FX Series RFID Readers

Integrator Guide

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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	11/2009	Initial release
-02 Rev A	7/2010	Software updates

Table of Contents

About This Guide

Introduction

This Integrator Guide provides information about installing, configuring, and using the FX Series RFID readers and is intended for use by professional installers and system integrators. The FX Series readers provide real time, seamless tag processing for EPC Class1 Gen2 compliant tags.

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

Configurations

This guide includes the following FX Series RFID reader configurations:

- FX7400-42350A30-US: 4-Port RFID Reader, US
- FX7400-22350A30-US: 2-Port RFID Reader, US
- FX7400-42310A30-WR: 4-Port RFID Reader, Global
- FX7400-22310A30-WR: 2-Port RFID Reader, Global

Chapter Descriptions

Topics covered in this guide are as follows:

- *Chapter 1, Quick Start* provides a Quick Start tag reading demonstration.
- *Chapter 2, Getting Started* provides an overview of RFID technology/components and a description of the FX Series reader and features.
- *Chapter 3, Installation and Communication* provides information on installing and setting up the FX Series readers.
- *Chapter 4, Administrator Console* describes how to connect to the reader and how to use the web-based Administrator Console to configure and manage FX Series readers.
- *Chapter 5, Installation Examples* provides sample setups and describes how to apply these to a user installation.
- *Chapter 6, Troubleshooting* describes FX Series readers troubleshooting procedures.
- *Appendix A, Technical Specifications* includes the technical specifications for the reader.
- Appendix B, LLRP and RM API Extensions provides references to Low Level Reader Protocol (LLRP) and Reader Management (RM) extensions for the FX Series reader.
- *Appendix C, FTP Firmware Upgrade* provides reader firmware upgrade information on using the web-based **Administrator Console** and an FTP or FTPS server running a host computer.
- *Appendix D, Java Install/Upgrade Procedures* describes how to upgrade the host computer with a new Java update and clear the cache.
- Appendix E, Static IP Configuration describes three methods of setting the static IP address on an FX7400 RFID Reader.
- *Appendix F, RF Air Link Configuration* describes how to select air link configuration from a set of available air link profiles.

Notational Conventions

The following conventions are used in this document:

- “RFID reader” or “reader” refers to the Motorola FX Series RFID readers.
- *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.

- *FX Series RFID Reader Regulatory Guide,* p/n 72-125267-xx
- *FX Series Reader Software Interface Control Guide,* p/n 72E-131718--xx
- *ShowCase II User Guide*, p/n 72E-122491-xx
- *Application Guide for Motorola Enterprise Mobility Devices*, p/n 72E-68902-xx
- *RFID 3 API*

For the latest version of all software and guides, go to: http://www.motorola.com/enterprisemobility/support.

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 Quick Start

Introduction

This chapter provides a Quick Start setup demonstration.

Quick Start Demonstration

The Quick Start demonstration offers a simple, temporary way to quickly set up the reader and read tags. The demonstration includes:

Step 1, Setup

For information on complete component kits available from Motorola, see *Appendix A, Technical Specifications*.

1. Unpack the reader. See *Unpacking the Reader on page 3-1*.
2. Set up the reader and tags on a desktop.
3. Connect the antenna to antenna Port 1. See *Figure 1-1*.
4. Connect the Ethernet cable to the Ethernet port. See *Figure 1-1*.
   Connecting the reader to a subnet that supports DHCP is recommended. This Quick Start procedure is not guaranteed to work if DHCP is disabled in the reader and if the reader is connected directly to a PC.
5. Connect the AC power supply to a power outlet and connect to the power port. See *Figure 1-1*.

NOTE This step is not required for networks supporting Power-over-Ethernet (POE).

6. Wait for the green power LED to stay lit. See *System Start-up/Boot LED Sequence on page 3-9* for boot-up details.

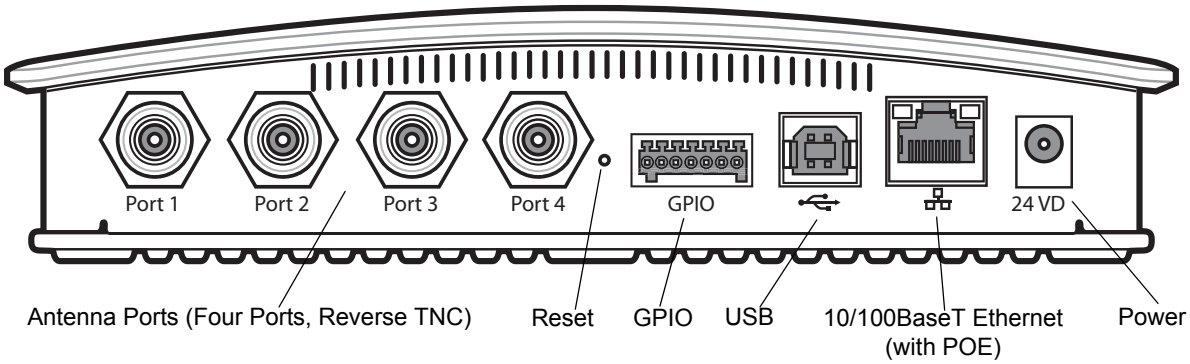

Figure 1-1 *FX Series RFID Reader Rear Panel Connections*

Step 2, Connecting to the Reader

To connect via host name:

1. Open a browser. Recommended browsers are IE6, IE7, IE8, or Mozilla 3.
2. Enter the host name, provided on the CD label, in the browser (e.g., http://fx7400cd3b0d) and press **Enter**. The **User Login** window appears and the reader is ready.

NOTE Connect the reader to a network that supports host name registration and lookup to ensure the network can access the reader using the host name. For instance, some networks can register hostnames through DHCP. When first connecting to the reader, it is recommended to keep DHCP enabled in both the PC and in the reader, although it is not guaranteed that hostname will work all the time. Use the host name provided on the CD label, or construct it using the reader MAC address on the bottom of the reader. The host name is a string with the prefix FX7400, followed by the last three MAC address octets. For example, for a MAC address of 00:15:70:CD:3B:0D, use the prefix FX7400, followed by the last three MAC address octets (CD, 3B, and 0D), to create the host name FX7400CD3B0D. Type http://FX7400CD3B0D in the browser address bar to access the reader.

To connect using the USB port for network connection, see *Motorola USB RNDIS Driver on page 3-6*. The default IP address for the reader is 169.254.10.1

Step 3, First Time / Start-Up Login

When starting the reader for the first time, set a unique user ID and password.

1. In the **User Login** window, enter **admin** in the **User Name:** field and enter **change** in the **Password:** field.

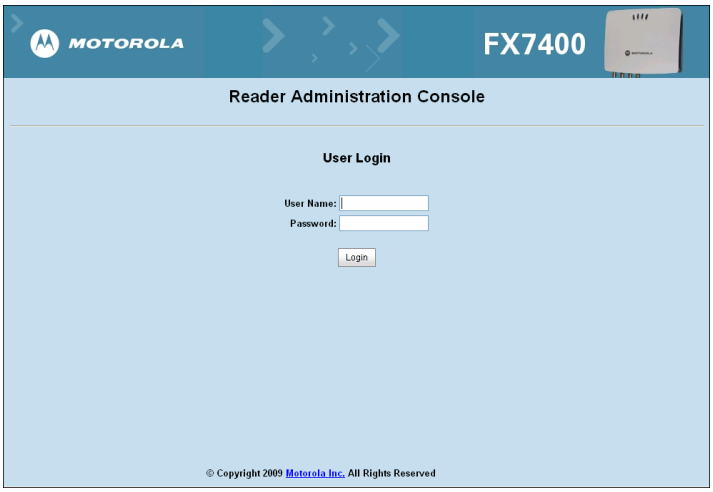

Figure 1-2 *User Login Window*

NOTE Contact Motorola Enterprise Mobility support if you forget the user ID and password. See *Service Information on page xi*.

2. Click **Login.** The **Region Configuration** window appears.

NOTE The Region Configuration window does not appear for US reader configurations. For these models, the Administrator Console main window appears. See *Figure 4-1 on page 4-2*.

Step 4, Set Region

Set the region of operation. **Setting the unit to a different region is illegal**.

NOTE Region configuration is not available for readers configured to operate in the United States region (under FCC rules). In this case, skip this step.

1. In the **Configure Region Settings** window, select the region from the drop-down menu.

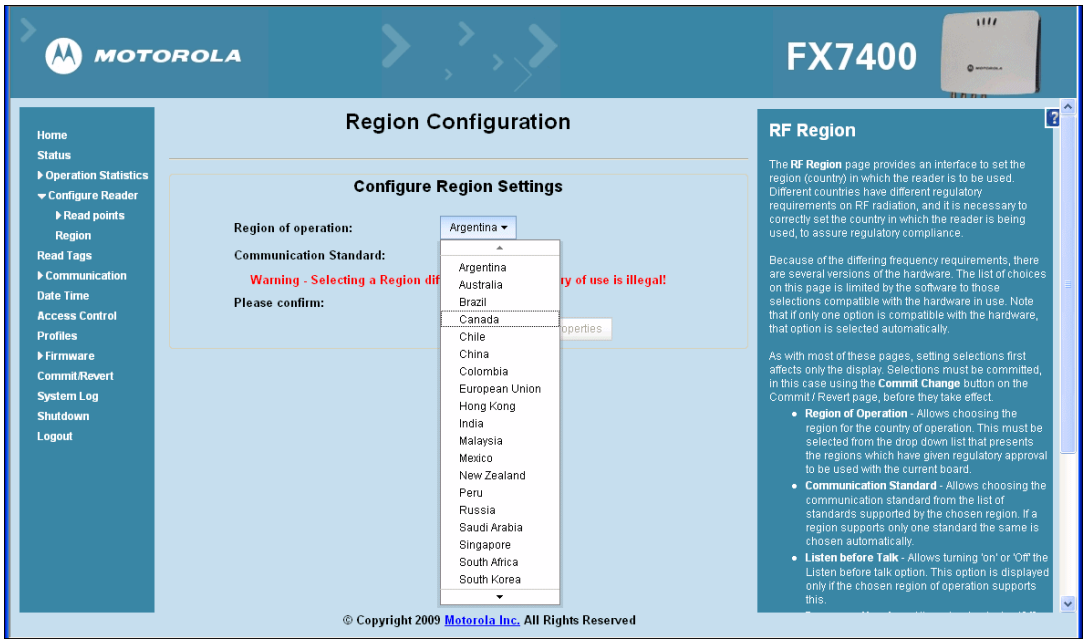

Figure 1-3 *Selecting the Region*

2. Select the **Communication Standard**, if applicable.
3. Select **Frequency Hopping**, if applicable.
4. Select the appropriate channel(s), if applicable.
5. Select the **I understand** check box.

6. Select **Set Properties** to complete the region selection. The **Operation Successful** window appears.

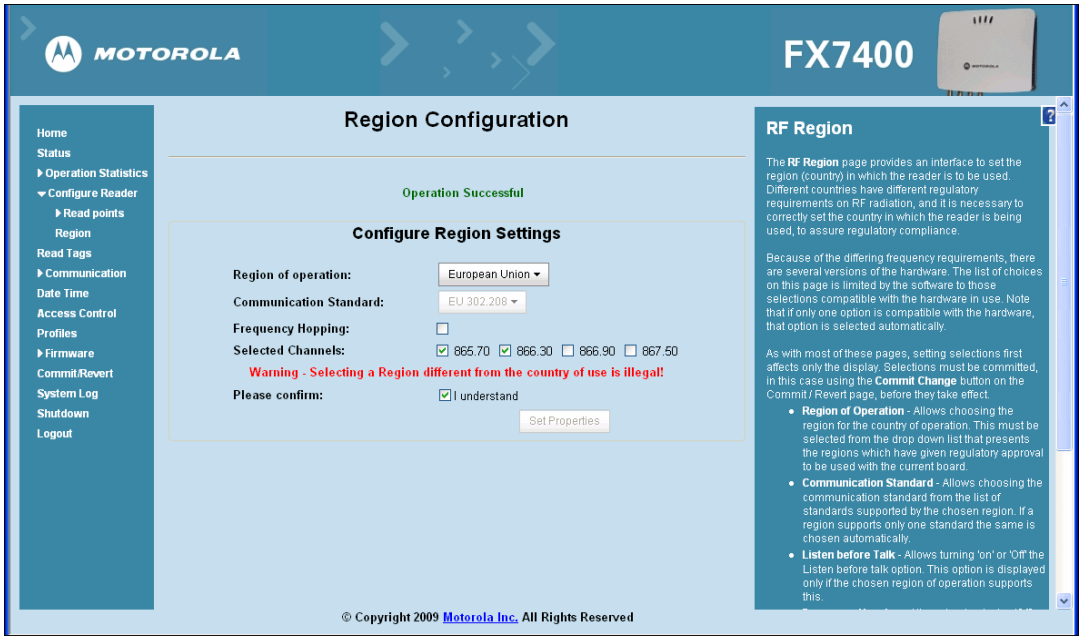

Figure 1-4 *Region Configuration, Operation Successful Window*

7. Select **Commit/Discard**.

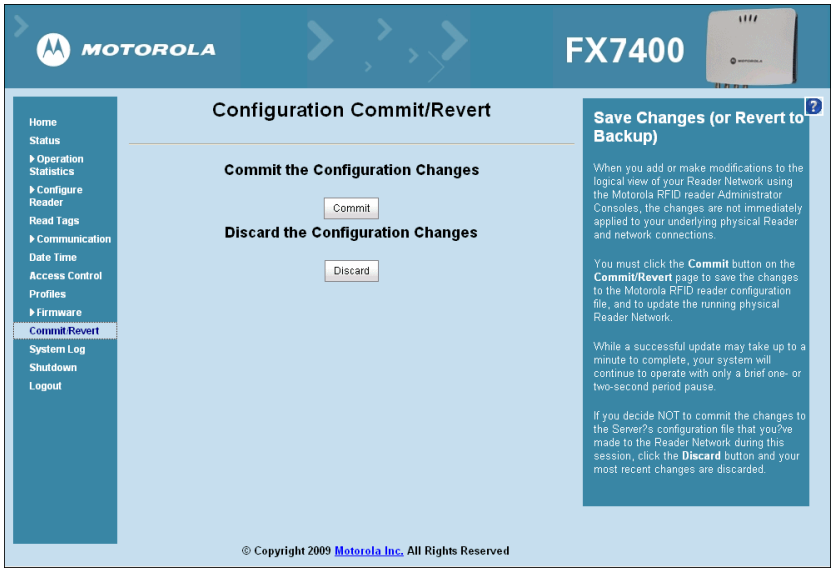

Figure 1-5 *Commit/Discard Window*

8. Click **Commit** to save the new region configuration and apply these changes to the reader configuration file, or click **Discard** to discard the region configuration changes. When the commit completes, the **Commit Successful** window appears.

Step 5, Read Tags

Select **Read Tags** to view the **Reader Operation** window.

NOTE Enable Java JRE support on the browser for this page to function properly. See *Appendix D, Java Install/Upgrade Procedures*.

NOTE When upgrading the FX7400 from version 1.0 to version 1.1 (or vice-versa), close the browser and re-open it to clear the old version of files cached. If the java cache for applets is on, clear the cached applet before starting the browser to use the **ReadTags** page. See *Clearing the Java Cache on page D-2*.

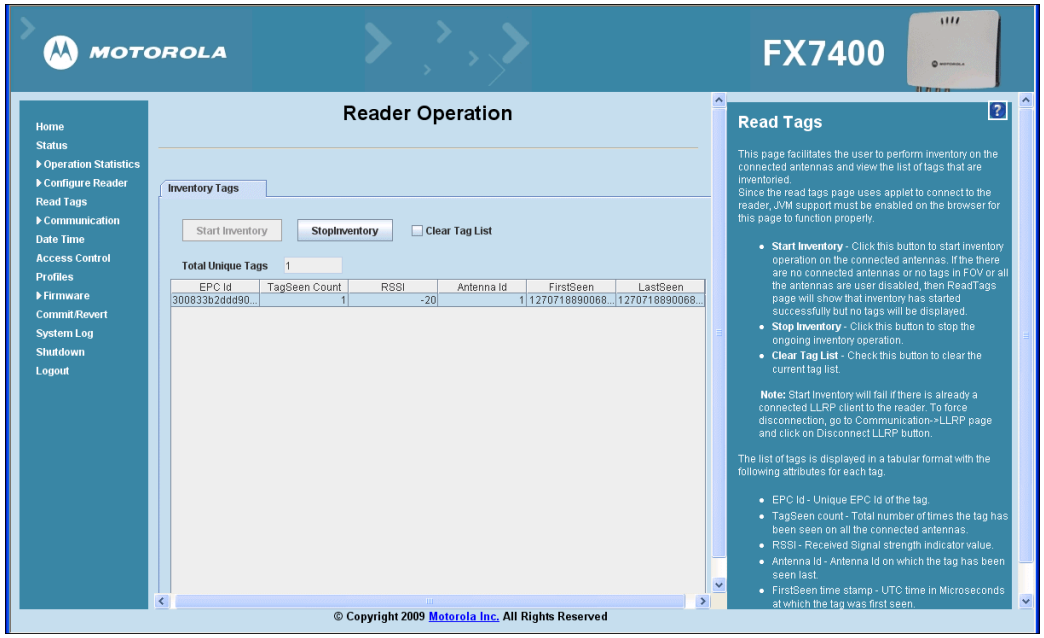

Figure 1-6 *Read Tags Window*

- Click **Start Inventory** to initiate an on-demand scan on the connected antennas and/or to enable or disable polled read points.
- Click **Stop Inventory** to stop the inventory operation.
- Select the **Clear Tag List** check box to clear the current tag list.

The list of tags appears in a table with the following attributes for each tag:

- **EPC Id***:* Unique tag EPC ID.
- **TagSeen Count***:* Number of times the tag is identified on the specific antenna.
- **RSSI**: Received Signal Strength Indication.
- **Antenna Id***:* Antenna ID on which the tag is seen.
- **FirstSeen** time stamp: UTC time (in microseconds) when the tag was first seen.
- **LastSeen** time stamp: UTC time (in microseconds) when the tag was last seen.

Chapter 2 Getting Started

Introduction

This chapter provides an overview of RFID technology and components, and describes the FX Series reader 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.

A typical RFID system consists of transponders (called tags), readers, and antennas. To read a tag the reader sends out radio frequency waves (using attached antennas). 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.

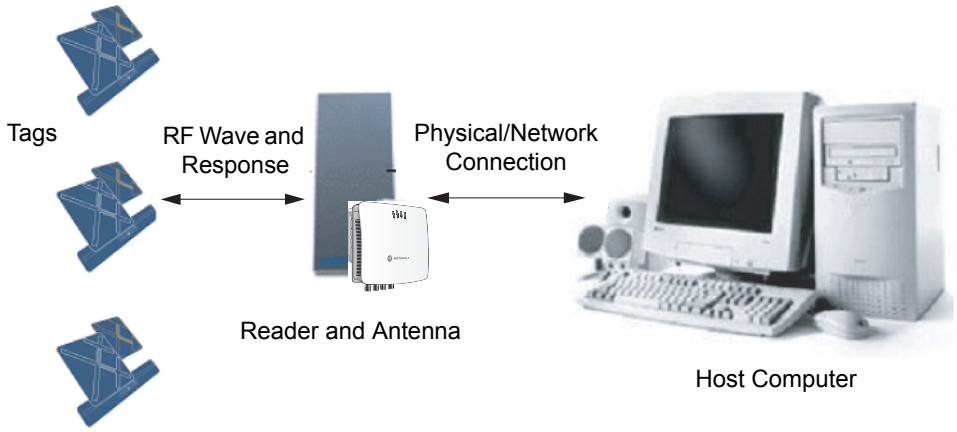

Figure 2-1 *RFID System Elements*

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. A typical Motorola RFID system consists of the following components:

- Silicon based RFID tags that attach to retail products, vehicles, trailers, containers, pallets, boxes, etc.
- Different antenna types to support applications such as dock door (area antennas) and conveyor.
- Readers power and communicate with the tags for data capture and provide 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, and are available with two power options:

- Active Tags: typically powered by light-weight batteries and have limited life.
- Passive Tags: the RFID reader generates an RF field that powers the tag. Passive tags are much lighter, less expensive, and have a much longer life than active tags.

Antennas

Antennas transmit and receive radio frequency signals. A **read point** is the RF range of an antenna.

Readers

Readers communicate with the tags and can transfer the data to a host computer. Readers also provide features such as filtering, CRC check, and tag writing. The FX Series readers read Gen2 (dense reader mode) RFID tags.

FX Series RFID Readers

The Motorola FX Series RFID readers are intelligent, C1G2 UHF RFID readers with RFID read performance that provides real-time, seamless EPC-compliant tags processing. The FX Series RFID readers are designed for indoor inventory management and asset tracking applications in large scale deployments. The readers can host third-party customer-driven embedded applications.

The FX Series RFID readers are based on Motorola's strategic FX Series reader platform and are easy to use, deploy, and manage. The readers offer a variety of options for connecting to corporate networks using Ethernet or USB connections. Features include:

- ISO 18000-6C standard (EPC Class 1 Gen 2)
- Dense reader mode capability
- Enterprise-class performance
- Application-specific setup for ease of installation
- Power over Ethernet (POE) to eliminate the need for a power drop
- SSL/SSH based security for secure data transmission
- Windows CE
- Support for custom or third-party applications
- Feature set for event and tag management
- Support for NXP custom commands over LLRP
- Radio mode support via LLRP

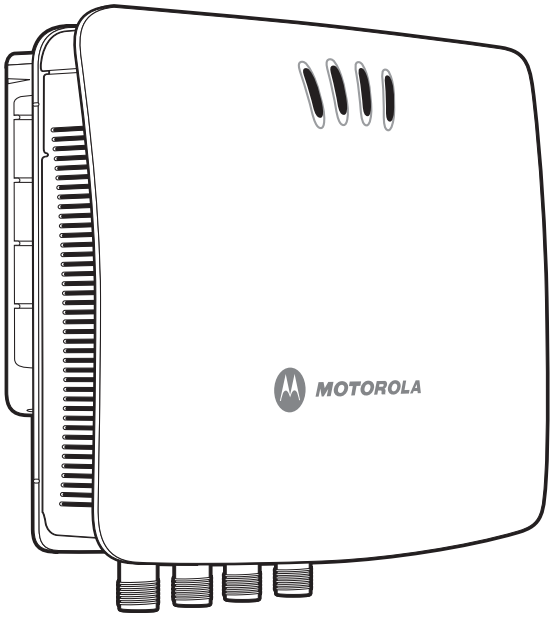

Figure 2-2 *FX RFID Reader*

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

The FX Series RFID reader configurations include either two or four monostatic antenna ports. The monostatic ports are used only with monostatic antennas.

Versions and Kits

The FX Series RFID readers are available in a 2-port or 4-port version, individually (reader and mounting bracket) or in a kit that includes the reader, mounting bracket, an antenna, and a power supply. For detailed kit information, see *FX7400 Kits on page A-1*.

WARNING! **For Mounting in Environmental Air Handling Space (EAHS): Do not install the Mounting Bracket, Antenna, Cables, PSU, and PoE (Power Injector) in the EAHS unless they are suitable for use in EAHS per UL 2043.**

FX Series RFID Reader

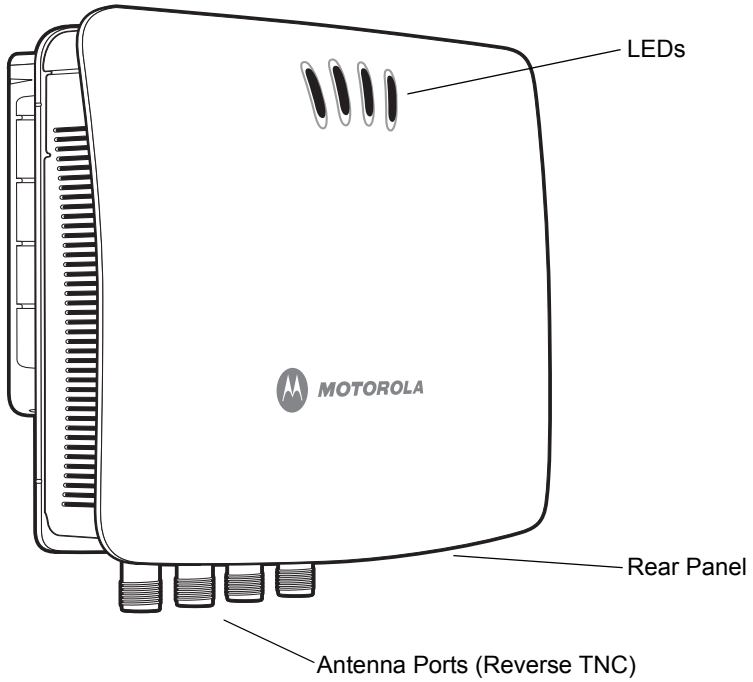

Figure 2-3 *FX Series RFID Reader*

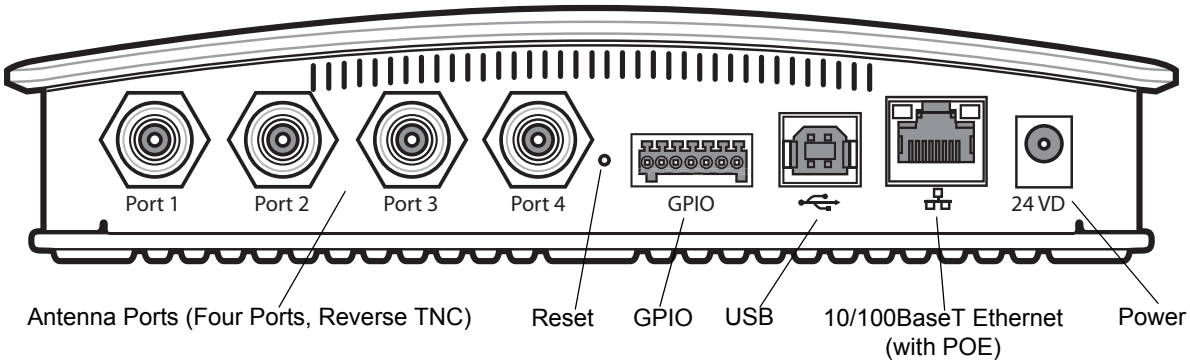

Figure 2-4 *FX Series RFID Reader Rear Panel Connections*

CAUTION Use only parts provided with the FX Series RFID readers, or Motorola approved/recommended parts. Substituting other cables or parts can degrade system performance, damage the reader, and/or void the warranty.

FX Series RFID Reader Rear Panel

Table 2-1 *Rear Panel Descriptions*

Port	Description
Antenna Ports (Reverse TNC)	Two port version: Connect up to two antennas. Four port version: Connect up to four antennas. See *Table A-1 on page A-2* for the maximum antenna gains and RF output powers for both US/Canada and EU. See *Connecting Antennas on page 3-4* for connection information.
Reset	To reset the reader insert a paper clip into the reset hole, press and hold the reset button for not more than 2 seconds. This resets the reader, but retains the user ID and password.
GPIO	Insert a DE15 serial cable to connect to external devices. See *GPIO Interface Connection on page 3-8* for more information.
USB	The USB client port supports (by default) a network mode of operation. This enables a secondary network interface as a virtual adapter over USB. ActiveSync can also be enabled on the USB client port. Use Visual Studio to use the USB port for development. Use a remote display tool to access the Windows CE graphical interface. Advanced users can disable and enable ActiveSync via a registry change in Windows CE, and can create a custom communication protocol on the USB port. See *USB Connection on page 3-6* for connection information.
10/100BaseT Ethernet	Insert a standard RJ45 Ethernet cable to connect to an Ethernet network with or without POE capability, or to a local computer. See *Ethernet Connection on page 3-5* for connection information.
Power	DC connector connects to a Motorola approved power supply AC adapter (varies depending on the country). Maximum power 24 VDC, 1.2 A. See *Powering the Reader on page 3-8* for connection information.

FX Series RFID Readers LEDs

The reader LEDs indicate reader status as described in *Table 2-2*. For the LED boot up sequence see *System Start-up/Boot LED Sequence on page 3-9*.

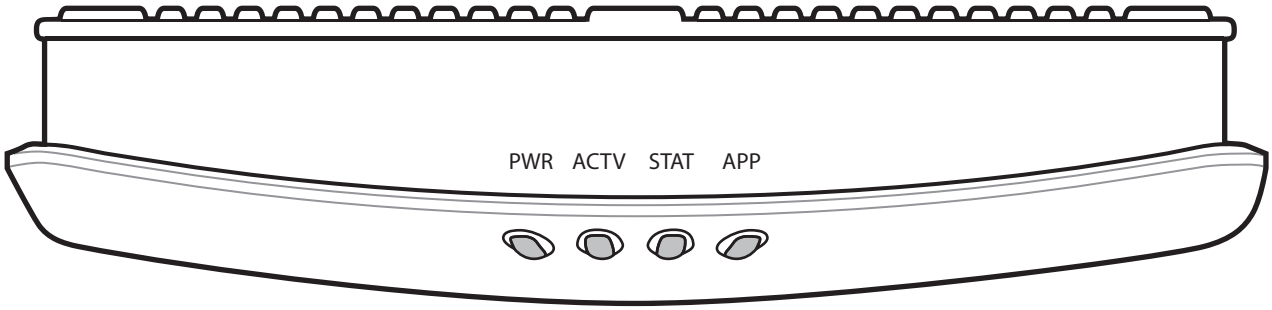

Figure 2-5 *FX Series RFID Readers LEDs*

Table 2-2 *LED Indications*

LED	Function	Color/Status	Description
PWR	Power	Off Red Solid Red Flashing Amber Solid Green Solid	Reader is powered off Booting Firmware upgrade Application initialization after booting Reader is powered on and operational
ACTV	Activity	Off Amber Flashing Green Flashing	No RF operations On for 500 mSec indicates another tag operation On for 500 mSec indicates a tag is inventoried or read
STAT	Status	Off Red Solid Red Flashing Green Flashing	No errors or GPIO events Firmware update failure On for 500 mSec indicates an error in RF operation On for 500 mSec indicates a GPI event
APP	Application	Green/Red/Amber	Controlled through RM

FX Series RFID Readers Features

Configuration and Upgrading

Use the **Administrator Console** to reconfigure the reader. See *Chapter 4, Administrator Console*. The reader can also accept new firmware and configuration updates.

Tag Management

The **Administrator Console** provides the **Read** tags feature. See *Read Tags on page 4-22*. Use client applications based on Showcase II, Motorola EMDK (Enterprise Mobility Development Kit), or LLRP (EPCGlobal Low Level Reader Protocol) for additional tag management operations such as **Write**, **Lock**, **Filtering**, **Event Management** and **Kill**.

Device Management

Quick Backup and Recovery

Use a web browser to back up and restore reader configuration by downloading the configuration XML file. Use the **Administrator Console** to download the file to the reader.

SNMP Integration

The reader can send real time notification of specific events and failures to the SNMP server.

Security

User Level Security

Use this feature to assign different access levels to users, allowing them to perform necessary tasks without compromising security. The reader recognizes three user access levels:

- **View** - view reader configuration settings.
- **Admin** - view and edit configuration settings and perform administrative tasks such as updating reader firmware.

Logging

The reader keeps a log of all system-related activities for security and troubleshooting. The log includes time-stamped system activities such as login attempts and hardware failures. Use the log to pinpoint problems, to facilitate quick resolution, and to identify administrators who may require additional training to prevent future problems. See *System Log on page 4-38*.

Connection Options

The FX7400 provides flexibility for connecting to networks through an Ethernet connection or the USB client port. The reader's primary network interface is Ethernet. The Ethernet interface accesses each reader from anywhere on the network using the unique host name or IP address.

Additionally, the USB client port supports (by default) a **Network** mode of operation. This enables a secondary network interface as a virtual adapter over USB. The interfaces co-exist and if the Ethernet connection fails, the application can switch to USB using a specific IP and can control the reader.

ActiveSync can also be enabled on the USB client port. Use Visual Studio to use the USB port for development. Use a remote display tool to access the Windows CE graphical interface.

Advanced users can disable and enable ActiveSync via a registry change in Windows CE, and can create a custom communication protocol on the USB port.

See *Communications Connections on page 3-5*. To use the USB port for network connection, see *Motorola USB RNDIS Driver on page 3-6*.

Chapter 3 Installation and Communication

Introduction

This chapter includes the following FX Series RFID reader installation and communication procedures:

CAUTION The FX Series RFID readers must be professionally installed.

WARNING! **For Mounting in Environmental Air Handling Space (EAHS): Any cables used to interconnect to other equipment must be suitable for use in EAHS as per UL2043.**

Unpacking the Reader

Remove the reader from the shipping container and inspect it for damage. Keep the shipping container, it is the approved shipping container and should be used if the reader needs to be returned for servicing.

Mounting and Removing the Reader

WARNING! **When installing the antenna ensure a minimum separation distance of 9.1 in (23 cm) between the antennas and all persons.**

Mounting Tips

Mount the reader in any orientation. Consider the following before selecting a location for the FX Series reader:

- Mount the reader indoors, in operating range and out of direct sunlight, high moisture, and/or extreme temperatures.
- Mount the reader in an area free from electromagnetic interference. Sources of interference include generators, pumps, converters, non-interruptible power supplies, AC switching relays, light dimmers, and computer CRT terminals.
- Mount the reader within 15 feet of the antennas.
- Ensure that power can reach the reader.
- The recommended minimum horizontal mounting surface width is 7 1/2 inches. However, the unit can mount on surfaces as narrow as 6 inches (in locations where unit overhang is not an issue). For vertical mounting the unit can mount on a surface as small as 6 inches by 6 inches.
- Mount the reader onto a permanent fixture, such as a wall or a shelf, where it is not disturbed, bumped, or damaged. The recommended minimum clearance on all sides of the reader is five inches.
- Use a level for precise vertical or horizontal mounting.

Mounting Using the Mounting Plate

WARNING! **For Mounting in Environmental Air Handling Space (EAHS): Do not install the Mounting Bracket in the EAHS.**

1. Position the mounting plate on a flat surface (wall or shelf). Position the release tab on the top. See *Figure 3-1*.
2. Mark the hole locations using the mounting plate as a guide. See *Figure 3-1*. Remove the mounting plate and drill holes (appropriate for the surface material) at the marked locations.

NOTE For wood surfaces, drill two 1/8" diameter by 7/8" deep holes. For drywall/masonry surfaces, drill two 3/16" diameter by 7/8" deep (min) holes and install using the provided anchors.

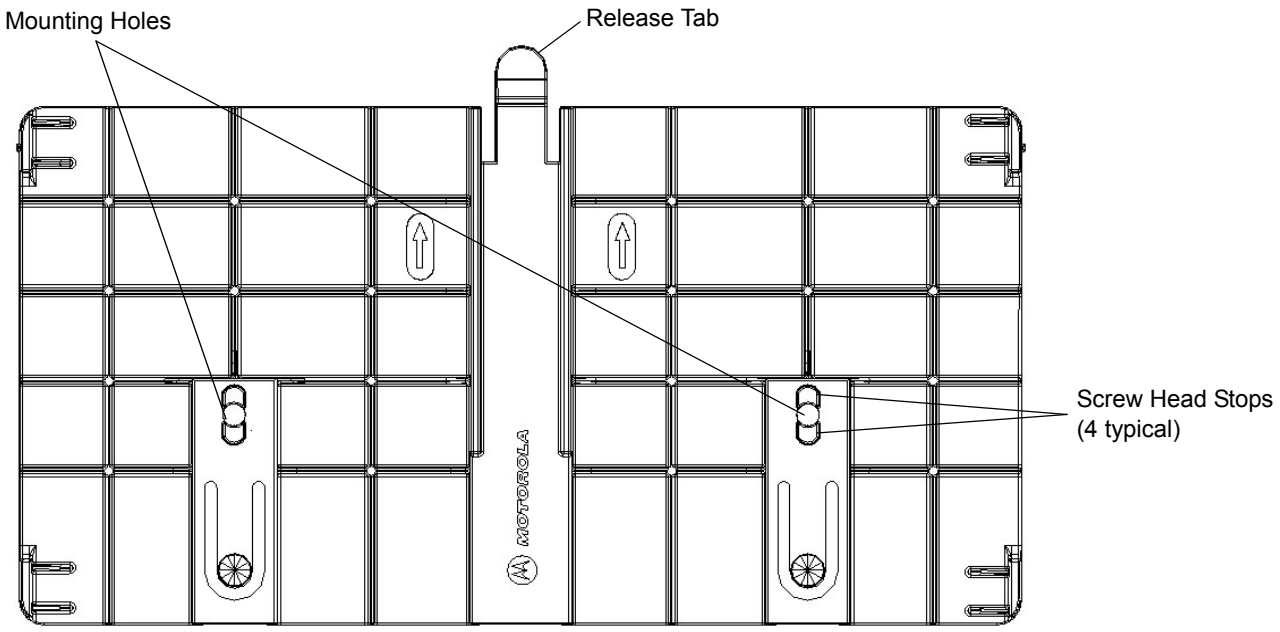

Figure 3-1 *Mounting Plate, Front*

3. Reposition the mounting plate over the mounting holes and secure using the supplied fasteners (as appropriate for the surface material).

NOTE Mount the reader with the cable connections up or down, depending on the installation requirements.

CAUTION Use a hand screw driver to install the mounting plate (do not use a power driver). Do not use excessive torque, and tighten the screws so that they are just snug on the screw head stops (see *Figure 3-1*). If the reader does not engage the mounting plate, loosen the screw(s) 1/8 to 1/4 turn and try again.

4. Position the reader by aligning the markers on the metal base plate and the wall bracket, with the key-slot holes over the mounting screws. Gently slide the reader down to lock into place.
5. To remove the reader, press the release tab and slide the reader up while gently pulling out.

Direct Mounting (Without the Mounting Plate)

CAUTION Not using the mounting plate can affect read performance at elevated temperatures. Also, if not using the mounting plate, secure the reader to prevent it from coming off of the mounting screws.

To mount the unit without using the mounting bracket:

1. Use the mounting bracket as a template to locate the holes, or locate and mark the holes on 4 3/16” centers, +/- 1/32”.
2. For wood surfaces, drill two 1/8" diameter by 7/8" deep holes on 4.192" centers. For drywall/masonry surfaces, drill two 3/16" diameter by 7/8" deep (min) holes on 4.192" centers and install using the provided anchors.
3. Position the reader with the key-slot holes over the mounting screws and gently slide the reader down to lock into place.

4. Adjust the screw head height to assure a snug fit. Or if the screws are accessible from the back, use machine screws with a lock washer/nut and tighten the nut (from the back) to secure the reader.

Connecting Antennas

WARNING! **When installing the antenna ensure a minimum separation distance of 9.1 in (23 cm) between the antenna and all persons.**

CAUTION Power off the reader before connecting antennas. See *Powering the Reader on page 3-8*. Never disconnect the antennas while the reader is powered on or reading tags. This can damage the reader.

CAUTION Do not turn on the antenna ports from a host when the antennas are not connected.

CAUTION Maximum antenna gain (including any cable loss) cannot exceed 6 dBiL.

CAUTION When mounting the antennas outside the building, connect the screen of the coaxial cable to earth (ground) at the entrance to the building. Perform this in accordance with applicable national electrical installation codes. In the U.S., this is required by Section 820.93 of the National Electrical Code, ANSI/NFPA 70.

WARNING! **For Mounting in Environmental Air Handling Space (EAHS): Do not install Antennas and Antenna Cables in the EAHS unless they are suitable for use in EAHS as per UL 2043.**

Table 3-1 *Antenna Gain and Radiated Power*

FX Series	US	EU
Max Conducted RF Power	+ 30dBm	+29.6dBm
Max Antenna Gain Allowed (including cable loss)	+ 6dBiL	+ 5.5dBiL
Max Radiated Power Allowed	4W EIRP	2W ERP

To connect the antennas to the reader (see *Figure 3-2*):

1. For each antenna, attach the antenna reverse TNC connector to an antenna port.
2. Secure the cable using wire ties. Do not bend the cable.

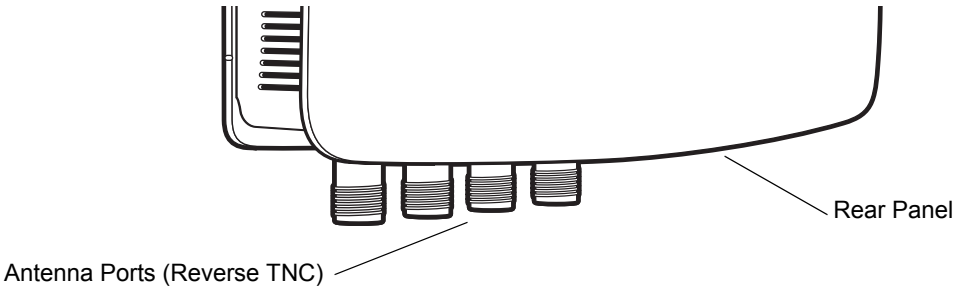

Figure 3-2 *FX Series RFID Reader Antenna Connection*

Communications Connections

Use a standard Ethernet connection or a POE Ethernet connection to connect the FX Series reader to a host or network.

Ethernet Connection

The reader communicates with the host using an Ethernet connection (10/100Base-T Ethernet cable). This connection allows access to the **Administrator Console**, used to change reader settings and control the reader. With a wired Ethernet connection (10/100Base-T cable), power the FX Series reader using either the reader Motorola AC power supply, or by Power-Over-Ethernet through the Ethernet cable.

Ethernet: Power through AC Outlet

The FX Series reader communicates to the host through a 10/100Base-T Ethernet cable and receives power through a Motorola AC power supply.

1. Route the Ethernet cable.
2. Route the power cable.
3. Terminate the Ethernet cable according to *Table A-2 on page A-4*.
4. Connect the Ethernet cable to the LAN port on the FX Series reader. See *Figure 2-4 on page 2-5*.
5. Connect the other end of the Ethernet cable to the host system LAN port.
6. Connect the Motorola AC power supply to a wall outlet.
7. Insert the power supply barrel connector into the FX Series reader power port. See *Figure 2-4 on page 2-5*.
8. Verify that the unit booted properly and is operational. See *System Start-up/Boot LED Sequence on page 3-9*.
9. On a networked computer, open an internet browser and connect to the reader. See *Connecting to the Reader on page 4-3*.
10. Log in to the **Administrator Console**. See *Administrator Console Login on page 4-9*.

Ethernet: Power through POE

The POE installation option allows the FX Series reader to communicate and receive power on the same 10/100Base-T Ethernet cable.

1. Insert the POE Ethernet connector on the RJ45 Ethernet cable into the reader 10/100BaseT Ethernet port. See *Figure 2-4 on page 2-5*.
2. Connect the other end of the cable to an Ethernet network with POE capability.
3. Verify that the reader booted properly and is operational. See *System Start-up/Boot LED Sequence on page 3-9*.
4. On a networked computer, open an internet browser and connect to the reader. See *Connecting to the Reader on page 4-3*.
5. Log in to the **Administrator Console**. See *Administrator Console Login on page 4-9*.

CAUTION Do not connect to PoE networks outside the building.

To connect to a network that is not POE capable:

1. Terminate the Ethernet cable according to *Table A-2 on page A-4*.
2. Connect the Ethernet cable to the FX Series reader 10/100BaseT Ethernet port. See *Figure 2-4 on page 2-5*.
3. Connect the other end of the Ethernet cable to a POE power injector.
4. Connect a patch cable from the POE power injector to the host system LAN port.
5. Verify that the unit booted properly and is operational. See *System Start-up/Boot LED Sequence on page 3-9*.
6. On a networked computer, open an internet browser and connect to the reader. See *Connecting to the Reader on page 4-3*.
7. Log in to the **Administrator Console**. See *Administrator Console Login on page 4-9*.

USB Connection

The USB client port supports (by default) a **Network** mode of operation. This enables a secondary network interface as a virtual adapter over USB. The interfaces co-exist and if the Ethernet connection fails, the application can switch to USB using a specific IP and can control the reader. To use the USB port for network connection, install the *Motorola USB RNDIS Driver* on the host.

The USB port also supports ActiveSync. Use the USB port for development using Visual Studio, and use a remote display tool to access the Windows CE graphical interface. To enable ActiveSync, set the **USB Operation Mode** to **ActiveSync** in the **Communications** window of the Administrator Console. See *Communication Settings on page 4-23*. Advanced users can disable and enable ActiveSync via a registry change in Windows CE, and can create a custom communication protocol on the USB port.

To connect the FX7400 to the host PC, insert a USB cable into the USB client port on the reader. See *Figure 2-4 on page 2-5*. Connect the other end of the cable to a USB port on the host PC.

Motorola USB RNDIS Driver

To use the USB port for network connection, install the Motorola USB Remote Network Device (RNDIS) driver and enable the driver on the FX7400. The Motorola RNDIS driver supports Windows XP, Windows Vista, Windows 7, and Windows Server 2008 operating systems.

To install the RNDIS driver on the host.

1. Download the installer file **Motorola RNDIS.msi** from http://www.motorola.com/enterprisemobility/support to the host PC.
2. Select this file on the host PC to install the host side drivers for using the USB Remote Network Device Interface on the FX7400.
3. Connect a USB cable between the host and the reader. The **Welcome to the Found New Hardware Wizard** screen appears.
4. Select the **No, not this time** radio button and click **Next**.
5. Select the default option **Install Software Automatically (Recommended)**.
6. In the Hardware Installation pop-up window, select **Continue Anyway**.
7. Select **Finish** to complete the installation. This assigns the host an auto-configured IP address. The network is now ready to use and the reader's IP address is fixed to 169.254.10.1.

Sample Implementation

This implementation assumes that only one FX7400 reader is connected to a host PC via USB. This feature does not function with multiple readers connected to the host.

Use an LLRP aware client or the RFID3 API (which internally uses LLRP) to establish connection.

1. The primary RFID server connects to the FX7400 via the Ethernet interface.
2. The host PC connects to the FX7400 via the USB port. An application on the host PC monitors communication between the primary RFID server and FX7400 reader.
3. When the application on the host PC detects a communication failure between the primary RFID server and the reader, it connects to and controls the reader using the USB virtual interface.
4. The FX7400 listens on the USB virtual interface on a fixed port (49152) as well as on the standard LLRP port (5084). To enable this, select the **Allow LLRP Connection Override** check box in **Communication** console window.

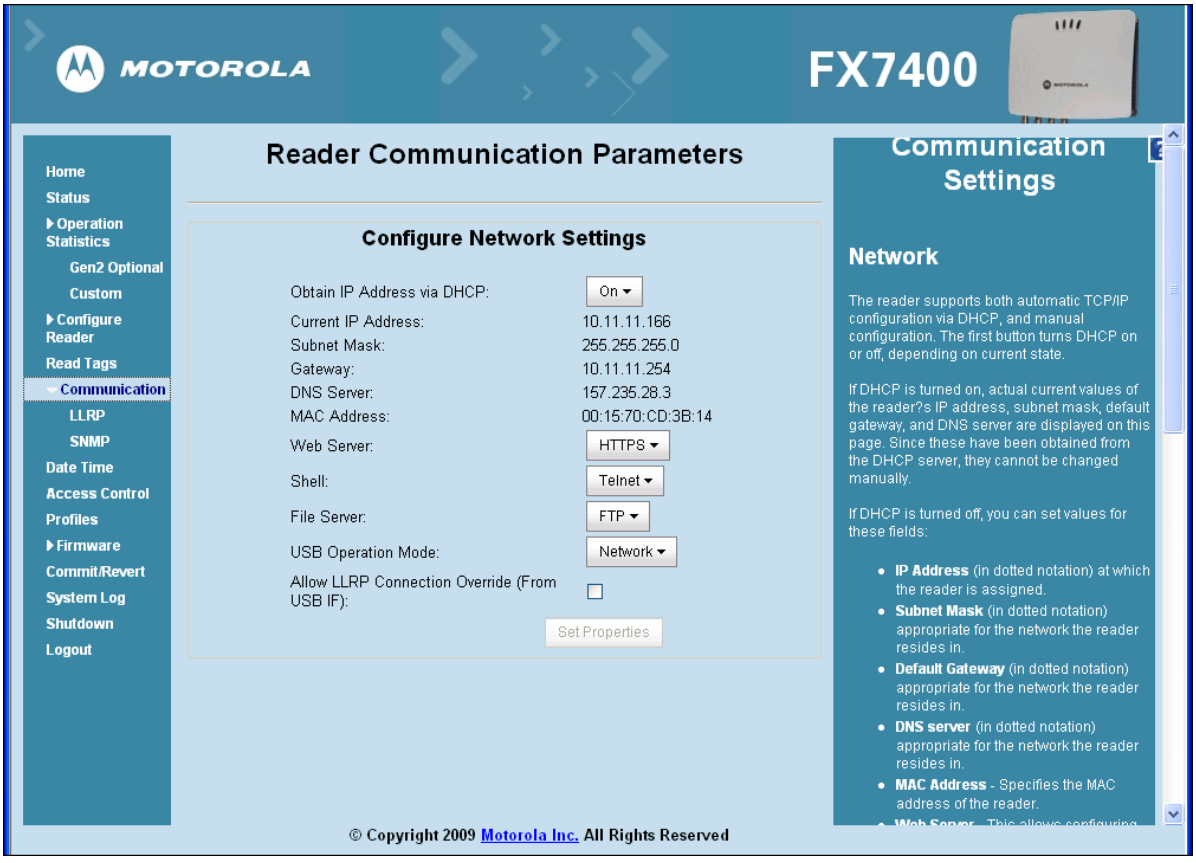

Figure 3-3 *Communication Window*

Only one LLRP session can be active on the reader, either through the primary Ethernet interface or through the virtual network over USB interface.

If connection is active on one interface and a subsequent connection attempt is made on the other interface, the last attempt prevails and creates a new session on that interface, disconnecting the previous interface.

GPIO Interface Connection

This pluggable terminal block type allows connecting individual wires independently. A single connector accommodates both inputs and outputs. See *Table A-4 on page A-6* for pinout information.

GPIO signals allow some flexibility. Inputs are pulled up within the reader to +5 VDC and can be shorted to ground to pull them low. This allows driving them directly via simple relay or switch contacts. Alternatively, 5V logic can drive inputs. In the logic low state, the current sourced from the reader is approximately 3 mA, so standard gates in most logic families can drive them. Current flow in the high state is negligible. When the equipment uses an external +24 VDC power supply, a +24 VDC connection is provided. This output is not available when an external 24 VDC supply is not present.

NOTE Do not connect the +24 VDC output directly to either general purpose input that tolerates voltages in excess of 5V but is designed to operate optimally within the range of 0 to +5 VDC.

The general purpose outputs are open-drain drivers, pulled up to 5V. Each output can withstand voltages up to +30 VDC but should not be driven negative. For best results use the +24 VDC supply as a source of external current and use the outputs directly to drive 24V relays, indicator lamps, etc., wired between the 24V supply and individual general purpose outputs. Although each output can sink up to 1A, the maximum current that can be drawn from the internal 24V supply is 1A, so use an external power supply if the current requirement exceeds this. Note that the state of the general purpose outputs is inverted, e.g., driving a GPO line high at the processor pulls the corresponding output low.

Powering the Reader

CAUTION Connect the antennas before supplying power to the reader.

WARNING! **For Mounting in Environmental Air Handling Space (EAHS): Do not install Power Supplies and PoE (Power Injector) in the EAHS unless they are suitable for use in EAHS as per UL 2043.**

Powering the Reader via AC Power Supply

The Motorola approved AC power supply connects to the power port on the FX Series reader using a locking connector (see *Figure 2-4 on page 2-5*). The power supply is compatible with:

- 120V 60 Hz (North America)
- 230V 50 Hz (International excluding Japan)
- 100V 50/60 Hz (Japan).

1. Insert the power supply barrel connector into the reader power port (see *Figure 2-4 on page 2-5*). Rotate the connector to lock it in place.
2. Apply power to the power supply. The green Power LED stays on to indicate the reader is powered and ready. See *System Start-up/Boot LED Sequence on page 3-9*.

To power down the reader, unplug the power supply from its power source. The green Power LED turns off to indicate that the device is off and the system is not operational. Remove the connector from the reader power port.

Powering the Reader via Power-over-Ethernet (POE)

1. Insert the POE Ethernet connector on the RJ45 Ethernet cable into the reader 10/100BaseT Ethernet port. See *Figure 2-4 on page 2-5*.
2. Connect the other end of the cable to an Ethernet network with POE capability. See *System Start-up/Boot LED Sequence on page 3-9*.

To power down the reader, remove the Ethernet cable from the network. The green Power LED turns off to indicate that the device is off and the system is not operational. Remove the connector from the 10/100BaseT Ethernet port.

System Start-up/Boot LED Sequence

See *Figure 2-5 on page 2-6* for LED locations. During system start-up:

1. All LEDs turn green.
2. All LEDs turn off and the PWR LED turns red.
3. The PWR LED turns off and then turns green.
4. When the sequence completes the green PWR LED remains on and all other LEDs are off.

Reading Tags

After the reader powers up, test the reader. See *System Start-up/Boot LED Sequence on page 3-9*.

1. Enable tag reading using the web-based **Administrator Console** (see *Read Tags on page 4-22*) or control the reader through a real-time application such as Showcase II.
2. Present a tag so it is facing the antenna and slowly approach the antenna until the activity LED turns green, indicating that the reader read the tag. See *Figure 2-5 on page 2-6*. The distance between the tag and the antenna is the approximate read range.

NOTE For optimal read results, do not hold the tag at an angle or wave the tag, as this can cause the read distance to vary.

Chapter 4 Administrator Console

Introduction

NOTE The screens and windows in this chapter may differ from actual screens and windows. The applications described may not be available on (or applicable to) all devices. Procedures are not device-specific and are intended to provide a functional overview.

This chapter describes the FX Series **Reader Administrator Console** functions and procedures. Access the **Administrator Console** using a web browser from a host computer, and use this to manage and configure the readers. The **Administrator Console** main window and support windows have four areas, each containing unique information about the reader.

- **Selection Menu** - selects the function for the primary information window
- **Primary Information Window** - provides the primary function information
- **Product Identification Header** - identifies the product
- **Help Information Window**:
  - provides detailed information to support the primary information window
  - includes a scroll bar to scroll through information
  - includes a toggle button to turn on/off the help information window

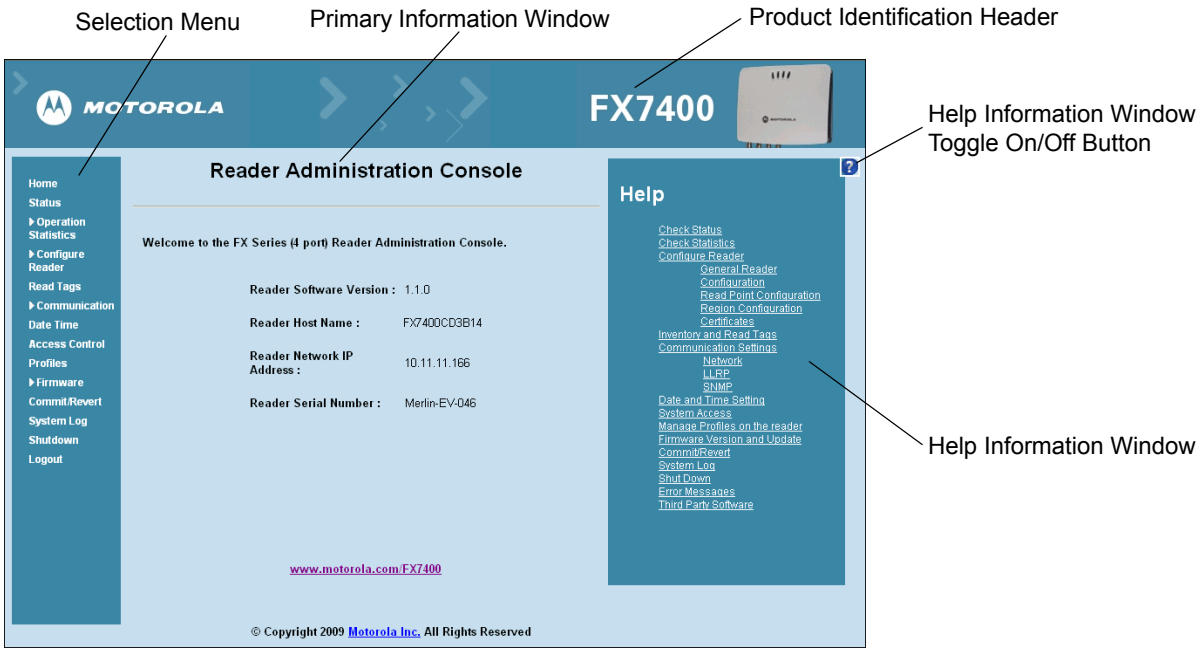

Figure 4-1 *Reader Administrator Console Main Menu*

Profiles

Use profiles for multiple reader deployments to save configuration time, as only a few APIs are needed to completely configure a reader. See *Reader Profiles on page 4-28*.

Resetting the Reader

To reset the reader, press and hold the reset button for not more than 2 seconds. See *Figure 2-4 on page 2-5* for the reset button location. The reader reboots but retains the user ID and password. See *System Start-up/Boot LED Sequence on page 3-9*.

NOTE Hard rebooting the reader (disconnecting power) is not recommended as this discards all the tag events and system log information.

Connecting to the Reader

NOTE This section describes procedures in a Windows environment.

To use the Administrator Console to manage the reader, first power up the reader and connect it to an accessible network. See *Powering the Reader on page 3-8* and *Ethernet Connection on page 3-5*. The green power LED indicates that the reader is ready. If the green power LED is not lit, reset the reader. See *Resetting the Reader on page 4-2*.

Connect to the reader in one of two ways:

1. *Connecting via Host Name on page 4-3*
2. *Connecting via IP Address on page 4-4*

There are three ways to assign an IP address to the reader:

1. Using DHCP on the network
2. *Using APIPA (Automatic Private IP Addressing) when DHCP Server is Not Available on page 4-5*
3. Statically assigning an IP

Any method of assigning the IP supports connection using host name or IP address. Alternatively, connect the reader directly to a local computer using Automatic Private IP Addressing (APIPA). See *Using APIPA (Automatic Private IP Addressing) when DHCP Server is Not Available on page 4-5*.

NOTE When using APIPA, the FX Series reader cannot communicate with computers on different subnets, or with computers that do not use automatic private IP addressing.

Connecting via Host Name

To connect to the reader using the host name:

CAUTION Reader host name is not guaranteed to work at all times. Its recommended use is only in networks where the probability for IP collisions is low, such as a network in which a DNS server is configured to work together with DHCP to register host names. Host name usage is not recommended in a network where there is no strict control to prevent IP collisions, such as informal networks that use IP static configuration without strict control.

1. Open a browser. Recommended browsers are IE6, IE7, IE8, or Mozilla 3.
2. Enter the host name provided on the CD label in the browser (e.g., http://fx7400cd3b0d) and press **Enter**. The **Console Login** window appears and the reader is ready.
3. Proceed to *Administrator Console Login on page 4-9* to log in to the reader.

NOTE Connect the reader to a network that supports host name registration and lookup to ensure the network can access the reader using the host name. For instance, some networks can register host names through DHCP. When first connecting to the reader, it is recommended to keep DHCP enabled in both the PC and the reader, although it is not guaranteed that the host name will work all the time. Use the host name provided on the CD label, or construct it using the reader MAC address on the reader back label. The host name is a string with prefix FX7400, followed by the last three MAC address octets. For example, for a MAC address of 00:15:70:CD:3B:0D, use the prefix FX7400, followed by the last three MAC address octets (CD, 3B, and 0D), for the host name FX7400CD3B0D. Type http://FX7400CD3B0D in the browser address bar to access the reader.

For a network that does not support host name registration and lookup, use the Showcase II auto discovery feature to obtain the IP address, and use the IP address connect method.

Connecting via IP Address

To use the IP address to connect to the reader:

1. Open a browser. Recommended browsers are IE6, IE7, IE8, or Mozilla 3.
2. Enter the IP address in the browser (e.g., http://157.235.88.99) and press **Enter**. The **Console Login** window appears and the reader is ready.
3. Proceed to *Administrator Console Login on page 4-9* to login to the reader.

Using APIPA (Automatic Private IP Addressing) when DHCP Server is Not Available

If a DHCP server is not available, the FX Series reader can use APIPA to automatically provide a unique network IP address. The reader can then use TCP/IP to communicate with other computers also using an APIPA-generated IP address.

NOTE **APIPA does not function if DHCP is disabled in the reader**. When using APIPA, the FX Series reader cannot communicate with computers on different subnets, or that do not use automatic private IP addressing. Automatic private IP addressing is enabled by default. For additional information visit http://support.microsoft.com/ and search on **APIPA**.

The APIPA procedure is recommended when the reader is connected directly to a PC. It reduces the overhead needed to configure the reader to a static IP address.

Windows-based computers support APIPA by default when DHCP fails. To enable APIPA for a Windows PC:

1. Go to **Start** > **Settings** > **Network Connections** > **Local Area Connection Status** and select **Properties**. Set the DHCP to **On** (even though no DHCP server is reachable) and open a browser window.
2. In the **General** tab, select **Internet Protocol (TCP/IP)** and click **Properties**.

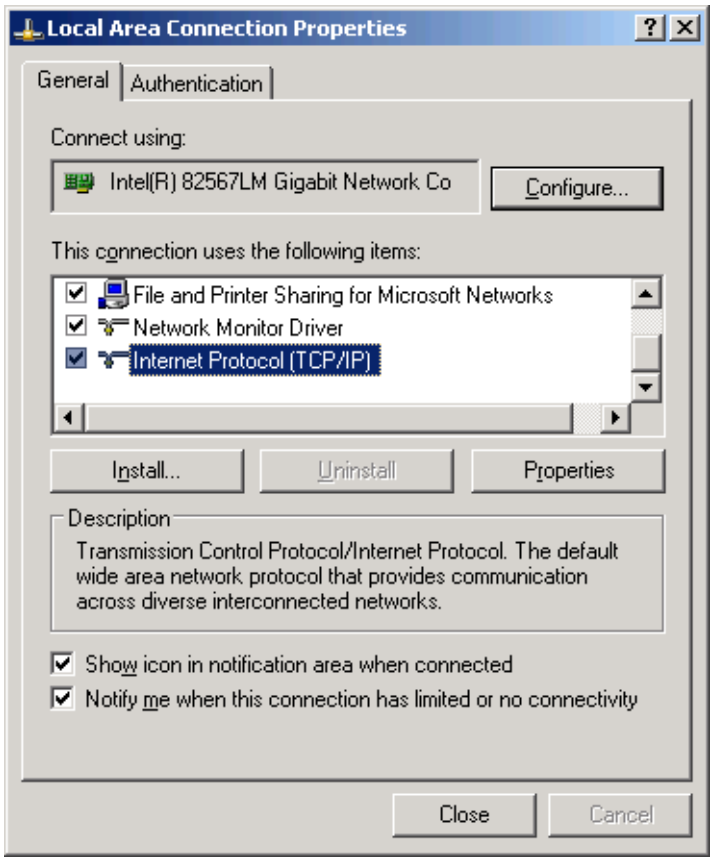

Figure 4-2 *Set Internet Protocol (TCP/IP) Window*

3. Connect the FX Series reader to a local computer using a standard Ethernet cable. Ensure DHCP is enabled in the reader.

NOTE Do not use an Ethernet crossover cable.

4. In the **Properties** window, select the **General** tab, select **Obtain an IP Address automatically**, and select **Obtain DNS Server address automatically**.

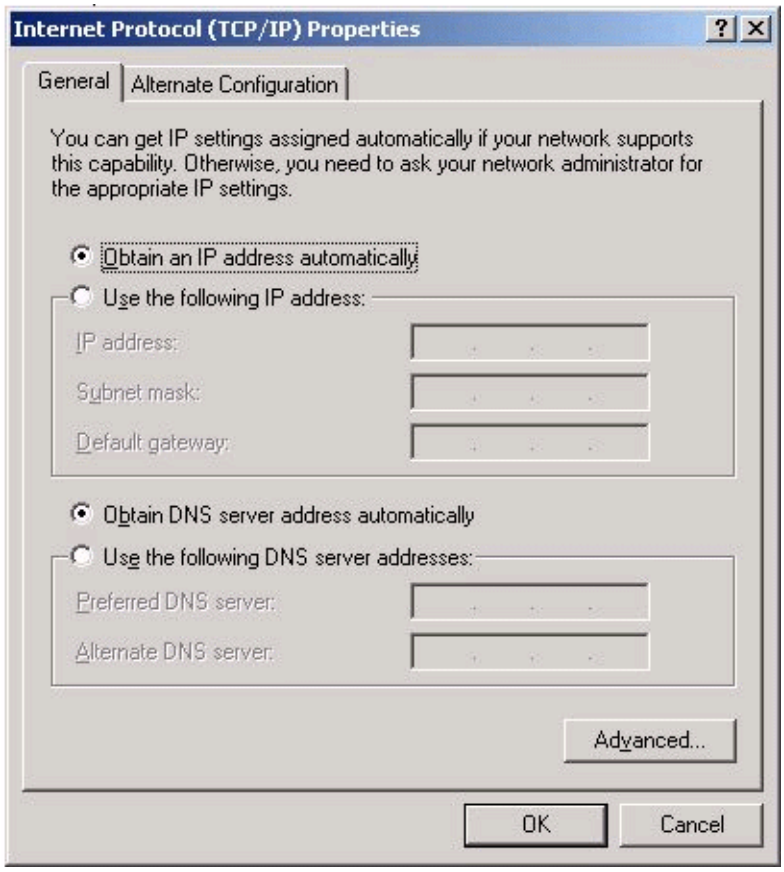

Figure 4-3 *TCP/IP General Properties Window*

5. Confirm that the **Alternate Configuration** tab is set to **Automatic private IP address** (Windows default).

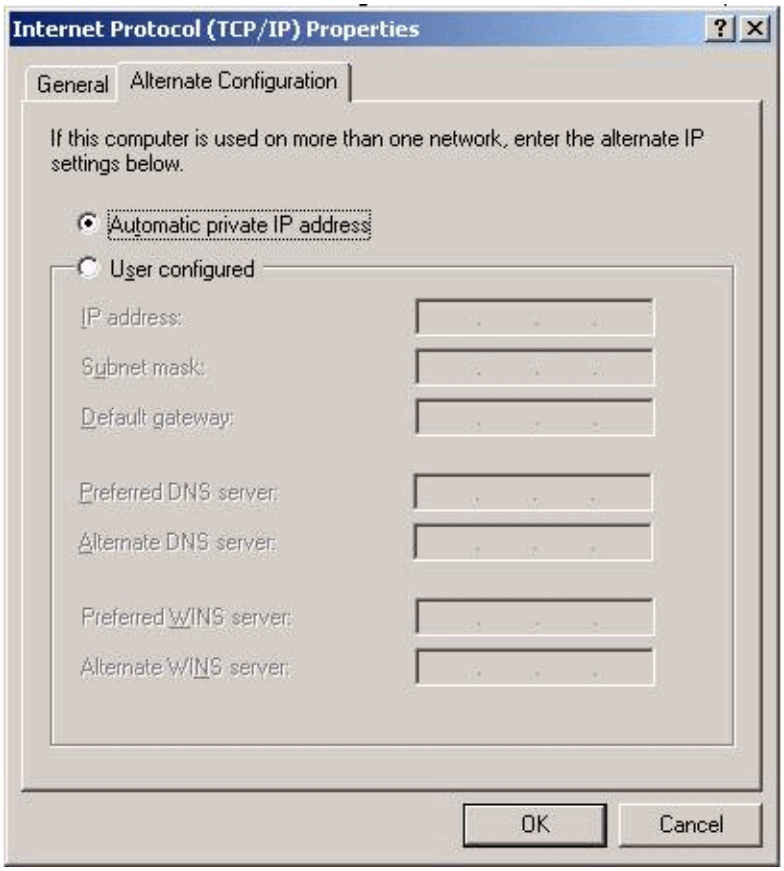

Figure 4-4 *TCP/IP Alternate Configuration Window*

6. Wait until the computer indicates the connection has limited connectivity. The reader also takes time to detect that there is no DHCP server to execute APIPA protocol.

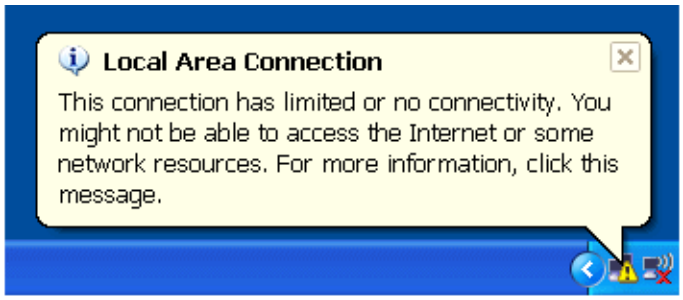

Figure 4-5 *Limited Connectivity Window*

7. Confirm that the computer IP address is now set to the 169.254.x.y (where x.y is the last six characters of the FX Series reader MAC address) with a subnet mask of 255.255.0.0.

8. The CD label provides the reader host name. Enter the host name into the browser (e.g., http://fx7400cd3b0d) and press **Enter**. The local computer connects to the reader and the **Console Login** window appears.

9. Proceed to *Administrator Console Login on page 4-9* to log in to the reader.

Obtaining the IP Address via Command Prompt

The **Administrator Console** provides the reader IP address. See *Figure 4-1 on page 4-2*. To obtain the reader IP address without logging into the reader, open a command window and ping the reader host name. See *Connecting via Host Name on page 4-3*.

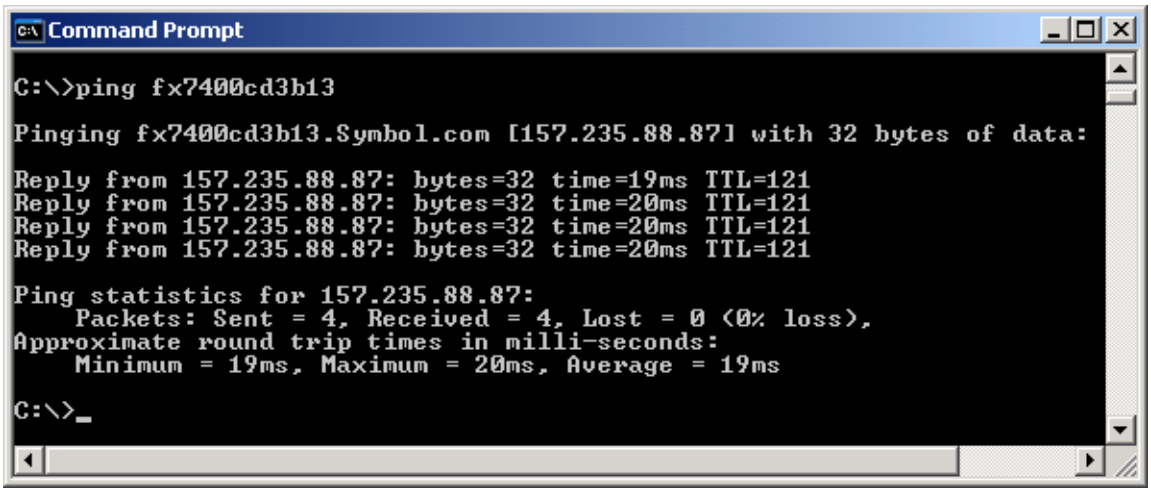

Figure 4-6 *IP Ping Window*

Administrator Console Login

The reader has a unique first time startup sequence that requires setting a unique user ID and password and as well as the region (regulatory requirement).

NOTE The recommended browsers are IE6, IE7, IE8, and Mozilla 3. These browsers were tested and validated to work properly. Other browsers may or may not work properly.

First Time / Start-Up Login

When starting the reader for the first time, set a unique user ID and password and set the region of reader operation. Setting the reader to a different region is illegal.

Logging In with Default User ID and Password

1. Upon connecting to the reader with a web browser, the **User Login** window appears.

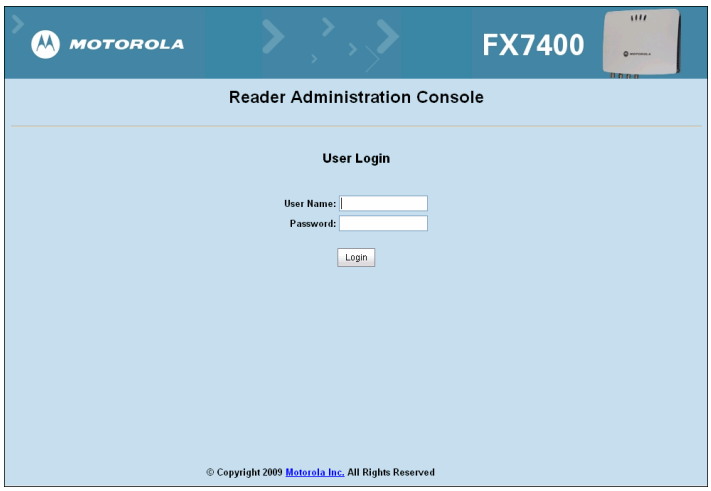

Figure 4-7 *User Login Window*

2. Enter **admin** in the **User Name:** field and **change** in the **Password:** field and click **Login**.

Figure 4-8 *Entering User Name and Password*

For global reader configurations, the **Region Configuration** window appears. For US reader configurations, the **Administrator Console** main window appears.

Setting the Region

For global reader configurations, set the region of operation. **Setting the unit to a different region is illegal**.

NOTE Region configuration is not available for readers configured to operate in the United States region (under FCC rules). In this case, skip this step.

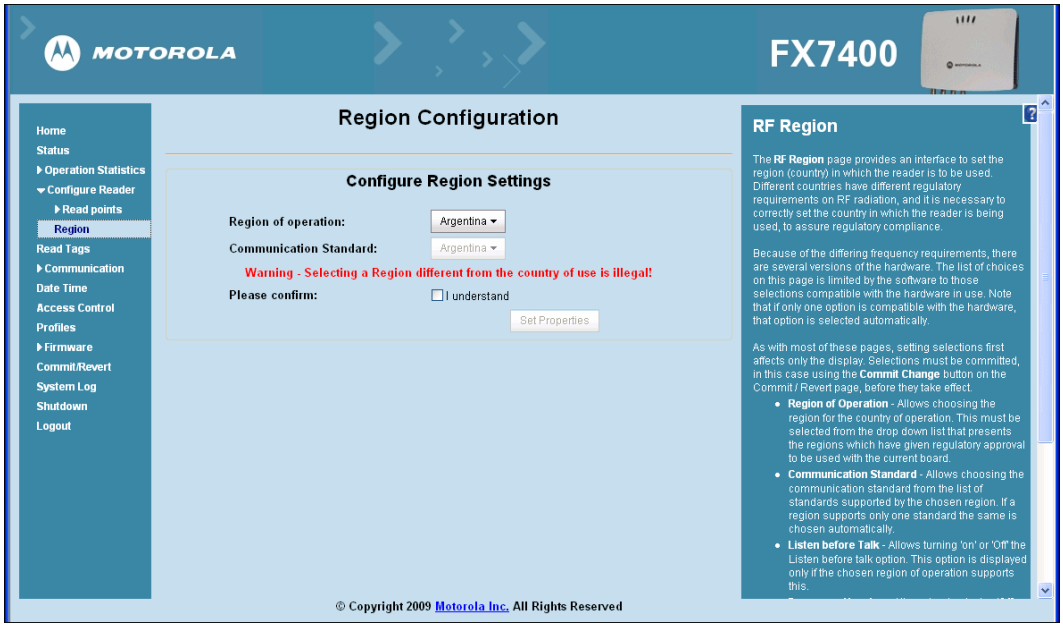

Figure 4-9 *Configure Region Settings Window*

1. In the **Configure Region Settings** window, select the region from the drop-down menu.

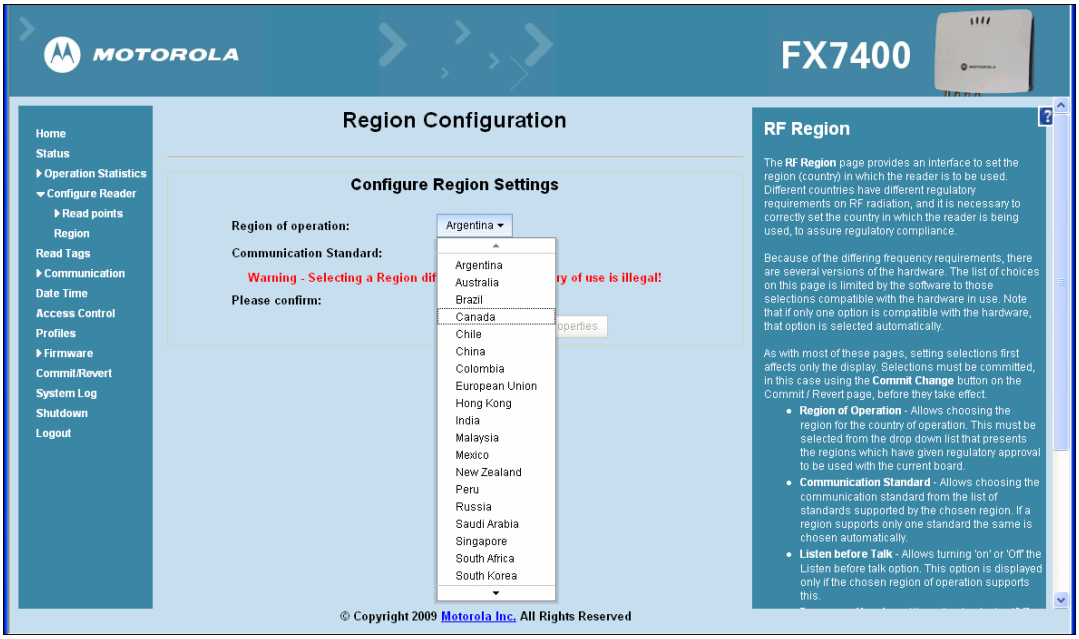

Figure 4-10 *Selecting the Region*

2. Select the **Communication Standard** if applicable.
3. Select **Frequency Hopping**, if applicable.
4. Select the appropriate channel(s), if applicable.
5. Click the **I understand** check box.

6. Click **Set Properties** to complete the region selection. The **Operation Successful** window appears.
7. Select **Commit/Discard** from the selection menu.

NOTE Most changes to the reader require a commit to save them.

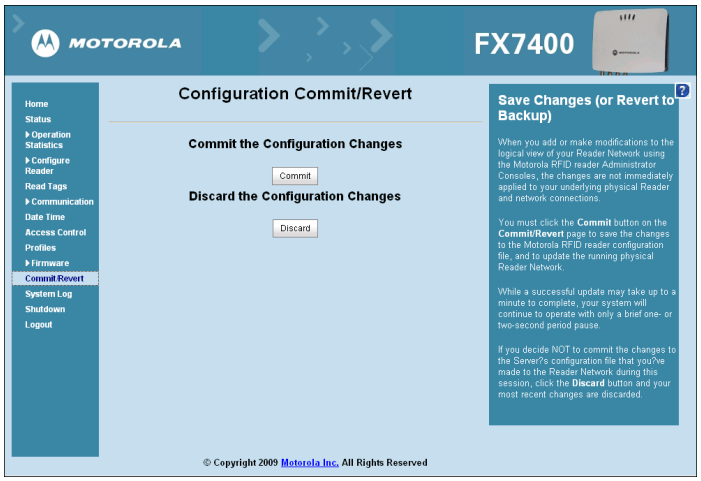

Figure 4-11 *Commit/Discard Window*

8. Click **Commit** to apply the changes to the reader configuration file, or **Discard** to discard the new region configuration changes.

   When the commit completes, the **Commit Successful** window appears. The region is now set and stored in the reader.

Normal Login

After setting the user ID, password, and region, the reader defaults to the normal login procedure.

1. Upon connecting to the reader with a web browser, the **User Login** window appears.

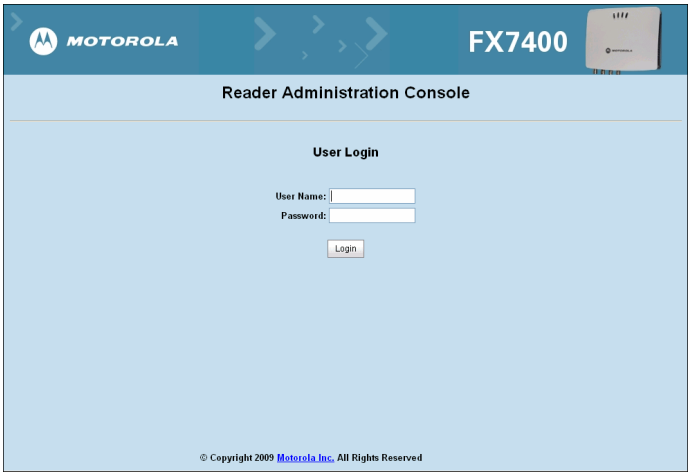

Figure 4-12 *User Login Window*

2. Enter the **User Name:** and **Password:** in the appropriate fields and click **Login**. The reader **Administrator Console Main Menu** window appears.

Reader Administrator Console

The **Reader Administrator Console** main window appears after successfully logging into the reader.

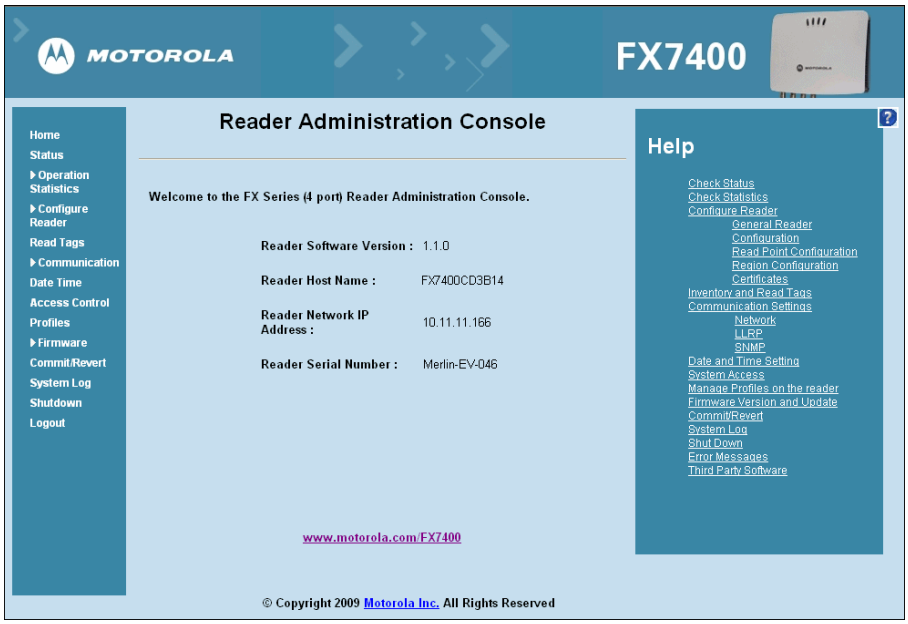

Figure 4-13 *Reader Administrator Console Main Window*

Administrator Console Option Selections

Click an item from the selection menu on the left to select:

- **Status** - see *Status on page 4-13*
- **Configure Reader** - see *Configure Reader on page 4-14*
  - **Read Points** - see *Read Points on page 4-15*
    - **Advanced** - see *Read Points - Advanced on page 4-16*
  - **Region** - see *Configure Region on page 4-17*
  - **Certificates** - see *Configure Certificates on page 4-18*
- **Operation Statistics** - see *Reader Statistics on page 4-19*
  - **Gen2 Optional** - see *Reader Gen2 Optional Operation Statistics on page 4-20*
  - **Custom** - see *Reader Custom Command Operation Statistics on page 4-21*
- **Read Tags** - see *Read Tags on page 4-22*
- **Communication** - see *Communication Settings on page 4-23*
  - **LLRP** - see *LLRP Communications Protocol on page 4-24*
  - **SNMP** - see *SNMP Settings on page 4-25*
- **Date/Time** - see *System Time Management on page 4-26*
- **Access Control** - see *Access Control on page 4-27*
- **Profiles** - see *Reader Profiles on page 4-28*

- **Firmware** - see *Firmware Version/Update on page 4-33*
  - **Update** - see *Firmware Update on page 4-34*
- **Commit/Discard** - see *Commit/Discard on page 4-37*
- **System Log** - see *System Log on page 4-38*
- **Shutdown** - see *Shutdown on page 4-39*
- **Logout** - click **Logout** to immediately log out of the **Administrator Console.**

Status

Click **Status** on the selection menu to view the **Reader Status** window. This window displays information about the reader and read points (antennas).

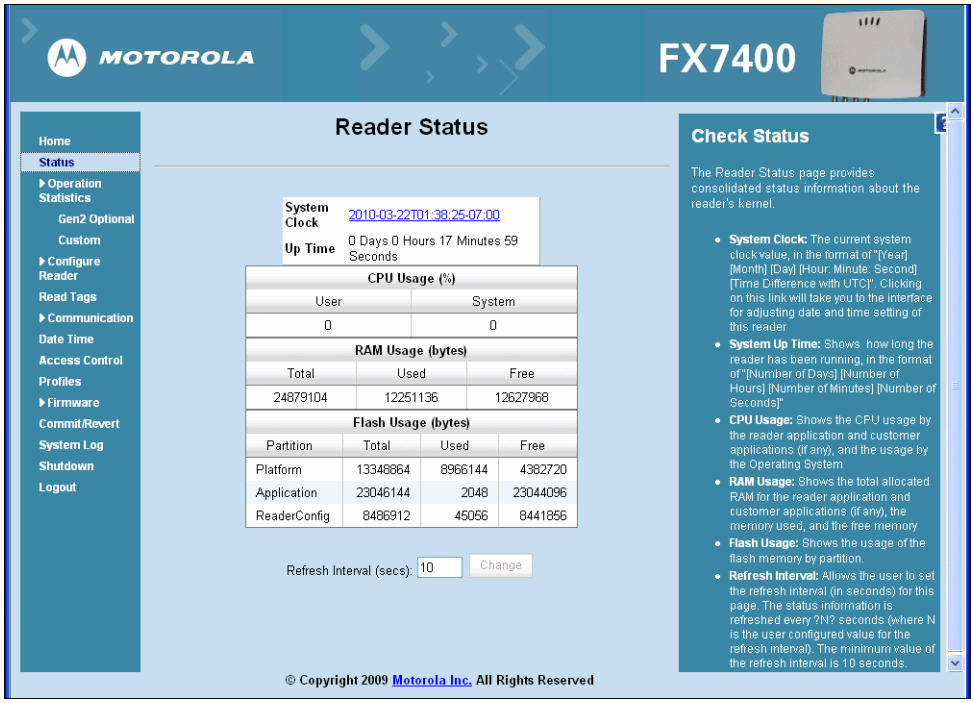

Figure 4-14 *Reader Status Window*

The **Reader Status** window provides consolidated reader status information:

- **System Clock** - The current system clock value, in the format [Year] [Month] [Day] [Hour: Minute: Second] [Time Difference with UTC]. Click the link to adjust the reader date and time settings.
- **Up Time** - Displays how long the reader has been running, in the format [Number of Days] [Number of Hours] [Number of Minutes] [Number of Seconds].
- **CPU Usage** - Displays the CPU usage, the user applications (if any), and the system usage.
- **RAM Usage** - Displays the total allocated RAM for the reader, the memory used, and free memory.
- **Flash Usage** - Displays the flash memory usage by partition.
- **Refresh Interval** - Sets the refresh interval (in seconds) for the window. The status information refreshes every **N** seconds (where **N** is the user configured value for the refresh interval). The minimum refresh interval value is 10 seconds.

Configure Reader

Use the **Configure Reader** submenus to access the following functions.

Reader Parameters (General)

Select **General** in the selection menu to configure reader settings using this window.

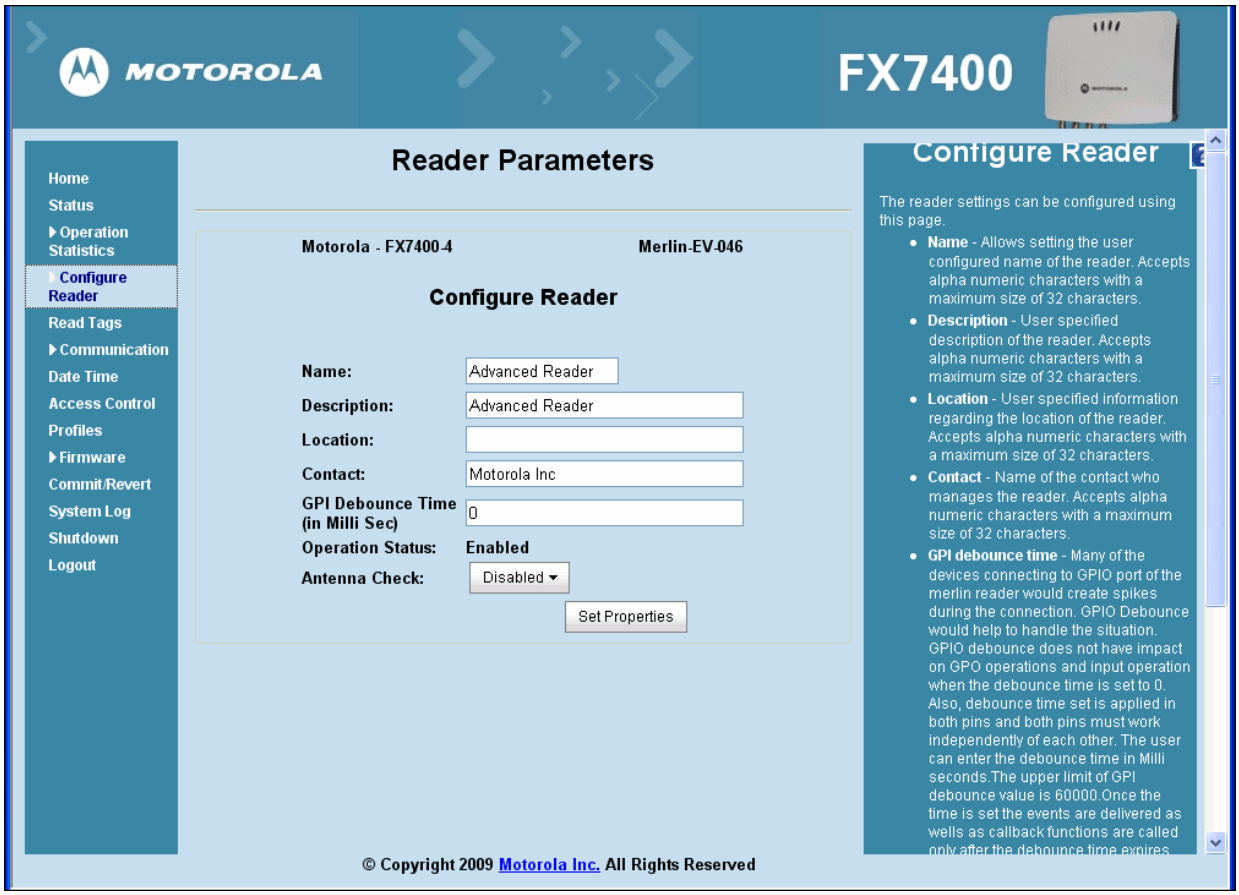

Figure 4-15 *Reader Parameters*

- **Name** - Sets the reader name. Accepts up to 32 alphanumeric characters.
- **Description** - Describes the reader. Accepts up to 32 alphanumeric characters.
- **Location** - Provides information on the reader location. Accepts up to 32 alphanumeric characters.
- **Contact** - Name of the reader manager contact. Accepts up to 32 alphanumeric characters.
- **GPI Debounce Time** - Delays input events up to this time, and delivers these events only if the PIN states remains on the same level.
- **Operation Status** - Displays the reader current operation status (**Enabled**, **Disabled**, or **Unknown**).
- **Antenna Check** - Controls the antenna sensing feature on the reader. **Disabled** indicates that the reader does not attempt to check if an antenna is connected on the ports. When **Enabled**, the reader monitors the presence of an antenna on the port and only transmits RF if an antenna is connected.
- **Set Properties** - Sends the changes to the reader.

These settings only affect the display. Use *Commit/Discard on page 4-37* to save the changes.

Read Points

Click **Read points** in the selection menu to view the **Antenna Status and Configuration** window. Use this window to configure the read point settings and view the current read points state.

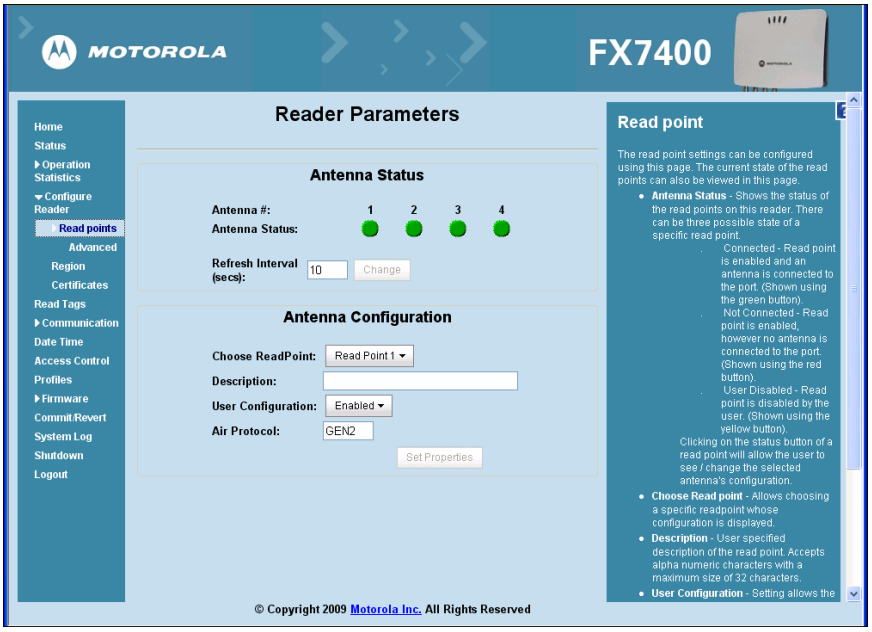

Figure 4-16 *Configure Read Points*

Antenna Status

The status buttons indicate the status of the reader read points:

- Green: Connected - Read point is enabled and an antenna is connected to the port.
- Red: Not connected - Read point is enabled, no antenna is connected to the port.
- Yellow: User disabled - The user disabled the read point.

Click a read point's status button to view and/or change the selected antenna configuration.

Antenna Configuration

- **Choose Read Point** - Select a read point (or all) to display the configuration.
- **Description** - Enter a read point description of up to 32 alphanumeric characters.
- **User Configuration** - Enable or disable the read point. Disabling a read point blocks RF operation using the port/antenna.
- **Air Protocol** - Displays the air protocols the read point supports. The reader currently supports only EPC Class1 GEN2 air protocol.
- **Set Properties** - Select **Set Properties** to apply the changes. Select *Commit/Discard on page 4-37* to save the changes to the reader.

Read Points - Advanced

Click **Advanced** under **Read points** in the selection menu to view the **Advanced Antenna Configuration** window. Use this window to modify the transmission power and frequency configuration elements of the antenna.

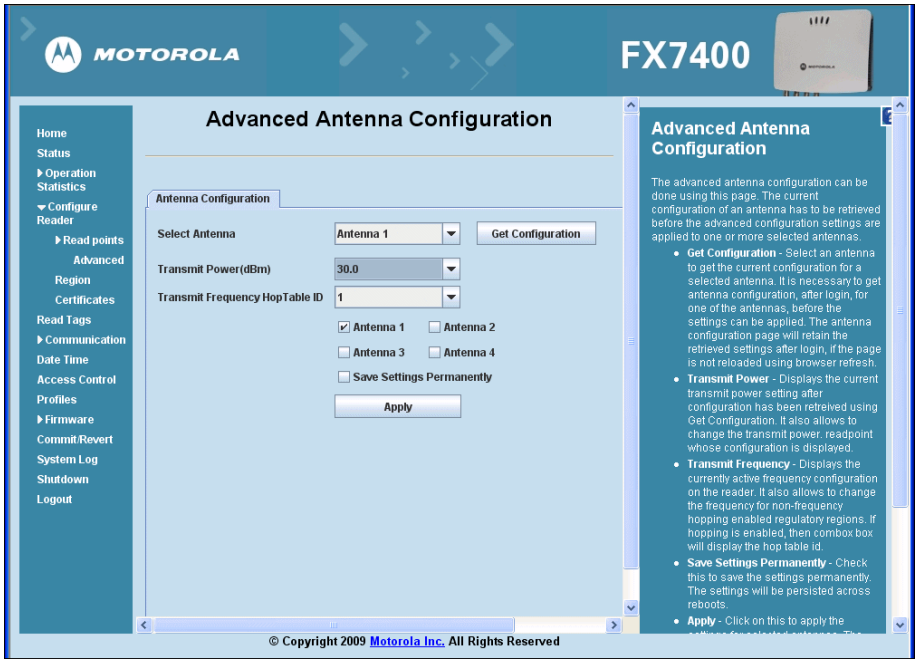

Figure 4-17 *Advanced Antenna Configuration*

Configure Region

Different countries have different RF regulatory requirements. To assure regulatory compliance, select **Region** to set the reader for specific regulatory requirements in the country of reader operation using the **Configure Region Settings** window. The choices on the window are limited to the selections compatible with the reader.

NOTE Region configuration is not required for readers configured to operate in the United States region (under FCC rules).

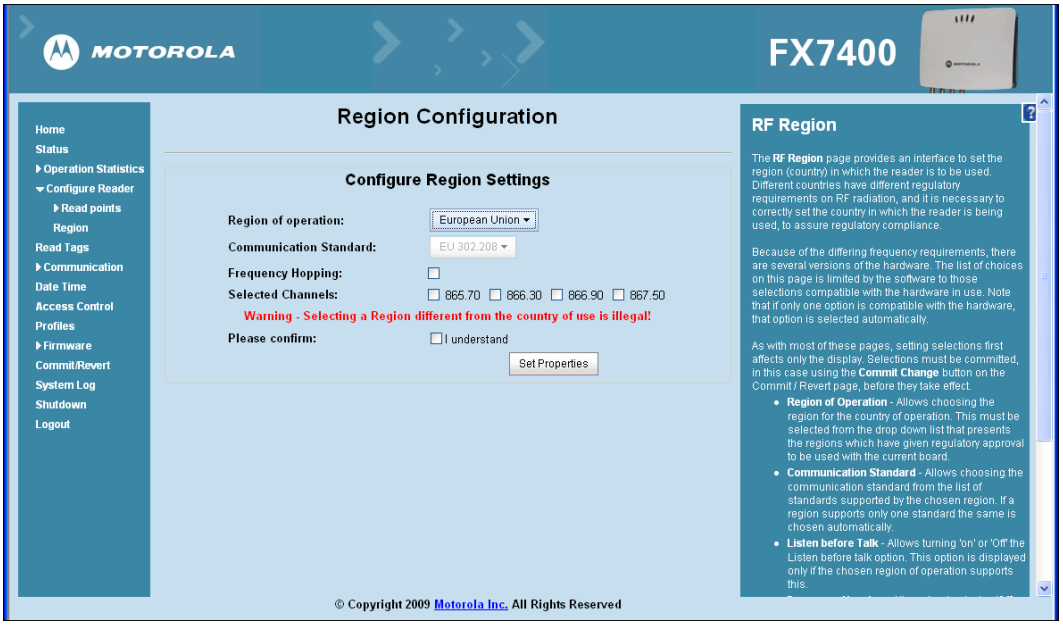

Figure 4-18 *Configure Region Settings Window*

- **Region of Operation** - Select the country of operation from the drop-down list. This list includes countries which have regulatory approval to use with the current board.
- **Communication Standard** - Select the communication standard from the list of standards that the chosen region supports. If a region supports only one standard, it is automatically selected.
- **Frequency Hopping** - Check to select frequency hopping. This option appears only if the chosen region of operation supports this.
- **Selected Channels** - Select a subset of channels on which to operate (from the list of supported channels). This option appears only if the chosen region of operation supports this.
- **Listen before Talk (not supported in the current release)** - Check to select the listen before talk option. This option appears only if the chosen region of operation supports this.
- **Please confirm** - Check the **I understand** check box.
- **Set Properties** - Click to apply the changes. Confirm that the choices are in compliance with local regulatory requirements by checking the **I understand** check box. Select *Commit/Discard on page 4-37* to save the changes to the reader.

Configure Certificates

This option is only available in HTTPS mode. See *Communication Settings on page 4-23* and set the **Web Server** option to HTTPS to select this mode.

Select **Certificates** to update the digital certificate of the reader and display current certificate details. The certificate installed in the reader appears with the following properties:

- Subject name of the certificate
- Issuer name
- Validity from and to dates
- Serial number of the certificate
- Date of installation of the certificate

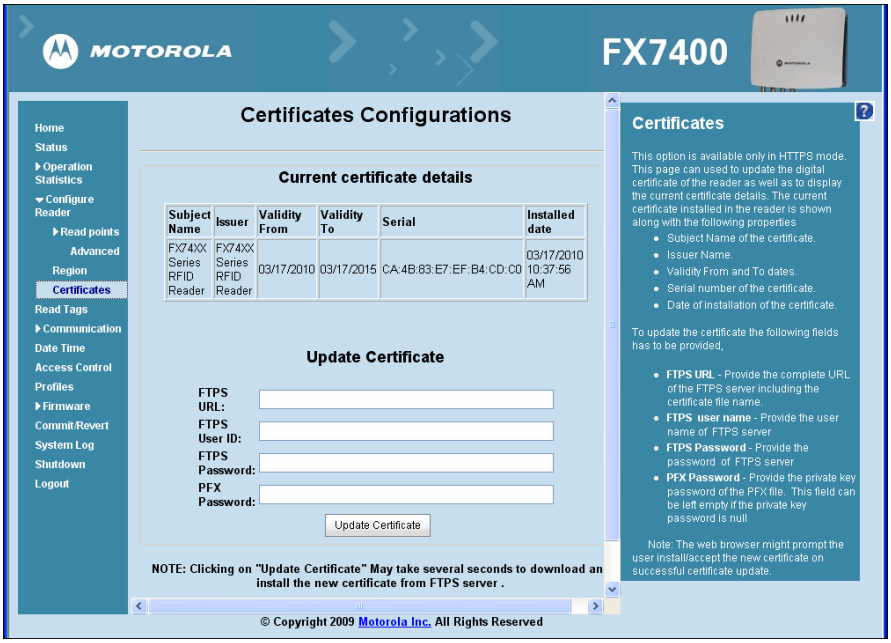

Figure 4-19 *Certificates Configuration Window*

To update the certificate complete the following fields:

- **FTPS URL** – Enter the complete URL of the FTPS server including the certificate file name.
- **FTPS User ID** – Enter the user name for the FTPS server.
- **FTPS Password** – Enter the password for the FTPS server
- **PFX Password** – Enter the private key password for the PFX file. Leave this field empty if the private key password is null.

NOTE The web browser may display a prompt to install/accept the new certificate upon a successful update.

Reader Statistics

Select **Operation Statistics** to view the **Reader Operation Statistics** window. This window provides options to view the statistics of individual read points or combined statistics for all read points, including the success and failure values of statistics for each read point. The statistic count is cumulative once the reader starts or the **Reset Statistics** button is selected.

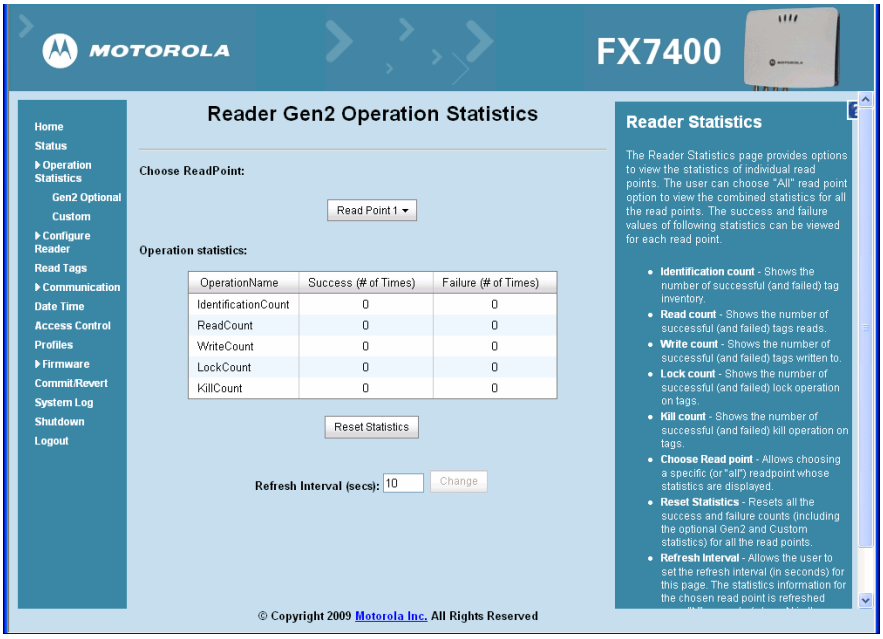

Figure 4-20 *Reader Operation Statistics Window*

- **Choose ReadPoint** - Select a specific read point or select **All** from the drop-down list to display the statistics.
- **IdentificationCount** - Displays the number of successful (and failed) tag inventories.
- **ReadCount** - Displays the number of successful (and failed) tag reads.
- **WriteCount** - Displays the number of successful (and failed) tag writes.
- **Lockcount** - Displays the number of successful (and failed) lock operations on tags.
- **KillCount** - Displays the number of successful (and failed) kill operations on tags.
- **Reset Statistics** - Resets all success and failure counts for all read points.
- **Refresh Interval** - Sets the refresh interval (in seconds) for this window. The statistics information for the chosen read point is refreshed every **N** seconds (where **N** is the set refresh interval). The minimum value is 10 seconds. Input a new value and click **Change** to set a new interval.

Reader Gen2 Optional Operation Statistics

Select **Gen2 Optional** to view the **Reader Gen2 Operation Statistics** window. This window provides options to view the statistics of individual read points for the optional Gen2 operations the reader supports.

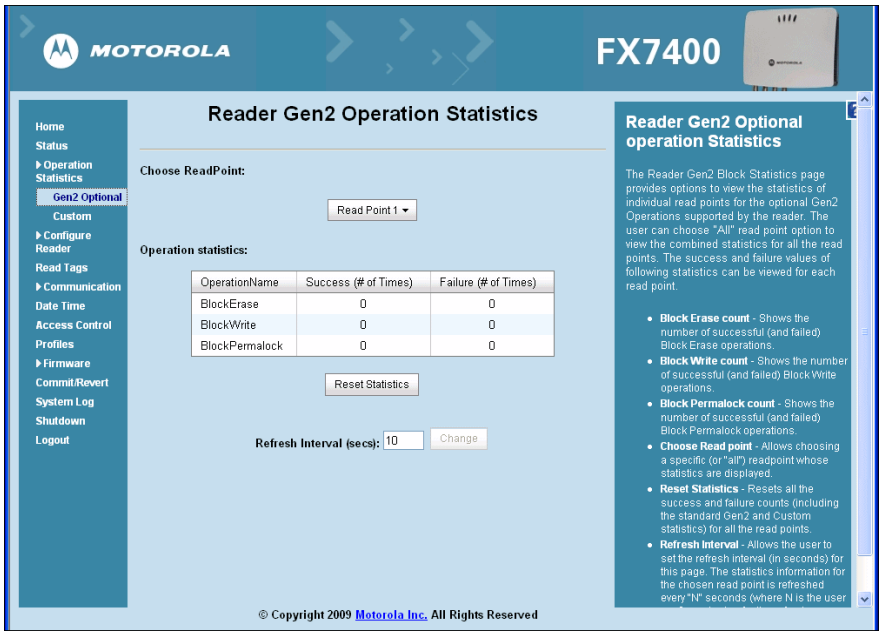

Figure 4-21 *Reader Gen2 Operation Statistics Window*

- **Choose ReadPoint** - Select a specific read point from the drop-down list to display the statistics, or select **All** to view the combined statistics for all read points.
- **BlockErase** - Displays the number of successful (and failed) block erase operations.
- **BlockWrite** - Displays the number of successful (and failed) block write operations.
- **BlockPermalock** - Displays the number of successful (and failed) block permalock operations.
- **Reset Statistics** - Resets all success and failure counts (including the standard Gen2 and custom statistics) for all read points.
- **Refresh Interval** - Sets the refresh interval (in seconds) for this window. The statistics information for the chosen read point is refreshed every **N** seconds (where **N** is the set refresh interval). The minimum value is 10 seconds. Input a new value and click **Change** to set a new interval.

Reader Custom Command Operation Statistics

Select **Custom** to view the **Reader Custom Command Operation Statistics** window. This window provides options to view the statistics of individual read points for the custom operations the reader supports.

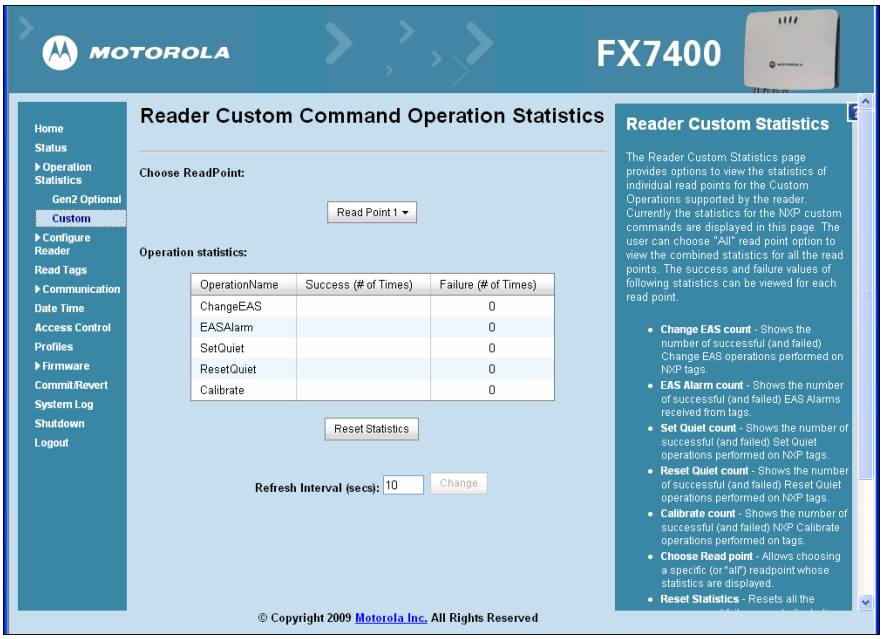

Figure 4-22 *Reader Custom Command Operation Statistics Window*

- **Choose ReadPoint** - Select a specific read point from the drop-down list to display the statistics, or select **All** to view the combined statistics for all read points.
- **ChangeEAS** - Displays the number of successful (and failed) change EAS operations performed on NXP tags.
- **EASAlarm** - Displays the number of successful (and failed) EAS alarms received from tags.
- **SetQuiet** - Displays the number of successful (and failed) set quiet operations performed on NXP tags.
- **ResetQuiet** - Displays the number of successful (and failed) reset quiet operations performed on NXP tags.
- **Calibrate** - Displays the number of successful (and failed) NXP calibrate operations performed on tags.
- **Reset Statistics** - Resets all the success and failure counts (including the standard and optional Gen2 operation statistics) for all the read points.
- **Refresh Interval** - Sets the refresh interval (in seconds) for this window. The statistics information for the chosen read point is refreshed every **N** seconds (where **N** is the set refresh interval). The minimum value is 10 seconds. Input a new value and click **Change** to set a new interval.

Read Tags

Select **Read Tags** to view the **Reader Operation** window. Click **Start Inventory** to initiate an on-demand scan and/or to enable and disable polled read points.

NOTE Enable Java JRE support on the browser in order for this window to function properly. See *Appendix D, Java Install/Upgrade Procedures*.

NOTE When upgrading the FX7400 from version 1.0 to version 1.1 (or vice-versa), close the browser and re-open it to clear the old version of files cached. If the java cache for applets is on, clear the cached applet before starting the browser to use the **ReadTags** page. See *Clearing the Java Cache on page D-2*.

The polling state displays the current polling setting (**Enabled** or **Disabled**).

Enabling polling from the **Administrator Console** displays the **Polling State: Enabled from Web** message. Enabling polling from byte stream displays the **Polling State: Enabled from byte stream** message.

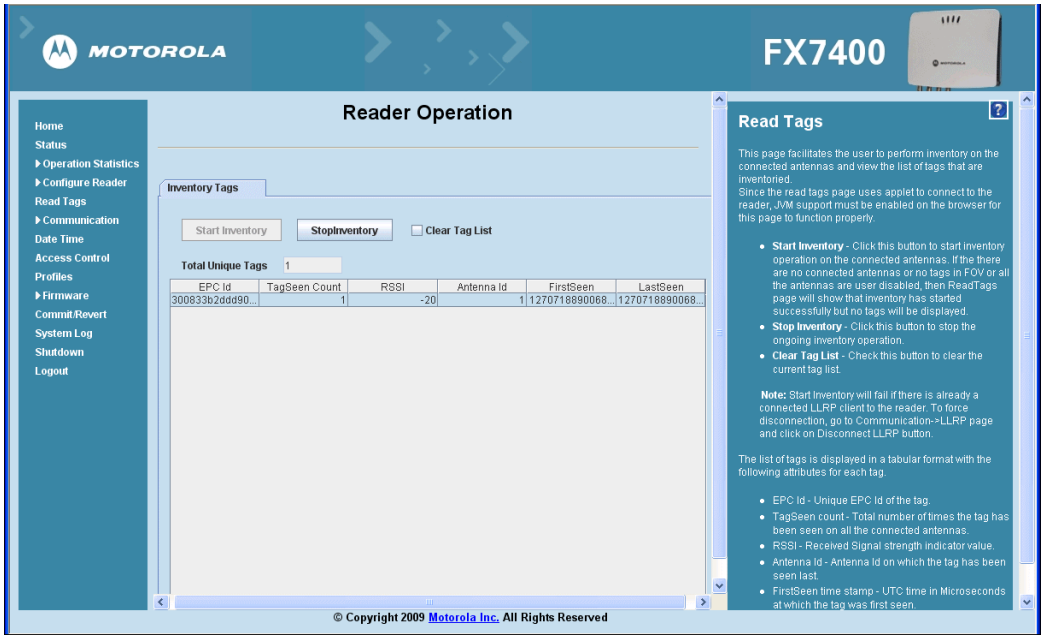

Figure 4-23 *Read Tags Window*

- **Start Inventory** - Starts inventory operation on the connected antennas.
- **Stop Inventory** - Stops the ongoing inventory operation.
- **Clear Tag List** - Clears the current tag list.

The list of tags appears in a table with the following attributes for each tag:

- **EPC Id** - Unique tag EPC ID.
- **TagSeen Count** - Number of times the tag was identified on the specific antenna.
- **RSSI** - Received Signal Strength Indication.
- **Antenna Id** - Antenna ID on which the tag is seen.
- **FirstSeen** time stamp - UTC time (in microseconds) when the tag was first seen.
- **LastSeen** time stamp - UTC time (in microseconds) when the tag was last seen.

Communication Settings

Select **Communication** to view the **Configure Network Settings** window. The reader supports both automatic TCP/IP configuration via DHCP, and manual configuration.

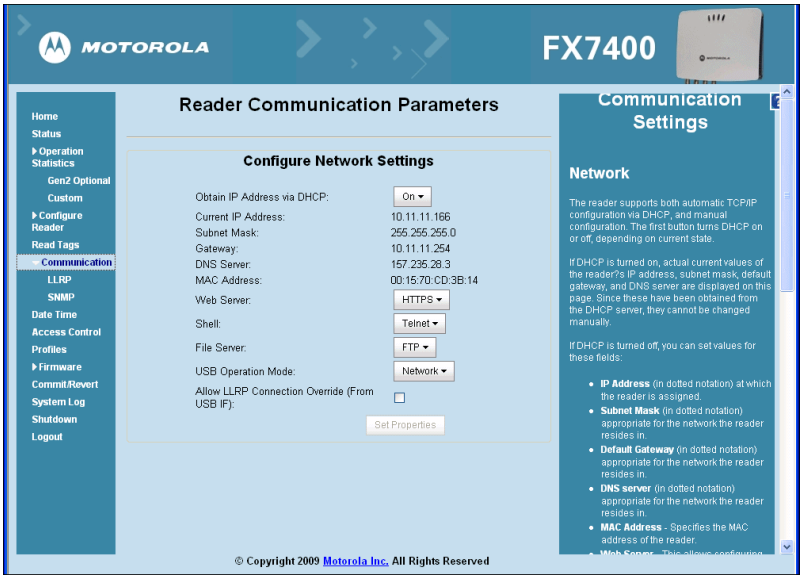

Figure 4-24 *Configure Network Settings Window*

Change communication settings by entering information in the text boxes or using the drop-down lists.

- **Obtain IP Address via DHCP** - Toggles the Dynamic Host Configuration Protocol (DHCP) **On** or **Off**. The DHCP server running on networks can assign a dynamic IP address to the host and readers. Turning DHCP on autopopulates the **Current IP Address**, **Subnet Mask**, **Gateway**, and **DNS Server** fields. To manually set these fields, toggle the DHCP to **Off** and enter the values. Contact the system administrator to determine if the network supports DHCP.
- **Current IP Address** - IP address of the reader, in dotted notation. If manually assigning an IP address to the reader, check with the system administrator to ensure the IP address is valid in the network.
- **Subnet Mask** - IP address that determines to what subnet an IP address belongs.
- **Gateway** - The reader uses this IP address to access another network.
- **DNS Server** - The reader uses the Domain Name System (DNS) IP address to translate domain names.
- **MAC Address** – Specifies the reader MAC address.
- **Web Server** – Configures the web server in either HTTP (unsecure) or HTTPS (secure) mode.
- **Shell** – Configures the shell to either Telnet (unsecure) or SSH (secure) mode, or disables the shell.
- **File Server** – Configures the file server to either FTP (unsecure) or FTPS (secure) mode, or disables this.
- **USB Operation Mode** - Configures the USB client port on the reader to either **Network** (Virtual Network Adapter) or **Active Sync** mode. The default mode is **Network**. Changing the **USB Operation Mode** restarts the LLRP service on the reader.
- **Allow LLRP Connection Override (From USB IF)** - This option is available only if **USB Operation Mode** is set to **Network**. Allows the reader to listen on an alternate port (49152) on the virtual network (over USB) interface. When an LLRP client is connected over the primary interface (Ethernet and primary LLRP port) and this option is enabled, a different client can override this connection on the alternate interface (virtual network and

alternate port 49152). This also allows the primary interface to override an existing connection on the alternate interface. This option is disabled by default. Changing the **Allow LLRP Connection Override** option restarts the LLRP service on the reader.

- **Set Properties** - Click to apply the changes. Select *Commit/Discard on page 4-37* to save the changes to the reader. If the commit is not successful, the system indicates the problem and allows repeating the operation. DHCP and IP address changes update only upon reader reboot.

CAUTION If using ActiveSync over the reader USB port, broadcast packets are not transmitted over the Ethernet port which can prevent network services from operating properly. To correct this, disable ActiveSync or disconnect the USB cable from the reader when using network services over Ethernet.

LLRP Communications Protocol

Select **LLRP** to view the **Configure LLRP Settings** window. By default, LLRP activates in server mode listening on port 5084. In server mode, LLRP clients can connect to the reader using the port number specified in the **Client** port field. You can also configure the reader in LLRP client mode. In this case, configure the LLRP server address in this web page as well. LLRP cannot be disabled since it is the primary native protocol for RFID for the reader.

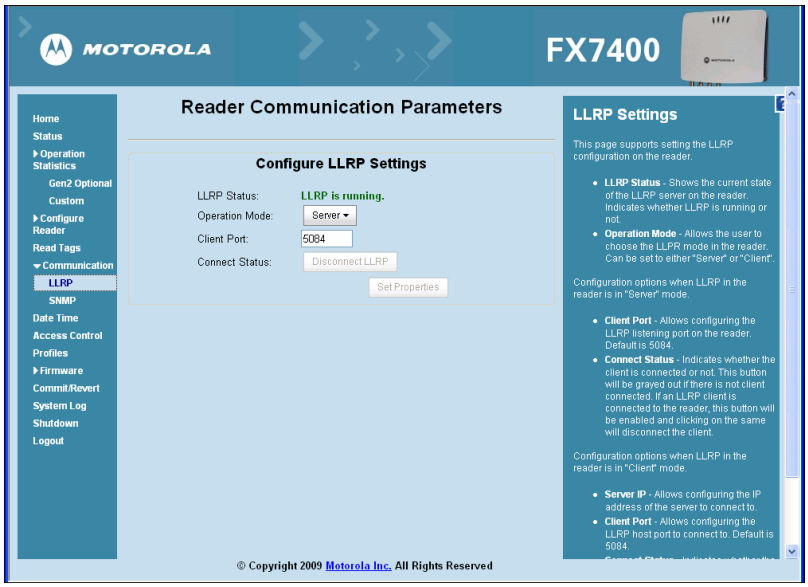

Figure 4-25 *Configure LLRP Settings Window*

LLRP-specific configuration parameters are separate from other parameters related to communications. The configurable LLRP parameters are:

- **LLRP Status** - Displays the current state of the LLRP server on the reader (running or not running).
- **Operation Mode** - Sets the LLRP mode in the reader to **Server** or **Client**.
- **Client Port** - Configures the LLRP listening port on the reader. The default is 5084.
- **Connect Status** - Indicates the LLRP client or host connection status. **ConnectLLRP** and **DisconnectLLRP** connect the reader to or disconnect the reader from an LLRP client or host. In server mode, this button is grayed out if there is no client connected.

- **Server IP** (client mode only) - Configures the IP address of the server.

NOTE Selecting LLRP client mode uses LLRPClient IP and LLRPClient/Server Port values to connect to the client.
In LLRP server mode, incoming requests from the client use only the LLRP port value as the listening port. Updated parameters persist across reader reboots.

SNMP Settings

Select **SNMP** to view the **Configure SNMP Settings** window.

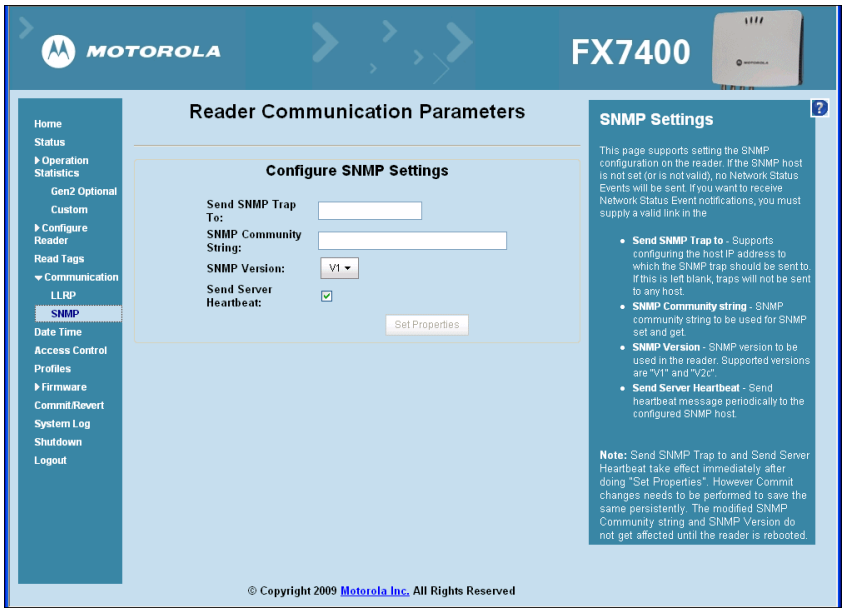

Figure 4-26 *Configure SNMP Settings Window*

Use this window to configure the SNMP host settings to allow sending network status events and receiving network status event notifications:

- **Send SNMP Trap To** - Configures the host IP address to which the SNMP trap is sent. Leave this blank to send no traps to any host.
- **SNMP Community String** - SNMP community string to use for SNMP set and get.
- **SNMP Version** - SNMP version to use in the reader. Supported versions are **V1** and **V2c**.
- **Send Server Heartbeat** - Sends a heartbeat message periodically to the configured SNMP host.

NOTE **Send SNMP Trap To** and **Send Server Heartbeat** take effect immediately after clicking **Set Properties**. However, perform a **Commit** to persist the changes. The modified **SNMP Community String** and **SNMP Version** are not affected until the reader reboots.

System Time Management

Select **Date Time** to view the **System Time Management** window. Use this window to set the date and time value or to specify an NTP synchronization server.

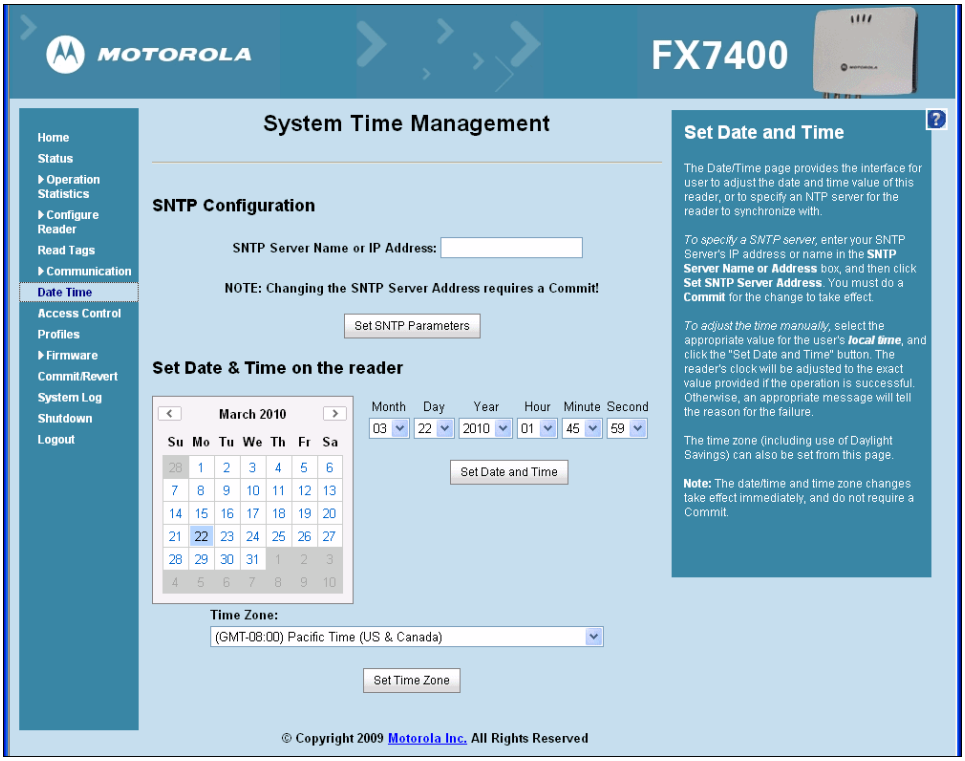

Figure 4-27 *System Time Management Window*

To synchronize the clock with a particular SNTP server, enter the server IP address in the **SNTP Server Address:** field, click **Set SNTP Parameters,** and commit the changes (see *Commit/Discard on page 4-37*).

NOTE SNTP (Simple Network Time Protocol) is an Internet standard protocol (built on TCP/IP) that assures accurate synchronization to the millisecond of computer clock times in a network of computers.

It is essential to have a DNS server configured to allow adding an SNTP server on this window. If using a static IP address, enter a valid DNS server address in the TCP/IP configuration. If this address is not present, the reader can not add an SNTP server address from this window. Ensure the DHCP server sets up the DNS server address while issuing the IP address.

To set the system time manually, use the drop-down lists to select units of time, then click **Set Date and Time**. Use the **Time Zone:** drop-down list to set the time zone, then click **Set Time Zone.** The date/time and time zone changes take effect immediately and do not require a commit.

Access Control

To ensure controlled and secure access to reader **Administrator Console** functions, click **Access Control** to open the **Manage Users** window. Use this window to designate which users and computers are authorized to have system access by setting up authorized user accounts. Only users logging in with a registered user name and password can successfully access **Administrator Console** functions.

Users must log in and out of the system to ensure that:

- System access is granted only to authorized users.
- Only one user is logged in at a time to ensure that multiple users don't make conflicting changes to the system. Users who perform no action for a period of time are automatically logged out of the system and must log in again.

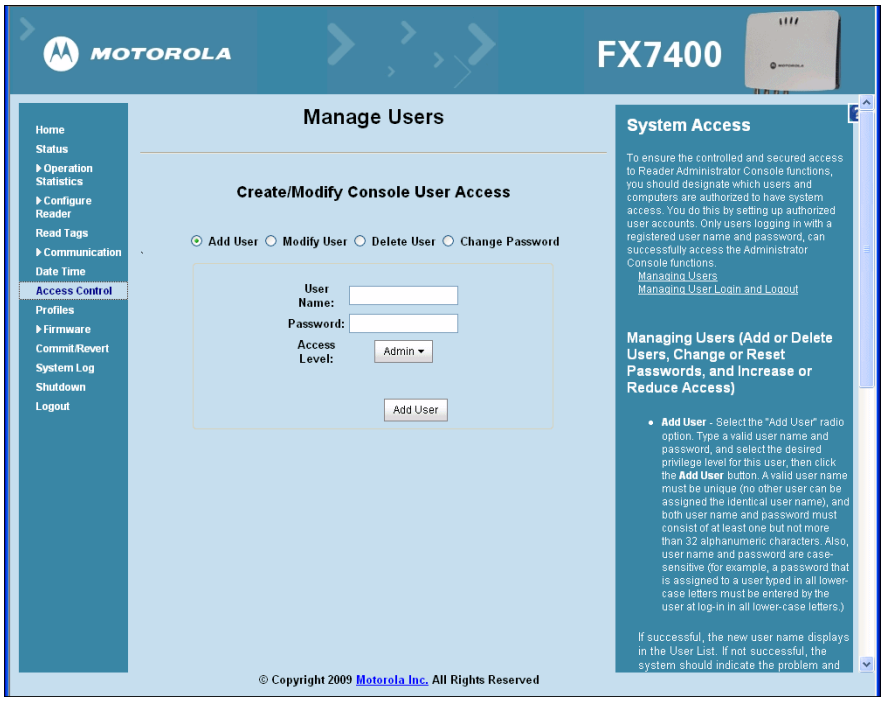

Figure 4-28 *Manage Users Window*

To add or modify users in order to grant rights and permissions:

- **Add User** - Select this radio button and enter a valid **User Name** and **Password**. Select the desired **Access Level** for this user, then click **Add User**. A valid user name must be unique (assigned to only one user) and both user name and password must be between one and 32 alphanumeric characters. The user name and password are case-sensitive. If the entry is successful, the new user name appears in the user drop-down list. If not successful, the system indicates the problem and allows repeating the operation.
- **Modify User** - Select this radio button and select the user name from the **User Name** drop-down list. Select the new **Access Level** for this user. Click **Modify** to set the new user access level.
- **Delete User** - Select this radio button and select the user name from the **User Name** drop-down list. Click **Delete User** to remove this user from the system. This user name is now free to use on a new user.
- **Change Password** - Select this radio button and select the user name from the **User Name** drop-down list. On the **Change Password** window, enter the old password and the new password (twice) and click **Change Password**.

Reader Profiles

Select **Profiles** in the selection menu to view the **Reader Profiles** window, which shows the current profiles on the reader and allows performing profile-related operations. Profiles are useful for multiple reader deployments. To configure the readers, manually download the proper configuration file, or use APIs to programmatically configure many readers quickly. This procedure saves configuration time because only a few APIs are needed to configure a reader completely.

NOTE Enable Java JRE 1.6 support on the browser in order for this window to function properly. See *Appendix D, Java Install/Upgrade Procedures*.

The **Reader Profiles** window uses an applet to connect to the reader. The window displays a set of provided configuration files, or profiles, that a user can re-use and/or modify depending on the reader application or use case. The profiles serve as configuration examples.

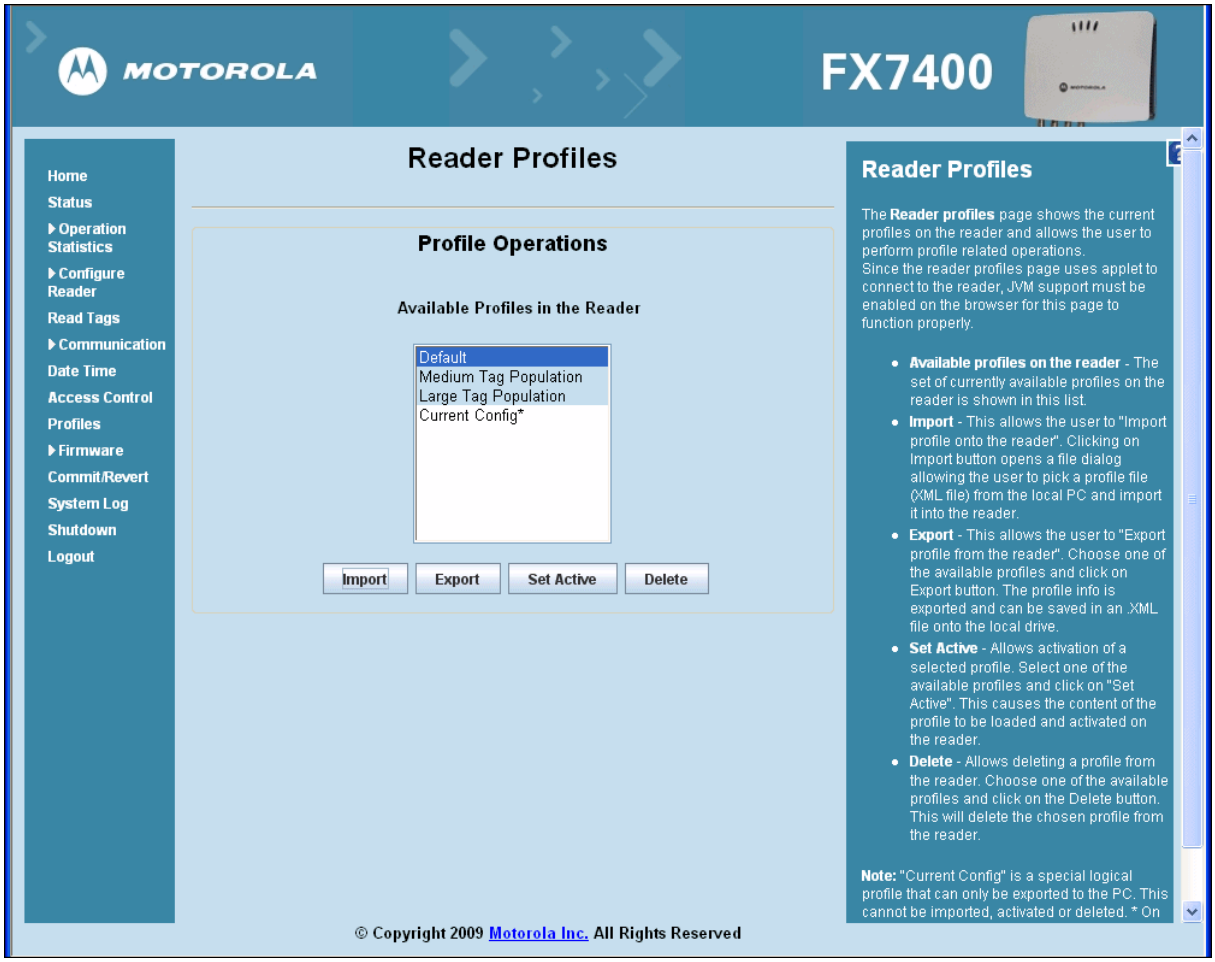

Figure 4-29 *Reader Profiles Window*

The **Reader Profiles** window functions are:

- **Available Profiles in the Reader** - Displays the available reader profiles.
- **Import** - Click to open a file dialog and pick a profile (XML file) from the local PC and import it into the reader.

- **Export** - Select an available profile and click **Export** to export profile information and save an .XML file onto the local drive.
- **Set Active** - Activates a selected profile. Select an available profile and click **Set Active** to load the profile content in the reader.

CAUTION Swapping profiles between readers using static IP addresses is not recommended. Activating a profile with a static IP address changes the IP of the reader, and if not done properly can make the reader inaccessible.

- **Delete -** Select an available profile and click **Delete** to delete the profile.

NOTE **Current Config** is a special logical profile that can only be exported to the PC. This cannot be imported, activated, or deleted. Only the profile name indicates that it is the active profile.

Profiles can specify a number of reader parameters, including RF air link profiles. Air link profiles cannot be configured using LLRP or web page interface. See *Appendix F, RF Air Link Configuration* for more information about air link profile configuration.

Create a Custom Profile

The reader includes a set of sample profiles. These can not be changed, and a new profile with the same name cannot be imported. Export, modify, and import these profiles under a new name to create customized profiles. This keeps the original profiles intact to use as a reference.

To view the contents of a profile, select the profile and click **Export** to export the profile to the PC hosting the **Reader Profiles** window. The profile files are in XML format. Open the file using a text editor application (such as Notepad) and edit to modify the reader configuration. Save the modified file under a new name.

Click **Import** and browse to the modified file and import the file into the **Reader Profile** window. This adds the modified file to the list of profiles. The reader does not perform any checking when importing the file.

To validate the profile file contents, and to activate the modified profile, select the profile and click **Set Active**. The reader performs checking on some of the parameter values and notifies the user if it detects an error.

Using Default Sample Profiles

In the **Reader Profiles** window, the reader by default offers a set of template profiles. Currently these templates are **Default**, **Medium Tag Population**, and **Large Tag Population**. Note that these profiles do not reside in the reader's memory as real files, but are simply templates to view as examples. Do not use these templates as real profiles after creating one or a set of custom profiles. Following are the differences between the templates and real profiles:

- The templates are not real files. Some template parameters are shared with the current configuration file. The <**MOTOROLA_LLRP_CONFIG**> section in the medium and large population templates is independent of the current configuration file. Parameters outside <**MOTOROLA_LLRP_CONFIG**> are shared with the current configuration file. These parameters can change when activating a custom profile that contains a change outside <**MOTOROLA_LLRP_CONFIG**> section.
- Customer-defined profiles are real profiles which the reader treats as independent files, so the contents are not shared with any other profile.

The following example illustrates what happens to template profiles when changing a parameter outside <**MOTOROLA_LLRP_CONFIG**>:

1. The user receives a new reader with the default configuration, and notices that the default template is active.
2. The user makes the large tag population template active in order to test it.
3. The user runs the test using the large tag population template.
4. The user decides to customize the large tag population template, and exports and saves it to a host computer using file name **customLargeTagPopulation.xml.**
5. The user changes the **TagPopulation** parameter which is inside <**MOTOROLA_LLRP_CONFIG**>.
6. The user also changes the air link parameter **MACLinkProfile**, which is outside <**MOTOROLA_LLRP_CONFIG**>, to the value **5** (See *Appendix F, RF Air Link Configuration* for instructions on changing the air link profile changes).
7. The user saves **customLargeTagPopulation.xml** and imports it to the reader.
8. The user makes **customLargeTagPopulation.xml** active to try out the new settings for **TagPopulation** and **MACLinkProfile**.
9. The user tests the new **customLargeTagPopulation** profile.
10. To re-check the results from Step 3, the user makes the large tag population template active and run tests again.
11. The user notices that the results obtained in Step 3 and Step 10 are not consistent.
12. The user inspects the large tag population template by exporting to a file named **defaultLargeTagPopulation.xml.**
13. The user opens **defaultLargeTagPopulation.xml** and sees that **MACLinkProfile** is not set to its default value of 65535, but to 5.

The problems with the above procedure are in steps 6 and 10.

In Step 3 of this example, the user is able to use a template if the reader is new or does not contain custom profiles. Step 3 is not recommended if the reader contains custom profiles. Once users define custom profiles they should not use templates, particularly if a custom profile contains a change outside the <**MOTOROLA_LLRP_CONFIG**> section, as illustrated in Step 6. Changing **MACLinkProfile** for the custom profile inadvertently changed the default template because this parameter is not in <**MOTOROLA_LLRP_CONFIG**>, so in Step 10, the user did not get consistent results.

To avoid this, first define a custom profile for each default template by exporting all default templates and re-importing them to the reader as real profiles under new names. This creates copies of the templates, but as real profiles. The user can then return to these copies without changing the default values of parameters outside <**MOTOROLA_LLRP_CONFIG**>.

Another recommendation is to confine profile changes to the <**MOTOROLA_LLRP_CONFIG**> section only. If a change outside this section is necessary, do not rely on the integrity of the default templates. Note that this template behavior may change in future releases.

Changing RF Power Level Using Profiles

To control power levels, primarily use the LLRP interface or the RFID API3. Alternatively, use the Showcase II demo tool to control the RF power level. To control RF power at the reader, create a profile specifying the LLRP parameters that control RF power. For example, the following profile excerpt shows a power level of 24 dBm for all antennas. This excerpt is based on the Large Tag Population template and shows the pertinent changes in bold. The **TransmitPower** parameter is an index to a power table exposed through LLRP capabilities. Divide this index by 10 and add 14 to get the RF power level at the port. So, to achieve a power level of 30 dBm, set **TransmitPower** to 160. To achieve a power level of 24 dBm, set **TransmitPower** to 100 as in the following example.

```
<MOTOROLA_LLRP_CONFIG>
<SET_READER_CONFIG MessageID='0'
    xmlns:llrp='http://www.llrp.org/ltk/schema/core/encoding/xml/1.0'
    xmlns='http://www.llrp.org/ltk/schema/core/encoding/xml/1.0'>
    <ResetToFactoryDefault>true</ResetToFactoryDefault>
        <AntennaConfiguration>
            <AntennaID>1</AntennaID>
            <RFTransmitter>
            <HopTableID>1</HopTableID>
            <ChannelIndex>0</ChannelIndex>
            <TransmitPower>100</TransmitPower>
            </RFTransmitter>
        <C1G2InventoryCommand>
            <TagInventoryStateAware>false</TagInventoryStateAware>
                    <C1G2SingulationControl>
                <Session>2</Session>
                    <TagPopulation>600</TagPopulation>
                <TagTransitTime>0</TagTransitTime>
            </C1G2SingulationControl>
        </C1G2InventoryCommand>
    </AntennaConfiguration>
    <AntennaConfiguration>
            <AntennaID>2</AntennaID>
            <RFTransmitter>
            <HopTableID>1</HopTableID>
            <ChannelIndex>0</ChannelIndex>
            <TransmitPower>100</TransmitPower>
            </RFTransmitter>
        <C1G2InventoryCommand>
            <TagInventoryStateAware>false</TagInventoryStateAware>
                    <C1G2SingulationControl>
                <Session>2</Session>
                    <TagPopulation>600</TagPopulation>
                <TagTransitTime>0</TagTransitTime>
```

```
            </C1G2SingulationControl>
        </C1G2InventoryCommand>
    </AntennaConfiguration>
    <AntennaConfiguration>
        <AntennaID>3</AntennaID>
            <RFTransmitter>
            <HopTableID>1</HopTableID>
            <ChannelIndex>0</ChannelIndex>
            <TransmitPower>100</TransmitPower>
            </RFTransmitter>
        <C1G2InventoryCommand>
            <TagInventoryStateAware>false</TagInventoryStateAware>
                    <C1G2SingulationControl>
                <Session>2</Session>
                    <TagPopulation>600</TagPopulation>
                <TagTransitTime>0</TagTransitTime>
            </C1G2SingulationControl>
        </C1G2InventoryCommand>
    </AntennaConfiguration>
    <AntennaConfiguration>
        <AntennaID>4</AntennaID>
            <RFTransmitter>
            <HopTableID>1</HopTableID>
            <ChannelIndex>0</ChannelIndex>
            <TransmitPower>100</TransmitPower>
            </RFTransmitter>
        <C1G2InventoryCommand>
            <TagInventoryStateAware>false</TagInventoryStateAware>
                    <C1G2SingulationControl>
                <Session>2</Session>
                    <TagPopulation>600</TagPopulation>
                <TagTransitTime>0</TagTransitTime>
            </C1G2SingulationControl>
        </C1G2InventoryCommand>
    </AntennaConfiguration>
</SET_READER_CONFIG>
</MOTOROLA_LLRP_CONFIG>
```

Firmware Version/Update

The **Firmware Version** window displays the current firmware version and allows upgrading to new firmware. From the selection menu, click **Firmware**.

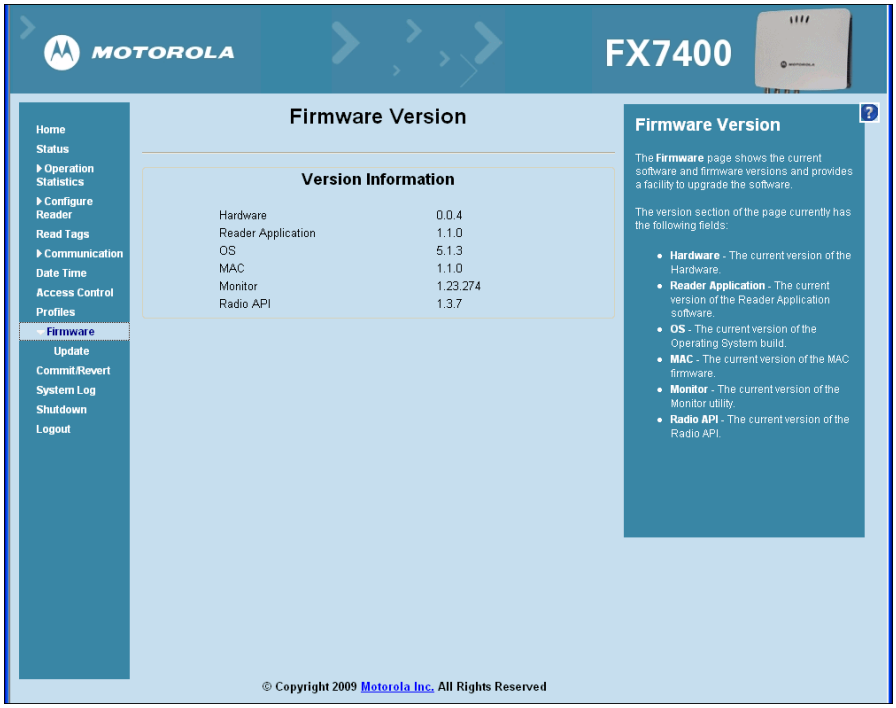

Figure 4-30 *Firmware Version*

The **Version Information** section of the window displays:

- **Hardware** - The current hardware version.
- **Reader Application** - The current reader application software version.
- **OS** - The current operating system build version.
- **MAC** - The current MAC (radio) firmware version.
- **Monitor** - The current monitor utility version.
- **Radio API** - The current radio API version.

NOTE The full version number includes a build number which does not appear on the **Firmware Version/Update** window. To retrieve the full number, type http://*ip.ip.ip.ip*/Version.html in the browser, where *ip.ip.ip.ip* denotes the reader IP or host name.

Firmware Update

The **Firmware Update** window allows upgrading to new firmware. From the selection menu, click **Update**.

NOTE You must be logged in with Administrator privileges in order to access this window. See *Access Control on page 4-27*.

The reader supports three different methods of updating the firmware:

- FTP / FTPS server
- CAB file
- File-based upload

Each method indicates firmware update progress in the window. After upgrading the necessary partitions the reader reboots with a message **Reboot** to indicate that the firmware upgrade completed.

Partition download and flash programming takes about 15 minutes, depending on network load conditions. Typical file uploads are much less than 15 minutes since they deal with only one or a few partitions. Do not reboot or power off the reader while the green LED is blinking.

CAUTION When using ActiveSync over the reader USB port, broadcast packets are not transmitted over the Ethernet port which can prevent network services to operate properly. To correct this, disable ActiveSync or disconnect the USB cable from the reader when using network services over Ethernet.

Firmware Update via FTP / FTPS Server

NOTE For more detail on upgrading using an FTP / FTPS server, see *Appendix C, FTP Firmware Upgrade*.

In the **Firmware Update** window, select the **FTP/FTPS Server** radio button.

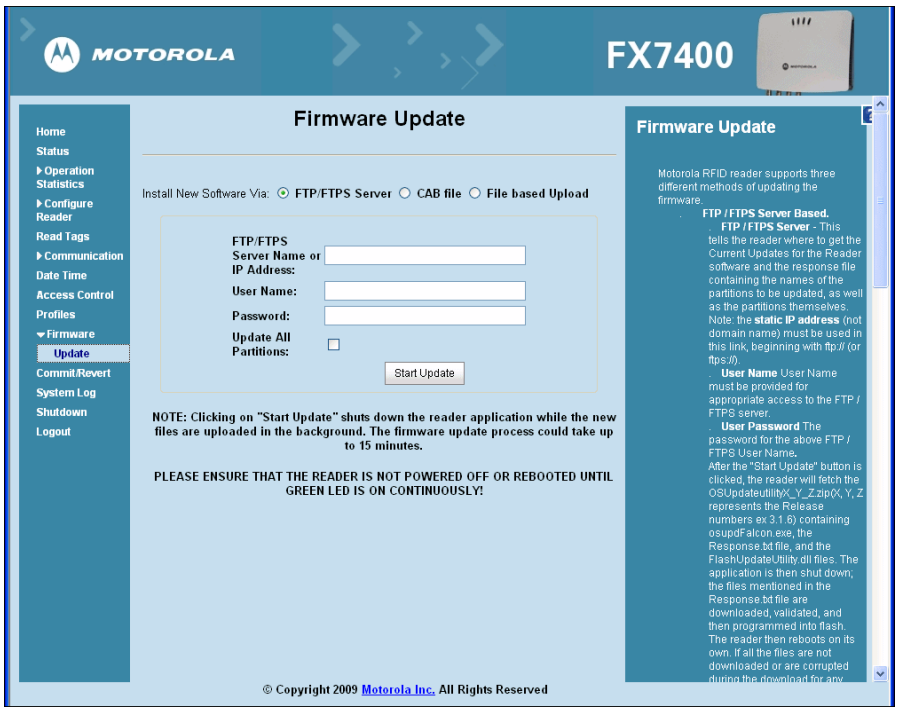

Figure 4-31 *Firmware Update Window - FTP/FTPS Server*

Specify the following fields:

- **FTP / FTPS Server Name or IP Address** - Identifies the location of the current software updates, the response file that contains the names of the partitions to update, and the partitions. Use an IP address or domain name in this link, beginning with ftp:// (or ftps://).
- **User Name** - Enter the user name for appropriate access to the FTP / FTPS server.
- **User Password** - Password for the FTP / FTPS **User Name**.
- **Update All Partitions** - Check to force the update of all reader partitions. This increases firmware update time.

CAUTION This option is NOT recommended because updating all partitions increases update time and resets all configurations including user logins. Power disruption during update can cause the reader to fail.

- **Start Update** - Click to start the update. The reader application shuts down and the files listed in the **Response.txt** file are downloaded, validated, and programmed into flash. The reader reboots. If files do not download or are corrupt, they are ignored and the old partitions remain. The PWR LED blinks red during the upgrade. If the upgrade fails, the STAT LED turns red. If the upgrade succeeds, the reader resets and the PWR LED eventually turns solid green.

Firmware Update via CAB File

In the **Firmware Update** window, select the **CAB file** radio button.

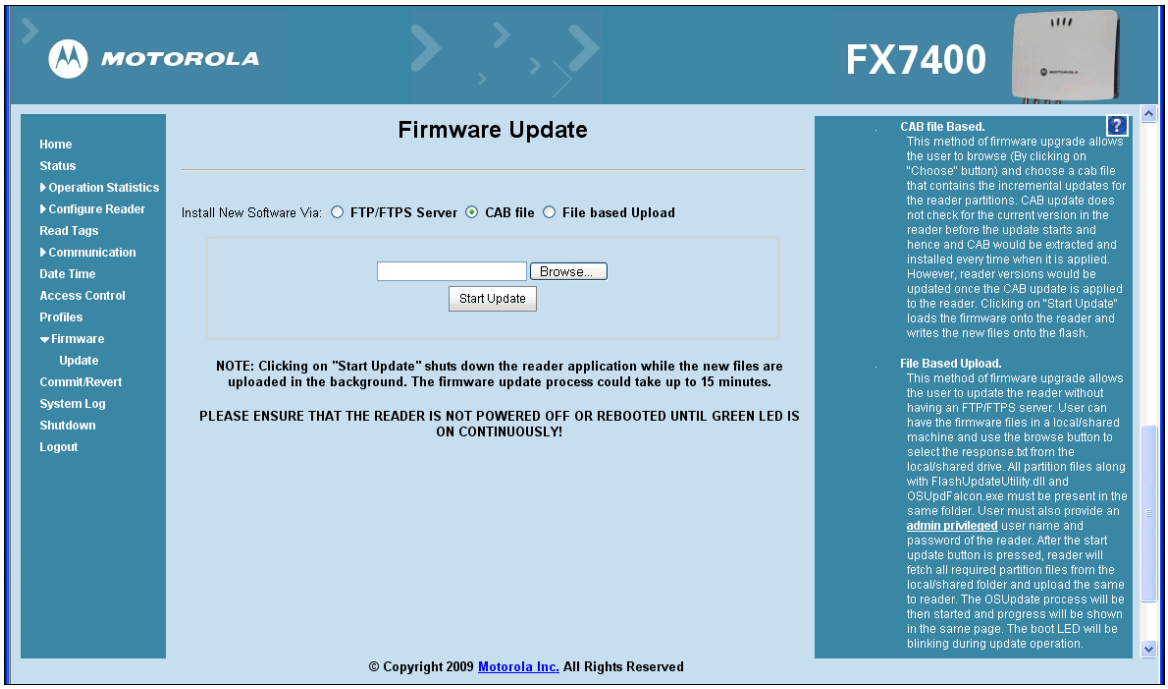

Figure 4-32 *Firmware Update Window - CAB File*

Click **Browse** to browse to and choose a cab file containing the incremental updates for the reader partitions.

Click **Start Update** to load the firmware and write the new files onto the flash. The reader application shuts down and the files specified in the cab file are downloaded, validated, and programmed into flash. The reader reboots. If files do not download or are corrupt, they are not programmed into flash, and the old partitions remain. The PWR LED blinks red during the upgrade. If the upgrade fails, the STAT LED turns red. If the upgrade succeeds, the reader resets and the PWR LED eventually turns solid green.

File Based Firmware Update

In the **Firmware Update** window, select the **File based Upload** radio button.

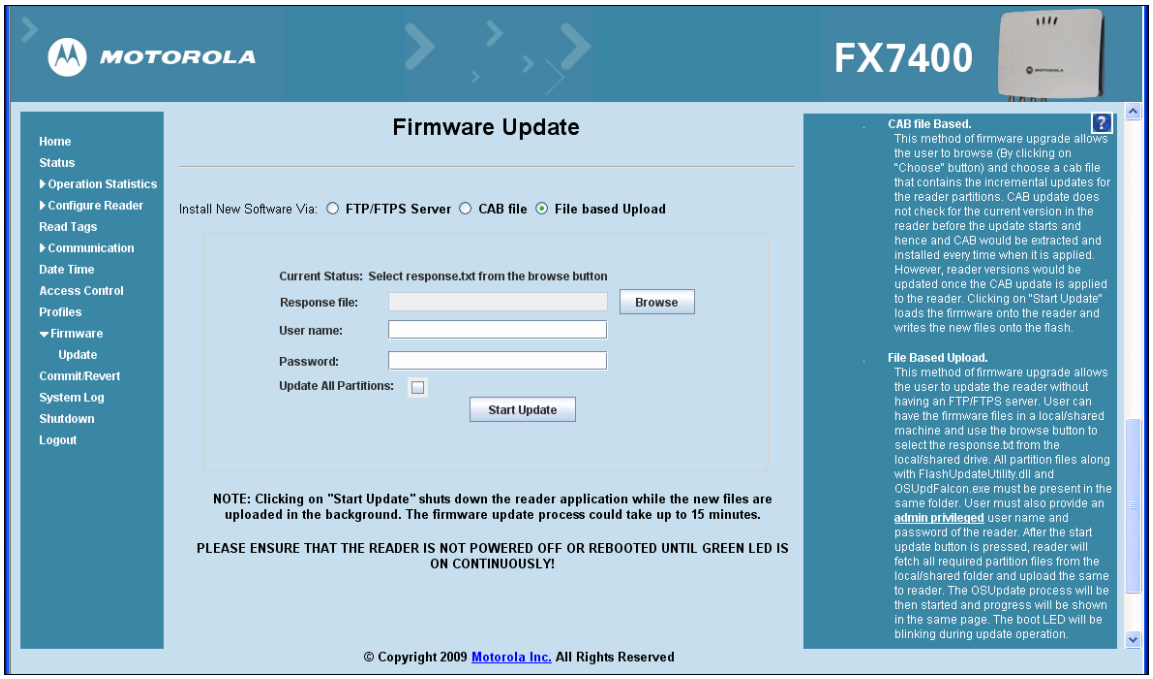

Figure 4-33 *Firmware Update Window - File Based Upload*

This upgrade method allows updating the reader from firmware files stored on a local/shared host PC, rather than an FTP/FTPS server.

NOTE In order to use the file-based firmware update method, set **File Server** to **FTP** in *Communication Settings on page 4-23*.

- **Response file** - Click **Browse** and select **response.txt** from the local/shared drive. Ensure all partition files as well as **FlashUpdateUtility.dll** and **OSUpdFalcon.exe** are present in the same folder.
- **User name** - Enter the administrator privileged user name for the reader.
- **Password** - Enter the password for the reader.
- **Update All Partitions** - Check to force the update of all reader partitions. This increases firmware update time.
- **Start Update** - Click to start the update. The reader uploads all required partition files from the local/shared folder. The OSUpdate process starts and indicates progress in the window. The PWR LED blinks during the update. If the update succeeds, the reader resets and the PWR LED eventually turns solid green. If the update fails, the STAT LED turns red.

Commit/Discard

Changes made to the logical view of the Reader Network using the **Administrator Console** do not immediately apply to the reader and network connections. To apply reader configuration modifications, click **Commit/Discard** to save the changes and notify the reader to update the configuration file.

1. Click **Commit/Discard**. The **Commit/Discard** window appears.

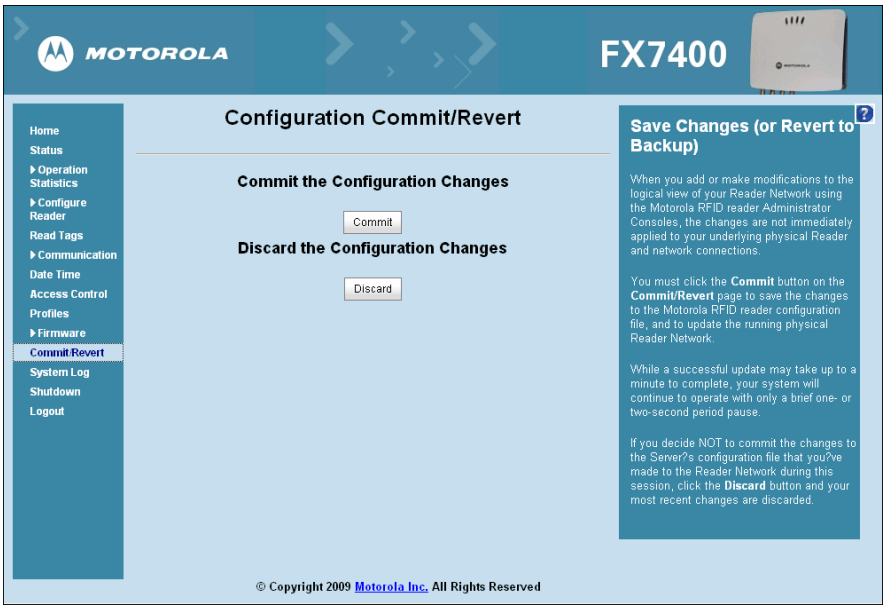

Figure 4-34 *Commit/Discard Window*

2. Click **Commit** to save a new configuration and apply changes to the reader configuration file, to save the changes to the configuration file, and to update the reader/network.
   A successful update can take up to a minute, however the system continues to operate with only a brief one or two second pause where no polling occurs.

   Click **Discard** to discard changes made (during this session) to the reader configuration. This discards all uncommitted changes.

System Log

The **System Log** window lists reader log information.

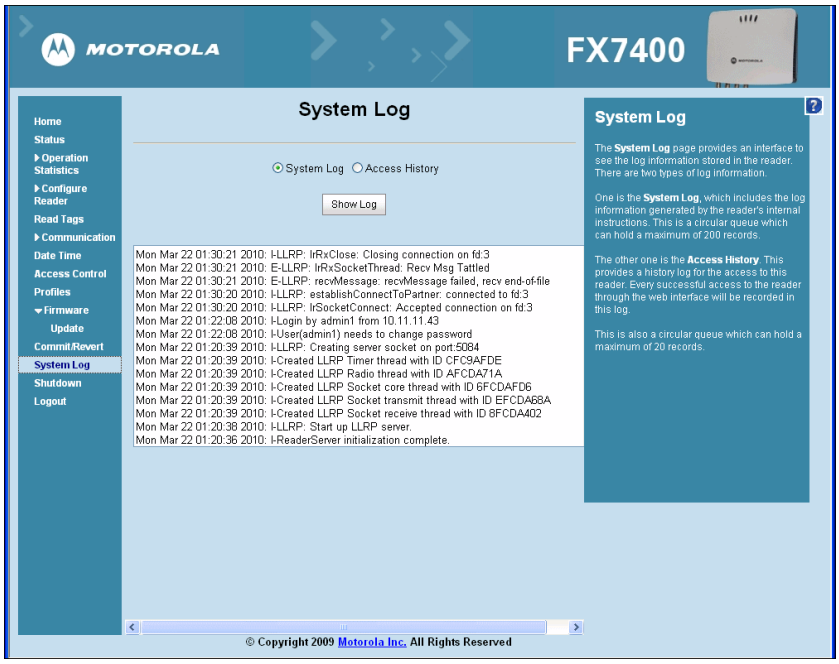

Figure 4-35 *System Log Window*

There are two types of log information:

- **System Log** - Includes the log information generated by the reader internal instructions. This is a circular queue that holds a maximum of 200 records.
- **Access History** - Provides a history log for reader access, including every successful access to the reader through the web interface. This is also a circular queue which can hold a maximum of 20 records.

Shutdown

To protect the integrity of the reader data, gracefully reboot the reader.

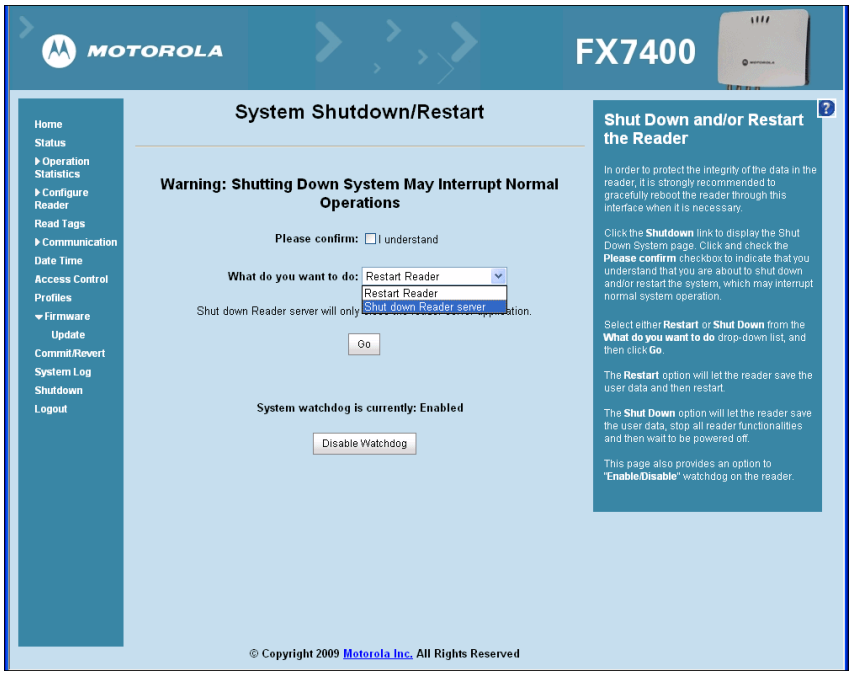

Figure 4-36 *System Shutdown/Restart Window*

From the **Administrator Console**:

1. Click the **Shutdown** link to display the **System Shutdown/Restart** window.
2. Check the **Please Confirm** check box to accept the system shut down and/or restart the system (this may interrupt normal system operation).
3. Select one of the following options from the **What do you want to do** drop-down list:
   - **Restart Reader** - saves the user data and then restarts.
   - **Shut down Reader server** - the reader saves the user data, stops all reader functions, and waits to be powered off.
4. Click **Go**.

This window also provides an option to enable or disable the reader watchdog.

Chapter 5 Installation Examples

Introduction

This chapter provides examples on how to optimize reader configuration in various applications.

> ***NOTE*** The applications described may not be available on (or applicable to) all devices. Procedures are not device-specific and are intended to provide a functional overview.

The installation examples are:

Troubleshooting

See *General Read Performance Optimization on page 5-4* and *Chapter 6, Troubleshooting* for configuration tips and troubleshooting information.

Point of Sale (POS)

Example Parameters

The reader reads up to 10 different tags (1" x 4" RFID embedded garment tags) in the targeted read zone.

Installation

- One 5" x 5" (5.5 dBic with 100^{o} beam width) antenna is mounted one foot below the service table (service table is RF penetrable material).
- The reader is mounted underneath the table (see *Chapter 3, Installation and Communication*).

Configuration

- Reader power: 20 dBm
- Reader profile or tag population: Default (see *Reader Profiles on page 4-28*)
- Session: Session 1 (default)

Back Room Inventory Fill

Example Parameters

The reader reads 100 tagged T-shirts in a cardboard box in five seconds at a distance of 2 - 6 feet.

Installation

- Two AN480 antennas: one antenna is mounted 1.5 feet above the box, the second antenna is mounted one foot below the box.
- The reader is mounted underneath the table (see *Chapter 3, Installation and Communication*).

Configuration and Optimization

- Reader power: 30 dBm
- Reader profile or tag population: Default (see *Reader Profiles on page 4-28*)
- Session: Session 1

Exit/Entry

Example Parameters

The reader reads 20 tags moving at 4 - 7 feet per second at distances up to 8 feet. The read duration is approximately 7 seconds.

Installation

- Two AN480 antennas are installed in a single-sided portal configuration. One antenna is mounted 2.5 feet above the floor and the second is 4 feet above the floor.
- The reader is mounted within 20 feet from the antennas (see *Chapter 3, Installation and Communication*).

Configuration and Optimization

- Reader power: 30 dBm
- Reader profile or tag population: Default (see *Reader Profiles on page 4-28*)
- Session: Session 1

Transition/Impact Door

Example Parameters

The reader reads 200 tags moving at 2 - 4 feet/second for seven seconds.

Installation

- Four AN480 antennas are installed in a double-sided portal configuration. One pair of antennas is mounted two feet above the floor and the second pair is five feet above the floor.
- The distance of the portals is 10 feet.
- The reader is mounted within 20 feet of the antennas (see *Chapter 3, Installation and Communication*).

Configuration and Optimization

- Reader power: 30 dBm
- Reader profile or tag population: Large (see *Reader Profiles on page 4-28*)
- Session: Session 2

Back Room Receiving

Example Parameters

The reader reads 500 tags in five seconds within a distance of 10 feet.

Installation

- Four AN480 antennas are installed in a double-sided portal configuration. One pair of antennas is mounted two feet above the floor and the second pair is five feet above the floor.
- The distance of the portals is 10 feet.
- The reader is mounted within 20 feet of the antennas (see *Chapter 3, Installation and Communication*).

Configuration and Optimization

- Reader power: 30 dBm
- Reader profile or tag population: Large (see *Reader Profiles on page 4-28*)
- Session: Session 2

General Read Performance Optimization

If too few of the desired tags are read:

- Turn up the power.
- Reduce the distance between the antenna and the tags.

If more than the desired tags are read:

- Turn down the power.
- Remove stray tags from the target read area.
- The application may require post filtering of the read data.

Chapter 6 Troubleshooting

Table 6-1 provides FX Series troubleshooting information.

Table 6-1 *Troubleshooting*

Problem/Error	Possible Causes	Possible Solutions
Reader error LED lights after the reader is in operation.	The CPU cannot communicate.	Refer to the system log for error messages.
Reader error LED stays lit on power up.	An error occurred during the power up sequence.	Refer to the system log for error messages.
Cannot connect to the reader.	User name and password is unknown.	The default user name is **admin** and the default password is **change**. To change the user name and password, see *Communications Connections on page 3-5*.
Reader is not reading tags.	The tag is out of its read range. Antennas are not connected. Tags are damaged. Tags are not EPCgen2. If reading with the reader's web page, Java JRE 1.6 or later is not installed.	Move the tag into read range. See *Read Tags on page 4-22*. Connect antennas. Confirm that tags are good. Confirm that tags are EPCgen2. Install Java JRE 1.6. See *Java Install/Upgrade Procedures on page D-1*
Cannot access the **Administrator Console**.	The IP address is unknown.	See *Communications Connections on page 3-5* to view the IP address, or use the host name to connect to the reader.

Table 6-1 *Troubleshooting (Continued)*

Problem/Error	Possible Causes	Possible Solutions
Certain real time applications are no longer functional.	The node address, IP address, or other reader configuration parameter(s) were changed using the **Administrator Console**, and the application expects the previous configuration.	Update the settings within the application. Refer to the application manual.
	The user closed the browser without logging out of the **Administrator Console**, so other applications cannot connect to the reader.	Log out of the **Administrator Console**.
Cannot log into **Administrator Console**.	The user forgot the password.	Press and hold the reset button for more than 5 seconds. This resets the reader configuration to factory defaults, including the password.
Unable to add SNTP server, reader returning error.	SNTP server is not reachable. SNTP server name is not resolvable via DNS server. DNS server is not reachable.	Ensure the SNTP server is accessible. Ensure the DNS server name is configured in TCP/IP configuration. Ensure the DNS server is accessible.
Operation failed.	A user operation did not complete, typically due to invalid input.	Validate all inputs and retry the operation. If it is not successful, see *Service Information on page xi*.
Invalid User Name and/or Password - Try again.	The user name and/or password were not found in the system, or do not match the current user registry.	Accurately retype login information. If this is not successful, see *Service Information on page xi*.
Session has Timed-out - Log in again.	The current session was inactive beyond the time-out period (15 minutes), so the system automatically logged out.	Log in again. As a security precaution to protect against unauthorized system access, always log out of the system when finished.
User name is not correct.	The user name does not match the current user registry (illegal characters, too long, too short, unknown, or duplicate.) User forgot the user ID.	Accurately retype the user name. See *Service Information on page xi.*
The user name has already been used.	The user name is duplicated when adding a new user to the user registry.	Enter a new user name.

Table 6-1 *Troubleshooting (Continued)*

Problem/Error	Possible Causes	Possible Solutions
Not a legal IP address (1.0.0.0 - 255.255.255.255). Cannot reach the specified IP address. The SNMP Host Link is not valid.	The IP address entered is either formatted inaccurately or cannot be accessed (pinged).	Accurately retype the IP address, and make sure the host device is connected and online. If this is not successful, see *Service Information on page xi*.
Invalid network mask.	The network mask entered is not formatted correctly.	Confirm the correct network mask from the network administrator and enter it correctly.
Invalid SNMP version number.	The version number for SNMP protocol is not a supported version.	Use version number 1 for SNMP version 1, and 2 for SNMP version 2c.
Invalid description.	The description contained invalid characters (<,>,or').	Correct the description.
Invalid password.	The password does not match the current user registry (illegal characters, too long, or too short.) User forgot the password.	Accurately retype the password. See *Service Information on page xi*.
Name has already been used. Serial number has already been used. IP address has already been used.	The name, serial number, or IP address entered already exists in the system.	Enter a unique value for the new name, serial number, or IP address.
Select an item from the list.	The system requires selecting an item from the list box before continuing.	Select an item from the list box, and then continue.
Last command is pending. Try again later.	The system did not finish processing the previous command.	Wait a few moments for the previous command to complete before sending another command.
Another administrator is currently logged in. Try again later.	The system does not allow more than one administrator to log in at a time.	Wait until the other administrator logs out (or times out) before logging in.
Backup configuration file does not exist.	The system cannot revert to a backup configuration unless a backup file exists.	Commit the new configuration to create a backup file.
Failed to confirm the new password.	The system requires entering the password identically two times.	Accurately retype the password twice.
Network configuration change(s) have not been saved.	The user requested log out prior to committing/ discarding the changes made during the session.	Select one of the **Commit/Discard** options.

Table 6-1 *Troubleshooting (Continued)*

Problem/Error	Possible Causes	Possible Solutions
New password is the same as the old one.	The system requires entering a new password (different from the existing password) during the **Change Password** operation.	Enter a password that is different from the existing password.
Old password is not correct.	The system requires entering the existing password during the **Change Password** operation.	Accurately retype the existing password.
Unspecified error occurred - code: ####	A specific error message is missing for the given status code.	Note the code number, and contact Motorola Enterprise Mobility Support. See *Service Information on page xi*.
The requested page was not found. Internal Web Server Error.	The system experienced an internal web server error.	Contact Motorola Enterprise Mobility Support. See *Service Information on page xi*
Request method was NULL. No query string was provided.	The system does not permit executing a proxy program from the command line rather than the web server.	No action required. The system is reporting that this action is not permitted.
Content length is unknown.	The system cannot accept an incorrectly formatted HTTP POST request (from an unsupported browser application).	Use a GET request instead, or update the software.
Couldn't read complete post message.	The system stopped a POST operation before completion.	Retry the operation, and allow it to complete.
Unhandled reply type.	The system generated an unexpected value.	Contact Motorola Enterprise Mobility Support. See *Service Information on page xi*.
Failed to open port. Failed to connect. Failed to transmit. Failed to receive. Error during Receive of Command.	Error during receive of command.	Contact Motorola Enterprise Mobility Support. See *Service Information on page xi*.

Table 6-1 *Troubleshooting (Continued)*

Problem/Error	Possible Causes	Possible Solutions
Invalid Device Address.	The device address information (parent) is invalid, missing, or formatted inaccurately.	Contact Motorola Enterprise Mobility Support. See *Service Information on page xi*.
Command parsing state error. Missing argument for the command. Command internal type cast error. Missing operator. Unknown operator.	A command was formatted inaccurately.	Contact Motorola Enterprise Mobility Support. See *Service Information on page xi*.
The action must be confirmed.	The user must confirm the requested action before it is executed.	Select the confirmation option when issuing this request.

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

Appendix A Technical Specifications

FX7400 Kits

KT-FX74004US-01 4-Port US Reader Kit

- FX7400-42310A30-US (4-port US reader)
- AN480-CL66100WR (wide-band AN-480 antenna)
- BRKT-70661-01R (antenna mounting bracket)
- CBLRD-1B4001800R (15-foot RF cable)
- 50-14000-159R (power supply)
- 23844-00-00R (US power cord)

KT-FX74002US-01 2-Port US Reader Kit

- FX7400-22310A30-US (2-port US reader)
- AN480-CL66100WR (wide-band AN-480 antenna)
- BRKT-70661-01R (antenna mounting bracket)
- CBLRD-1B4001800R (15-foot RF cable)
- 50-14000-159R (power supply)
- 23844-00-00R (US power cord)

KT-FX74004WR-01 4-Port Global Reader Kit

- FX7400-42315A30-US (4-port global reader)
- AN480-CL66100WR (wide-band AN-480 antenna)
- BRKT-70661-01R (antenna mounting bracket)
- CBLRD-1B4001800R (15-foot RF cable)
- 50-14000-159R (power supply)

KT-FX74002WR-01 2-Port Global Reader Kit

- FX7400-22315A30-US (2-port global reader)
- AN480-CL66100WR (wide-band AN-480 antenna)
- BRKT-70661-01R (antenna mounting bracket)
- CBLRD-1B4001800R (15-foot RF cable)
- 50-14000-159R (power supply)

Technical Specifications

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

Table A-1 *Technical Specifications*

Item	FX
Physical and Environmental Characteristics	
Dimensions	7.7 in. L x 5.9 in. W x 1.7 in. D 19.56 cm L x 14.99 cm W x 4.32 cm D
Mounting Dimensions (Mounting Holes)	2 holes required, center to center 4.192 inches
Weight	1.8 lbs (kg)
Base Material	Die cast aluminum, sheet metal and plastic.
LEDs	Multi-color LEDs: Power, Activity, Status and Applications
FX Environmental Specifications	
Operational Temperature	14° to +122° F/-10° to +50° C
Storage Temperature	-40° to +158° F/-40° to +70° C
Humidity	5 to 85% non-condensing
Vibration	Vibration Operational: 5.5 Grms, 0.02G2/Hz Random 20 Hz to 1000 Hz rolling off at -6 dB/octave to 2000 Hz for 1 hour per axis in all three axes.
Connectivity	
Communications	10/100 BaseT Ethernet (RJ45) w/ POE support USB Client (USB Type B)
General Purpose I/O	2 inputs, 2 outputs, optically isolated (Terminal Block)
Power	+24Vdc or POE (IEEE 802.3af)
Antenna Ports	FX 7400-4: 4 mono-static ports (Reverse Polarity TNC) FX 7400-2: 2 mono-static ports (Reverse Polarity TNC)

Table A-1 *Technical Specifications (Continued)*

Item	FX		
Compliance Information			
Safety	cUL 60950-01, UL 2043, IEC 60950-1, EN 60950-1		
RF/EMI/EMC	FCC Part 15, RSS 210, EN 302 208, ICES-003 Class B, EN 301 489-1/3		
SAR/MPE	FCC 47CFR2:OET Bulletin 65; EN 50364		
Other	ROHS, WEEE		
Antenna Parameters	FX Series	US	EU
	Max Conducted RF Power	+ 30dBm	+29.6dBm
	Max Antenna Gain Allowed (including cable loss)	+ 6dBiL	+ 5.5dBiL
	Max Radiated Power Allowed	4W EIRP	2W ERP
	Maximum Beam Width	N/A	Per EN 302 208
Hardware/OS and Firmware Management			
Memory	Flash 64 MB; DRAM 64 MB		
Operating System	Microsoft Windows CE 5.0		
Firmware Upgrade	Web based and remote firmware upgrade capabilities		
Management Protocols	RM 1.0.1 (with XML over HTTP/HTTPS and SNMP binding)		
Network Services	DHCP, HTTPS, FTPS, SSH, HTTP, FTP, Telnet, SNMP and NTP		
Air Protocols	ISO 18000-6C (EPC Class 1 Gen 2)		
Frequency (UHF Band)	902 MHz to 928 MHz, 865 MHz to 868 MHz		
Power Output	+15dBm to +30dBm		
IP addressing	Static and Dynamic		
Host Interface Protocol	LLRP		
API Support	.NET and C		
Warranty			
The FX7400-4 and FX7400-2 are warranted against defects in workmanship and materials for a period of one year (12 months) from date of shipment, provided the product remains unmodified and is operated under normal and proper conditions. For the complete Motorola hardware product warranty statement, go to: http://www.motorola.com/enterprisemobility/warranty			

Cable Pinouts

10/100bT Ethernet / POE Connector

The 10/100BT Ethernet / POE connector is an RJ45 receptacle. This port complies with the IEE 802.3af specification for Powered Devices.

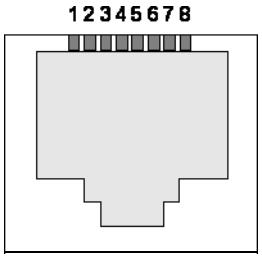

Figure A-1 *Ethernet Connections*

Table A-2 *10/100bT Ethernet / POE Connector Pinout*

Pin	Pin Name	Direction	Description	POE Mode A Function	POE Mode B Function
Pin 1	TX-P	O	TX Data Positive	Positive Vport	
Pin 2	TX-N	O	TX Data Negative	Positive Vport	
Pin 3	RX-P	I	RX Data Positive	Negative Vport	
Pin 4	NC	-	No Connect		Positive Vport
Pin 5	NC	-	No Connect		Positive Vport
Pin 6	RX_N	I	RX Data Negative	Negative Vport	
Pin 7	NC	-	No Connect		Negative Vport
Pin 8	NC	-	No Connect		Negative Vport

USB Client Connector

The USB Client port is supplied on a USB Type B connector.

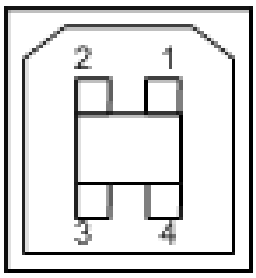

Figure A-2 *USB Client Connector*

Table A-3 *USB Client Port Connector Pinout*

Pin	Pin Name	Direction	Description
Pin 1	5.0V_USB	I	5.0V USB Power Rail
Pin 2	USB_DN	I/O	Data Negative
Pin 3	USB_DP	I/O	Data Positive
Pin 4	GND	-	Ground

GPIO Port Connections

These plug terminal block types allow connecting and disconnecting individual wires independently. A single connector is used for both inputs and outputs. See *Table A-4* for pin descriptions.

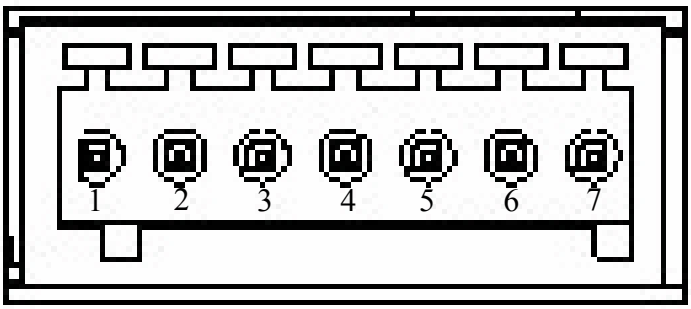

Figure A-3 *FX Series RFID Reader GPIO Connection*

Table A-4 *GPIO Pin Outs*

Pin #	Pin Name	Direction	Description
1	+24V DC Power	-	Supplies +24V DC at up to 1 Amp
2	GP output #1	O	Signal for GP output #1
3	GP output #2	O	Signal for GP output #2
4	GND	-	Ground connection
5	GP input #1	I	Signal for GP input #1
6	GP input #2	I	Signal for GP input #2
7	GND	-	Ground connection

Appendix B LLRP and RM API Extensions

For information on Low Level Reader Protocol (LLRP) and Reader Management (RM) extensions for the FX Series reader, refer to the *FX Series Reader Software Interface Control Guide*.

Appendix C FTP Firmware Upgrade

Introduction

This appendix provides reader firmware upgrade information on using the web-based **Administrator Console** and an FTP or FTPS server running a host computer. Use this procedure to upgrade the following software components:

- Monitor
- OS
- Reader Server Application (includes Radio API and MAC Radio firmware)

Prerequisites

The following items are required to perform the update:

- Reader with power supply or POE connection
- Laptop (or other host computer)
- An Ethernet cable
- An FTP server
- Current firmware file examples:
  - OSUpdFalcon.exe
  - response.txt
  - FlashUpdateUtility.dll
  - FalParTbl*XXX*.hex (Partition table, *XXX* is a filename variable)
  - FalConfig*XXXXX*.hex (Config Area, *XXXXX* is a filename variable)
  - FalMon*XXXX*.hex (Monitor, *XXXX* is a filename variable)
  - FalBkupOS*XXXXX*.hex (Backup OS, *XXXXX* is a filename variable)
  - FalOS*XXXXX*.hex (OS, *XXXXX* is a filename variable)
  - FalPlat*XXX*.hex (Platform partition, *XXX* is a filename variable)

- FalApp*XXX*.hex (Application, *XXX* is a filename variable)
- FalRConfig*XXX*.hex (Reader Config, *XXX* is a filename variable

Refer to the release notes to determine which files were updated; not all of the files are updated in every release. If updating the partition table, install this file first, otherwise there is no specific order necessary when installing these files.

Auto Recovery

The Auto Recovery feature allows the reader to recover flash images that are corrupt due to a power outage during software upgrade. If a firmware upgrade fails (e.g., due to a power outage), on the next reboot the reader retries the update from the same remote server. If the reader cannot complete the update, a recovery web page appears when accessing the reader management interface via a web browser. To reattempt upgrade, enter the FTP server path and credentials.

Update Phases

The firmware update takes place in three phases:

- **Phase 1** - The reader application retrieves the **Response.txt**, **OSUpdFalcon.exe**, and **FlashUpdateUtility.dll** files from the ftp server.
- **Phase 2** - The reader application shuts down and the **OSUpdFalcon.exe** starts. The files referenced in the **Response.txt** file are retrieved from the FTP server and written to flash.
- **Phase 3** - The reader resets after all partitions update successfully. It may also update the RFID firmware if it detects a different version in the platform partition.

A typical entry in the **Response.txt** is:

;*Platform* partition version 31

-t4 –fFalPlat031.hex –s8680222

NOTE The Application Server, Radio API, and MAC firmware code all reside in the **Platform** partition.

The recovery console only supports the FTP mode update, and does not support secure FTP (FTP over TLS explicit) or CAB file update.

The **-t** parameter is the file type, **-f** is the name of the file, and **-s** the size. Ensure the file size is correct. **";"** comments out the rest of the line.

Updating Firmware via FTP

To update the firmware using the Administrator Console and an FTP server:

1. Create a folder on a local FTP server and name it: **\FXUPDT\ReleaseXXX**.
2. Download the firmware files from http://www.motorola.com/enterprisemobility/support. into this folder and unzip the files if they are zipped.
3. Ensure that the host computer can ping the readers. If they cannot, consult with the network administrator.
4. On the reader to update, access the web based **Administrator Console**:
   a. Open a browser and type the IP address or host name of the reader to update (format example: http://157.235.88.147). The **Reader Administrator Console** login screen appears. See *Connecting to the Reader on page 4-3*.
   b. Enter the user name and password. The default settings are:

      Username: **admin**

      Password: **change**

      The **Administrator Console Main Menu** appears. See *Figure 4-1 on page 4-2*.
5. Select **Update** below **Firmware**. The **Firmware Update** screen appears with the **FTP/FTPS Server** option selected. See *Figure 4-31 on page 4-34*.
6. To upgrade the firmware:
   a. Ensure the FTP server is running on the host computer, and that the file path is the same as when logging on using the FTP server.
   b. On the **Firmware Update** screen, enter in the following information:

      In the **FTP/FTPS Server Name or IP Address** field, enter *ftp://<ip address of host computer>/filepath (format example: ftp://192.168.1.3// FX UPDT/ReleaseXXX)*.

      Enter the FTP server **User Name**.

      Enter the FTP server **Password**.

      NOTE If using the default host computer FTP server, the system user name and password may be required (consult the system administrator).

   c. Click **Start Update** to start the update. The reader indicates that it is going to shutdown.
   d. The PWR LED on the reader flashes red during the update. The reader application software first downloads **osupFX.exe**, **FlashUpdateUtility.dll**, and **Response.txt** files, starts running **Osupdate**, and shuts down. **Osupdate** then downloads all the files specified in the **Response.txt** file into RAM, and if successful writes the files to Flash. If the FTP is not successful, no files are written to Flash and the STAT LED turns solid red.
   e. The update can take up to 15 minutes, depending on network load conditions and the number of partitions being updated. Do not remove power to the reader or reboot the reader during the update.
   f. The reader reboots when the update completes. The PWR LED eventually turns solid green to indicate that the update was successful and reader is operational.
7. Log onto the web console, access the **Firmware Version/Update** screen, and verify the new upgrade version is running. Some cases require the full version numbers for the software components. To do this, type http://*ip.ip.ip.ip*/Version.html in the browser, where *ip.ip.ip.ip* denotes the reader IP or host name.

Appendix D Java Install/Upgrade Procedures

Introduction

The FX Series reader browser interface requires Java JRE 1.6 or later. To confirm the Java version in the Internet Explorer web browser (version 6), go to **Tools** > **Internet Options** > **Advanced** tab:

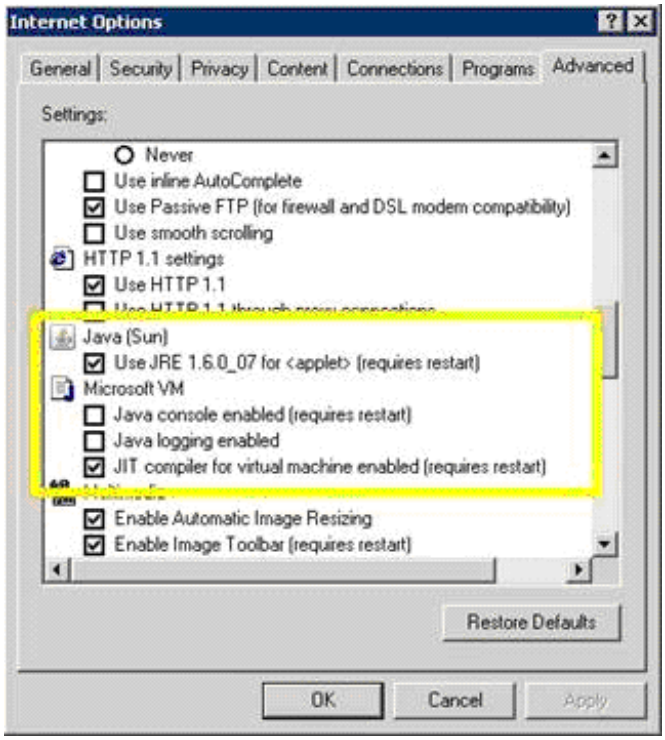

Figure D-1 *Java Version Window*

Install Java JRE 1.6 or later if the virtual machine configuration entries are missing, or if an earlier version is installed. Download Java runtime environment from http://www.java.com/en/download/manual.jsp

NOTE Newer Internet Explorer versions such as Version 7 and 8 and Firefox (Mozilla 3) support JRE by default. There is no need to install Java in these programs.

Clearing the Java Cache

When using the **Administrator Console**, clear the Java plug-in cache to load the latest information in the browser:

1. Select **Start** > **Control Panel.**
2. Double-click the Java icon to display the **Java Control Panel**.

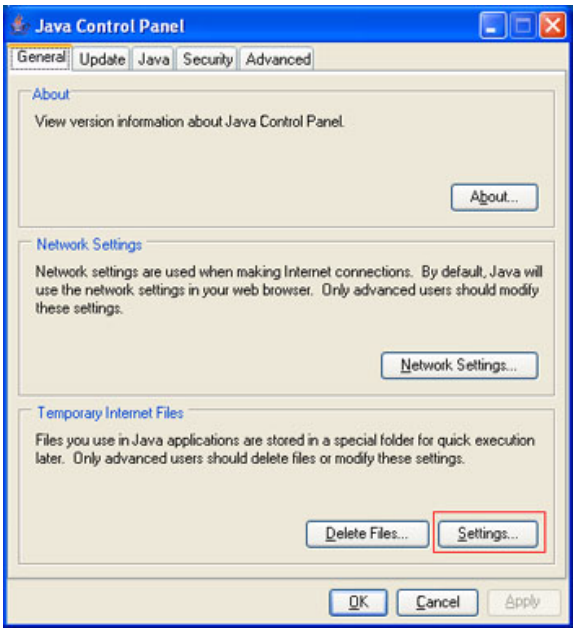

Figure D-2 *Java Control Panel*

3. Click **Settings** under **Temporary Internet Files**.

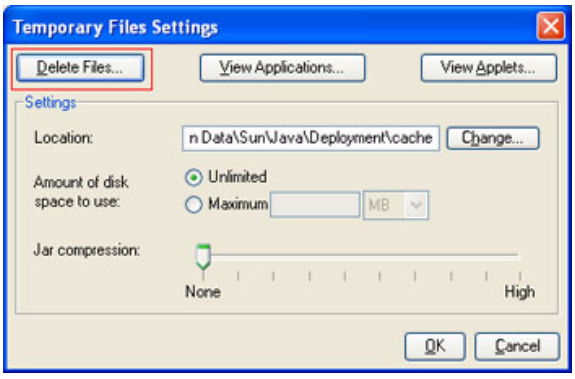

Figure D-3 *Java Temporary Internet Files Window*

4. Click **Delete Files** in the **Temporary Internet Files** window.

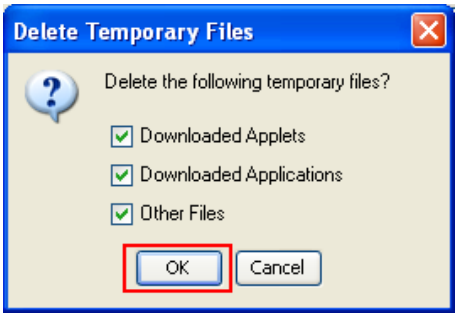

Figure D-4 *Java Delete Temporary Files Window*

5. Click **OK** to delete all files, applications, and applets from the cache.
6. Click **OK** on the **Temporary Files Settings** window.

Appendix E Static IP Configuration

Introduction

This appendix describes three methods of setting the static IP address on an FX7400 RFID Reader.

DHCP Network is Available - Set the Static IP Using the Web Console

1. Browse the device using the host name, e.g., FX7400CD3B1E.
2. Log onto the device.

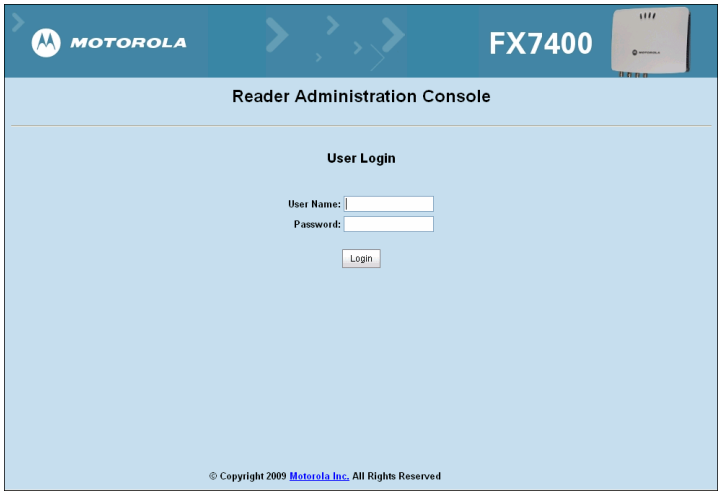

Figure E-1 *Reader Administration Console Login Window*

3. Click **Communication**.

4. Set **Obtain IP Address via DHCP** to **Off** and enter all required information.

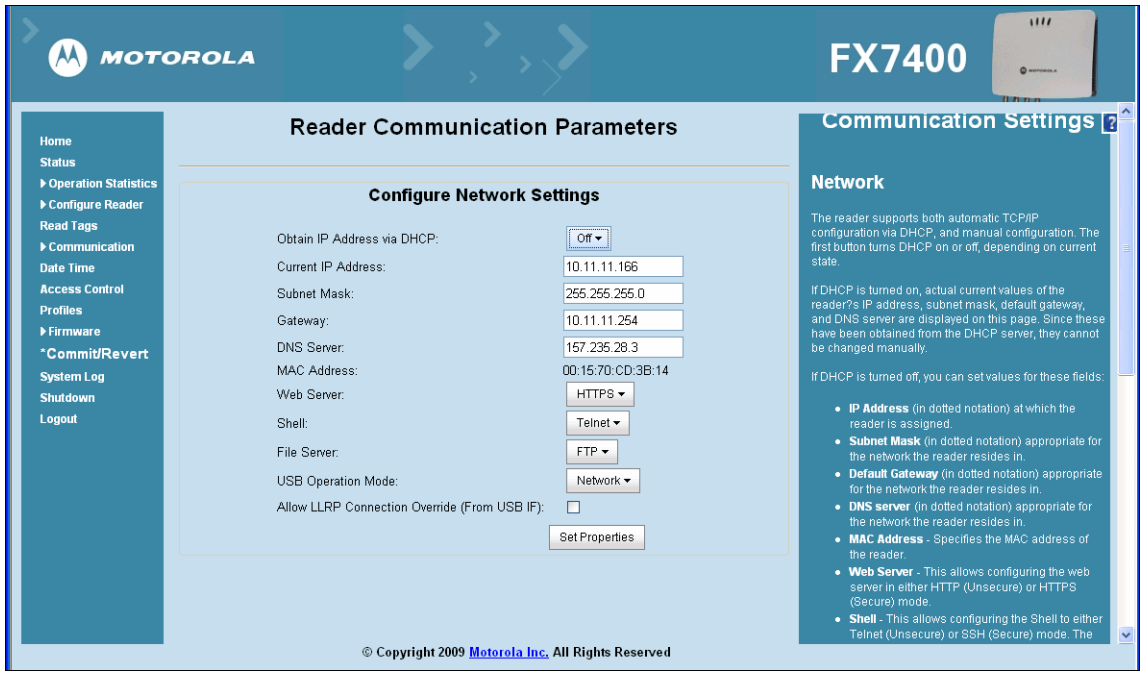

Figure E-2 *Reader Communication Parameters Window*

5. Click **Set Properties**. You can set a static IP that doesn't belong to this DHCP network.

6. Click **Commit/Discard**, then click the **Commit** button.

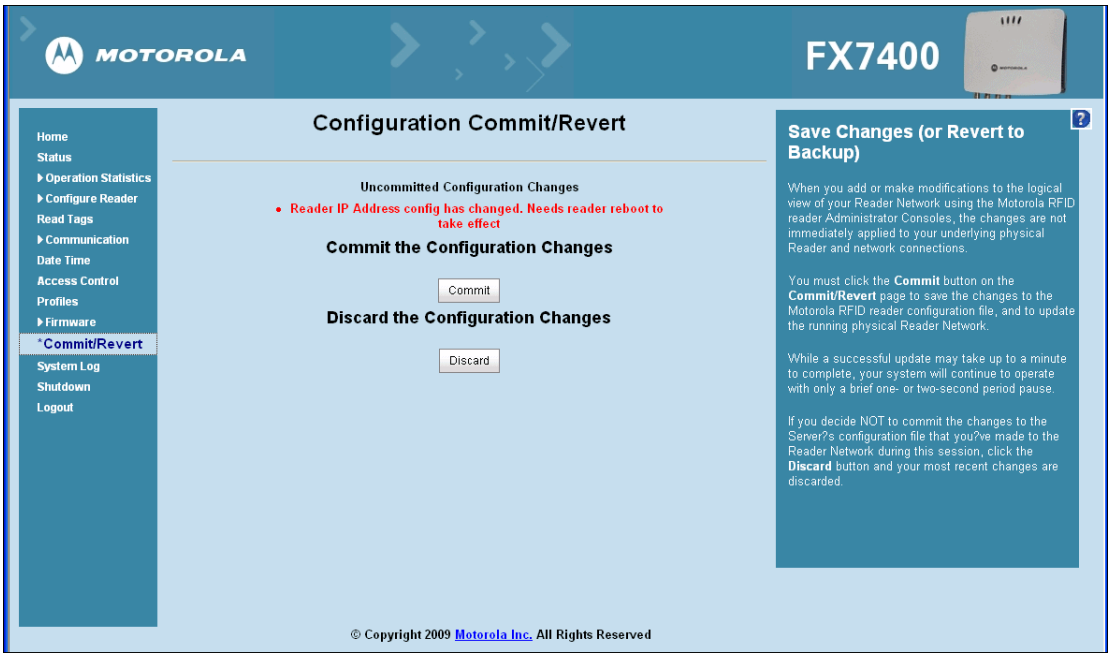

Figure E-3 *Commit/Discard Window*

7. The message **Reader IP Address config has changed. Needs reader reboot to take effect** appears. Reset the device and use the reader with the static IP network.

DHCP Network Not Available - Set the Static IP Using the Web Console

1. Connect the device and a PC running Windows XP to the same network that doesn't have a DHCP server, or connect the device directly to the PC.
2. Ensure both the device and PC Ethernet jack use at least one LED to indicate network connection detect.
3. If the PC uses an assigned static IP, update it to use DHCP. The PC obtains an IP that starts with **169**.

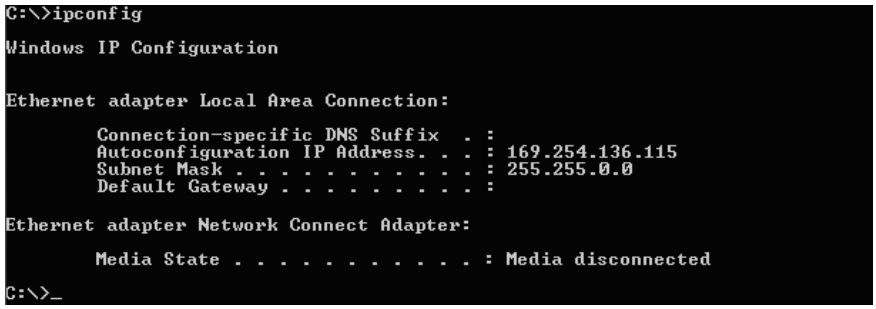

Figure E-4 *Obtain IP Address*

4. When possible, ping the hostname of the device.

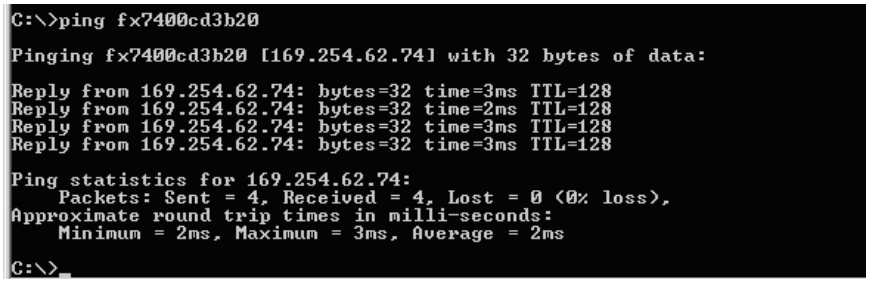

Figure E-5 *Ping the Hostname*

5. Browse the device with host name, e.g., FX7400CD3B1E.
6. Log onto the device.
7. Click **Communication**.

8. Set **Obtain IP Address via DHCP** to **Off** and enter all required information.

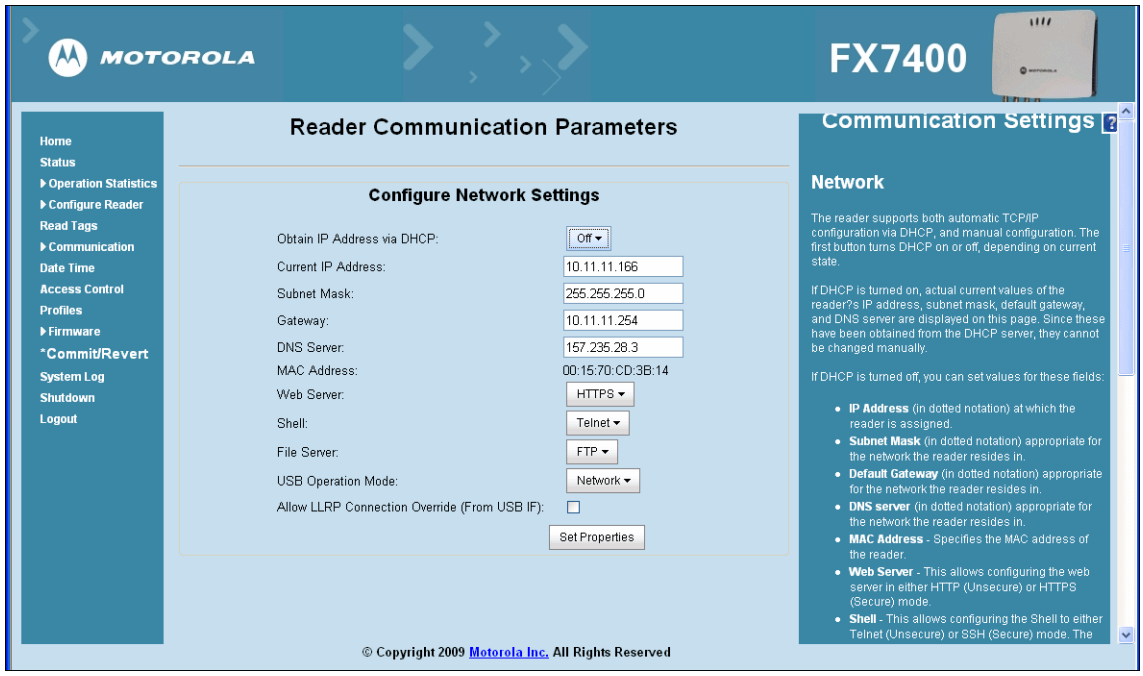

Figure E-6 *Reader Communication Parameters Window*

9. Click **Set Properties**.

10. Click **Commit/Discard**, then click the **Commit** button.

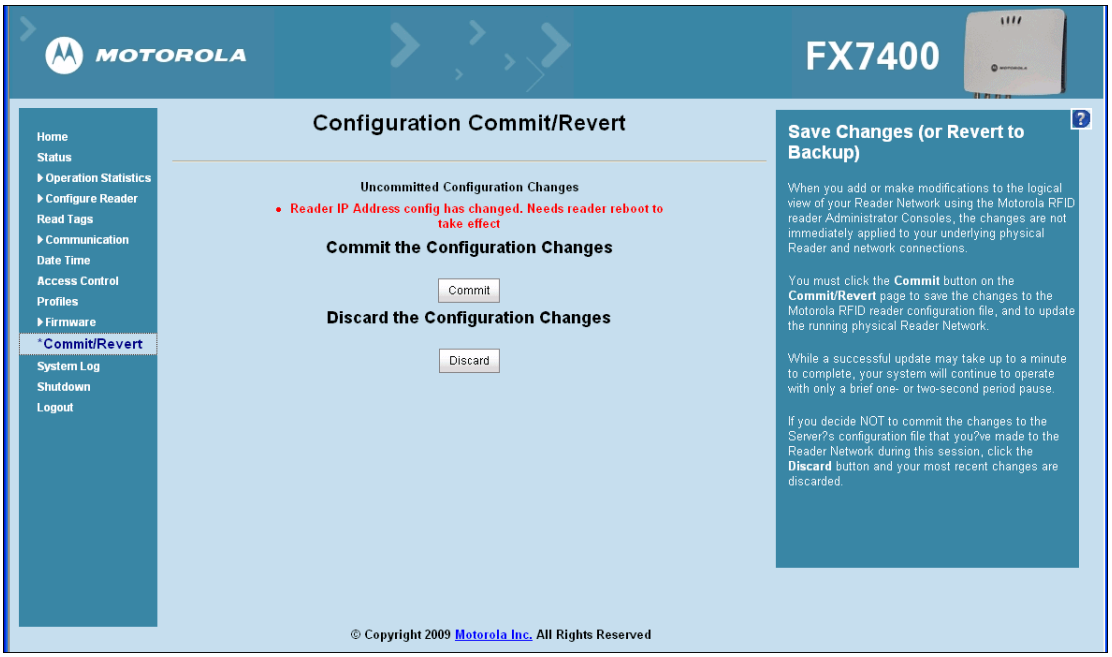

Figure E-7 *Commit/Discard Window*

11. The message **Reader IP Address config has changed. Needs reader reboot to take effect** appears. Reset the device and use the reader with the static IP network.

DHCP Network Not Available - Edit Configuration Files to Set the Static IP

Use this option to configure a static IP on the reader regardless of the host network settings:

1. Establish an ActiveSync connection over USB to the reader.
2. Browse to the **\ReaderConfig** directory on the reader. Copy **AdvReaderConfig.xml** from **\ReaderConfig** to a local folder.

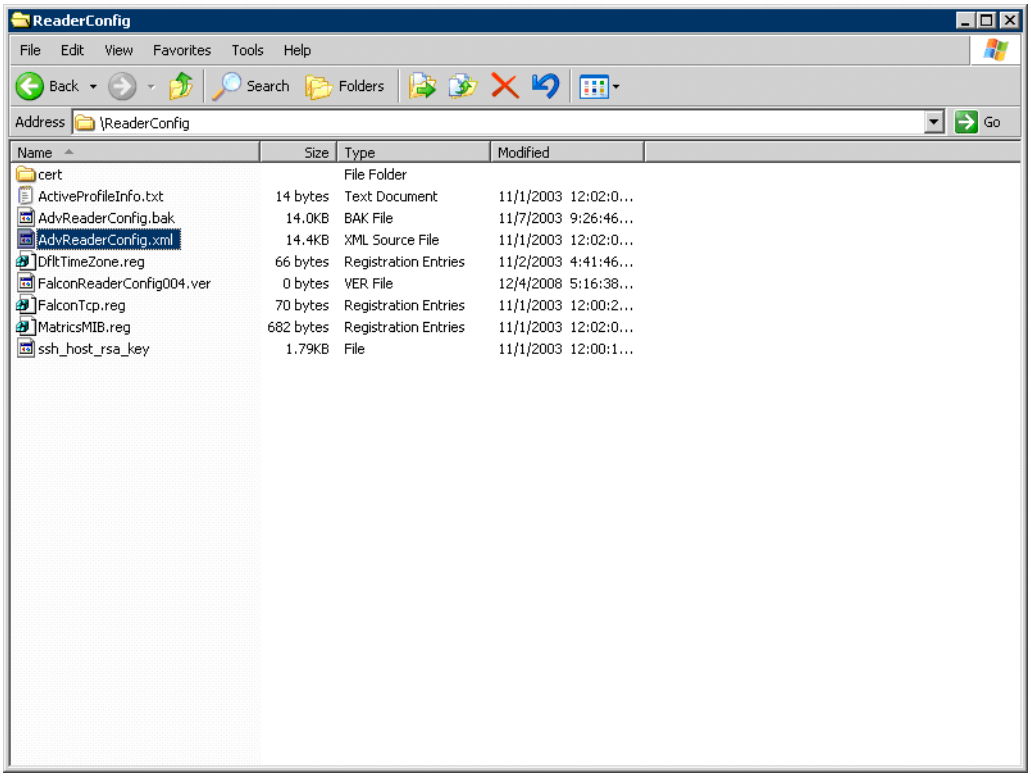

Figure E-8 *Copy AdvReaderConfig.xml*

3. Open **AdvReaderConfig.xml** in any text editor.

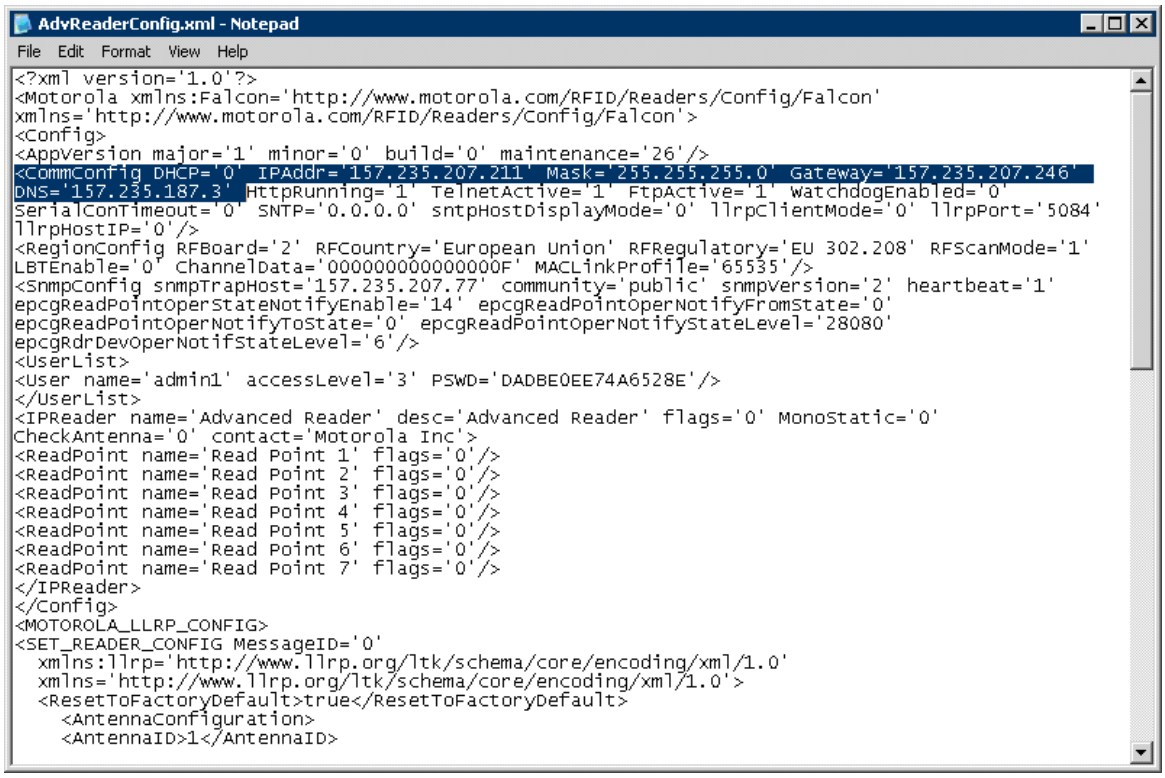

Figure E-9 *Copy AdvReaderConfig.xml*

4. Change **DHCP** to **0**, and set **IPAddr**, **Mask**, and optionally **Gateway** and **DNS** IP addresses to desired values.
5. Save the edited file locally.
6. Copy and replace the edited **AdvReaderConfig.xml file** in the **\ReaderConfig** directory.
7. Reset the reader twice as follows:
   a. Insert a paper clip into the reset hole for less than two seconds, or repower the unit. The Boot LED turns red, then remains amber during initialization. When the reader has initialized, the LED turns green.
   b. Reset the reader again as in Step a. When the Boot LED is green, the reader is ready and accessible using the configured IP.

Appendix F RF Air Link Configuration

Introduction

This appendix describes how to select air link configuration from a set of available air link profiles. *Table F-1* lists air link profiles available for FCC (US) based readers. FCC based readers by default use profile ID 2.

Table F-1 *Available Air Link Profiles for FCC (US) Based Readers*

Profile ID	Modulation Type	Tari (uS)	X	PW (uS)	Rtcal (uS)	Trcal (uS)	DR	M	TRExt	LF(KHz)	Data rate (kbps)
0	DSBASK	25	1	12.5	75	200	8	FM0	1	40	40
1	DSBASK	12.5	1	6.25	37.5	50	8	M=2	1	160	80
2	PR-ASK	25	0.5	12.5	62.5	85.33	21.33	M=4	1	250	62.5
3	PR-ASK	25	0.5	12.5	62.5	71.11	21.33	M=4	1	300	75
4	DSBASK	6.25	0.5	3.13	15.63	20	8	FM0	1	400	400
5	PR-ASK	25	0.5	12.5	62.5	85.33	21.33	M=2	1	250	125
6	PR-ASK	25	0.5	12.5	62.5	85.33	21.33	M=4	0	250	62.5
7	PR-ASK	25	0.5	12.5	62.5	71.11	21.33	M=4	0	300	75

Table F-2 lists the air link profiles available for ETSI (EU) based readers. ETSI based readers by default use profile ID 3.

Table F-2 *Available Air Link Profiles for ETSI (EU) Based Readers*

Profile ID	Modulation Type	Tari(uS)	X	PW (uS)	Rtcal (uS)	Trcal (uS)	DR	M	TRExt	LF(KHz)	Data rate (kbps)
2	PR-ASK	25	0.5	12.5	62.5	85.33	21.33	M=4	1	250	62.5
3	PR-ASK	25	0.5	12.5	62.5	71.11	21.33	M=4	1	300	75
5	PR-ASK	25	0.5	12.5	62.5	85.33	21.33	M=2	1	250	125
6	PR-ASK	25	0.5	12.5	62.5	85.33	21.33	M=4	0	250	62.5
7	PR-ASK	25	0.5	12.5	62.5	71.11	21.33	M=4	0	300	75

You currently can not change air link profiles through LLRP or on a reader web page. To change a profile, edit the reader configuration (profile) file and re-import it to the reader to specify the air link profile ID for the reader to use.

To change an air link profile, load or export a profile using either APIs or the **Profiles** web page. In the **Profiles** web page, export the profile that contains a new air link profile and save it to a local PC. Then use a text editor to edit the XML file. Following is an example of a reader profile:

```
<?xml version='1.0'?>
<Motorola xmlns:Falcon='http://www.motorola.com/RFID/Readers/Config/Falcon'
xmlns='http://www.motorola.com/RFID/Readers/Config/Falcon'>
<Config>
<AppVersion major='1' minor='0' build='0' maintenance='36'/>
<CommConfig DHCP='1' IPAddr='192.168.127.254' Mask='255.255.255.0' Gateway='0.0.0.0' DNS='0.0.0.0'
HttpRunning='1' TelnetActive='1' FtpActive='1' WatchdogEnabled='0' SerialConTimeout='0' SNTP='0.0.0.0'
sntpHostDisplayMode='0' llrpClientMode='0' llrpPort='5084' llrpHostIP='192.168.127.2'/>
<RegionConfig RFBoard='0' RFCountry='United States' RFRegulatory='US FCC 15' RFScanMode='0'
LBTEnable='0' ChannelData='FFFFFFFFFFFFFFF' MACLinkProfile='65535'/>
<SnmpConfig snmpVersion='1' heartbeat='1' epcgReadPointOperStateNotifyEnable='15'
epcgReadPointOperNotifyFromState='0' epcgReadPointOperNotifyToState='0'
epcgReadPointOperNotifyStateLevel='28080' epcgRdrDevOperNotifStateLevel='6'/>
<UserList>
<User name='admin' accessLevel='3' PSWD='DADBE0EE74A6528E'/>
</UserList>
<IPReader name='Advanced Reader' desc='Advanced Reader' flags='0' MonoStatic='0' CheckAntenna='0'
contact='Motorola Inc'>
<ReadPoint name='Read Point 1' flags='0'/>
<ReadPoint name='Read Point 2' flags='3'/>
<ReadPoint name='Read Point 3' flags='3'/>
<ReadPoint name='Read Point 4' flags='3'/>
<ReadPoint name='Read Point 5' flags='0'/>
<ReadPoint name='Read Point 6' flags='0'/>
```

```
<ReadPoint name='Read Point 7' flags='0'/>
</IPReader>
</Config>
<MOTOROLA_LLRP_CONFIG>
<SET_READER_CONFIG MessageID='0'
 xmlns:llrp='http://www.llrp.org/ltk/schema/core/encoding/xml/1.0'
 xmlns='http://www.llrp.org/ltk/schema/core/encoding/xml/1.0'>
 <ResetToFactoryDefault>true</ResetToFactoryDefault>
 </SET_READER_CONFIG>
</MOTOROLA_LLRP_CONFIG>
<RadioProfileData><RadioRegisterData Address='ffffffff' Data='0'/>
</RadioProfileData>
<CustomProfileData ForceEAPMode='0' MaxNumberOfTagsBuffered='512'/>
</Motorola >
```

Change the **MACLinkProfile** parameter to the desired air profile ID. For instance, for profile ID 5, change the XML text in bold in the previous example from **MACLinkProfile='65535'** to **MACLinkProfile='5'**. By default the **MACLinkProfile** is set to **65535** to indicate that the “default” air link profile ID is in place. The default air link profile ID depends on the reader regional configuration. After editing, import the profile back to the reader and activate it. Once activated, the new air link profile is in place and ready to use. A reboot is not necessary.

CAUTION Activating a custom profile that contains a change to the air link profile setting also changes the templates in the **Reader Profiles** window, causing the Default, Medium, and Large Tag Population templates to no longer have the default air link profile setting. See *Using Default Sample Profiles on page 4-29*.

RF Air Link Configuration over LLRP

The LLRP RF Control parameter can control air link configuration such as forward link and reverse link parameters. Refer to the **C1G2RFControl** Parameter in the LLRP specification. The list of supported modes is exposed as a list of individual **UHFC1G2RfModeTableEntry** parameters in regulatory capabilities.

The reader currently supports nine radio modes of operation. *Table F-3* shows the mapping of the LLRP mode index vs. the air link profile shown in *Table F-1* and *Table F-2*. Note that the LLRP index is one-based, and the air link profile ID configured directly in the reader configuration file is zero-based.

Table F-3 *LLRP Mode Index Mapping to Air Link Profile ID*

Mode Index in LLRP	Air Link Profile ID	Modulation Type	Tari (uS)	X	PW (uS)	Rtcal (uS)	Trcal (uS)	DR	M	TRExt	LF (KHz)	Data rate (kbps)
1	0	DSBASK	25	1	12.5	75	200	8	FM0	1	40	40
2	1	DSBASK	12.5	1	6.25	37.5	50	8	M=2	1	160	80
3	2	PR-ASK	25	0.5	12.5	62.5	85.33	21.33	M=4	1	250	62.5
4	3	PR-ASK	25	0.5	12.5	62.5	71.11	21.33	M=4	1	300	75
5	4	DSBASK	6.25	0.5	3.13	15.63	20	8	FM0	1	400	400
6	5	PR-ASK	25	0.5	12.5	62.5	85.33	21.33	M=2	1	250	125
7	6	PR-ASK	25	0.5	12.5	62.5	85.33	21.33	M=4	0	250	62.5
8	7	PR-ASK	25	0.5	12.5	62.5	71.11	21.33	M=4	0	300	75

In LLRP, Mode Index is reported as zero by default. A Mode Index value of 0 (not listed in *Table F-3*) is a special index that maps to different Mode Index depending on the regulatory region in use. For backward compatibility with the previous FX version, for FCC-based regulatory purposes, an RF Mode with Mode Index 0 maps to Mode Index 3, and for ETSI-based regulatory purposes, an RF Mode with Mode Index 0 maps to Mode Index 4.

Note that ETSI readers support only Mode Indexes 3, 4, 6, 7, and 8.

Table F-4 lists the various radio modes (1-8) and the values for different parameters. The details for this are returned as part of the LLRP Regulatory (**UHFBandCapabilities**) capabilities.

Table F-4 *Radio Modes*

Mode Index	Divide Ratio	BDR Value	M Value	FLM Value	PIE Value	Min Tari	Max Tari	Step Tari	Spectral Mask Indicator	EPC HAG T&C Conform-ance
1	8	40000	FM0	DSB_ASK	2000	25000	25000	0	Single Interrogator	true
2	8	80000	2	DSB_ASK	2000	12500	12500	0	Single Interrogator	true
3	64/3	62500	4	PR_ASK	1500	25000	25000	0	Dense Interrogator	true
4	64/3	75000	4	PR_ASK	1500	25000	25000	0	Dense Interrogator	true
5	8	400000	FM0	DSB_ASK	1500	6250	6250	0	Single Interrogator	true
6	64/3	125000	2	PR_ASK	1500	25000	25000	0	Dense Interrogator	true
7	64/3	62500	4	PR_ASK	1500	25000	25000	0	Dense Interrogator	true
8	64/3	75000	4	PR_ASK	1500	25000	25000	0	Dense Interrogator	true

One of these radio modes can be specified in the **C1G2RFControl** of the antenna configuration. This radio mode is used for the operation, which overwrites the reader configuration file setting.

Index

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