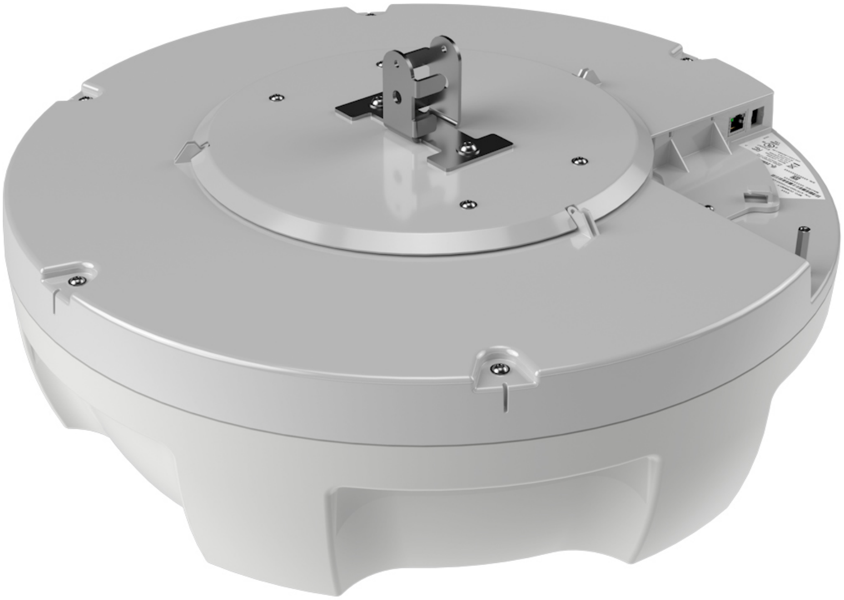
ATR7000

Advanced Array RFID Reader



Integration Guide

MN-003191-04EN

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Revision History

Changes to the original guide are listed below:

Change	Date	Description
-04 Rev A	11/2024	Updates: Added SSH Key Management in the Administrator Console section. Added SCP-based update in the Firmware Upgrade section. Added Security Recommendations.
-03 Rev A	3/2020	Updates: - Note about points to follow when powering the ATR7000 in the Ethernet: Power through PoE+ (802.3at) section. - PowerSession - Select Reader and Read Tags screens in the Reading Tags section. -Reader Parameters Window screen to show the current reader default setting, and the Power Negotiation bullet point in the Reader Parameters section.
-02 Rev A	4/2019	Updates: - Reserved Polarization added to Beam Configuration Table
-01 Rev A	9/2018	Initial Release

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About This Guide

Introduction

This Integration Guide provides information about installing, configuring, and using the ATR7000 Advanced Array RFID Reader and is intended for use by professional installers and system integrators. The ATR7000 reader is part of Zebra’s FX series fixed reader platform and provides real time, seamless tag processing for EPC Class1 Gen2 compliant tags.

The ATR7000 reader fulfills the RFID fixed reader infrastructure component of Zebra's Advanced Asset Tracking Solution (ZAATS) to provide continuous identification, location, and tracking of tagged items.

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

Chapter Descriptions

Topics covered in this guide are as follows:

- Quick Start provides a Quick Start tag reading demonstration.
- Getting Started provides the ATR7000 RFID fixed reader features, parts, and LED indications.
- Installation and Communication provides information on installing and setting up the ATR7000 reader.
- ATR Beam Configuration provides information so the user can control the beams in a pre-determined way and includes reference coordinate system information for ATR7000, beam configuration, and information about reading tags.
- Administrator Console describes how to connect to the reader and how to use the web-based Administrator Console to configure and manage the ATR7000 reader.
- Application Development provides information on developing applications for the ATR7000, and includes references to the appropriate guides.
- Firmware Upgrade provides reader firmware upgrade information on using the web-based Administrator Console and an FTP or FTPS server running a host computer.
- Troubleshooting describes ATR7000 reader troubleshooting procedures.
- Technical Specifications includes the technical specifications for the reader.
- Static IP Configuration describes three methods of setting the static IP address on an ATR7000 RFID reader.

- RF Air Link Configuration describes how to select air link configuration from a set of available air link profiles.
- Copying Files To and From the Reader describes the SCP, FTP, and FTPS protocols for copying files.
- Data Protection describes how the ATR7000 protects RFID data in transition.

Notational Conventions

The following conventions are used in this document:

- “RFID reader”, “RFID fixed reader”, or “reader” refers to the Zebra ATR7000 RFID reader.
- 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

The following documents provide more information about the reader.

- ATR7000 Advanced Array RFID Reader Quick Reference Guide (p/n MN-003193-xx).
- RFID Demo Applications User Guide (p/n 72E-160038-xx). Provides instructions for using sample applications such as PowerSession.
- RFID Reader Software Interface Control Guide (p/n 72E-131718-xx). Describes Low Level Reader Protocol (LLRP) and Reader Management (RM) extensions for the reader.
- FX Series Embedded SDK Installation Guide. Provides instructions for installing the embedded SDK for C and Java.
- FX Series Embedded SDK Sample Application Guide. Explains how to use the embedded sample application with an integrated development environment.
- FX Series Embedded SDK Programmers Guide. Provides instructions for creating embedded applications.
- RFID3 API
- EPCglobal Low Level Reader Protocol (LLRP) Standard

For the latest version of these guides and software, go to www.zebra.com/support.

Service Information

If you have a problem using the equipment, contact your facility's technical or systems support. If there is a problem with the equipment, they will contact the Zebra Global Customer Support Center at: www.zebra.com/support.

When contacting Zebra support, please have the following information available:

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

Zebra responds to calls by e-mail, telephone or fax within the time limits set forth in support agreements.

If your problem cannot be solved by Zebra support, you may need to return your equipment for servicing and will be given specific directions. Zebra is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty. If you purchased your business product from a Zebra business partner, contact that business partner for support.

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 on page 8
- Step 2, Connecting to the Reader on page 9
- Step 3, First Time / Start-Up Login on page 10
- Step 4, Set Region on page 11
- Step 5, Read Tags on page 13

Step 1, Setup

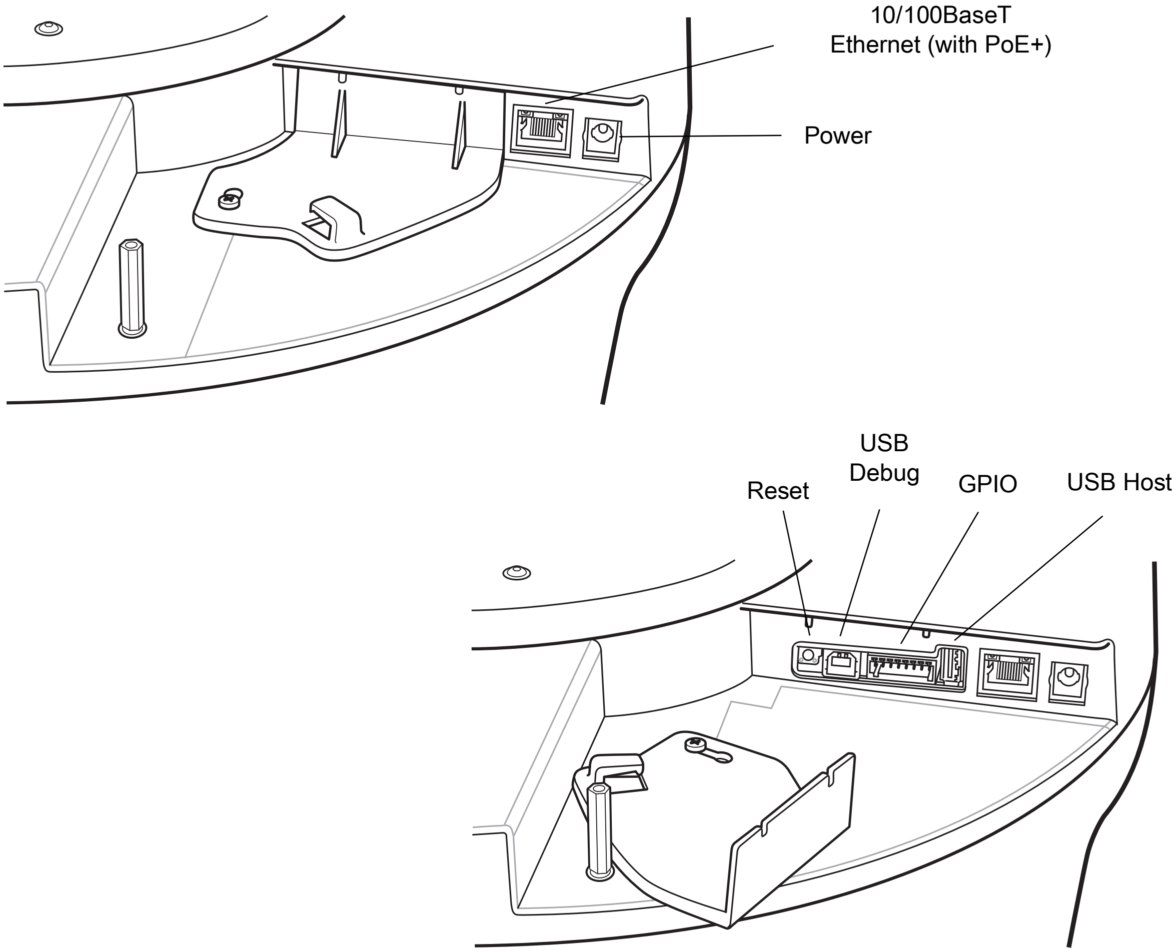
For information on complete component kits available from Zebra, see Technical Specifications.

1. Unpack the reader. See Unpacking the Reader on page 19.
2. Place the reader on a desktop.
3. Connect the Ethernet cable to the Ethernet port. See Figure 1.

NOTE: The factory default for the reader is DHCP enabled. 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.

4. To connect to power:
   - When using an AC power supply, connect the AC power supply to a power outlet and connect to the power port.
   - When using PoE+, plug the Ethernet cable into the PoE+ injector.
5. Wait for the green power LED to stay lit, boot up time is approximately 60 seconds. See System Start-up/Boot LED Sequence on page 30 for additional boot-up details.

Figure 1 ATR7000 RFID Fixed Reader Side Panel Connections



Step 2, Connecting to the Reader

To connect via host name:

1. Open a browser. The minimum browser recommendations are IE11 (disabling Compatibility View is recommended), Chrome v58, and FireFox v54**.**
2. Enter the host name followed by the last three octets of the MAC, provided on a label on the reader, in the browser (For example, for an ATR7000 MAC address of 0023683BA63A, use the prefix ATR7000, followed by 3BA63A. Enter http://ATR70003BA63A in the browser address bar) and press **Enter**. The **User Login** window appears and the reader is ready.

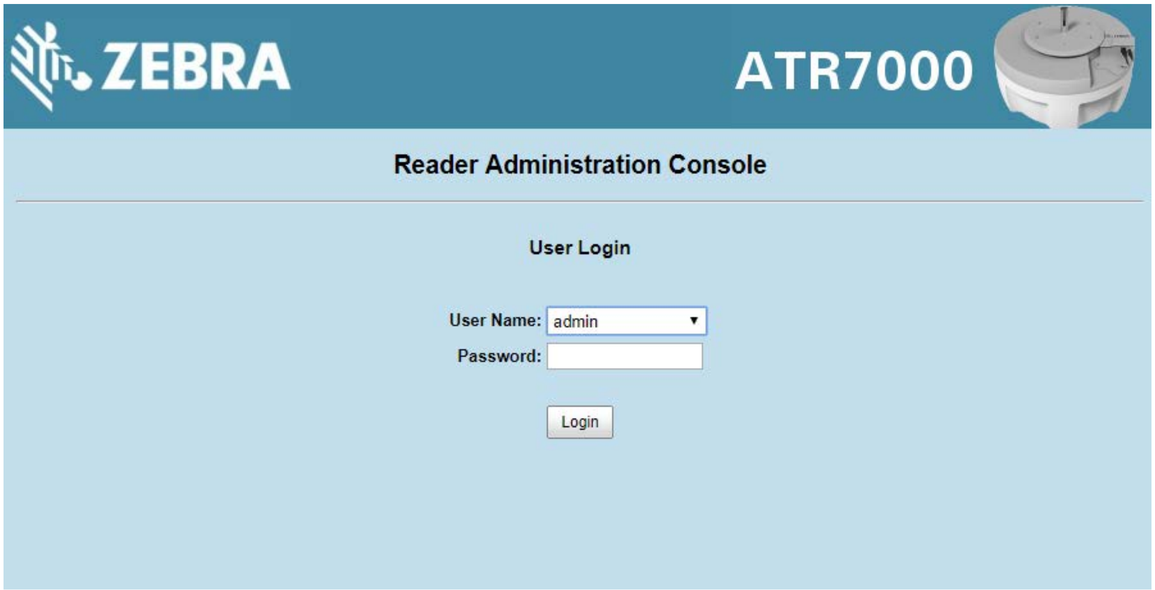
NOTE: Connect the reader to a network that supports host name registration and lookup to ensure the network can access the reader using the host name. For instance, some networks can register host names through DHCP. When first connecting to the reader, it is recommended to keep DHCP enabled in both the PC and in the reader, although it is not guaranteed that host name will work all the time. Use the host name printed on the reader label, or construct it using the reader MAC address on the bottom of the reader.

Step 3, First Time / Start-Up Login

When starting the reader for the first time:

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

Figure 2 User Login Window



Reader Administration Console

User Login

User Name: admin

Password:

NOTE: If you forget the user ID and/or password, see Reset to Factory Defaults LED Sequence on page 30 to reset the reader to factory defaults, and then select **admin** for the user name and enter **change** in the password field to regain access.

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 27 on page 38.

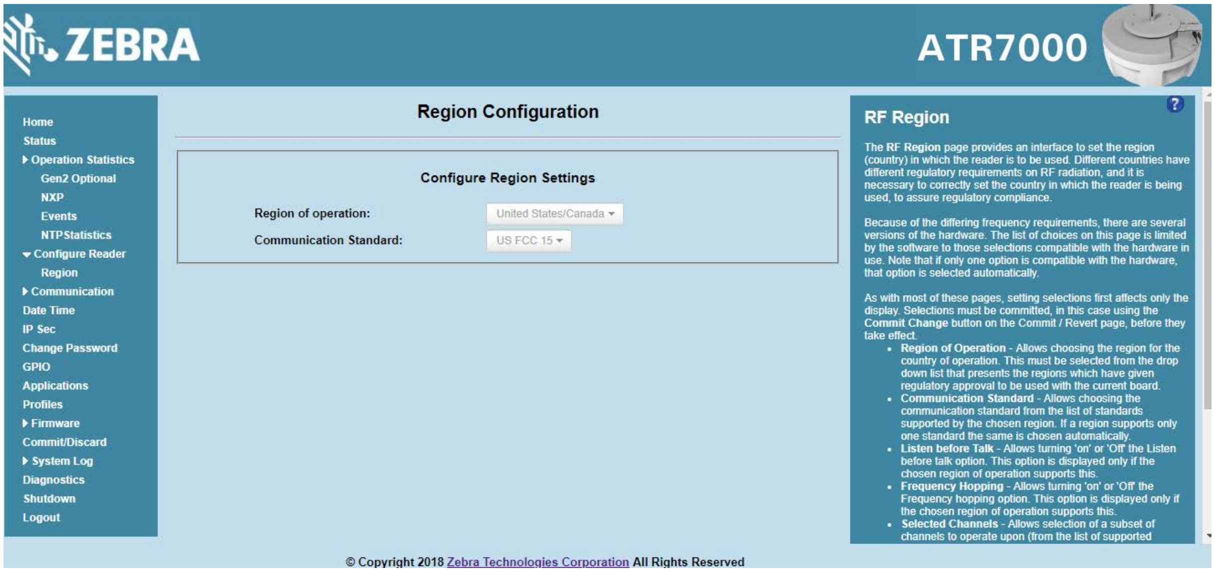
Step 4, Set Region

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 3 Selecting the Region



Region Configuration

Configure Region Settings

Region of operation: United States/Canada

Communication Standard: US FCC 15

RF Region

The **RF Region** page provides an interface to set the region (country) in which the reader is to be used. Different countries have different regulatory requirements on RF radiation, and it is necessary to correctly set the country in which the reader is being used, to assure regulatory compliance.

Because of the differing frequency requirements, there are several versions of the hardware. The list of choices on this page is limited by the software to those selections compatible with the hardware in use. Note that if only one option is compatible with the hardware, that option is selected automatically.

As with most of these pages, setting selections first affects only the display. Selections must be committed, in this case using the **Commit Change** button on the Commit / Revert page, before they take effect.

- **Region of Operation** - Allows choosing the region for the country of operation. This must be selected from the drop down list that presents the regions which have given regulatory approval to be used with the current board.
- **Communication Standard** - Allows choosing the communication standard from the list of standards supported by the chosen region. If a region supports only one standard the same is chosen automatically.
- **Listen before Talk** - Allows turning 'on' or 'Off' the Listen before talk option. This option is displayed only if the chosen region of operation supports this.
- **Frequency Hopping** - Allows turning 'on' or 'Off' the Frequency hopping option. This option is displayed only if the chosen region of operation supports this.
- **Selected Channels** - Allows selection of a subset of channels to operate upon (from the list of supported

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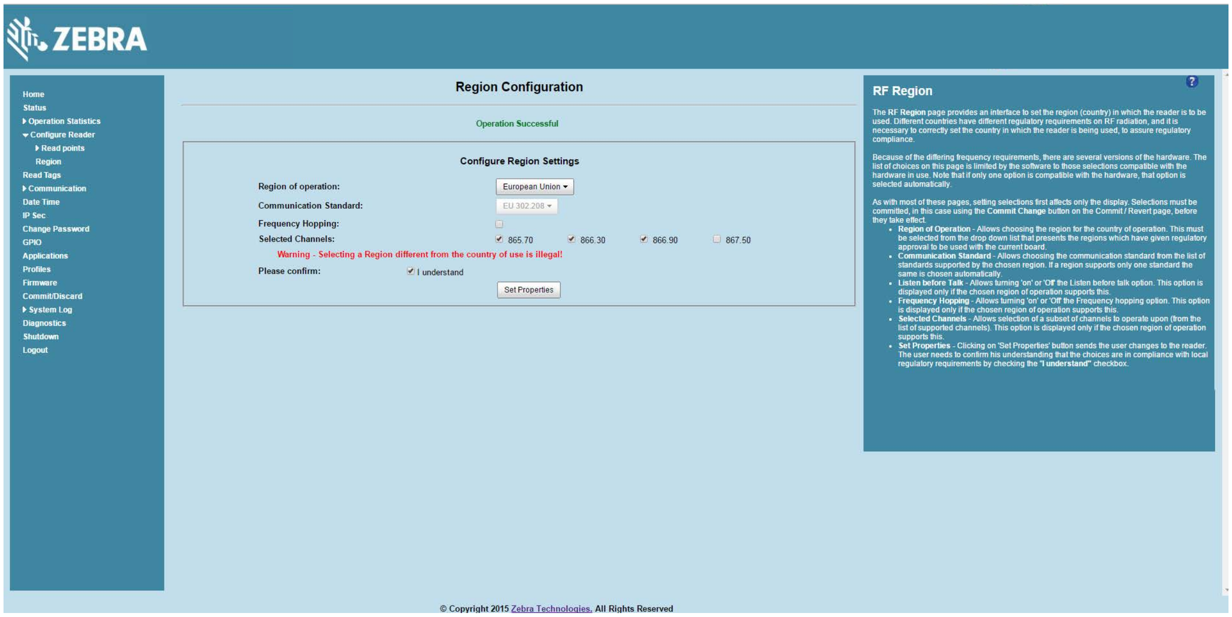
2. Select the **Communication Standard**, if applicable.
3. Select **Frequency Hopping**, if applicable.
4. Select the appropriate channel(s), if applicable.
5. Select the **I understand** check box.
6. Select **Set Properties** to complete the region selection. The **Operation Successful** window appears.

Figure 4 Region Configuration, Operation Successful Window



Region Configuration

Operation Successful

Configure Region Settings

Region of operation: European Union

Communication Standard: EU 302.208

Frequency Hopping: □

Selected Channels: ☑ 865.70 ☑ 866.30 ☑ 866.90 □ 867.50

Warning - Selecting a Region different from the country of use is illegal!

Please confirm: ☑ I understand

RF Region

The RF **Region** page provides an interface to set the region (country) in which the reader is to be used. Different countries have different regulatory requirements on RF radiation, and it is necessary to correctly set the country in which the reader is being used, to assure regulatory compliance.

Because of the differing frequency requirements, there are several versions of the hardware. The list of choices on this page is limited by the software to those selections compatible with the hardware in use. Note that if only one option is compatible with the hardware, that option is selected automatically.

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- **Frequency Hopping** - Allows turning 'on' or 'Off' the Frequency hopping option. This option is displayed only if the chosen region of operation supports this.
- **Selected Channels** - Allows selection of a subset of channels to operate upon (from the list of supported channels). This option is displayed only if the chosen region of operation supports this.
- **Set Properties** - Clicking on 'Set Properties' button sends the user changes to the reader. The user needs to confirm his understanding that the choices are in compliance with local regulatory requirements by checking the **"I understand"** checkbox.

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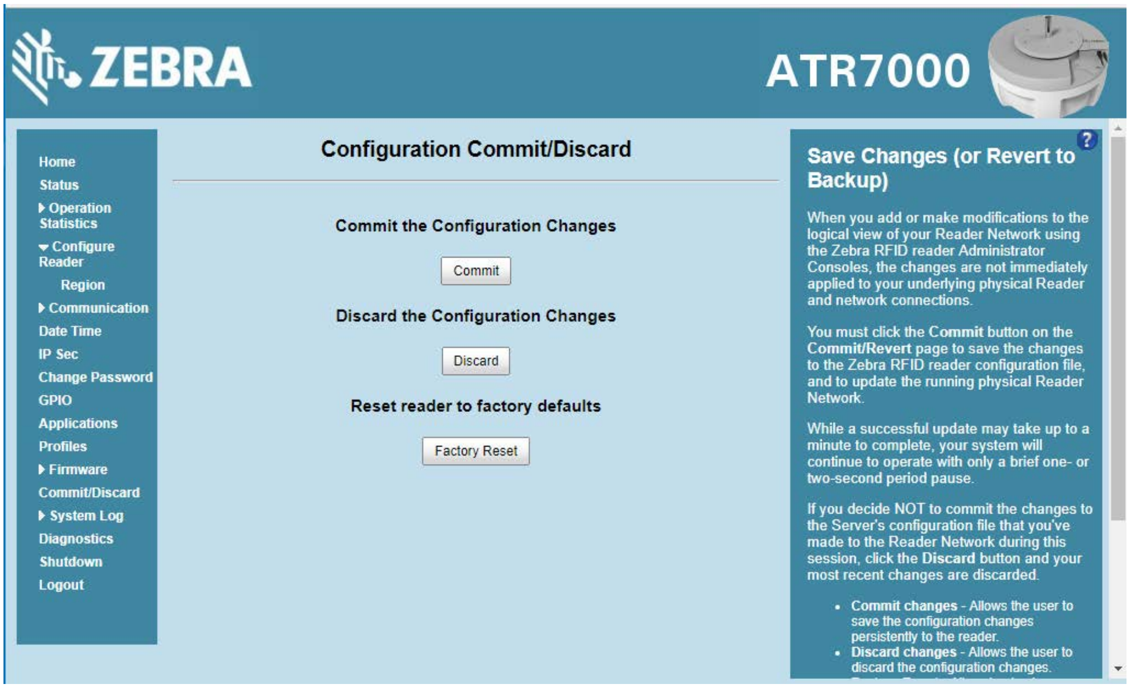
7. Select **Commit/Discard**.

Figure 5 Commit/Discard Window



Configuration Commit/Discard

Commit the Configuration Changes

Discard the Configuration Changes

Reset reader to factory defaults

Save Changes (or Revert to Backup)

When you add or make modifications to the logical view of your Reader Network using the Zebra RFID reader Administrator Consoles, the changes are not immediately applied to your underlying physical Reader and network connections.

You must click the **Commit** button on the **Commit/Revert** page to save the changes to the Zebra RFID reader configuration file, and to update the running physical Reader Network.

While a successful update may take up to a minute to complete, your system will continue to operate with only a brief one- or two-second period pause.

If you decide NOT to commit the changes to the Server's configuration file that you've made to the Reader Network during this session, click the **Discard** button and your most recent changes are discarded.

- **Commit changes** - Allows the user to save the configuration changes persistently to the reader.
- **Discard changes** - Allows the user to discard the configuration changes.

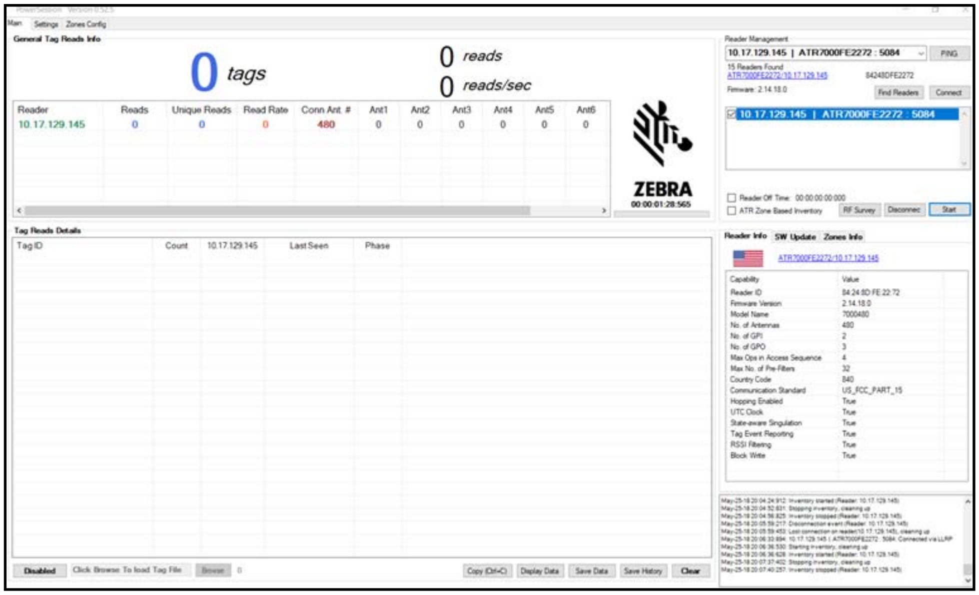
8. Click **Commit** to save the new region configuration and apply these changes to the reader configuration file, or click **Discard** to discard the region configuration changes. When the commit completes, the **Commit Successful** window appears.

Step 5, Read Tags

1. Open the PowerSession demonstration application. Refer to the RFID Demo Applications User Guide for installation instructions.
2. Click **Find Readers** to list all ATR7000 readers on the network in the **Reader Management** section, and then select the desired reader.

   Alternatively, enter the reader IP address or hostname in the list box.

Figure 6 PowerSession - Select Reader



0 tags

0 reads

0 reads/sec

Reader	Reads	Unique Reads	Read Rate	Conn Ant. #	Ant1	Ant2	Ant3	Ant4	Ant5	Ant6
10.17.129.145	0	0	0	480	0	0	0	0	0	0

Tag Reads Details

Tag ID	Count	10.17.129.145	Last Seen	Phase

10.17.129.145 | ATR7000FE2272 : 5084

15 Readers Found

ATR7000FE2272/10.17.129.145 84248DFE2272

Firmware: 2.14.18.0

☑ 10.17.129.145 | ATR7000FE2272 : 5084

□ Reader Off Time: 00:00:00:00:000

□ ATR Zone Based Inventory

ATR7000FE2272/10.17.129.145

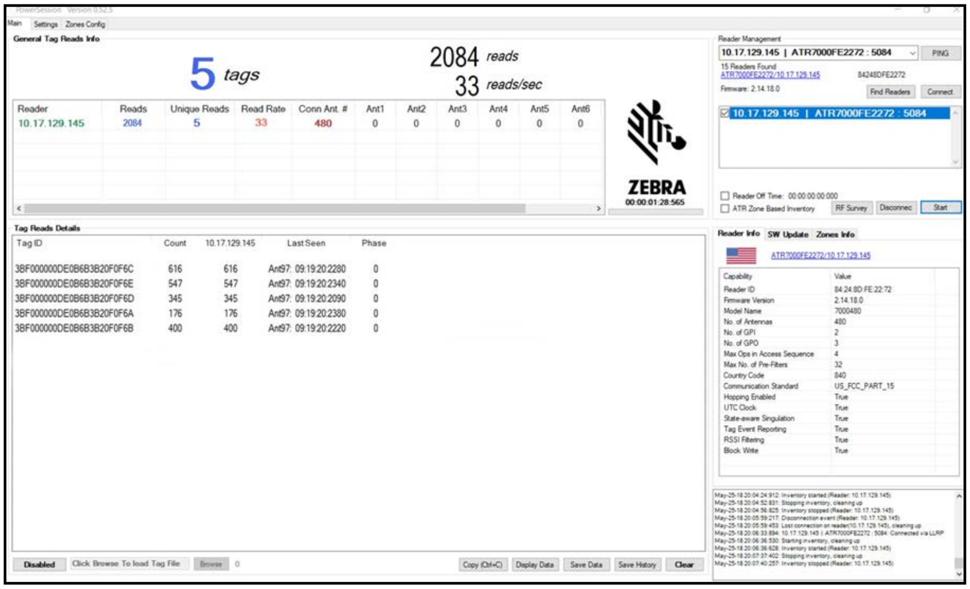
Capability	Value
Reader ID	84:24:8D:FE:22:72
Firmware Version	2.14.18.0
Model Name	7000480
No. of Antennas	480
No. of GPI	2
No. of GPO	3
Max Ops in Access Sequence	4
Max No. of Pre-Filters	32
Country Code	840
Communication Standard	US_FCC_PART_15
Hopping Enabled	True
UTC Clock	True
State-aware Singulation	True
Tag Event Reporting	True
RSSI Filtering	True
Block Write	True

```
May-25-18 20:04:24:912: Inventory started (Reader: 10.17.129.145)
May-25-18 20:04:52:831: Stopping inventory, cleaning up
May-25-18 20:04:56:825: Inventory stopped (Reader: 10.17.129.145)
May-25-18 20:05:59:217: Disconnection event (Reader: 10.17.129.145)
May-25-18 20:05:59:453: Lost connection on reader(10.17.129.145), cleaning up
May-25-18 20:06:33:894: 10.17.129.145 | ATR7000FE2272 : 5084: Connected via LLRP
May-25-18 20:06:36:530: Starting inventory, cleaning up
May-25-18 20:06:36:628: Inventory started (Reader: 10.17.129.145)
May-25-18 20:07:37:402: Stopping inventory, cleaning up
May-25-18 20:07:40:257: Inventory stopped (Reader: 10.17.129.145)
```

0

3. Click **Connect** to connect to the reader.
4. Click **Start** to inventory tags. Tags in the field of view appear in the **Tag Reads Details** section.

Figure 7 PowerSession - Read Tags



5 tags

2084 reads

33 reads/sec

Reader	Reads	Unique Reads	Read Rate	Conn Ant. #	Ant1	Ant2	Ant3	Ant4	Ant5	Ant6
10.17.129.145	2084	5	33	480	0	0	0	0	0	0

Tag Reads Details

Tag ID	Count	10.17.129.145	Last Seen	Phase
3BF000000DE0B6B3B20F0F6C	616	616	Ant97: 09:19:20:2280	0
3BF000000DE0B6B3B20F0F6E	547	547	Ant97: 09:19:20:2340	0
3BF000000DE0B6B3B20F0F6D	345	345	Ant97: 09:19:20:2090	0
3BF000000DE0B6B3B20F0F6A	176	176	Ant97: 09:19:20:2380	0
3BF000000DE0B6B3B20F0F6B	400	400	Ant97: 09:19:20:2220	0

10.17.129.145 | ATR7000FE2272 : 5084

15 Readers Found

ATR7000FE2272/10.17.129.145 84248DFE2272

Firmware: 2.14.18.0

☑ 10.17.129.145 | ATR7000FE2272 : 5084

□ Reader Off Time: 00:00:00:00:000

□ ATR Zone Based Inventory

ATR7000FE2272/10.17.129.145

Capability	Value
Reader ID	84:24:8D:FE:22:72
Firmware Version	2.14.18.0
Model Name	7000480
No. of Antennas	480
No. of GPI	2
No. of GPO	3
Max Ops in Access Sequence	4
Max No. of Pre-Filters	32
Country Code	840
Communication Standard	US_FCC_PART_15
Hopping Enabled	True
UTC Clock	True
State-aware Singulation	True
Tag Event Reporting	True
RSSI Filtering	True
Block Write	True

```
May-25-18 20:04:24:912: Inventory started (Reader: 10.17.129.145)
May-25-18 20:04:52:831: Stopping inventory, cleaning up
May-25-18 20:04:56:825: Inventory stopped (Reader: 10.17.129.145)
May-25-18 20:05:59:217: Disconnection event (Reader: 10.17.129.145)
May-25-18 20:05:59:453: Lost connection on reader(10.17.129.145), cleaning up
May-25-18 20:06:33:894: 10.17.129.145 | ATR7000FE2272 : 5084: Connected via LLRP
May-25-18 20:06:36:530: Starting inventory, cleaning up
May-25-18 20:06:36:628: Inventory started (Reader: 10.17.129.145)
May-25-18 20:07:37:402: Stopping inventory, cleaning up
May-25-18 20:07:40:257: Inventory stopped (Reader: 10.17.129.145)
```

0

Getting Started

Introduction

This chapter provides the ATR7000 RFID fixed reader features, parts, and LED indications.

Features

The ATR7000 RFID reader is based on Zebra's FX Series fixed reader platform and is easy to use, deploy, and manage. The RFID read performance provides real-time, seamless EPC-compliant tags processing for inventory management and asset tracking applications in large scale deployments.

The ATR7000 RFID reader provides a wide range of features that enable implementation of complete, high-performance, intelligent RFID solutions.

Table 1 ATR7000 RFID Reader Features

Feature	Zebra ATR7000
Air Protocol	ISO 18000-63 (EPC Class 1 Gen2 V2)
Operating System	Linux
Operating Temperature	-20° to +55° C
Antenna Elements	14 (internal)
Power Supply	+24V DC, POE+
API	RFID3
GPIO	2 Input, 3 Output
Maximum RF Output Power	+36 dBm EIRP
RX Sensitivity	-85 dBm
IP Sealing	IP51
Power-Over-Ethernet	802.3at
Embedded Applications	Yes
Wi-Fi/Bluetooth Dongle Support	Future

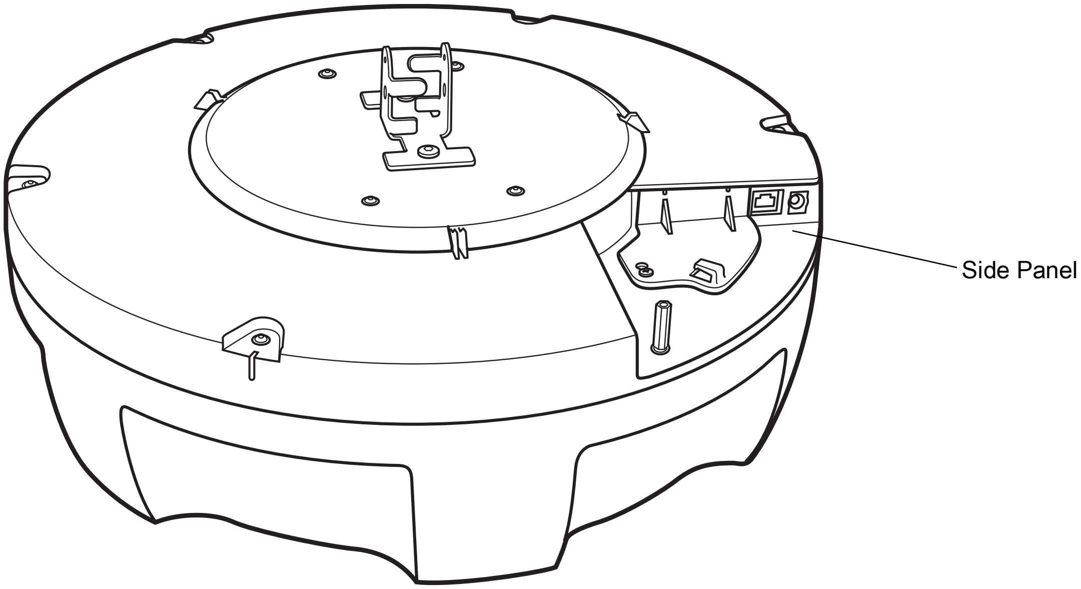
Table 1 ATR7000 RFID Reader Features

Feature	Zebra ATR7000
SDKs	
Embedded Applications: Host Based Applications:	C, Java C, Java, Net

ATR7000 Parts

ATR7000 Side Panel

Figure 8 ATR7000 RFID Reader



CAUTION: Use only parts provided with the ATR7000 RFID reader, or Zebra approved/recommended parts. Substituting other cables or parts can degrade system performance, damage the reader, and/or void the warranty.

ATR7000 Side Panel Components

Figure 9 ATR7000 RFID Reader Side Panel Connections

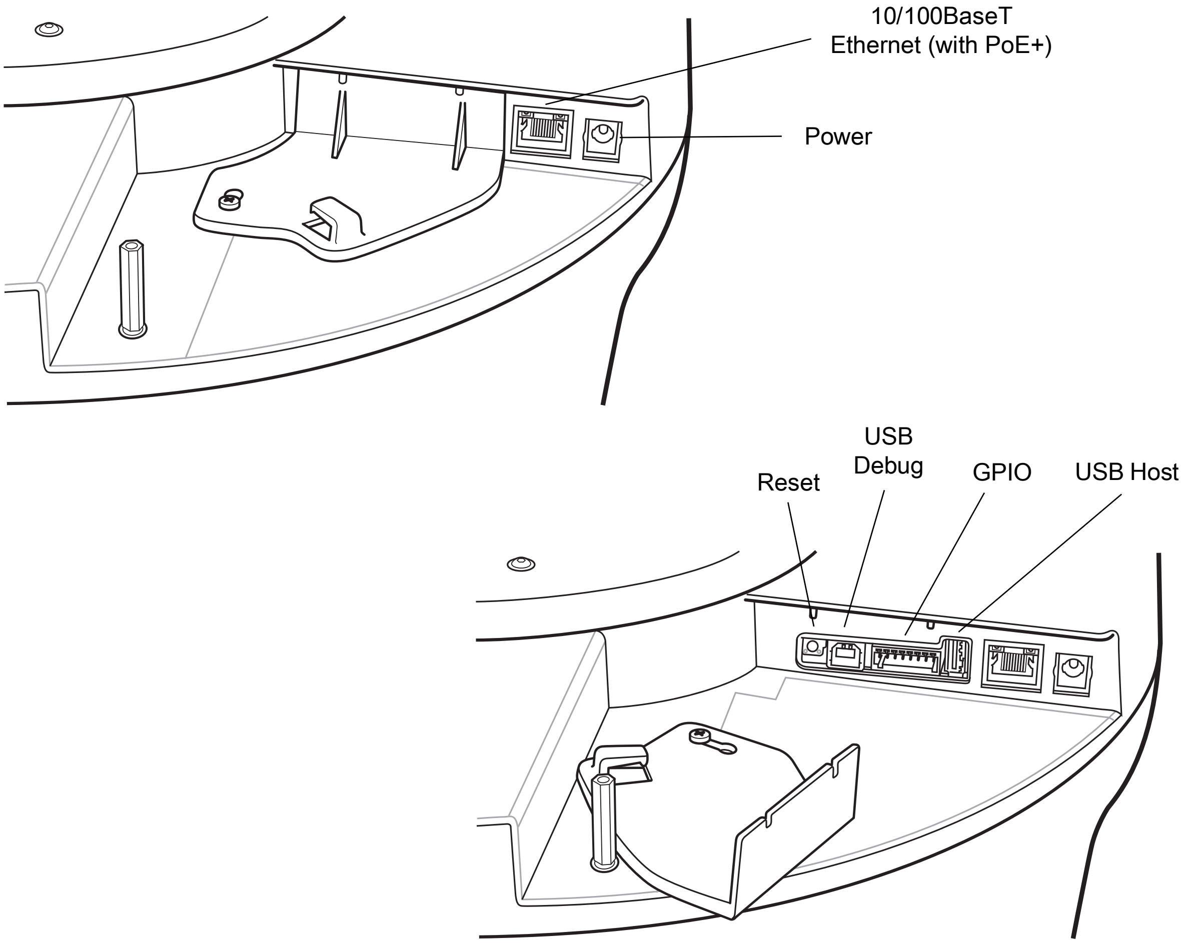


Table 2 Side Panel Descriptions

Port	Description
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 27 for connection information.
Power	DC connector connects to a Zebra approved, certified LPS rated power supply. Rated 24 VDC, 3.25 A min., 55 deg. C.
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	See GPIO Interface Connection on page 28 for more information.
USB Debug	USB debug port is for log purposes and only for use by technicians.
USB Host	The USB host port is reserved for future use.

ATR7000 LED

The reader LED indicates reader status as described in Table 3. For the LED boot up sequence see System Start-up/Boot LED Sequence on page 30.

Figure 10 ATR7000 RFID Reader LED

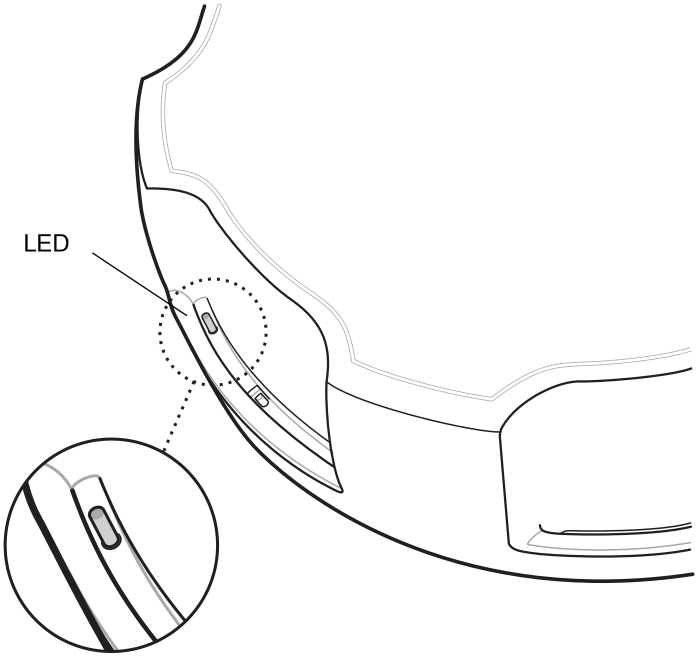


Table 3 ATR7000 LED Indications

Color/Status	Description	Transition Time
Off	Reader is powered off	
Solid Red, then Solid Amber	Power applied to reader and reader booting	Transition from Off to Solid Red happens in around a second. Transition from Solid Red to Amber happens in a second, then remains in Amber state for around 40 seconds.
Slow Blinking Green	Sub-components and application initializing	Reader typically remains in this state for 10 seconds, but can be up to 70 seconds if sub-components need software update, which usually happens on first bootup of the reader after deployment or first bootup as part of a reader software upgrade.
Solid Green	Applications up and ready for operation	
Fast Blinking Green	Continuous reading (inventory) of tags	
Fast Blinking Green with Intermittent Amber/Red	Reader operations on tags with intermittent errors	

Color/Status	Description	Transition Time
Solid Amber	Ethernet cable not connected	State changes to solid green if Ethernet link is restored
Repeated Blinking Red Followed By Blinking Green	Antenna port is faulty	
Solid Red	Hard Error	

Installation and Communication

Introduction

⚠ **CAUTION:** The ATR7000 RFID reader must be professionally installed.

This chapter includes the following ATR7000 RFID reader installation and communication procedures:

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.

Installing the ATR7000 in an Open Ceiling

WARNING: Do not install the ATR7000 in an Environmental Air Handling Space (EAHS).

Depending on the site truss configuration, the ATR7000 can be mounted directly to the truss, or to a strut channel secured to the trusses.

Required Equipment

- ATR7000 reader
- Telescoping pole mounting kit (multiple length ranges available).

NOTE: Mounting pole must be UL certified model rated to support 12 lb min. load.

Additional Equipment (Not Included, Dependent on Installation Requirements)

- SK5500-SR0 adapter kit, includes VESA bracket, nest, hand mount, and mounting screws

Tools Required

- Level
- Laser length measuring device
- Lift platform
- Set of wrenches and screw drivers
- Beam clamps (varied based on I-beam types)
- Miscellaneous: gloves, ties, extra hardware as needed.

Installation Options

The ATR7000 reader is designed to be installed overhead at a typical height (off the floor) between 12’ and 18’. Select one of the following three options for mounting the ATR7000 that best suits the installation environment:

- Installing Directly on the Truss on page 21
- Installing Using a Strut Channel Clamped to the Bottom of the Truss on page 22
- Installing Using a Strut Channel and Threaded Rods Clamped to the Top of the Truss on page 23

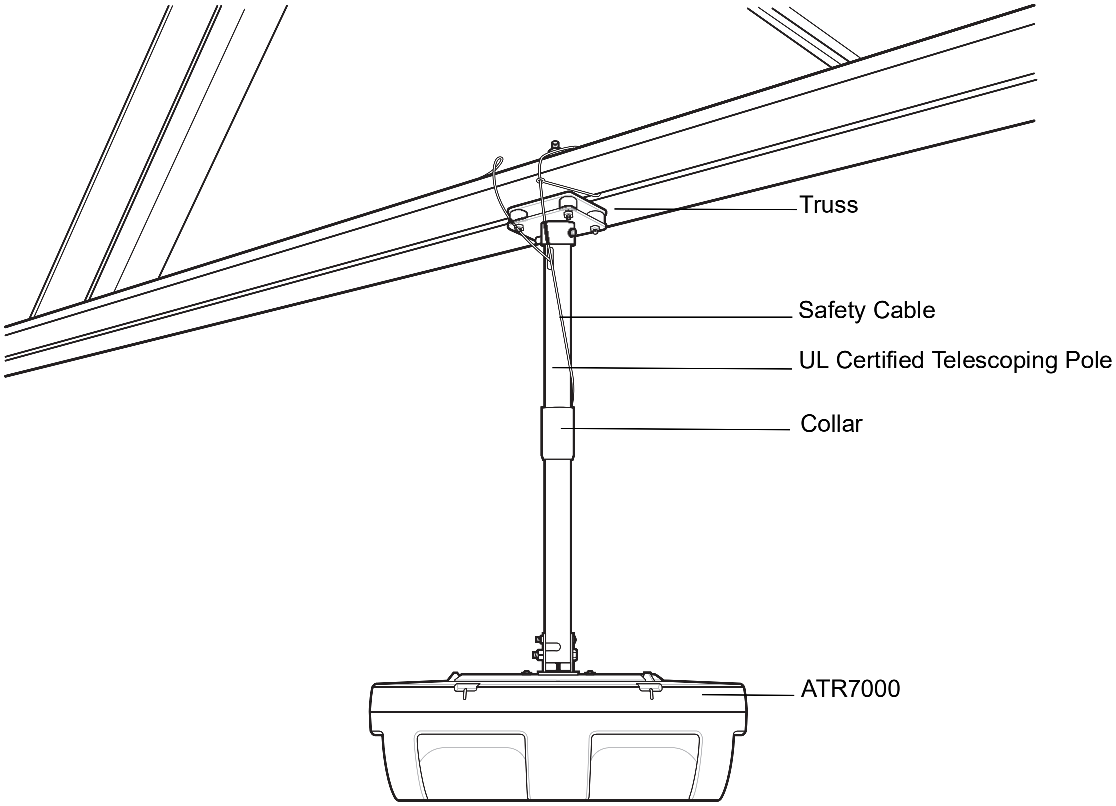
After selecting the installation configuration, proceed to Mounting the ATR7000 on page 24.

Installing Directly on the Truss

For locations with high ceilings where the bottom of the trusses are at least 14 ft from the floor, ATR7000 devices can be mounted directly to the truss using UL certified mounting pole (not included).

NOTE: Refer to the site survey report for the proper mounting height of each ATR7000. In general, this is 12 ft from the bottom of the device to the floor.

Figure 11 Installing the ATR7000 Directly on the Truss

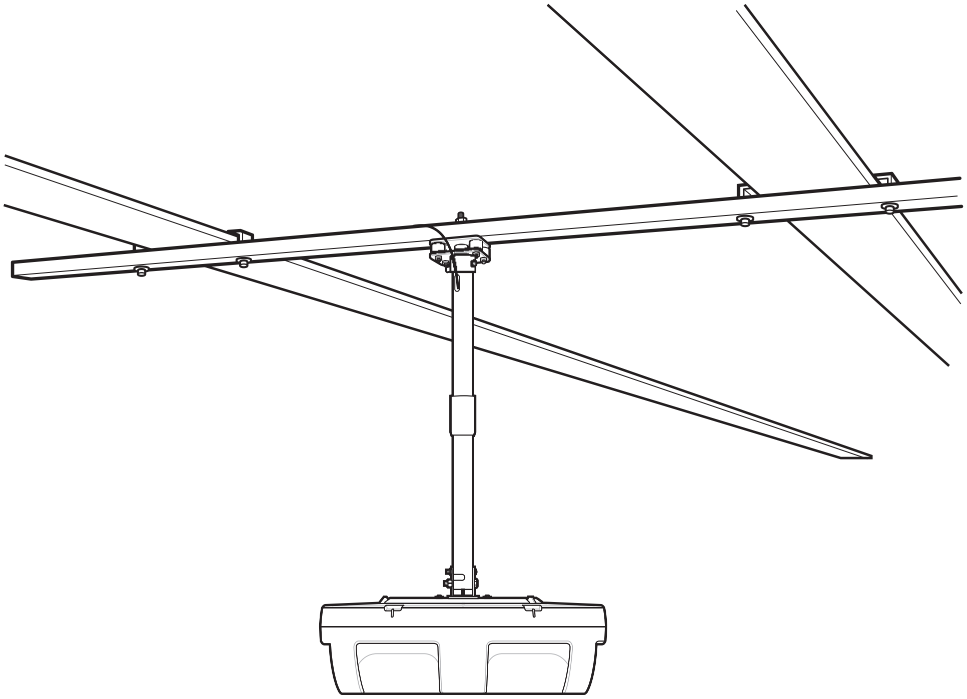


Installing Using a Strut Channel Clamped to the Bottom of the Truss

For locations with high ceilings where the bottom of the trusses are at least 15' 3" from the floor and where the ATR7000 cannot be located directly under a truss, add a strut channel to the lower section of two trusses and mount the ATR7000 on the strut channel.

NOTE: Refer to the site survey report for the proper mounting height of each. In general, this is 12‘ from the bottom of the device to the floor.

Figure 12 Installing the ATR7000 Using a Strut Channel



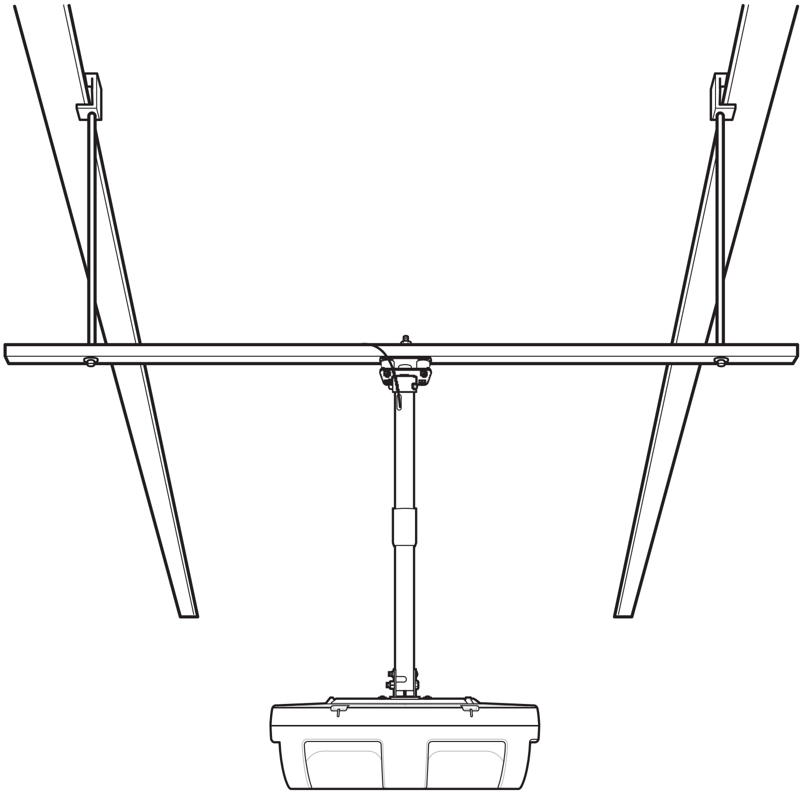
Secure the strut channel to two trusses using beam clamps appropriate for the installation. Refer to the instructions provided with the beam clamp used.

Installing Using a Strut Channel and Threaded Rods Clamped to the Top of the Truss

For an alternative configuration using a strut channel, mount the strut channel to the top of the truss using threaded rods and beam clamps, and mount the ATR7000 on the strut channel.

NOTE: Refer to the site survey report for the proper mounting height of each. In general, this is 12 ft from the bottom of the device to the floor.

Figure 13 Installing the ATR7000 to the Top of the Truss

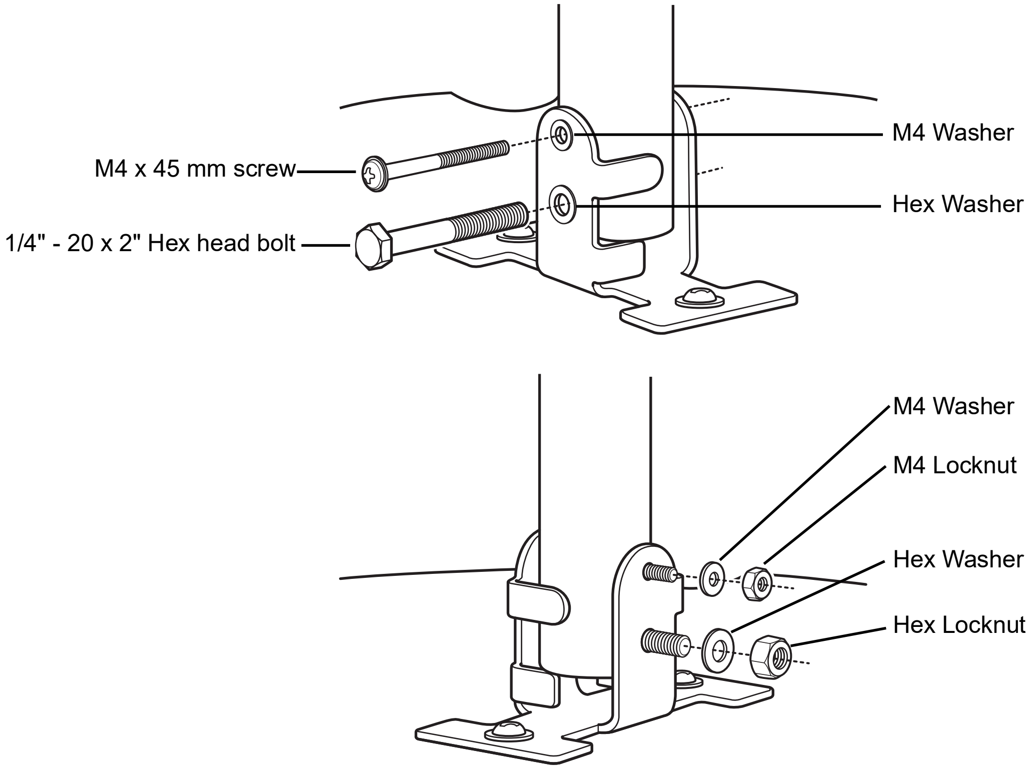


Mounting the ATR7000

1. Turn the center collar on the telescoping pole to expose the lower portion of the pole, and then turn the collar back to tighten it.
2. Attach the ATR7000 unit to the lower portion of the pole using the fasteners shown in Figure 14.

NOTE: Only use mounting hardware included with certified mounting pole.

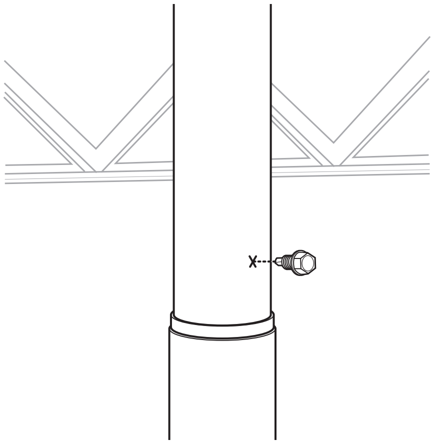
Figure 14 Attaching the ATR7000 unit to the Telescoping Pole



3. Attach the telescoping pole to the truss or strut channel according to manufacturer recommendations.
4. Adjust the length of the telescoping pole to accommodate the ATR7000 height per the site survey report.
5. Level the telescoping pole to accommodate the angle of the truss, if necessary.
6. Drive the self-tapping screw (included with pole hardware) into the pole approximately 1/2" above the collar, locking the pole. Remove any cables from the pole before fastening this screw.

NOTE: Pole adjustment instructions are included for reference only. Always follow the mounting and adjustment instructions provided with the certified mounting pole.

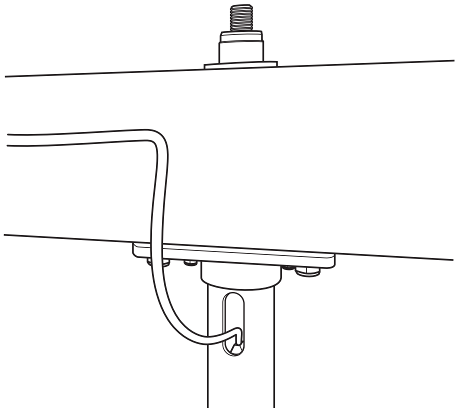
Figure 15 Driving the Self-Tapping Screw Into the Pole



7. Connect the Cat5e/6 UTP Ethernet cable installed as part of the network infrastructure.

   a. Route the network cable into the hole at the top of the pole and out through the bottom of the pole.

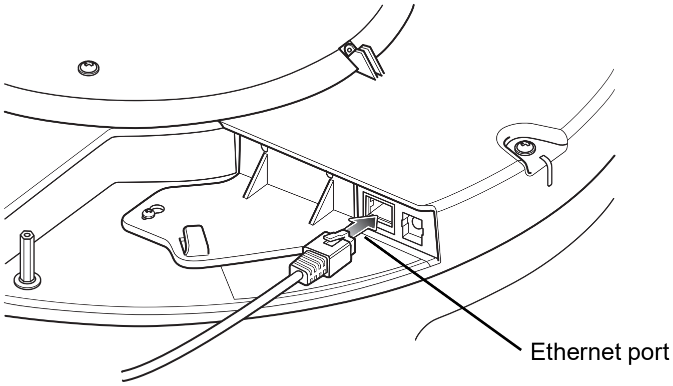
Figure 16 Running the Cable Through the Management Hole



   b. Terminate the cable after routing it through the pole.

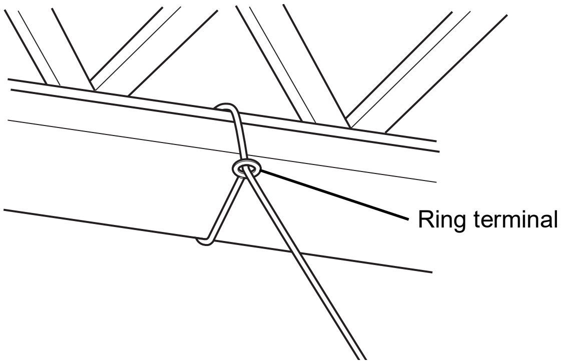
   c. Connect the cable to the Ethernet port on the ATR7000.

Figure 17 Connecting the Cable to the ATR7000 PoE+ Port



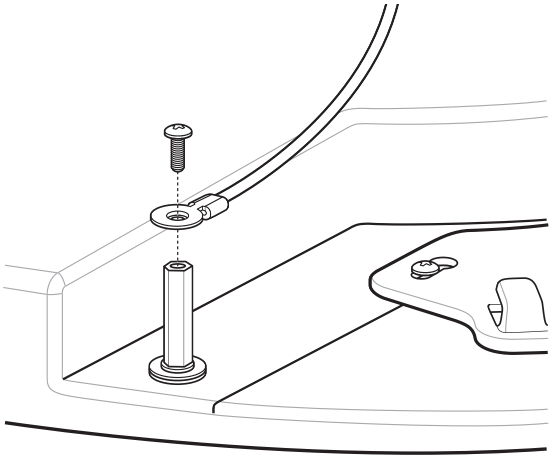
8. Install the safety cable.
   a. Loop the ring terminal end of the safety cable around a truss, and pass the other end of the cable through the ring terminal to securely fasten the cable to the truss.

Figure 18 Securing the Safety Cable to the Truss



   b. Run the safety cable into the hole at the top of the pole and out through the bottom of the pole.
   c. Secure the eyelet with the M4x10 mm screw.

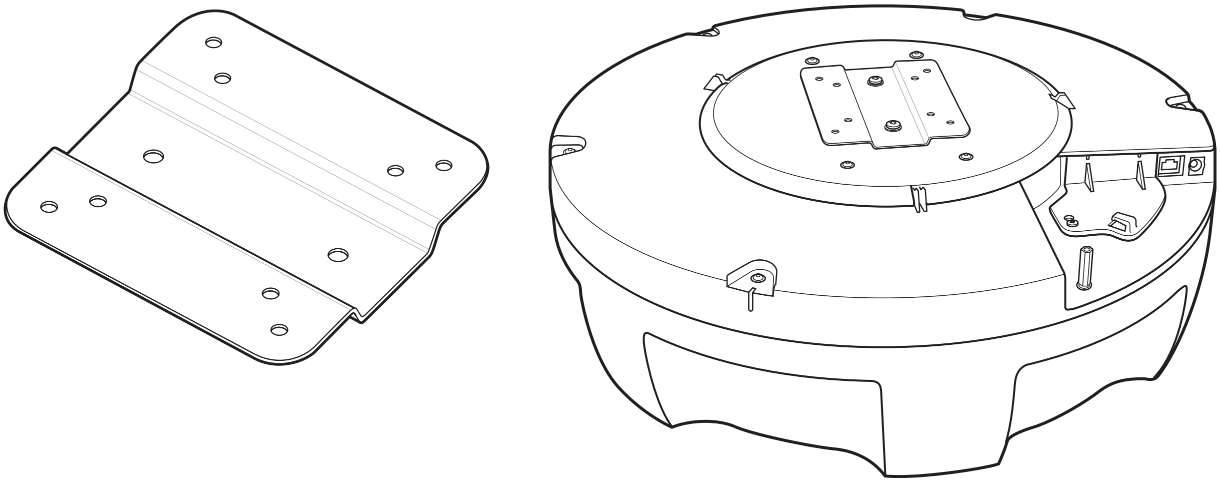
Figure 19 Securing the Safety Cable to the ATR7000



VESA Mounting

The VESA mount is an accessory to enable the ATR7000 installation using VESA-75 or VESA-100 standard patterns. The ATR7000 may optionally be mounted via four VESA holes on 100 mm x 100 mm and 75 mm x 75 mm patterns using M4 screws, that have been provided with the VESA support you are mounting to. Make sure VESA support is rated to support a 12 lb min. load. Mount the VESA Mount Adapter to the ATR7000 using the two mounting screws provided with the ATR7000.

Figure 20 VESA Mount Adapter



Communications and Power Connections

Use a standard Ethernet connection or PoE + Ethernet to connect the ATR7000 RFID 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 ATR7000 RFID reader using either the reader Zebra AC power supply, or by POE+ through the Ethernet cable.

Ethernet: Power through AC Outlet

The ATR7000 RFID reader communicates to the host through a 10/100Base-T Ethernet cable and receives power through a Zebra AC power supply.

1. Route the Ethernet cable.
2. Route the power cable.
3. Terminate the Ethernet cable.
4. Connect the Ethernet cable to the LAN port on the ATR7000 reader (see Figure 9 on page 16).
5. Connect the other end of the Ethernet cable to the host system LAN port.
6. Connect the Zebra AC power supply to a wall outlet.
7. Insert the power supply barrel connector into the ATR7000 reader power port and rotate clockwise a 1/4 turn for full locking engagement.
8. Verify that the unit booted properly and is operational. See System Start-up/Boot LED Sequence on page 30.
9. On a networked computer, open an Internet browser and connect to the reader. See Connecting to the Reader on page 39.
10. Log in to the **Administrator Console**. See Administrator Console Login on page 41.

CAUTION: If the AC power supply is used, use caution to ensure that it is securely located and/or fastened to prevent falling from the overhead installation.

Ethernet: Power through PoE+ (802.3at)

The PoE installation option allows the ATR7000 RFID 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 9 on page 16.
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 30.
4. On a networked computer, open an Internet browser and connect to the reader. See Connecting to the Reader on page 39.
5. Log in to the **Administrator Console**. See Administrator Console Login on page 41.

CAUTION: Do not connect to PoE networks outside the building.

NOTE: Ensure to follow these points when powering the ATR7000:

- When powering the ATR7000 over Ethernet, any PoE+ (802.3at) compliant Power Source Equipment such as a switch, midspan, or PoE+ injector may be used to power the ATR7000, provided the power source supply is at least 22.9 W at the ATR7000 port.
- When powering the ATR7000 from a PoE+ (802.3at) switch that supports LLDP Power Negotiation, ensure that LLDP is enabled in the switch configuration, and Power Negotiation is enabled (default setting) in the ATR7000 reader configuration. See Configure Reader on page 51.
- The ATR7000 can be powered from a PoE+ switch that does not support LLDP or has LLDP power negotiation disabled in its configuration, provided such a switch is capable of supplying at least 22.9 W through its device port. In such a case, disable the Power Negotiation configuration in the ATR7000 reader configuration. See Configure Reader on page 51.
- In the switch configuration when a maximum power cap is specified, ensure that at least 22.9 W of power is supplied at the reader port. Power loss due to the cabling used must be accounted, to ensure that the power supply configuration is set correctly.

USB Connection

The USB debug port is used by service technicians as a debug console.

GPIO Interface Connection

This pluggable terminal block allows connecting individual wires independently. A single connector accommodates both inputs and outputs and a +24 VDC supply pin for external sensors and signaling devices. See Table 9 on page 102 for pinout information. The GPIO interface is electrically isolated from the reader's chassis ground, but its ground is common to the power return of the 24 VDC external supply when this is present.

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. They are broadly compatible with industrial sensors with NPN outputs and may also be connected directly to relays or switch contacts. Alternatively, they can be driven by 5V logic. 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 directly.

Current flow in the logic high state is close to zero. Although the GPIO interface is fully operational in all power modes, the +24 VDC supply is only available when an external supply is present.

NOTE: Do not connect the +24 VDC output directly to any of the general purpose inputs. Although these can withstand voltages above 5V, they are designed to operate optimally in the range of 0 to +5 VDC.

The general-purpose outputs are open-drain (NPN type) drivers, pulled up to 5V. Each output can withstand voltages up to +30 VDC but should not be driven negative. Drive 24V relays, indicator lamps, etc., by wiring them between the +24 VDC supply pin and the general purpose output pins. 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 requirements exceeds this. Note that the state of the general purpose outputs is inverted, i.e., driving a control pin high at the processor pulls the corresponding output low.

LED Sequences

System Start-up/Boot LED Sequence

1. During system start-up:The reader LED turns off and turns on red for a second when power is applied to the reader.
2. The reader LED turns amber.
3. After approximately 60 seconds, the reader LED turns green to indicate successful RFID application initialization.
4. When the sequence completes, the green reader LED remains on.

LED Sequence to Indicate Network Status After Booting

After the RFID application initializes:

1. The reader LED turns green for 5 seconds to indicate success (following the sequence from System Start-up/Boot LED Sequence).
2. The reader checks the Ethernet address and indicates the status using the reader LED:
   - If the reader has a DHCP address, the reader LED blinks green for 3 seconds.
   - If the reader has static IP address, the reader LED blinks amber 3 seconds.
   - If the reader has an IP address from zero-configuration networking algorithm, the reader LED blinks red for 3 seconds.
   - If the reader doesn't have valid IP, the reader LED blinks amber and green using a 90-second timeout to indicate that it is waiting to acquire an IP address.
     - If it obtains a valid IP within the timeout period, the reader indicates the status as described above.
     - If the timeout expires before the reader obtains an IP, the reader LED stops blinking.
3. The reader LED again turns solid green.

Reset to Factory Defaults LED Sequence

Holding the reset button for 8 seconds resets the reader to the factory default configuration.

1. Reader LED turns on RED when you press and hold the reset button.
2. Reader LED blinks amber.
3. Reader LED blinks green fast 5 times to indicate that the reader detects a reset operation.
4. Release the reset button to reset the reader to factory defaults.

LED Sequence for Software Update Status

The reader LED activity reflects the software update progress as follows:

1. The reader LED blinks red during software update.
2. After reset, the reader LED is solid amber until the update completes.
3. The reader LED blinks green until all components are fully initialized with the updated software.
4. The reader LED turns solid green when the reader is fully initialized and ready for operations.

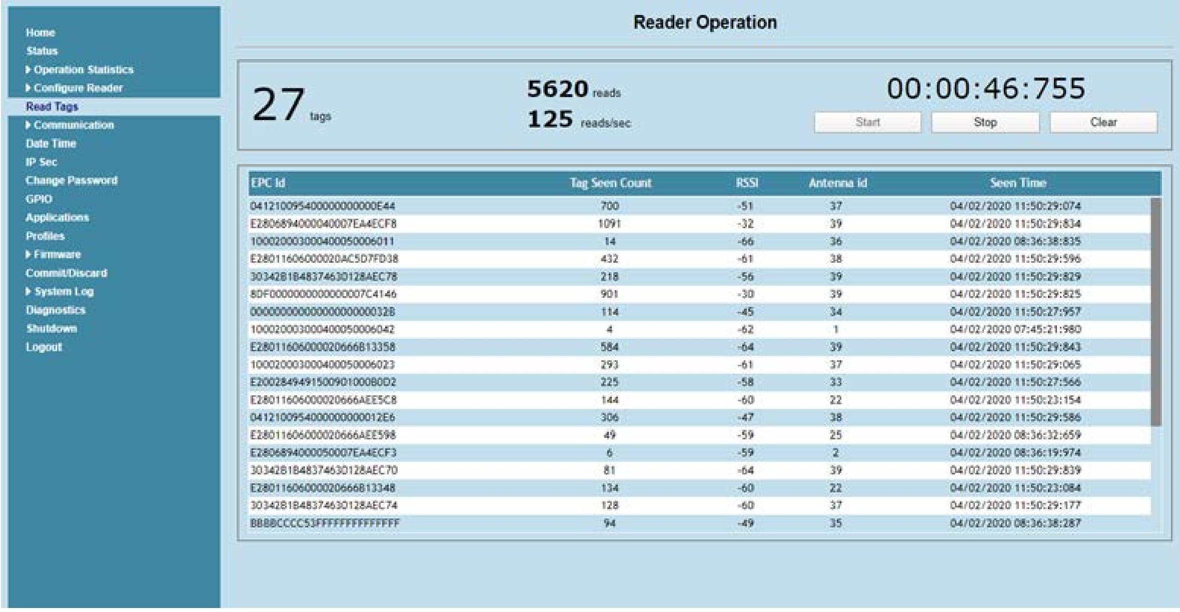
Reading Tags

After the reader fully powers up, indicated by LED showing solid green, tags read may be performed either from the reader's web-based Administrator Console or by using the PowerSession demonstration application.

1. Tag reading using the web-based Administrator Console.
   a. Log in to the reader Administrative Console and click on the Read Tags link. Press Start to perform a continuous inventory. ATR7000 will perform a tag inventory operation on all the beams from 101 to 397. Any tag in the field of view of the reader is inventoried and displayed (as shown in Figure 21).

NOTE: The Read Tags page in the Administrative Console is not available in reader firmware versions prior to V2.15.17.

Figure 21 Reader Operation Window



27 tags

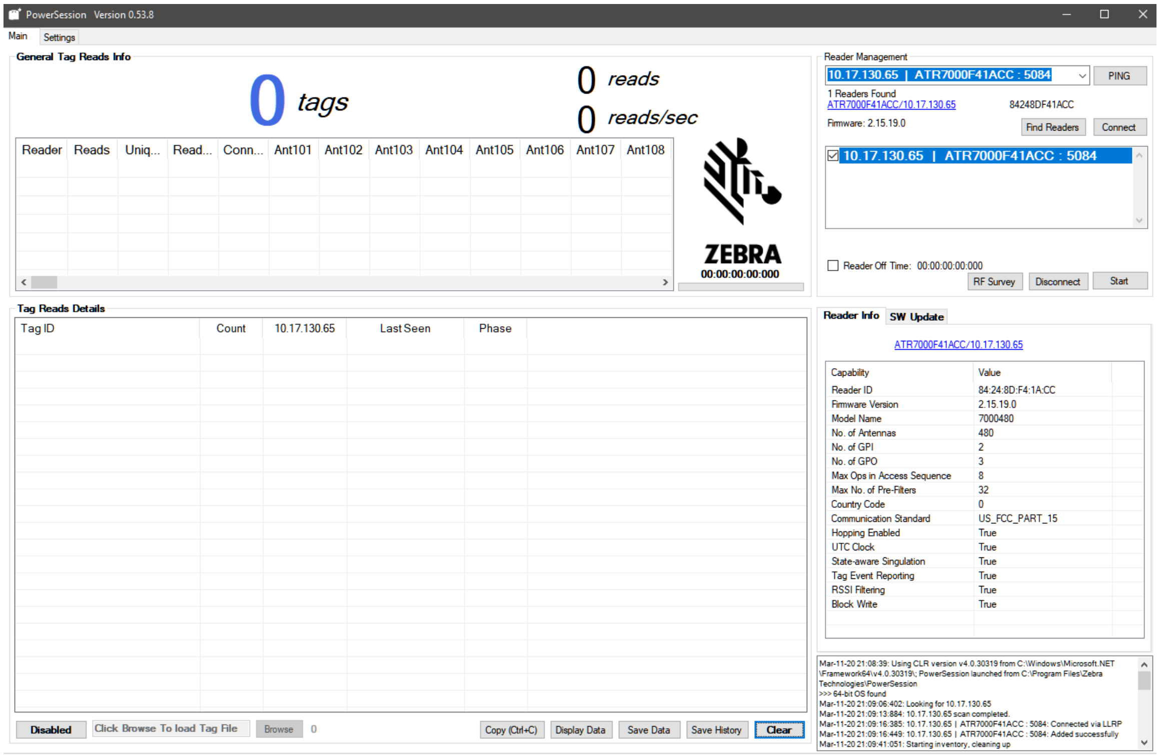
5620 reads
125 reads/sec

00:00:46:755

EPC Id	Tag Seen Count	RSSI	Antenna Id	Seen Time
041210095400000000000E44	700	-51	37	04/02/2020 11:50:29:074
E2806894000040007EA4ECF8	1091	-32	39	04/02/2020 11:50:29:834
100020003000400050006011	14	-66	36	04/02/2020 08:36:38:835
E28011606000020AC5D7FD38	432	-61	38	04/02/2020 11:50:29:596
30342B1B48374630128AEC78	218	-56	39	04/02/2020 11:50:29:829
8DF00000000000007C4146	901	-30	39	04/02/2020 11:50:29:825
00000000000000000000032B	114	-45	34	04/02/2020 11:50:27:957
100020003000400050006042	4	-62	1	04/02/2020 07:45:21:980
E2801160600020666B13358	584	-64	39	04/02/2020 11:50:29:843
100020003000400050006023	293	-61	37	04/02/2020 11:50:29:065
E20028494915009010008OD2	225	-58	33	04/02/2020 11:50:27:566
E2801160600020666AEE5C8	144	-60	22	04/02/2020 11:50:23:154
0412100954000000000012E6	306	-47	38	04/02/2020 11:50:29:586
E2801160600020666AEE598	49	-59	25	04/02/2020 08:36:32:659
E2806894000050007EA4ECF3	6	-59	2	04/02/2020 08:36:19:974
30342B1B48374630128AEC70	81	-64	39	04/02/2020 11:50:29:839
E2801160600020666B13348	134	-60	22	04/02/2020 11:50:23:084
30342B1B48374630128AEC74	128	-60	37	04/02/2020 11:50:29:177
BBBBCCCC53FFFFFFFFFFFFFF	94	-49	35	04/02/2020 08:36:38:287

2. Tag reading using PowerSession PC application.
   a. Open the PowerSession demonstration application. Refer to the RFID Demo Applications User Guide for installation instructions.
   b. Click Find Readers to list all ATR7000 readers on the network in the Reader Management section and then select the desired reader.
   c. Alternatively, enter the reader IP address or hostname in the list box.

Figure 22 PowerSession - Select Reader



0 tags

0 reads

0 reads/sec

00:00:00:00:000

Reader	Reads	Uniq...	Read...	Conn...	Ant101	Ant102	Ant103	Ant104	Ant105	Ant106	Ant107	Ant108

Tag ID	Count	10.17.130.65	Last Seen	Phase

Reader Management: 10.17.130.65 | ATR7000F41ACC : 5084

1 Readers Found

ATR7000F41ACC/10.17.130.65 84248DF41ACC

Firmware: 2.15.19.0

☑ 10.17.130.65 | ATR7000F41ACC : 5084

☐ Reader Off Time: 00:00:00:00:000

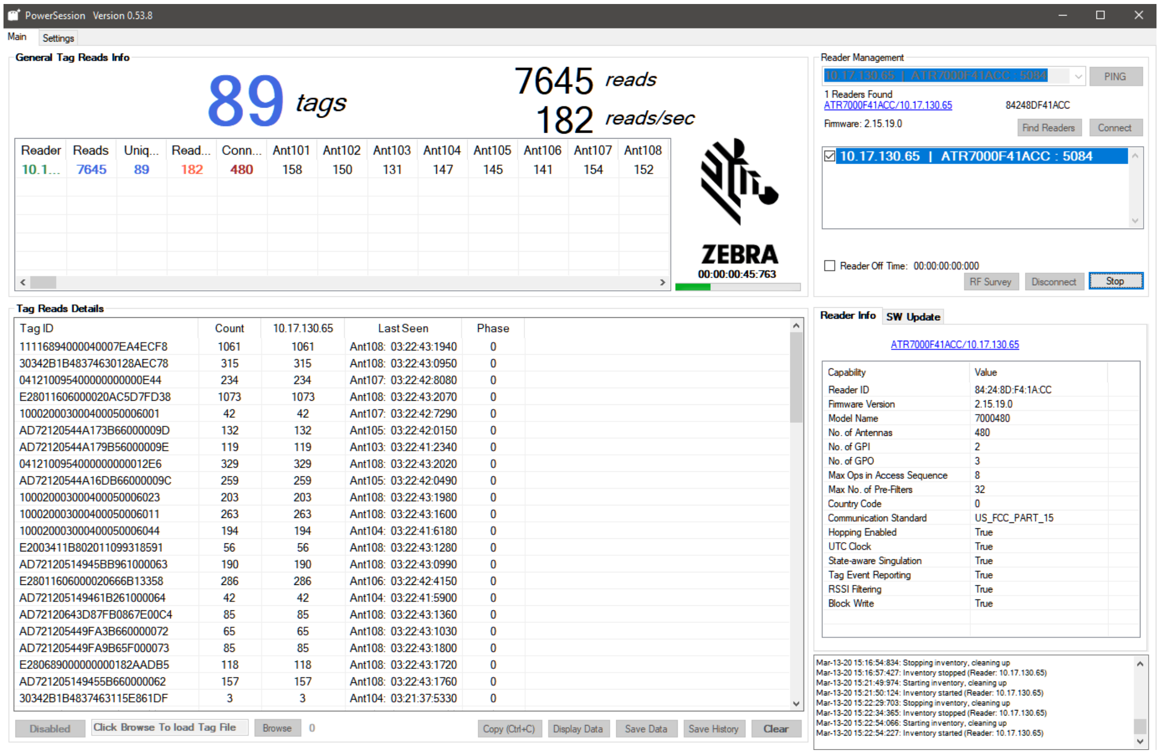
ATR7000F41ACC/10.17.130.65

Capability	Value
Reader ID	84:24:8D:F4:1A:CC
Firmware Version	2.15.19.0
Model Name	7000480
No. of Antennas	480
No. of GPI	2
No. of GPO	3
Max Ops in Access Sequence	8
Max No. of Pre-Filters	32
Country Code	0
Communication Standard	US_FCC_PART_15
Hopping Enabled	True
UTC Clock	True
State-aware Singulation	True
Tag Event Reporting	True
RSSI Filtering	True
Block Write	True

```
Mar-11-20 21:08:39: Using CLR version v4.0.30319 from C:\Windows\Microsoft.NET
\Framework64\v4.0.30319\; PowerSession launched from C:\Program Files\Zebra
Technologies\PowerSession
>>> 64-bit OS found
Mar-11-20 21:09:06:402: Looking for 10.17.130.65
Mar-11-20 21:09:13:884: 10.17.130.65 scan completed.
Mar-11-20 21:09:16:385: 10.17.130.65 | ATR7000F41ACC : 5084: Connected via LLRP
Mar-11-20 21:09:16:449: 10.17.130.65 | ATR7000F41ACC : 5084: Added successfully
Mar-11-20 21:09:41:051: Starting inventory, cleaning up
```

3. Click Connect to connect to the reader.
4. Click Start to inventory tags. Tags in the field of view appear in the Tag Reads Details section.

Figure 23 PowerSession - Read Tags



89 tags

7645 reads

182 reads/sec

00:00:00:45:763

Reader	Reads	Uniq...	Read...	Conn...	Ant101	Ant102	Ant103	Ant104	Ant105	Ant106	Ant107	Ant108
10.1...	7645	89	182	480	158	150	131	147	145	141	154	152

Tag ID	Count	10.17.130.65	Last Seen	Phase
111168940000400007EA4ECF8	1061	1061	Ant108: 03:22:43:1940	0
30342B1B48374630128AEC78	315	315	Ant108: 03:22:43:0950	0
0412100954000000000000E44	234	234	Ant107: 03:22:42:8080	0
E28011606000020AC5D7FD38	1073	1073	Ant108: 03:22:43:2070	0
100020003000400050006001	42	42	Ant107: 03:22:42:7290	0
AD72120544A173B66000009D	132	132	Ant105: 03:22:42:0150	0
AD72120544A179B56000009E	119	119	Ant103: 03:22:41:2340	0
04121009540000000000012E6	329	329	Ant108: 03:22:43:2020	0
AD72120544A16DB66000009C	259	259	Ant105: 03:22:42:0490	0
100020003000400050006023	203	203	Ant108: 03:22:43:1980	0
100020003000400050006011	263	263	Ant108: 03:22:43:1600	0
100020003000400050006044	194	194	Ant104: 03:22:41:6180	0
E2003411B802011099318591	56	56	Ant108: 03:22:43:1280	0
AD72120514945BB961000063	190	190	Ant108: 03:22:43:0990	0
E28011606000020666B13358	286	286	Ant106: 03:22:42:4150	0
AD721205149461B261000064	42	42	Ant104: 03:22:41:5900	0
AD72120643D87FB0867E00C4	85	85	Ant108: 03:22:43:1360	0
AD721205449FA3B660000072	65	65	Ant108: 03:22:43:1030	0
AD721205449FA9B65F000073	85	85	Ant108: 03:22:43:1800	0
E280689000000000182AADB5	118	118	Ant108: 03:22:43:1720	0
AD721205149455B660000062	157	157	Ant108: 03:22:43:1760	0
30342B1B4837463115E861DF	3	3	Ant104: 03:21:37:5330	0

Reader Management: 10.17.130.65 | ATR7000F41ACC : 5084

1 Readers Found

ATR7000F41ACC/10.17.130.65 84248DF41ACC

Firmware: 2.15.19.0

☑ 10.17.130.65 | ATR7000F41ACC : 5084

☐ Reader Off Time: 00:00:00:00:000

ATR7000F41ACC/10.17.130.65

Capability	Value
Reader ID	84:24:8D:F4:1A:CC
Firmware Version	2.15.19.0
Model Name	7000480
No. of Antennas	480
No. of GPI	2
No. of GPO	3
Max Ops in Access Sequence	8
Max No. of Pre-Filters	32
Country Code	0
Communication Standard	US_FCC_PART_15
Hopping Enabled	True
UTC Clock	True
State-aware Singulation	True
Tag Event Reporting	True
RSSI Filtering	True
Block Write	True

```
Mar-13-20 15:16:54:834: Stopping inventory, cleaning up
Mar-13-20 15:16:57:427: Inventory stopped (Reader: 10.17.130.65)
Mar-13-20 15:21:49:974: Starting inventory, cleaning up
Mar-13-20 15:21:50:124: Inventory started (Reader: 10.17.130.65)
Mar-13-20 15:22:29:703: Stopping inventory, cleaning up
Mar-13-20 15:22:34:365: Inventory stopped (Reader: 10.17.130.65)
Mar-13-20 15:22:54:066: Starting inventory, cleaning up
Mar-13-20 15:22:54:227: Inventory started (Reader: 10.17.130.65)
```

ATR Beam Configuration

Introduction

The most notable difference between an ATR7000 and a standard fixed reader is that in a fixed reader, an antenna is associated with a physical port (i.e. antenna connector, cable, and antenna). For the ATR7000, with its integral beam steered antenna array, an antenna is “virtual” in the sense that an antenna is defined as a beam with a specific polarization steered in a specific direction.

This chapter provides information so the user can control the beams in a pre-determined way and includes the following:

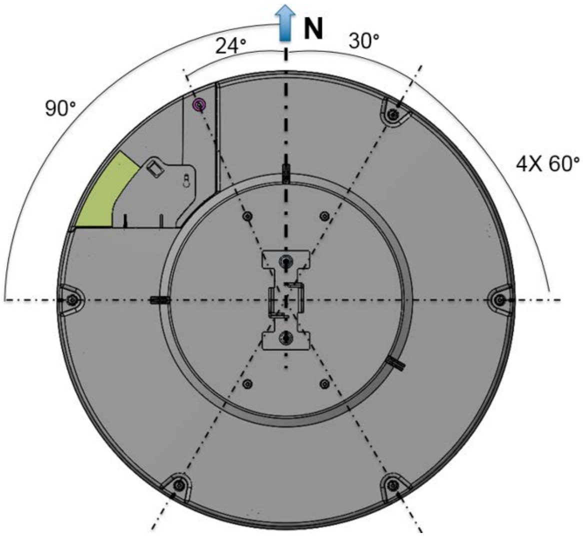
- Reference Coordinate System for ATR7000
- ATR7000 Beam Configuration
- Reading Tags

Reference Coordinate System for ATR7000

The directional orientation of the ATR7000 in the field (after installation) is important for ensuring that a user can precisely control the beam steering direction, and therefore, the coverage area of a reader. As the ATR7000 steers its beam, the beam direction is defined in terms of an azimuth and an elevation. In a multi-reader RTLS deployment the orientation of each reader is critical for the location analytics to properly “triangulate” and determine a tags precise location.

To define a reference coordinate system for beam direction (pointing angle), the ATR7000 has established a “True-North” direction, defined as 0º azimuth, and a “boresight” direction, defined as 0º elevation (the beam pointing directly at the ground when an ATR7000 is mounted overhead parallel to the ground).

Figure 24 True North Orientation - Location of Notches

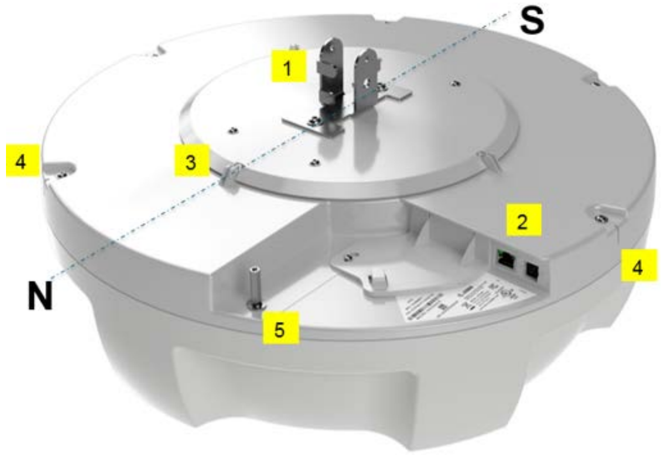


In both cases of either a standalone ATR7000 or an ATR7000-based RTLS deployment, the term “True-North” is not synonymous with magnetic north (i.e. North on a compass); nor is it synonymous with the direction towards the north pole. “True-North” for an ATR7000 is defined in the context of a local facility coordinate system where the facility origin is defined as x=0, y=0, z=0, and True-North is defined as the direction of the positive y axis (0 º azimuth). Similarly in this context, 0 º elevation is defined as the direction of the negative z axis.

During installation, it is typical that a reader is installed directly overhead with the bottom of the antenna radome parallel to the floor for additional installation information, please refer to Figure 11 and Figure 12. The boresight direction (the beam pointed directly at the floor) is defined as 0 º elevation and the horizon is at an elevation equal to 90 º .

There are several features built into the ATR7000 which can be referenced for orientation during installation (visible from the top) and post installation (visible from the ground). As shown in Figure 25, there are 5 notches in the ATR7000. The True-North orientation of an ATR7000 reader in relation to the notches is shown (top view) in Figure 24. Note the safety cable mount is 24° counter-clockwise from True-North.”

Figure 25 Orientation Features 1, 2, 3 Visible from the Top

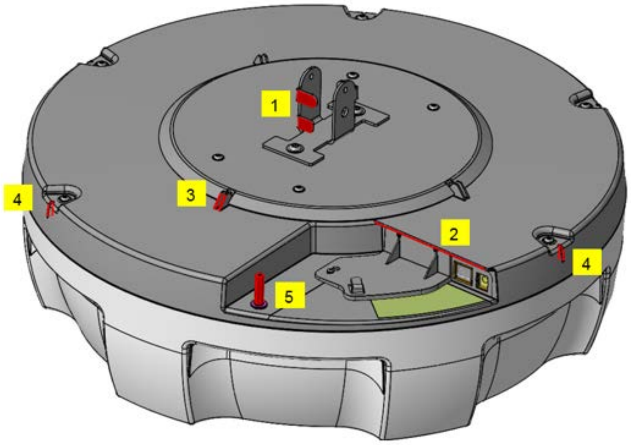


1- Tabs on Pole Mounting Bracket

2- I/O ports – overhang/protective edge

3- One of the three Top Plate Locating Ribs

Figure 26 Orientation Features 4, 5 Visible from Floor



4- Five notches (~2 mm wide) by the Top Cover mounting screws

5- Safety cable mounting standoff

Even In applications that use a standalone ATR7000, it is important to align the reader to the True-North direction. Alternately, a compensation to azimuth should be factored in to account for the difference. In an ATR7000-based RTLS deployment, beam direction is under the control of software. As long as the actual installation orientation is known (and recorded), the software will compensate for any deviation, however, the deviation to True-North must be recorded accurately.

ATR Beam Configuration

The ATR7000 has defined 291 beams, 97 directions with three distinct polarizations for more precise control over RF coverage.

The table below shows a complete list of all beam scanning options available using Zebra's standard APIs or PowerSession. In general, the best performance is obtained using Left Hand Circular Polarization (LHCP). Additional polarization options are provided for optimizing for certain tag types and/or for certain use cases.

Table 4 ATR7000 Beam Configuration

ATR7000 Beam Configuration																								
"Reserved"																								
Azimuth	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	265	300	315	330	345
Elevation																								
60	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
45	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
30	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
15	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
0	97																							
Theta Polarization																								
Azimuth	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	265	300	315	330	345
Elevation																								
60	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124
45	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148
30	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172
15	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196
0	197																							
Phi Polarization																								
Azimuth	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	265	300	315	330	345
Elevation																								
60	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224
45	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248
30	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272
15	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296
0	297																							
Left Hand Circular Polarization (LHCP)																								
Azimuth	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	265	300	315	330	345
Elevation																								
60	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324
45	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348
30	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372
15	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396
0	397																							

Reading Tags

Enable tag reading using the web-based Administrator Console or control the reader through a real-time application such as PowerSession. Additional information on Reading Tags can be found in this guide in the Reading Tags section of the Installation and Communication chapter. Please refer to the RFID Demo Applications Guide for additional details regarding PowerSession.

Administrator Console

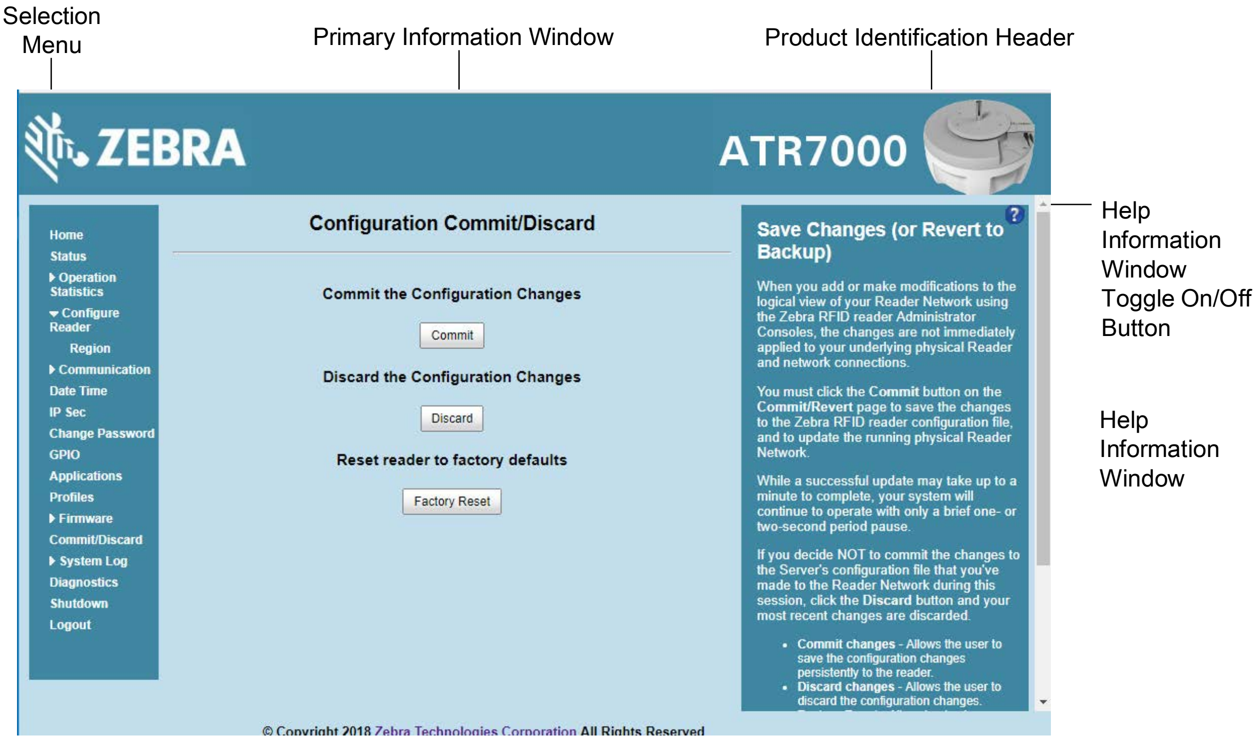
Introduction

This chapter describes the ATR7000 web-based **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.

NOTE: The screens and windows in this chapter may slightly differ from actual screens and windows.

- **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 27 Reader Administrator Console Main Menu



Configuration Commit/Discard

Commit the Configuration Changes

Discard the Configuration Changes

Reset reader to factory defaults

Save Changes (or Revert to Backup)

When you add or make modifications to the logical view of your Reader Network using the Zebra RFID reader Administrator Consoles, the changes are not immediately applied to your underlying physical Reader and network connections.

You must click the **Commit** button on the **Commit/Revert** page to save the changes to the Zebra RFID reader configuration file, and to update the running physical Reader Network.

While a successful update may take up to a minute to complete, your system will continue to operate with only a brief one- or two-second period pause.

If you decide NOT to commit the changes to the Server's configuration file that you've made to the Reader Network during this session, click the **Discard** button and your most recent changes are discarded.

- **Commit changes** - Allows the user to save the configuration changes persistently to the reader.
- **Discard changes** - Allows the user to discard the configuration changes.

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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 78.

Resetting the Reader

To reset the reader, press and hold the reset button for not more than 2 seconds. See Figure 9 on page 16 for the reset button location. The reader reboots but retains the user ID and password. See System Start-up/Boot LED Sequence on page 30.

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

Auto Discovery

The ATR7000 reader can automatically belong to a network. The reader implements WS-Discovery conforming to RFID Reader Management Profile (RDMP) specification in ISO 24791-3. RDMP is based on an extension for Device Profile for Web Services (DPWS). The discovery mechanism is limited to subnets and does not work across subnets. The PowerSession application supports this feature, and it lists the discovered reader using reader host names. Because this feature is based on WS-Discovery, the readers can also be discovered in Windows 7/10 computers by clicking on the **Network** icon in a file browser.

Connecting to the Reader

To use the Administrator Console to manage the reader, first power up the reader and connect it to an accessible network. A solid green state of the reader LED indicates that the reader is ready. If the reader LED is not lit, reset the reader. See Resetting the Reader on page 38.

Connect to the reader in one of two ways:

- Connecting via Host Name on page 40.

or

- Connecting via IP Address on page 40. (To obtain the IP address, see Obtaining the IP Address via Command Prompt on page 39)

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

- Using DHCP on the network.

or

- Using Zero-Configuration Networking when DHCP Server is Not Available on page 41.

or

- Statically assigning an IP. See Static IP Configuration on page 105.

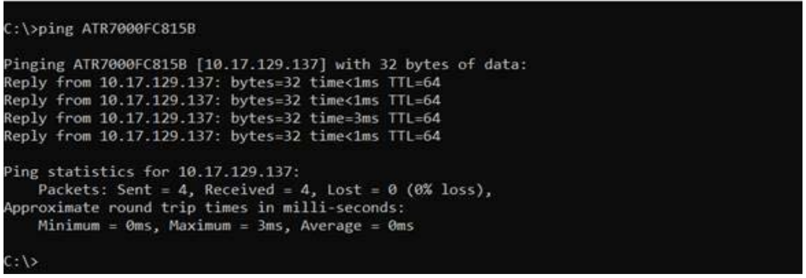
Any method of assigning the IP supports connection using host name or IP address. Alternatively, connect the reader directly to a local computer using zero-configuration networking. See Using Zero-Configuration Networking when DHCP Server is Not Available on page 41.

NOTE: When using zero-configuration networking, the ATR7000 readers cannot communicate with computers on different subnets, or with computers that do not use automatic private IP addressing.

Obtaining the IP Address via Command Prompt

To obtain the reader IP address without logging into the reader, open a command window and ping the reader host name.

Figure 28 IP Ping Window



```
C:\>ping ATR7000FC815B

Pinging ATR7000FC815B [10.17.129.137] with 32 bytes of data:
Reply from 10.17.129.137: bytes=32 time<1ms TTL=64
Reply from 10.17.129.137: bytes=32 time<1ms TTL=64
Reply from 10.17.129.137: bytes=32 time=3ms TTL=64
Reply from 10.17.129.137: bytes=32 time<1ms TTL=64

Ping statistics for 10.17.129.137:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 3ms, Average = 0ms

C:\>
```

Connecting via 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.

To connect to the reader using the host name:

1. Open a browser. Recommended browsers are IE11 (disabling Compatibility View is recommended), Chrome v58, and FireFox v54.
2. Enter the host name provided on the reader label in the browser (for example, http://ATR7000cd3b0d) and press **Enter**. The **Console Login** window appears and the reader is ready.
3. Proceed to Administrator Console Login on page 41 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 printed on the reader label, or construct it using the reader MAC address on the reader back label. The host name is a string with prefix ATR7000, followed by the last three MAC address octets. For example, for a MAC address of 00:15:70:CD:3B:0D, use the prefix ATR7000, followed by the last three MAC address octets (CD, 3B, and 0D), for the host name ATR7000CD3B0D. Type http://ATR7000CD3B0D in the browser address bar to access the reader.

For a network that does not support host name registration and lookup, use the PowerSession 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. The minimum browser recommends are IE11 (disabling Compatibility View is recommended), Chrome v58, and FireFox v54**.**
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 41 to login to the reader.

Using Zero-Configuration Networking when DHCP Server is Not Available

If a DHCP server is not available, the ATR7000 readers can use zero-configuration networking to automatically provide a unique network IP address. The reader can then use TCP/IP to communicate with other computers also using a zero-configuration networking-generated IP address.

NOTE: When using zero-configuration networking, the ATR7000 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.

The zero-configuration networking 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.

When zero-configuration networking executes after failing to detect a DHCP server, the reader automatically assigns an IPv4 IP address to the Ethernet interface in the form 169.254.xxx.xxx. This IP address is predictable because it uses the last 2 bytes of the MAC address, usually represented as HEX values, to complete the IPv4 address. These values are converted to decimal format (e.g., if the MAC address ends with 55:9A, the IPv4 address assigned by the zero-configuration algorithm is 169.254.85.148.

Windows-based computers support APIPA/zero-configuration networking by default when DHCP fails. To enable APIPA for a Windows PC, visit http://support.microsoft.com/ and search for APIPA.

Administrator Console Login

NOTE: The recommended browsers are IE11 (disabling Compatibility View is recommended), Chrome v58, and FireFox 54. These browsers were tested and validated to work properly. Other browsers may or may not work properly.

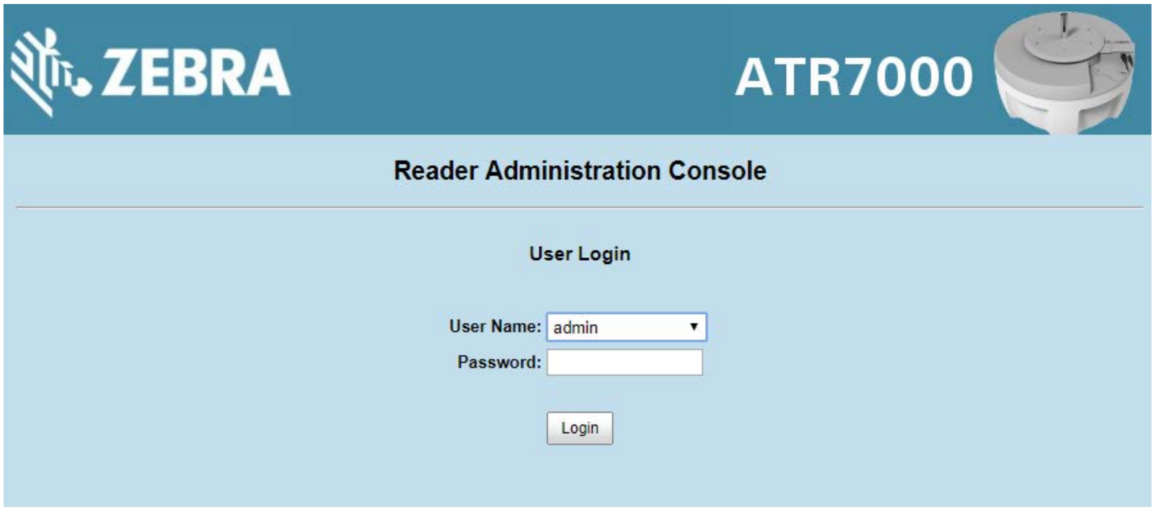
First Time / Start-Up Login

When starting the reader for the first time, set the region of reader operation. Setting the reader to a different region is illegal.

Logging In with Default User ID and Password

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

Figure 29 User Login Window



User Name: admin
Password:

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

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

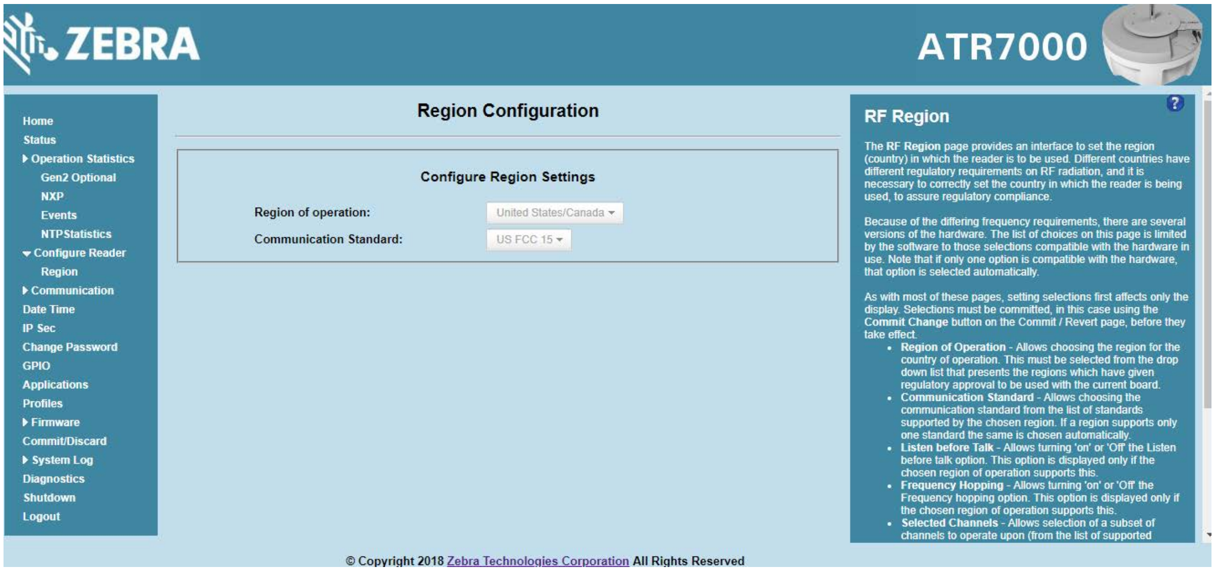
Setting the Region

The ATR7000 currently supports only United States and Canada regions. For global reader configurations (supported in future), set the region of operation.

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. Setting the unit to a different region is illegal.

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

Figure 30 Region Configuration Window



Region Configuration

Configure Region Settings

Region of operation: United States/Canada

Communication Standard: US FCC 15

RF Region

The **RF Region** page provides an interface to set the region (country) in which the reader is to be used. Different countries have different regulatory requirements on RF radiation, and it is necessary to correctly set the country in which the reader is being used, to assure regulatory compliance.

Because of the differing frequency requirements, there are several versions of the hardware. The list of choices on this page is limited by the software to those selections compatible with the hardware in use. Note that if only one option is compatible with the hardware, that option is selected automatically.

As with most of these pages, setting selections first affects only the display. Selections must be committed, in this case using the **Commit Change** button on the Commit / Revert page, before they take effect.

- **Region of Operation** - Allows choosing the region for the country of operation. This must be selected from the drop down list that presents the regions which have given regulatory approval to be used with the current board.
- **Communication Standard** - Allows choosing the communication standard from the list of standards supported by the chosen region. If a region supports only one standard the same is chosen automatically.
- **Listen before Talk** - Allows turning 'on' or 'Off' the Listen before talk option. This option is displayed only if the chosen region of operation supports this.
- **Frequency Hopping** - Allows turning 'on' or 'Off' the Frequency hopping option. This option is displayed only if the chosen region of operation supports this.
- **Selected Channels** - Allows selection of a subset of channels to operate upon (from the list of supported

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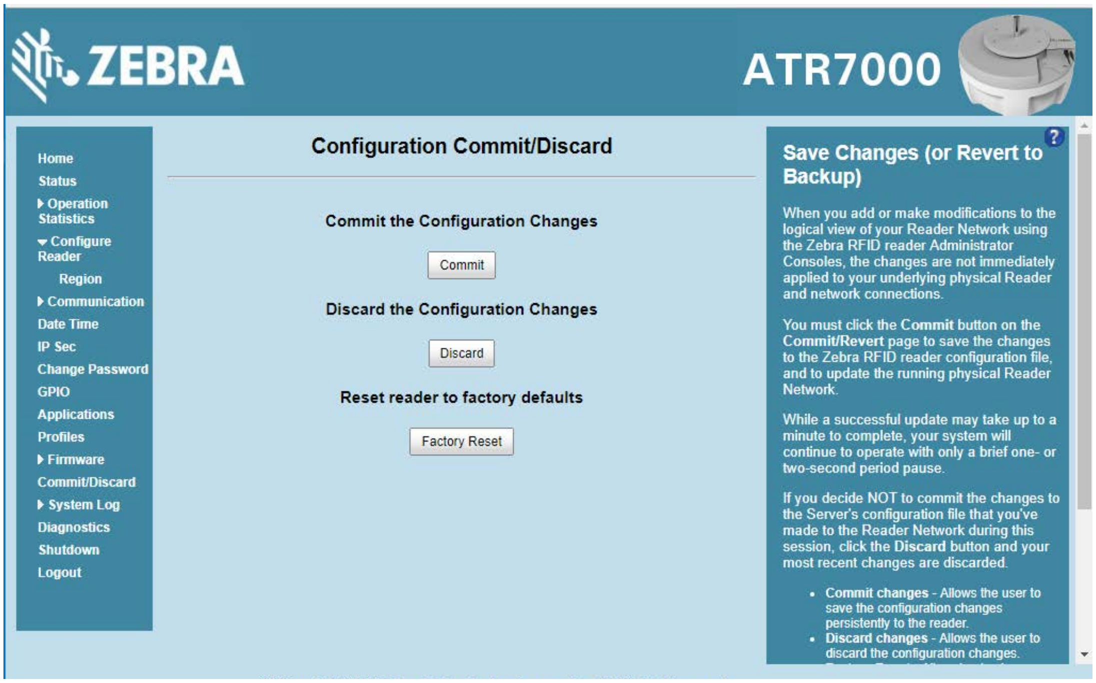
2. Select the **Communication Standard**, if applicable.
3. Select **Frequency Hopping**, if applicable.
4. Select the appropriate channel(s), if applicable.
5. Click the **I understand** check box.
6. Click **Set Properties** to complete the region selection. The **Operation Successful** window appears.
7. Select **Commit/Discard** from the selection menu.

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

Figure 31 Commit/Discard Window



Configuration Commit/Discard

Commit the Configuration Changes

Discard the Configuration Changes

Reset reader to factory defaults

Save Changes (or Revert to Backup)

When you add or make modifications to the logical view of your Reader Network using the Zebra RFID reader Administrator Consoles, the changes are not immediately applied to your underlying physical Reader and network connections.

You must click the **Commit** button on the **Commit/Revert** page to save the changes to the Zebra RFID reader configuration file, and to update the running physical Reader Network.

While a successful update may take up to a minute to complete, your system will continue to operate with only a brief one- or two-second period pause.

If you decide NOT to commit the changes to the Server's configuration file that you've made to the Reader Network during this session, click the **Discard** button and your most recent changes are discarded.

- **Commit changes** - Allows the user to save the configuration changes persistently to the reader.
- **Discard changes** - Allows the user to discard the configuration changes.

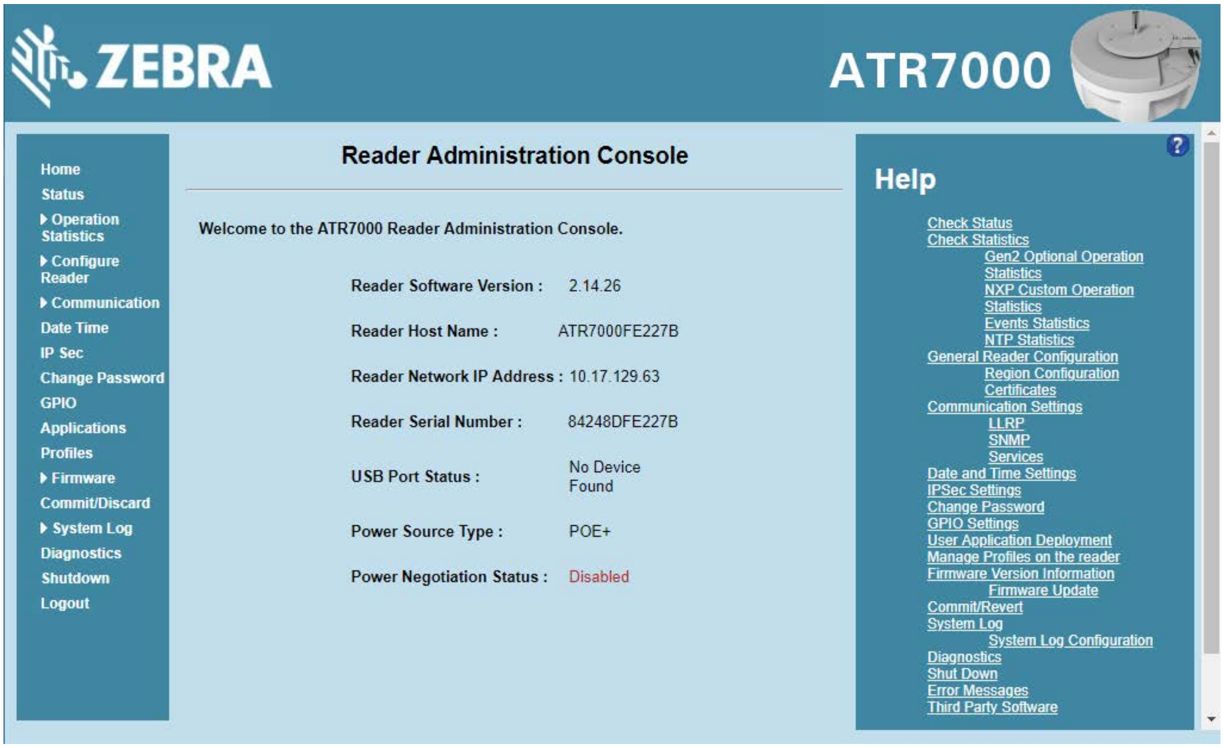
8. Click **Commit** to apply the changes to the reader configuration file, or **Discard** to discard the new region configuration changes.

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

Reader Administrator Console

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

Figure 32 Reader Administrator Console Main Window



Reader Administration Console

Welcome to the ATR7000 Reader Administration Console.

Reader Software Version : 2.14.26

Reader Host Name : ATR7000FE227B

Reader Network IP Address : 10.17.129.63

Reader Serial Number : 84248DFE227B

USB Port Status : No Device Found

Power Source Type : POE+

Power Negotiation Status : Disabled

Administrator Console Option Selections

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

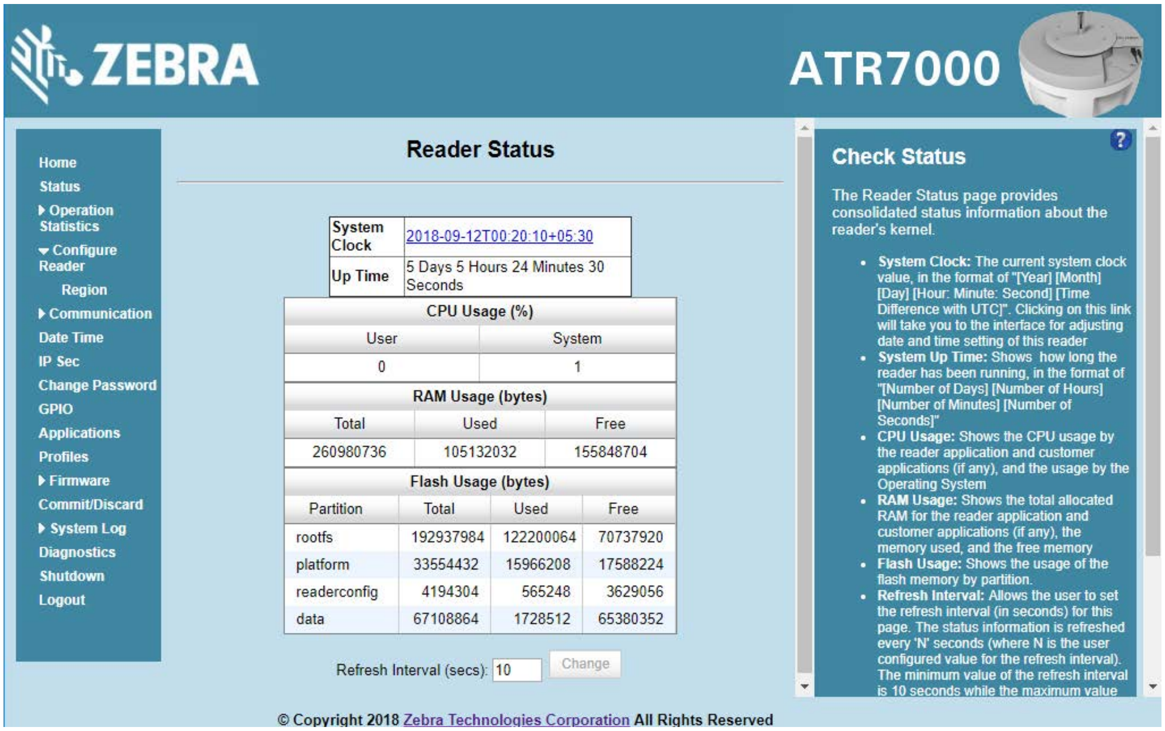
- **Status** - see Status on page 45
- **Operation Statistics** - see Reader Statistics on page 46
  - **Gen2 Optional** - see Reader Gen2 Optional Operation Statistics on page 47
  - **NXP** - see NXP Custom Command Operation Statistics on page 48
  - **Events** - see Event Statistics on page 49
  - **NTP Statistics** - see NXP Custom Command Operation Statistics on page 48
- **Configure Reader** - see Configure Reader on page 51
  - **Region** - see Configure Region on page 52
  - **Certificates** - see Certificates on page 53
- **Read Tags** - see Communication Settings on page 68
- **Communication** - see Communication Settings on page 68
  - **LLRP** - see Configure LLRP Settings on page 69
  - **SNMP** - see SNMP Settings on page 70
  - **Services** - see Network Services Settings on page 72
- **Date/Time** - see System Time Management on page 73
- **IP Sec** - see IPV6 IP Sec on page 74
- **Change Password** - see Change Password on page 75
- **GPIO** - see GPIO on page 76

- **Applications** - see Applications on page 77
- **Profiles** - see Reader Profiles on page 78
- **Firmware** - see Firmware Version/Update on page 79
  - **Update** - see Select Revert Back to revert the firmware to last known version. The reader automatically reboots. This option is not enabled if the reader detects an error in the previous firmware update. Firmware Update on page 80
- **Commit/Discard** - see Commit/Discard on page 80
- **System Log** - see System Log on page 81
  - **Configure** - see Configure System Log on page 83
- **Diagnostics** - see Reader Diagnostics on page 84
- **Shutdown** - see Shutdown on page 84
- **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 33 Reader Status Window



Reader Status

System Clock	2018-09-12T00:20:10+05:30
Up Time	5 Days 5 Hours 24 Minutes 30 Seconds

CPU Usage (%)	
User	System
0	1

RAM Usage (bytes)		
Total	Used	Free
260980736	105132032	155848704

Flash Usage (bytes)			
Partition	Total	Used	Free
rootfs	192937984	122200064	70737920
platform	33554432	15966208	17588224
readerconfig	4194304	565248	3629056
data	67108864	1728512	65380352

Refresh Interval (secs): 10 Change

Check Status

The Reader Status page provides consolidated status information about the reader's kernel.

- **System Clock:** The current system clock value, in the format of "[Year] [Month] [Day] [Hour: Minute: Second] [Time Difference with UTC]". Clicking on this link will take you to the interface for adjusting date and time setting of this reader
- **System Up Time:** Shows how long the reader has been running, in the format of "[Number of Days] [Number of Hours] [Number of Minutes] [Number of Seconds]"
- **CPU Usage:** Shows the CPU usage by the reader application and customer applications (if any), and the usage by the Operating System
- **RAM Usage:** Shows the total allocated RAM for the reader application and customer applications (if any), the memory used, and the free memory
- **Flash Usage:** Shows the usage of the flash memory by partition.
- **Refresh Interval:** Allows the user to set the refresh interval (in seconds) for this page. The status information is refreshed every 'N' seconds (where N is the user configured value for the refresh interval). The minimum value of the refresh interval is 10 seconds while the maximum value

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

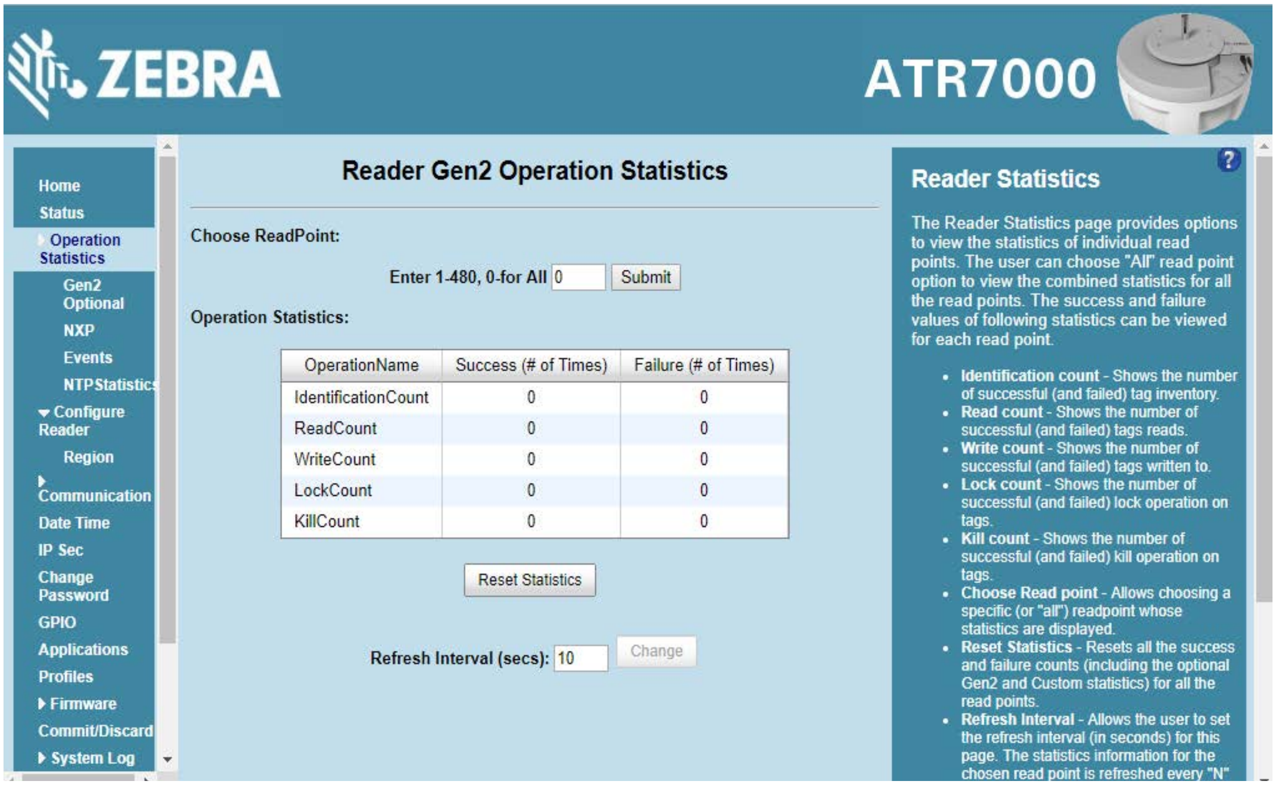
- **System Clock:** The current system clock value, in the format of [Year] [Month] [Day] [Hour: Minute: Second] [Time Difference with UTC]. Click the link to adjust the reader date and time settings.
- **Up Time** - Displays how long the reader has been running, in the format [Number of Days] [Number of Hours] [Number of Minutes] [Number of Seconds].

- **CPU Usage:** Displays the CPU usage for the system and reader applications, including customer applications.
- **RAM Usage:** Displays the total allocated RAM for the reader application and customer applications (if any), the memory used, and the 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; the maximum allowed is 86,400 seconds.

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 34 Reader Operation Statistics Window



Reader Gen2 Operation Statistics

Choose ReadPoint:

Enter 1-480, 0-for All 0

Operation Statistics:

OperationName	Success (# of Times)	Failure (# of Times)
IdentificationCount	0	0
ReadCount	0	0
WriteCount	0	0
LockCount	0	0
KillCount	0	0

Refresh Interval (secs): 10

Reader Statistics

The Reader Statistics page provides options to view the statistics of individual read points. The user can choose "All" read point option to view the combined statistics for all the read points. The success and failure values of following statistics can be viewed for each read point.

- **Identification count** - Shows the number of successful (and failed) tag inventory.
- **Read count** - Shows the number of successful (and failed) tags reads.
- **Write count** - Shows the number of successful (and failed) tags written to.
- **Lock count** - Shows the number of successful (and failed) lock operation on tags.
- **Kill count** - Shows the number of successful (and failed) kill operation on tags.
- **Choose Read point** - Allows choosing a specific (or "all") readpoint whose statistics are displayed.
- **Reset Statistics** - Resets all the success and failure counts (including the optional Gen2 and Custom statistics) for all the read points.
- **Refresh Interval** - Allows the user to set the refresh interval (in seconds) for this page. The statistics information for the chosen read point is refreshed every "N"

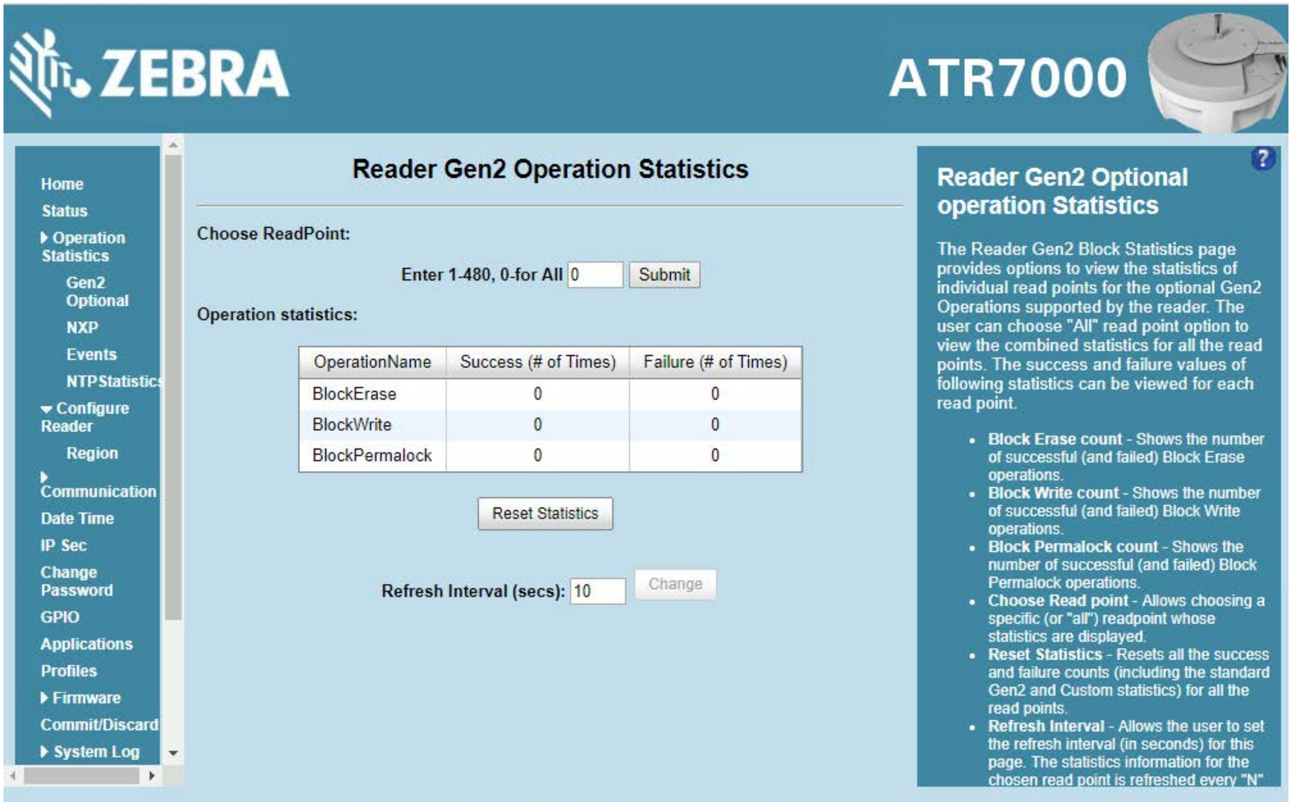
- **Choose ReadPoint** - Select a specific read point or select **All** from the drop-down list to display the statistics.
- **IdentificationCount** - Displays the number of successful (and failed) tag inventories.
- **ReadCount** - Displays the number of successful (and failed) tag reads.
- **WriteCount** - 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 (including the optional 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 and the maximum value allowed is 86,400 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 read points for the optional Gen2 operations the reader supports.

Figure 35 Reader Gen2 Operation Statistics Window



Reader Gen2 Operation Statistics

Choose ReadPoint:

Enter 1-480, 0-for All 0

Operation statistics:

OperationName	Success (# of Times)	Failure (# of Times)
BlockErase	0	0
BlockWrite	0	0
BlockPermalock	0	0

Refresh Interval (secs): 10

Reader Gen2 Optional operation Statistics

The Reader Gen2 Block Statistics page provides options to view the statistics of individual read points for the optional Gen2 Operations supported by the reader. The user can choose "All" read point option to view the combined statistics for all the read points. The success and failure values of following statistics can be viewed for each read point.

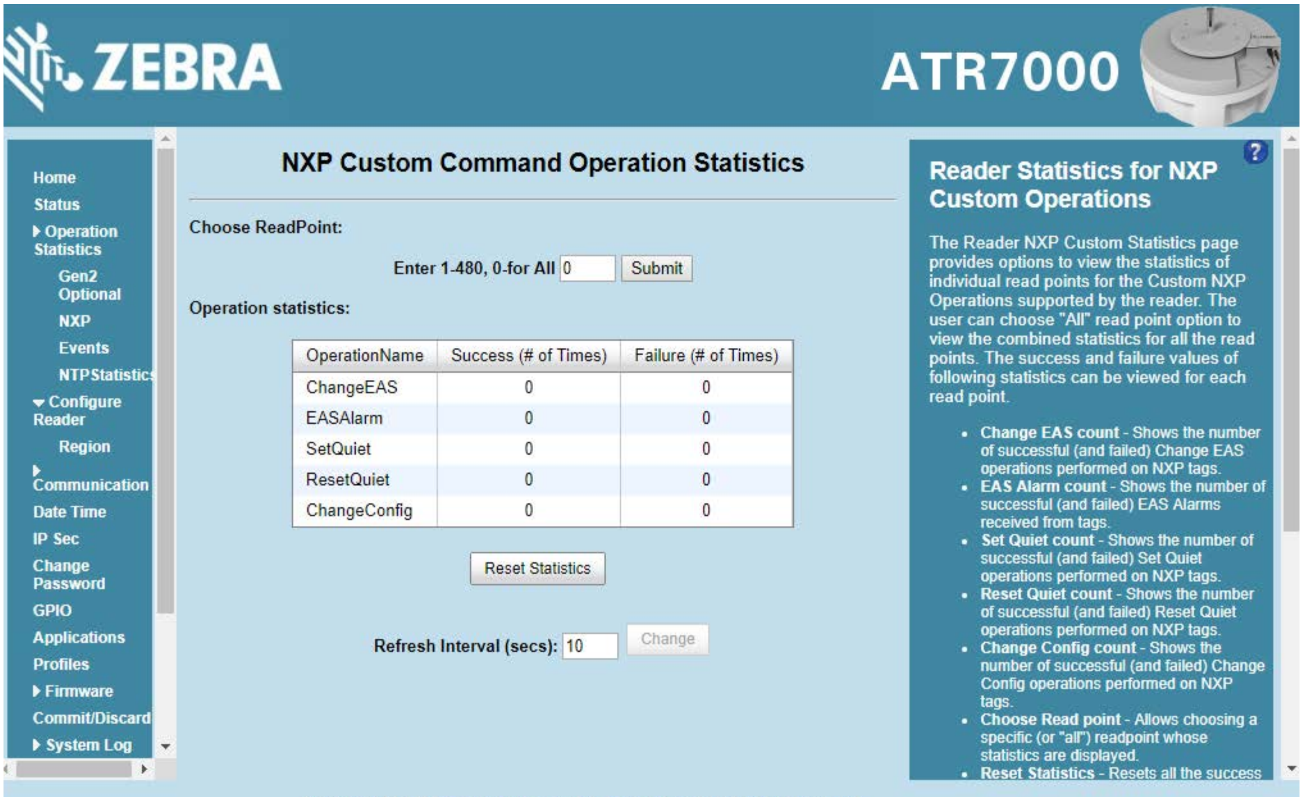
- **Block Erase count** - Shows the number of successful (and failed) Block Erase operations.
- **Block Write count** - Shows the number of successful (and failed) Block Write operations.
- **Block Permalock count** - Shows the number of successful (and failed) Block Permalock operations.
- **Choose Read point** - Allows choosing a specific (or "all") readpoint whose statistics are displayed.
- **Reset Statistics** - Resets all the success and failure counts (including the standard Gen2 and Custom statistics) for all the read points.
- **Refresh Interval** - Allows the user to set the refresh interval (in seconds) for this page. The statistics information for the chosen read point is refreshed every "N"

- **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 and the maximum value allowed is 86,400 seconds. Input a new value and click **Change** to set a new interval.

NXP Custom Command Operation Statistics

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

Figure 36 NXP Custom Command Operation Statistics Window



NXP Custom Command Operation Statistics

Choose ReadPoint:

Enter 1-480, 0-for All 0

Operation statistics:

OperationName	Success (# of Times)	Failure (# of Times)
ChangeEAS	0	0
EASAlarm	0	0
SetQuiet	0	0
ResetQuiet	0	0
ChangeConfig	0	0

Refresh Interval (secs): 10

Reader Statistics for NXP Custom Operations

The Reader NXP Custom Statistics page provides options to view the statistics of individual read points for the Custom NXP Operations supported by the reader. The user can choose "All" read point option to view the combined statistics for all the read points. The success and failure values of following statistics can be viewed for each read point.

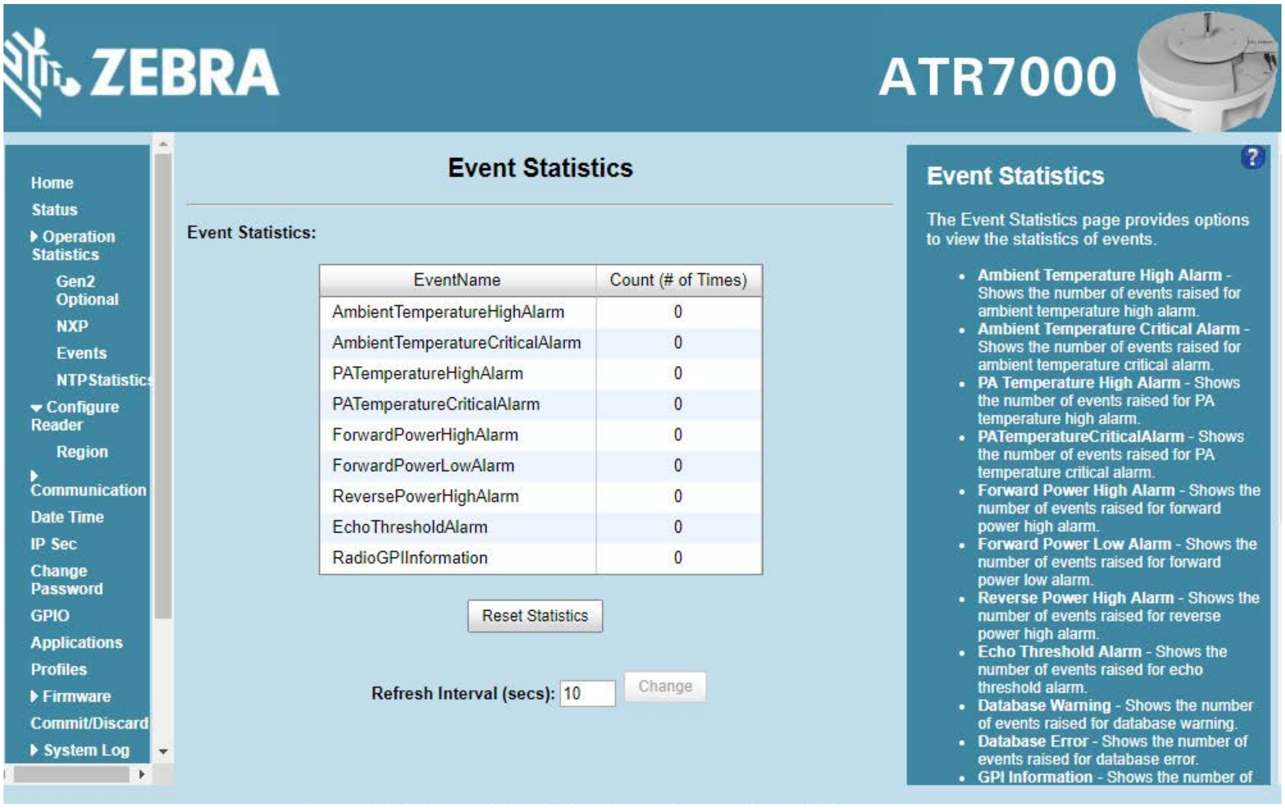
- **Change EAS count** - Shows the number of successful (and failed) Change EAS operations performed on NXP tags.
- **EAS Alarm count** - Shows the number of successful (and failed) EAS Alarms received from tags.
- **Set Quiet count** - Shows the number of successful (and failed) Set Quiet operations performed on NXP tags.
- **Reset Quiet count** - Shows the number of successful (and failed) Reset Quiet operations performed on NXP tags.
- **Change Config count** - Shows the number of successful (and failed) Change Config operations performed on NXP tags.
- **Choose Read point** - Allows choosing a specific (or "all") readpoint whose statistics are displayed.
- **Reset Statistics** - Resets all the success

- **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.
- **ChangeConfig** - Displays the number of successful (and failed) change configuration operations performed on NXP 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 and the maximum value allowed is 86,400 seconds. Input a new value and click **Change** to set a new interval.

Event Statistics

Select **Events** to view the **Events Statistics** window. This window provides options to view the statistics of events.

Figure 37 Event Statistics Window



Event Statistics

Event Statistics:

EventName	Count (# of Times)
AmbientTemperatureHighAlarm	0
AmbientTemperatureCriticalAlarm	0
PATemperatureHighAlarm	0
PATemperatureCriticalAlarm	0
ForwardPowerHighAlarm	0
ForwardPowerLowAlarm	0
ReversePowerHighAlarm	0
EchoThresholdAlarm	0
RadioGPIInformation	0

Refresh Interval (secs): 10

Event Statistics

The Event Statistics page provides options to view the statistics of events.

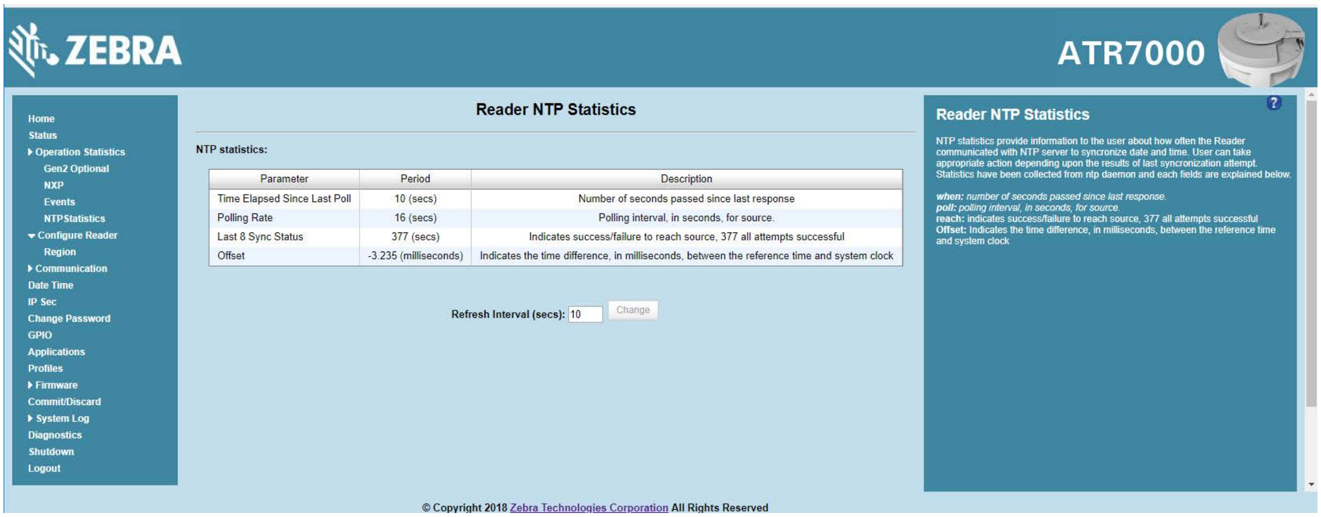
- **Ambient Temperature High Alarm** - Shows the number of events raised for ambient temperature high alarm.
- **Ambient Temperature Critical Alarm** - Shows the number of events raised for ambient temperature critical alarm.
- **PA Temperature High Alarm** - Shows the number of events raised for PA temperature high alarm.
- **PATemperatureCriticalAlarm** - Shows the number of events raised for PA temperature critical alarm.
- **Forward Power High Alarm** - Shows the number of events raised for forward power high alarm.
- **Forward Power Low Alarm** - Shows the number of events raised for forward power low alarm.
- **Reverse Power High Alarm** - Shows the number of events raised for reverse power high alarm.
- **Echo Threshold Alarm** - Shows the number of events raised for echo threshold alarm.
- **Database Warning** - Shows the number of events raised for database warning.
- **Database Error** - Shows the number of events raised for database error.
- **GPI Information** - Shows the number of

- **AmbientTemperatureHighAlarm** - Displays the number of events raised for ambient temperature high alarm.
- **AmbientTemperatureCriticalAlarm** - Displays the number of events raised for ambient temperature critical alarm.
- **PATemperatureHighAlarm** - Displays the number of events raised for PA temperature high alarm.
- **PATemperatureCriticalAlarm** - Displays the number of events raised for PA temperature critical alarm.
- **ForwardPowerHighAlarm** - Displays the number of events raised for forward power high alarm.
- **ForwardPowerLowAlarm** - Displays the number of events raised for forward power low alarm.
- **ReversePowerHighAlarm** - Displays the number of events raised for reverse power high alarm.
- **EchoThresholdAlarm** - Displays the number of events raised for echo threshold alarm.
- **DatabaseWarning** - Displays the number of warning events raised whenever the radio tag list buffer is almost full.
- **DatabaseError** - Displays the number of events raised when the radio tag list buffer is full.
- **GPIInformation** - Displays the number of events raised for radio GPI events.
- **Reset Statistics** - Resets all the success and failure counts 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 and the maximum value allowed is 86,400 seconds. Input a new value and click **Change** to set a new interval.

NTP Statistics

NTP statistics provide information to the user about how often the reader communicated with the NTP server to synchronize date and time. User can take appropriate action depending upon the results of the last synchronization attempt. Statistics have been collected from NTP daemon and each field are explained below.

Figure 38 NTP Statistics Window



Reader NTP Statistics

NTP statistics:

Parameter	Period	Description
Time Elapsed Since Last Poll	10 (secs)	Number of seconds passed since last response
Polling Rate	16 (secs)	Polling interval, in seconds, for source.
Last 8 Sync Status	377 (secs)	Indicates success/failure to reach source, 377 all attempts successful
Offset	-3.235 (milliseconds)	Indicates the time difference, in milliseconds, between the reference time and system clock

Refresh Interval (secs): 10

Reader NTP Statistics

NTP statistics provide information to the user about how often the Reader communicated with NTP server to syncronize date and time. User can take appropriate action depending upon the results of last syncronization attempt. Statistics have been collected from ntp daemon and each fields are explained below.

when: *number of seconds passed since last response.*
poll: *polling interval, in seconds, for source.*
reach: indicates success/failure to reach source, 377 all attempts successful
Offset: Indicates the time difference, in milliseconds, between the reference time and system clock

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Statistics have been collected from NTP daemon, each field is explained below.

- **When:** Number of seconds elapsed since last response.
- **Poll:** Polling interval, in seconds, for source.
- **Reach:** Indicates success/failure to reach source. A reading of 377 shows that all attempts were successful.
- **Offset:** Indicates the time difference, in milliseconds, between the reference time and system clock.

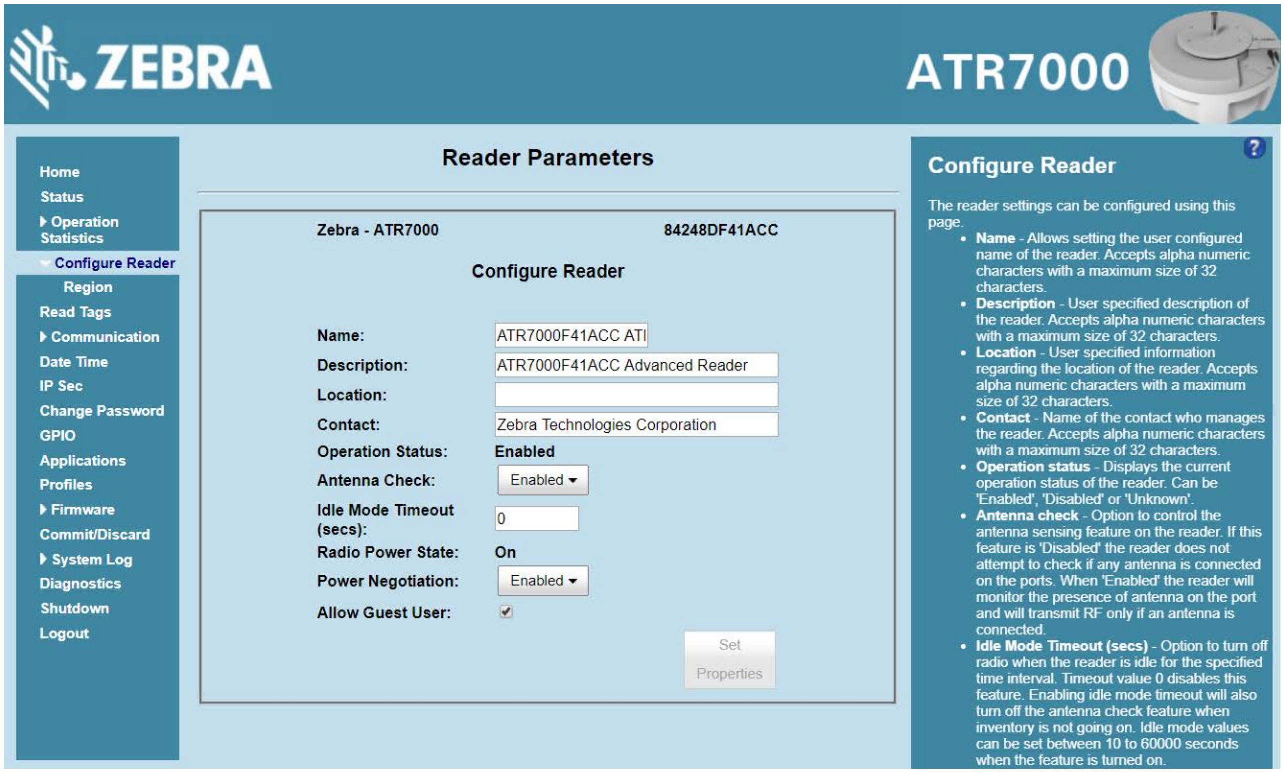
Configure Reader

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

Reader Parameters

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

Figure 39 Reader Parameters Window



Reader Parameters

Zebra - ATR7000 84248DF41ACC

Configure Reader

Name:	ATR7000F41ACC ATI
Description:	ATR7000F41ACC Advanced Reader
Location:	
Contact:	Zebra Technologies Corporation
Operation Status:	Enabled
Antenna Check:	Enabled
Idle Mode Timeout (secs):	0
Radio Power State:	On
Power Negotiation:	Enabled
Allow Guest User:	☑

Configure Reader

The reader settings can be configured using this page.

- **Name** - Allows setting the user configured name of the reader. Accepts alpha numeric characters with a maximum size of 32 characters.
- **Description** - User specified description of the reader. Accepts alpha numeric characters with a maximum size of 32 characters.
- **Location** - User specified information regarding the location of the reader. Accepts alpha numeric characters with a maximum size of 32 characters.
- **Contact** - Name of the contact who manages the reader. Accepts alpha numeric characters with a maximum size of 32 characters.
- **Operation status** - Displays the current operation status of the reader. Can be 'Enabled', 'Disabled' or 'Unknown'.
- **Antenna check** - Option to control the antenna sensing feature on the reader. If this feature is 'Disabled' the reader does not attempt to check if any antenna is connected on the ports. When 'Enabled' the reader will monitor the presence of antenna on the port and will transmit RF only if an antenna is connected.
- **Idle Mode Timeout (secs)** - Option to turn off radio when the reader is idle for the specified time interval. Timeout value 0 disables this feature. Enabling idle mode timeout will also turn off the antenna check feature when inventory is not going on. Idle mode values can be set between 10 to 60000 seconds when the feature is turned on.

- **Name** - Sets the user-configured reader name. Accepts up to 32 alphanumeric characters.
- **Description** - Sets a user-configured reader description. Accepts up to 32 alphanumeric characters.
- **Location** - Enter information on the reader location. Accepts up to 32 alphanumeric characters.
- **Contact** - Enter the 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 current operation status of the reader (**Enabled**, **Disabled**, or **Unknown**).
- **Antenna Check** - When enabled, the reader checks for any port fault and send event to the host indicating the faulty port. When disabled, no error is sent back for faulty port status.
- **Idle Mode Timeout (secs)** - Turns off the radio when the reader is idle for the specified time interval. A value of **0** disables this feature. Enabling this also turns off the antenna check feature when idle mode is entered after time out.
- **Radio Power State** - Displays the current state (**On** or **Off**) of the radio. The radio can be turned off if the **Idle Mode Timeout** is set to a non-zero value and the radio is not performing RF operations for a time period greater than the time specified by this timeout. The radio turns on automatically when RF operation starts.

- **Power Negotiation** - The ATR7000 requires at least 22.9 W to function properly. When the reader is Powered over Ethernet, PoE+ switches typically offers only PoE power levels to powered devices unless the device negotiates required power using LLDP protocol. When the Power Negotiation option is set as enabled, and committed, the ATR7000 readers negotiate PoE+ power level for its operation with the switch. Status of power negotiation is displayed in the Home page of the Administrative Console.

These settings only affect the display. Use Commit/Discard on page 80 to save the changes.

Configure Region

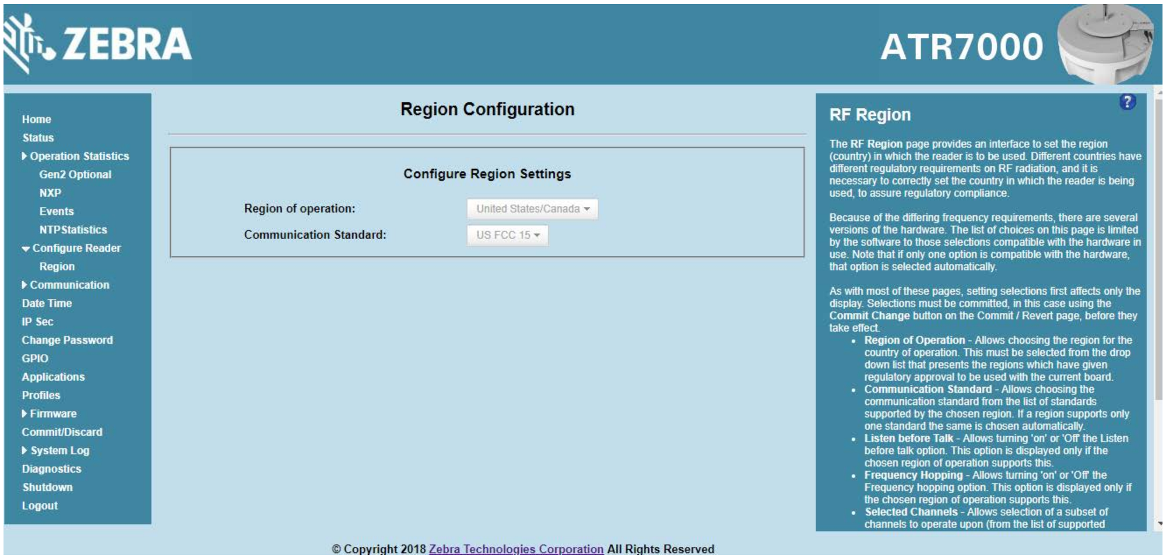
The ATR7000 currently supports United States, Canada, and other regions in 900 MHz RFID band. For global reader configurations, set the region of operation. **Setting the unit to a different region is illegal**.

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.

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

Because of the differing frequency requirements, there are several versions of the hardware. The list of choices on this page is limited by the software to those selections compatible with the hardware in use. Note that if only one option is compatible with the hardware, that option is selected automatically.

Figure 40 Region Configuration Window



Region Configuration

Configure Region Settings

Region of operation: United States/Canada

Communication Standard: US FCC 15

RF Region

The **RF Region** page provides an interface to set the region (country) in which the reader is to be used. Different countries have different regulatory requirements on RF radiation, and it is necessary to correctly set the country in which the reader is being used, to assure regulatory compliance.

Because of the differing frequency requirements, there are several versions of the hardware. The list of choices on this page is limited by the software to those selections compatible with the hardware in use. Note that if only one option is compatible with the hardware, that option is selected automatically.

As with most of these pages, setting selections first affects only the display. Selections must be committed, in this case using the **Commit Change** button on the Commit / Revert page, before they take effect.

- **Region of Operation** - Allows choosing the region for the country of operation. This must be selected from the drop down list that presents the regions which have given regulatory approval to be used with the current board.
- **Communication Standard** - Allows choosing the communication standard from the list of standards supported by the chosen region. If a region supports only one standard the same is chosen automatically.
- **Listen before Talk** - Allows turning 'on' or 'Off' the Listen before talk option. This option is displayed only if the chosen region of operation supports this.
- **Frequency Hopping** - Allows turning 'on' or 'Off' the Frequency hopping option. This option is displayed only if the chosen region of operation supports this.
- **Selected Channels** - Allows selection of a subset of channels to operate upon (from the list of supported

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- **Region of Operation** - Select the region for the country of operation from the drop-down list. This list includes regions 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.
- **Please confirm** - Check the **I understand** check box to confirm your understanding that the choices are in compliance with local regulatory requirements.

- **Set Properties** - Click to apply the changes. Select Commit/Discard on page 80 to save the changes to the reader.

Certificates

You can protect network services on the reader using SSL/TLS to secure the communication channel against eavesdropping or tampering, and optionally authenticate peer networked nodes involved in the communication. SSL/TLS protocol uses Public Key Infrastructure digital certificates. The following services on the reader support SSL/TLS.

- Web **Administrator Console** service (HTTPS). See Network Services Settings on page 72.
- File Transfer Service (FTPS - explicit SSL/TLS over FTP). See Network Services Settings on page 72.
- Shell Service (SSH - by default always in secure mode).
- Secure LLRP Service (refer to the EPC Global LLRP Standard, **Security in TCP Transport**). See the **Enable Secure Mode** option in Configure LLRP Settings on page 69.

NOTE: The supported version of SSL/TLS varies between services. Different services support SSL v3 and TLS 1.0 and above.

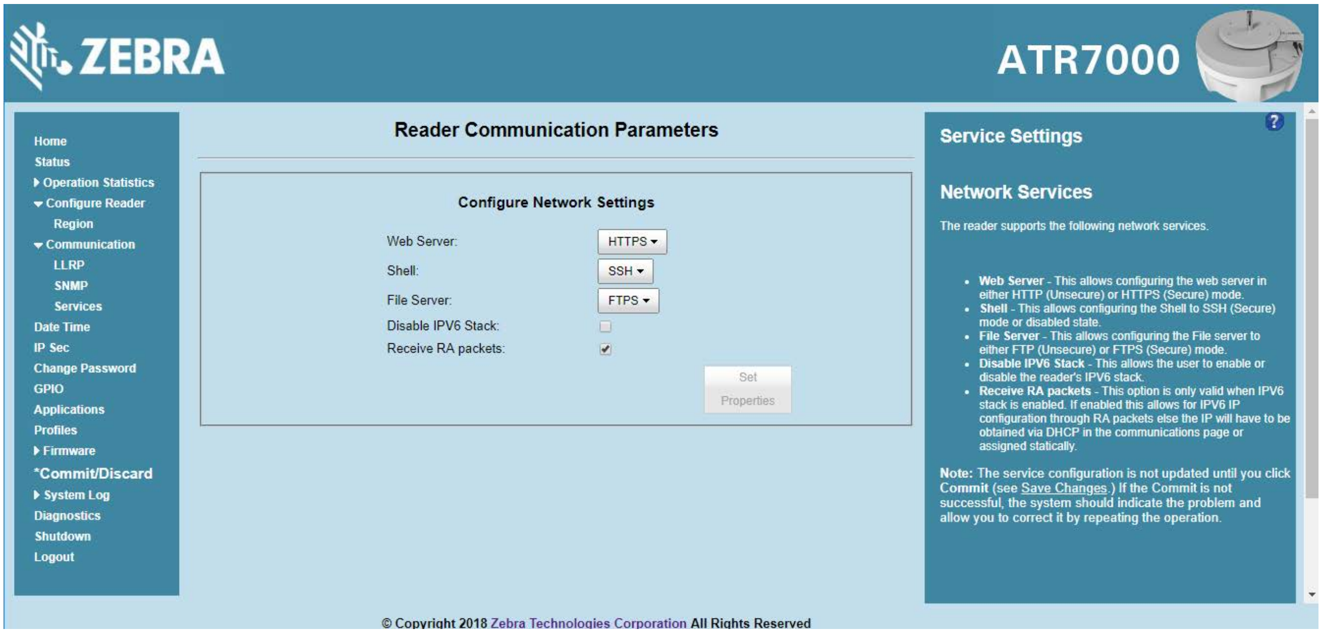
NOTE: The **Validate Peer** option in Secure LLRP Service configuration enables authentication of reader and/or clients using digital certificates. You must import a custom certificate (instead of the default self-signed certificate) to the reader to enable this option. See Configure LLRP Settings on page 69 for details. Services other than Secure LLRP rely on password-based authentication.

NOTE: The SNMP service on the reader supports SNMP v2c and does not support security.

Certificate Configuration

The **Certificate Configuration** page is available under the **Configure Reader** menu when the **Administrator Console** is in HTTPS mode only. To enable HTTPS mode, select **Communication** > **Services**, and on the **Reader Communication Parameters** page select **HTTPS** from the **Web Server** drop-down menu.

Figure 41 Setting HTTPS Mode



Reader Communication Parameters

Configure Network Settings

Web Server: HTTPS
Shell: SSH
File Server: FTPS
Disable IPV6 Stack: ☐
Receive RA packets: ☑

Service Settings

Network Services

The reader supports the following network services.

- **Web Server** - This allows configuring the web server in either HTTP (Unsecure) or HTTPS (Secure) mode.
- **Shell** - This allows configuring the Shell to SSH (Secure) mode or disabled state.
- **File Server** - This allows configuring the File server to either FTP (Unsecure) or FTPS (Secure) mode.
- **Disable IPV6 Stack** - This allows the user to enable or disable the reader's IPV6 stack.
- **Receive RA packets** - This option is only valid when IPV6 stack is enabled. If enabled this allows for IPV6 IP configuration through RA packets else the IP will have to be obtained via DHCP in the communications page or assigned statically.

Note: The service configuration is not updated until you click **Commit** (see Save Changes.) If the Commit is not successful, the system should indicate the problem and allow you to correct it by repeating the operation.

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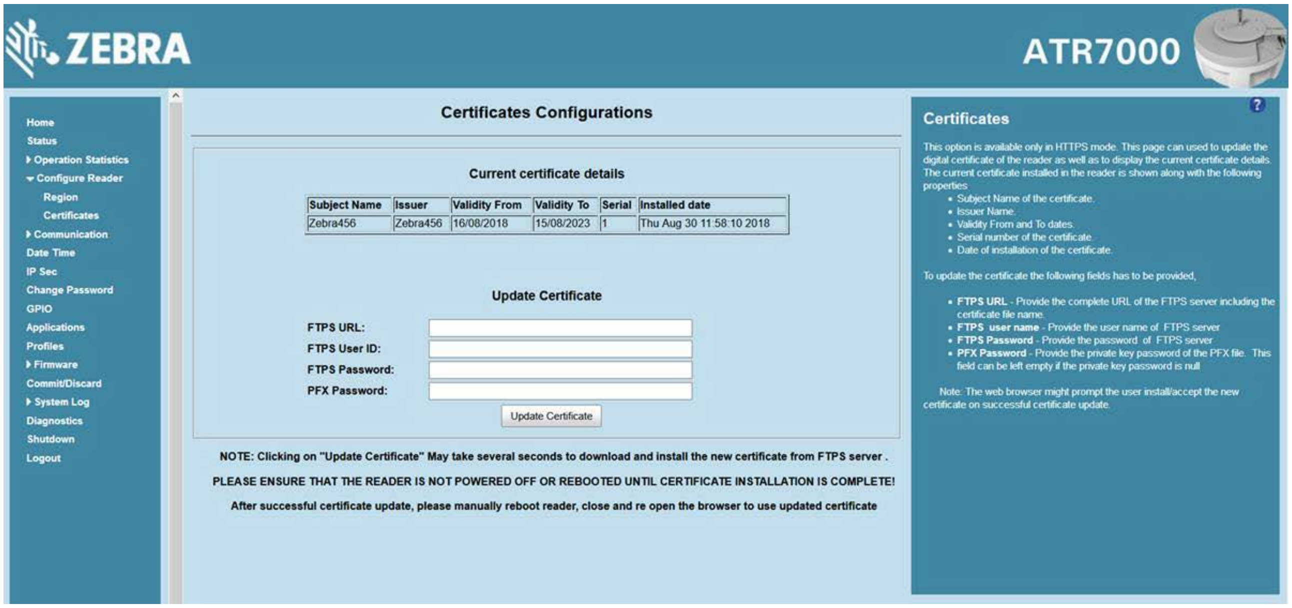
Select **Configure Reader** > **Certificates.** The **Certificate Configuration** page provides the current certificate details and an option to update to a custom certificate.

Figure 42 Certificate Configuration Window



Certificates Configurations

Current certificate details

Subject Name	Issuer	Validity From	Validity To	Serial	Installed date
Zebra456	Zebra456	16/08/2018	15/08/2023	1	Thu Aug 30 11:58:10 2018

Update Certificate

FTPS URL:
FTPS User ID:
FTPS Password:
PFX Password:

NOTE: Clicking on "Update Certificate" May take several seconds to download and install the new certificate from FTPS server .

PLEASE ENSURE THAT THE READER IS NOT POWERED OFF OR REBOOTED UNTIL CERTIFICATE INSTALLATION IS COMPLETE!

After successful certificate update, please manually reboot reader, close and re open the browser to use updated certificate

Certificates

This option is available only in HTTPS mode. This page can used to update the digital certificate of the reader as well as to display the current certificate details. The current certificate installed in the reader is shown along 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.

To update the certificate the following fields has to be provided,

- **FTPS URL** - Provide the complete URL of the FTPS server including the certificate file name.
- **FTPS user name** - Provide the user name of FTPS server
- **FTPS Password** - Provide the password of FTPS server
- **PFX Password** - Provide the private key password of the PFX file. This field can be left empty if the private key password is null

Note: The web browser might prompt the user install/accept the new certificate on successful certificate update.

The **Current certificate details** section displays the installed certificate's details such as issuer, serial number, and validity information.

By default, the reader uses self-signed certificates (characterized by **Subject Name** and **Issuer** in **Current certificate details**) for all secure interfaces using SSL/TLS.

Self-signed certificates have restrictions, such as by default clients do not trust them because they are not issued by a trusted Certification Authority (CA). Custom trusted certificates may be beneficial in certain use cases, for example:

- LLRP by default does not authenticate the client or reader. Security extensions to the standard allow client or reader authentication using digital certificates. The entities involved validate digital certificates by confirming the certificates were issued from a trusted source. Therefore a custom certificate is required to authenticate the client or reader. See the **Validate Peer** option in Configure LLRP Settings on page 69.
- By default web browsers display a warning or prevent connection to the **Administrator Console** when the console service is in HTTPS mode. See Network Services Settings on page 72. This can be an inconvenience for certain environments, particularly when browsers are configured to reject connection to servers that do not publish a trusted certificate.

ATR7000 readers do not allow automatic certificate request and updating. The reader certificate must be issued externally and imported to the reader.

The **Update Certificate** section allows importing a custom certificate to the reader. You must use one of the digital certificate generation mechanisms to create the certificate (see Creating a Custom Certificate). The reader only supports certificates in PKCS#12 format (typically with a **.pfx** extension). This format uses a signed certificate, with a private key (optionally encrypted) bundled into a single file. The certificate must be hosted on a secure FTP server (running in **Explicit SSL/TLS over FTP mode**). The following options are used to perform the update.

- **FTPS URL**: Full path to server, including ftps:// prefix, where the **.pfx** file is hosted.
- **FTPS User ID**: User login ID to secure FTP server.
- **FTPS Password**: Password for specified user.
- **PFX Password**: Password for encrypted key in the **.pfx** file, if the key is encrypted.

NOTE: The ATR7000 supports only a single digital certificate. If a custom certificate is installed, the issuer of the certificate is trusted by the reader, so any client attempting to connect to the reader over secure LLRP mode is trusted if the certificate issued to the client is from the same issuer.

NOTE: The ATR7000 supports only supports certificates using the RSA public key algorithm. When obtaining a certificate issued from the reader or clients, ensure that RSA is the selected key algorithm.

NOTE: A manual reboot of the reader is required after updating the certificate for the services using SSL/TLS.

Creating a Custom Certificate

ATR7000 readers require that custom certificates are created externally and imported to the reader using a secure FTP, as described previously. The certificate and key used by the reader must be in PKCS#12 format (a single .pfx file), while the certificate and keys used by clients interfacing to the LLRP service on the reader must be in PEM format. If you obtain a certificate in a different format it must be converted to the appropriate format using a tools such as OpenSSL (www.openssl.org).

Digital certificates are typically requested and issued from a certification authority hosted internally in an enterprise environment or by a trusted third party certification authority. The process of requesting and creating certificates varies between platforms. For example, a Windows Server environment typically uses Microsoft Certification Server to process certificate requests and issue certificates. Unix-based systems typically use OpenSSL. This guide can not document all options. The following example illustrates one method of creating custom certificates.

Custom Certificate Creation Example

The following example illustrates how to set up an OpenSSL-based certification authority to issue reader and client certificates. These scripts can be executed in a Unix operating system or on Windows with a Unix shell scripting environment such as Cygwin.

Create the following text files in a suitable folder on the host machine:

- caconfig.cnf - OpenSSL configuration file for Certification Authority certificate creation and signing
- samplereader.cnf - OpenSSL configuration file for reader certificate creation
- samplehost.cnf - OpenSSL configuration file for reader certificate creation
- InitRootCA.sh - Script for initializing a new Root Certification Authority
- CreateReaderCert.sh - Script for creating reader certificate
- CreateClientCert.sh - Script for creating client certificate

File contents are as follows. Refer to **OpenSSL** (www.openssl.org) documentation for details on configuration options.

Edit configuration options to accommodate the deployment environment.

caconfig.cnf

```
# Sample caconfig.cnf file for XYZ certification authority
#
# Default configuration to use when one is not provided on the command line.
#
[ ca ]
default_ca    = local_ca
#
#
# Default location of directories and files needed to generate certificates.
#
[ local_ca ]
dir        = .
certificate   = $dir/cacert.pem
database     = $dir/index.txt
new_certs_dir  = $dir/signedcerts
private_key   = $dir/private/cakey.pem
serial      = $dir/serial
#
#
# Default expiration and encryption policies for certificates.
#
default_crl_days     = 365
default_days       = 1825
default_md        = sha1
#
policy      = local_ca_policy

#
#
# Default policy to use when generating server certificates.  The following
# fields must be defined in the server certificate.
#
```

```
[ local_ca_policy ]
commonName              = supplied
stateOrProvinceName     = supplied
countryName             = supplied
emailAddress            = supplied
organizationName        = supplied
organizationalUnitName  = supplied

#
#
# The default root certificate generation policy.
#
[ req ]
default_bits    = 2048
default_keyfile = ./private/cakey.pem
default_md      = sha1
#
prompt                  = no
distinguished_name      = root_ca_distinguished_name
x509_extensions         = v3_ca
#
#
# Root Certificate Authority distinguished name.  Change these fields to match
# your local environment!
#
[ root_ca_distinguished_name ]
commonName              = XYZ Root Certification Authority
stateOrProvinceName     = IL
countryName             = US
emailAddress            = ca@xyz.com
organizationName        = XYZ
organizationalUnitName  = ABC Dept
#
```

```
[ root_ca_extensions ]
basicConstraints        = CA:true

[ v3_req ]
basicConstraints       = CA:FALSE
keyUsage               = nonRepudiation, digitalSignature, keyEncipherment

[ v3_ca ]
basicConstraints        = critical, CA:true, pathlen:0
nsCertType              = sslCA
keyUsage                = cRLSign, keyCertSign
extendedKeyUsage        = serverAuth, clientAuth
nsComment               = "CA Certificate"

[ ssl_client_server ]
basicConstraints        = CA:FALSE
nsCertType              = server, client
keyUsage                = digitalSignature, keyEncipherment
extendedKeyUsage        = serverAuth, clientAuth, nsSGC, msSGC
nsComment               = "SSL/TLS Certificate"
```

samplereader.cnf

```
#
# samplehost.cnf - customized for a reader. Edit last 4 octets after ATR7000 to suit hostname of reader to which certificate is issued
#

[ req ]
prompt                 = no
distinguished_name     = ATR7000123456.ds

[ ATR70000657E5.ds ]
commonName             = ATR7000123456
stateOrProvinceName    = IL
countryName            = US
emailAddress           = root@ATR7000123456
organizationName       = Company Name
organizationalUnitName = Department Name
```

samplehost.cnf

```
#
# samplehost.cnf - customized for a client that will connect to the reader's LLRP port. Edit hostname to match FQDN of client.
#

[ req ]
prompt                 = no
distinguished_name     = clienthostname.mycompany.com

[clienthostname.mycompany.com ]
commonName             = CLIENTHOSTNAME
stateOrProvinceName    = IL
countryName            = US
emailAddress           = root@clienthostname.mycompany.com
organizationName       = Company Name
organizationalUnitName = Department Name
```

InitRootCA.sh

```
#Initialize from current directory
#Enable definition for environment variable OPENSSL_FIPS to execute in FIPS mode on system with FIPS compliant OpenSSL build
#export OPENSSL_FIPS=1
export WORKSPACE_DIR=$( cd "$( dirname "$0" )" && pwd )
#Make sure CA key password is unique and secret
export CA_KEY_PASSWORD=CA-abcd12345
#Cleanup Certificate Store folder
rm -rf $WORKSPACE_DIR/CA-Certs
#Change directory to CA-Certs and create folders for certificate and key storage in myCA
mkdir -p $WORKSPACE_DIR/CA-Certs
cd $WORKSPACE_DIR/CA-Certs
mkdir -p myCA/signedcerts
mkdir -p myCA/private
cd myCA
#Initialize serial number
echo '01' > serial  && touch index.txt
#Create CA private key and certificate
export OPENSSL_CONF=$WORKSPACE_DIR/caconfig.cnf
echo 'Creating CA key and certificate....'
openssl req -x509 -newkey rsa:2048 -out cacert.pem -outform PEM -days 1825 -passout pass:$CA_KEY_PASSWORD
openssl x509 -in cacert.pem -out cacert.crt
echo 'Test Certificate Authority Initialized. CA certificate saved in cacert.crt. Install it to trusted CA certificate store'
```

CreateReaderCert.sh

```
#Initialize from current directory

#Enable definition for environment variable OPENSSL_FIPS to execute in FIPS mode on system with FIPS compliant OpenSSL build

#export OPENSSL_FIPS=1

export WORKSPACE_DIR=$( cd "$( dirname "$0" )" && pwd )

#Make sure passwords are unique and secret

export CA_KEY_PASSWORD=CA-abcd12345

export GENERATED_CERT_KEY_PASSWORD=abcd12345

cd $WORKSPACE_DIR/CA-Certs/myCA

#Create sample reader key and certificate

export OPENSSL_CONF=$WORKSPACE_DIR/samplereader.cnf

echo 'Creating reader key and certificate with its signing request ....'

openssl req -newkey rsa:1024 -keyout reader_key.pem -keyform PEM -out tempreq.pem -outform PEM -passout pass:$GENERATED_CERT_KEY_PASSWORD

#CA now signs client certificate by processing its certificate sigining request

echo 'CA Signing reader certificate....'

export OPENSSL_CONF=$WORKSPACE_DIR/caconfig.cnf

openssl ca -extensions ssl_client_server -in tempreq.pem -out reader_crt.pem -passin pass:$CA_KEY_PASSWORD -batch

rm -f tempreq.pem

echo 'Exporting reader certificate and key to PKCS#12 format....'

openssl pkcs12 -export -out reader.pfx -inkey reader_key.pem -in reader_crt.pem -certfile cacert.crt -passin pass:$GENERATED_CERT_KEY_PASSWORD -passout pass:$GENERATED_CERT_KEY_PASSWORD

echo 'Reader certificate, key and export to PKCS#12 format (.pfx) completed.'

echo 'Note: PFX protected with password: '$GENERATED_CERT_KEY_PASSWORD
```

CreateClientCert.sh

```
#Initialize from current directory

#Enable definition for environment variable OPENSSL_FIPS to execute in FIPS mode on system with FIPS compliant OpenSSL build

#export OPENSSL_FIPS=1

export WORKSPACE_DIR=$( cd "$( dirname "$0" )" && pwd )

#Make sure passwords are unique and secret

export CA_KEY_PASSWORD=CA-abcd12345

export GENERATED_CERT_KEY_PASSWORD=abcd12345

cd $WORKSPACE_DIR/CA-Certs/myCA

echo 'Current dir:'$( cd "$( dirname "$0" )" && pwd )

#Create sample client key and certificate

export OPENSSL_CONF=$WORKSPACE_DIR/samplehost.cnf

echo 'Creating client key and certificate with its signing request ....'

openssl req -newkey rsa:1024 -keyout client_key.pem -keyform PEM -out tempreq.pem -outform PEM -passout pass:$GENERATED_CERT_KEY_PASSWORD

#CA now signs client certificate by processing its certificate sigining request

echo 'CA Signing client certificate....'

export OPENSSL_CONF=$WORKSPACE_DIR/caconfig.cnf

openssl ca -in tempreq.pem -out client_crt.pem -extensions ssl_client_server -passin pass:$CA_KEY_PASSWORD -batch

rm -f tempreq.pem

echo 'Client key, certificate creation and signing completed. Use files client_key.pem and client_crt.pem'
```

Script Usage

The following section illustrates how to use the previous scripts on the host machine.

Certification Authority Initialization

- Edit **caconfig.cnf** to change the configuration for CA if necessary.
- Execute CA initialization command sequence by invoking **./InitRootCA.sh.**

Issue Reader certificate:

- Edit **samplereader.cnf** to update any configuration such as **hostname** if necessary.
- Execute **CreateReaderCert.sh** by invoking **./CreateReaderCert.sh**.

Issue Client certificate:

- Certificate and key issued using this method can be directly used with the LLRP client.
- Edit **samplehost.cnf** to update any configuration such as **hostname** for the client, if necessary.
- Execute **CreateClientCert.sh** by invoking **./CreateClientCert.sh**.

SSH Key Management

Users can import SSH keys into the reader to establish remote connections without password authentication. SSH keys enable secure, passwordless login to remote servers.

Generating a New SSH Key Pair

Before importing SSH keys into the reader, you need to generate them. This step creates a pair of cryptographic keys: a public key (shared with the remote server) and a private key (kept secure on your local machine).

1. Open a terminal on a local machine.
2. Run the following command to create an SSH key pair:

   ```
   $ssh-keygen -t rsa -b 4096
   ```

   - -t rsa specifies the type of encryption (RSA).
   - -b 4096 specifies the bit length of the key (higher is more secure).

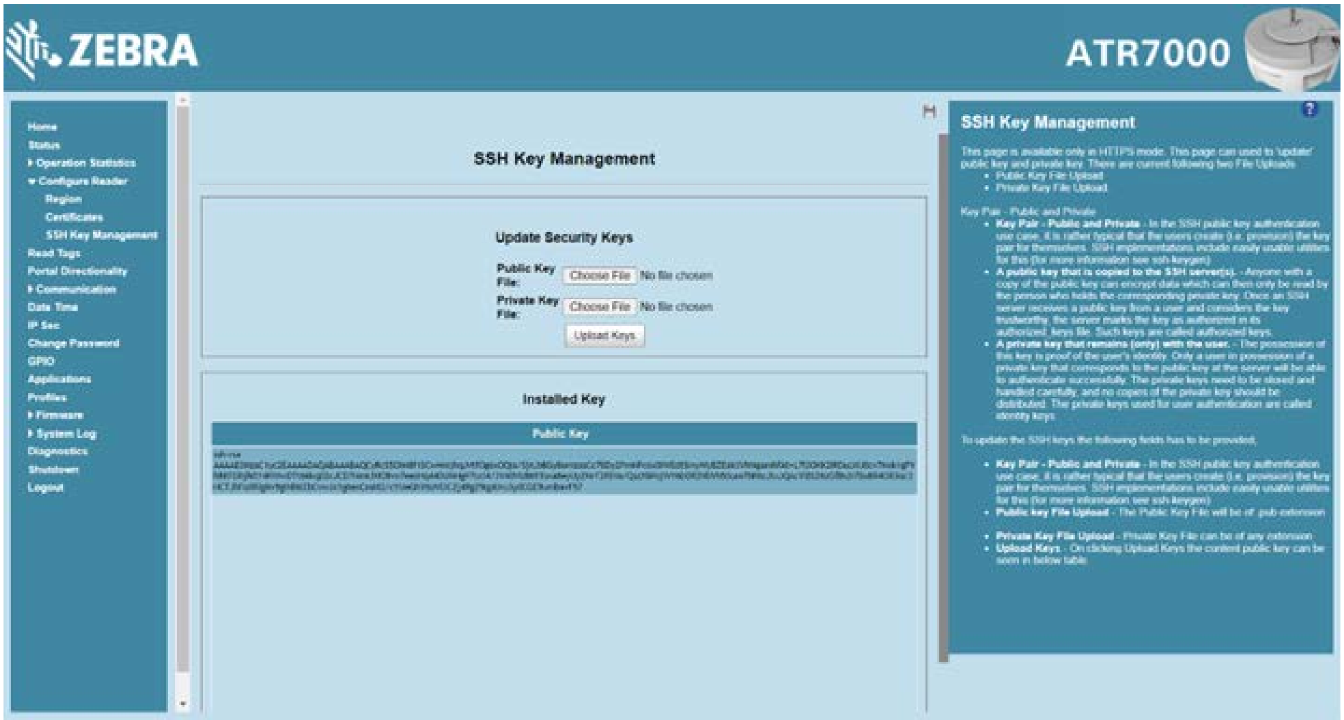
NOTE: FX readers currently support 2048- and 4096-bit RSA SSH keys only.

3. When prompted to **Enter a file in which to save the key**, enter the desired location or press **Enter** to accept the default location (~/.ssh/id_rsa).
4. When prompted to enter a passphrase, press **Enter** to leave it empty (FX readers do not support SSH keys with passphrases).

Once done, there will be two files: one private key file (containing a key beginning with '-----BEGIN OPENSSH PRIVATE KEY-----') and another public key file (with a .pub extension containing a key beginning with 'ssh-rsa').

Importing SSH Keys

Import the SSH keys into the reader by navigating to **Configure Reader** > **SSH Key Management**.



SSH Key Management

Update Security Keys

Public Key File: Choose File No file chosen

Private Key File: Choose File No file chosen

Installed Key

Public Key
ssh-rsa [illegible]

SSH Key Management

This page is available only in HTTPS mode. This page can used to 'update' public key and private key. There are current following two File Uploads
- Public Key File Upload
- Private Key File Upload

Key Pair - Public and Private
- **Key Pair - Public and Private** - In the SSH public key authentication use case, it is rather typical that the users create (i.e. provision) the key pair for themselves. SSH implementations include easily usable utilities for this (for more information see ssh-keygen)
- **A public key that is copied to the SSH server(s).** - Anyone with a copy of the public key can encrypt data which can then only be read by the person who holds the corresponding private key. Once an SSH server receives a public key from a user and considers the key trustworthy, the server marks the key as authorized in its authorized_keys file. Such keys are called authorized keys.
- **A private key that remains (only) with the user.** - The possession of this key is proof of the user's identity. Only a user in possession of a private key that corresponds to the public key at the server will be able to authenticate successfully. The private keys need to be stored and handled carefully, and no copies of the private key should be distributed. The private keys used for user authentication are called identity keys.

To update the SSH keys the following fields has to be provided.

- **Key Pair - Public and Private** - In the SSH public key authentication use case, it is rather typical that the users create (i.e. provision) the key pair for themselves. SSH implementations include easily usable utilities for this (for more information see ssh-keygen)
- **Public key File Upload** - The Public Key File will be of .pub extension
- **Private Key File Upload** - Private Key File can be of any extension
- **Upload Keys** - On clicking Upload Keys the content public key can be seen in below table

NOTE: The current public key is displayed under the **Installed Key** section.

Import both the public and private keys into the reader by selecting **Public Key File** and **Private Key File** and navigating to the appropriate location on your local machine.

When selected, click **Upload Keys** to upload the files to the reader and replace the existing keys.

NOTE: The reader can possess only a single active public SSH key.

The new public key will now be displayed under the **Installed Key** section.

Adding SSH Key to a Remote Server

Adding the SSH key tells the remote server to allow login from your FX reader, which holds the matching private key.

1. Log in to the remote server using a password:

   ssh user@remote_server_ip

2. When logged in, append your public key to the server's ~/.ssh/authorized_keys file:

   echo "your_public_key_here" >> ~/.ssh/authorized_keys

NOTE: The public key begins with “ssh-rsa. Ensure the entire file content is copied.

3. Ensure the permissions on the ~/.ssh/ directory and the authorized_keys file are correct:

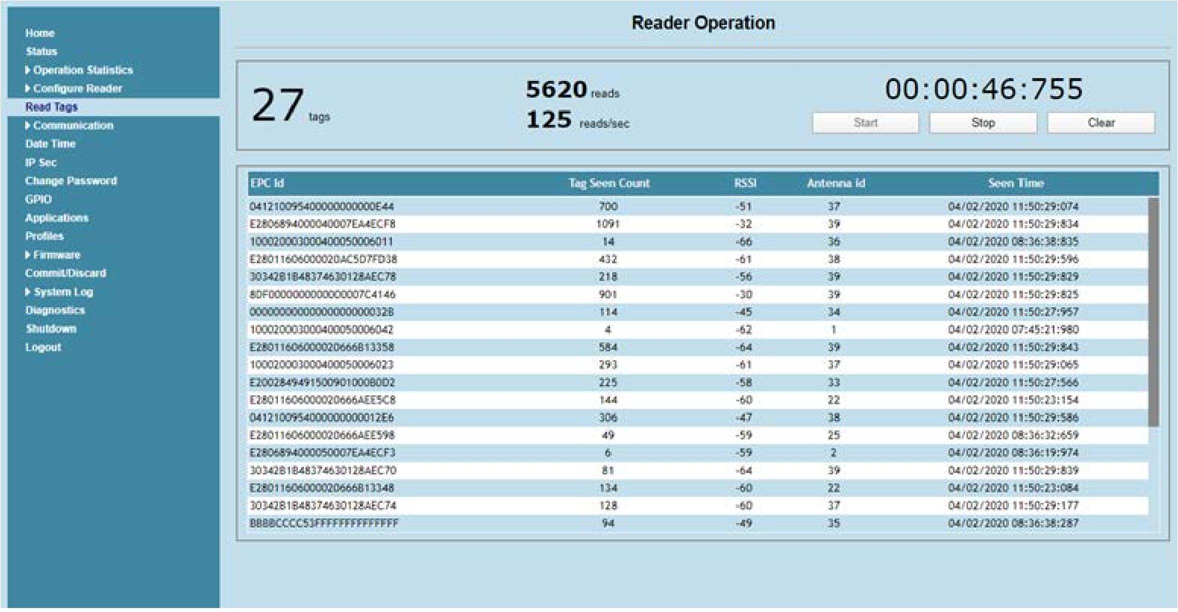
   chmod 700 ~/.ssh

   chmod 600 ~/.ssh/authorized_keys

Read Tags

Select Read Tags to perform an inventory of tags in the field of view of the reader.

Figure 43 Reader Operation



Reader Operation

27 tags

5620 reads

125 reads/sec

00:00:46:755

EPC Id	Tag Seen Count	RSSI	Antenna Id	Seen Time
041210095400000000000E44	700	-51	37	04/02/2020 11:50:29:074
E2806894000040007EA4ECF8	1091	-32	39	04/02/2020 11:50:29:834
100020003000400050006011	14	-66	36	04/02/2020 08:36:38:835
E28011606000020AC5D7FD38	432	-61	38	04/02/2020 11:50:29:596
30342B1B48374630128AEC78	218	-56	39	04/02/2020 11:50:29:829
8DF0000000000000007C4146	901	-30	39	04/02/2020 11:50:29:825
00000000000000000000032B	114	-45	34	04/02/2020 11:50:27:957
100020003000400050006042	4	-62	1	04/02/2020 07:45:21:980
E280116060000020666B13358	584	-64	39	04/02/2020 11:50:29:843
100020003000400050006023	293	-61	37	04/02/2020 11:50:29:065
E200284949150090100080D2	225	-58	33	04/02/2020 11:50:27:566
E28011606000020666AEE5C8	144	-60	22	04/02/2020 11:50:23:154
0412100954000000000012E6	306	-47	38	04/02/2020 11:50:29:586
E28011606000020666AEE598	49	-59	25	04/02/2020 08:36:32:659
E2806894000050007EA4ECF3	6	-59	2	04/02/2020 08:36:19:974
30342B1B48374630128AEC70	81	-64	39	04/02/2020 11:50:29:839
E28011606000020666B13348	134	-60	22	04/02/2020 11:50:23:084
30342B1B48374630128AEC74	128	-60	37	04/02/2020 11:50:29:177
BBBBCCCC53FFFFFFFFFFFFFF	94	-49	35	04/02/2020 08:36:38:287

Inventory operation on all tags in the field of view is initiated by clicking the Start button. Inventory is performed on all virtual antennas of the ATR7000. Statistics on total unique tags read, total number of inventory responses, and read rate is displayed.

For each inventoried tag, its EPC ID, number of times the tag was seen, peak RSSI of tag's response, virtual antenna on which tag was observed, and the last seen timestamp are displayed in a table.

The Inventory operation is continuous and may be stopped by clicking the Stop button.

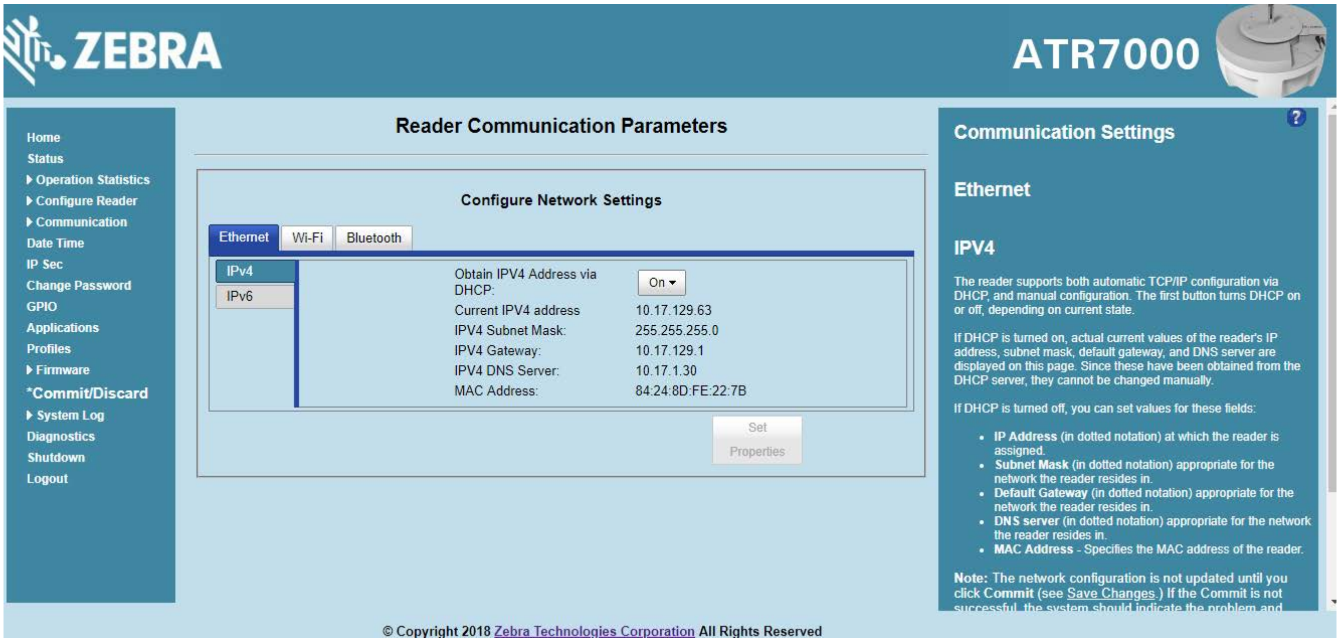
Current inventory statistics are cleared by clicking the Clear button.

Communication Settings

Select **Communication** to view the **Configure Network Settings** window.

Configure Network Settings with Ethernet

Figure 44 Configure Network Settings - Ethernet



Reader Communication Parameters

Configure Network Settings

Obtain IPV4 Address via DHCP:	On
Current IPV4 address	10.17.129.63
IPV4 Subnet Mask:	255.255.255.0
IPV4 Gateway:	10.17.129.1
IPV4 DNS Server:	10.17.1.30
MAC Address:	84:24:8D:FE:22:7B

Communication Settings

Ethernet

IPV4

The reader supports both automatic TCP/IP configuration via DHCP, and manual configuration. The first button turns DHCP on or off, depending on current state.

If DHCP is turned on, actual current values of the reader's IP address, subnet mask, default gateway, and DNS server are displayed on this page. Since these have been obtained from the DHCP server, they cannot be changed manually.

If DHCP is turned off, you can set values for these fields:

- **IP Address** (in dotted notation) at which the reader is assigned.
- **Subnet Mask** (in dotted notation) appropriate for the network the reader resides in.
- **Default Gateway** (in dotted notation) appropriate for the network the reader resides in.
- **DNS server** (in dotted notation) appropriate for the network the reader resides in.
- **MAC Address** - Specifies the MAC address of the reader.

Note: The network configuration is not updated until you click **Commit** (see Save Changes.) If the Commit is not successful, the system should indicate the problem and

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IPV4

NOTE: You must click **Commit** to update the network configuration. If the Commit is not successful, the system indicates the problem and allows correcting it by repeating the operation. DHCP and IP address updates do apply until the reader is rebooted.

- **Obtain IPV4 Address via DHCP** - The reader supports both automatic TCP/IP configuration via DHCP and manual configuration. The DHCP button turns DHCP on and off.

  If DHCP is turned on, this window displays actual current values of the reader's IP address, subnet mask, default gateway, and DNS server. Because these are obtained from the DHCP server, they cannot be changed manually.

  If DHCP is turned off, you can set the following values for these fields.
- **Current IPV4 Address** - IP address (in dotted notation) at which the reader is assigned.
- **IPV4 Subnet Mask** - Subnet mask (in dotted notation) appropriate for the network in which the reader resides.
- **IPV4 Default Gateway** - Default gateway (in dotted notation) appropriate for the network in which the reader resides.
- **IPV4 DNS Server** - DNS server (in dotted notation) appropriate for the network in which the reader resides.
- **MAC Address** - The MAC address of the reader.

IPV6

NOTE: Also enable automatic configuration for IPV6 through RA packets configuration. To enable or disable RA packet configuration go to the Services window.

- **Obtain IPV6 Address via DHCP** - The reader supports both automatic TCP/IPV6 configuration via DHCP and manual configuration. The DHCP button turns DHCP on and off.

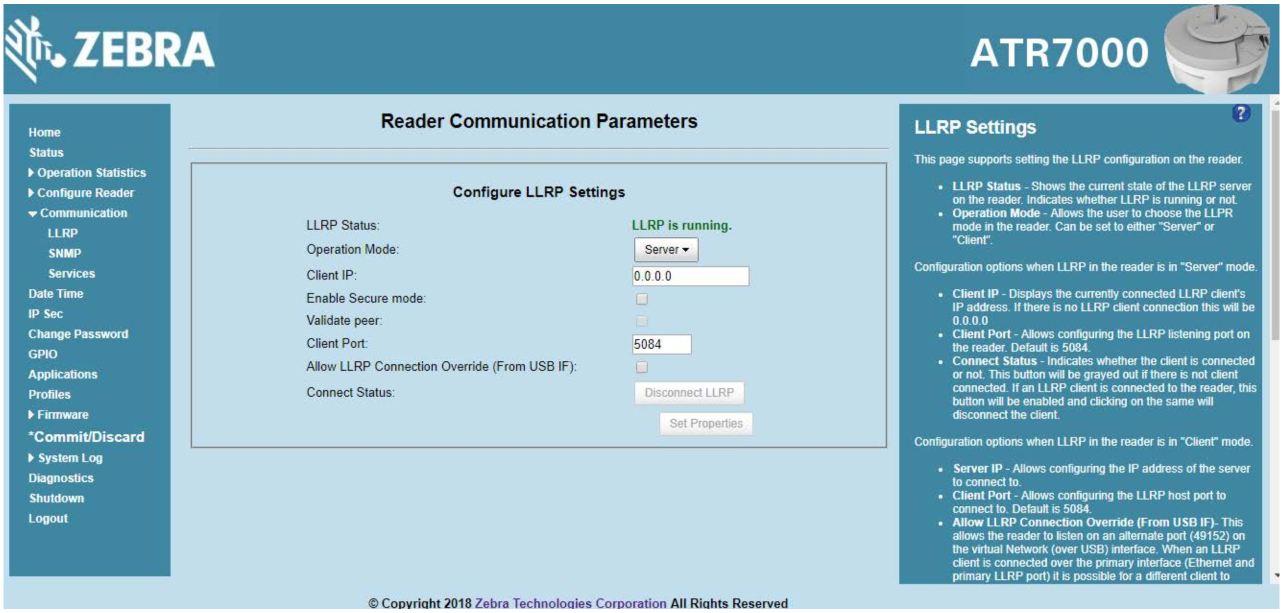
  If DHCP is turned on, this window displays actual current values of the reader's IPV6 address, prefix length, default gateway, and DNS server. Because these are obtained from the DHCP server, they cannot be changed manually.

  If DHCP is turned off, you can set the following values for these fields.
- **Current IPV6 Address** - IP address (in dotted notation) at which the reader is assigned.
- **Prefix Length** - Prefix length appropriate for the network in which the reader resides.
- **IPV6 Default Gateway** - Default gateway (in dotted notation) appropriate for the network in which the reader resides.
- **IPV6 DNS Server** - DNS server (in dotted notation) appropriate for the network in which the reader resides.
- **MAC Address** - The MAC address of the reader.

Configure LLRP Settings

Select **LLRP** to view and set the LLRP settings. By default, LLRP activates in server mode, where LLRP clients can connect to the reader using the port number specified in the **Client** port field. The reader can also be configured 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 45 Configure LLRP Settings Window



Reader Communication Parameters

Configure LLRP Settings

LLRP Status:	LLRP is running.
Operation Mode:	Server ▾
Client IP:	0.0.0.0
Enable Secure mode:	□
Validate peer:	□
Client Port:	5084
Allow LLRP Connection Override (From USB IF):	□
Connect Status:	Disconnect LLRP

LLRP Settings

This page supports setting the LLRP configuration on the reader.

- **LLRP Status** - Shows the current state of the LLRP server on the reader. Indicates whether LLRP is running or not.
- **Operation Mode** - Allows the user to choose the LLPR mode in the reader. Can be set to either "Server" or "Client".

Configuration options when LLRP in the reader is in "Server" mode.

- **Client IP** - Displays the currently connected LLRP client's IP address. If there is no LLRP client connection this will be 0.0.0.0
- **Client Port** - Allows configuring the LLRP listening port on the reader. Default is 5084.
- **Connect Status** - Indicates whether the client is connected or not. This button will be grayed out if there is not client connected. If an LLRP client is connected to the reader, this button will be enabled and clicking on the same will disconnect the client.

Configuration options when LLRP in the reader is in "Client" mode.

- **Server IP** - Allows configuring the IP address of the server to connect to.
- **Client Port** - Allows configuring the LLRP host port to connect to. Default is 5084.
- **Allow LLRP Connection Override (From USB IF)**- This 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) it is possible for a different client to

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This window offers the following fields:

- **LLRP Status** - Displays the current state of the LLRP server on the reader. Indicates whether LLRP is running.
- **Operation Mode** - Sets the LLPR mode in the reader to either **Server** or **Client**.

LLRP configuration options when the reader is in **Server** mode:

- **Client IP** - Displays the currently connected LLRP client's IP address. If there is no LLRP client connection, this is 0.0.0.0.
- **Client Port** - Configures the LLRP listening port on the reader. The default is 5084.
- **Connect Status** - Indicates whether the client is connected. This button is grayed out if there is no client connected. If an LLRP client is connected to the reader, this button is enabled; click this button to disconnect the client.

LLRP configuration options when the reader is in **Client** mode:

- **Server IP** - Configures the IP address of the server to connect to.
- **Client Port** - Configures the LLRP host port to connect to. The default is 5084.
- **Allow LLRP Connection Override (From USB IF)** - This 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), a different client can override this connection on the alternate interface (Virtual Network and alternate port 49152) if this option is enabled. This also permits overriding a connection from a primary interface over an existing connection on an alternate interface. This option is off by default. Changing this option restarts the LLRP service on the reader.
- **Connect Status** - Indicates whether the reader is connected to the LLRP host. This button toggles between **ConnectLLRP** and **DisconnectLLRP**. Clicking **ConnectLLRP** initiates an LLRP connection to the host server.

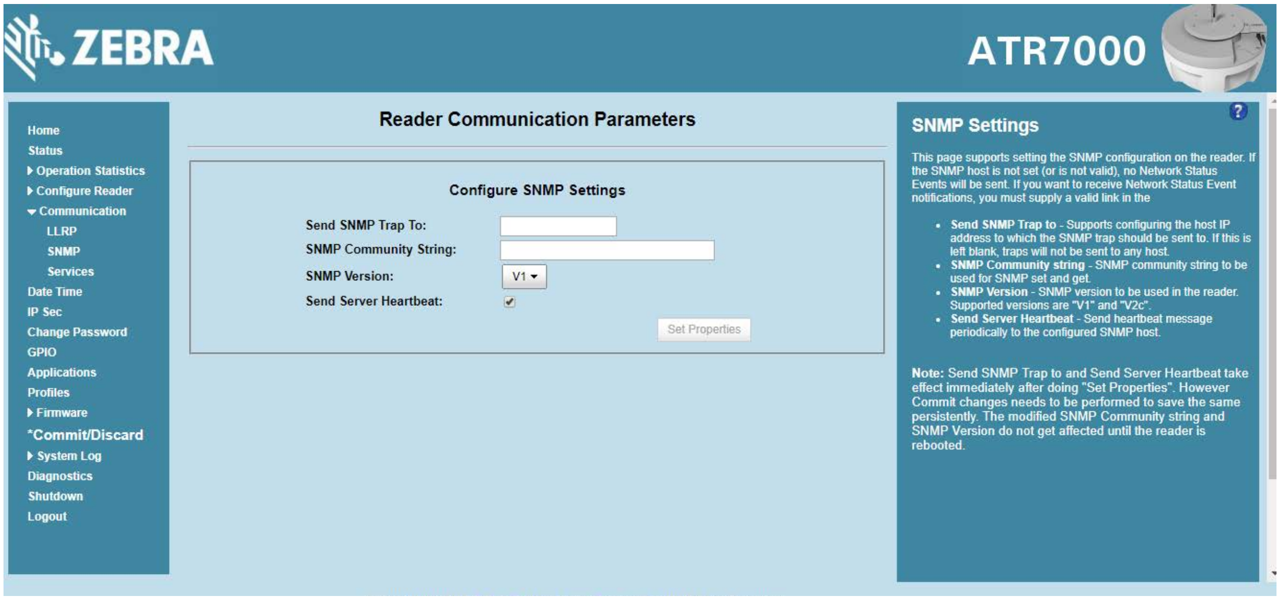
LLRP configuration options when the reader is in **Secure** mode:

- **Security Mode** - Specifies whether LLRP communicates in secure or unsecured mode. Checking **Enable Secure Mode** switches the LLRP port to 5085 by default. You can override the port value. LLRP in secure mode supports ciphers that are compliant with TLS1.2.
- **Validate Peer** - Specifies whether the validation of peer against the same certification authority issued certificate is required. If you select the validate peer option, the secure LLRP service on the reader allows connection for valid secure peer entities only if the certificate of the peer is issued from the same certification authority that issued the certificate for the reader. By default the reader uses self-signed certificates, and peer certificate based validation is disabled.

SNMP Settings

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

Figure 46 Configure SNMP Settings Window



Reader Communication Parameters

Configure SNMP Settings

Send SNMP Trap To:

SNMP Community String:

SNMP Version: V1

Send Server Heartbeat: ☑

SNMP Settings

This page supports setting the SNMP configuration on the reader. If the SNMP host is not set (or is not valid), no Network Status Events will be sent. If you want to receive Network Status Event notifications, you must supply a valid link in the

- **Send SNMP Trap to** - Supports configuring the host IP address to which the SNMP trap should be sent to. If this is left blank, traps will not be sent to any host.
- **SNMP Community string** - SNMP community string to be used for SNMP set and get.
- **SNMP Version** - SNMP version to be used in the reader. Supported versions are "V1" and "V2c".
- **Send Server Heartbeat** - Send heartbeat message periodically to the configured SNMP host.

Note: Send SNMP Trap to and Send Server Heartbeat take effect immediately after doing "Set Properties". However Commit changes needs to be performed to save the same persistently. The modified SNMP Community string and SNMP Version do not get affected until the reader is rebooted.

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.

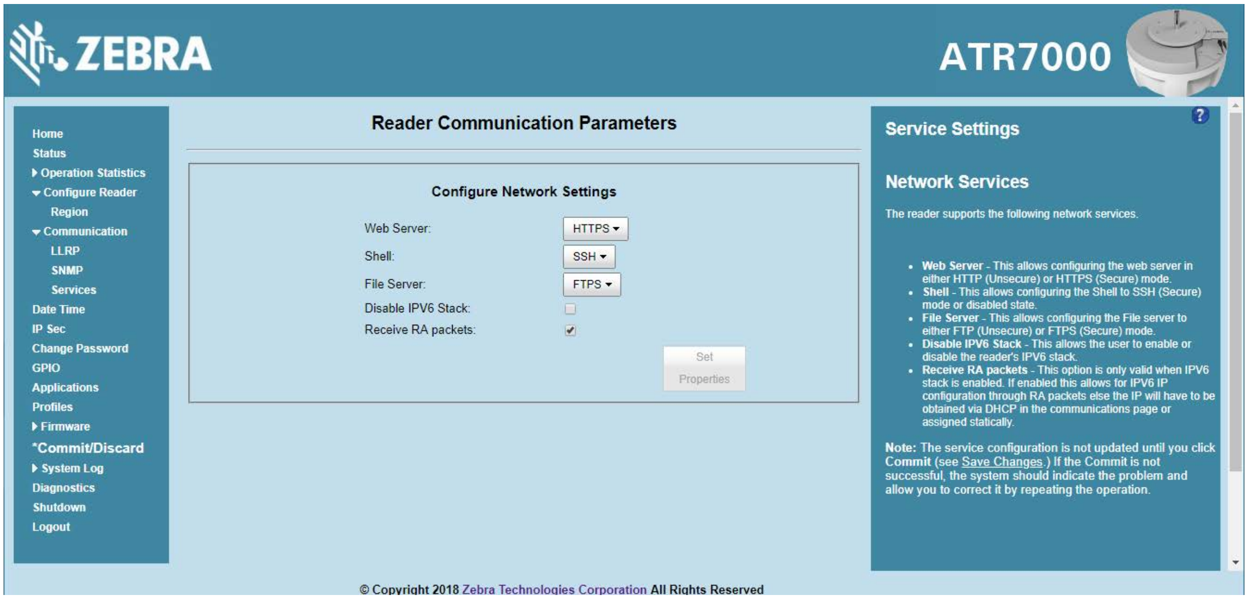
NOTE: Send SNMP Trap To and **Send Server Heartbeat** take effect immediately after clicking **Set Properties**. However, perform a **Commit** to persist the changes. The modified **SNMP Community String** and **SNMP Version** are not affected until the reader reboots.

- **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.

Network Services Settings

Select **Services** to view the **Configure Network Service Settings** window.

Figure 47 Configure Network Service Settings Window



Reader Communication Parameters

Configure Network Settings

Web Server:	HTTPS
Shell:	SSH
File Server:	FTPS
Disable IPV6 Stack:	☐
Receive RA packets:	☑

Service Settings

Network Services

The reader supports the following network services.

- **Web Server** - This allows configuring the web server in either HTTP (Unsecure) or HTTPS (Secure) mode.
- **Shell** - This allows configuring the Shell to SSH (Secure) mode or disabled state.
- **File Server** - This allows configuring the File server to either FTP (Unsecure) or FTPS (Secure) mode.
- **Disable IPV6 Stack** - This allows the user to enable or disable the reader's IPV6 stack.
- **Receive RA packets** - This option is only valid when IPV6 stack is enabled. If enabled this allows for IPV6 IP configuration through RA packets else the IP will have to be obtained via DHCP in the communications page or assigned statically.

Note: The service configuration is not updated until you click **Commit** (see Save Changes.) If the Commit is not successful, the system should indicate the problem and allow you to correct it by repeating the operation.

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The reader supports the following network services.

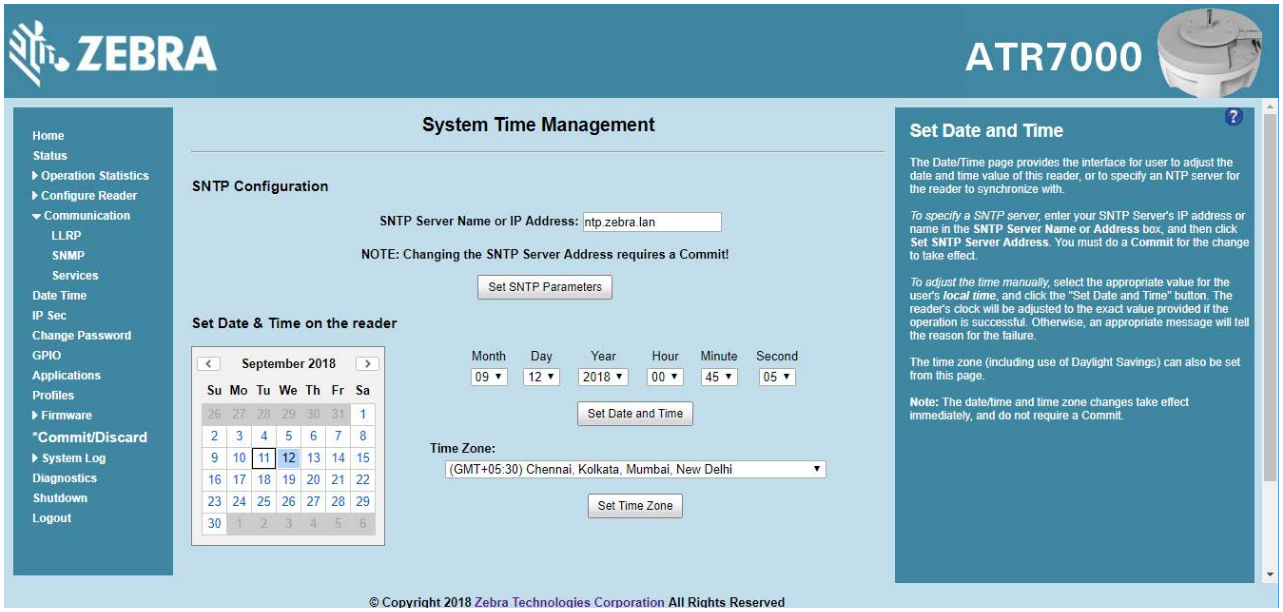
- **Web Server** - Configures the web server in either HTTP (unsecure) or HTTPS (secure) mode.
- **Shell** - Sets the shell to SSH (secure) mode or a disabled state.
- **File Server** - Sets the file server to either FTP (unsecure) or FTPS (secure) mode.
- **Disable IPV6 Stack** - Select this to disable the reader's IPV6 stack.
- **Receive RA packets** - This option is only valid when the IPV6 stack is enabled. Enable this to allow IPV6 IP configuration through RA packets; otherwise obtain the IP via DHCP in the Communication window or assign statically.

System Time Management

Select **Date Time** to view the **System Time Management** window. Use this window to set the date and time value of the reader, or to specify an NTP server for the reader to synchronize with.

NOTE: The date/time and time zone changes take effect immediately, and do not require a Commit.

Figure 48 System Time Management Window



System Time Management

SNTP Configuration

SNTP Server Name or IP Address: ntp.zebra.lan

NOTE: Changing the SNTP Server Address requires a Commit!

Set Date & Time on the reader

September 2018

Su	Mo	Tu	We	Th	Fr	Sa
26	27	28	29	30	31	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	1	2	3	4	5	6

Month	Day	Year	Hour	Minute	Second
09	12	2018	00	45	05

Time Zone: (GMT+05:30) Chennai, Kolkata, Mumbai, New Delhi

Set Date and Time

The Date/Time page provides the interface for user to adjust the date and time value of this reader, or to specify an NTP server for the reader to synchronize with.

To specify a SNTP server, enter your SNTP Server's IP address or name in the **SNTP Server Name or Address** box, and then click **Set SNTP Server Address**. You must do a **Commit** for the change to take effect.

To adjust the time manually, select the appropriate value for the user's ***local time***, and click the "Set Date and Time" button. The reader's clock will be adjusted to the exact value provided if the operation is successful. Otherwise, an appropriate message will tell the reason for the failure.

The time zone (including use of Daylight Savings) can also be set from this page.

Note: The date/time and time zone changes take effect immediately, and do not require a Commit.

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To specify an SNTP server, enter the SNTP server's IP address or name in the **SNTP Server Name or IP Address** box, and then click **Set SNTP Parameters**. You must select Commit for the change to take effect.

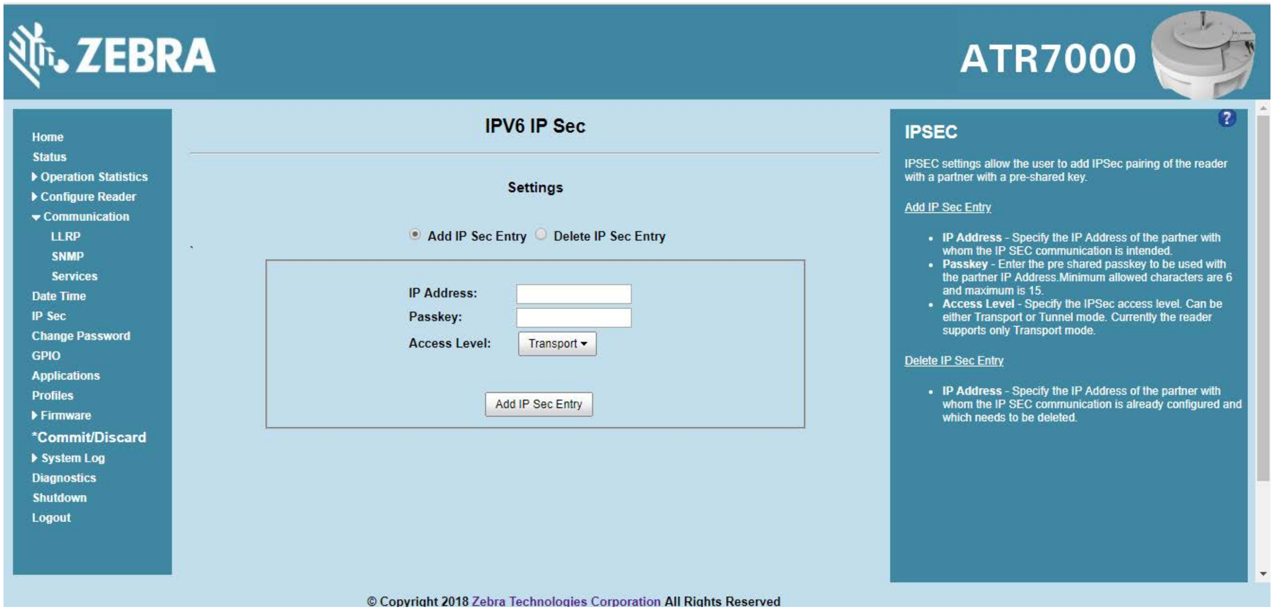
To adjust the time manually, select the appropriate value for the user's local time, and click the Set Date and Time button. This adjusts the reader's clock to the value provided if the operation is successful. Otherwise, an appropriate message indicates the reason for the failure.

You can also set the **Time Zone** (including use of Daylight Savings) using the drop-down menu.

IPV6 IP Sec

Select **IP Sec** to view the **IPV6 IP Sec** window. IP Sec settings allow adding IP Sec pairing of the reader with a partner with a pre-shared key.

Figure 49 IPV6 IP Sec Window



IPV6 IP Sec

Settings

● Add IP Sec Entry ○ Delete IP Sec Entry

IP Address:

Passkey:

Access Level: Transport ▾

IPSEC

IPSEC settings allow the user to add IPSec pairing of the reader with a partner with a pre-shared key.

Add IP Sec Entry

- **IP Address** - Specify the IP Address of the partner with whom the IP SEC communication is intended.
- **Passkey** - Enter the pre shared passkey to be used with the partner IP Address.Minimum allowed characters are 6 and maximum is 15.
- **Access Level** - Specify the IPSec access level. Can be either Transport or Tunnel mode. Currently the reader supports only Transport mode.

Delete IP Sec Entry

- **IP Address** - Specify the IP Address of the partner with whom the IP SEC communication is already configured and which needs to be deleted.

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To add an IP Sec entry:

1. Click the Add IP Sec Entry radio button.
2. In the **IP Address** field, specify the IP address of the partner with whom the IP SEC communication is intended.
3. In the **Passkey** field, enter the pre-shared passkey (from 6 to 15 characters) to use with the partner IP address.
4. In the **Access Level** drop-down list, select the IP Sec access level. Options are **Transport** and **Tunnel** mode. Currently the reader only supports **Transport** mode.
5. Click the Add IP Sec Entry button.

To delete an IP Sec entry:

1. Click Delete IP Sec Entry radio button.
2. In the **IP Address** field, specify the IP address of the partner with whom the IP SEC communication is configured and is to be deleted.
3. Click the Delete IP Sec Entry radio button.

Change Password

To ensure the controlled and secured access to reader **Administrator Console** functions, 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.

ATR7000 User Accounts

The ATR7000 supports the following user accounts:

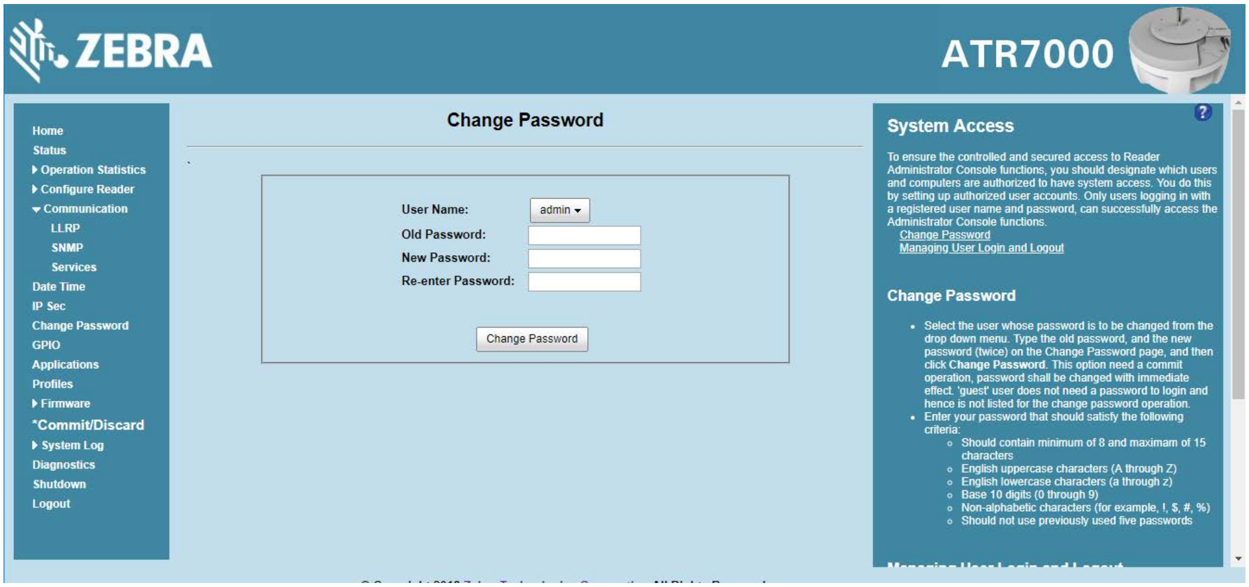
- **admin** - This user has web access but no shell access, with full privileges to make changes on the reader using the Administrator Console interface and to access to the reader using the FTP interface.
- **guest** - This user has web access but no shell access, with read-only privileges in the Administrator Console and can not make configuration changes. The **guest** user does not need a password to log in to the Administrator Console.

NOTE: The **Change Password** function is not supported for the user **guest**.

- **rfidadm** - This is the reader administrator, with shell access but no Administrator Console access. **rfidadm** has full access to the **/apps** directory and read-only access to most of the other directories, including the **/platform**, **/usr**, **/lib**, **/etc**, and **/bin** directories. The **rfidadm** user can use this account to install and uninstall RFID programs and upload user applications.

Select **Change Password** to view the **Change Password** window.

Figure 50 Change Password Window



User Name: admin
Old Password:
New Password:
Re-enter Password:

System Access

To ensure the controlled and secured access to Reader Administrator Console functions, you should designate which users and computers are authorized to have system access. You do this by setting up authorized user accounts. Only users logging in with a registered user name and password, can successfully access the Administrator Console functions.

Change Password
Managing User Login and Logout

Change Password

- Select the user whose password is to be changed from the drop down menu. Type the old password, and the new password (twice) on the Change Password page, and then click **Change Password**. This option need a commit operation, password shall be changed with immediate effect. 'guest' user does not need a password to login and hence is not listed for the change password operation.
- Enter your password that should satisfy the following criteria:
  - Should contain minimum of 8 and maximam of 15 characters
  - English uppercase characters (A through Z)
  - English lowercase characters (a through z)
  - Base 10 digits (0 through 9)
  - Non-alphabetic characters (for example, !, $, #, %)
  - Should not use previously used five passwords

To set a user password:

1. In the **User Name** drop-down list, select the user for whom to change the password.
2. In the **Old Password** field, enter the existing password for that user.
3. In the **New Password** field, enter the new password, and again in the **Re-Enter Password** field.
4. Click **Change Password**. The password changes immediately and does not require a Commit operation.

Managing User Login and Logout

Users must log in and log out of the system to ensure that system access is granted only to authorized users, and that only one user is logged in at a time to ensure that multiple users do not make conflicting changes to the system.

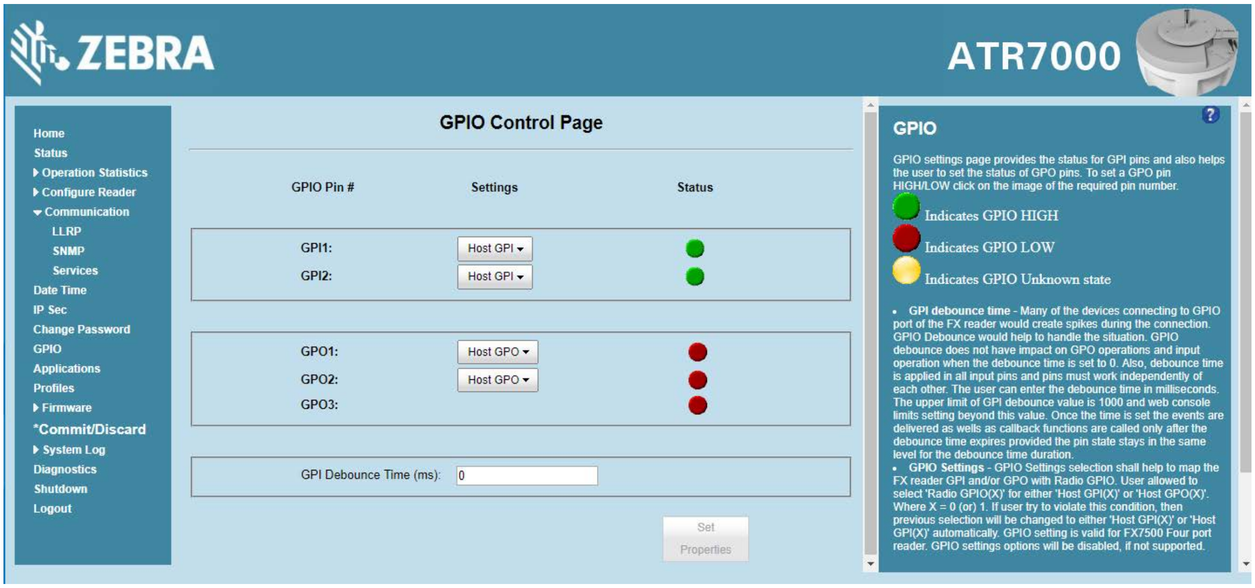
If the user performs no action for a period of time, the system automatically logs him or her out. The user must log in again to use the Administrator Console.

GPIO

Select **GPIO** to view the **GPIO Control Page**. This window allows viewing and setting the status for GPI pins.

NOTE: The ATR7000 has two inputs and three outputs.

Figure 51 GPIO Control Window



GPIO Control Page

GPIO Pin #	Settings	Status
GPI1:	Host GPI	🟢
GPI2:	Host GPI	🟢
GPO1:	Host GPO	🔴
GPO2:	Host GPO	🔴
GPO3:		🔴

GPI Debounce Time (ms): 0

GPIO

GPIO settings page provides the status for GPI pins and also helps the user to set the status of GPO pins. To set a GPO pin HIGH/LOW click on the image of the required pin number.

🟢 Indicates GPIO HIGH

🔴 Indicates GPIO LOW

🟡 Indicates GPIO Unknown state

- **GPI debounce time** - Many of the devices connecting to GPIO port of the FX reader would create spikes during the connection. GPIO Debounce would help to handle the situation. GPIO debounce does not have impact on GPO operations and input operation when the debounce time is set to 0. Also, debounce time is applied in all input pins and pins must work independently of each other. The user can enter the debounce time in milliseconds. The upper limit of GPI debounce value is 1000 and web console limits setting beyond this value. Once the time is set the events are delivered as wells as callback functions are called only after the debounce time expires provided the pin state stays in the same level for the debounce time duration.
- **GPIO Settings** - GPIO Settings selection shall help to map the FX reader GPI and/or GPO with Radio GPIO. User allowed to select 'Radio GPIO(X)' for either 'Host GPI(X)' or 'Host GPO(X)'. Where X = 0 (or) 1. If user try to violate this condition, then previous selection will be changed to either 'Host GPI(X)' or 'Host GPI(X)' automatically. GPIO setting is valid for FX7500 Four port reader. GPIO settings options will be disabled, if not supported.

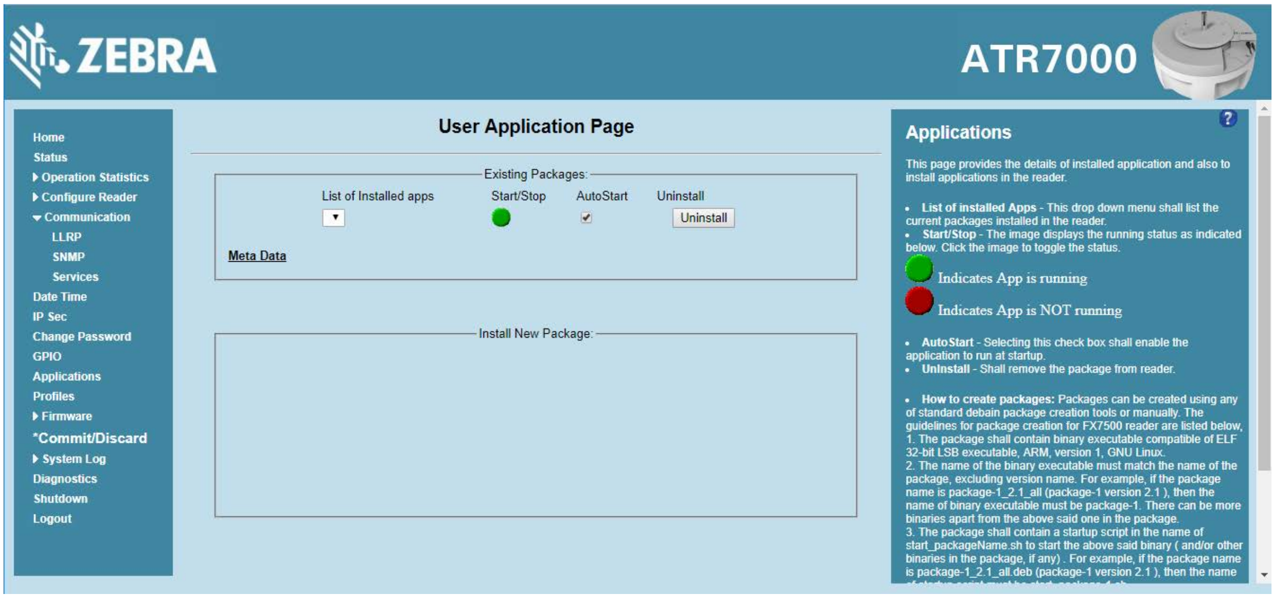
- **Settings** - Map the reader GPI and/or GPO with the host GPIO. Select **Host** for **GPIx** or **GPOx** where *x* = 0 or 1. An attempt to violate this condition changes the selection to either **Host GPIx** or **Host GPOx** automatically. The settings are disabled if a configuration is not supported.
- **Status** - To set a GPO pin high or low, click on the image next to the required pin number:
  - Green 🟢 indicates GPIO HIGH
  - Red 🔴 indicates GPIO LOW
  - Yellow 🟡 indicates GPIO unknown
- **GPI Debounce Time** - Enter a value of up to 1000 milliseconds to minimize spikes that can occur when a device connects to the GPIO port of the reader. The default is 50. Debounce time applies to all input pins, and pins must work independently of each other. Events and callback functions occur only after the debounce time expires, provided the pin state remains at the same level for the debounce time duration. GPIO debounce does not impact GPO and input operations when set to 0.

- **Set Properties** - Click this when all selections are made.

Applications

Select **Applications** to view the **User Application Page**. This window allows installing applications on the reader and provides details of the installed application.

Figure 52 User Application Window



Applications

This page provides the details of installed application and also to install applications in the reader.

- **List of installed Apps** - This drop down menu shall list the current packages installed in the reader.
- **Start/Stop** - The image displays the running status as indicated below. Click the image to toggle the status.

🟢 Indicates App is running

🔴 Indicates App is NOT running

- **AutoStart** - Selecting this check box shall enable the application to run at startup.
- **Uninstall** - Shall remove the package from reader.

- **How to create packages:** Packages can be created using any of standard debain package creation tools or manually. The guidelines for package creation for FX7500 reader are listed below,
1. The package shall contain binary executable compatible of ELF 32-bit LSB executable, ARM, version 1, GNU Linux.
2. The name of the binary executable must match the name of the package, excluding version name. For example, if the package name is package-1_2.1_all (package-1 version 2.1), then the name of binary executable must be package-1. There can be more binaries apart from the above said one in the package.
3. The package shall contain a startup script in the name of start_packageName.sh to start the above said binary (and/or other binaries in the package, if any) . For example, if the package name is package-1_2.1_all.deb (package-1 version 2.1), then the name

The **Existing Packages** section includes the following options:

- **List of Installed apps** - The drop-down menu lists the current packages installed in the reader.
- **Start/Stop** - The image displays the running status as follows. Click the image to toggle the status.
  - Green 🟢 indicates application is running
  - Red 🔴 indicates application is not running
- **AutoStart** - Select this check box to run the application at startup.
- **Uninstall** - Removes the package from the reader.

To create packages for the ATR7000 reader, use any of the standard Debian package creation tools, or create them manually. *The FXSeries SDK Programmers Guide* provides details on creating application packages to install on the reader.

- The package must contain a binary executable compatible with ELF 32-bit LSB executable, ARM, version 1, GNU Linux.
- The name of the binary executable must match the name of the package, excluding the version name. For example, if the package name is **package-1_2.1_all** (package 1 version 2.1), the name of the binary executable must be **package-1**. There can be more than one binary in the package.
- The package must contain a startup script in the name of **start_packageName.sh** to start the binary or binaries in the package. For example, if the package name is **package-1_2.1_all.deb** (package 1 version 2.1), the name of the startup script must be **start_package-1.sh.**

- The package must contain a stop script in the name of **stop_packageName.sh** to stop the binary or binaries in the package. For example, if the package name is **package-1_2.1_all.deb** (package 1 version 2.1), the name of stop script must be **stop_package-1.sh.**

NOTE: The reader executes the packages with the privileges of **rfidadm** user account. See the ATR7000 User Accounts on page 75 for information on **rfidadm** user privileges.

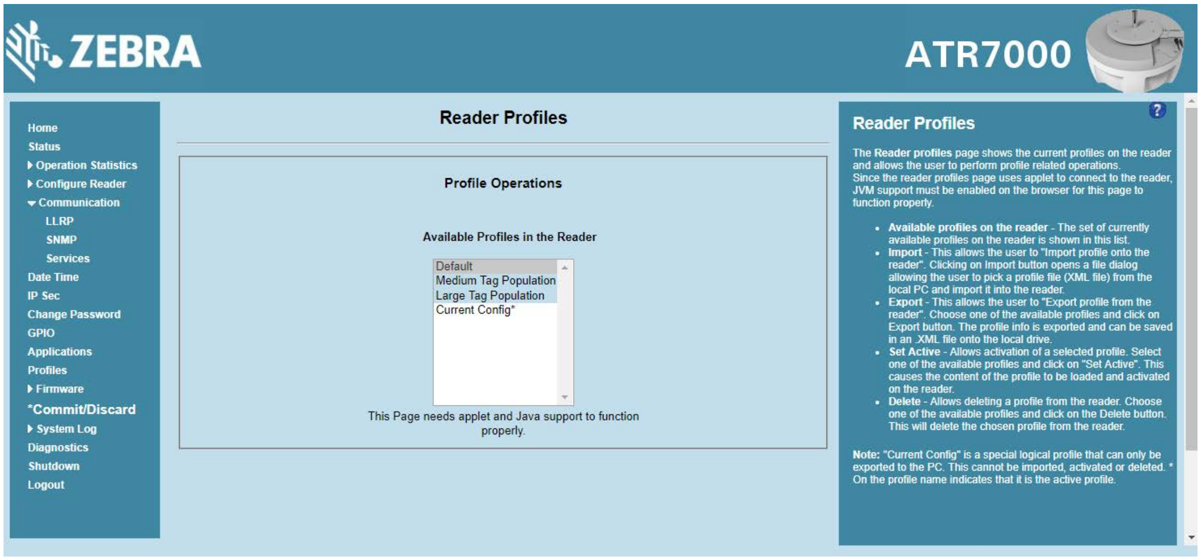
Reader Profiles

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.

NOTE: Because the **Reader Profiles** window uses an applet to connect to the reader, enable JVM support on the browser in order for this window to function properly.

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 53 Reader Profiles Window



Reader Profiles

Profile Operations

Available Profiles in the Reader

This Page needs applet and Java support to function properly.

Reader Profiles

The **Reader profiles** page shows the current profiles on the reader and allows the user to perform profile related operations.
Since the reader profiles page uses applet to connect to the reader, JVM support must be enabled on the browser for this page to function properly.

- **Available profiles on the reader** - The set of currently available profiles on the reader is shown in this list.
- **Import** - This allows the user to "Import profile onto the reader". Clicking on Import button opens a file dialog allowing the user to pick a profile file (XML file) from the local PC and import it into the reader.
- **Export** - This allows the user to "Export profile from the reader". Choose one of the available profiles and click on Export button. The profile info is exported and can be saved in an .XML file onto the local drive.
- **Set Active** - Allows activation of a selected profile. Select one of the available profiles and click on "Set Active". This causes the content of the profile to be loaded and activated on the reader.
- **Delete** - Allows deleting a profile from the reader. Choose one of the available profiles and click on the Delete button. This will delete the chosen profile from the reader.

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

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.

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.

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.
- **Delete -** Select an available profile and click **Delete** to delete the 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 RF Air Link Configuration for more information about air link profile configuration.

FIPS Support

The ATR7000 supports FIPS 140-2 Level 1 for the following interfaces.

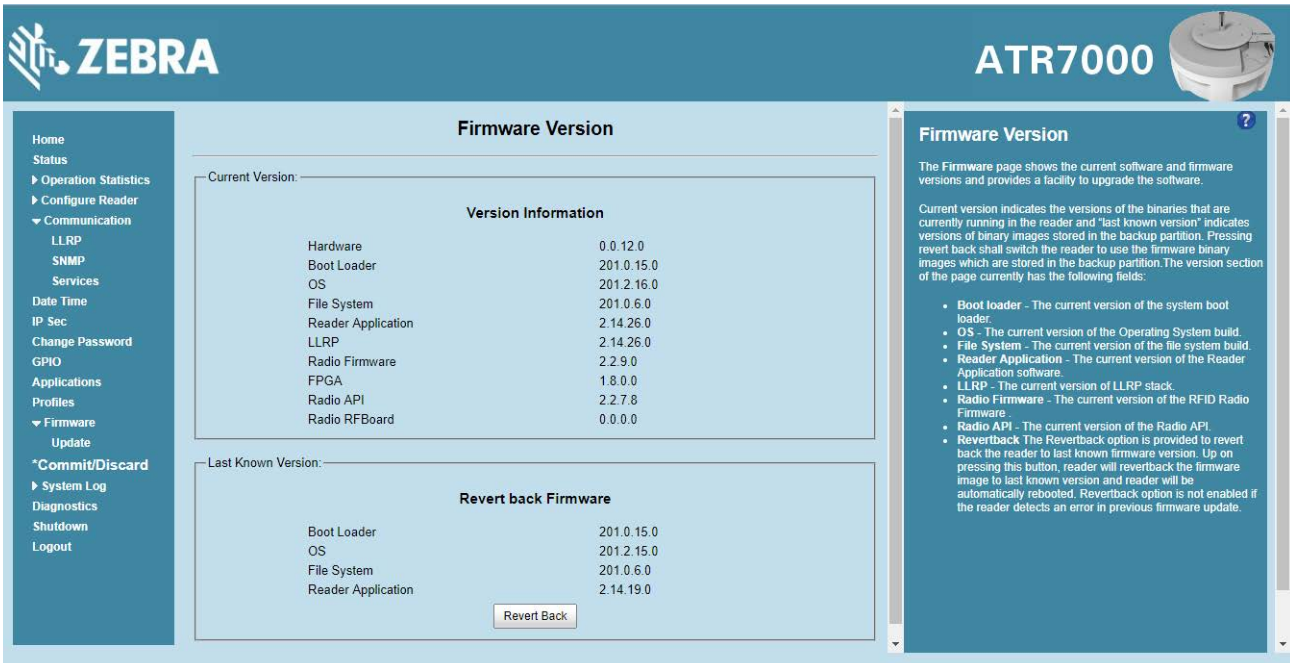
- HTTPS
- FTPS
- SSH
- LLRP Server
- IPSec

To enable or disable FIPS support in the reader profile, export the profile XML (**CurrentConfig**) from the reader and set **FIPS_MODE_ENABLED** to **1** to enable FIPS, or **0** to disable FIPS. Then import the XML to the reader and activate. Changing the FIPS mode restarts the reader. By default, FIPS is disabled.

Firmware Version/Update

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

Figure 54 Firmware Version Window



Firmware Version

Current Version:

Version Information

Hardware	0.0.12.0
Boot Loader	201.0.15.0
OS	201.2.16.0
File System	201.0.6.0
Reader Application	2.14.26.0
LLRP	2.14.26.0
Radio Firmware	2.2.9.0
FPGA	1.8.0.0
Radio API	2.2.7.8
Radio RFBoard	0.0.0.0

Last Known Version:

Revert back Firmware

Boot Loader	201.0.15.0
OS	201.2.15.0
File System	201.0.6.0
Reader Application	2.14.19.0

Firmware Version

The **Firmware** page shows the current software and firmware versions and provides a facility to upgrade the software.

Current version indicates the versions of the binaries that are currently running in the reader and “last known version” indicates versions of binary images stored in the backup partition. Pressing revert back shall switch the reader to use the firmware binary images which are stored in the backup partition.The version section of the page currently has the following fields:

- **Boot loader** - The current version of the system boot loader.
- **OS** - The current version of the Operating System build.
- **File System** - The current version of the file system build.
- **Reader Application** - The current version of the Reader Application software.
- **LLRP** - The current version of LLRP stack.
- **Radio Firmware** - The current version of the RFID Radio Firmware .
- **Radio API** - The current version of the Radio API.
- **Revertback** The Revertback option is provided to revert back the reader to last known firmware version. Up on pressing this button, reader will revertback the firmware image to last known version and reader will be automatically rebooted. Revertback option is not enabled if the reader detects an error in previous firmware update.

Current Version indicates the binary versions currently running in the reader. **Last Known Version** indicates binary image versions stored in the backup partition. This window provides version information on the following firmware.

- Boot Loader
- OS
- File System
- Reader Application
- LLRP
- Radio Firmware
- Radio FPGA
- Radio API

Select **Revert Back** to revert the firmware to last known version. The reader automatically reboots. This option is not enabled if the reader detects an error in the previous firmware update. 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 Change Password on page 75.

The reader supports two different methods of updating the firmware:

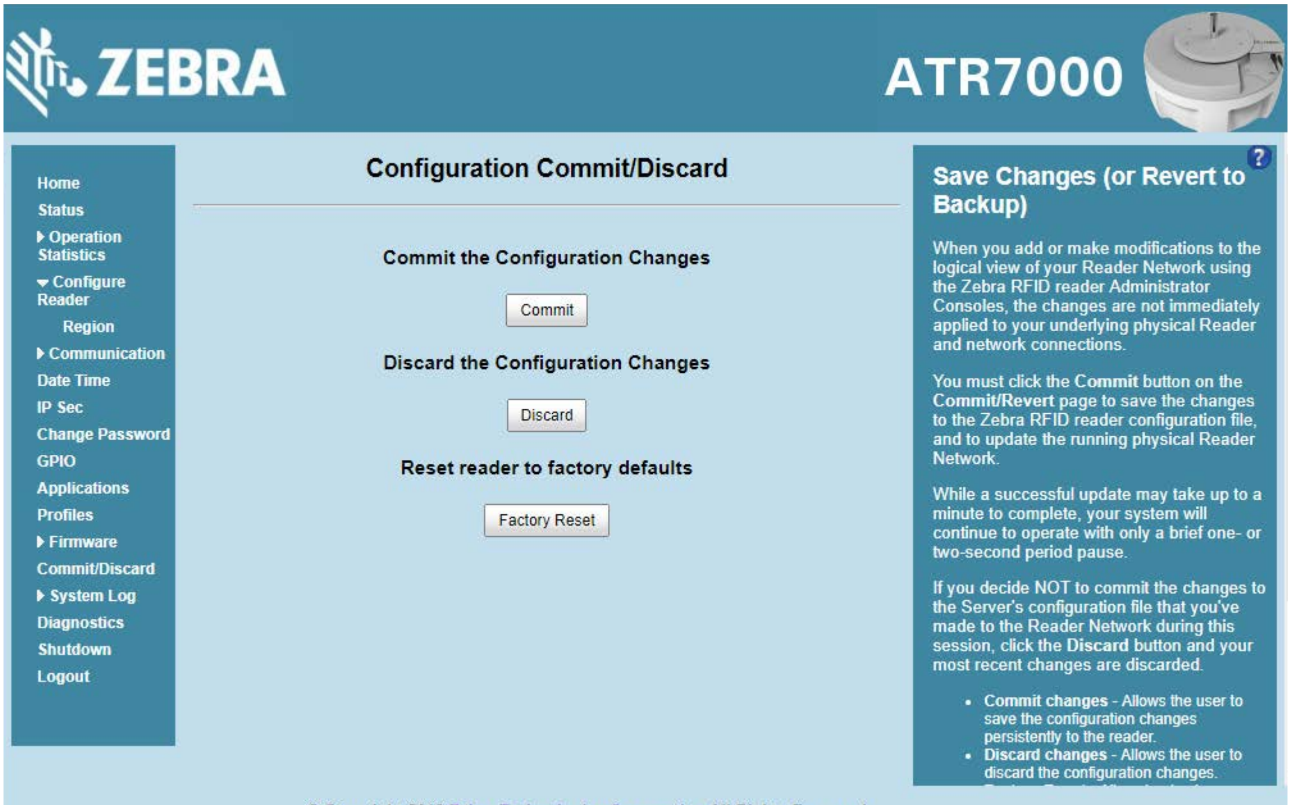
- File-based update that allows uploading the firmware files from the PC (or a network location) to the reader and running the update.
- FTP / FTPS / SCP server-based update.

For instructions on updating the firmware, see Firmware Upgrade.

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, select **Commit/Discard**, then click **Commit** to save the changes to the reader configuration file, and to update the running physical reader network. While a successful update can take up to a minute to complete, the system continues to operate with a brief one or two second pause.

Figure 55 Commit/Discard Window



Configuration Commit/Discard

Commit the Configuration Changes

Discard the Configuration Changes

Reset reader to factory defaults

Save Changes (or Revert to Backup)

When you add or make modifications to the logical view of your Reader Network using the Zebra RFID reader Administrator Consoles, the changes are not immediately applied to your underlying physical Reader and network connections.

You must click the **Commit** button on the **Commit/Revert** page to save the changes to the Zebra RFID reader configuration file, and to update the running physical Reader Network.

While a successful update may take up to a minute to complete, your system will continue to operate with only a brief one- or two-second period pause.

If you decide NOT to commit the changes to the Server's configuration file that you've made to the Reader Network during this session, click the **Discard** button and your most recent changes are discarded.

- **Commit changes** - Allows the user to save the configuration changes persistently to the reader.
- **Discard changes** - Allows the user to discard the configuration changes.

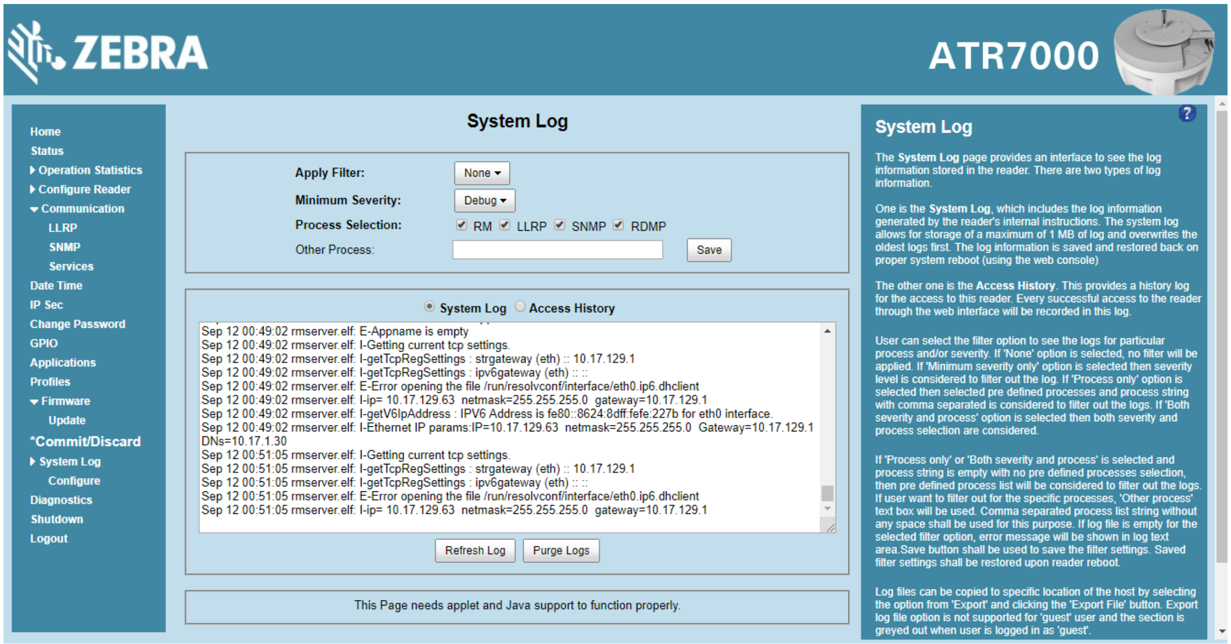
To discard changes to the server's configuration file made to the reader network during this session, click **Discard**.

Click **Factory Reset** to reset the reader to factory defaults. This clears all customized user settings, including configuration, and installed applications. The reader reboots automatically.

System Log

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

Figure 56 System Log Window



System Log

Apply Filter: None ▾

Minimum Severity: Debug ▾

Process Selection: ☑ RM ☑ LLRP ☑ SNMP ☑ RDMP

Other Process: [ ] Save

● System Log ○ Access History

```
Sep 12 00:49:02 rmserver.elf: E-Appname is empty
Sep 12 00:49:02 rmserver.elf: I-Getting current tcp settings.
Sep 12 00:49:02 rmserver.elf: I-getTcpRegSettings : strgateway (eth) :: 10.17.129.1
Sep 12 00:49:02 rmserver.elf: I-getTcpRegSettings : ipv6gateway (eth) :: ::
Sep 12 00:49:02 rmserver.elf: E-Error opening the file /run/resolvconf/interface/eth0.ip6.dhclient
Sep 12 00:49:02 rmserver.elf: I-ip= 10.17.129.63  netmask=255.255.255.0  gateway=10.17.129.1
Sep 12 00:49:02 rmserver.elf: I-getV6IpAddress : IPV6 Address is fe80::8624:8dff:fefe:227b for eth0 interface.
Sep 12 00:49:02 rmserver.elf: I-Ethernet IP params:IP=10.17.129.63  netmask=255.255.255.0  Gateway=10.17.129.1
DNs=10.17.1.30
Sep 12 00:51:05 rmserver.elf: I-Getting current tcp settings.
Sep 12 00:51:05 rmserver.elf: I-getTcpRegSettings : strgateway (eth) :: 10.17.129.1
Sep 12 00:51:05 rmserver.elf: I-getTcpRegSettings : ipv6gateway (eth) :: ::
Sep 12 00:51:05 rmserver.elf: E-Error opening the file /run/resolvconf/interface/eth0.ip6.dhclient
Sep 12 00:51:05 rmserver.elf: I-ip= 10.17.129.63  netmask=255.255.255.0  gateway=10.17.129.1
```

Refresh Log   Purge Logs

This Page needs applet and Java support to function properly.

System Log

The **System Log** page provides an interface to see the log information stored in the reader. There are two types of log information.

One is the **System Log**, which includes the log information generated by the reader's internal instructions. The system log allows for storage of a maximum of 1 MB of log and overwrites the oldest logs first. The log information is saved and restored back on proper system reboot (using the web console)

The other one is the **Access History**. This provides a history log for the access to this reader. Every successful access to the reader through the web interface will be recorded in this log.

User can select the filter option to see the logs for particular process and/or severity. If 'None' option is selected, no filter will be applied. If 'Minimum severity only' option is selected then severity level is considered to filter out the log. If 'Process only' option is selected then selected pre defined processes and process string with comma separated is considered to filter out the logs. If 'Both severity and process' option is selected then both severity and process selection are considered.

If 'Process only' or 'Both severity and process' is selected and process string is empty with no pre defined processes selection, then pre defined process list will be considered to filter out the logs. If user want to filter out for the specific processes, 'Other process' text box will be used. Comma separated process list string without any space shall be used for this purpose. If log file is empty for the selected filter option, error message will be shown in log text area.Save button shall be used to save the filter settings. Saved filter settings shall be restored upon reader reboot.

Log files can be copied to specific location of the host by selecting the option from 'Export' and clicking the 'Export File' button. Export log file option is not supported for 'guest' user and the section is greyed out when user is logged in as 'guest'.

This window offers the following options:

- **Apply Filter** - Select a filter option from the drop-down menu to view logs for particular process and/or severity:
  - **None** - Do not apply a filter.
  - **Minimum Severity only** - The severity level filters the log.
  - **Process Selection only** - Selected pre-defined processes and comma-separated process strings filters the logs.
  - **Minimum Severity & Process Selection** - both severity and process selection are considered in the filter.

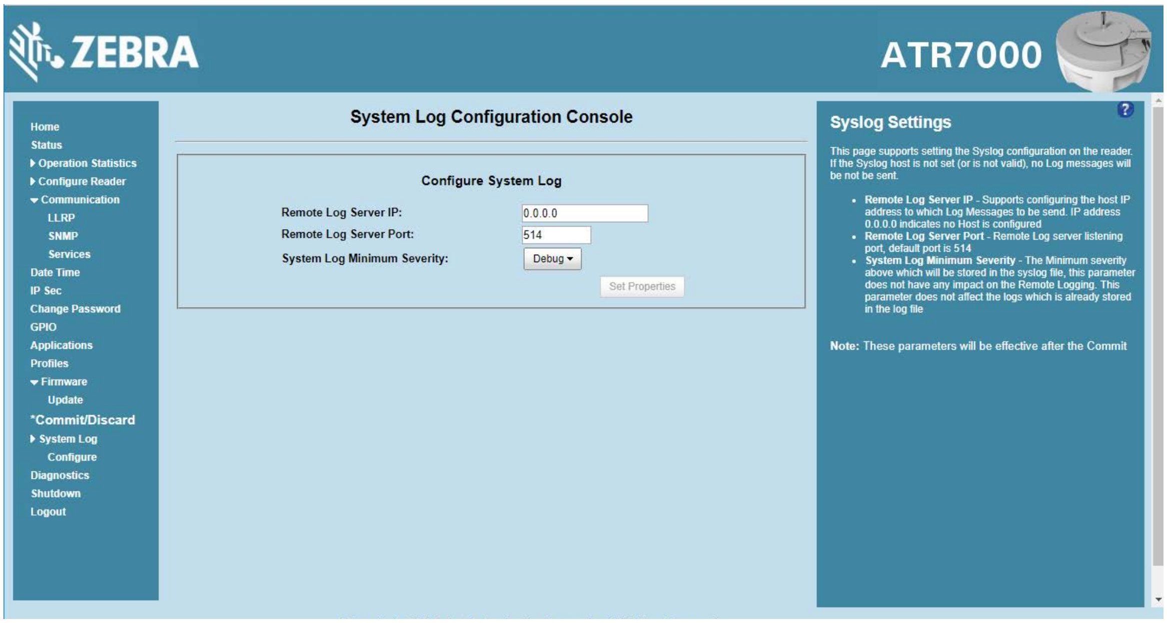
If you select **Process Selection only** or **Minimum Severity & Process Selection** and the process string is empty with no pre-defined process selection, then the pre-defined process list filters the logs.

- **Minimum Severity** - Select the severity level on which to filter.
- **Process Selection** - Select the types of processes to filter upon.
- **Other process** - To filter for specific processes, enter the process in this text box using a comma-separated process list string with no spaces. If the log file is empty for the selected filter option, an error message appears in the log text area. Click **Save** to save the filter settings, which persist upon reader reboot.
- **Log area** - Select a radio button for one of the two types of log information offered:
  - **System Log** - Includes the log information generated by the reader internal instructions. This stores up to 1 MB of log information, and overwrites the oldest logs first. The log information is saved and restored on proper system reboot (via the Administrator Console).
  - **Access History** - Provides a history log for reader access, including every successful access to the reader through the Administrator Console.
- Select the **Refresh Log** to refresh the information in the log, or **Purge Logs** to clear the information.
- To copy the log file to a specific location on the host select an option from the **Export** drop-down. Enter the location in the **File Path** field, then select the Export File button.

Configure System Log

This window configures system log settings. If the system log host is not set (or is not valid), log messages are not sent.

Figure 57 Configure System Log Window



System Log Configuration Console

Configure System Log

Remote Log Server IP: 0.0.0.0
Remote Log Server Port: 514
System Log Minimum Severity: Debug

Syslog Settings

This page supports setting the Syslog configuration on the reader. If the Syslog host is not set (or is not valid), no Log messages will be not be sent.

- **Remote Log Server IP** - Supports configuring the host IP address to which Log Messages to be send. IP address 0.0.0.0 indicates no Host is configured
- **Remote Log Server Port** - Remote Log server listening port, default port is 514
- **System Log Minimum Severity** - The Minimum severity above which will be stored in the syslog file, this parameter does not have any impact on the Remote Logging. This parameter does not affect the logs which is already stored in the log file

Note: These parameters will be effective after the Commit

This window offers the following options:

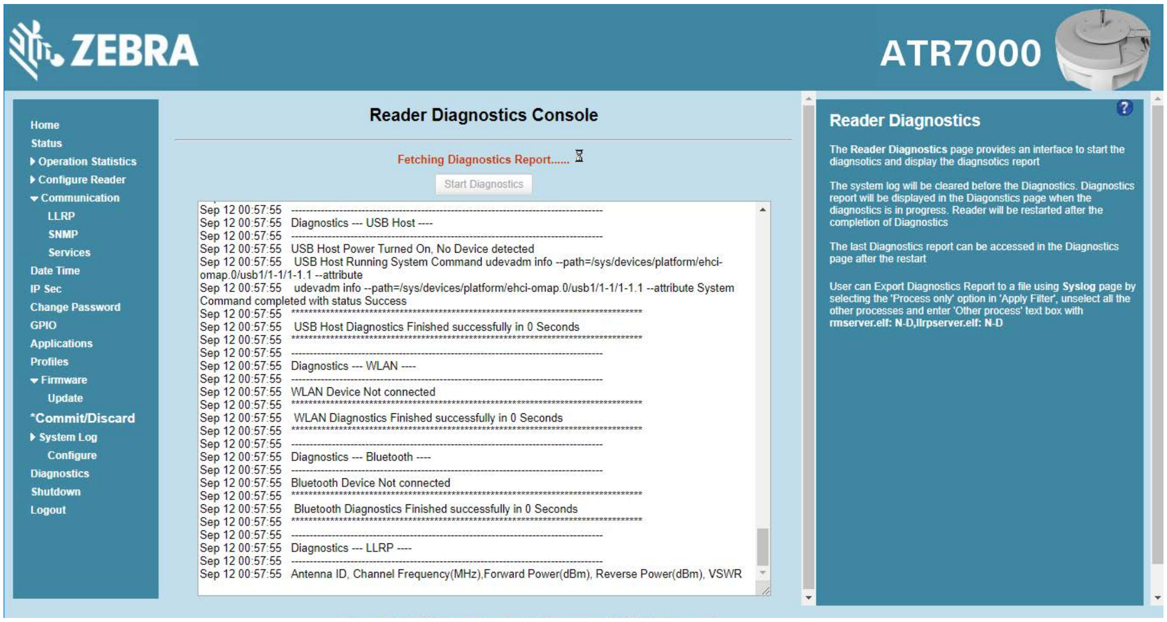
- **Remote Log Server IP** - Configures the host IP address to which log messages are sent. IP address 0.0.0.0 indicates that no host is configured.
- **Remote Log Server Port** - Remote log server listening port. The default port is 514.
- **System Log Minimum Severity** - The minimum severity above which data is stored in the log file. This option does not impact remote logging or the logs already stored in the log file.

NOTE: You must select **Commit** to activate these settings.

Reader Diagnostics

Select **Diagnostics** to view the **Reader Diagnostics** window, which allows running diagnostics and viewing the diagnostics report.

Figure 58 Reader Diagnostics Window



Reader Diagnostics Console

Fetching Diagnostics Report......

```
Sep 12 00:57:55   ---------------------------------------------------------------------------------
Sep 12 00:57:55   Diagnostics --- USB Host ----
Sep 12 00:57:55   ---------------------------------------------------------------------------------
Sep 12 00:57:55   USB Host Power Turned On, No Device detected
Sep 12 00:57:55    USB Host Running System Command udevadm info --path=/sys/devices/platform/ehci-
omap.0/usb1/1-1/1-1.1 --attribute
Sep 12 00:57:55    udevadm info --path=/sys/devices/platform/ehci-omap.0/usb1/1-1/1-1.1 --attribute System
Command completed with status Success
Sep 12 00:57:55   ***************************************************************************
Sep 12 00:57:55    USB Host Diagnostics Finished successfully in 0 Seconds
Sep 12 00:57:55   ***************************************************************************
Sep 12 00:57:55   ---------------------------------------------------------------------------------
Sep 12 00:57:55   Diagnostics --- WLAN ----
Sep 12 00:57:55   ---------------------------------------------------------------------------------
Sep 12 00:57:55   WLAN Device Not connected
Sep 12 00:57:55   ***************************************************************************
Sep 12 00:57:55    WLAN Diagnostics Finished successfully in 0 Seconds
Sep 12 00:57:55   ***************************************************************************
Sep 12 00:57:55   ---------------------------------------------------------------------------------
Sep 12 00:57:55   Diagnostics --- Bluetooth ----
Sep 12 00:57:55   ---------------------------------------------------------------------------------
Sep 12 00:57:55   Bluetooth Device Not connected
Sep 12 00:57:55   ***************************************************************************
Sep 12 00:57:55    Bluetooth Diagnostics Finished successfully in 0 Seconds
Sep 12 00:57:55   ***************************************************************************
Sep 12 00:57:55   ---------------------------------------------------------------------------------
Sep 12 00:57:55   Diagnostics --- LLRP ----
Sep 12 00:57:55   ---------------------------------------------------------------------------------
Sep 12 00:57:55   Antenna ID, Channel Frequency(MHz),Forward Power(dBm), Reverse Power(dBm), VSWR
```

Reader Diagnostics

The **Reader Diagnostics** page provides an interface to start the diagnsotics and display the diagnsotics report

The system log will be cleared before the Diagnostics. Diagnostics report will be displayed in the Diagonstics page when the diagnostics is in progress. Reader will be restarted after the completion of Diagnostics

The last Diagnostics report can be accessed in the Diagnostics page after the restart

User can Export Diagnostics Report to a file using **Syslog** page by selecting the 'Process only' option in 'Apply Filter', unselect all the other processes and enter 'Other process' text box with **rmserver.elf: N-D,llrpserver.elf: N-D**

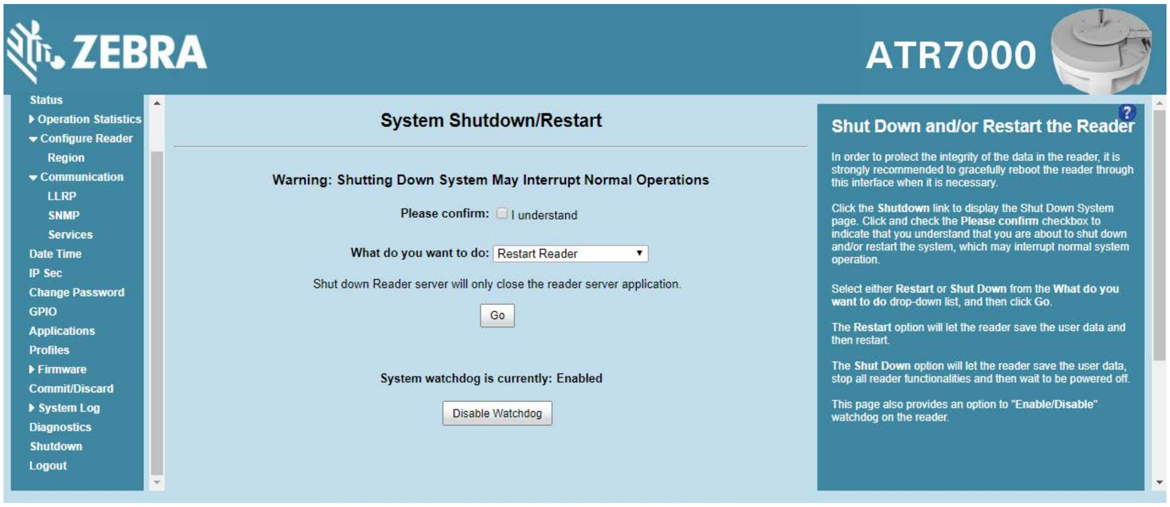
Selecting **Start Diagnostics** clears the system log and displays the diagnostics report. The reader reboots when the diagnostics completes. Return to the **Diagnostics window to view the** diagnostics report.

To export the diagnostics report to a file, on the System Log window, select **Process Selection only** in **Apply Filter**, de-select all other processes, and in the **Other Process** text box enter:
rmserver.elf: N-D,llrpserver.elf: N-D

Shutdown

Reader settings in LLRP allow tags that have been read by reader, but not yet reported to the user to be saved on the reader. However, such tag data is lost if reader is powered off abruptly. To protect the integrity of the reader data, gracefully reboot the reader via the Administrator Console when necessary. This saves the tags list and restores it on the next reboot in a reportable state.

Figure 59 System Shutdown/Restart Window



System Shutdown/Restart

Warning: Shutting Down System May Interrupt Normal Operations

Please confirm: □ I understand

What do you want to do: Restart Reader ▾

Shut down Reader server will only close the reader server application.

System watchdog is currently: Enabled

Shut Down and/or Restart the Reader

In order to protect the integrity of the data in the reader, it is strongly recommended to gracefully reboot the reader through this interface when it is necessary.

Click the **Shutdown** link to display the Shut Down System page. Click and check the **Please confirm** checkbox to indicate that you understand that you are about to shut down and/or restart the system, which may interrupt normal system operation.

Select either **Restart** or **Shut Down** from the **What do you want to do** drop-down list, and then click **Go**.

The **Restart** option will let the reader save the user data and then restart.

The **Shut Down** option will let the reader save the user data, stop all reader functionalities and then wait to be powered off.

This page also provides an option to "**Enable/Disable**" watchdog on the reader.

To shut down or restart the reader:

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.

Application Development

Introduction

The ATR7000 RFID reader can host embedded applications, so data can be parsed directly on the reader. Since data is processed in real time at the network edge, the amount of data transmitted to your backend servers is substantially reduced, increasing network bandwidth and improving network performance. Latencies are reduced, improving application performance. And the integration of data into a wide variety of middleware applications is simplified, reducing deployment time and cost. The ATR7000 also provides flexibility for host embedded applications on the reader or on a separate PC.

Reference Guides

The following resources can be found on www.zebra.com/support**.**

- RFID Reader Software Interface Control Guide (p/n 72E-131718-xx)
- Programmer’s Guide provided with the Zebra RFID SDK. This introductory guide describes how to perform various functions using the RFID3 API set.
- FX Series Embedded SDK Installation Guide provided with the Zebra RFID SDK.
- FX Series Embedded SDK Programmers Guide provides instructions on creating new embedded applications.
- See Related Documents on page 6 for more documentation regarding RFID API and application development.

Troubleshooting

Troubleshooting

NOTE: If problems still occur, contact the distributor or call the local contact. See Service Information on page 6 for contact information.

Table 5 provides ATR7000 troubleshooting information.

Table 5 Troubleshooting

Problem/Error	Possible Causes	Possible Solutions
Reader LED remains solid red 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 access the **Administrator Console**.	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 and Power Connections on page 27.
Reader is not reading tags.	The tag is out of its read range.	Move the tag into read range. See Communication Settings on page 68.
	Antennas are not connected.	Connect antennas.
	Tags are damaged.	Confirm that tags are good.
	Tags are not EPCgen2.	Confirm that tags are EPCgen2.
Cannot connect to the reader.	The IP address is unknown.	See Communications and Power Connections on page 27 to view the IP address, or use the host name to connect to the reader.

Table 5 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**. The applications can use the **Force Login** option to log in even when the user closes the browser without logging out. **Force Login** option is supported for the administrative user.
Cannot log into **Administrator Console**.	The user forgot the password.	Press and hold the reset button for more than 8 seconds. This resets the reader configuration to factory defaults, including the password. This also removes the contents of the **apps** partition.
Unable to add SNTP server, reader returning error: **Error: Cannot find the specified Host Address**	SNTP server is not reachable.	Ensure the SNTP server is accessible.
	SNTP server name is not resolvable via DNS server.	Ensure the DNS server name is configured in TCP/IP configuration.
	DNS server is not reachable.	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 6.
Invalid User Name and/or Password.	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 6.
Session has Timed-out.	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.

Table 5 Troubleshooting (Continued)

Problem/Error	Possible Causes	Possible Solutions
User name is not correct.	The user name does not match the current user registry (illegal characters, too long, too short, unknown, or duplicate).	Accurately retype the user name.
	User forgot the user ID. Web console supports the following users: - **Admin** (default password is **change**) - **Guest** (no password required) - **rfidadm** - supported over SSH,FTP/FTPS, SCP, but not over **Administrator Console.**	Reset the reader to factory defaults and select **Admin** for user name and enter **change** in the password field to regain access. See Reset to Factory Defaults LED Sequence on page 30.
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 6.
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).	Accurately retype the password.
	User forgot the password.	Reset the reader to factory defaults and select **Admin** for user name and enter **change** in the password field to regain access. See Reset to Factory Defaults LED Sequence on page 30.
The name, serial number, or IP address entered already exists in the system.	The name, serial number, or IP address entered was already used.	Enter a unique value for the new name, serial number, or IP address.

Table 5 Troubleshooting (Continued)

Problem/Error	Possible Causes	Possible Solutions
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 or override the current session with the new one.
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.
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 Zebra support. See Service Information on page 6.
The requested page was not found. Internal Web Server Error.	The system experienced an internal web server error.	Contact Zebra support. See Service Information on page 6.
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.
Could not read complete post message.	The system stopped a POST operation before completion.	Retry the operation, and allow it to complete.

Table 5 Troubleshooting (Continued)

Problem/Error	Possible Causes	Possible Solutions
Unhandled reply type.	The system generated an unexpected value.	Contact Zebra support. See Service Information on page 6.
Failed to open port. Failed to connect. Failed to transmit. Failed to receive. Error during Receive of Command.	Error during receive of command.	Contact Zebra support. See Service Information on page 6.
Invalid Device Address.	The device address information (parent) is invalid, missing, or formatted inaccurately.	Contact Zebra support. See Service Information on page 6.
Command parsing state error. Missing argument for the command. Command internal type cast error. Missing operator. Unknown operator.	A command was formatted inaccurately.	Contact Zebra support. See Service Information on page 6.
The action must be confirmed.	The user must confirm the requested action before it is executed.	Select the confirmation option when issuing this request.
OS update in progress.	Firmware update on the reader is ongoing. The current operation is not permitted.	Wait for the firmware update to complete and then retry the operation.
Cannot change password.	Cannot change password for guest.	Guest does not need a password to log in to the Administrator Console.
Reader powers up but does not allow network connection for RF operations.	• Regulatory configuration may be incomplete. • Reader not powered from 25W power source. • Power negotiation over PoE was enabled but PoE+ power negotiation failed with the switch.	• Confirm region of operation is correctly configured in Administrative Console. • Check power supply rating if reader is power from a fixed power supply. • If powered from network switch, confirm switch is PoE+ capable and enabled with LLDP negotiation.

Firmware Upgrade

Introduction

This chapter provides reader firmware update information on using the web-based **Administrator Console**. The following methods are available to update the firmware on the ATR7000 reader.

- File-based update that allows uploading the firmware files from the PC (or a network location) to the reader and running the update.
- FTP / FTPS / SCP server-based update.

Use this procedure to update the following software components:

- uboot
- OS
- Reader Server Application (includes Radio API and 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:
    - OSUpdate.elf
    - response.txt
    - u-boot_*X.X.X.X*.bin (uBoot, *X.X.X.X* is a filename version)
    - uImage_ *X.X.X.X* (OS, *X.X.X.X* is a filename variable)
    - rootfs_ *X.X.X.X*.jffs2 (Root FileSystem, *X.X.X.X* is a filename variable)
    - platform_ *X.X.X.X*.tar.gz (Platform partition, *X.X.X.X* is a filename variable)

Refer to the release notes to determine which files are updated; not all of the files are updated in every release.

Failsafe Update

The ATR7000 reader provides true failsafe firmware updates. Each partition (such as OS and platform) has an active and backup partition.

The firmware update process always writes the new images to the backup partition. This ensures that any power or network outages in the middle of firmware update does not prevent the reader from being operational. In the case of a firmware update failure, the reader LED remains solid red.

Update Phases

The firmware update takes place in three phases:

- **Phase 1** - The reader application retrieves the **response.txt** and **OSUpdate.elf** files from the ftp server.
- **Phase 2** - The reader application shuts down and the **OSUpdate** 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

-t5 -fplatform_1.1.15.0.tar.gz -s8004561 -u8130879
```

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

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.

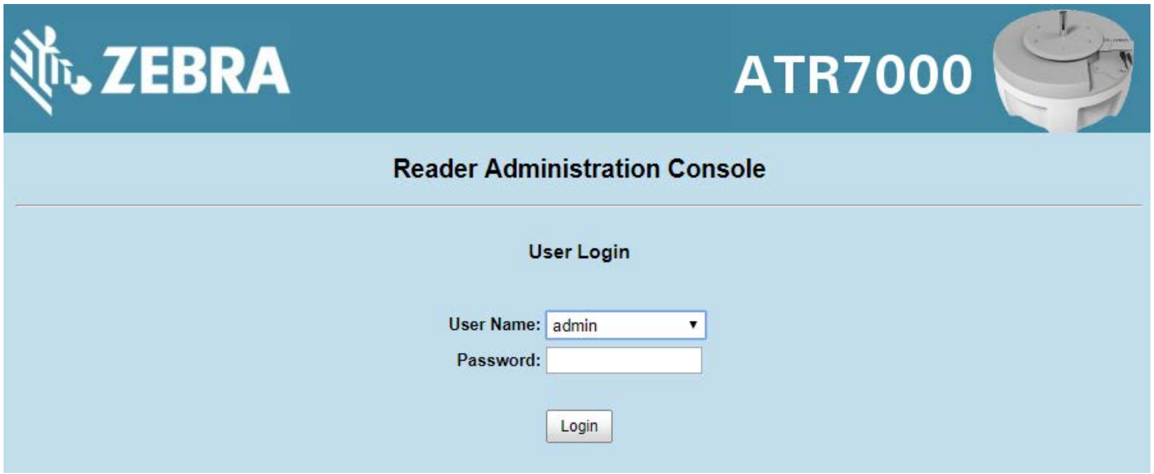
Updating ATR7000 Reader Software

Verifying Firmware Version

To verify that the ATR7000 reader firmware is outdated:

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

Figure 60 User Login Window



Reader Administration Console

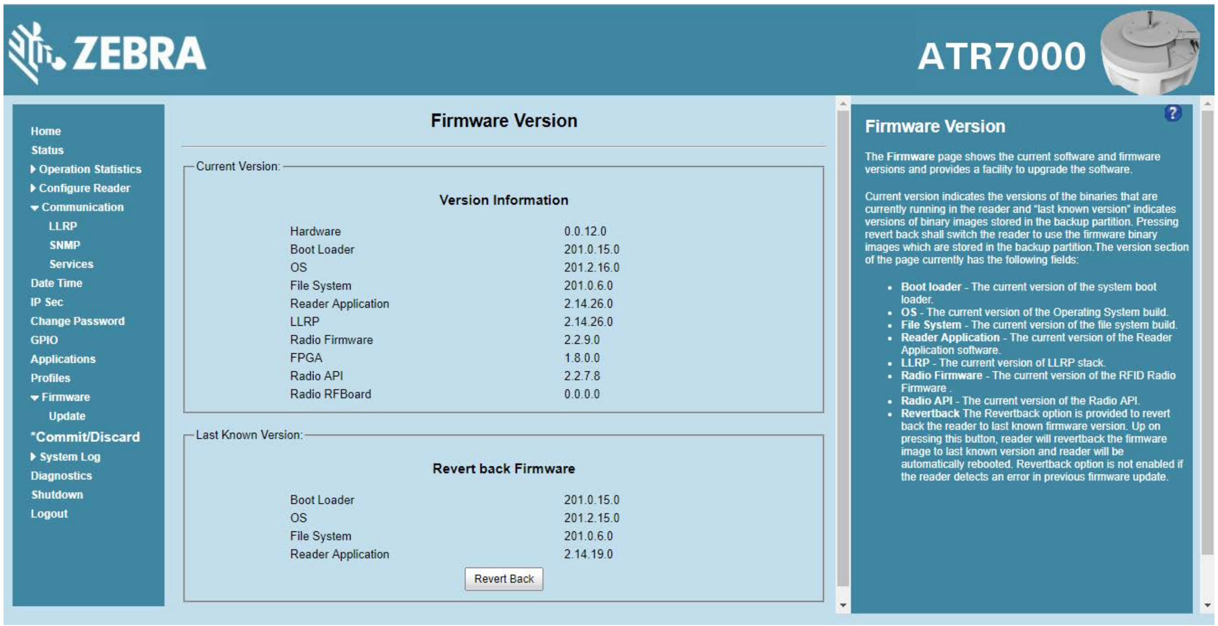
User Login

User Name: admin

Password:

2. Select **Firmware** on the left side panel to verify that the current version of reader software is outdated (for example, 1.1.66).

Figure 61 Firmware Version Window



Firmware Version

Current Version:

Version Information

Hardware	0.0.12.0
Boot Loader	201.0.15.0
OS	201.2.16.0
File System	201.0.6.0
Reader Application	2.14.26.0
LLRP	2.14.26.0
Radio Firmware	2.2.9.0
FPGA	1.8.0.0
Radio API	2.2.7.8
Radio RFBoard	0.0.0.0

Last Known Version:

Revert back Firmware

Boot Loader	201.0.15.0
OS	201.2.15.0
File System	201.0.6.0
Reader Application	2.14.19.0

Firmware Version

The **Firmware** page shows the current software and firmware versions and provides a facility to upgrade the software.

Current version indicates the versions of the binaries that are currently running in the reader and "last known version" indicates versions of binary images stored in the backup partition. Pressing revert back shall switch the reader to use the firmware binary images which are stored in the backup partition.The version section of the page currently has the following fields:

- **Boot loader** - The current version of the system boot loader.
- **OS** - The current version of the Operating System build.
- **File System** - The current version of the file system build.
- **Reader Application** - The current version of the Reader Application software.
- **LLRP** - The current version of LLRP stack.
- **Radio Firmware** - The current version of the RFID Radio Firmware .
- **Radio API** - The current version of the Radio API.
- **Revertback** The Revertback option is provided to revert back the reader to last known firmware version. Up on pressing this button, reader will revertback the firmware image to last known version and reader will be automatically rebooted. Revertback option is not enabled if the reader detects an error in previous firmware update.

Updating Methods

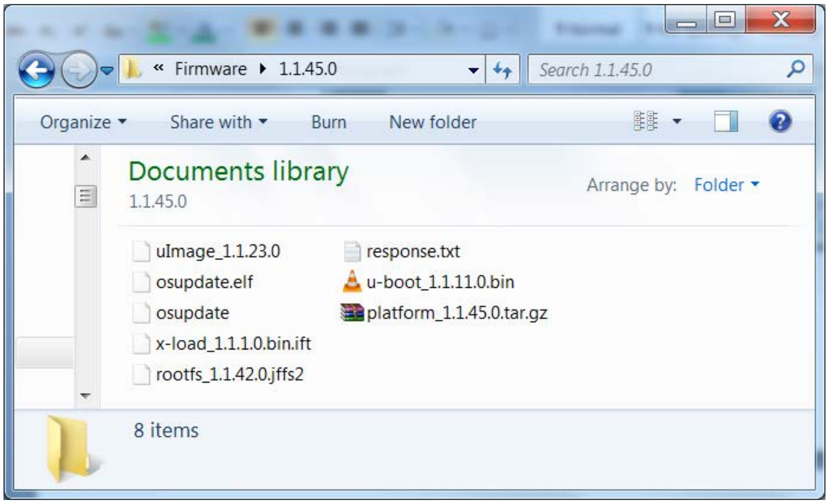
Download the reader update files from www.zebra.com/support, then use one of three methods to update the reader software to a later version, e.g., 1.1.45.0 or higher:

- File-Based Update on page 95
- FTP/SCP-Based Update on page 96 (Recommended)

File-Based Update

1. Copy all reader update files into any folder on a host computer.

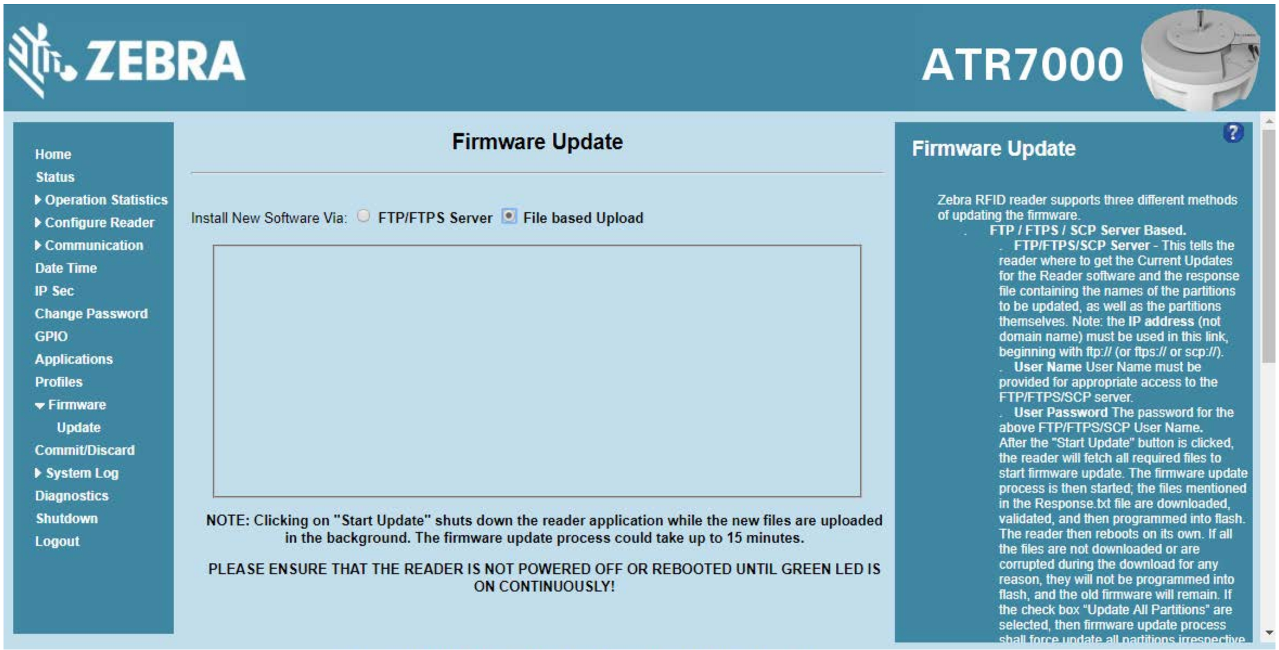
Figure 62 Host Computer Folder



uImage_1.1.23.0
osupdate.elf
osupdate
x-load_1.1.1.0.bin.ift
rootfs_1.1.42.0.jffs2
response.txt
u-boot_1.1.11.0.bin
platform_1.1.45.0.tar.gz

2. Log into the reader and navigate to the **Firmware Update** page.

Figure 63 Firmware Update Window



Install New Software Via: ○ FTP/FTPS Server ● File based Upload

NOTE: Clicking on "Start Update" shuts down the reader application while the new files are uploaded in the background. The firmware update process could take up to 15 minutes.

PLEASE ENSURE THAT THE READER IS NOT POWERED OFF OR REBOOTED UNTIL GREEN LED IS ON CONTINUOUSLY!

Firmware Update

Zebra RFID reader supports three different methods of updating the firmware.

. **FTP / FTPS / SCP Server Based.**

. **FTP/FTPS/SCP Server** - This tells the reader where to get the Current Updates for the Reader software and the response file containing the names of the partitions to be updated, as well as the partitions themselves. Note: the **IP address** (not domain name) must be used in this link, beginning with ftp:// (or ftps:// or scp://).

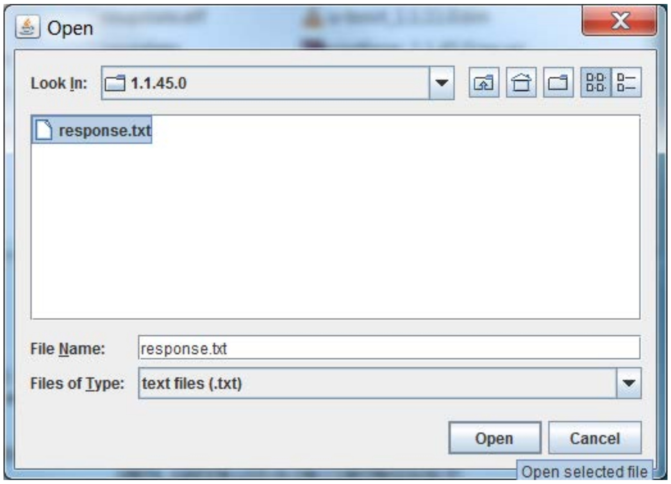
. **User Name** User Name must be provided for appropriate access to the FTP/FTPS/SCP server.

. **User Password** The password for the above FTP/FTPS/SCP User Name.

After the "Start Update" button is clicked, the reader will fetch all required files to start firmware update. The firmware update process is then started; the files mentioned in the Response.txt file are downloaded, validated, and then programmed into flash. The reader then reboots on its own. If all the files are not downloaded or are corrupted during the download for any reason, they will not be programmed into flash, and the old firmware will remain. If the check box "Update All Partitions" are selected, then firmware update process shall force update all partitions irrespective

3. Select **File based Upload**.
4. Click on **Browse** and navigate to the folder that contains the firmware update files.

Figure 64 Browsing Update Files



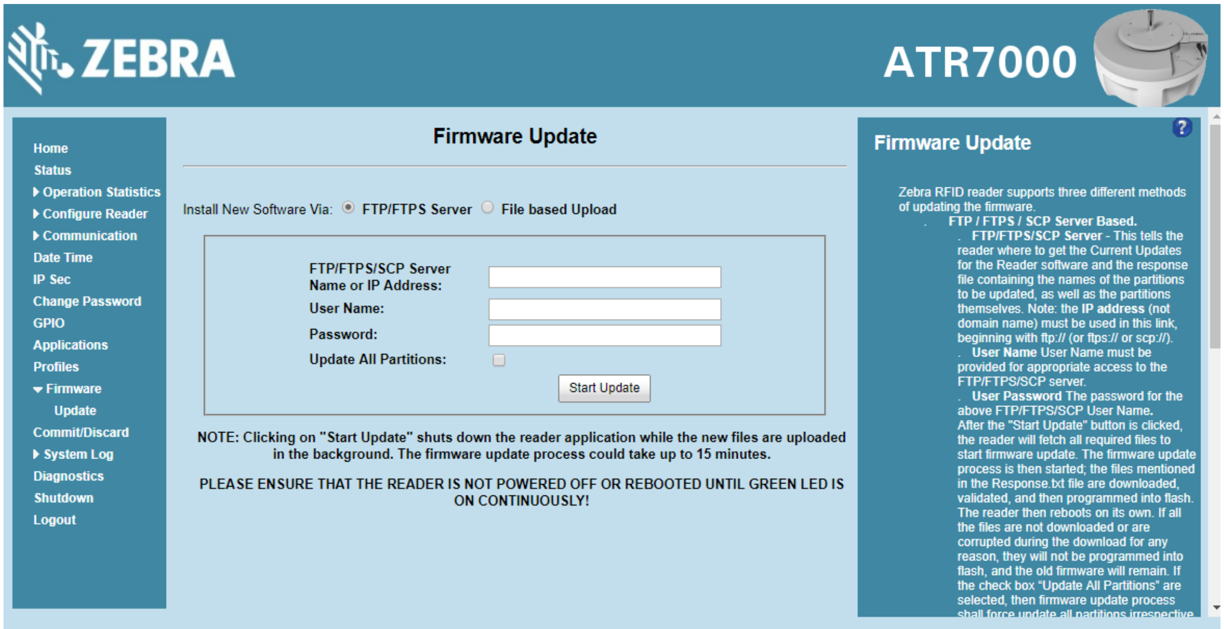
5. Select all files and click **Open**.
6. Click **Start Update**. The reader starts the update process and displays the update status as follows:
   - The reader continuously blinks the power/status LED red.
   - The reader power/status LED remains steady orange.
   - The reader power/status LED settles to a steady green to indicate that the update is complete.
7. When the update completes, the reader reboots and returns to the login screen.

FTP/SCP-Based Update

Copy all the update files into an appropriate FTP location.

1. Log into the reader and navigate to the **Firmware Update** page.

Figure 65 Firmware Update Window



Firmware Update

Install New Software Via: ● FTP/FTPS Server ○ File based Upload

FTP/FTPS/SCP Server Name or IP Address:	
User Name:	
Password:	
Update All Partitions:	□

NOTE: Clicking on "Start Update" shuts down the reader application while the new files are uploaded in the background. The firmware update process could take up to 15 minutes.

PLEASE ENSURE THAT THE READER IS NOT POWERED OFF OR REBOOTED UNTIL GREEN LED IS ON CONTINUOUSLY!

Firmware Update

Zebra RFID reader supports three different methods of updating the firmware.

- **FTP / FTPS / SCP Server Based.**
  - **FTP/FTPS/SCP Server** - This tells the reader where to get the Current Updates for the Reader software and the response file containing the names of the partitions to be updated, as well as the partitions themselves. Note: the **IP address** (not domain name) must be used in this link, beginning with ftp:// (or ftps:// or scp://).
  - **User Name** User Name must be provided for appropriate access to the FTP/FTPS/SCP server.
  - **User Password** The password for the above FTP/FTPS/SCP User Name.

After the "Start Update" button is clicked, the reader will fetch all required files to start firmware update. The firmware update process is then started; the files mentioned in the Response.txt file are downloaded, validated, and then programmed into flash. The reader then reboots on its own. If all the files are not downloaded or are corrupted during the download for any reason, they will not be programmed into flash, and the old firmware will remain. If the check box "Update All Partitions" are selected, then firmware update process shall force update all partitions irrespective

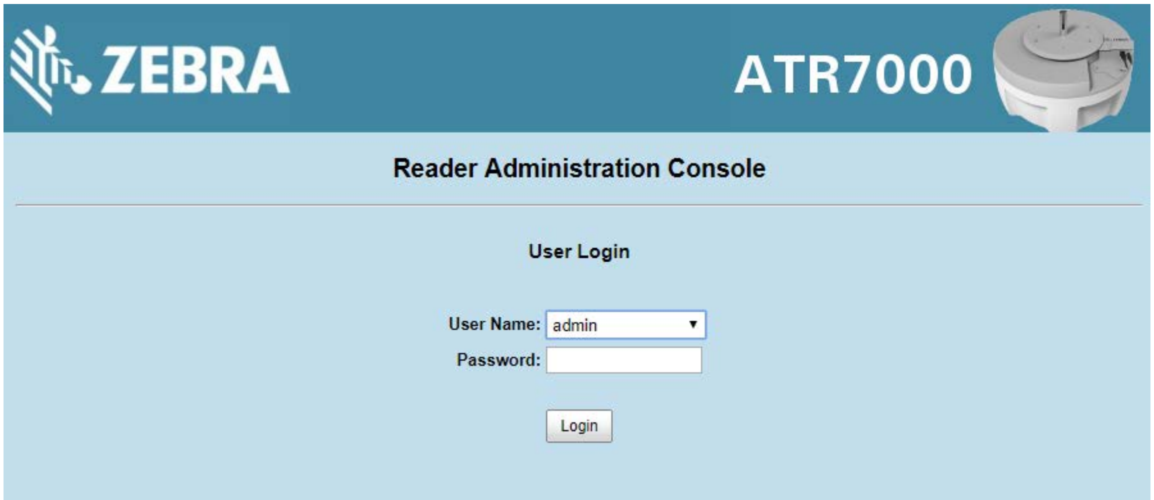
2. Select **FTP/FTPS/SCP Server**.
3. Enter the FTP/FTPS/SCP location where the files are located.
4. Enter the **User Name** and **Password** for the FTP/FTPS/SCP server login.
5. An SSH key-based authentication is possible in the case of an SCP-based firmware update. In this case, the password is not required, provided the reader's public SSH key has already been added to the authorized_keys file of the SCP server serving the files. For more information on how to import SSH keys, refer to SSH Key Management.
6. Click **Start Update**. The reader starts the update process and displays the update status as follows:
   - The reader continuously blinks the power/status LED red.
   - The reader power/status LED remains steady orange.
   - The reader power/status LED settles to a steady green to indicate that the update is complete.
7. When the update completes, the reader reboots and returns to the login screen.

Verifying Firmware Version

To verify reader update success:

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

Figure 66 User Login Window



Reader Administration Console

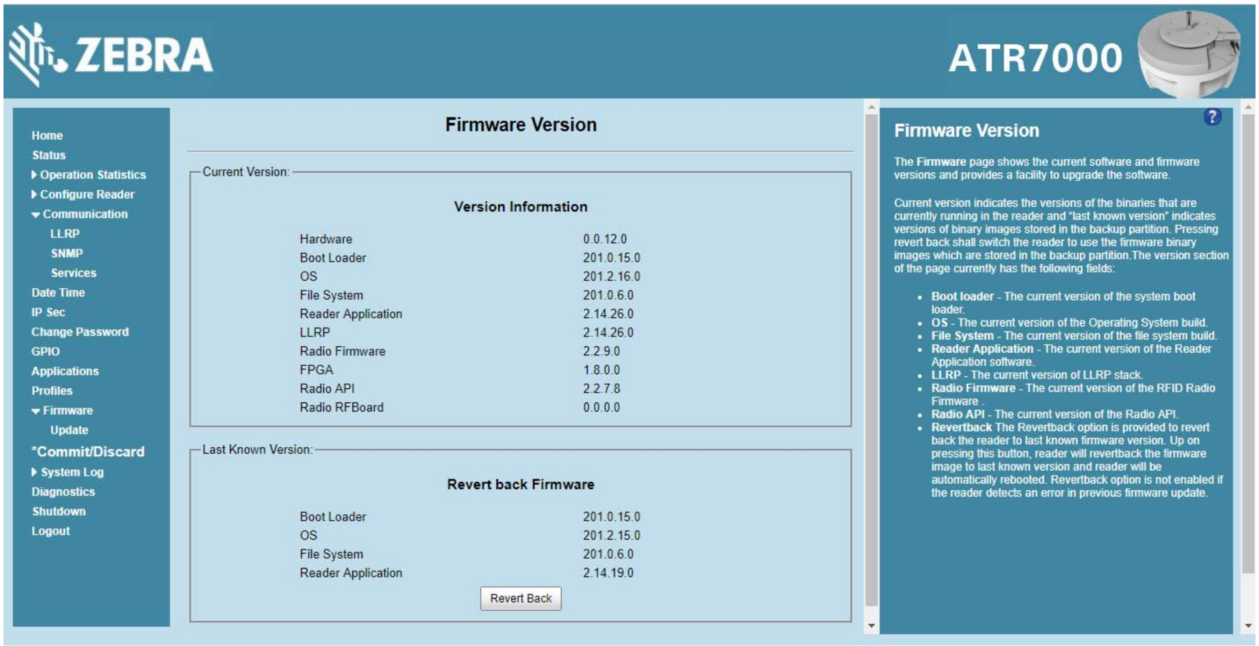
User Login

User Name: admin

Password:

2. Select **Firmware** on the left side panel to verify that the current version of reader software is the new version number, e.g., 1.1.68, which indicates that the update was successful.

Figure 67 Firmware Version Window



Firmware Version

Current Version:

Version Information

Hardware	0.0.12.0
Boot Loader	201.0.15.0
OS	201.2.16.0
File System	201.0.6.0
Reader Application	2.14.26.0
LLRP	2.14.26.0
Radio Firmware	2.2.9.0
FPGA	1.8.0.0
Radio API	2.2.7.8
Radio RFBoard	0.0.0.0

Last Known Version:

Revert back Firmware

Boot Loader	201.0.15.0
OS	201.2.15.0
File System	201.0.6.0
Reader Application	2.14.19.0

Firmware Version

The **Firmware** page shows the current software and firmware versions and provides a facility to upgrade the software.

Current version indicates the versions of the binaries that are currently running in the reader and "last known version" indicates versions of binary images stored in the backup partition. Pressing revert back shall switch the reader to use the firmware binary images which are stored in the backup partition.The version section of the page currently has the following fields:

- **Boot loader** - The current version of the system boot loader.
- **OS** - The current version of the Operating System build.
- **File System** - The current version of the file system build.
- **Reader Application** - The current version of the Reader Application software.
- **LLRP** - The current version of LLRP stack.
- **Radio Firmware** - The current version of the RFID Radio Firmware .
- **Radio API** - The current version of the Radio API.
- **Revertback** The Revertback option is provided to revert back the reader to last known firmware version. Up on pressing this button, reader will revertback the firmware image to last known version and reader will be automatically rebooted. Revertback option is not enabled if the reader detects an error in previous firmware update.

Technical Specifications

Technical Specifications

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

Table 6 Technical Specifications

Item	Description
Physical and Environmental Characteristics	
Dimensions	19 in. Diameter x 6.34 in. Height (48.26 cm Diameter x 16.10 cm Height)
Weight	11.1 lbs ± 0.1 lbs (5.03 kg +/- 0.05 kg)
Visual Status Indicators	Multi-color LED: Power, Activity, Status, and Applications
Mounting	Pole mounted. VESA mount option supports 100 mm x 100 mm and 75 mm x 75 mm with M4 screws.
ATR7000 Environmental Specifications	
Operational Temperature	-4° to +131° F / -20° to +55° C
Storage Temperature	-40° to +158° F / -40° to +70° C
Humidity	5 to 95% non-condensing
Shock and Vibration	MIL-STD-810G
Seal	IP 51
Connectivity	
Communications	10/100 BaseT Ethernet (RJ45) w/ PoE+ support, USB Host (Type A)
General Purpose I/O	2 inputs, 3 outputs, optically isolated (terminal block) External 24 VDC power available for GPIO
Power Input	PoE+ (802.3at) 48 VDC PoE + or 24 VDC Universal Power Supply
Antenna Elements	14 (internal)

Table 6 Technical Specifications (Continued)

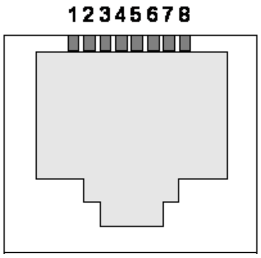
Item	Description
Hardware/OS and Firmware Management	
Memory	Flash 512 MB; DRAM 256 MB
Operating System	Linux
Firmware Upgrade	Web-based and remote firmware upgrade capabilities
Management Protocols	RM 1.0.1 (with XML over HTTP/HTTPS and SNMP binding)
Network Services	DHCP, HTTPS, FTPS, SFPT, SCP, SSH, HTTP, FTP, SNMP and NTP
Network Stack	IPv4, IPv6
Security	Transport Layer Security Ver. 1.2, FIPS 140-2 Level 1
Air Protocols	EPCglobal UHF Class 1 Gen2, ISO 18000-6C
Frequency (UHF Band)	902 MHz to 928 MHz
Beam Scanning Range	Azimuth 0-360 degrees, Elevation 0-60 degrees
Transmit Power Output	16dBm to +36dBm EIRP
Max Receive Sensitivity	-88dBm
Power Consumption	22W, Operational; <4W, Idle
IP Addressing	Static and Dynamic
Host Interface Protocol	LLRP v1.0.1
API Support	Host Applications – .NET, C and Java EMDK; Embedded Applications – C & Java SDK
Warranty	
For the complete Zebra hardware product warranty statement, go to www.zebra.com/warranty.	
Recommended Services	
Support Services	Zebra One Care Select and Zebra One Care On Site
Advanced Services	RFID Design and Deployment Services

Cable Pinouts

10/100bT Ethernet / PoE Connector

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

Figure 68 Ethernet Connections



USB Debug Connector

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

Figure 69 USB Debug Connector

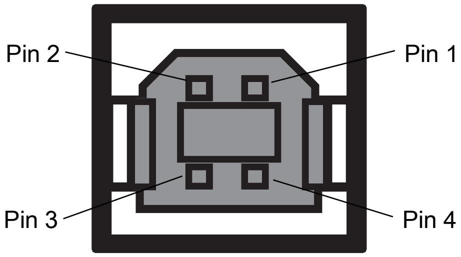


Table 7 USB Debug Port Connector Pinout

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

USB Host Connector

The USB Host port is supplied on a USB Type A flag connector.

Figure 70 USB Host Connector (J22)

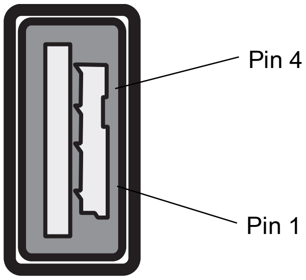


Table 8 USB Host Port Connector (J22) Pinout

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

GPIO Port Connections

The ATR7000 GPIO connector pinouts include the following:

Figure 71 ATR7000 RFID Reader GPIO Connection

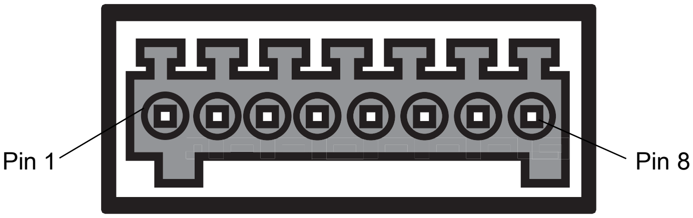


Table 9 ATR7000 GPIO Pin Outs

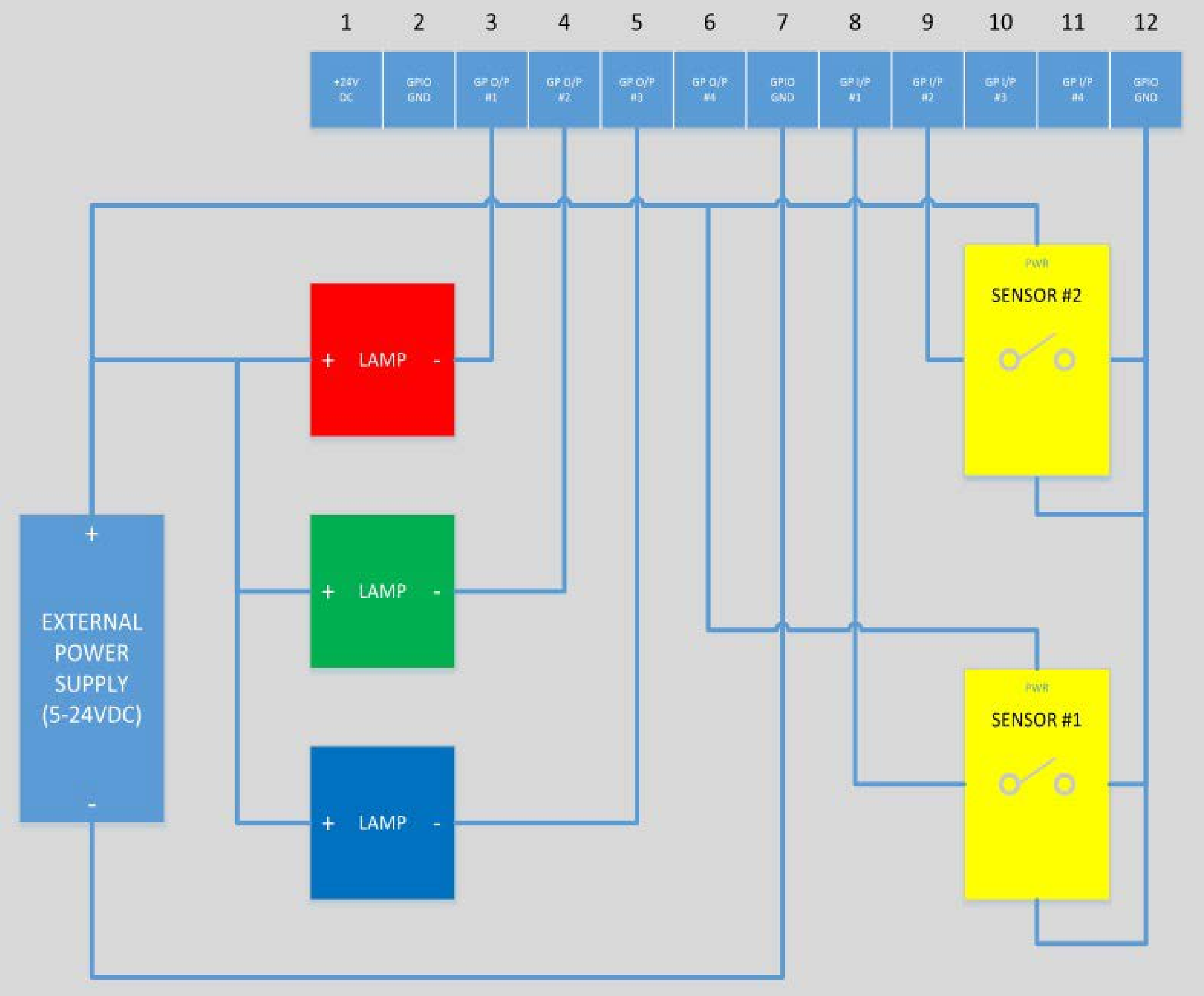
Pin #	Pin Name	Direction	Description
1	+24V DC Power	O	Supplies +24V DC at up to 1 Amp
2	GP output #1	O	Signal for GP output #1
3	GP output #2	O	Signal for GP output #2
4	GP output #3	O	Signal for GP output #3
5	GND	-	Ground connection
6	GP input #1	I	Signal for GP input #1

Table 9 ATR7000 GPIO Pin Outs (Continued)

Pin #	Pin Name	Direction	Description
7	GP input #2	I	Signal for GP input #2
8	GND	-	Ground connection

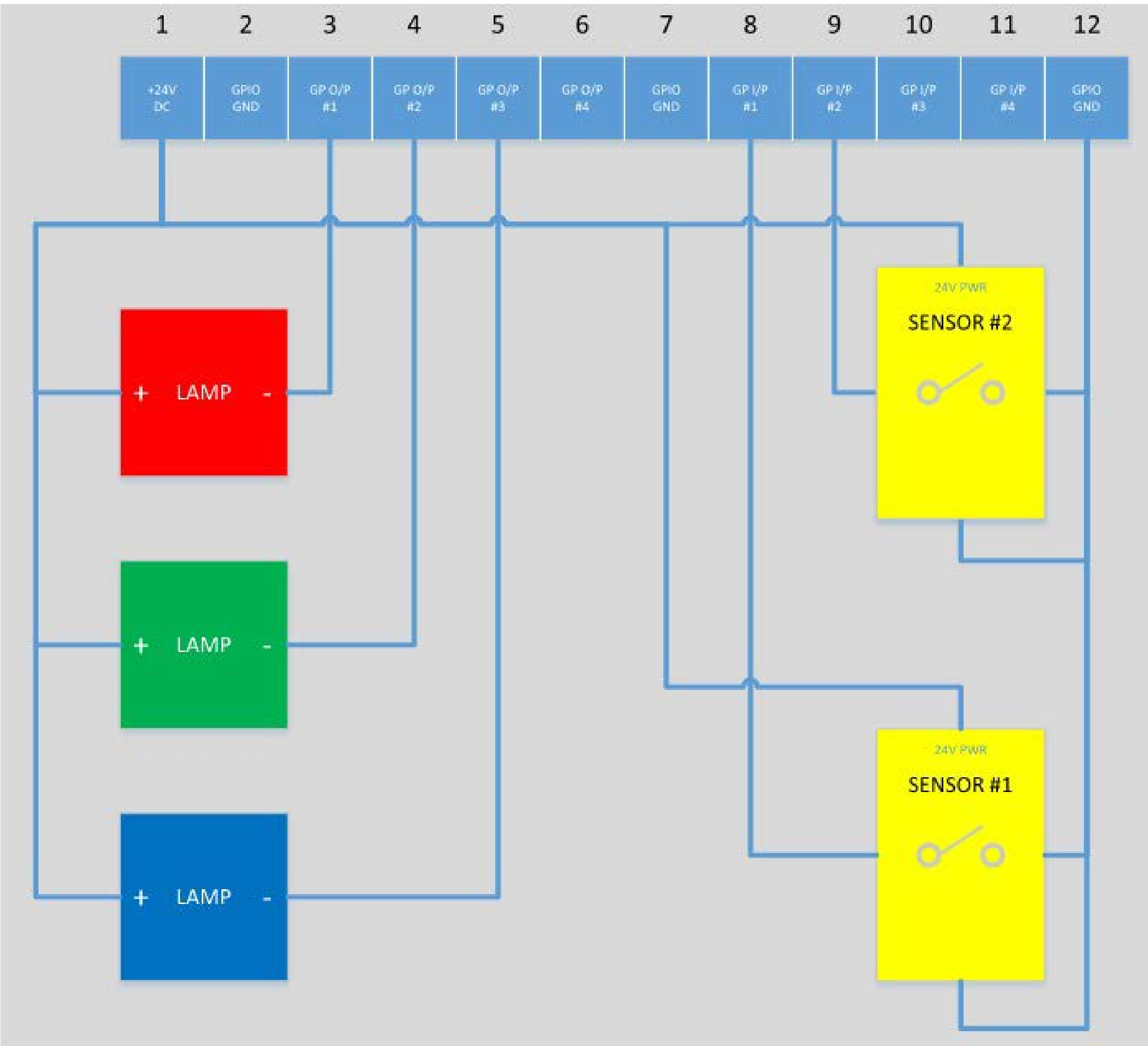
The following figure provides an example of a typical GPIO setup with the power derived from an external power supply.

Figure 72 ATR7000 GPIO Setup Example with Power Derived from External Power Supply



The following figure provides an example of a typical GPIO setup with the power derived from GPIO 24V Pin.

Figure 73 ATR7000 GPIO Setup Example with Power Derived from GPIO 24V Pin



Static IP Configuration

Introduction

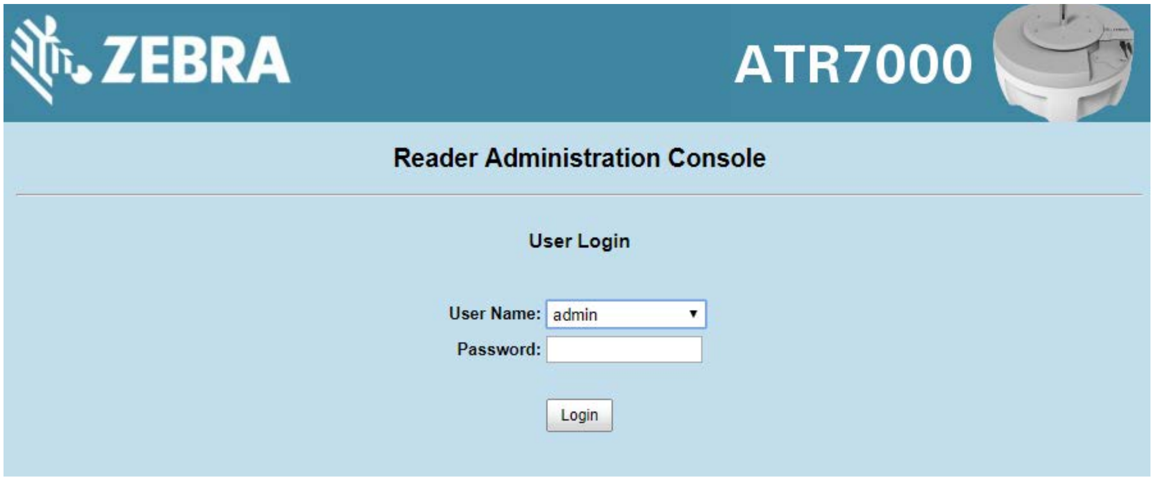
This chapter describes three methods of setting the static IP address on an ATR7000 RFID reader.

Reader IP Address or Host Name is Known

To set the Static IP using the web console:

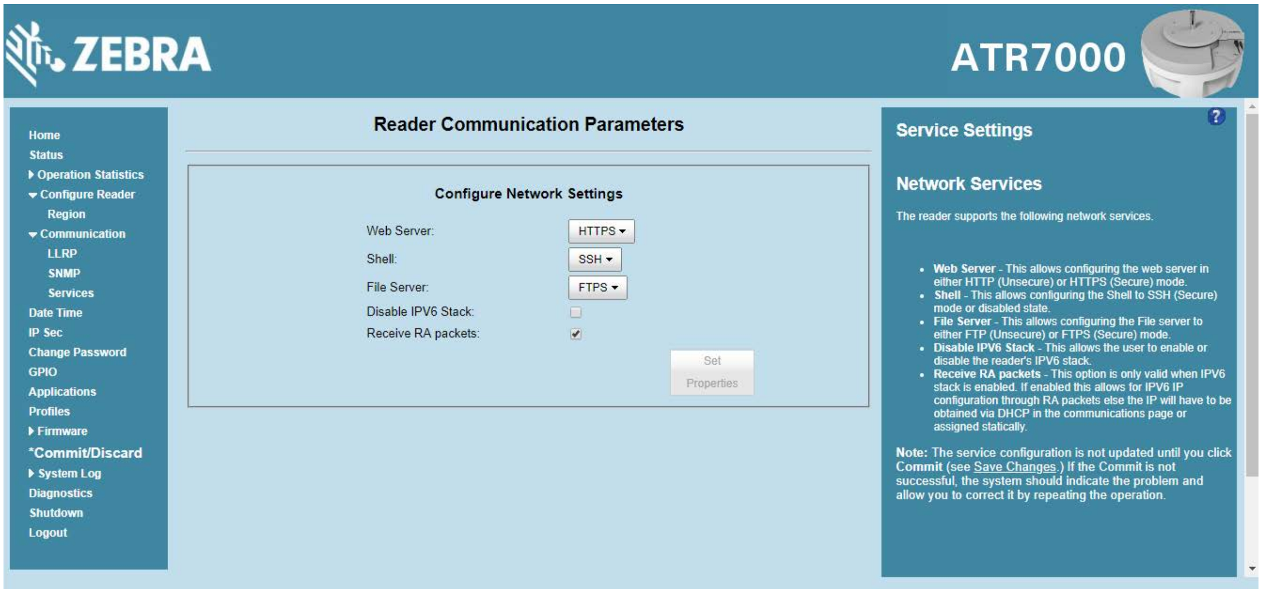
1. Browse the device using the host name, for example: ATR7000CD3B1E.
2. Log in to the device.

Figure 74 Reader Administration Console Login Window



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

Figure 75 Reader Communication Parameters Window



Reader Communication Parameters

Configure Network Settings

Web Server: HTTPS

Shell: SSH

File Server: FTPS

Disable IPV6 Stack: □

Receive RA packets: ☑

Service Settings

Network Services

The reader supports the following network services.

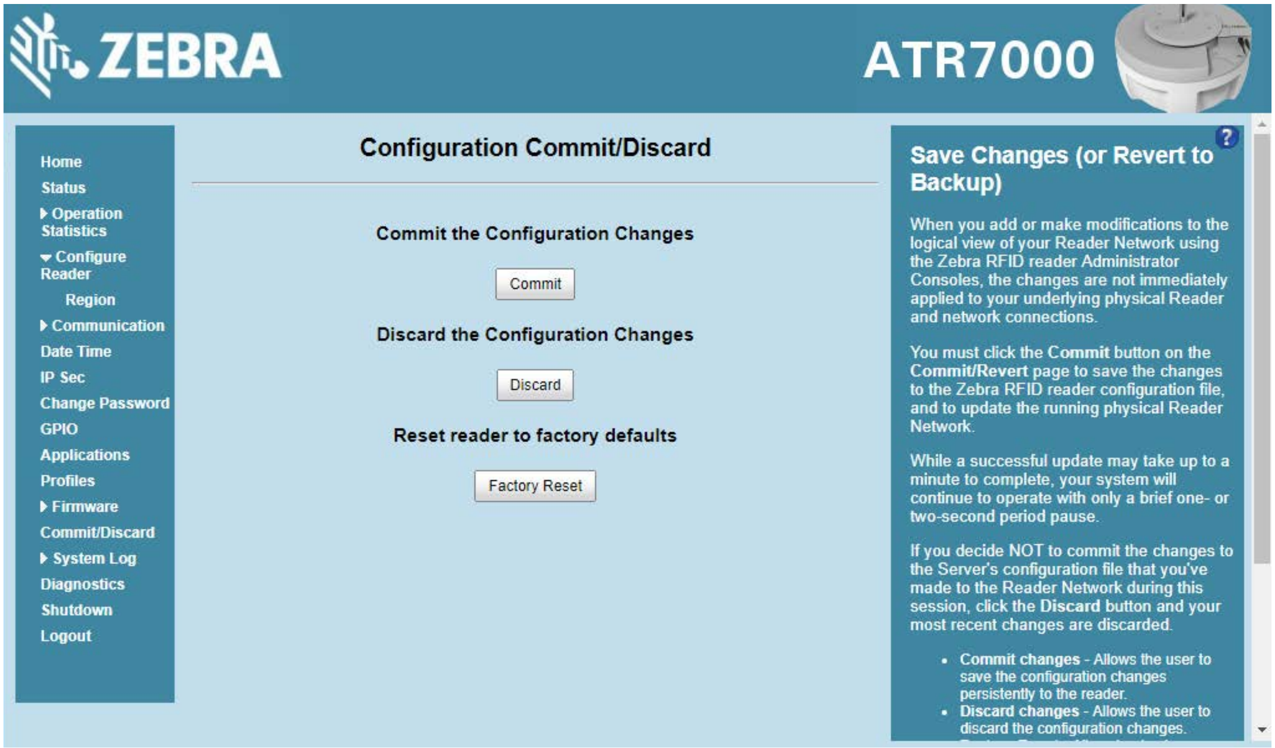
- **Web Server** - This allows configuring the web server in either HTTP (Unsecure) or HTTPS (Secure) mode.
- **Shell** - This allows configuring the Shell to SSH (Secure) mode or disabled state.
- **File Server** - This allows configuring the File server to either FTP (Unsecure) or FTPS (Secure) mode.
- **Disable IPV6 Stack** - This allows the user to enable or disable the reader's IPV6 stack.
- **Receive RA packets** - This option is only valid when IPV6 stack is enabled. If enabled this allows for IPV6 IP configuration through RA packets else the IP will have to be obtained via DHCP in the communications page or assigned statically.

Note: The service configuration is not updated until you click **Commit** (see Save Changes.) If the Commit is not successful, the system should indicate the problem and allow you to correct it by repeating the operation.

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 76 Commit/Discard Window



Configuration Commit/Discard

Commit the Configuration Changes

Discard the Configuration Changes

Reset reader to factory defaults

Save Changes (or Revert to Backup)

When you add or make modifications to the logical view of your Reader Network using the Zebra RFID reader Administrator Consoles, the changes are not immediately applied to your underlying physical Reader and network connections.

You must click the **Commit** button on the **Commit/Revert** page to save the changes to the Zebra RFID reader configuration file, and to update the running physical Reader Network.

While a successful update may take up to a minute to complete, your system will continue to operate with only a brief one- or two-second period pause.

If you decide NOT to commit the changes to the Server's configuration file that you've made to the Reader Network during this session, click the **Discard** button and your most recent changes are discarded.

- **Commit changes** - Allows the user to save the configuration changes persistently to the reader.
- **Discard changes** - Allows the user to discard the configuration changes.

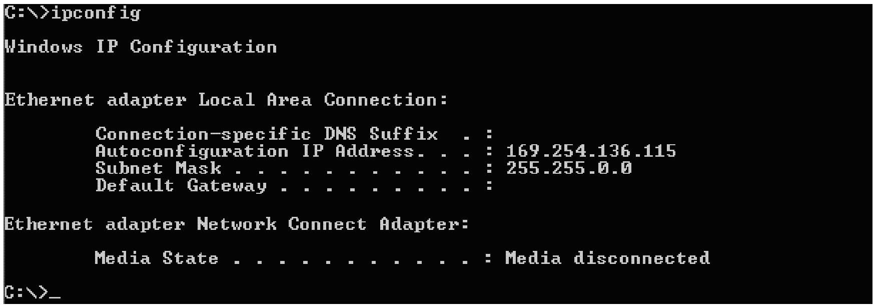
7. The message **Reader IP Address config has changed. Needs reader reboot to take effect** appears. Reset the device and use the reader with the static IP network.

Reader IP is Not Known (DHCP Network Not Available)

To 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**.

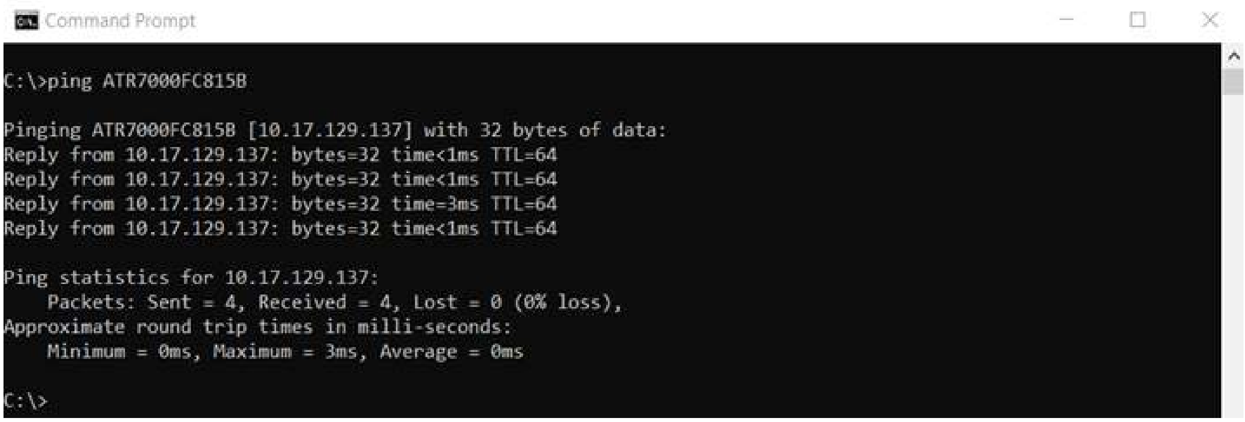
Figure 77 Obtain IP Address



```
C:\>ipconfig

Windows IP Configuration


Ethernet adapter Local Area Connection:

        Connection-specific DNS Suffix  . :
        Autoconfiguration IP Address. . . : 169.254.136.115
        Subnet Mask . . . . . . . . . . . : 255.255.0.0
        Default Gateway . . . . . . . . . :

Ethernet adapter Network Connect Adapter:

        Media State . . . . . . . . . . . : Media disconnected

C:\>_
```

4. When possible, ping the host name of the device.

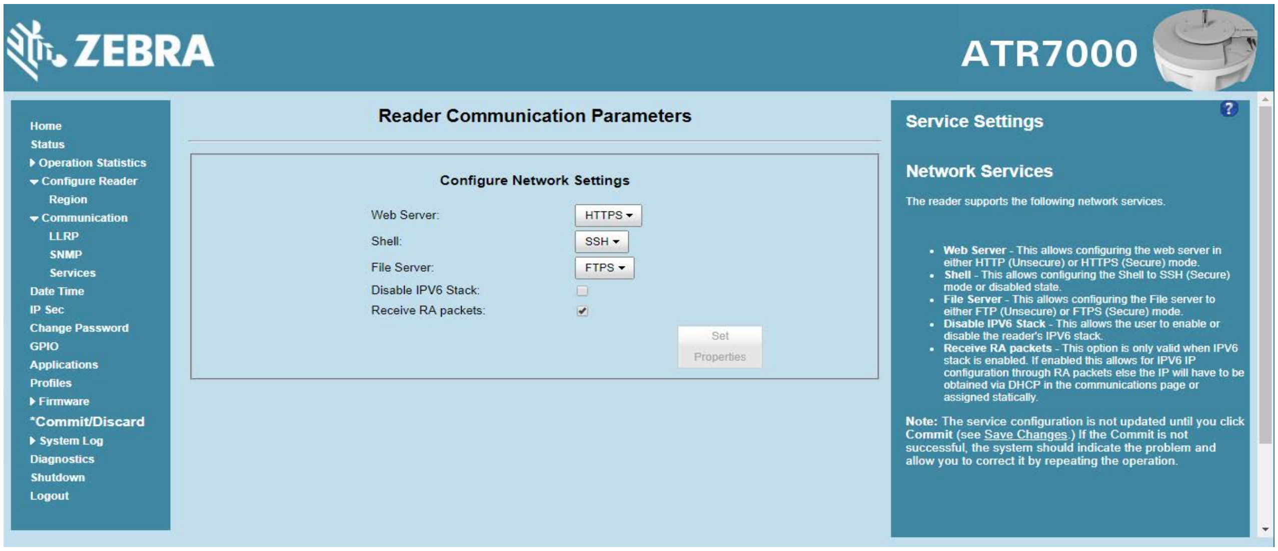
Figure 78 Ping the Host Name



```
C:\>ping ATR7000FC815B

Pinging ATR7000FC815B [10.17.129.137] with 32 bytes of data:
Reply from 10.17.129.137: bytes=32 time<1ms TTL=64
Reply from 10.17.129.137: bytes=32 time<1ms TTL=64
Reply from 10.17.129.137: bytes=32 time=3ms TTL=64
Reply from 10.17.129.137: bytes=32 time<1ms TTL=64

Ping statistics for 10.17.129.137:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 3ms, Average = 0ms

C:\>
```

5. Use a browser to connect to the device with the host name, for example: ATR7000CD3B1E, or use the IP address obtained from ping replies (for example, 169.254.62.74).
6. Log onto the device.
7. Click **Communication**.
8. Set **Obtain IP Address via DHCP** to **Off** and enter all required information.

Figure 79 Reader Communication Parameters Window



Reader Communication Parameters

Configure Network Settings

Web Server: HTTPS
Shell: SSH
File Server: FTPS
Disable IPV6 Stack: □
Receive RA packets: ☑

Service Settings

Network Services

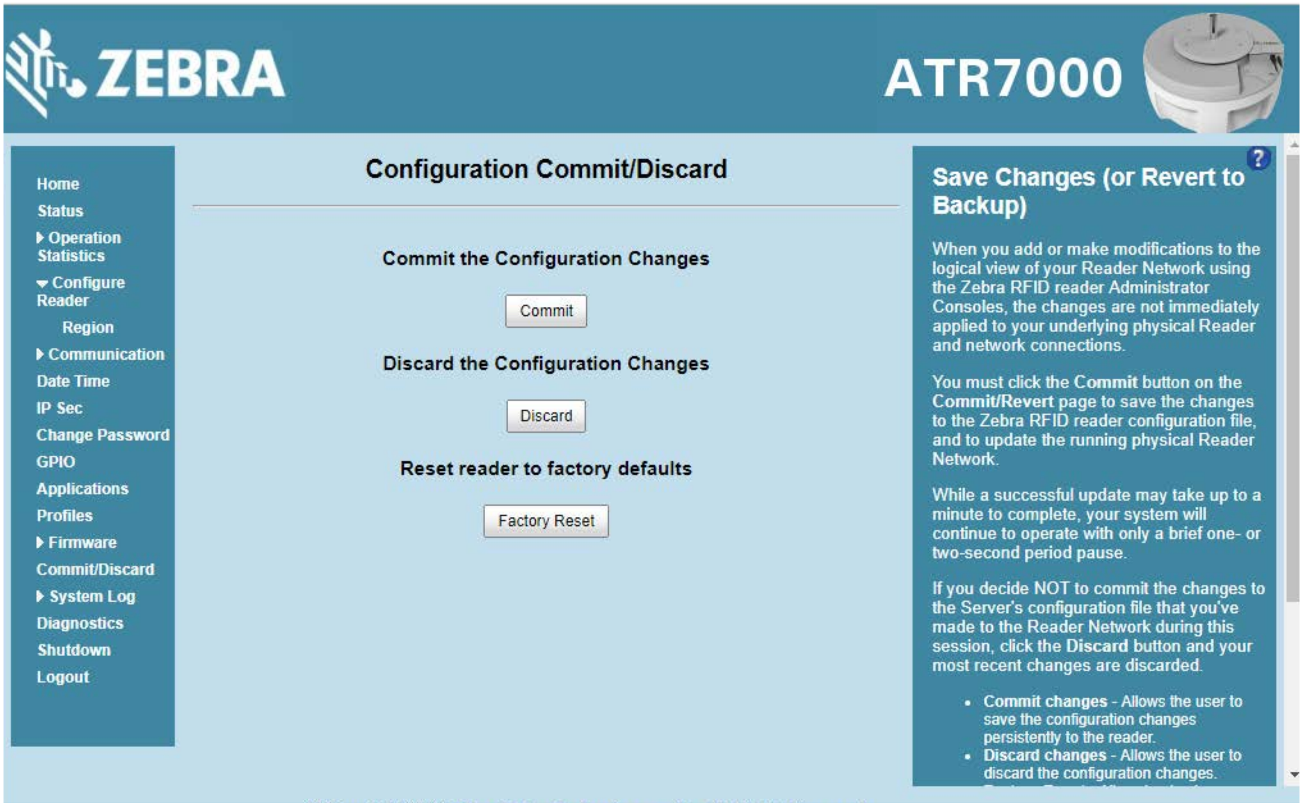
The reader supports the following network services.

- **Web Server** - This allows configuring the web server in either HTTP (Unsecure) or HTTPS (Secure) mode.
- **Shell** - This allows configuring the Shell to SSH (Secure) mode or disabled state.
- **File Server** - This allows configuring the File server to either FTP (Unsecure) or FTPS (Secure) mode.
- **Disable IPV6 Stack** - This allows the user to enable or disable the reader's IPV6 stack.
- **Receive RA packets** - This option is only valid when IPV6 stack is enabled. If enabled this allows for IPV6 IP configuration through RA packets else the IP will have to be obtained via DHCP in the communications page or assigned statically.

Note: The service configuration is not updated until you click **Commit** (see Save Changes.) If the Commit is not successful, the system should indicate the problem and allow you to correct it by repeating the operation.

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

Figure 80 Commit/Discard Window



Configuration Commit/Discard

Commit the Configuration Changes

Discard the Configuration Changes

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Save Changes (or Revert to Backup)

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While a successful update may take up to a minute to complete, your system will continue to operate with only a brief one- or two-second period pause.

If you decide NOT to commit the changes to the Server's configuration file that you've made to the Reader Network during this session, click the **Discard** button and your most recent changes are discarded.

- **Commit changes** - Allows the user to save the configuration changes persistently to the reader.
- **Discard changes** - Allows the user to discard the configuration changes.

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.

RF Air Link Configuration

Introduction

This chapter lists the different air link configurations supported. The air link configuration is available through LLRP and RFID3 API interfaces.

Radio Modes

The supported modes are exposed as a list of individual **UHFC1G2RfModeTableEntry** parameters in regulatory capabilities as shown in Table 10. The **Mode Index** column refers to the index used to walk the **C1G2UHFRFModeTable**. Refer to the EPCglobal *Low Level Reader Protocol (LLRP) Standard*.

Table 10 Radio Modes for FCC/IC Readers

RF Mode Index	Divide Ratio	BDR Value	M Value M2=2, FM0=1, M4=4, M8=8	FLM Value	PIE Value	Min Tari	Max Tari	Step Tari	Spectral Mask Indicator**	EPC HAG T&C Conformance
1	64/3	120000	2	PR_ASK	1500	25000	25000	0	Dense	false
2	64/3	120000	2	PR_ASK	1500	12500	23000	2100	Dense	false
3	64/3	120000	2	PR_ASK	2000	25000	25000	0	Dense	false
4	64/3	120000	2	PR_ASK	2000	12500	23000	2100	Dense	false
5	64/3	128000	2	PR_ASK	1500	25000	25000	0	Dense	false
6	64/3	128000	2	PR_ASK	1500	12500	23000	2100	Dense	false
7	64/3	128000	2	PR_ASK	2000	25000	25000	0	Dense	false
8	64/3	128000	2	PR_ASK	2000	12500	23000	2100	Dense	false
9	64/3	160000	2	PR_ASK	1500	12500	18800	2100	Dense	false
10	64/3	160000	2	PR_ASK	2000	12500	18800	2100	Dense	false

*RF Mode 21 is the automac air link profile which is also the default.

**Spectral mask indicator may vary for certain Tari values. Detailed information is available upon request.

Table 10 Radio Modes for FCC/IC Readers (Continued)

RF Mode Index	Divide Ratio	BDR Value	M Value M2=2, FM0=1, M4=4, M8=8	FLM Value	PIE Value	Min Tari	Max Tari	Step Tari	Spectral Mask Indicator**	EPC HAG T&C Conformance
11	64/3	60000	4	PR_ASK	1500	25000	25000	0	Dense	false
12	64/3	60000	4	PR_ASK	1500	12500	23000	2100	Dense	false
13	64/3	60000	4	PR_ASK	2000	25000	25000	0	Dense	false
14	64/3	60000	4	PR_ASK	2000	12500	23000	2100	Dense	false
15	64/3	64000	4	PR_ASK	1500	25000	25000	0	Dense	false
16	64/3	64000	4	PR_ASK	1500	12500	23000	2100	Dense	false
17	64/3	64000	4	PR_ASK	2000	25000	25000	0	Dense	false
18	64/3	64000	4	PR_ASK	2000	12500	23000	2100	Dense	false
19	64/3	80000	4	PR_ASK	1500	12500	18800	2100	Dense	false
20	64/3	80000	4	PR_ASK	2000	12500	18800	2100	Dense	false
*21	64/3	variable	variable	PR_ASK	variable	6250	25000	variable	variable	false
22	64/3	320000	1	PR_ASK	1500	12500	18800	2100	Dense	false
23	64/3	320000	1	PR_ASK	2000	12500	18800	2100	Dense	false
24	64/3	30000	8	PR_ASK	1500	25000	25000	0	Dense	false
25	64/3	30000	8	PR_ASK	1500	12500	23000	2100	Dense	false
26	64/3	30000	8	PR_ASK	2000	25000	25000	0	Dense	false
27	64/3	30000	8	PR_ASK	2000	12500	23000	2100	Dense	false
28	64/3	32000	8	PR_ASK	1500	25000	25000	0	Dense	false
29	64/3	32000	8	PR_ASK	1500	12500	23000	2100	Dense	false
30	64/3	32000	8	PR_ASK	2000	25000	25000	0	Dense	false
31	64/3	32000	8	PR_ASK	2000	12500	23000	2100	Dense	false
32	64/3	40000	8	PR_ASK	1500	12500	18800	2100	Dense	false
33	64/3	40000	8	PR_ASK	2000	12500	18800	2100	Dense	false

*RF Mode 21 is the automac air link profile which is also the default.

**Spectral mask indicator may vary for certain Tari values. Detailed information is available upon request.

Copying Files To and From the Reader

Introduction

The ATR7000 RFID reader supports the SCP, FTP, and FTPS protocols for copying files.

SCP

The following examples illustrate SCP use:

scp SourceFileName rfidadm@MyReaderIP:/apps

scp rfidadm@MyReaderIP:/apps/SourceFileName userid@MyLinuxMachineIP:/MyFolderName

FTP

The following examples illustrate FTP use:

```
ftp> open
To 157.235.207.146
Connected to 157.235.207.146.
220 Welcome to Thredbo FTP service.
User (157.235.207.146:(none)): rfidadm
331 Please specify the password.
Password:
230 Login successful.
ftp>
```

Use FTP commands such as **is**, **get**, and **put** to manage files. For more information on FTP commands refer to www.cs.colostate.edu/helpdocs/ftp.html. GUI applications such as **FileZilla** are also supported on Windows and Linux machines to connect to the ATR7000.

FTPS

Use any standard GUI tool such as **FileZilla,** to connect to the ATR7000 RFID reader over FTPS.

Data Protection

Introduction

The ATR7000 RFID reader stores data in transition when it detects a network condition that prevents the reader from sending data. This applies to RFID tag data that the reader application is transmitting to the outbound TCP socket, and is no longer owned by the RFID application because it was sent to the network layer for transmission.

When the reader cannot queue RFID data in the outbound TCP socket when an LLRP connection is already established, it stores all outbound LLRP messages in the data protection queue. The queue can store up to 66,000 messages, which represents more than 5 minutes worth of data when reading 200 tags/second (the nominal data rate in DRM (dense reader mode) configuration). If the network is still unavailable when the data protection queue is full, the oldest messages are discarded to accommodate the most recent tag reports.

This feature can not be disabled and operates regardless of the physical network interface used.

Security Recommendations

Introduction

This chapter covers general security guidelines to undertake while using the FX Series RFID readers.

Enable Strong Password for User Authentication

The reader enforces secure HTTP connections and changes the default password on the first login. It is recommended that a strong password be used for an "admin" account. The password chosen should satisfy the following criteria:

- Should contain minimum of 8 and maximum of 15 characters
- English uppercase characters (A through Z)
- English lowercase characters (a through z)
- Base 10 digits (0 through 9)
- Non-alphabetic characters (for example, !, $, #, %)
- Should not use previously used five passwords.

The “rfidadm” account on the reader has an empty password by default. It is recommended that a strong password be set for this account before readers are deployed.

The reader does not enforce password rotation, but the reader administrator recommends rotating all passwords periodically, for example, once every 30 days.

Configure Required Reader Services in Secure Mode

Network services on the reader have secure mode options, which may not be enabled by default. It is recommended that all required services be enabled with secure mode. For example, Choose HTTPs for web server instead of HTTP, Secure FTP over unencrypted FTP, etc.

If any service is not required, such as SSH shell access to the reader, it may be turned off. Refer to the Services section for details on reader services and configurations.

Update Default Self-Signed Certificate

Readers initialize with self-signed certificates by default. It is recommended that the reader's self-signed certificate be updated with a trusted CA-assigned certificate. Refer to the Certificate Configuration section for details.

Secure IoT Connector Interface

It is recommended that endpoints to which reader connections are made for IoT use cases be secured with trusted certificates and mutual TLS authentication enabled.

Refer to the Certificate Configuration section in this guide for details on importing reader certificates and trusted CA certificates into the reader.

Note that the reader allows two ways to import trusted CA certificates in X509 format to the reader:

- The CA certificate can be bundled with the PKCS#12 format .pfx file that includes the reader's private key.
- CA certificates can be imported to the reader's trusted certificate store using the addCAcert RM command. Refer to addCAcert, deleteCAcert and listCAcerts command documentation in the FX Series Reader Interface Control Guide.

Refer to the Certificate Configuration section in the Zebra IoT connector documentation for details on how to set certificates on the reader for endpoint connection security.

An alternate but less preferred option for securing the IoT interface is to use "Basic Authentication", which requires a username and password for endpoint connection authentication. For details, refer to the Device Setup section in Zebra IoT connector documentation.

Enable TLS Security for LLRP

The reader supports secure LLRP connections for data protection over LLRP mode. It is recommended that secure LLRP be used to authorize and encrypt the client-to-reader LLRP channel. TCP port 5085 is used for this purpose. Certificate-based authentication is used, and it requires the reader to be updated with trusted CA-assigned server certificates. Refer to the Certificate Configuration section and Configure LLRP Settings section of this guide for details.

Monitor Reader Certificate Expiry and Update Certificates Before Expiry

Refer to the Certificate Configuration section for different types of reader certificates and how these certificates can be updated.

Certificates have an expiration date. It is recommended that administrators keep track of the expiration date for certificates issued to the reader and update the certificates before they expire. If certificates expire, the connection attempt to remote endpoints can fail. Refer to the 'viewCurrentCertificateDetails' RM command, which can be used to programmatically check for the currently installed certificate details, including its expiry.

Update Custom Trusted CA Certificates to Reader Trusted Certificate Store

The reader has a trusted CA certificate store that may be updated with custom CA certificates. The reader can use such CA certificates to trust remote endpoints before connecting to them, provided the same CA issues the certificates.

The reader currently supports only RM commands for managing such CA certificates. Refer to addCAcert, deleteCAcert and listCAcerts RM command documentation in the FX Series Reader Interface Control Guide for details.

Enable FIP 140-2 Mode

FX series readers support reader services in secure mode to use only FIPS 140-2 compliant algorithms. Refer to the FIPS Support section in this guide for details on how to configure FIPS 140-2 mode. Note that as of 3.20.x release, FIPS 140-2 mode is supported for HTTPS, FTPS and LLRP services. FIPS 140-2 mode is not supported for IoT connector interfaces.

Enable Port-Based Network Access Control

Reader supports 802.1x EAP over ethernet. If your deployment supports 802.1x EAP, it is recommended that you enable it. Refer to the 802.1x EAP Configuration section for details.

Disable Serial Port

The external serial and serial-to-USB ports on FX9600 and ATR7000 should be turned off if applications or deployment do not require access to the serial port. Refer to the FX9600 Serial Port Configuration section for details on port usage and how it can be set to disabled mode.

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