations > Antenna Info** to select the antennas to use.

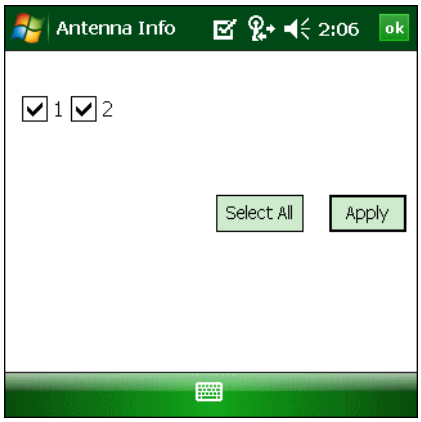

Figure 4-16 *Antenna Information Window*

Management Menu Options

The **Management** menu provides access to reader management functionality such as updating firmware, selecting an antenna mode, and rebooting. The **Management** menu options include:

- Login and Logout options
- Reboot option
- OEM Update option
- Software/Firmware Update option

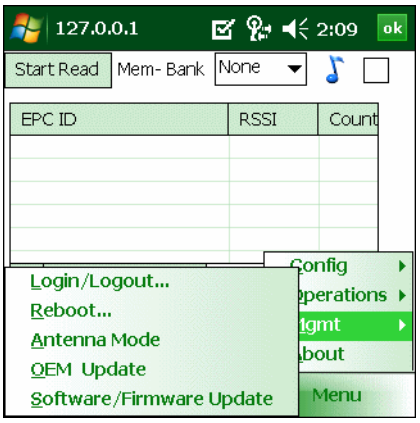

Figure 4-17 *Management Menu*

Login/Logout Settings

The Reader Management functionality requires login authentication. Select **Mgmt > Login/Logout...** to log in or out of this functionality.

Figure 4-18 *Login Window*

This window includes the following fields:

- **Reader Type** - MC indicates the MC319Z.
- **User name** - Enter the user name used to gain access to reader management functionality.
- **Password** - Enter the password used to gain access to reader management functionality.
- **IP** - IP address of the host. For MC319Z, the default is **127.0.0.1** or **localhost**.

Reboot Settings

This feature is not supported by handheld readers.

OEM Update

Select **Mgmt > OEM Update** to update the reader configuration file.

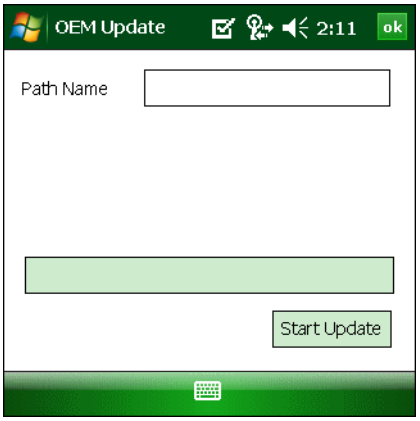

Figure 4-19 *OEM Update Window*

Enter the **Path Name** indicating the location and name of the configuration file, and select **Start Update**.

Software/Firmware Update

Select **Mgmt > Software/Firmware Update** to update the reader firmware software.

Figure 4-20 *OEM Update Window*

Enter the **Path Name** indicating the location and name of the update file, and select **Start Update**.

About

The **About** window displays the sample application version information

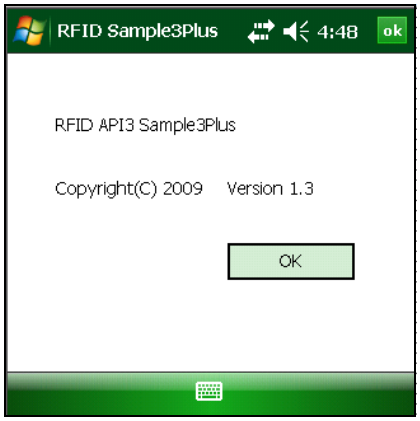

Figure 4-21 *About Window*

NOTE The version numbers displayed in this window are examples. Actual version numbers are based on the versions of the files on the device.

Reading Tags

To use the sample application to read tags:

1. Aim the mobile computer at the tag in any orientation (horizontally or vertically). The distance between the tag and the antenna is the approximate read range.

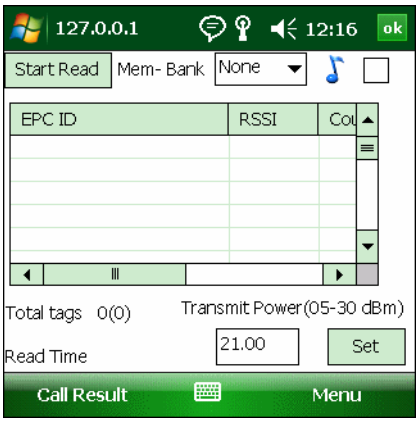

Figure 4-22 *RFID Tag Read*

2. Tap **Start Read** to interrogate all RFID tags within the radio frequency (RF) field of view, and capture data from each new tag found.

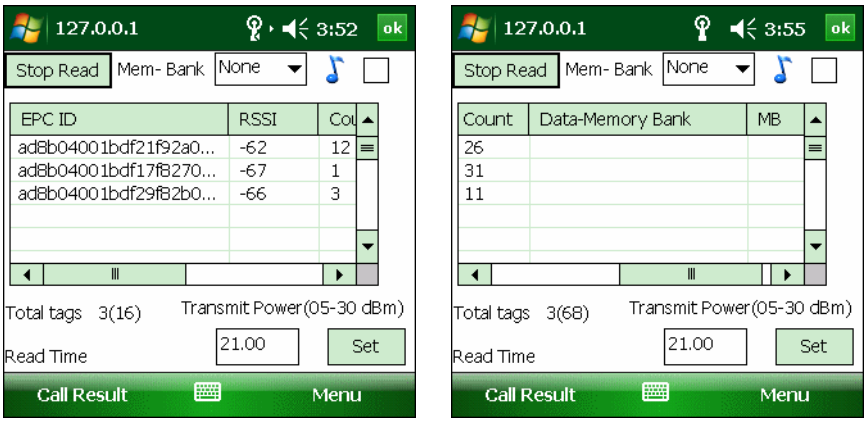

Figure 4-23 *RFID Tag List*

The sample application lists the following information for each tag read:

- **EPC ID** - The data content of the tag.
- **RSSI** - Received Signal Strength for the tag.
- **Count** - The number of times the mobile computer read the tag.
- **Data Memory Bank** - The memory bank data if you selected Reserved, TID, User, or EPC with offset.
- **MB** - The selected memory bank (TID, RSVD, USER or EPC).

Tap **Stop Read** to stop interrogating tags.

Chapter 5 Tag Locator

Introduction

Use Tag Locater to detect the location of a tag. By providing the TagID of an item, this application can find the relative position of the tag with respect to the mobile computer. Move the mobile computer back and forth to obtain the location of the tag as indicated by the beep frequency and a vertical progress bar showing the relative position of the tag.

The Tag Locater application requires the following components/DLLs on the device:

- RFIDAPI32.dll (Version 5.1.15 or higher)
- Symbol.RFID3.Device.dll (Assembly version 1.1.0.1, File version 1.1.0.7 or higher)
- Symbol.Audio.dll
- Symbol.dll
- Symbol.Notification.dll
- Symbol.StandardForms.dll

Using Tag Locator

To use the Tag Locator application:

1. Tap **TagLocator** in the **Application** folder on the mobile computer to open the Tag Locater application.

Figure 5-1 *Tag Locator*

2. Enter the tag ID in one of three ways:
   - Type the tag ID in the **TagID** text box, then select **Locate** or press and hold the trigger.
   - Perform a search operation by selecting the **Search Tags** button or by pressing and holding the trigger.
   - Select the **Import Tags** button to import a list of saved tags from a .csv file. See *Locating Tags Using a .csv File on page 5-3*.

Locating Tags Using a .csv File

1. Select the **Import Tags** button to import a list of saved tags from a .csv file. The following window appears.

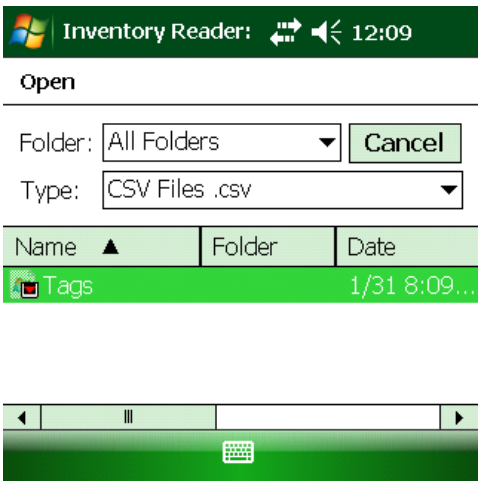

Figure 5-2 *Opening a .csv File*

2. Select the desired .csv file to import the tags to the list.

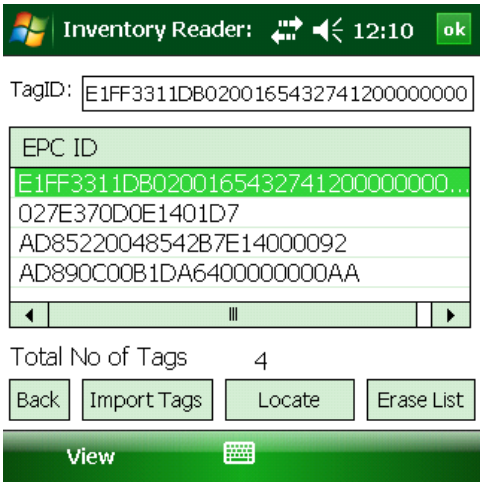

Figure 5-3 *Tag List*

3. Select a tag from the list to search.

4. Select the **Locate** button or press and hold the trigger. Move the mobile computer in all directions to get the relative position of the tag, indicated by a beep, the vertical progress bar, or both.

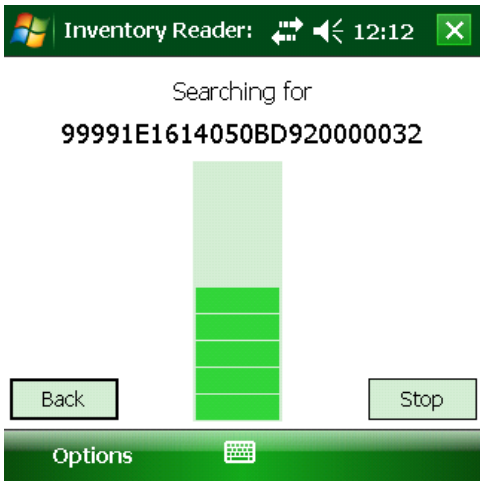

Figure 5-4 *Tag Search*

Use the **Options** menu to turn the beeper on and off and to display data in ASCII or hexadecimal format.

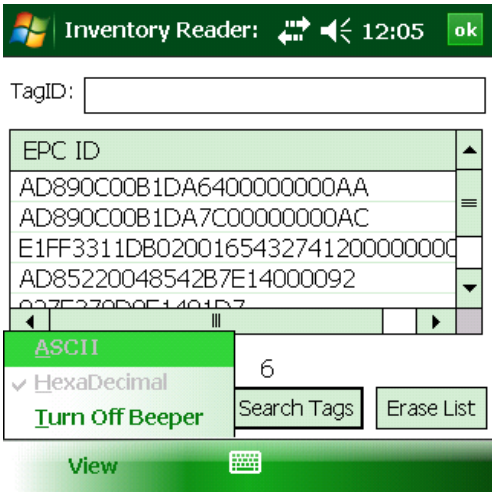

Figure 5-5 *Options Menu*

Chapter 6 Troubleshooting

Introduction

Table 6-1 on page 6-1 provides troubleshooting information.

Troubleshooting

Table 6-1 *Troubleshooting*

Problem	Possible Causes	Possible Solutions
Mobile computer does not turn on.	Lithium-ion battery not charged.	Charge or replace the lithium-ion battery.
	Lithium-ion battery not installed properly.	Ensure battery is installed properly. Refer to the *MC3000 Mobile Computer Integrator Guide*.
	System crash.	Perform a warm boot. If the RFID reader still does not turn on, perform a cold boot. Refer to the *MC3000 Mobile Computer Integrator Guide*.
Rechargeable lithium-ion battery did not charge.	Battery failed.	Replace battery. If the mobile computer still does not operate, try a warm boot, then a cold boot. Refer to the *MC3000 Mobile Computer Integrator Guide*.
	Mobile computer removed from cradle while battery was charging.	Insert mobile computer in cradle and begin charging. The lithium-ion battery requires less than four hours to recharge fully.
Mobile computer turns off without proper warning messages during heavy use.	Due to component tolerances, this can occur when using battery part number 55-060112-xx.	Use battery 55-002152-xx (p/n 82-127909-xx).
No sound.	Volume setting is low or turned off.	Increase the volume setting.

Table 6-1 *Troubleshooting (Continued)*

Problem	Possible Causes	Possible Solutions
Tapping the window buttons or icons does not activate the corresponding feature.	LCD screen not aligned correctly.	Re-calibrate the screen.
	Battery is not inserted properly.	Insert the battery properly. Refer to the *MC3000 Mobile Computer Integrator Guide.*
A message appears stating that the mobile computer memory is full.	Too many files stored on the mobile computer.	Delete unused memos and records. Save these records on the host computer.
	Too many applications installed on the mobile computer.	If additional applications have been installed on the RFID reader, remove them to recover memory. Tap **Start** > **Settings** > **System** tab > **Remove Programs** icon.
Reader is not reading tags.	The tag is out of its read range. Tags are damaged. Tags are not EPCgen2. Read application is not loaded.	Move the tag into the read range. See *Reading Tags on page 1-5*. Use tags of good quality. Use EPCgen2 tags. Verify that the unit is loaded with a read application.
Reader is not reading tags and the LLRP icon is red.	The battery is cold or degraded.	Recharge or replace the battery. If the problem still exists, exit and restart LLRP.

NOTE If problems still occur, contact the distributor or call the local contact. See *page ix* for contact information.

Appendix A Technical Specifications

Technical Specifications

The following tables summarize the RFID reader intended operating environment and technical hardware specifications.

Table A-1 *Technical Specifications*

Item	MC319Z RFID
Physical and Environmental Characteristics	
Dimensions	9.1 in. L x 3.6 in. W x 7.6 in. H 23.1 cm L x 9.1 cm H x 19.3 cm H
Weight	23 oz. / 650 g (includes battery, RFID, scanner, and radio)
Keypad	48 key Terminal Emulation (5250, 3270, VT)
Display	3 in. 320 x 320 pixel color
Battery	Extended capacity (2X) battery pack
Performance Characteristics	
CPU	Intel® XScale® Bulverde PXA270 processor at 624MHz
Operating System	Microsoft Windows Mobile 6.1
Memory (RAM/ROM)	128 MB RAM/1 GB Flash
Application Development	SMDKs available through the Support Web Site
Data Capture Options	Laser engine reads 1D symbologies with intuitive laser aiming. RFID reader reads Gen2 tags.

Table A-1 *Technical Specifications (Continued)*

Item	MC319Z RFID		
Laser Decode Capability	Code 39 Codabar Interleaved 2 of 5 MSI UPC/EAN supplementals Webcode RSS Expanded Composite Code Macro PDF417 Data Matrix Australian 4-State Dutch Kix MicroQR	Code 128 Code 11 EAN-8 UPCA Coupon Code RSS-14 EAN-128 PDF417 MSI Plessey US Planet Canadian 4-State Aztec	Code 93 Discrete 2 of 5 EAN-13 UPCE Trioptic 39 RSS Limited TLC39 Micro PDF417 Maxi Code UK 4-State Japanese 4-State USPS 4-State(US4CB)
User Environment			
Operating Temperature	-4°F to 122°F (-20°C to 50°C)		
Battery Charging Temperature	32° to 104° F (0° to 40° C) ambient temperature range		
Storage Temperature	-25°F to 160°F (-40°C to 70°C)		
Humidity	0% to 95% non condensing		
Drop Specification	Multiple 6 ft. (1.8m) drops to concrete across operating temperature range		
Tumble	2,000 one-meter tumbles at room temperature (4,000 hits)		
Environmental Sealing	IP64		
ESD	+/-15kVdc air discharge +/-8kVdc direct discharge +/-8kVdc indirect discharge		
RFID			
Standards Supported	EPC Generation 2 UHF		
Nominal read range[1]	10 ft./3.04 m with the RFX6000 4x4 tag optimally oriented.		
Field	Half read range beam width: +/- 80 degrees (with tags optimally oriented).		
Antenna	Integrated, circularly polarized, 1.5 dB effective linear gain per axis (nominal); Antenna port for future support of optional external antenna.		
Frequency Range	902-928 MHz		
Output power	1W conducted (1.4W EIRP with integrated antenna)		

Table A-1 *Technical Specifications (Continued)*

Item	MC319Z RFID
Wireless Data Communications	
WLAN	802.11a/b/g
Output Power	100mW U.S. and International
Data Rate	802.11a: 54Mb per second 802.11b: 11Mb per second 802.11g: 54Mb per second
Antenna	Internal
Frequency Range:	802.11a: 5 GHz; country-dependent 802.11b: 2.4 GHz; country-dependent 802.11g: 2.4 GHz; country-dependent
Bluetooth	Bluetooth® Version 1.2 with BTExplorer™ (manager) included
Peripherals and Accessories	
Cradles	Single-slot available
Printers	Supports extensive line of Symbol approved printers, cables and accessories
Charger	4-Slot universal battery charger
Other Accessories	Cable Adapter Module; Magnetic Stripe Reader; Modem; Full set of holsters In accordance with the SymbolPlus partner program

Appendix B RFID APIs

RFID APIs are available in C and .NET. For information on supported RFID APIs, refer to the *Enterprise Mobility Developer Kit* (EMDK), available at http://supportcentral.motorola.com

For C, refer to the EMDK for C v2.1 or later. For .Net, refer to the EMDK for .NET v2.2 or later.

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Motorola Solutions, Inc.
One Motorola Plaza
Holtsville, New York 11742, USA
1-800-927-9626
http://www.motorola.com/enterprisemobility

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