**Table 9** Keyboard Emulation Configurable Options (Continued)

| Option | Description |
|---|---|
| Data Prefix/Data Suffix | The user can add a prefix and suffix for each tag read record.<br>**Note**: Data Prefix and Data Suffix should be in a character sequence only. |
| Configure Antenna Power | See Table 8. |
| Inventory Control Parameters | See Table 8. |
| Tag Field Selection | See Table 8 (defaults vary). |

**Figure 55** TCP/IP Socket Screen

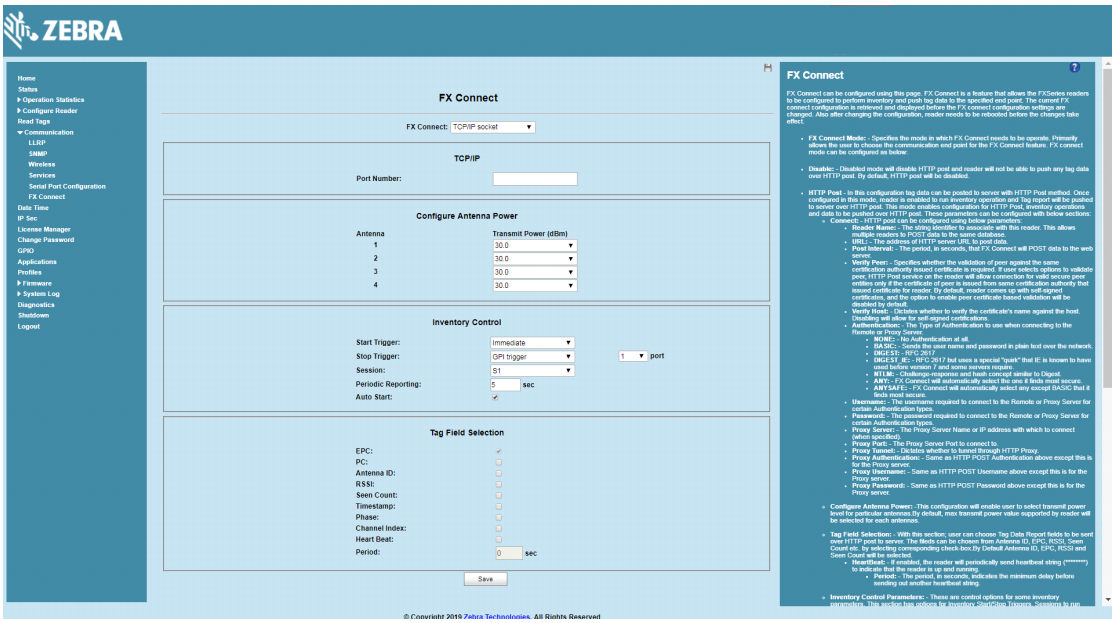



**Table 10** TCP/IP Socket Configurable Options

| Option | Description |
|---|---|
| **TCP/IP** - This section displays the configurable parameters for the TCP/IP. | |
| Port Number | This is the TCP/IP port number for which FX Connect will open TCP/IP socket and push data when inventory is running. |
| Configure Antenna Power | See Table 8. |
| Inventory Control Parameters | See Table 8. |
| Tag Field Selection | See Table 8 (defaults vary). |

**Figure 56** USB Flash Drive

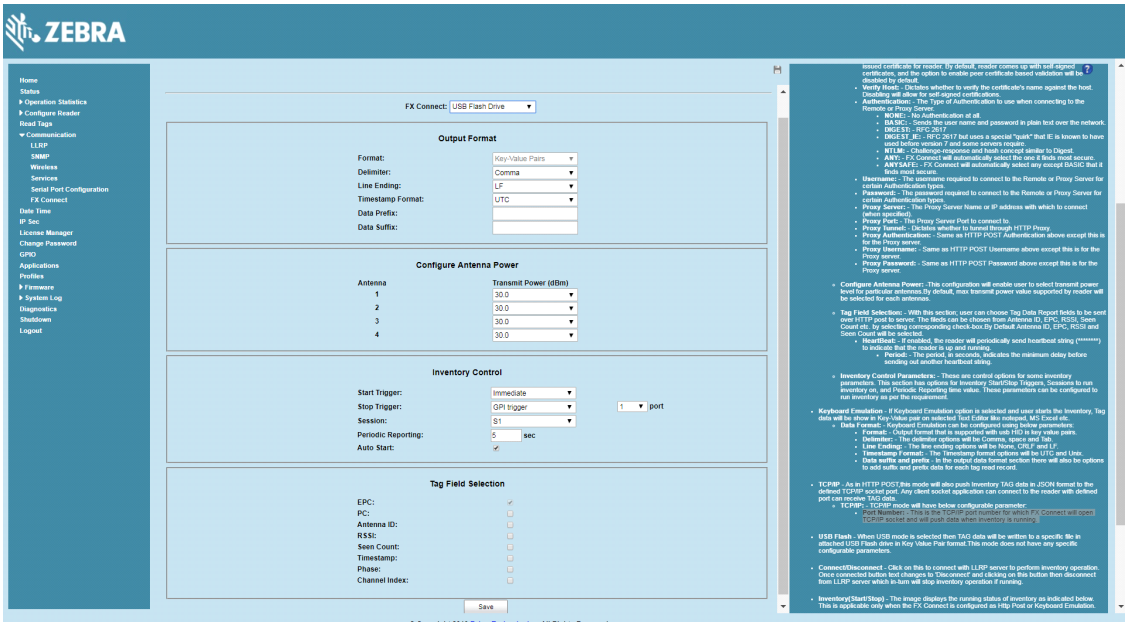



**Table 11** USB Flash Drive Configurable Options

| Option | Description |
|---|---|
| **Output Format** - This section displays the configurable parameters for the USB Flash Drive. | |
| Format | Output format that is supported with USB HID is key-value pairs. |
| Delimiter | The delimiter options are comma, space, and tab. |
| Line Ending | The line ending options are None, CRLF, and LF. |
| Timestamp Format | The timestamp format options are UTC and Unix. |
| Data Prefix/Data Suffix | The user can add a prefix and suffix for each tag read record.<br>**Note**: Data Prefix and Data Suffix should be in a character sequence only. |
| Configure Antenna Power | See Table 8. |
| Inventory Control Parameters | See Table 8. |
| Tag Field Selection | See Table 8 (defaults vary). |

## Running Inventory on FX Connect

To start the inventory operation for the selected and configured Output mode:

1. From the FX Connect console select **Connect**.

**NOTE** **Connect** appears after the user selects **Save**.

**Connect** changes to **Disconnect** after a successful connection.

   a. The inventory operation begins per the configured Start Trigger setting.

b. The inventory status light turns green when inventory beings running. and turns red when inventory stops per the configured Stop Trigger setting.

2. Select **Disconnect**.

**NOTE** **Disconnect** changes to **Connect** after a successful disconnection.

## Configuring the HTTP Post Server

**NOTE** You must have a valid license to run FX Connect. See FX Connect Licensing Management for more information.

To run the HTTP Server to receive tag data from FX Connect:

1. Open a web browser to connect to the FX reader using the host name or IP address. (See Quick Start for startup instructions.)
2. Click **Communication > FX Connect**.
3. Install Python 2.7 or greater.
4. Go to: github.com/BurntSushi/nfldb/wiki/Python-&-pip-Windows-installation and follow the instructions to install Python pip.
5. Open command shell.
6. Install Flask by typing the command: pip install Flask.
7. Save the text below as postServer.py.

```
from flask import Flask, request
app = Flask(__name__)

@app.route('/', methods = ['POST', 'GET'])

def message():
     if request.method == 'POST':
          app.logger.info('Request received.')
          app.logger.info('Url: %s', request.url)
          app.logger.info('Data: %s', (request.data).decode('utf-8'))
          app.logger.info('Is JSON: %s', request.is_json)
     else:
          app.logger.info('GET request received.')
     return 'OK\n'

if __name__ == '__main__':
     app.run(host='0.0.0.0', port='5001', debug=1)
```

**NOTE** The script above runs HTTP server on port 5001; if needed, change the port number.

8. To see the HTTP Post output, run the command: python postServer.py. This start s the HTTP server which receives tag data from FX Connect and displays the data in the command shell.

## Configuring the HTTP Proxy Server

To setup the Squid proxy server on an Ubuntu machine:

1. Install, start, and enable Squid on the Ubuntu machine using the following commands.

   ```
   $ sudo apt -y install squid
   $ sudo systemctl start squid
   $ sudo systemctl enable squid
   ```

2. The squid.conf file is created in: /etc/squid/squid.conf.
3. The default configuration file contains some configuration directives that affect the behavior of the Squid and they need to be configured.

   Open the squid.conf file and update the lines below, the **Save**.

   a. Under **rule allowing access from your local networks** add the following statements:

   ```
   acl all src 0.0.0.0/0.0.0.0
   acl Safe_ports port 8081         # custom http
   ```

   b. Under **access permission configuration** add the following statement:

   ```
   http_access allow all
   ```

   c. Under **access permission configuration** comment the statements:

   ```
   #http_access allow localhost manager
   #http_access deny manager
   ```

4. Restart the Squid with the following command:

   ```
   sudo systemctl restart squid
   ```

5. The proxy server is now ready.
6. Check the logs in the proxy server with the following command:

   ```
   sudo tail -f /var/log/squid/access.log
   ```

## Configuring USB HID

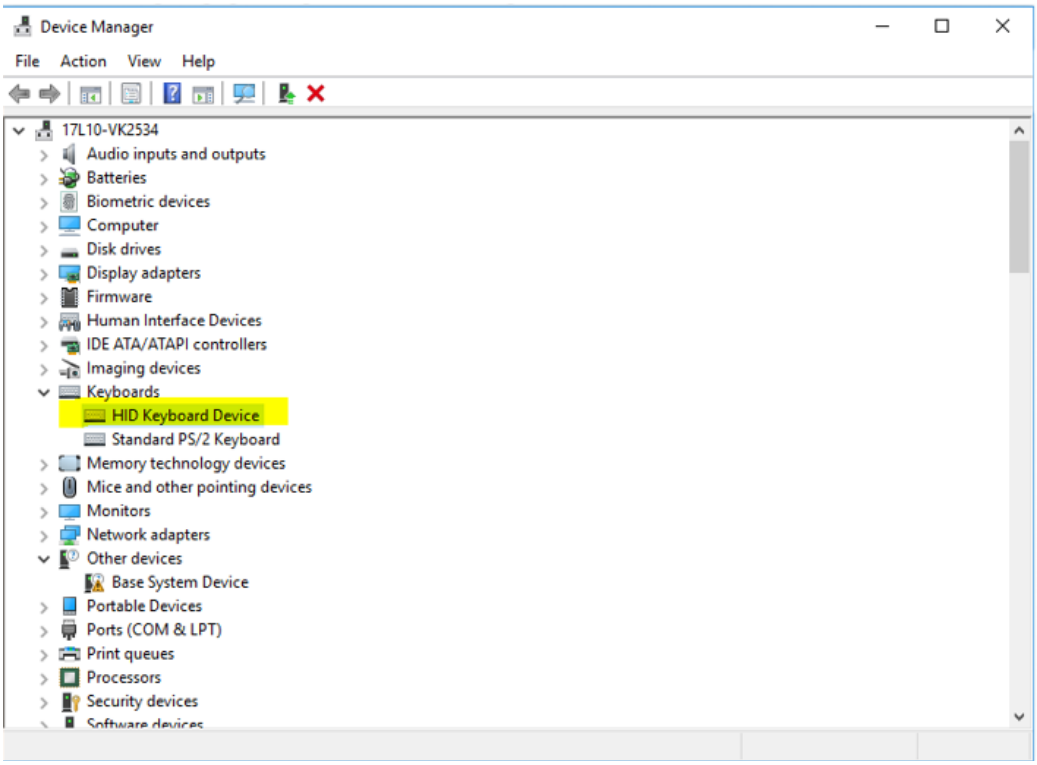
**NOTE** It is recommended to use two host PCs - one to control the reader through the web console and another to receive tag data.

**NOTE** Setting the reader to use USB HID disables RNDIS on the USB client port. The reader cannot be accessed using the RNDIS IP Address (169.254.10.1) in this scenario.

To run FX Connect in Keyboard Emulation:

1. Open the reader web console to FX Connect (see Figure 52 on page 78).
2. Connect the reader to the host machine through the USB Client port (same as RNDIS).
   See Figure 7 on page 19 and Figure 10 on page 21 for FX7500 and FX9600 USB Client ports. Windows automatically detects the reader as an HID device when inventory starts on FX Connect and enables the driver.

**Figure 57** HID Device Detection




3. Open any text editor application or MS Excel to receive push data from the reader. Use your cursor to select the spot where you want to print the tag data.
4. Start the inventory by selecting **Connect** on reader web console.

Tag data is printed in the application at the selected spot.

## Configuring the TCP/IP Socket

To use TCP/IP socket for receiving Tag data

1. Run TCP/IP socket client application on host machine. TCP/IP client will read the Tag data sent by the reader. Below is the simple TCP/IP client application which need to be compiled on host machine:

```
/*
 * tcpclient.c - A simple TCP client
 * usage: tcpclient <server IP> <port>
 */
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <unistd.h>
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <netdb.h>
#include <sys/ioctl.h>
```

```
#define BUFSIZE 10240

/*
 * error - wrapper for perror
 */
void error(char *msg) {
    perror(msg);
    exit(0);
}

int main(int argc, char **argv) {
    int sockfd, portno, n;
    struct sockaddr_in serveraddr;
    struct hostent *server;
    char *hostname;
    char buf[BUFSIZE];
        struct timeval t;
        int iMode = 1;
        int count = 0;

    /* check command line arguments */
    if (argc != 3) {
       fprintf(stderr,"usage: %s <server IP> <port>\n", argv[0]);
       exit(0);
    }
    hostname = argv[1];
    portno = atoi(argv[2]);

    /* socket: create the socket */
    sockfd = socket(AF_INET, SOCK_STREAM, 0);
    if (sockfd < 0)
        error("ERROR opening socket");

    /* gethostbyname: get the server's DNS entry */
    server = gethostbyname(hostname);
    if (server == NULL) {
        fprintf(stderr,"ERROR, no such host as %s\n", hostname);
        exit(0);
    }
        printf("Connecting to server : %s\n", server->h_name);
```

```
    /* build the server's Internet address */
    bzero((char *) &serveraddr, sizeof(serveraddr));
    serveraddr.sin_family = AF_INET;
    bcopy((char *)server->h_addr,
          (char *)&serveraddr.sin_addr.s_addr, server->h_length);
    serveraddr.sin_port = htons(portno);

    /* connect: create a connection with the server */
    if (connect(sockfd, (struct sockaddr *)&serveraddr, sizeof(serveraddr)) < 0){
          printf("Connecting to socket failed.\n");
          close(sockfd);
      error("ERROR connecting");
          return -1;
        }
        while(1){
                /* print the server's reply */
                bzero(buf, BUFSIZE);
                n = read(sockfd, buf, BUFSIZE);
                if (n < 0){
                        error("ERROR reading from socket");
                } else if (n == 0){
                        printf("Server Socket closed \n");
                        break;
                } else {
                        printf("\nMessage: %s", buf);
                }
                //if(count++ > 10)
                //      break;
        }
    close(sockfd);
    return 0;
}
```

2. Once compiled, run this application with reader IP and PORT which is already configured on the reader.
3. After running the application, click on connect button on the reader web console to run inventory under FX Connect.
4. Application will print the received tag data on screen.

### Configuring the USB Flash Drive

To get the tag data in USB drive there no configuration is required. The user just need to attach the USB flash drive in reader and click on **Connect** button at FX Connect web console.

The tag data will be pushed to USB flash drive in a file named as current timestamp.

## FX Connect Licensing Management

This section explains, in detail, the licensing model and the licensing mechanism used in FX Connect (a feature available for FX7500 and FX9600 RFID readers). The following areas are discussed:

- The three different modes to acquire a license.
- How to return licenses.
- Setup and administration of the license server.

### FX Connect Licensing Model

FX Connect features require a valid license installed in the reader. The FX Connect license purchased from Zebra determines the number of FX7500/FX9600 readers that can use FX Connect features. Only those readers that successfully acquired a license from the license server can read tags and output the RFID tag data to the designated output option on the FX Connect web page. There is also an option to acquire evaluation/trial licenses. The following sections explain where and how to procure the license. When you acquire the license, the user receives an Activation ID which is used to activate the license on the readers.

### Acquiring Licenses

Trial and permanent licenses can be ordered from the Zebra ordering portal. For urgent trial version orders, contact the FX Series product manager or your local sales representative. An entitlement email is sent when the order is processed.

### Types of Licenses

There are two types of FX Connect licenses.

- FX Connect Evaluation License
- FX Connect Perpetual

#### FX Connect Evaluation License

The evaluation license is a time bound license, based on the procurement type, and can be valid for 30, 60 or 90 days. The license is de-activated when the trial ends. Upon expiration of the trial term, the user is required to purchase a renewal license or switch to a permanent license.

#### FX Connect Perpetual

FX Connect perpetual is a permanent License and is available for the life of the reader.

### Enabling a License

To enable an FX Connect license, acquire the appropriate license type (evaluation or perpetual) and then login to the reader web interface to configure and activate the license.

## FX Connect Licensing Mechanism

### License Acquisition Modes

FX Connect supports acquiring a license in one of three ways:

- From a Cloud based server (default).
- From a Local License Server (LLS) - see page 91.
- From an off-line device - see page 93.

### Acquiring FX Connect License from Cloud Based Server

With this method of license acquisition, the license server is hosted on the cloud and the FX reader contacts the cloud-based license server to acquire licenses. This is the default mode for purchasing FX Connect licenses. It involves minimal setup and configuration.

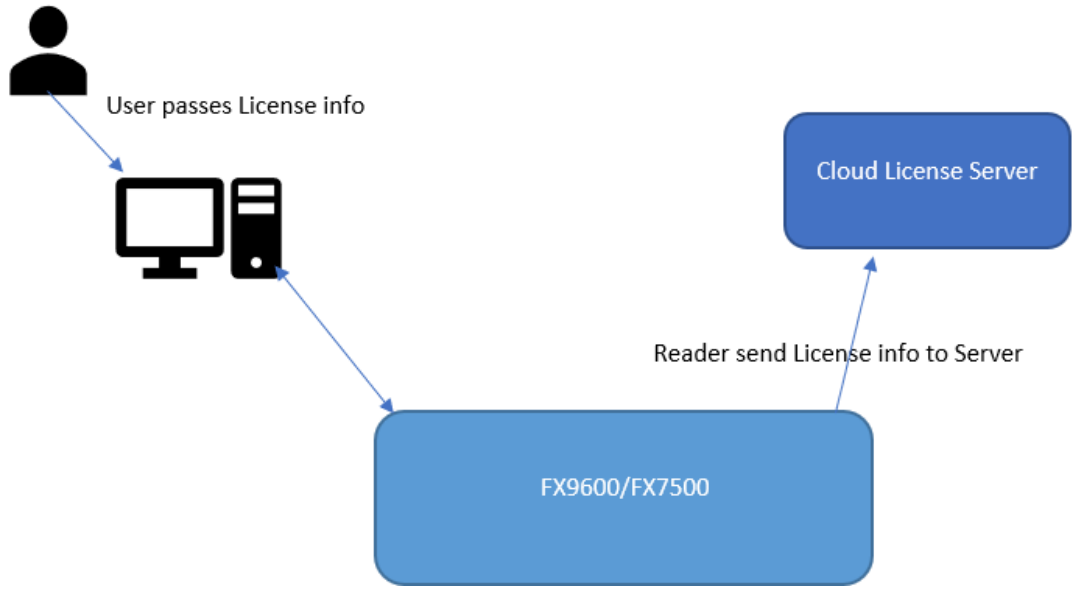
**IMPORTANT** With this method, the FX reader(s) must be connected to the Internet to acquire license(s) from the cloud server and start operations.

Copy and paste the following address of the cloud license server for FX Connect into a web browser. zebra-licensing.flexnetoperations.com/flexnet/deviceservices.

The value of the **license_server_url** field must be set to this address.

**NOTE** To circumvent a firewall while contacting the cloud-based license server, set up a proxy server. To do this, go to: https://supportcommunity.zebra.com/s/article/ZSL-Licensing-Server-Connectivity?language=en_US.

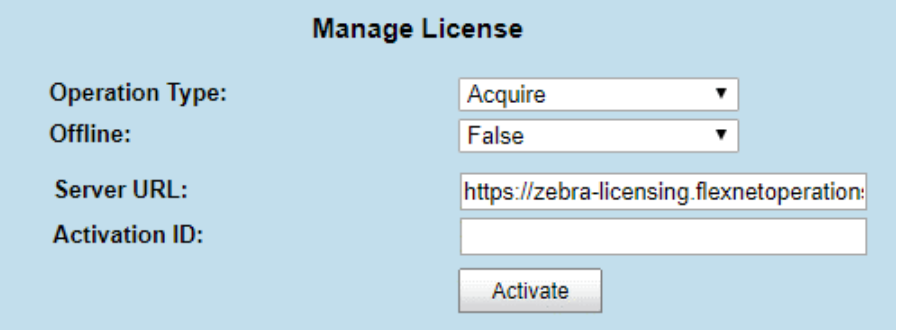
**Figure 58** License Acquisition Process From The Cloud



### Managing the License

Select the **License Manager UI** page on the reader.

**Figure 59** License Manager UI - Acquire License




1. **Operation Type:** Use the drop-down arrow and select Acquire.
2. **Offline:** Use the drop-down arrow and select False.
3. **Server URL:** The cloud server URL (https://zebra-licensing.flexnetoperations.com/flexnet/deviceservices) should display. This is the default and should not be modified.
4. **Activation ID:** Enter the appropriate ID. (This is the ID received when you purchase the license.)
5. Select **Activate**.

Upon successful completion of the operation, license information displays on the **Available License** page (see Available License Tab on page 94).

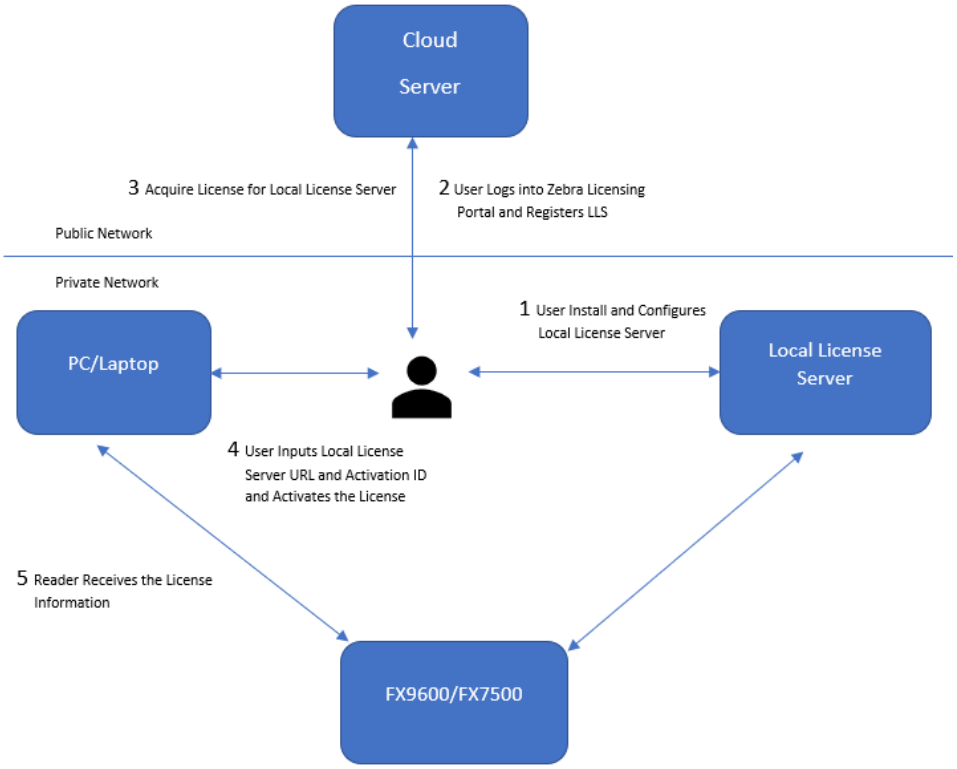
### Acquiring FX Connect License from Local License Server (LLS)

With this license purchase method, the license server resides locally on the private network that is reachable from the reader(s). This method does not require Internet connectivity as license acquisition comes from local sever connectivity.

The local server must be setup before installing the FX Connect license and it must be registered in the Zebra end user licensing portal. For details, go to: www.zebra.com/us/en/support-downloads/software-licensing.html. and select the **Manuals** link to download the Local License Server Administration Guide for Windows (part number, MN-003302-xx).

Figure 60 illustrates the process of license acquisition from a local license server.

**Figure 60** Local License Server Acquisition




### Setting Up a Local License Server

**NOTE** The following steps are described in detail in the Local License Server Administration Guide for Windows (part number, MN-003302-xx).

To setup a local license server:

1. Install the LLS.
2. Configure the LLS.
3. Login to the Zebra Licensing Portal and register the LLS.
4. Acquire a license(s) for the LLS (see Acquiring Licenses on page 89).
5. Input the LLS URL and Activation ID.
6. Activate the license.
7. The reader receives the license information, queries the LLS for the Activation ID, and acquires the license.

When all steps are complete, the FX reader must be setup to acquire licenses from the LLS. This is accomplished by changing the **license_server_url** field in HTML page file to the following http://<license_server_ip_or_hostname>:7070. The local license server by default listens on port 7070 which can be changed in the license server configuration. If a non-default port is configured in local license server, then be sure to update the **license_server_url** field in the HTML page to the same value. The **license_activation_id** field must be updated to the appropriate value provided by Zebra.

### Acquiring an FX Connect License From an Off-line Device

The FX Connect license can be activated on a standalone device. The FX7500/FX9600 readers do not require an Internet or Local Area Network. However, the user must download the Capability Response (License.bin file) from the Zebra Licensing Server. For details, go to: www.zebra.com/us/en/support-downloads/software-licensing.html. and select the **Manuals** link to download the Software Licenses Portal For End Users Quick Reference Guide 2018.08 (part number, MN-123456-xx). Refer to the section Activating Licenses on an Off-line Device for a detailed explanation on downloading the Capability Response from the Zebra Licensing Server.

### Requirements To Download the Capability Response

- Device ID - the unique identification number of the FX device on the Zebra Licensing Server. The Device ID must be in the following format:

  <Model Name>_<Mac_Address> i.e., FX9600_84_24_8D_EF_B2_BB
  where Model Name is the FX7500 or FX9600
  MAC/IEE address is a 12 digit number

  This information can be found on bottom of device.

**Figure 61** Reader Label

- Activation ID - the unique 32-bit alpha-numeric number shared to the user when the license is purchased. This number acts a key to enable the FX reader to activate the license. The Activation ID is in the following format:

  8c88-d0e7-9f3c-435b-968b-69a8-7f8e-a302

- Downloading Capability Response - the user must login to the Zebra Licensing Server. Refer to the link shared via e-mail when the license is purchased or go to:
  https://zebra-licensing.flexnetoperations.com/flexnet/deviceservices

  **NOTE** The email received upon license purchase includes all necessary login information. When using the link above, the Activation ID is your password.

  - Create the Device ID.
  - Map the Activation ID to the Device ID.
  - Click the Download Capability Response. The Lincense.bin file is loaded into the download folder in the format below:

    <Device ID>.bin file I.e.., FX9600_84_24_8D_EF_B2_BB.bin

### Activating the License on the Device

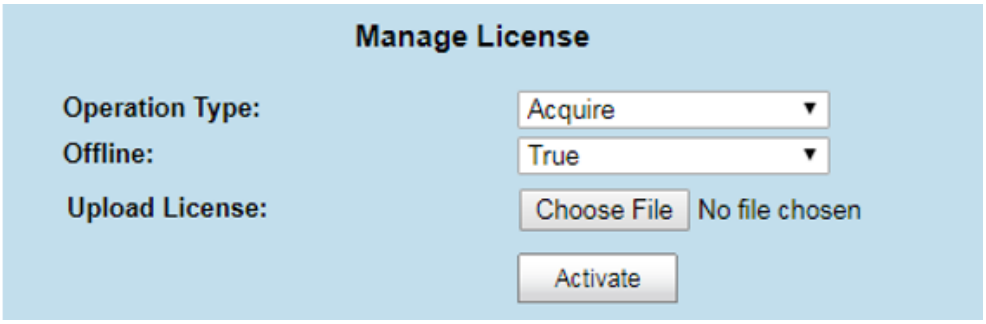
License manager has two functions:

- Manages the license.
- Displays the available licenses.

### Managing the License

Managing the license allows the user to upload the License.bin and acquire a license. Select the **License Manager UI** page on the reader. The following page displays.

**Figure 62** License Manager UI - Acquire License



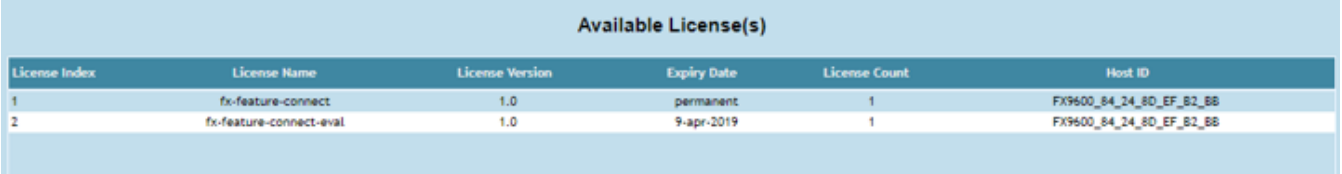

1. **Operation Type:** Use the drop-down arrow and select Acquire.
2. **Offline:** Use the drop-down arrow and select True.
3. **Upload License:** Select **Choose File** and browse to find the FX9600_84_24_8D_EF_B2_BB.bin file.
4. Select **OK**.
5. Select **Activate**.

**NOTE** The Capability Response downloads from the server and is only valid for five calendar day. The license.bin file uploads to the reader and is processed and validated.

### Available License Tab

The **Available License** page is populated when the license is processed and validated.

**Figure 63** Valid Licenses on the FX Connect Device




The following license attributes are displayed.

- License Index
- License Name
- License Version
- Expiry Date
- License Count
- Device Host ID

Figure 63 shows two valid licenses on the FX Connect device.

**NOTE** Both Perpetual and Evaluation licenses can be mapped to same Device ID.

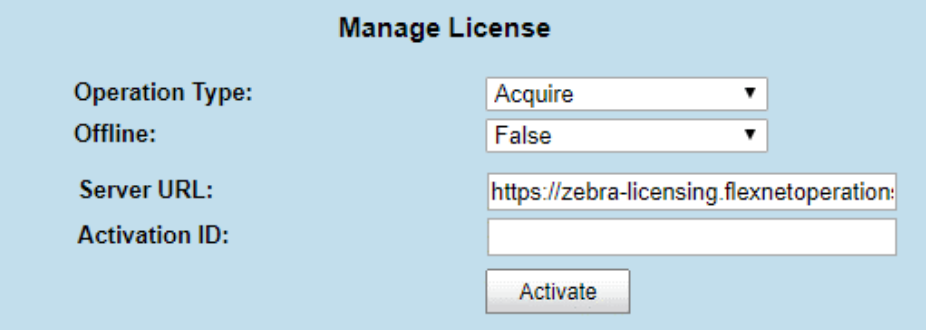
### Returning a License

**NOTE** The FX reader must be connected to Internet to a return license.

**IMPORTANT** If the user is unable to login to the reader web console (for example, if the reader becomes defective), go to: https://www.zebra.com/us/en/about-zebra/contact-zebra/contact-tech-support.html for Zebra Technical Support. At that time, the Zebra licensing team releases the license from the cloud server. The reader requires reboot upon online releasing of the license.

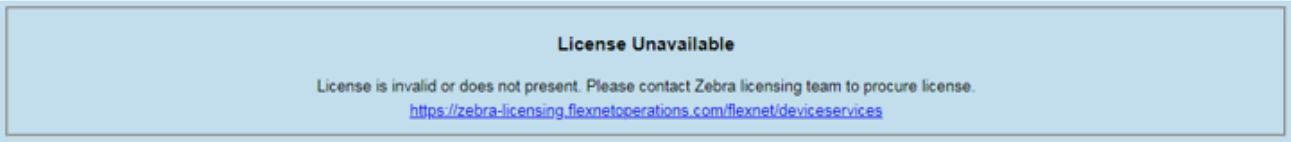
The license acquired using the steps above can be returned to the cloud server. Click on the License Manager UI page on the FX7500 or FX9600 device. The following page displays.

**Figure 64** Return a License




1. **Operation Type:** Use the drop-down arrow and select Return.
2. **Offline:** Use the drop-down arrow and select False.
3. **Server URL:** The cloud server URL (https://zebra-licensing.flexnetoperations.com/flexnet/deviceservices) should display. This is the default and should not be modified.
4. **Activation ID:** Enter the appropriate ID. (This is the ID received when you purchase the license.)
5. Select **Release**.
6. Upon successful release and completion of this operation, the license is removed from the reader and the reader reboots. License information is also deleted from the Available License page and the message below displays.

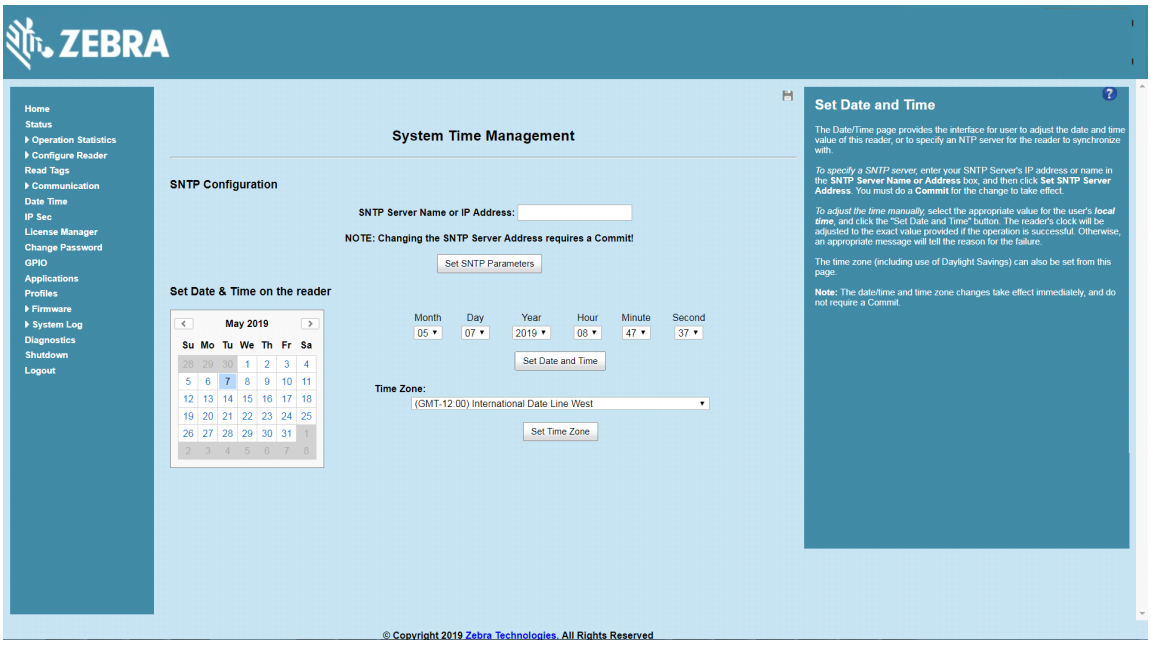
**Figure 65** License



# 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.

**Figure 66** System Time Management Window




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 select **Set SNTP Parameters**.

To adjust the time manually, select the appropriate value for the user's local time, and select 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.

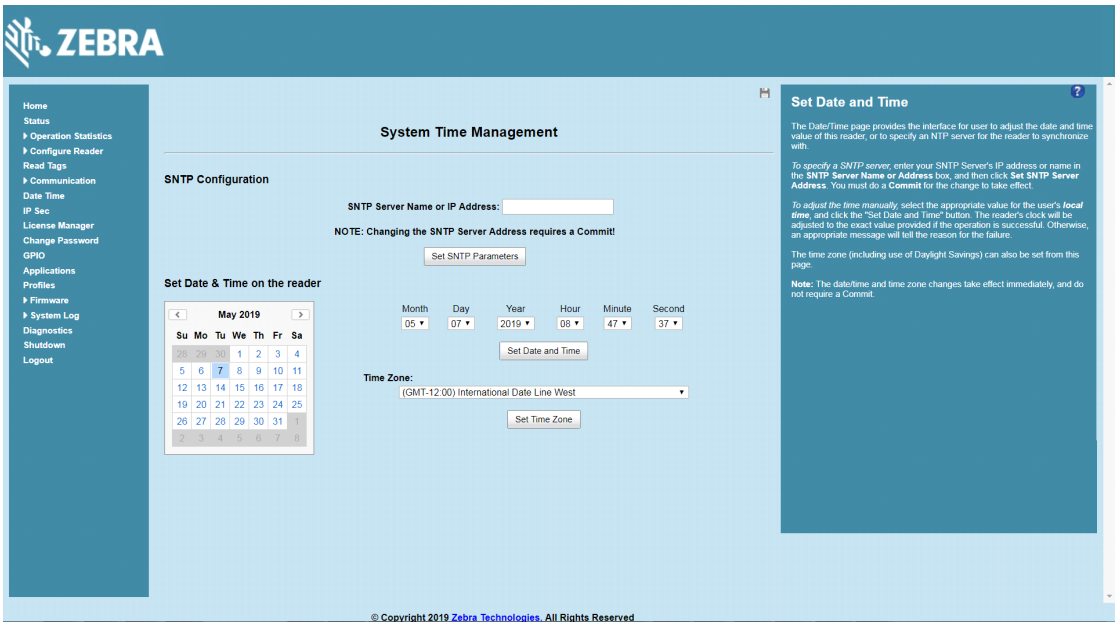
You can also set the **Time Zone** (including use of Daylight Savings) using the drop-down menu.

**NOTE:** The date/time and time zone changes take effect immediately.

# 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 67** IPV6 IP Sec Window




To add an IP Sec entry:

1. Select 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. Select the **Add IP Sec Entry** button.

To delete an IP Sec entry:

1. Select **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. Select the **Delete IP Sec Entry** 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.

## FX Series User Accounts

The FX Series supports the following user accounts:

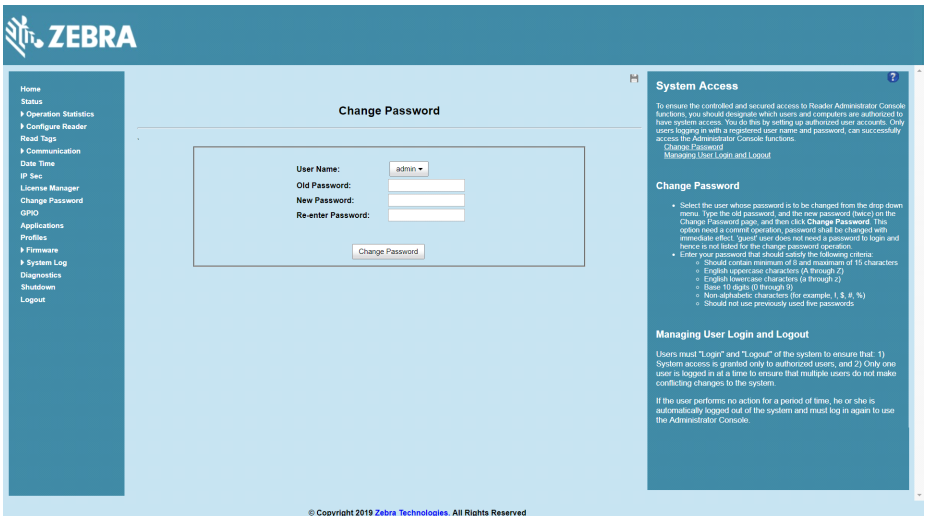
- **admin** - This user has web access but no shell access, with full privileges to make changes on the reader using the Administrator Console interface and to access to the reader using the FTP interface.
- **guest** - This user has web access but no shell access, with read-only privileges in the Administrator 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 68** Change Password Window




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. Select **Change Password**. The password changes immediately.

## 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.

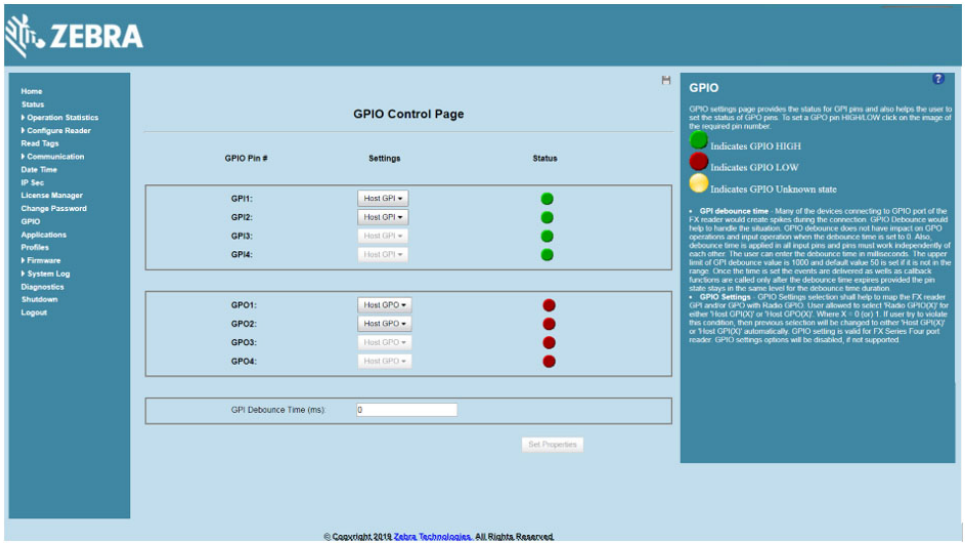
If the user performs no action for a period of time, the system automatically logs him or her out. The user must log in again to use the Administrator Console.

# GPIO

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

**NOTE:** The FX7500 has two inputs and three outputs. The FX9600 has four inputs and four outputs.

**Figure 69** FX7500 Example GPIO Control Page

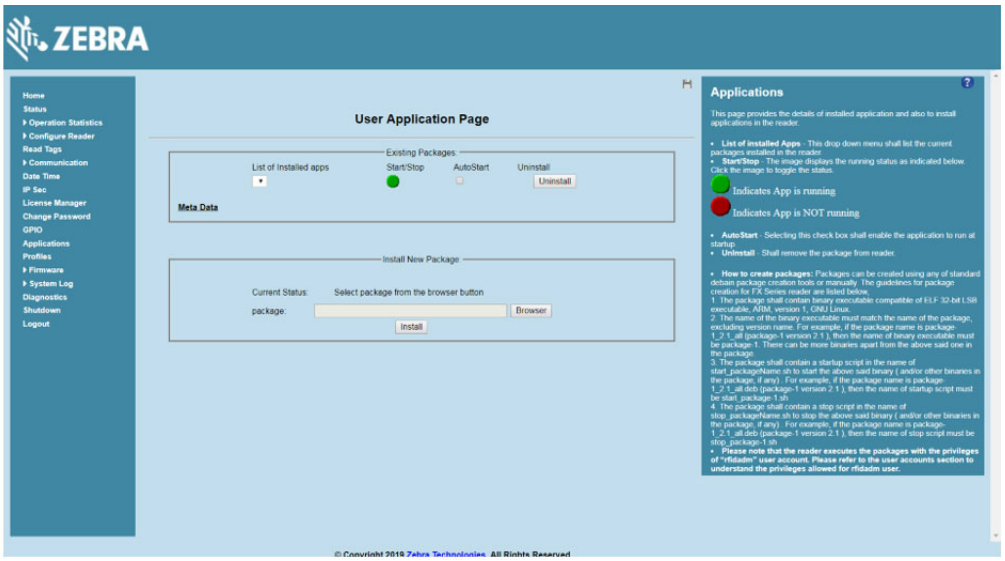



- **Settings** - Map the reader GPI and/or GPO with the radio GPIO. Select either **Radio** or **Host** for **GPI***x* or **GPO***x* where *x* = 0 or 1. An attempt to violate this condition changes the selection to either **Host GPI***x* or **Host GPO***x* automatically. The settings are disabled if a configuration is not supported.
- **Status** - To set a GPO pin high or low, select 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 FX 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** - Select 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 70** User Application Page




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. Select 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.
- **Install** - Installs a new package in the reader.

To create packages for the FX Series readers, use any of the standard Debian package creation tools, or create them manually. The FX Series 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 user accounts section for information on **rfidadm** user privileges.

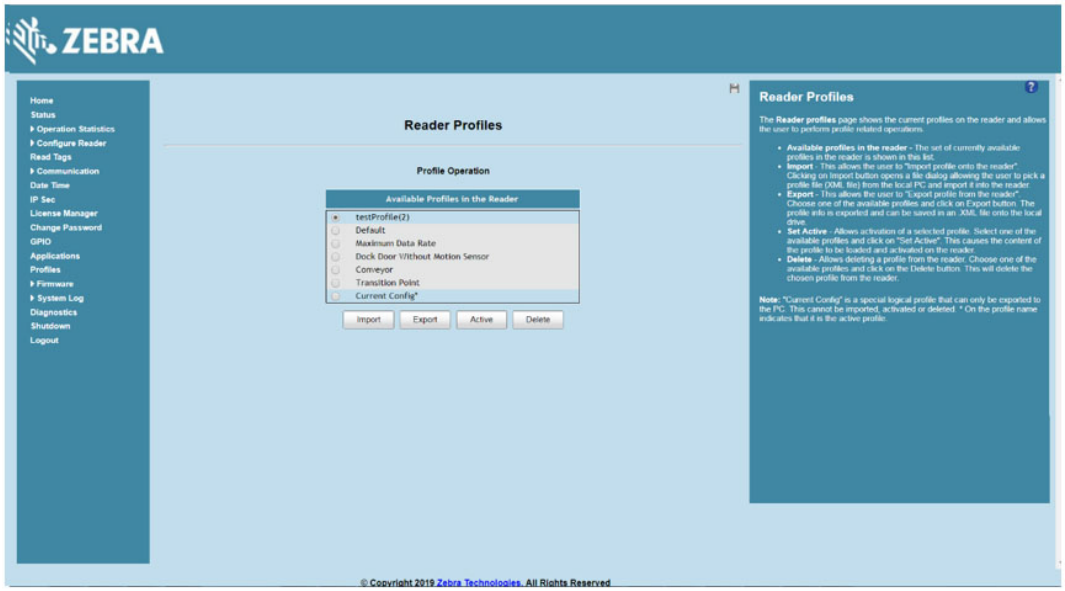
# Reader Profiles

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.

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 71** Reader Profiles Window

**NOTE** The user cannot make profile active if inventory is in progress.




The **Reader Profiles** window functions are:

- **Available Profiles in the Reader** - Displays the available reader profiles.
- **Import** - Select 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 select **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 select **Set Active** to load the profile content in the reader.

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

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

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

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

## FIPS Support

The FX7500 and FX9600 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, select **Firmware**.

**Figure 72** Firmware Version

**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 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, select **Update**.

**NOTE:** You must be logged in with Administrator privileges in order to access this window.
See Change Password on page 98.

The reader supports three different methods of updating the firmware:

- Update using a USB drive.
- 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 Functionality Changes

Firmware v3.0.35 or later includes a new auto commit functionality that no longer requires the user to manually commit changes. The **Commit/Discard** menu was removed.

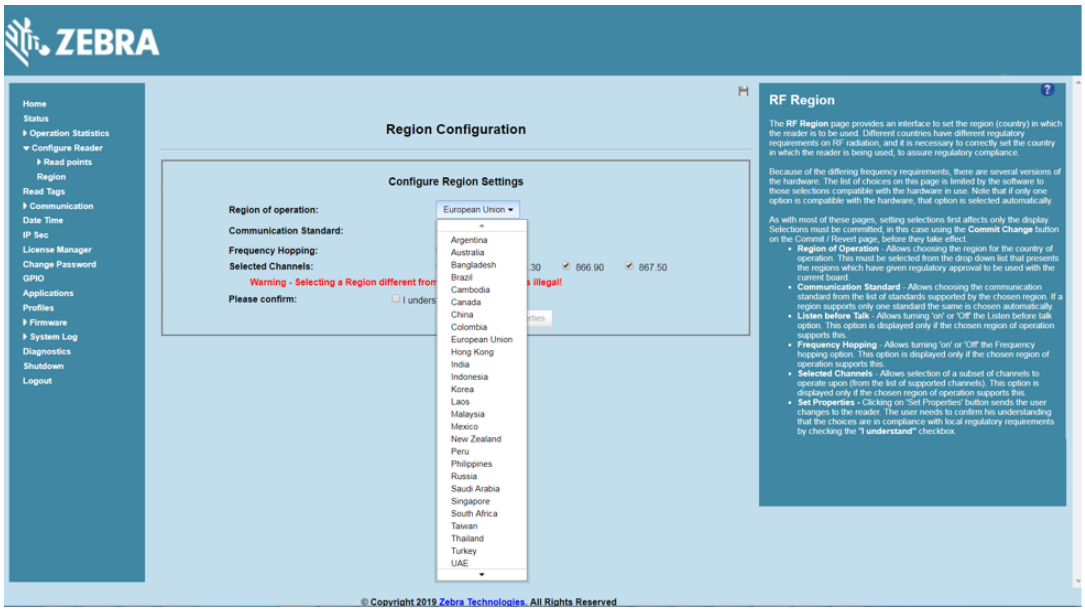
When the user changes any property and selects **Set Properties** on the web page, the commit function is automatically executed in the reader.

## Region Configuration Commit

The following steps are an example of how the commit/discard functionality works.

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

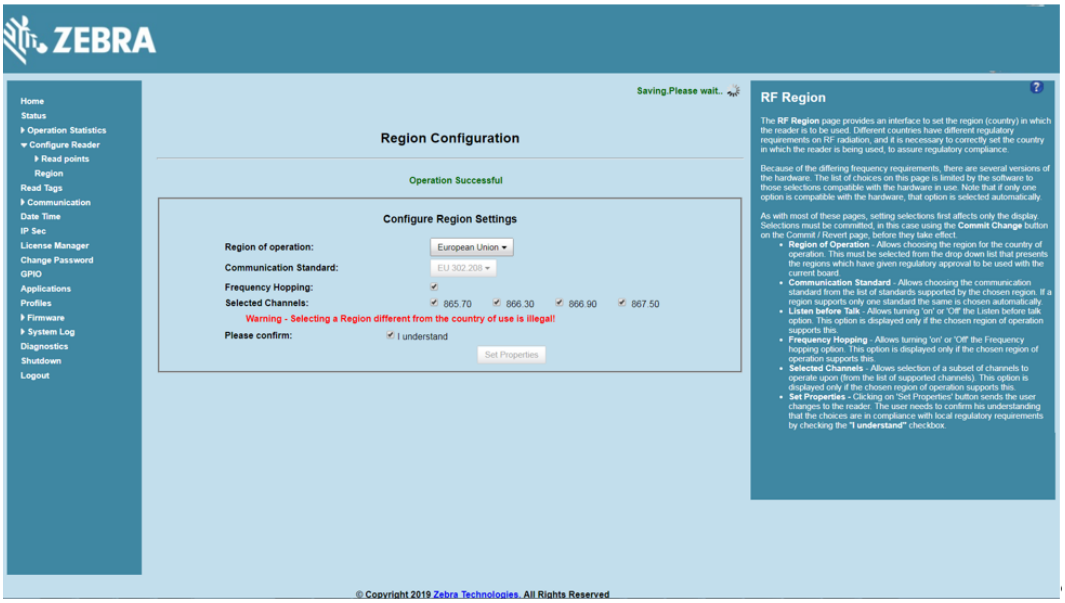
**Figure 73** Configure Region Settings




2. Select the Communication Standard, if applicable.
3. Select Frequency Hopping, if applicable.

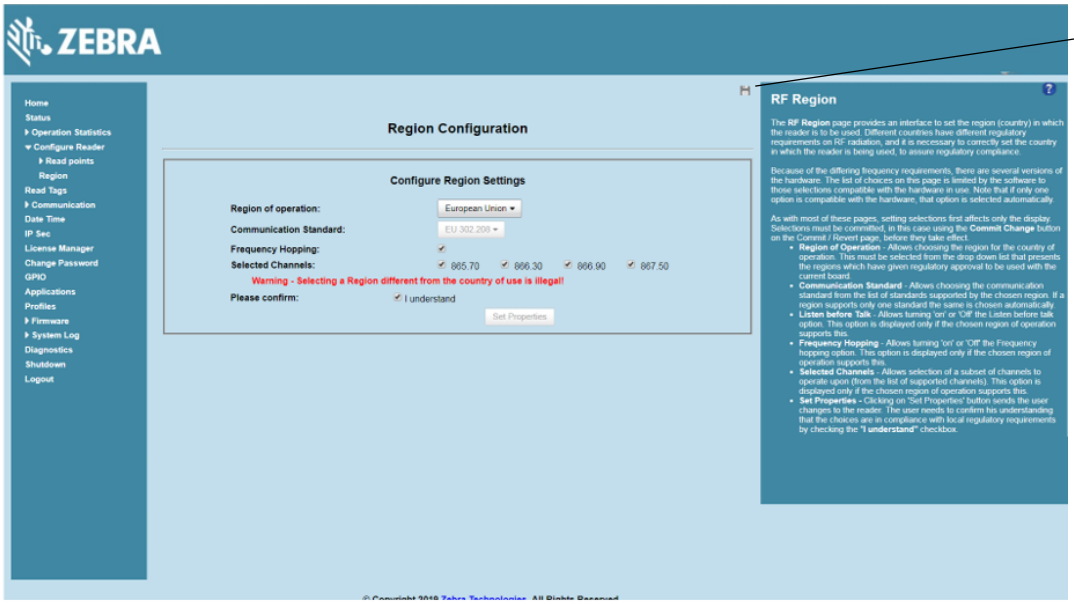
4. Select the appropriate channel(s), if applicable.
5. Select the **I understand** check box.
6. Select **Set Properties** to complete the region selection. The **Operation Successful** window displays a **Saving. Please wait...** message with a progress symbol until the commit completes.

**Figure 74** Configure Region Settings, Operation Successful Window




7. When the commit completes, a gray floppy disk icon displays indicating that the commit completed successfully.

**Figure 75** Commit Complete



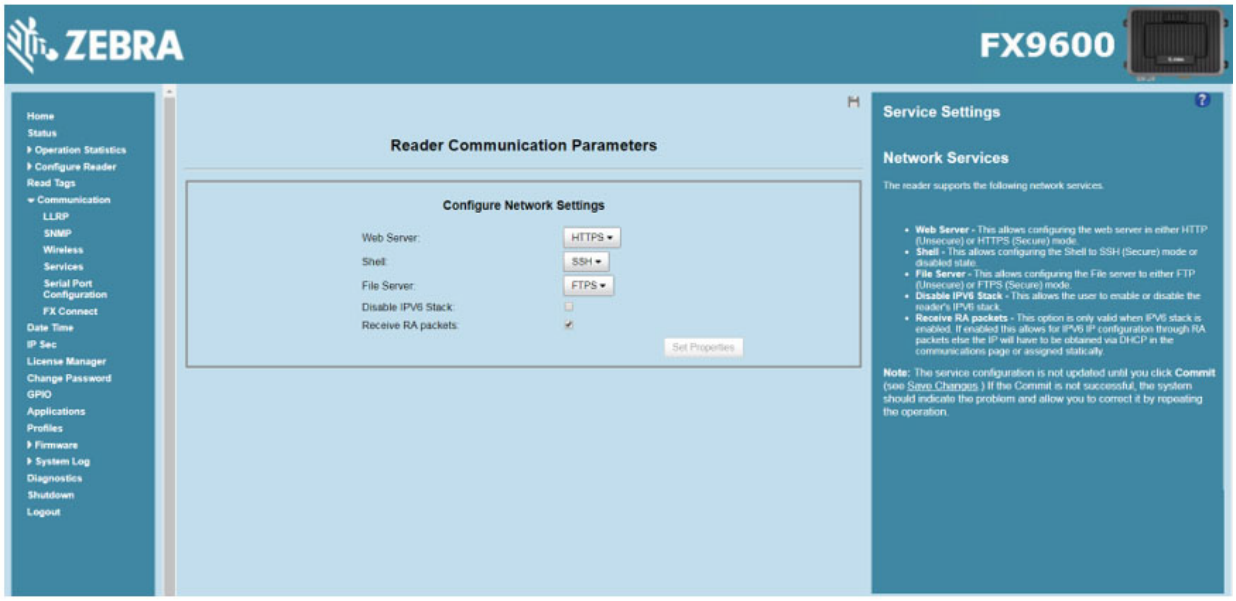

8. If after the successful completion of the commit any other action needs to be taken (for example, a reader reboot), the web page displays the appropriate message above the main setting tab.

## New Property Change Work Flow

The following steps are an example of how the commit/discard functionality works when changing a property.

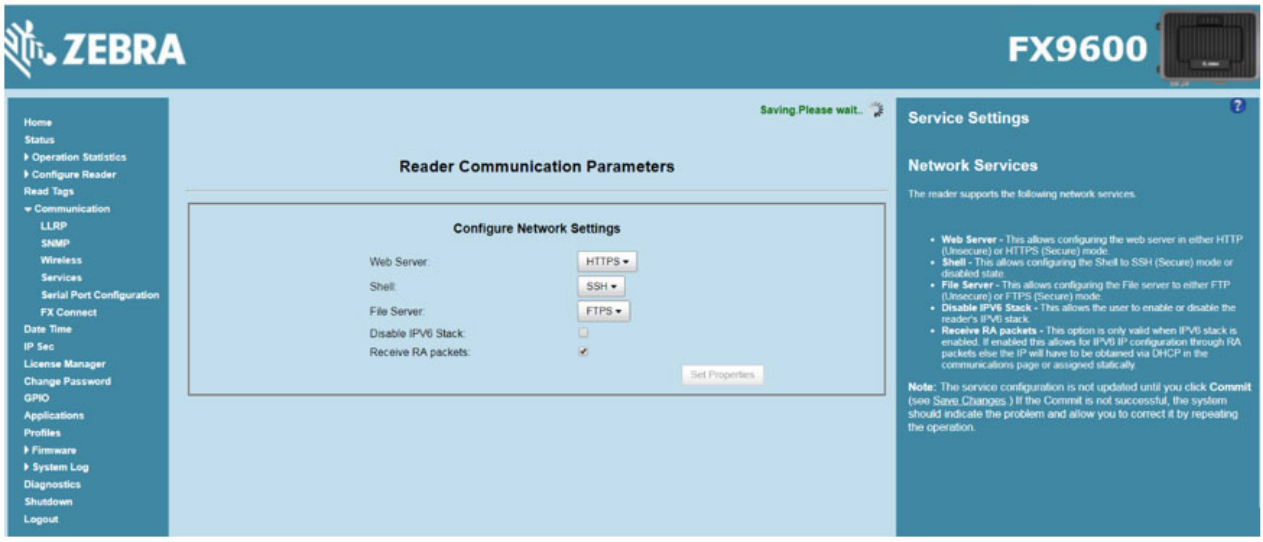
1. Select **Communication > Services**. On the **Configure Network Settings** screen, select a new Web Server or any other property from the appropriate drop-down menu.

**Figure 76** Configure Network Settings



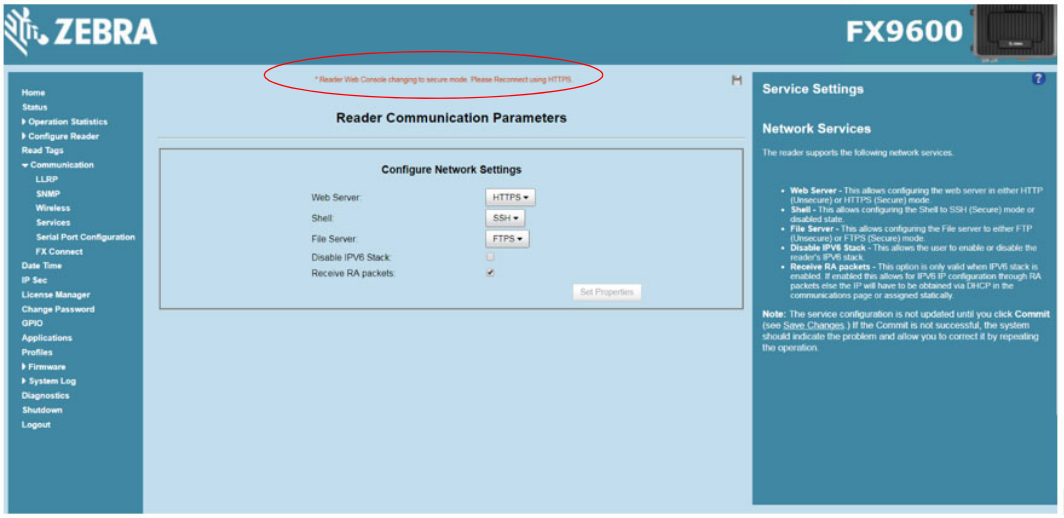

2. Select **Set Properties** to complete the new selection.
3. The message **Saving.Please wait...** displays with a progress symbol until the commit completes.

**Figure 77** Configure Network Settings, Saving.Please wait... message Window




4. When the commit completes, a gray floppy disk icon displays indicating that the commit completed successfully.
5. If after the successful completion of the commit any other action needs to be taken (for example, a reader reboot), the web page displays the appropriate message above the main setting tab.

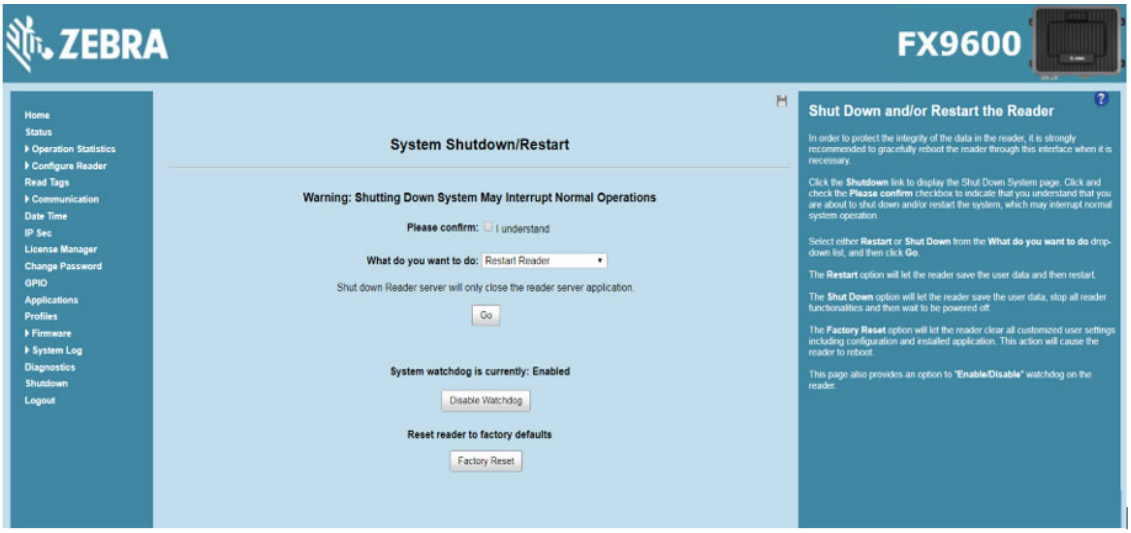
**Figure 78** Action Message




**IMPORTANT** With the new version of software, the Discard Functionality option is no longer supported. Changes automatically commit to the reader.

In addition, the reset reader to factory defaults option was moved to the System Shutdown/Restart screen shown in Figure 79.

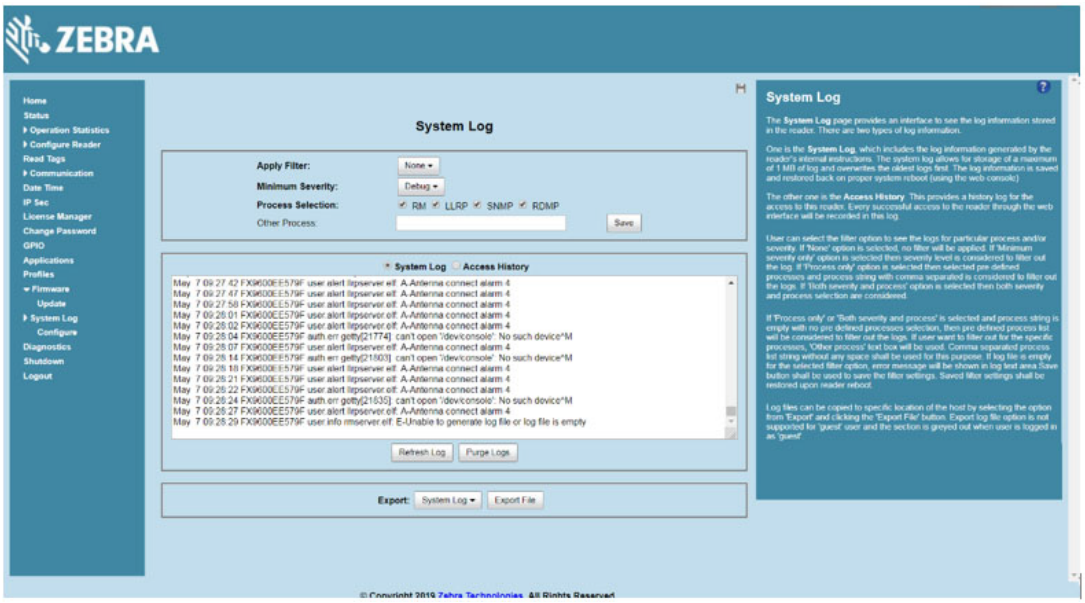
**Figure 79** Reset Reader To Factory Defaults



# System Log

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

**Figure 80** System Log Window




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** - When this option is used, the log severity level filters the log content. Logs having severity levels equal or above the selected severity display.
  - **Process Selection** - When this option is used, only the logs for the selected process(es) display. More than one process can be listed, separated by a comma in the **Other Process** field.
  - **Minimum Severity & Process Selection** - When this option is used, both severity level and process are used to filter the logs. Only the logs that match the severity level filter and the process filter display.

  When you select **Process Selection** only or **Minimum Severity** and **Process Selection** and no process is specified, by default, logs from RM, LLRP, SNMP, and RDMP are considered and display (severity level must match, if enabled).

- **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. Select **Save** to save the filter settings, which persist upon reader reboot.

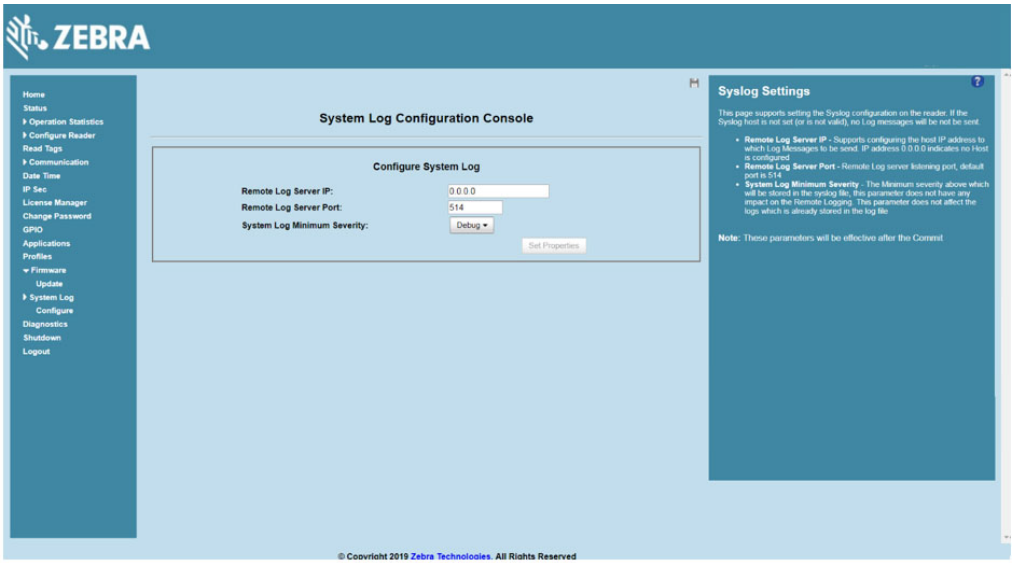
- **Log area** - Select a radio button for one of the two types of log information offered:
  - **System Log** - Includes the log information generated by the reader internal instructions. This stores up to 1 MB of log information, and overwrites the oldest logs first. The log information is saved and 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 **Refresh Log** to refresh the information in the log, or **Purge Logs** to clear the information.
- To export the system log select **System Log** from the **Export:** pull down menu, then select **Export File**. This saves the syslog file (and a zip file if there is more than one log file) in the **Downloads** folder on the PC.

  To export the customer support data file select **Customer Support Data File** from the **Export:** pull down menu, then select **Export File**. This saves the data file in the **Downloads** folder on the PC.

## 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 81** Configure System Log Window




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.

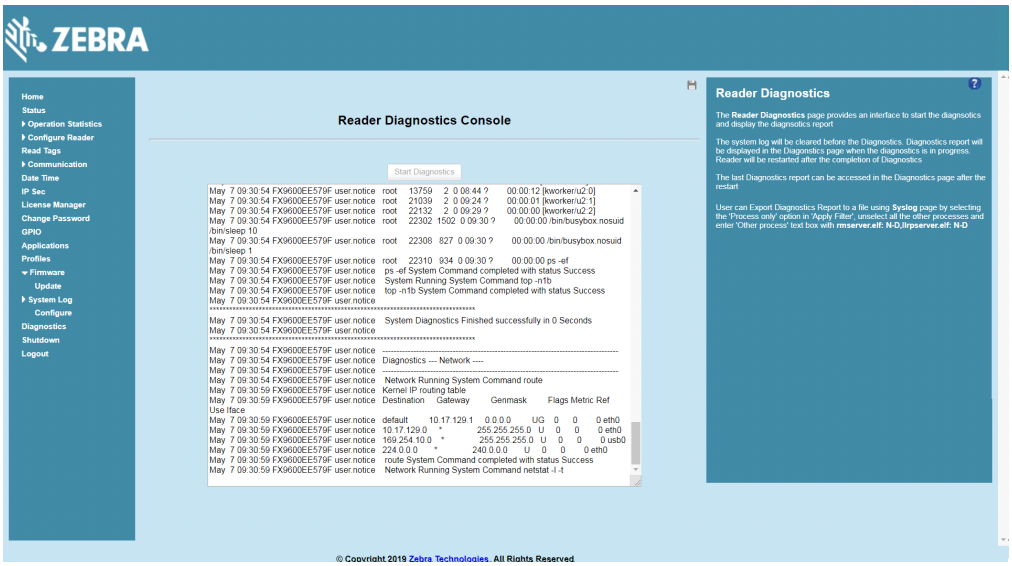
Select **Set Properties** to apply the changes. The **Operation Successful** window displays a **Saving. Please wait...** message with a progress symbol until the commit completes.

When the commit completes, a gray floppy disk icon displays indicating that the commit completed successfully. See Commit/Discard Functionality Changes on page 103 for more information.

# Reader Diagnostics

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

**Figure 82** Reader Diagnostics Window



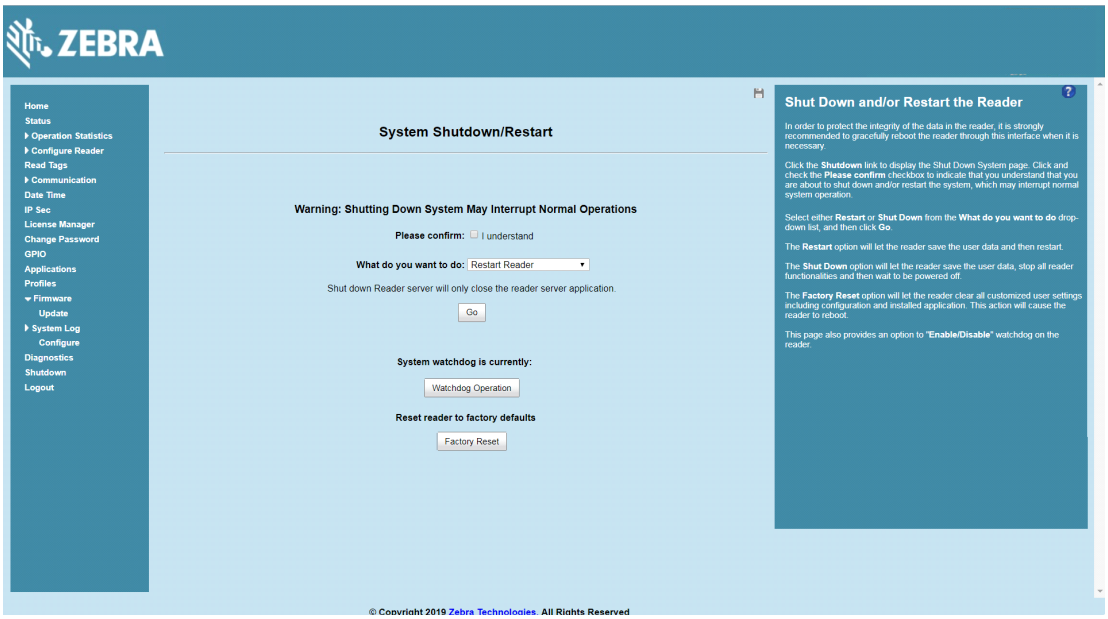

Selecting **Start Diagnostics** clears the system log and displays the diagnostics report. The reader reboots when the diagnostics completes. Return to the **Diagnostics** window to view the diagnostics report.

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

To protect the integrity of the reader data, gracefully reboot the reader via the Administrator Console when necessary.

**Figure 83** System Shutdown/Restart Window




To shut down or restart the reader:

1. Select 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. Select **Go**.

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

The reset reader to factory defaults option is available in this window.

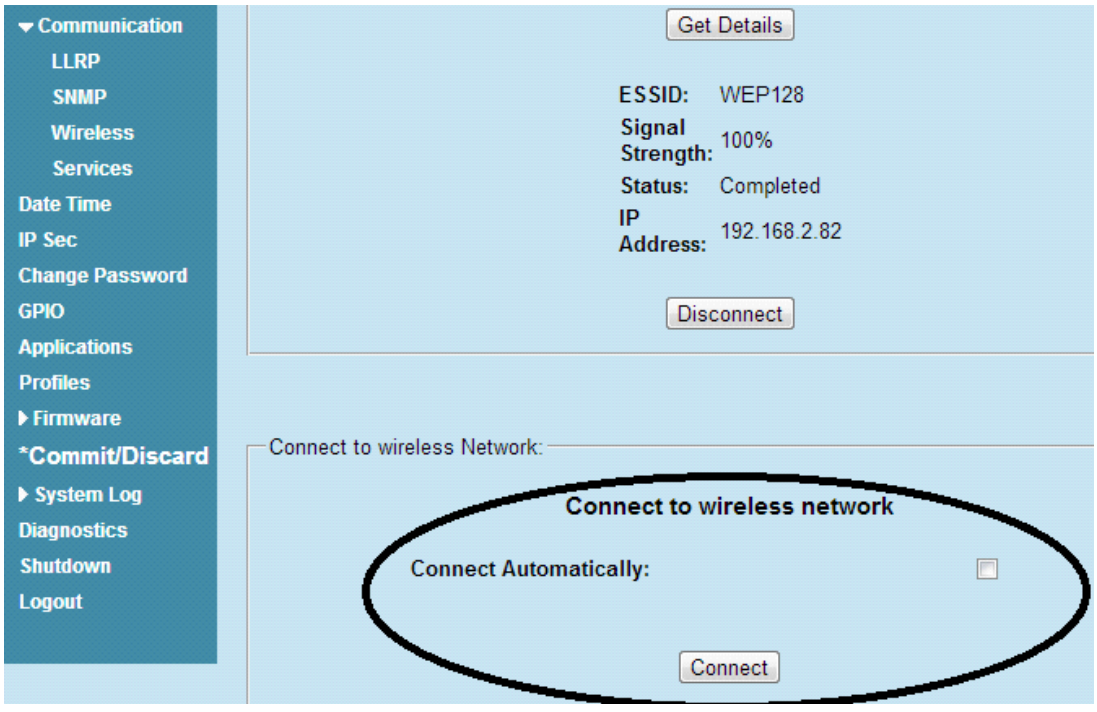
# Configure and Connect via Wi-Fi and Bluetooth

## Wireless Network Advanced Configuration

The FX Series uses the **wpa_supplicant** application to connect with wireless networks. Advanced users can place their own configuration file in the **/apps** folder to connect to wireless networks. This configuration file is **wpa_supplicant.conf**. The parameters of this file are well documented in the public domain. Refer to http://linux.die.net/man/5/wpa_supplicant.conf for the most commonly used parameters and http://www.daemon-systems.org/man/wpa_supplicant.conf.5.html for all available parameters.
Also see *Appendix , Copying Files To and From the Reader* for instructions on copying files to **/apps** directory.

If **/apps/wpa_supplicant.conf** is present in the reader, the reader uses this file to connect to a wireless network. This supersedes the configuration in the **Administrator Console**, which changes to reflect the custom configuration file.

**Figure 84** Administrator Console Update




There are no text boxes in the user interface for ESSID and password. The console obtains these directly from the custom configuration file.

## Sample Configuration Files

Wireless network with WPA2 encryption type (AP name is "DEV"):

```
ctrl_interface=/var/run/wpa_supplicant
ctrl_interface_group=0
ap_scan=1

network={
    ssid="DEV"
    proto=RSN WPA
    key_mgmt=WPA-PSK
    pairwise=CCMP TKIP
    group=CCMP TKIP
    psk="my secret password"
}
```

Open wireless network (AP Name is DEV_Open):

```
ctrl_interface=/var/run/wpa_supplicant
ctrl_interface_group=0
ap_scan=1
network={
    ssid="DEV_Open"
    key_mgmt=NONE
}
```

Wireless network with WEP encryption type (AP Name is WEP128):

```
ctrl_interface=/var/run/wpa_supplicant
ctrl_interface_group=0
ap_scan=1

network={
    ssid="WEP128"
    key_mgmt=NONE
    wep_key0= "my secret password "
    wep_tx_keyidx=0
    priority=5
}
```

Configuration file with multiple network blocks:

```
# Simple case: WPA-PSK, PSK as an ASCII passphrase, allow all valid ciphers
network={
    ssid="RFID_TNV"
    psk="123456789"
    priority=1
}
network={
    ssid="RFID_TNV_WPA/WPA2"
    psk="123456789"
    priority=2
}
```

Refer to http://linux.die.net/man/5/wpa_supplicant.conf for further examples.

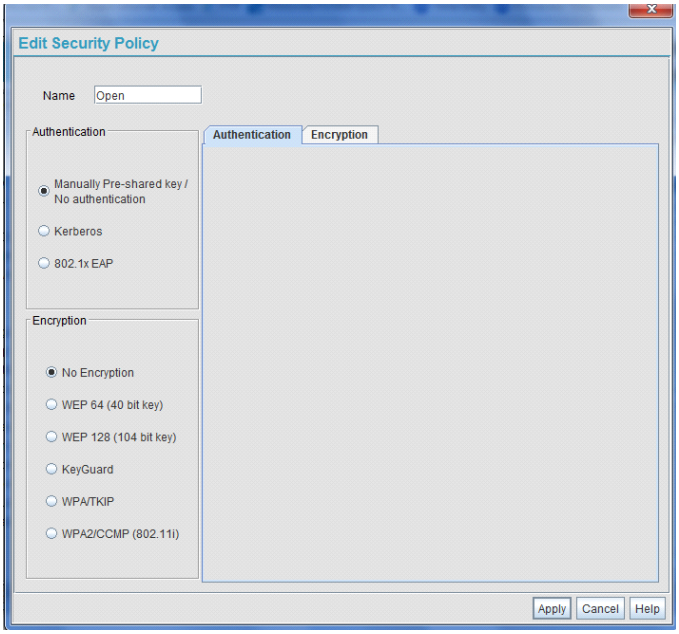
# Preferred Configurations for Access Points

The FX Series readers support WPA/WPA2 (http://en.wikipedia.org/wiki/Wi-Fi_Protected_Access) and WEP128 (http://en.wikipedia.org/wiki/Wired_Equivalent_Privacy) by default over the **Administrator Console**.

Other supported protocols are explained in this guide. Refer to the Access Point configuration manual to configure the Access Point to one of the following modes that match the reader configuration:

- WPA / TKIP
- WPA1 / CCMP
- WEP128
- Open Network

**Figure 85** Example Open Network Mode



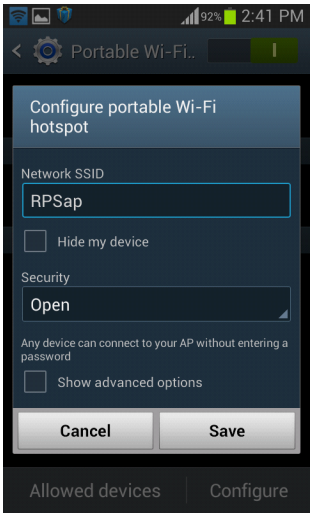
# Access Point Configuration for Android Device

## Open Network

To configure the access point to an open network for an Android device:

1. Enable the wireless tethering from the settings menu.
2. Select **Open** from the **Security** drop-down menu.
3. Select **Save**.

**Figure 86** Open Network Configuration for Android Device

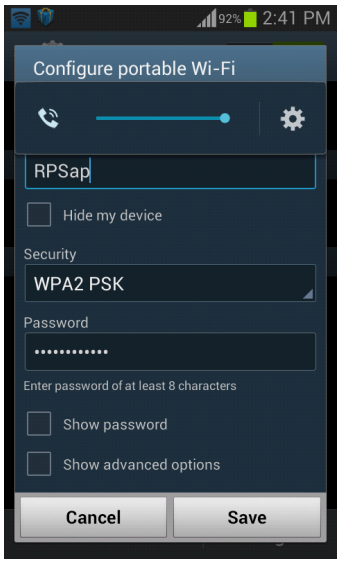



## WPA2 PSK

To configure the access point to WPA2 PSK for an Android device:

1. Select **WPA2 PSK** from the **Security** drop-down menu.
2. Enter a password.
3. Select **Save** to start the wireless hotspot.

**Figure 87** WPA2 PSK Configuration for Android Device



### WPA PSK

To configure the access point to WPA PSK for an Android device:

1. Select **WPA PSK** from the **Security** drop-down menu.
2. Enter a password.
3. Select **Save** to start the wireless hotspot.

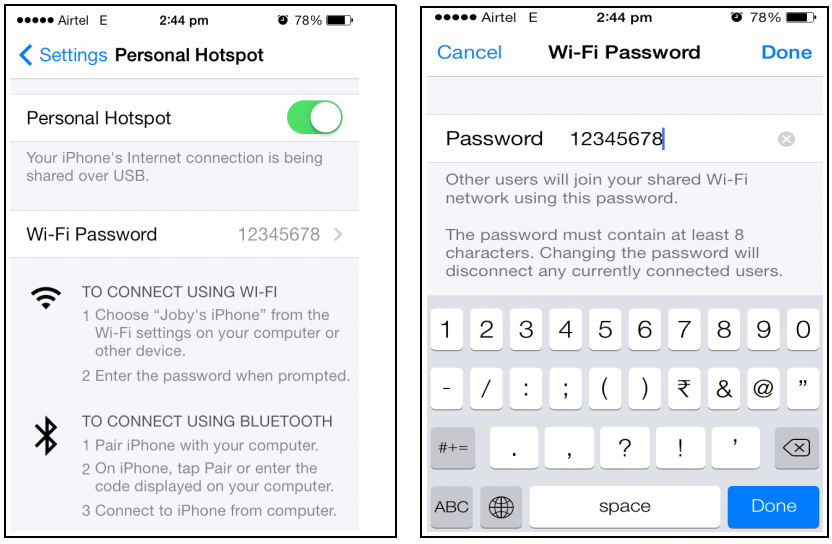
**Figure 88** WPA PSK Configuration for Android Device

## Internet Connection Configuration for iPhone

To configure the personal hotspot for an iPhone:

1. Select Setting.
2. **Select the Personal Hotspot button to turn on the Internet connection.**
3. Enter a password.

**Figure 89** iPhone Device



# Connecting to a Wireless Network Using a Wi-Fi Dongle

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

To connect to a wireless network using a USB Wi-Fi dongle on the FX7500 and FX9600:

1. Plug the supported wireless dongle into the USB host port on the FX7500 and FX9600. Zebra provides native support for USB Wi-Fi adapters with the Realtek chipset RTL 8187 and RTL 8812AU. See Table 7 on page 73 for a list of supported Wi-Fi dongles.

**Figure 90** FX7500 USB Host Port Location for Dongle

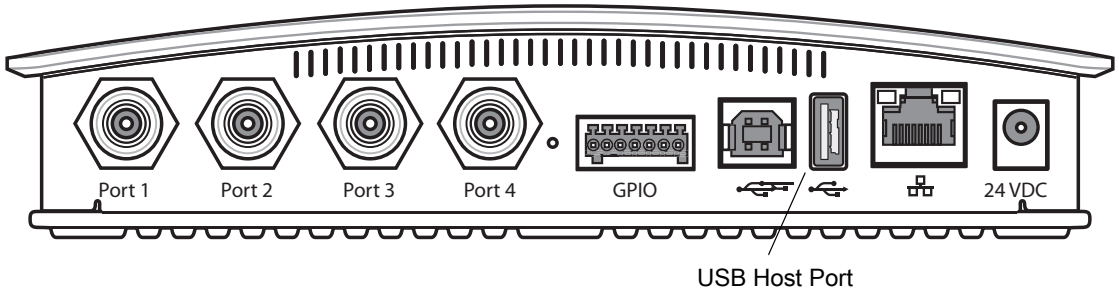
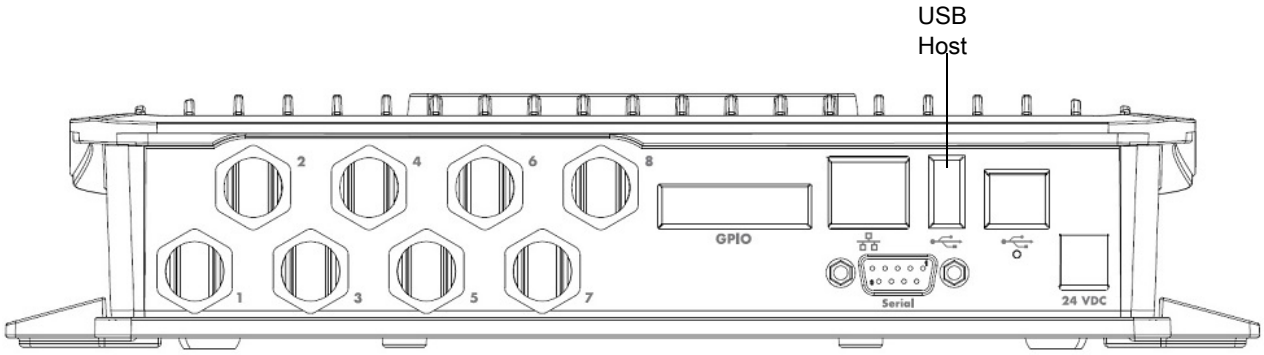
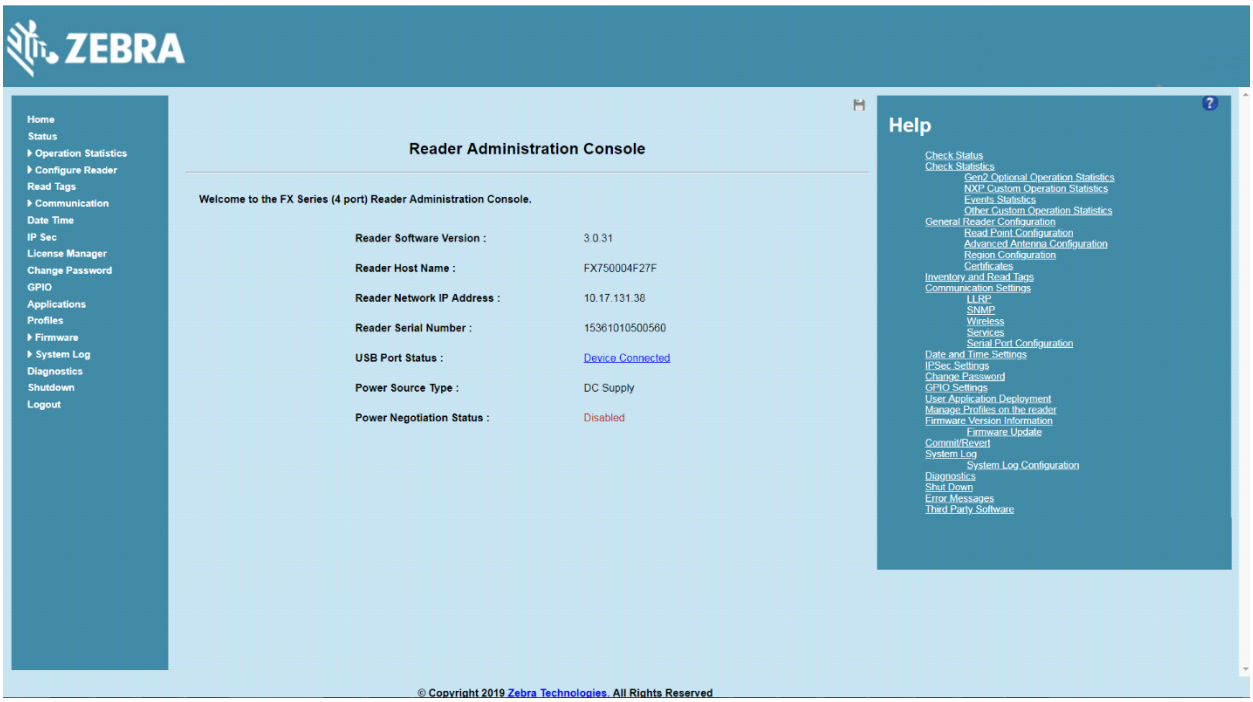



**Figure 91** FX9600 USB Host Port Location for Dongle



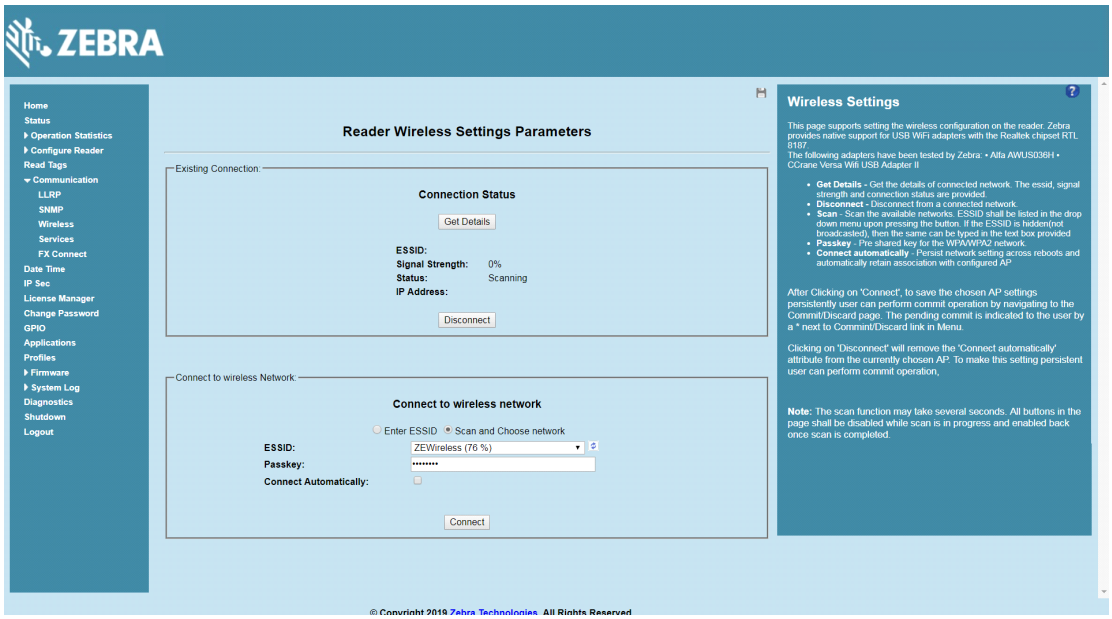

2. To confirm that the Wi-Fi dongle is detected properly, log in to the reader Administrator Console. On the Home page ensure the **USB Port Status** displays **Device Connected**. Hover the mouse pointer over this link to display the Wi-Fi dongle information shown in Figure 92.

**Figure 92** Wi-Fi Dongle Connected




3. Select **Communication > Wireless**.

**Figure 93** Wireless Settings

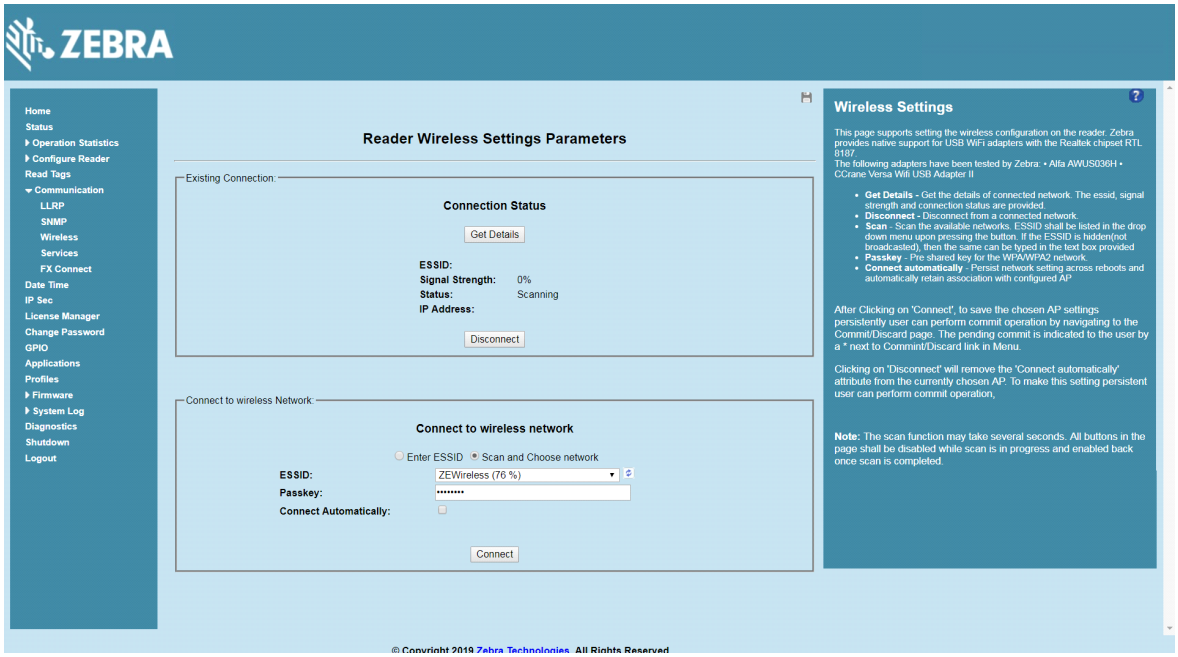



The Wi-Fi dongle can connect to the wireless network in one of two ways:

- Manually entering the ESSID.
- Scanning the current list of APs and choosing the correct one to connect to.

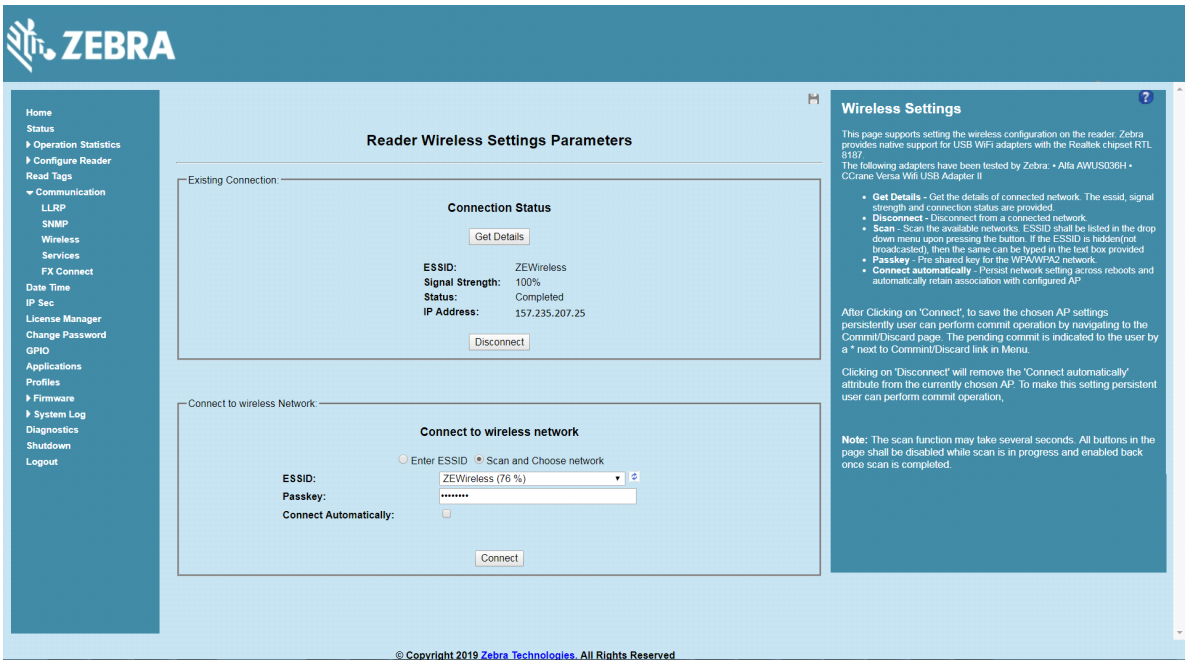
4. Once the APs are scanned, enter the appropriate passkey and enable **Connect Automatically** (if required to connect to the AP automatically if the connection is lost).

**Figure 94** Entering Connect Information




5. Select **Connect**. When the connection to the AP succeeds, an IP is assigned and appears in the **IP Address** field.

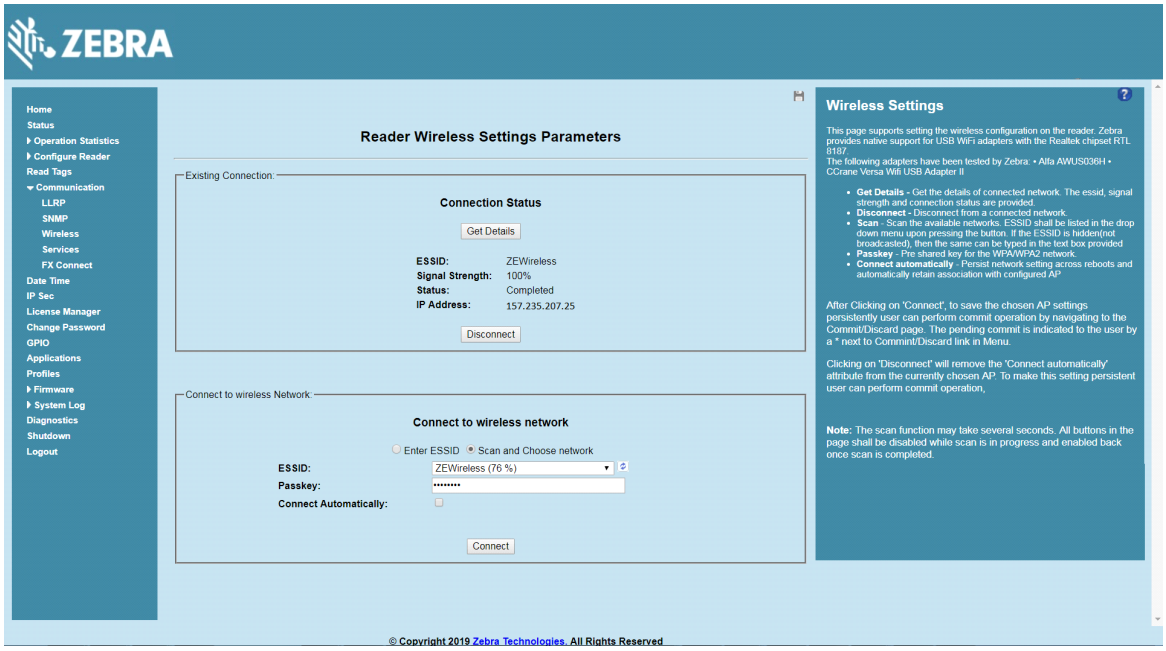
**Figure 95** Assigned IP Address




The reader is now accessible using the wireless IP shown in the **IP Address** field (157.235.207.24 in this case). The Wi-Fi interface supports dynamic addressing mechanisms for both IPV4 and IPv6. There is no provision to set a static IP address.

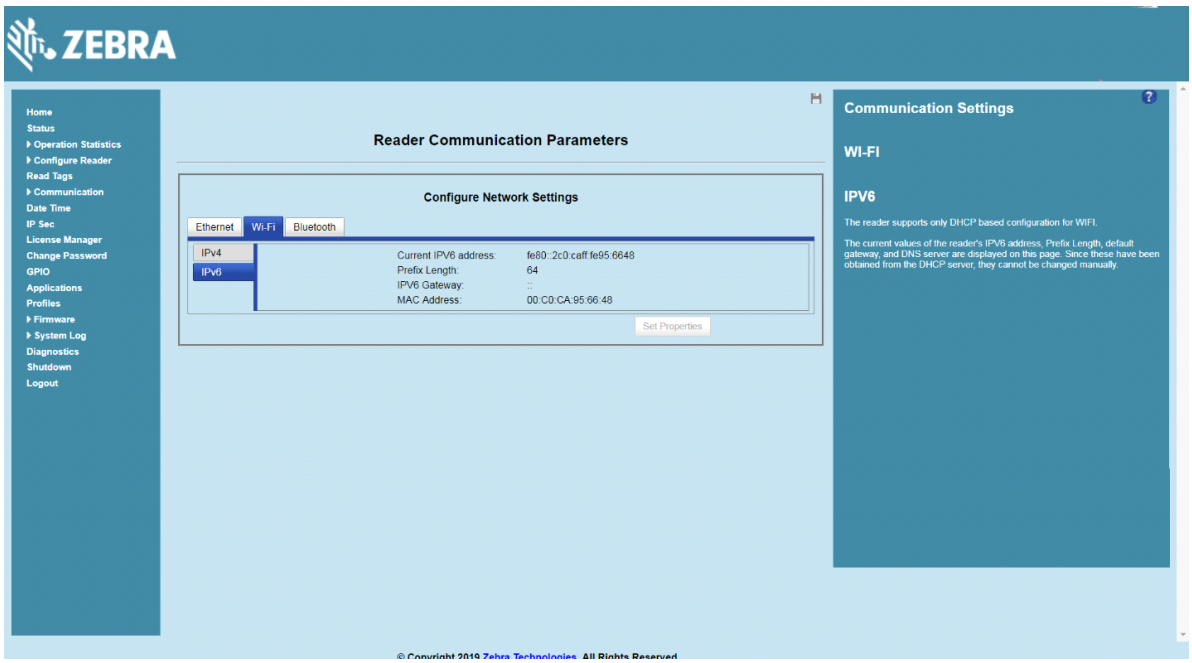
For wireless IP address details, select **Communication > Wi-Fi** tab.

**Figure 96** Wi-Fi Tab - IPV4




The reader can also be accessed via Wi-Fi using an IPV6 address if supported by the network to which the API is connected.

**Figure 97** Wi-Fi Tab - IPV6 Connecting to a Peer Device over Bluetooth Using a Bluetooth Dongle



# Connecting to a Peer Device over Bluetooth Using a Bluetooth Dongle

To connect to a peer device over Bluetooth using a USB Bluetooth dongle on the FX7500 and FX9600:

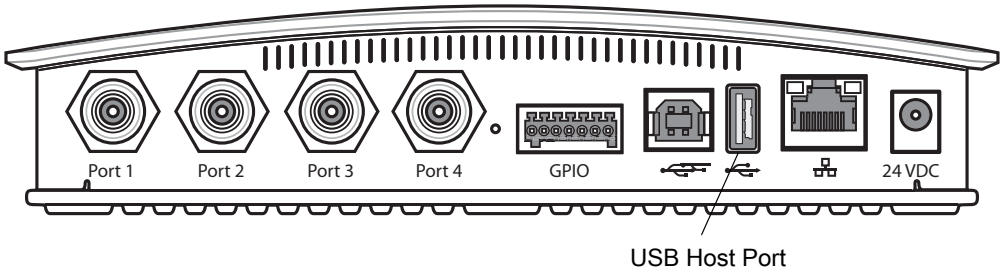
1. Plug the supported Bluetooth dongle into the USB host port on the FX Reader.

   The Zebra FX9600 provides native support for USB Bluetooth dongles based on chipsets CSR8510 and RT5370L. The following dongles were tested:

**Table 12** Supported Bluetooth Dongles

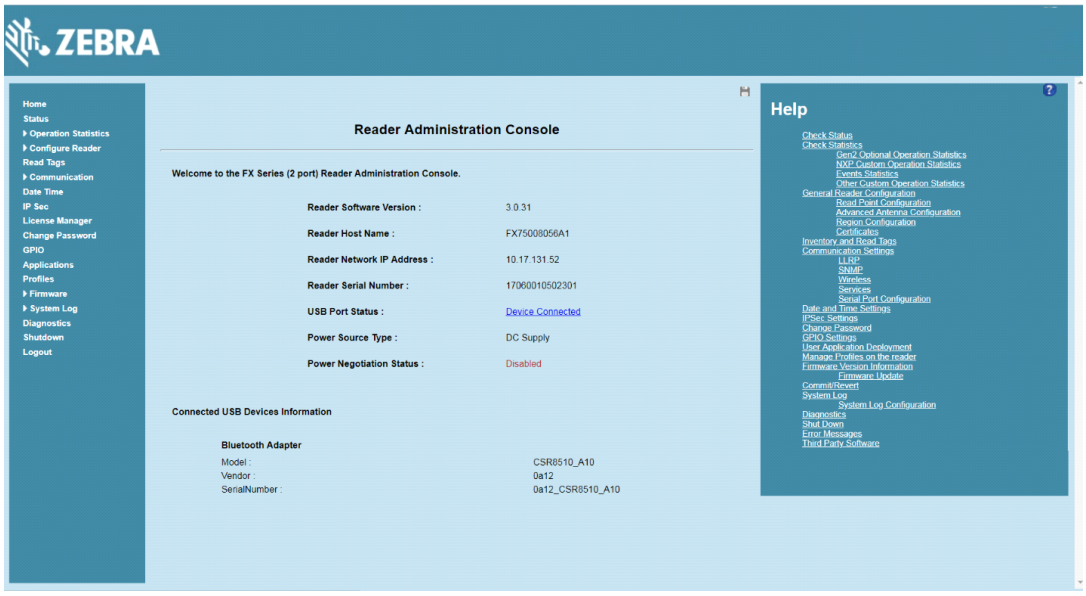
| Dongle Model | Zebra FX7500 | Zebra FX9600 |
|---|---|---|
| Bluetooth CSR 4.0 dongle Qualcomm / Atheros CSR8510 | Yes | Yes |
| Bluetooth 3.0+HS Ralink RT5370L | Yes | Yes |
| Asus Mini Bluetooth Dongle USB-BT211 | Yes | Yes |
| MediaLink Bluetooth Dongle MUA-BA3 | Yes | Yes |

**Figure 98** USB Host Port Location for Dongle



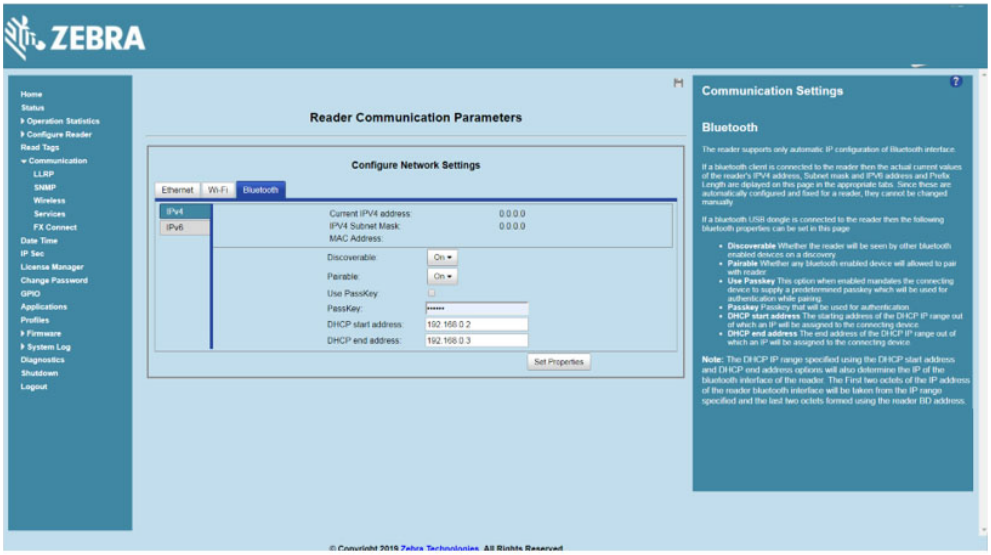

2. To confirm that the Bluetooth dongle is detected properly, log in to the reader Administrator Console. On the **Home** page ensure the **USB Port Status** displays **Device Connected**. Hover the mouse pointer over this link to display the Bluetooth dongle information.

**Figure 99** Bluetooth Dongle Connected Select **Communication > Bluetooth**.



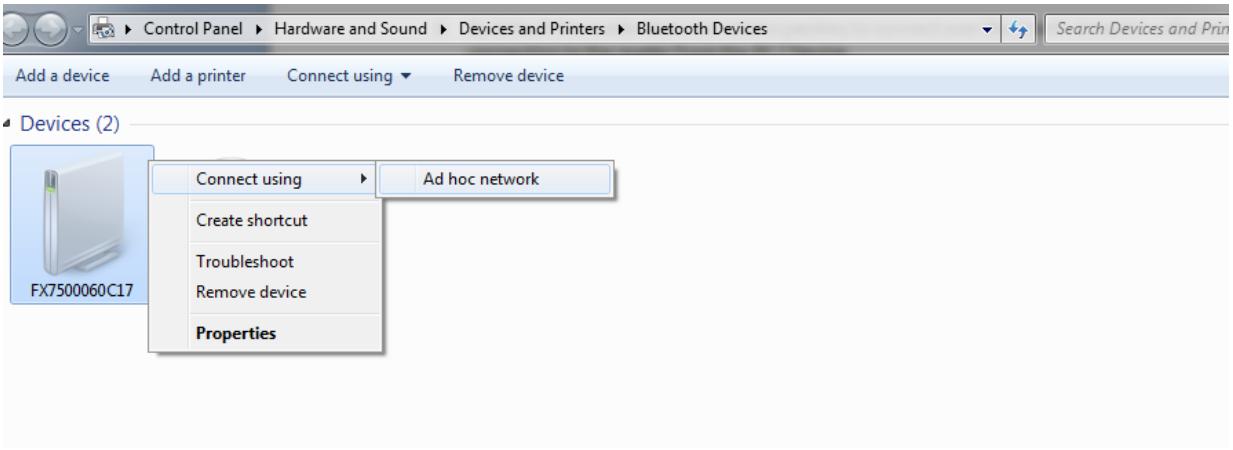
3. Change the **Discoverable** and **Pairable** properties to **On**.

**Figure 100** Changing Discoverable and Pairable Properties



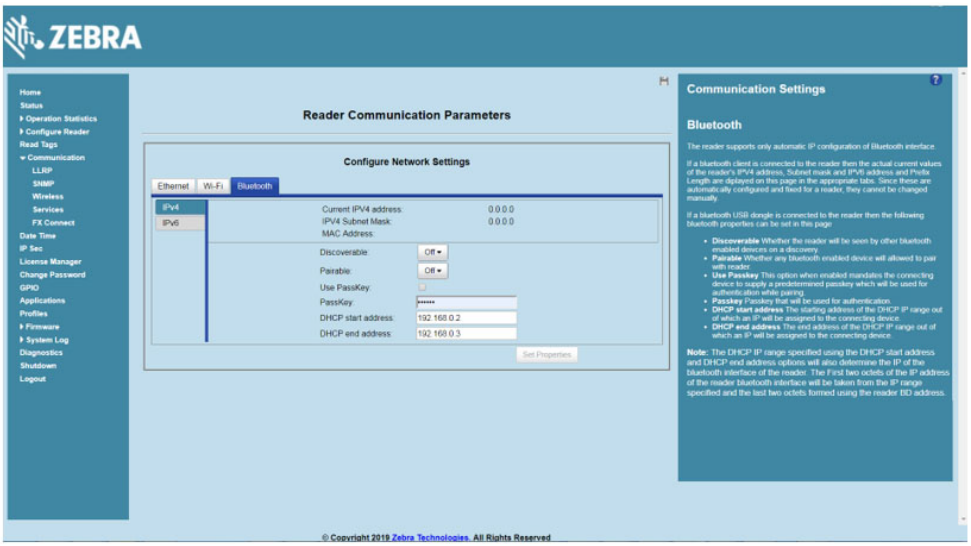

4. Optionally select **Use Passkey** and enter a passkey to validate the Bluetooth connection. The default passkey for the FX7500 and FX9600 is **0000**.
5. Discover the reader from a Bluetooth-enabled device (such as a laptop). Use the host name to identify the reader among the discovered devices (for example: **FX7500060C17**).
6. After a successful connection, right-click the reader icon (for example: **FX7500060C17**) in the list of Bluetooth devices and select **Connect using > Ad hoc network**. This establishes the network connection for later.

**Figure 101** Connecting to the Reader




7. The IP address assigned to the Bluetooth interface is 192.168.XX.XX. The last 2 octets are the last 2 octets of the Bluetooth MAC address (found in the **Properties** window on the PC once the Bluetooth connection is established). Also find this in the **Communication > Bluetooth** page. Both IPV4 and IPV6 based IP address are supported for adhoc Bluetooth connection between the reader and the client.

**Figure 102** Communication Bluetooth Tab




Open the web page or sample application to connect to the Bluetooth IP (192.168.67.21 in Figure 102) and read tags.

# Copying Files to the Reader

The FX7500 and FX9600 RFID readers support the SCP, FTP, and FTPS protocols for copying files. See Copying Files To and From the Reader for instructions on copying files to **/apps** directory.

# Application Development

## Introduction

The FX Series RFID readers 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 back-end 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 FX Series 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:

- FX Series 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.
- Zebra FX Series Embedded C/CPP SDK User Guide Linux provides instructions for using the FX Series Embedded native C/C++ SDK for Linux.
- Zebra FX Series Embedded Java SDK User Guide Linux explains how to use the FX Series Embedded Java SDK for Linux.
- Zebra FX Series Embedded Java SDK User Guide Windows describes instruction for using the FX Series Embedded Java SDK for Windows.
- See Related Documents and Software on page 11 for more documentation regarding RFID API and application development.

# 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 FX Series readers.

- Update using a USB drive.
- 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/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 FX Series readers provide 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 power LED on the reader lights 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.

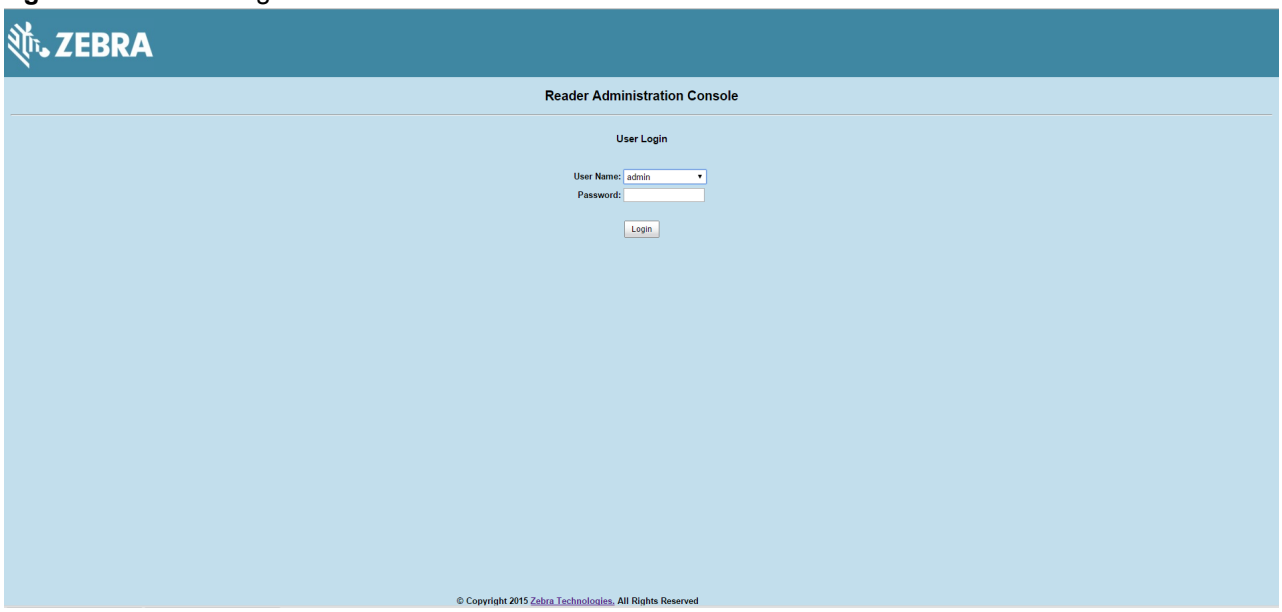
# Updating FX Series Reader Software

## Verifying Firmware Version

To verify that the FX7500 and FX9600 reader firmware is outdated:

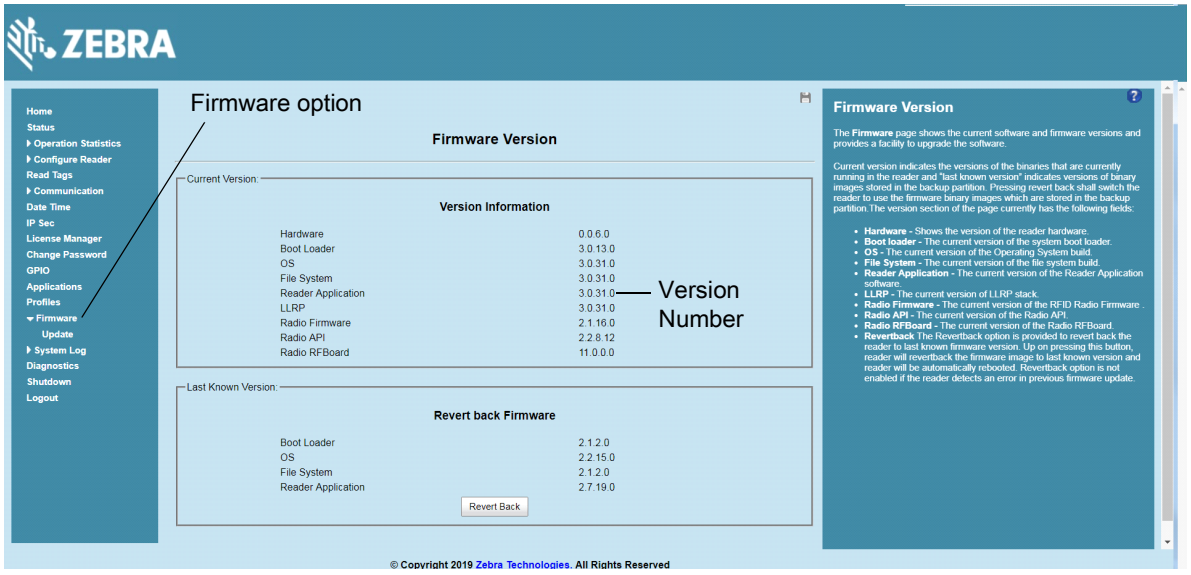
1. Log into the reader. In the **User Login** window, enter **admin** in the **User Name:** field and enter **change** in the **Password:** field.

**Figure 103** User Login Window




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 104** Firmware Version Window



# Updating Methods

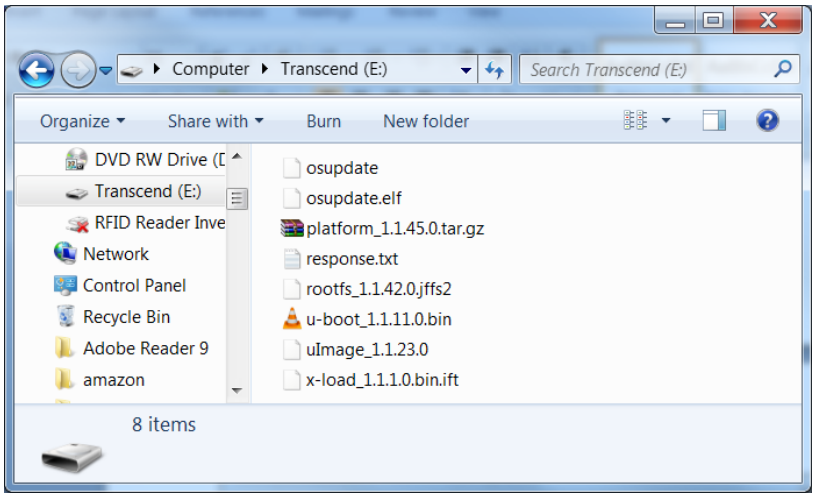
Download the reader update files from www.zebra.com/support:, then use one of three methods to update the reader software to a later version, e.g., 1.1.45.0 or higher:

- Update Using a USB Drive (Recommended)
- File-Based Update on page 128
- FTP-Based Update on page 131

## Update Using a USB Drive (Recommended)

1. Copy all reader update files into the root folder of the USB drive.

**Figure 105** USB Drive Root Folder




2. Insert the USB drive into the USB host port of the RFID reader.

**Figure 106** FX7500 USB Host Port Window

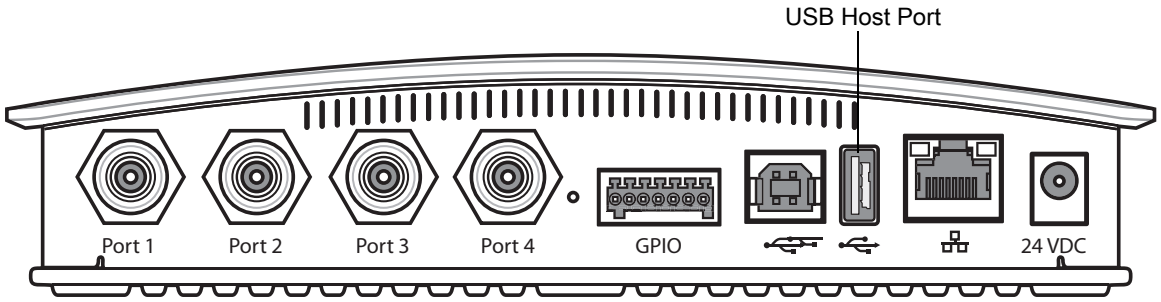
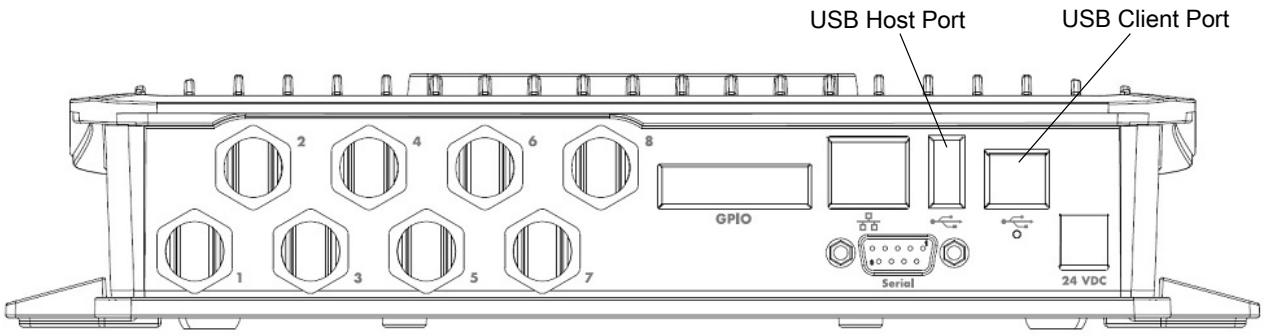



**Figure 107** FX9600 USB Host Port Window



The reader starts the update process in 5 - 7 seconds, and indicates progress as follows:

- The reader continuously blinks the Power LED red.
- The reader blinks all four LEDs orange once.
- The reader Power LED remains steady orange.
- The reader Power LED settles to a steady green to indicate that the update is complete.

**Figure 108** FX7500 Reader LEDs

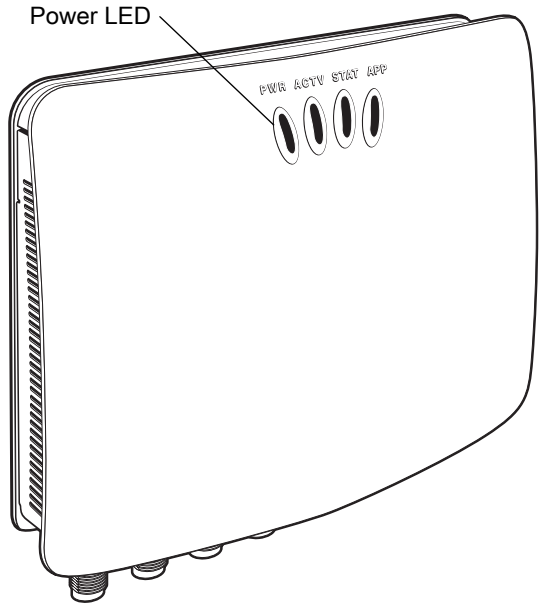
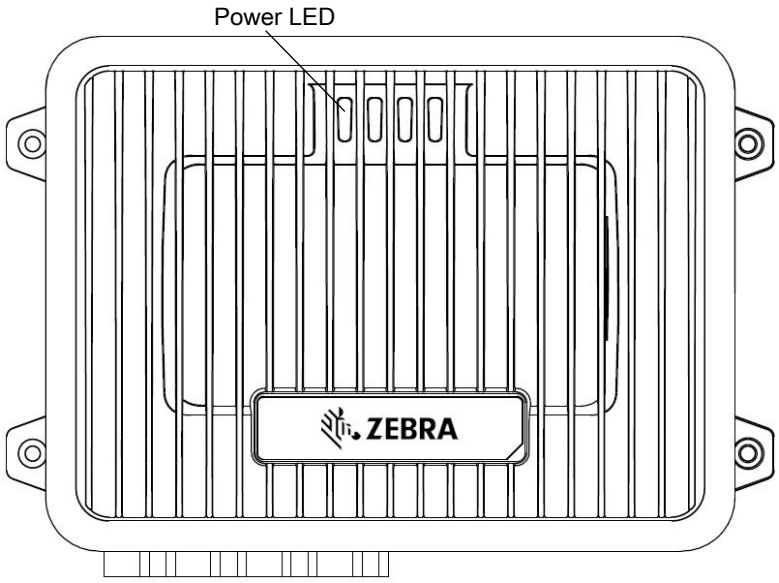


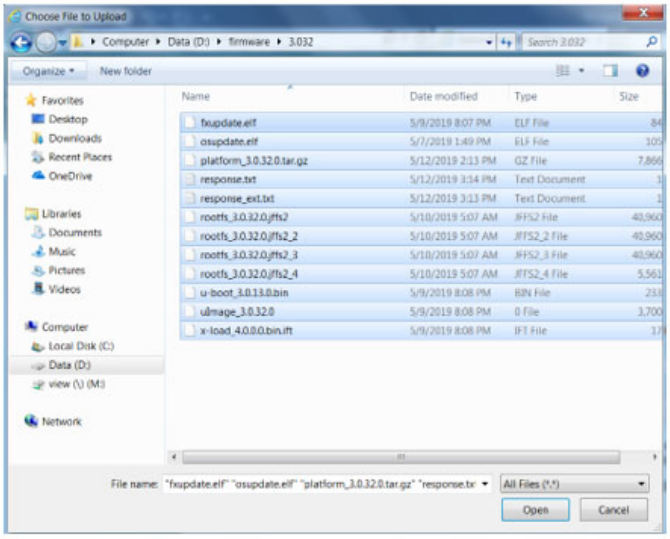

**Figure 109** FX9600 Reader LEDs




## File-Based Update

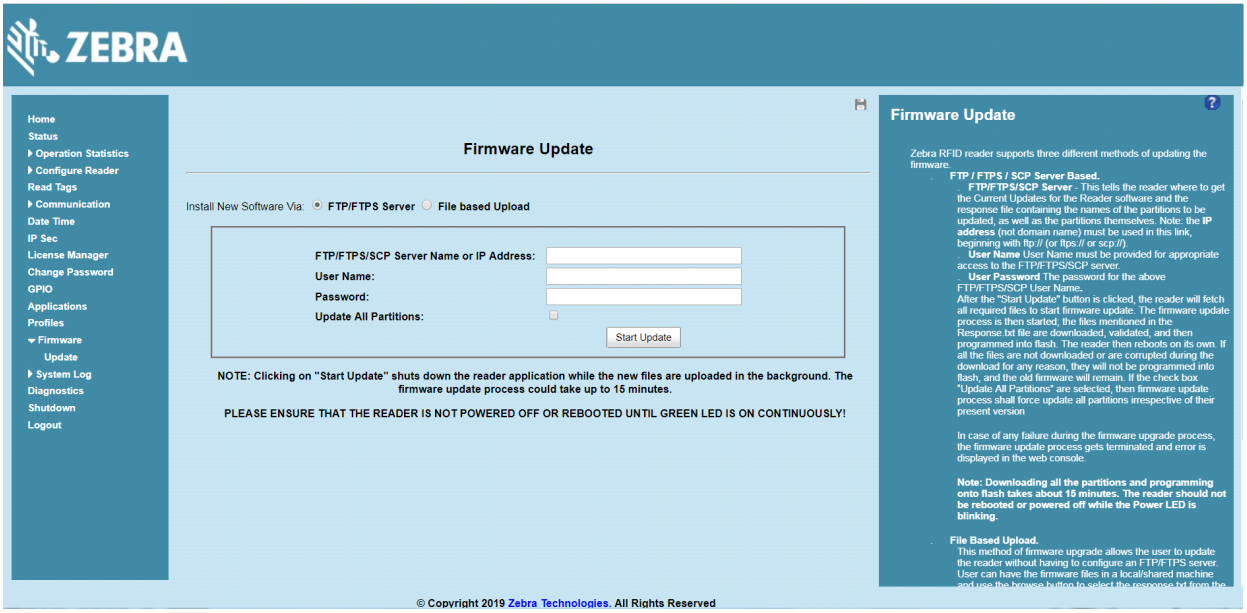
1. Copy all reader update files into any folder on a host computer.

**Figure 110** Host Computer Folder




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

**Figure 111** Firmware Update Window



3. Select **File based Upload**.

**Figure 112** Firmware Update Window

4. Select **Browse** and navigate to the folder or files that contains the firmware update files.

**Figure 113** Browsing Update Folders

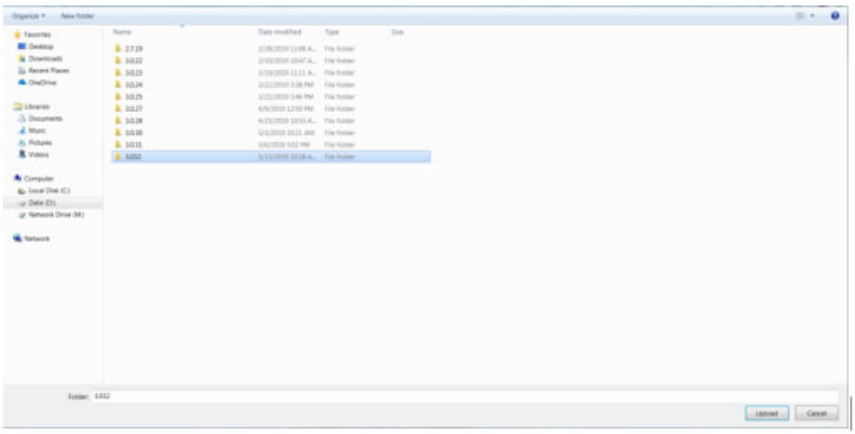
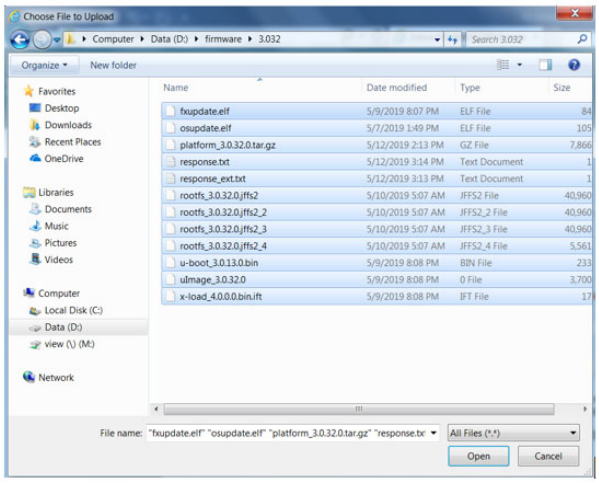


**Figure 114** Browsing Update Files




5. Select all the files.

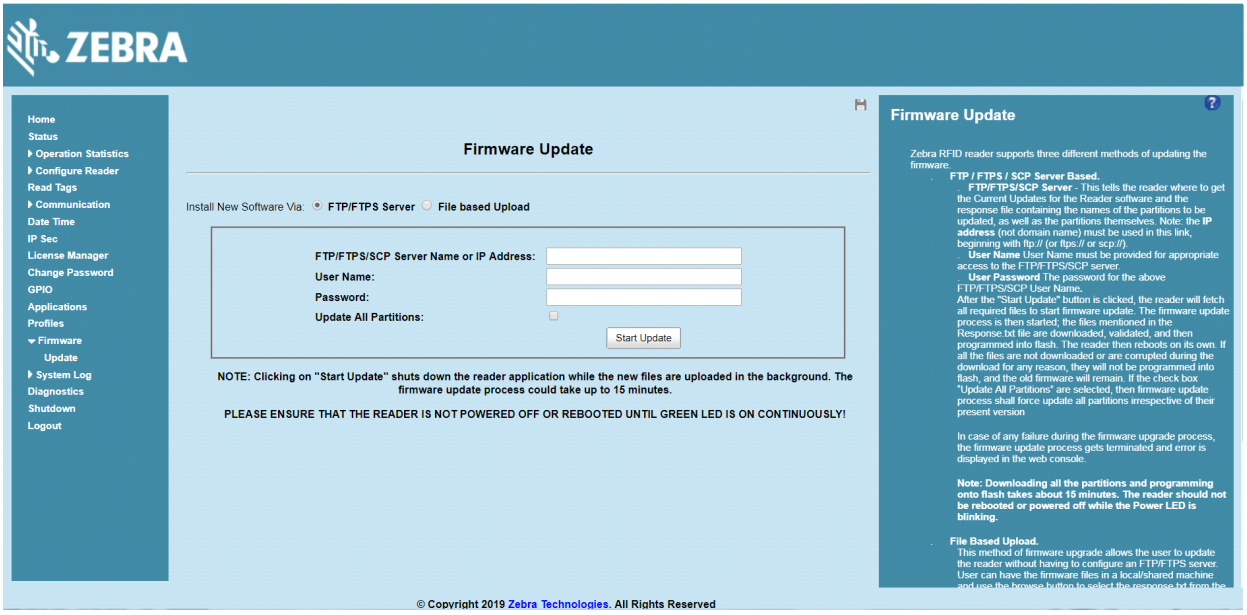
6. Select **Start Update**. The reader starts the update process and displays the update status as follows:
   - The reader continuously blinks the power LED red.
   - The reader blinks all four LEDs orange, one time.
   - The reader power LED remains steady orange.
   - The reader power LED remains solid green to indicate that the update is complete.
7. When the update completes, the reader reboots and returns to the login screen.

## FTP-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 115** Firmware Update Window




2. Select **FTP/FTPS Server**.

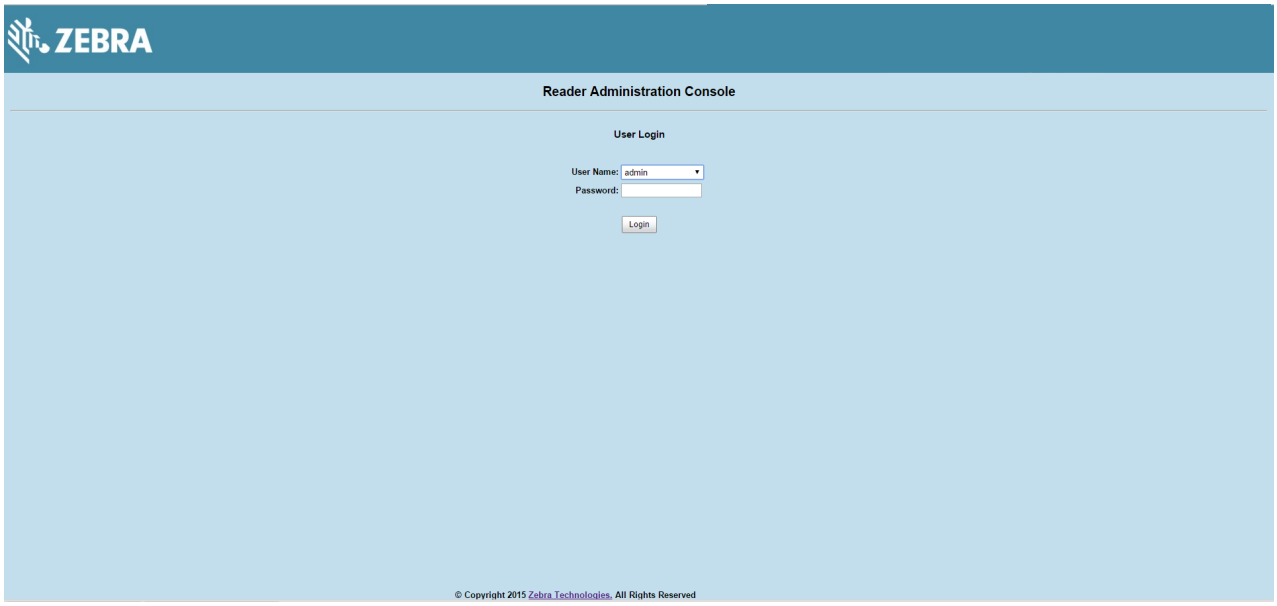
3. Enter the FTP location where the files are located.
4. Enter the **User Name** and **Password** for the FTP server login.
5. Select **Start Update**. The reader starts the update process and displays the update status as follows:
    - The reader continuously blinks the Power LED red.
    - The reader blinks all 4 LEDs orange once.
    - The reader Power LED remains steady orange.
    - The reader Power LED settles to a steady green to indicate that the update is complete.
6. When the update completes, the reader reboots and returns to the FX login screen.

## Verifying Firmware Version

To verify reader update success:

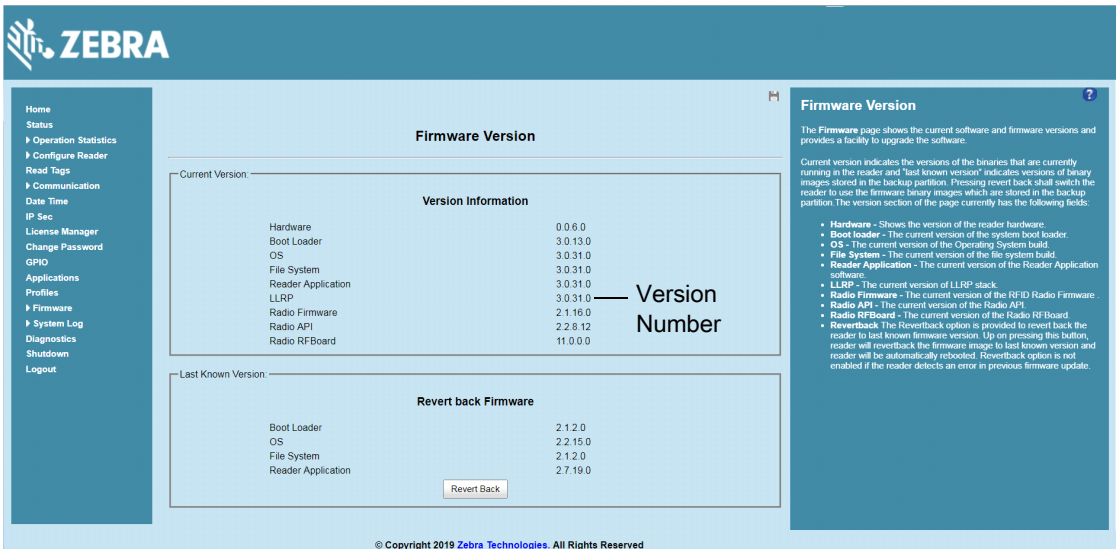
1. Log into the reader. In the **User Login** window, enter **admin** in the **User Name:** field and enter **change** in the **Password:** field.

**Figure 116** User Login Window




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 117** Firmware Version Window



# Troubleshooting

## Troubleshooting

Table 13 provides FX Series troubleshooting information.

**NOTE:** If problems still occur, contact the distributor or call the local contact. See *page 11* for contact information.

**Table 13** Troubleshooting

| Problem/Error | Possible Causes | Possible Solutions |
|---|---|---|
| Reader error LED lights after the reader is in operation. | The CPU cannot communicate. | Refer to the system log for error messages. |
| Reader error LED stays lit on power up. | An error occurred during the power up sequence. | Refer to the system log for error messages. |
| Cannot 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 29. |
| Reader is not reading tags. | The tag is out of its read range. | Move the tag into read range. See Read Tags on page 67. |
| | 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 29 to view the IP address, or use the host name to connect to the reader. |

**Table 13** 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 11*. |
| Invalid User Name and/or Password - Try again. | The user name and/or password were not found in the system, or do not match the current user registry. | Accurately retype login information. If this is not successful, see *Service Information on page 11*. |
| Session has Timed-out - Log in again. | The current session was inactive beyond the time-out period (15 minutes), so the system automatically logged out. | Log in again. As a security precaution to protect against unauthorized system access, always log out of the system when finished. |

**Table 13** 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:<br>- **Admin** (default password is **change**)<br>- **Guest** (no password required)<br>- **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.<br>See Reset to Factory Defaults LED Sequence on page 34. |
| Not a legal IP address (1.0.0.0 - 255.255.255.255).<br>Cannot reach the specified IP address.<br>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 11*. |
| 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 34. |
| 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. |
| 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. |

**Table 13** Troubleshooting (Continued)

| Problem/Error | Possible Causes | Possible Solutions |
|---|---|---|
| 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 setting and storing the changes made during the session. | Select **Set Properties** to update the network configuration. |
| 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.<br>See *Service Information on page 11*. |
| The requested page was not found.<br>Internal Web Server Error. | The system experienced an internal web server error. | Contact Zebra support.<br>See *Service Information on page 11* |
| Request method was NULL.<br>No query string was provided. | The system does not permit executing a proxy program from the command line rather than the web server. | No action required. The system is reporting that this action is not permitted. |
| Content length is unknown. | The system cannot accept an incorrectly formatted HTTP POST request (from an unsupported browser application). | Use a GET request instead, or update the software. |
| Couldn't read complete post message. | The system stopped a POST operation before completion. | Retry the operation, and allow it to complete. |
| Unhandled reply type. | The system generated an unexpected value. | Contact Zebra support.<br>See *Service Information on page 11*. |
| Failed to open port.<br>Failed to connect.<br>Failed to transmit.<br>Failed to receive.<br>Error during Receive of Command. | Error during receive of command. | Contact Zebra support.<br>See *Service Information on page 11*. |

**Table 13** Troubleshooting (Continued)

| Problem/Error | Possible Causes | Possible Solutions |
|---|---|---|
| Invalid Device Address. | The device address information (parent) is invalid, missing, or formatted inaccurately. | Contact Zebra support.<br>See *Service Information on page 11*. |
| Command parsing state error.<br>Missing argument for the command.<br>Command internal type cast error.<br>Missing operator.<br>Unknown operator. | A command was formatted inaccurately. | Contact Zebra support.<br>See *Service Information on page 11*. |
| The action must be confirmed. | The user must confirm the requested action before it is executed. | Select the confirmation option when issuing this request. |
| Invalid network adapter when navigating to the Bluetooth configuration page. | The Bluetooth dongle is not plugged in or not supported. | Plug in a supported Bluetooth dongle and refresh the browser. |
| Wireless scan error. | Wireless dongle is not plugged in or not supported. | Plug in a supported wireless dongle and repeat the wireless scan. |
| Unable to connect to the wireless network. | Access point is off or unreachable. | Turn on the access point and make sure it is accessible. |
| | Encryption type is not supported in the access point. | Use one of the following supported encryption types: WEP128, WPA/WPA2 and Open. |
| | The wireless page displays **Adapter not found**. | Connect the wireless adapter to the reader. |
| Wireless connection is complete, but no IP address. | No DHCP server is running in the network. | Add a DHCP server to the network. |
| 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. |

**Table 13** Troubleshooting (Continued)

| Problem/Error | Possible Causes | Possible Solutions |
|---|---|---|
| Cannot change password. | Cannot change password for guest. | Guest does not need a password to log in to the Administrator Console. |
| The following reader web console pages do not load correctly:<br>• Advanced Antenna Configuration<br>• ReadTags<br>• Services<br>• Serial Port Communication<br>• FXConnect<br>• License Manager<br>• User Application<br>• Profiles<br>• File based firmware upload<br>• Syslog Export | Port 8001 is not accessible. | Allow port 8001 to be accessible across the networks.<br>These web pages all use port 8001 to communicate to the reader and without this port the pages cannot function. |

# Technical Specifications

## Technical Specifications

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

**Table 14** Technical Specifications

| Item | Description |
|---|---|
| **Physical and Environmental Characteristics** | |
| Dimensions | |
| FX7500 | 7.7 in. L x 5.9 in. W x 1.7 in. D<br>(19.56 cm L x 14.99 cm W x 4.32 cm D) |
| FX9600 | 9.72 in. L x 7.25 in. W x 2.2 in. D<br>(24.67 cm x 18.42 cm W x 5.56 cm D mm) |
| Weight | |
| FX7500 | 1.9 lbs ± 0.1 lbs (0.86 kg +/- 0.05 kg) |
| FX9600 | 4.5 lbs (2.1 kg) |
| Base Material | |
| FX7500 | Die cast aluminum, sheet metal and plastic |
| FX9600 | Die cast aluminum |
| Visual Status Indicators | Multi-color LEDs: Power, Activity, Status, and Applications |
| Mounting | |
| FX7500 | Keyhole and standard VESA (75 mm x 75 mm) |
| FX9600 | Four mounting flanges and Four 100 mm x 100 mm VESA holes for 10-32 screw. |
| **FX 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 |

**Table 14** Technical Specifications (Continued)

| Item | Description |
|---|---|
| Shock and Vibration | |
| FX7500 | MIL-STD-810G |
| FX9600 | MIL-STD-810G |
| **Connectivity** | |
| Communications | 10/100 BaseT Ethernet (RJ45) w/ PoE support, PoE+, USB Client (Type B), USB Host (Type A) |
| General Purpose I/O | |
| FX7500 | 2 inputs, 3 outputs, optically isolated (terminal block)<br>External 12V ~ 48 VDC power available for GPIO |
| FX9600 | 4 inputs, 4 outputs, optically isolated (terminal block)<br>External 12V ~ 24 VDC power available for GPIO |
| Power | |
| FX7500 | PoE (802.3af), PoE+ (802.3at)<br>12 VDC to 48 VDC, or 24 VDC Universal Power Supply |
| FX9600 | PoE (802.3af), PoE+ (802.3at)<br>12 VDC to 24 VDC, or 24 VDC Universal Power Supply |
| Antenna Ports | |
| FX7500 | FX7500-2: 2 mono-static ports (reverse polarity TNC)<br>FX7500-4: 4 mono-static ports (reverse polarity TNC) |
| FX9600 | FX9600-4: 4 mono-static ports (reverse polarity TNC)<br>FX9600-8: 8 mono-static ports (reverse polarity TNC) |
| **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/IEC 18000-63 |
| Frequency (UHF Band) | Global Reader: 902 MHz to 928 MHz (Maximum, supports countries that use a part of this band)<br>865 MHz to 868 MHz<br>US (only) Reader: 902 MHz to 928 MHz |

**Table 14** Technical Specifications (Continued)

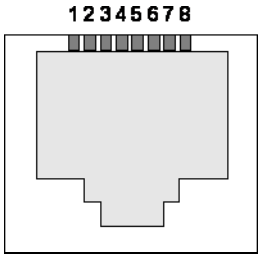
| Item | Description |
|---|---|
| Transmit Power Output<br>FX7500<br><br><br>FX9600 | <br>10dBm to +31.5dBm (PoE+, 12V ~ 48V External DC, Universal 24 VDC Power Supply; +10dBm to +30.0dBm (PoE)<br>0dBm to +33.0dBm (PoE+, 12V ~ 24V External DC, Universal 24 VDC Power Supply; +0dBm to +31.5dBm (PoE) |
| Max Receive Sensitivity<br>FX7500<br>FX9600 | <br>-82dBm<br>-86dBm |
| IP Addressing | Static and Dynamic |
| Host Interface Protocol | LLRP v1.0.1 |
| API Support | Host Applications – .NET, C and Java EMDK;<br>Embedded Applications – C & Java SDK |
| **Warranty** | |
| For the complete Zebra hardware product warranty statement, go to:<br>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 802.3af specification for Powered Devices.

**Figure 118** Ethernet Connections



## USB Client Connector

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

**Figure 119** USB Client Connector

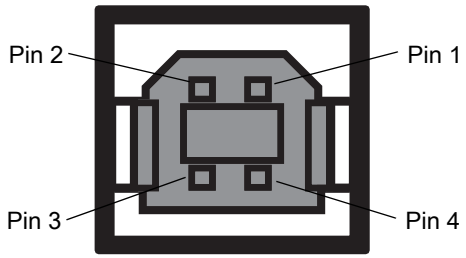



**Table 15** USB Client Port Connector Pinout

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

## USB Host Connector

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

**Figure 120** USB Host Connector (J22)

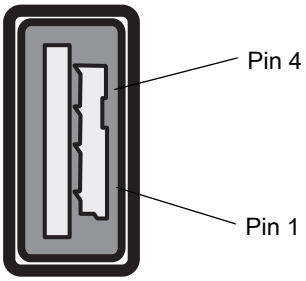



**Table 16** USB Host Port Connector (J22) Pinout

| 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 |

## FX7500 GPIO Port Connections

The FX7500 GPIO connector pinouts include the following:

**Figure 121** FX7500 RFID Reader GPIO Connection

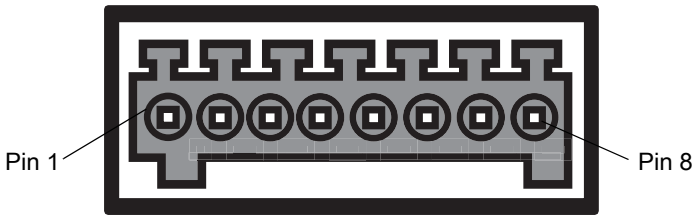



**Table 17** FX7500 GPIO Pinouts

| 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 |
| 7 | GP input #2 | I | Signal for GP input #2 |
| 8 | GND | - | Ground connection |

## FX9600 GPIO Connections

The FX9600 GPIO connector pinouts include the following:

**Figure 122** FX9600 RFID Reader GPIO Connection

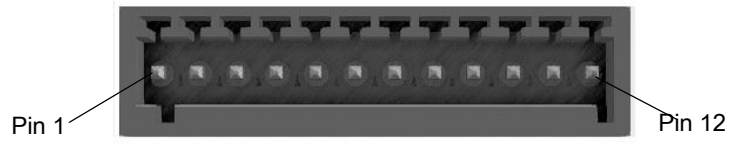



**Table 18** FX9600 GPIO Pinouts

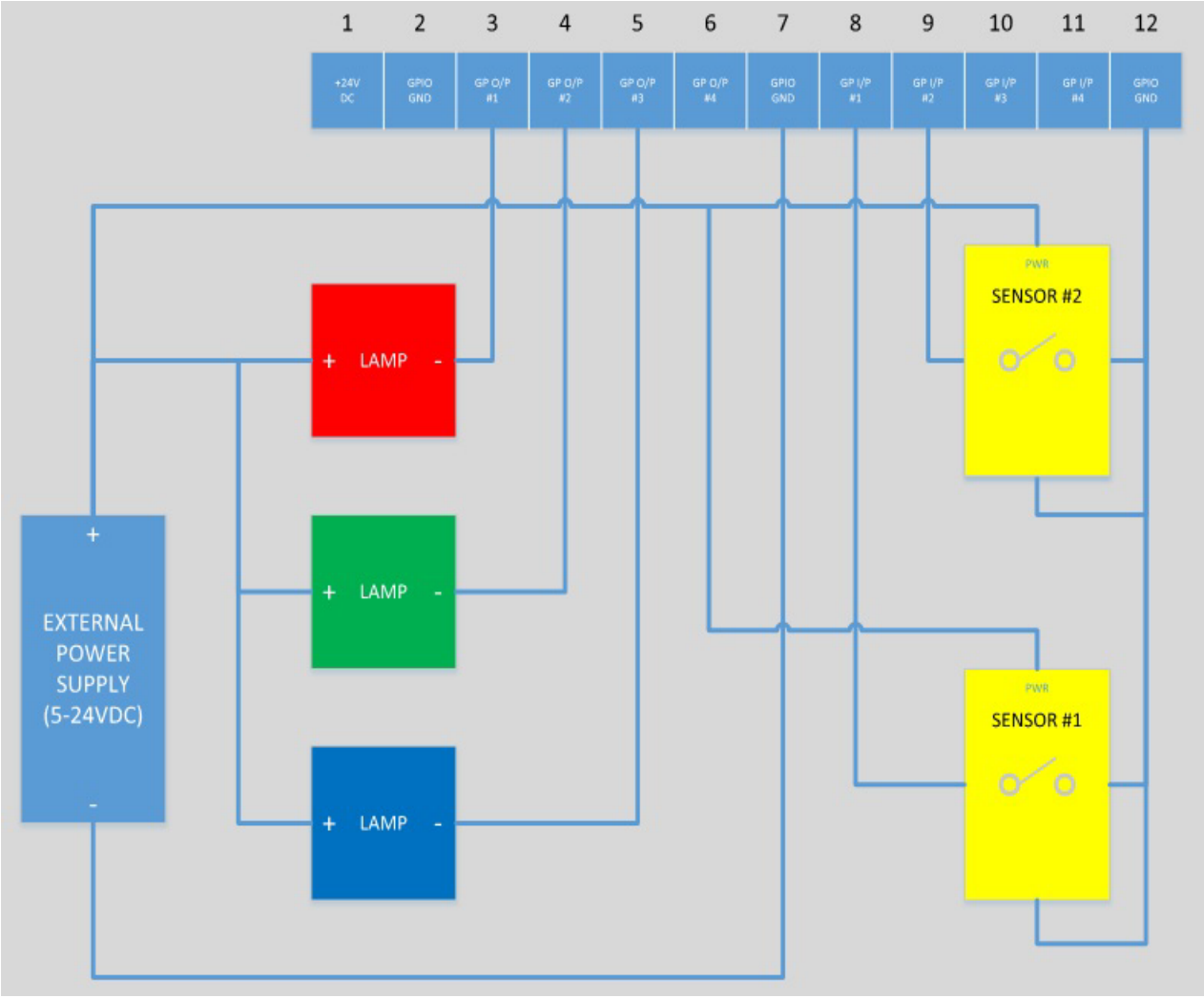
| Pin # | Pin Name | Direction | Description |
|---|---|---|---|
| 1 | +24V DC Power | O | Supplies +24VDC At up to 1 Amp |
| 2 | GND | - | Ground connection |
| 3 | GP output #1 | O | Signal for GP output #1 |
| 4 | GP output #2 | O | Signal for GP output #2 |
| 5 | GP output #3 | O | Signal for GP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

**Table 18** FX9600 GPIO Pinouts (Continued)

| Pin # | Pin Name | Direction | Description |
|---|---|---|---|
| 6 | GP output #4 | O | Signal for GP output #4 |
| 7 | GND | - | Ground connection |
| 8 | GP input #1 | I | Signal for GP input #1 |
| 9 | GP input #2 | I | Signal for GP input #1 |
| 10 | GP input #3 | I | Signal for GP input #1 |
| 11 | GP input #4 | I | Signal for GP input #1 |
| 12 | GND | - | Ground connection |

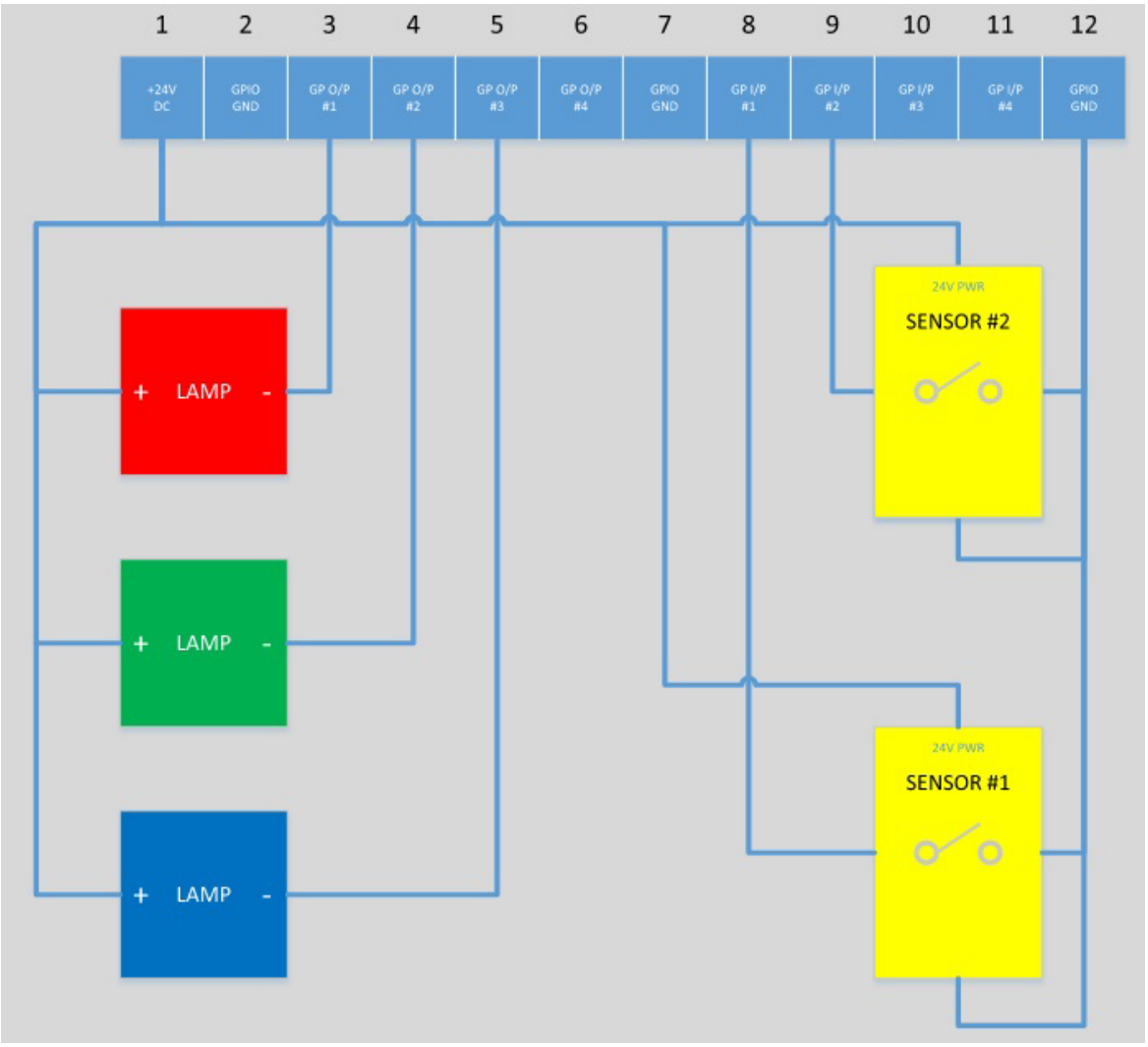
The Figure 123 provides an example of a typical GPIO setup with the power derived from an external power supply.

**Figure 123** *FX9600 GPIO Setup Example with Power Derived from External Power Supply*



The Figure 124 provides an example of a typical GPIO setup with the power derived from GPIO 24V Pin.

**Figure 124** *FX9600 GPIO Setup Example with Power Derived from GPIO 24V Pin*



# Static IP Configuration

## Introduction

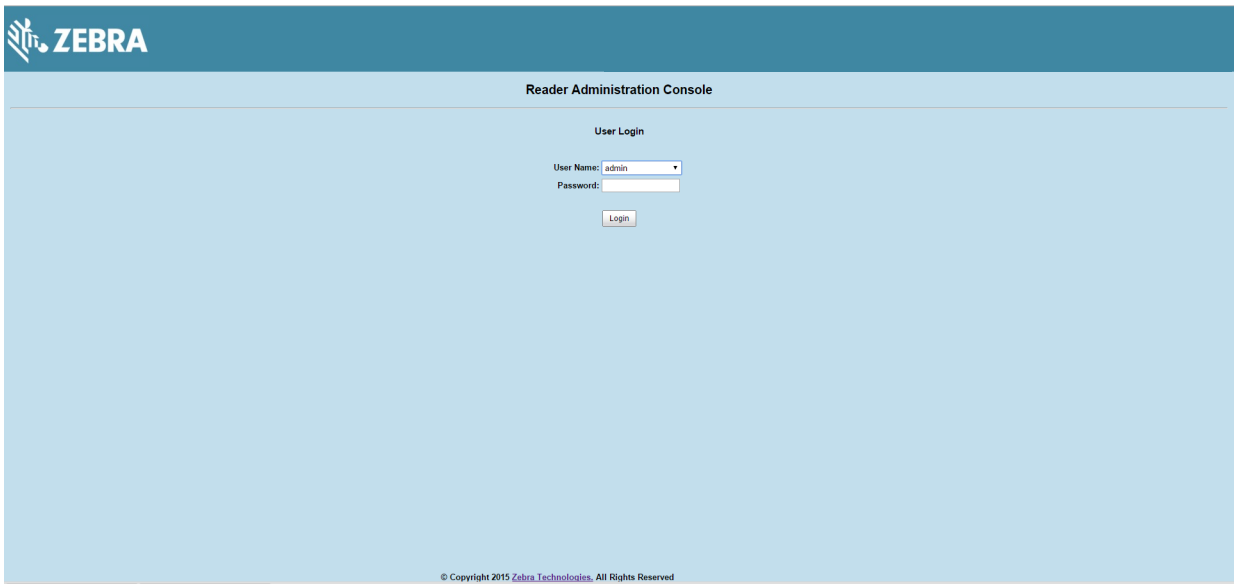
This chapter describes three methods of setting the static IP address on an FX7500 and FX9600 RFID Readers.

## Reader IP Address or Host Name is Known

Set the Static IP Using the Web Console

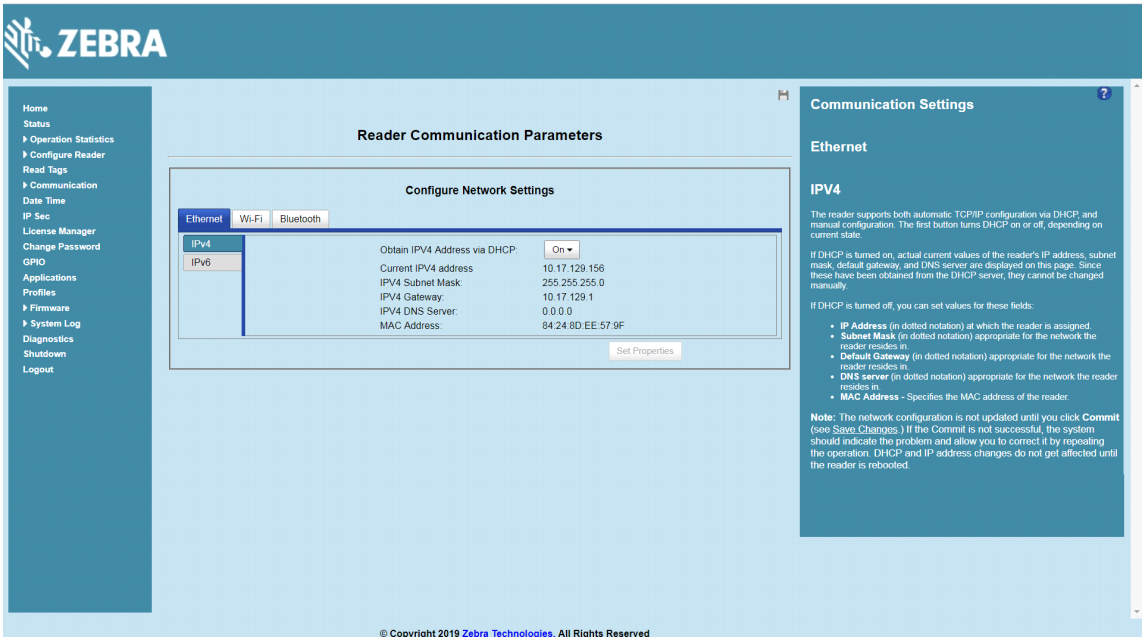
1. Browse the device using the host name, for example: FX7500CD3B1E.
2. Log onto the device.

**Figure 125** Reader Administration Console Login Window




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

**Figure 126** Reader Communication Parameters Window



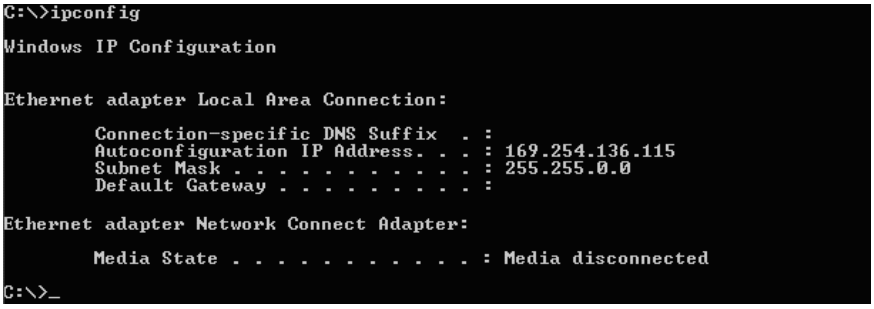

5. Select **Set Properties**. You can set a static IP that doesn't belong to this DHCP network.
6. The window displays a **Saving. Please wait...** message with a progress symbol until the commit completes.
7. When the commit completes, a gray floppy disk icon displays indicating that the commit completed successfully. The new selection is now set and stored in the reader.
8. 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)

Set the Static IP Using the Web Console

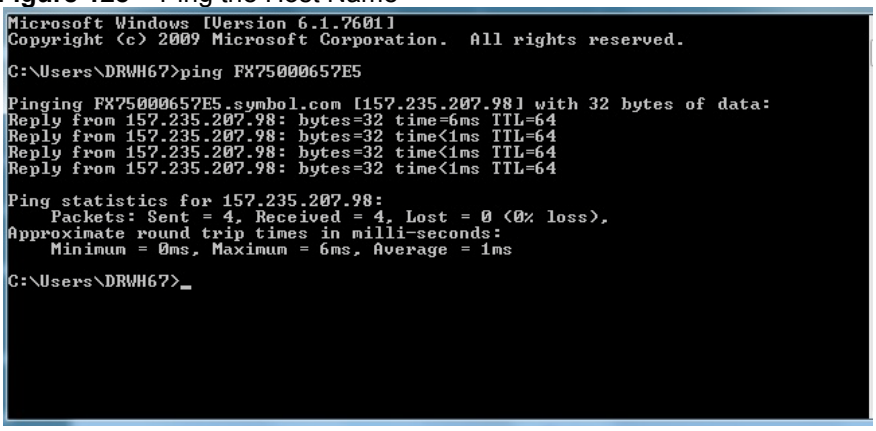
1. Connect the device and a PC running Windows XP to the same network that doesn't have a DHCP server, or connect the device directly to the PC.
2. Ensure both the device and PC Ethernet jack use at least one LED to indicate network connection detect.
3. If the PC uses an assigned static IP, update it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

**Figure 127** Obtain IP Address



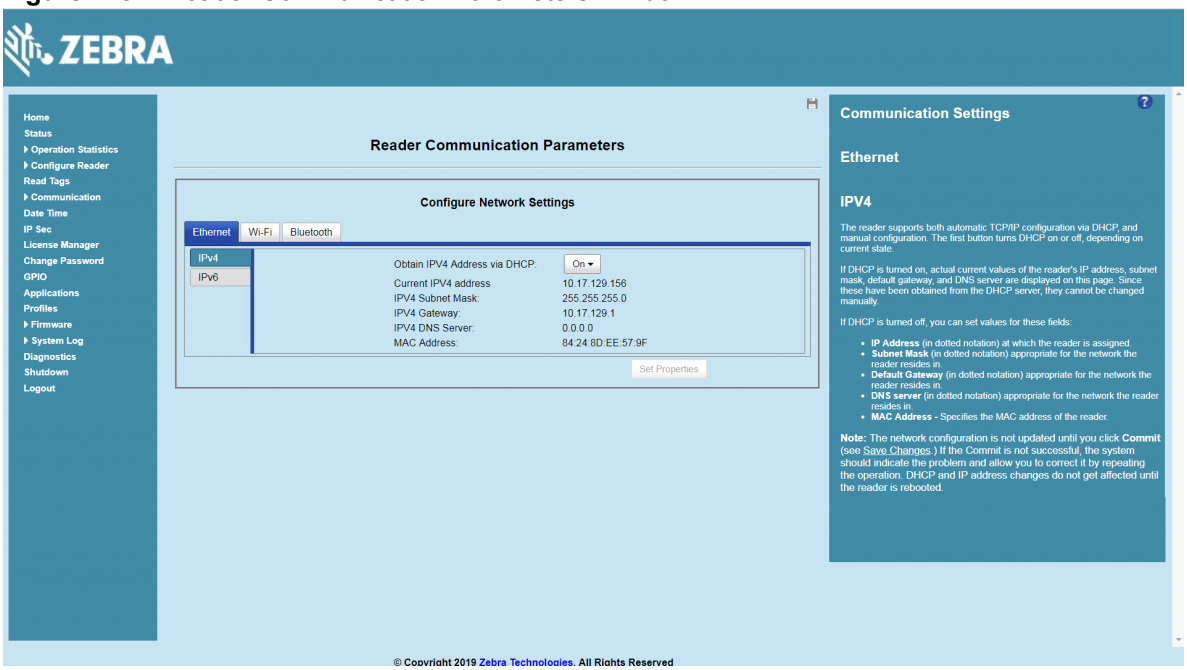

4. When possible, ping the host name of the device.

**Figure 128** Ping the Host Name




5. Use a browser to connect to the device with the host name, for example: FX7500CD3B1E, or use the IP address obtained from ping replies (for example, 169.254.62.74).
6. Log onto the device.
7. Select **Communication**.
8. Set **Obtain IP Address via DHCP** to **Off** and enter all required information.

**Figure 129** Reader Communication Parameters Window




9. Select **Set Properties**.
10. The window displays a **Saving. Please wait...** message with a progress symbol until the commit completes.
11. When the commit completes, a gray floppy disk icon displays indicating that the commit completed successfully. The new selection is now set and stored in the reader.
12. 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 appendix 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 19 and Table 20. The **Mode Index** column refers to the index used to walk the **C1G2UHFRFModeTable**. Refer to the EPCglobal *Low Level Reader Protocol (LLRP) Standard*.

**Table 19** Radio Modes for FCC 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 Conform-ance |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 64/3 | 640000 | 1 | PR_ASK | 1500 | 6250 | 6250 | 0 | Dense | false |
| 2 | 64/3 | 640000 | 1 | PR_ASK | 2000 | 6250 | 6250 | 0 | Dense | false |
| 3 | 64/3 | 120000 | 2 | PR_ASK | 1500 | 25000 | 25000 | 0 | Dense | false |
| 4 | 64/3 | 120000 | 2 | PR_ASK | 1500 | 12500 | 23000 | 2100 | Dense | false |
| 5 | 64/3 | 120000 | 2 | PR_ASK | 2000 | 25000 | 25000 | 0 | Dense | false |
| 6 | 64/3 | 120000 | 2 | PR_ASK | 2000 | 12500 | 23000 | 2100 | Dense | false |
| 7 | 64/3 | 128000 | 2 | PR_ASK | 1500 | 25000 | 25000 | 0 | Dense | false |
| 8 | 64/3 | 128000 | 2 | PR_ASK | 1500 | 12500 | 23000 | 2100 | Dense | false |
| 9 | 64/3 | 128000 | 2 | PR_ASK | 2000 | 25000 | 25000 | 0 | Dense | false |
| 10 | 64/3 | 128000 | 2 | PR_ASK | 2000 | 12500 | 23000 | 2100 | Dense | false |
| 11 | 64/3 | 160000 | 2 | PR_ASK | 1500 | 12500 | 18800 | 2100 | Dense | false |

*RF Mode 23 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 19** Radio Modes for FCC 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 Conform-ance |
|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 64/3 | 160000 | 2 | PR_ASK | 2000 | 12500 | 18800 | 2100 | Dense | false |
| 13 | 64/3 | 60000 | 4 | PR_ASK | 1500 | 25000 | 25000 | 0 | Dense | false |
| 14 | 64/3 | 60000 | 4 | PR_ASK | 1500 | 12500 | 23000 | 2100 | Dense | false |
| 15 | 64/3 | 60000 | 4 | PR_ASK | 2000 | 25000 | 25000 | 0 | Dense | false |
| 16 | 64/3 | 60000 | 4 | PR_ASK | 2000 | 12500 | 23000 | 2100 | Dense | false |
| 17 | 64/3 | 64000 | 4 | PR_ASK | 1500 | 25000 | 25000 | 0 | Dense | false |
| 18 | 64/3 | 64000 | 4 | PR_ASK | 1500 | 12500 | 23000 | 2100 | Dense | false |
| 19 | 64/3 | 64000 | 4 | PR_ASK | 2000 | 25000 | 25000 | 0 | Dense | false |
| 20 | 64/3 | 64000 | 4 | PR_ASK | 2000 | 12500 | 23000 | 2100 | Dense | false |
| 21 | 64/3 | 80000 | 4 | PR_ASK | 1500 | 12500 | 18800 | 2100 | Dense | false |
| 22 | 64/3 | 80000 | 4 | PR_ASK | 2000 | 12500 | 18800 | 2100 | Dense | false |
| *23 | 64/3 | variable | variable | PR_ASK | variable | 6250 | 25000 | variable | variable | false |
| 24 | 64/3 | 320000 | 1 | PR_ASK | 1500 | 12500 | 18800 | 2100 | Dense | false |
| 25 | 64/3 | 320000 | 1 | PR_ASK | 2000 | 12500 | 18800 | 2100 | Dense | false |
| 26 | 64/3 | 30000 | 8 | PR_ASK | 1500 | 25000 | 25000 | 0 | Dense | false |
| 27 | 64/3 | 30000 | 8 | PR_ASK | 1500 | 12500 | 23000 | 2100 | Dense | false |
| 28 | 64/3 | 30000 | 8 | PR_ASK | 2000 | 25000 | 25000 | 0 | Dense | false |
| 29 | 64/3 | 30000 | 8 | PR_ASK | 2000 | 12500 | 23000 | 2100 | Dense | false |
| 30 | 64/3 | 32000 | 8 | PR_ASK | 1500 | 25000 | 25000 | 0 | Dense | false |
| 31 | 64/3 | 32000 | 8 | PR_ASK | 1500 | 12500 | 23000 | 2100 | Dense | false |
| 32 | 64/3 | 32000 | 8 | PR_ASK | 2000 | 25000 | 25000 | 0 | Dense | false |
| 33 | 64/3 | 32000 | 8 | PR_ASK | 2000 | 12500 | 23000 | 2100 | Dense | false |
| 34 | 64/3 | 40000 | 8 | PR_ASK | 1500 | 12500 | 18800 | 2100 | Dense | false |
| 35 | 64/3 | 40000 | 8 | PR_ASK | 2000 | 12500 | 18800 | 2100 | Dense | false |

*RF Mode 23 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 20** Radio Modes for ETSI 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 Indica-tor** | EPC HAG T&C Conform-ance |
|---|---|---|---|---|---|---|---|---|---|---|
| 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 |
| 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 | 12500 | 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 |

*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 20** Radio Modes for ETSI 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 Indica-tor** | EPC HAG T&C Conform-ance |
|---|---|---|---|---|---|---|---|---|---|---|
| 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 FX7500 and FX9600 RFID readers support 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 FX7500 and FX9600.

## FTPS

Use any standard GUI tool such as **FileZilla,** to connect to the FX7500 and FX9600 RFID readers over FTPS.

# Data Protection

## Introduction

The FX7500 and FX9600 RFID readers store 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, meaning RFID data over Wi-Fi and Bluetooth is also protected.

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