

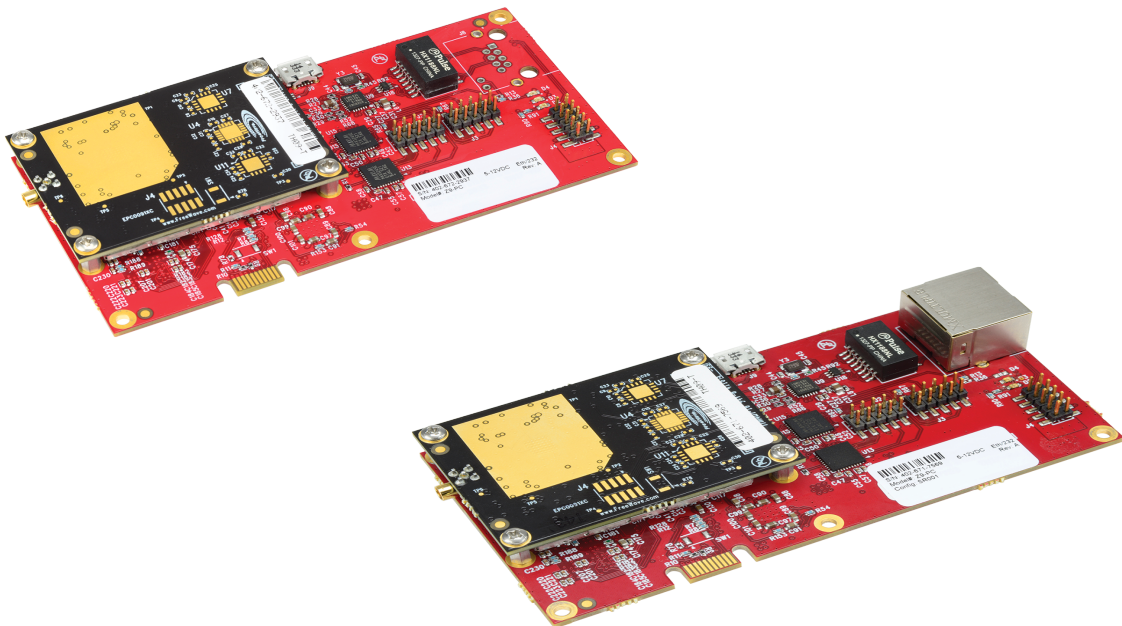


ZumLink™

Covers Model: Z9-PC and Z9-PC-SR001

Firmware 1.1.0.1

User & Reference Manual



Part Number: LUM0077AA

Revision: Sep-2018

Safety Information

The products described in this manual can fail in a variety of modes due to misuse, age, or malfunction and is not designed or intended for used in systems requiring fail-safe performance, including life safety systems. Systems with the products must be designed to prevent personal injury and property damage during product operation and in the event of product failure.



Warning! Verify power is OFF before connecting or disconnecting the interface or RF cables.

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 3. If Product has been modified, repaired, or altered by Customer unless FreeWave specifically authorized such alterations in each instance in writing. Where applicable, this includes the addition of conformal coating.
-



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Preface

Contact FreeWave Technical Support

For up-to-date troubleshooting information, check the **Support** page at www.freewave.com.

FreeWave provides technical support Monday through Friday, 8:00 AM to 5:00 PM Mountain Time (GMT -7).

- Call toll-free at 1.866.923.6168.
- In Colorado, call 303.381.9200.
- Contact us through e-mail at moreinfo@freewave.com.

Additional Information

Note: Use the <http://support.freewave.com/> website to download the latest documentation for Z9-PC / Z9-PC-SR001.

Registration is required to use this website.

Document Styles

This document uses these styles:

- Parameter setting text appears as: **[Page=radioSettings]**
- File names appear as: **configuration.cfg**.
- File paths appear as: **C:\Program Files (x86)\FreeWave Technologies**.
- User-entered text appears as: **xxxxxxxxxx**.



Caution: Indicates a situation that **MAY** cause damage to personnel, the radio, data, or network.

Example: Provides example information of the related text.

FREEWAVE Recommends: Identifies FreeWave recommendation information.

Important!: Provides crucial information relevant to the text or procedure.

Note: Emphasis of specific information relevant to the text or procedure.



Tip Provides time saving or informative suggestions about using the product.



Warning! Indicates a situation that **WILL** cause damage to personnel, the radio, data, or network.

1. Overview

Thank you for purchasing the FreeWave Z9-PC / Z9-PC-SR001.

ZumLink is the latest generation of radios offered by FreeWave and consists of enclosed and board level radios.

- Z9-PC is a board level 900MHz OEM Ethernet radio module.
- Z9-PC-SR001 is a board level 900MHz OEM Ethernet radio module with an RJ-45 Ethernet connector.

The Z9-PC or Z9-PC-SR001 are radio modules ideally suited for OEM applications where it will be embedded in the OEM product. It is built with the smallest possible footprint and with minimal industry standard physical connectivity. The intent is for the user to design their own custom interface to the radio module.

The interface board in the Z9-PC-DEVKIT is not intended to be used in the field. Rather it is a temporary mechanism to allow a user to evaluate the radio modules without needing to first design their own interface. If the user desires a ZumLink Ethernet product that has industry standard connectivity built-in, models Z9-P or Z9-PE should be considered.

The Z9-PC / Z9-PC-SR001 900MHz Series:

- Operates in the unlicensed 900MHz ISM band (902-928 MHz).
- Provides a maximum of 30dBm transmit output power.
- Is FCC compliant as both a Frequency Hopping Spread Spectrum (FHSS) and a Digital Modulating (DM) radio.
- Provides ZumIQ, a Linux-based application environment for the deployment of applications at the edge
- Has one Ethernet port, two serial ports, and one micro USB port.

Note: The frequency hopping capability is available at all bandwidths and the single channel (DM) operation is available for bandwidths of at least 500 kHz.

1.1. Communication Method

ZumLink uses Listen Before Talk (LBT) and Carrier Sense Multiple Access (CSMA) where there are no assigned slots. The radios transmit when the channel is clear.

- The Gateway broadcasts packets to all Endpoints within range.
- The Endpoints unicast packets back to the Gateway.
- The Gateway acknowledges the Endpoint packets.

FreeWave's traditional protocol has a Gateway Time Slot and an Endpoint Time Slot within a frame.

- The Gateway transmits in its slot and listens in the Endpoint slot.
- The Endpoint transmits its slot and listens in the Gateway slot.

1.2. ZumBoost Technology

ZumLink incorporates ZumBoost technology using four performance-enhancing algorithms used together or independently to improve throughput in the most demanding RF environments:

1.2.1. Adaptive Spectrum Learning

- Learns which RF signals are part of the ZumLink network and which are not, reducing bad packets and retransmissions.
- Standard on all **ZumLink** radios, the "Listen Before Talk" algorithm provides spectrum monitoring, delivering network intelligence and increasing throughputs in noisy environments.

1.2.2. Forward Error Correction

- The [fecRate \(on page 204\)](#) increases the reliability of the data transferred over the air at the cost of some transmission throughput.
- Improves sensitivity by 3dB to maximize range and link range in noisy environments.
- Adds redundant information to a data stream to detect packet errors and corrects them to avoid retransmission of the packet.

1.2.3. Packet Aggregation

- The [aggregateEnabled \(on page 202\)](#) setting increases throughput of small packets by combining multiple packets into a single packet minimizing the number of packets required for transmission.
- Does NOT affect medium and large packets.

1.2.4. Packet Compression

- When the [compressionEnabled \(on page 203\)](#) setting is enabled, the outgoing packets are analyzed and, if the data packet can be compressed, sent compressed to transmit fewer bits over the air.

1.3. ZumIQ Application Environment

ZumLink provides the ZumIQ Application Environment that allows for the development and deployment of Linux-based applications onto the radio. The application has access to the same computing resources as the radio but is in a segregated section of the Z9-PC / Z9-PC-SR001.

Note: Any application using a Linux-compatible language can be housed in ZumIQ.

2. Included & User-supplied Equipment

2.1. Included Equipment

Included Equipment	
Qty	Description
1	Z9-PC / Z9-PC-SR001 wireless device.
1	Power Cable with flying leads
1	Quick Start Guide

2.2. User-supplied Equipment

- Interface / Power Cables
- USB to micro-USB cable
- FCC approved antenna **
- Computer

Note: **See [Approved Antennas \(on page 181\)](#) for detailed information.
Approved antennas can be purchased directly from FreeWave.

3. Port Connections and Pinout Assignments

Port Connections

- [Z9-PC and Z9-PC-SR001 Port Connections \(on page 19\)](#)

Pinout Assignments

- [Z9-PC and Z9-PC-SR001 COM1 and COM2 Pinout Assignments \(on page 20\)](#)
- [Z9-PC and Z9-PC-SR001 J4 Power / Ethernet Pinout Assignments \(on page 22\)](#)

3.1. Z9-PC and Z9-PC-SR001 Port Connections

Important! The RJ-45 connector is NOT installed on the Z9-PC.



Warning! The Micro-USB Connector shield is connected to a Common Ground NOT a Chassis Ground.

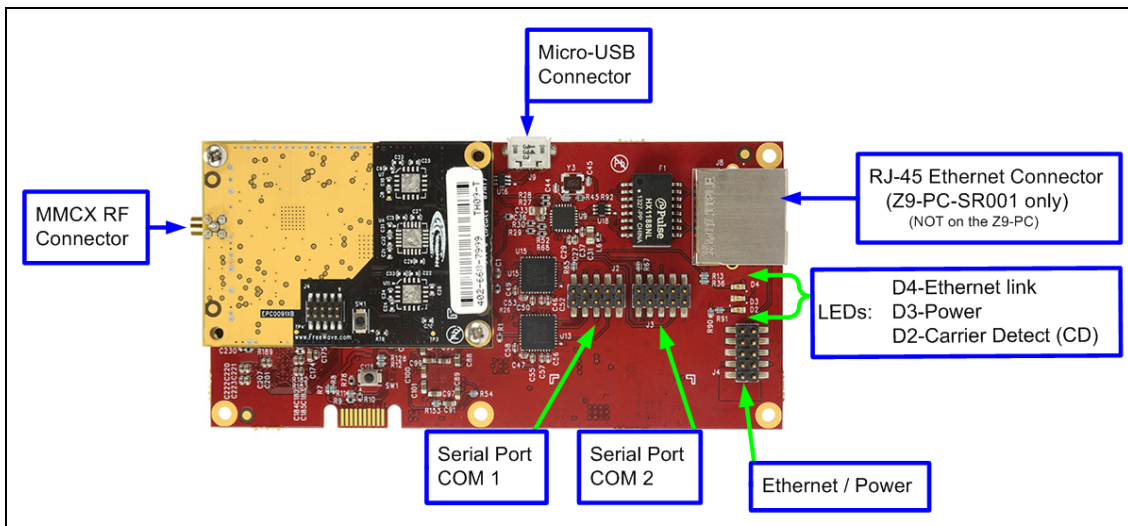


Figure 1: Z9-PC / Z9-PC-SR001 Port Connections

3.2. Z9-PC and Z9-PC-SR001 COM1 and COM2 Pinout Assignments

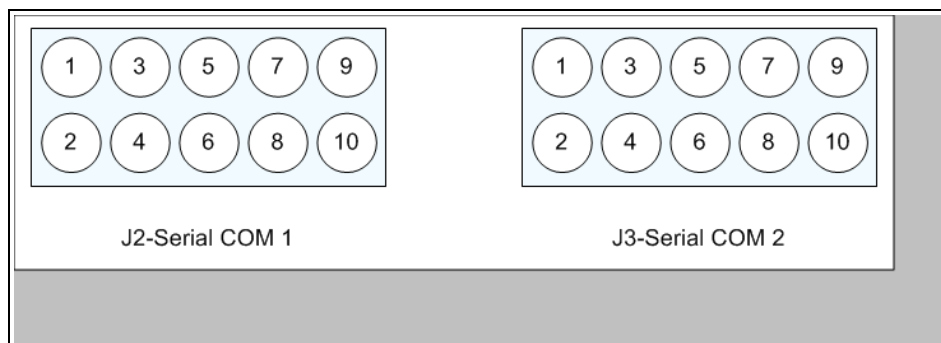
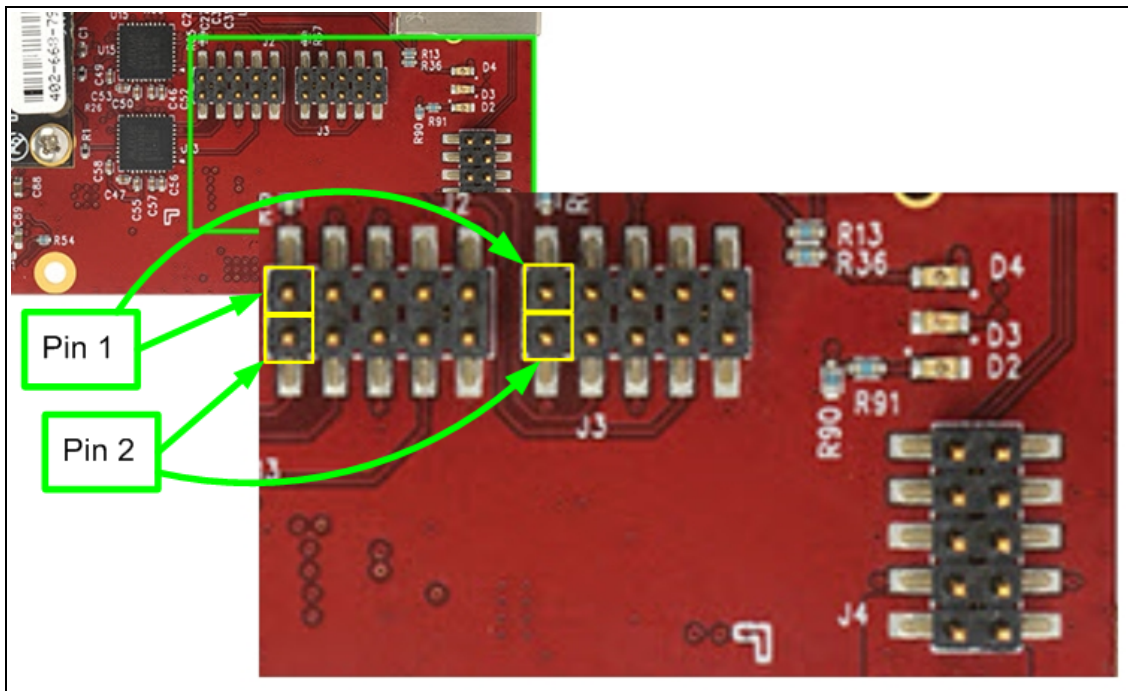


Figure 2: Z9-PC / Z9-PC-SR001 Pinout Assignments

Note: The information in the table refers to the **Serial Ports** in [Figure 2](#).

- (I) - Input
- (O) - Output

Z9-PC / Z9-PC-SR001 Serial Port Pinout Assignments		
Pin Number	RS232	Description
1	NC	Do Not Connect
2	CD --- (O)	Carrier detect output

Z9-PC / Z9-PC-SR001 Serial Port Pinout Assignments		
Pin Number	RS232	Description
3	RTS --- (I)	Request to send input
4	TXD --- (O)	Transmit data output
5	CTS --- (O)	Clear to send output
6	RXD --- (I)	Receive data input
7	GND	Ground
8	DTR --- (I)	Data terminal ready input
9	NC	Do Not Connect
10	GND	Ground

Z9-PC and Z9-PC-SR001 J4 Power / Ethernet Pinout Assignments

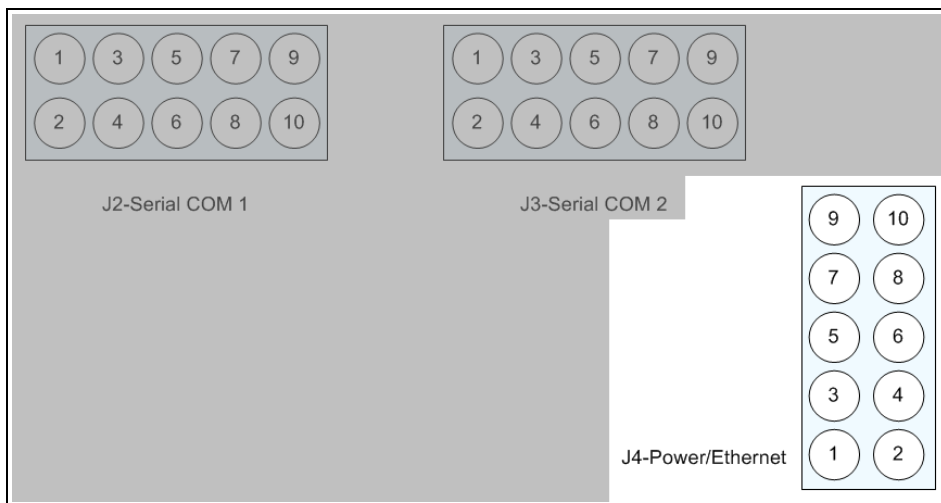
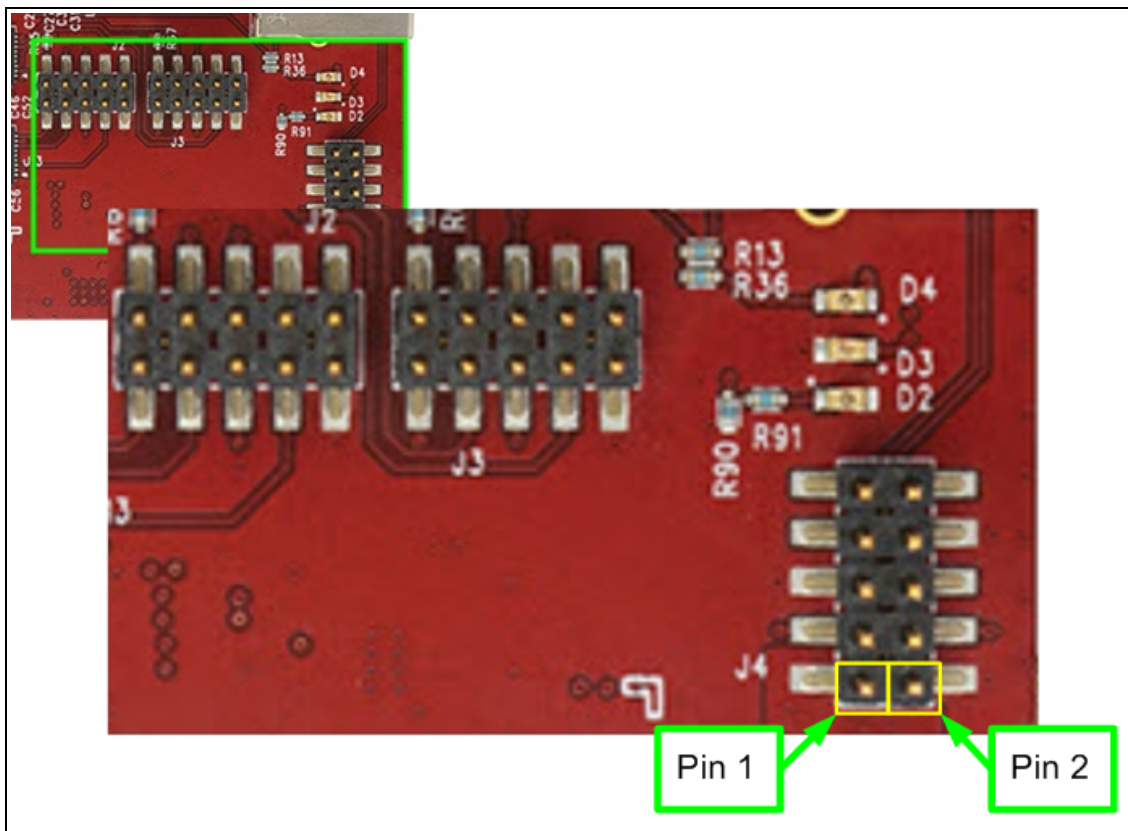


Figure 3: Z9-PC / Z9-PC-SR001 J4-Power / Ethernet Pinout Assignments

Note: The information in the table refers to the **Serial Ports** in [Figure 3](#).

Z9-PC / Z9-PC-SR001 J4-Power / Ethernet Pinout Assignments			
Pin Number	Assignment	Signal	Description
1	B+ (Power Input)	Input	+5 to +12 VDC ($\pm 10\%$)
2	GND	GND	Ground
3	NC	Do Not Connect	Reserved for future use.
4	NC	Do Not Connect	Reserved for future use.
5	GND	GND	Ground
6	RX-	Input	Receive minus line for Ethernet
7	RX+	Input	Receive plus line for Ethernet
8	GND	GND	Ground
9	TX-	Output	Transmit minus line for Ethernet
10	TX+	Output	Transmit plus line for Ethernet

4. Installation

- [Power Setup \(on page 25\)](#)
- [Installation \(on page 25\)](#)

4.1. Power Setup

- The Z9-PC / Z9-PC-SR001 is approved to operate with an input voltage range of +5 to +12 VDC ($\pm 10\%$) that can supply at least 0.8 Amps.
- See the [Technical Specifications \(on page 412\)](#) for additional information.

FREEWAVE Recommends: All input power supply wires should be at least **20AWG** wires. A dedicated and stable power supply line is preferred. The power supply used **MUST** provide more current than the amount of current drain listed in the specifications for the product and voltage. (at least 350 mA at 12V)



Warning! Use electrostatic discharge (ESD) protectors to protect the radio from electric shock and provide filtered conditioned power with over-voltage protection.

4.2. Installation

1. Install an FCC-approved antenna.
2. Connect the antenna feed line to the ZumLink.

Warning! Only FCC approved antennas may be used. See [Approved Antennas \(on page 181\)](#).



The antenna must be professionally installed on a fixed, mounted, and permanent outdoor structure to satisfy RF exposure requirements. Any antenna placed outdoors must be properly grounded. Use extreme caution when installing antennas and follow all instructions included with the antenna.



If installing a directional antenna, preset the antenna's direction appropriately.

3. Connect the Z9-PC / Z9-PC-SR001 to a power supply.

Note: Power is shared on the Ethernet / Power 10-pin header.

Note: The Z9-PC / Z9-PC-SR001 is approved to operate with an input voltage range of +5 to +12 VDC ($\pm 10\%$) that can supply at least 0.8 Amps.

FREEWAVE Recommends: All input power supply wires should be at least **20AWG** wires. A dedicated and stable power supply line is preferred. The power supply used **MUST** provide more current than the amount of current drain listed in the specifications for the product and voltage.

The LED lights blink to show startup.

Note: See [LEDs \(on page 416\)](#) for more information.

4. Connect the USB cable to the computer and the Micro USB end to the Z9-PC / Z9-PC-SR001.

The **FreeWave Drivers** and **ZumLink** windows may open.

Important! The USB does NOT power the Z9-PC / Z9-PC-SR001. It only provides a configuration interface.

The **FreeWave Drivers** and **ZumLink** windows may open.

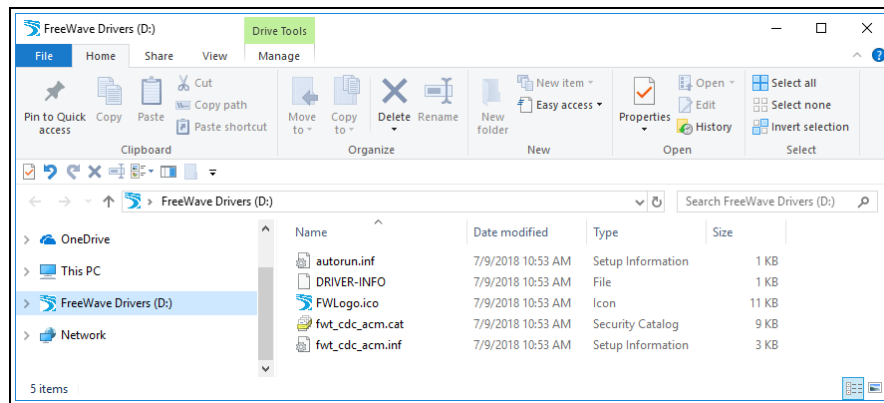


Figure 4: AutoPlay FreeWave Drivers window

Important! The driver installs automatically.

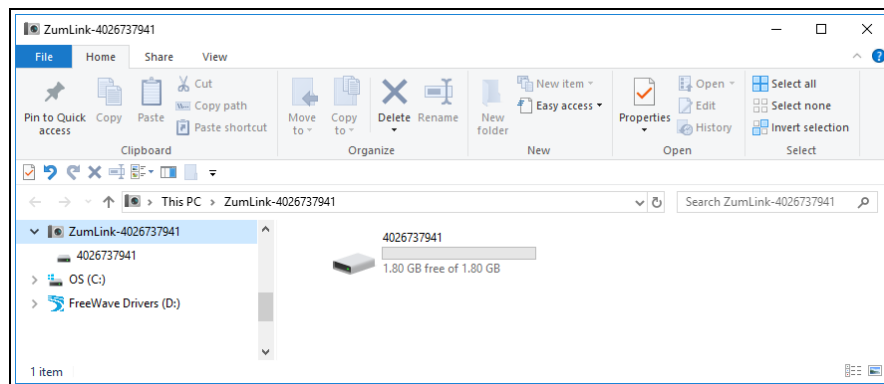


Figure 5: ZumLink window

5. Optional: Use the Ethernet port for data communications.
6. Continue with:
 - [Firmware Upgrade \(on page 27\)](#)
 - [Drag and Drop Configuration - ZumLink \(on page 52\)](#)
 - [CLI Configuration \(on page 64\)](#)
 - [Web Interface Configuration \(on page 74\)](#)

5. Firmware Upgrade

Important! The **Download** procedure must be completed first.

These are the basic steps to upgrade the Z9-PC / Z9-PC-SR001 firmware:

- A. [Download the Upgrade File \(on page 28\)](#)
- B. [Optional: Download the ZumIQ Application Environment \(on page 87\)](#)
- C. Review the [Upgrade Summary - v1.1.01 \(on page 31\)](#) to know which files are used to upgrade from a previous firmware version.
- D. Complete either the:
[Firmware Upgrade - Drag and Drop \(on page 34\)](#) or
[Firmware Upgrade - Web Interface \(on page 40\)](#)

5.1. Download the Upgrade File

Note: The images in this procedure are for Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

1. Click <http://support.freewave.com/>.
The **Login** window opens.

Important! Registration is required to use this website.

2. Enter the **User Name** and **Password**.

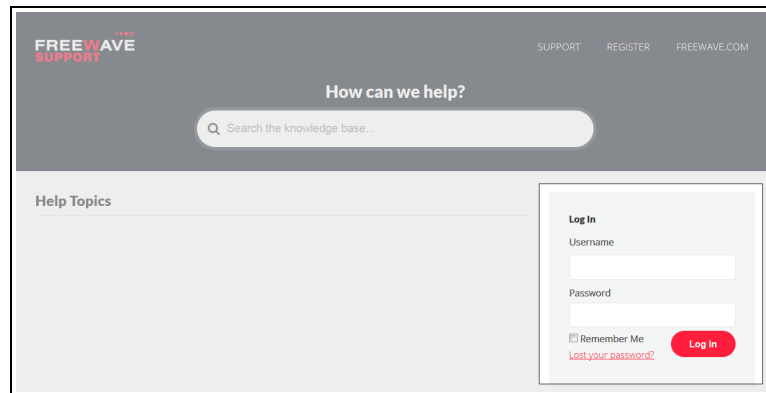
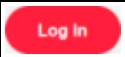


Figure 6: FreeWave Login window

3. Click .
A successful Login message briefly appears.
The **Help Topics** window opens.
4. Click the **Firmware** link. (Figure 7)

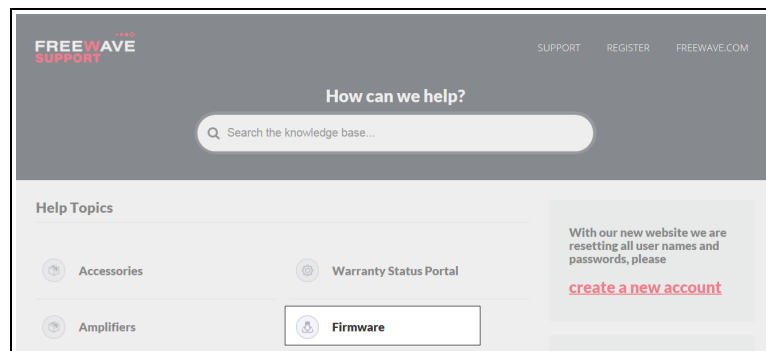


Figure 7: Help Topics window

The **Firmware** window opens.

5. Click the **ZumLink Firmware** link. (Figure 8)



Figure 8: Firmware window

The available firmware/software appears in the window. (Figure 9)



Figure 9: Z9-PC / Z9-PC-SR001 Firmware window

6. Click the firmware/software link.
The **Firmware Upgrade** window opens.
7. Select and click the **Firmware_v1_1_0_1** attachment. (Figure 10)



Figure 10: Z9-PC / Z9-PC-SR001 Firmware Upgrade window with selected Firmware v1_1_0_1 Attachment

The **Opening** dialog box opens. (Figure 11)

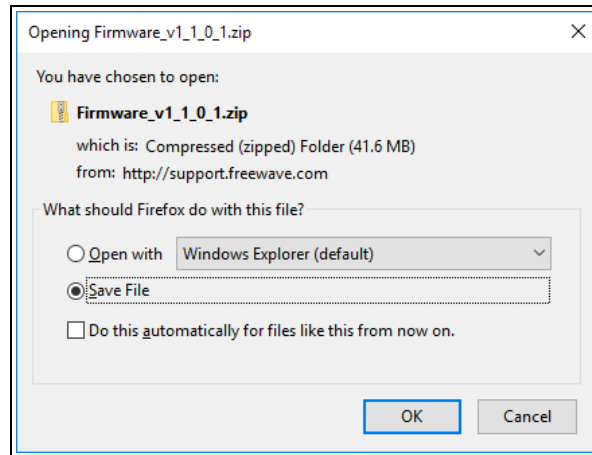


Figure 11: Opening Firmware v1_1_0_1.zip dialog box

8. Click **OK**.

The **Enter name of file to save to** dialog box opens. (Figure 12)

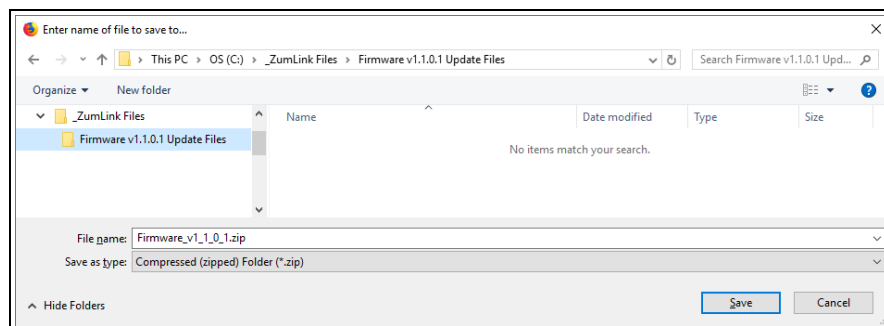


Figure 12: Enter name of file to save to dialog box

9. Search for and select a location to save the **.zip** file to and click **Save**.
The **Enter name of file to save to** dialog box closes.

10. Either:

- Continue with [Optional: Download the ZumiQ Application Environment \(on page 87\)](#) or
- Open a Windows® Explorer window and find the location where the **Firmware v1_1_0_1.zip** file was saved.

11. Double-click the **.zip** file.

12. Extract the files from the **.zip** file into the parent location.

Note: The **.zip** file includes the **.pkg** and **.fcf** files used in the upgrade process.

13. Continue with [Upgrade Summary - v1.1.01 \(on page 31\)](#).

5.2. Upgrade Summary - v1.1.01

5.2.1. Downgrade

Contact [FreeWave Technical Support \(on page 12\)](#) for firmware **DOWNGRADE** assistance.

5.2.2. Upgrade



Warning! The upgrade file names are numbered 1_, 2_, and 3_ and **MUST BE INSTALLED IN A SPECIFIC NUMERIC ORDER** for a successful upgrade.

The **UPGRADE** options are:

- [Upgrade from Firmware v1.0.7.0 \(on page 32\)](#)
- [Upgrade from Firmware v1.0.6.0 \(on page 32\)](#)
- [Upgrade from Firmware v1.0.4.3 \(Z9-PC and Z9-PC-SR001\) \(on page 33\)](#)
- [Upgrade from Firmware v1.0.4.2 \(Z9-P and Z9-PE\) \(on page 33\)](#)

After deciding the files needed for the Z9-PC / Z9-PC-SR001 upgrade from its installed firmware version, continue with either:

- [Firmware Upgrade - Drag and Drop \(on page 34\)](#)
- [Firmware Upgrade - Web Interface \(on page 40\)](#)

5.2.3. Upgrade from Firmware v1.0.7.0

Required Files

[1_Device_Firmware_v1_1_0_1.pkg](#)

[2_Radio_Firmware_v1_0_7_1.fcf](#)

Optional: ZumIQ Files

[3_Optional_ZumIQ_Environment_v1_1_0_0.pkg](#)

Important!: [Contact FreeWave Technical Support \(on page 12\)](#) for the ZumIQ license.

5.2.4. Upgrade from Firmware v1.0.6.0

Required Files

[1_Device_Firmware_v1_1_0_1.pkg](#)

[2_Radio_Firmware_v1_0_7_1.fcf](#)

Optional: ZumIQ Files

[3_Optional_ZumIQ_Environment_v1_1_0_0.pkg](#)

- The ZumIQ license is preserved

Note: ZumIQ can be added anytime in future.

FREEWAVE Recommends: If currently using the v1.0.6.0 developer environment, an upgrade to [3_Optional_ZumIQ_Environment_v1_1_0_0.pkg](#) is NOT required.

5.2.5. Upgrade from Firmware v1.0.4.3 (Z9-PC and Z9-PC-SR001)

Required Files

[1_Device_Firmware_v1_1_0_1.pkg](#)

[2_Radio_Firmware_v1_0_7_1.fcf](#)

Optional: ZumIQ Files

[3_Optional_ZumIQ_Environment_v1_1_0_0.pkg](#)

Note: ZumIQ can be added anytime in future.
[Contact FreeWave Technical Support \(on page 12\)](#) for the ZumIQ license.

5.2.6. Upgrade from Firmware v1.0.4.2 (Z9-P and Z9-PE)

Required Files

[1_Device_Firmware_v1_1_0_1.pkg](#)

[2_Radio_Firmware_v1_0_7_1.fcf](#)

Optional: ZumIQ Files

[3_Optional_ZumIQ_Environment_v1_1_0_0.pkg](#)

Note: ZumIQ can be added anytime in future.
[Contact FreeWave Technical Support \(on page 12\)](#) for the ZumIQ license.

After deciding the files needed for the Z9-PC / Z9-PC-SR001 upgrade from its installed firmware version, continue with either:

- [Firmware Upgrade - Drag and Drop \(on page 34\)](#)
- [Firmware Upgrade - Web Interface \(on page 40\)](#)

5.3. Firmware Upgrade - Drag and Drop

This is the drag-and-drop procedure to upgrade the Z9-PC / Z9-PC-SR001 firmware.



Warning! The upgrade file names are numbered 1_, 2_, and 3_ and **MUST BE INSTALLED IN A SPECIFIC NUMERIC ORDER** for a successful upgrade.

- Alternatively, use the [Firmware Upgrade - Web Interface \(on page 40\)](#) to upgrade the Z9-PC / Z9-PC-SR001.
- The images in this procedure are for Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

FREEWAVE Recommends: Upgrade to v1.1.0.1 to use the enhanced features and updated security of the Z9-PC / Z9-PC-SR001.
Prior to an upgrade or downgrade procedure, save and backup all applications.



Caution: This procedure requires the Windows® Explorer file extension to be visible. See the Microsoft® topic [Show or Hide File Name Extensions](#) to view the extensions.

1. Verify the [Download the Upgrade File \(on page 28\)](#) procedure is complete.
2. Connect the USB cable to the computer and the Micro USB end to the Z9-PC Micro-USB connection.

The **FreeWave Drivers** and **ZumLink** windows open.

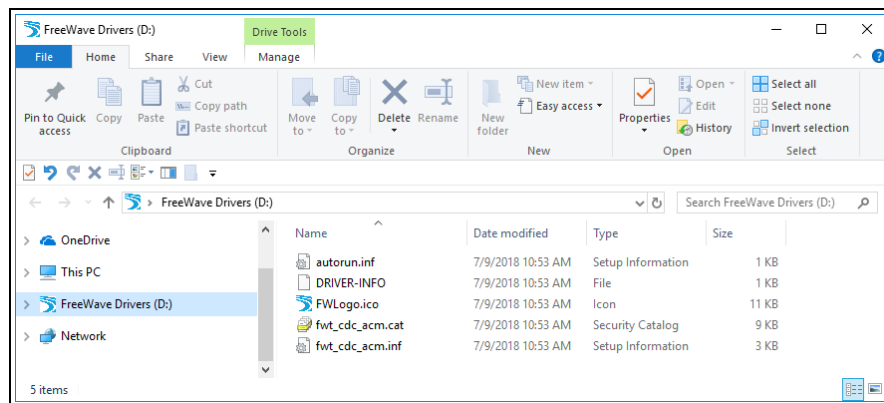


Figure 13: FreeWave Drivers window

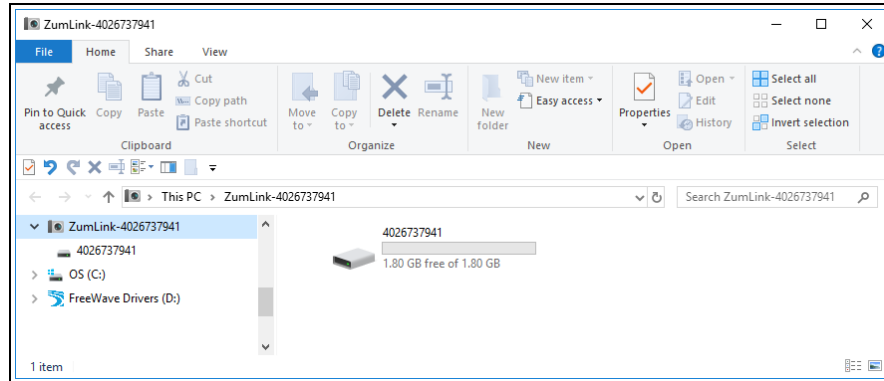


Figure 14: ZumLink window

3. In the **ZumLink** window, double-click the connected Z9-PC / Z9-PC-SR001. The files of the Z9-PC / Z9-PC-SR001 appear in the window. (Figure 15)

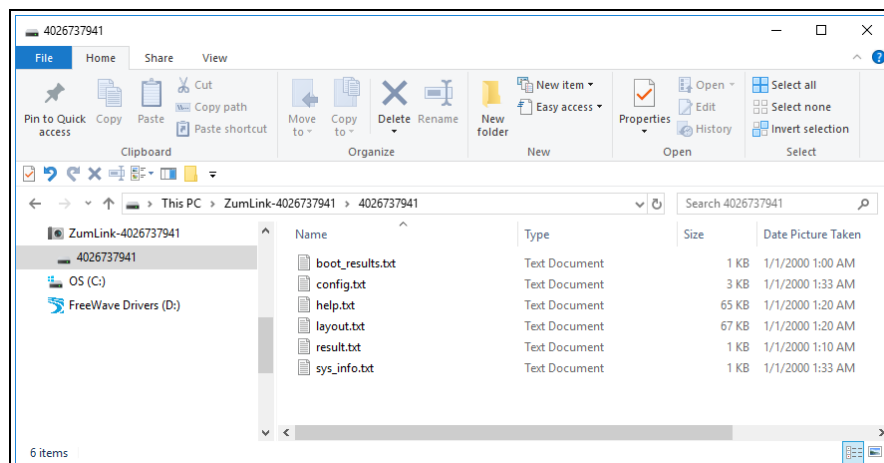


Figure 15: Opened ZumLink window showing the Default Files

4. Optional: Select, copy, and paste the **config.txt** file to a secure location.

Note: This is to backup the current **config.txt** before the upgrade process in case the old **config.txt** file needs to be restored.

5. Locate and select the downloaded **1_Device_Firmware_v1_1_0_1.pkg** upgrade file. (Figure 16)



Caution: A **.pkg** or **.fcf** file extension is required for Windows® 7. A **.pkg.txt** or **.fcf.txt** file extension may be required for some versions of Windows® 8, Windows® 8.1, and Windows® 10. Failure to save the file with the correct extension type results in the copied file **NOT** integrating with the Z9-PC / Z9-PC-SR001.

6. If using some versions of Windows® 8, Windows® 8.1, or Windows® 10, change the extension of the **.pkg** file to **.pkg.txt** and select that file.

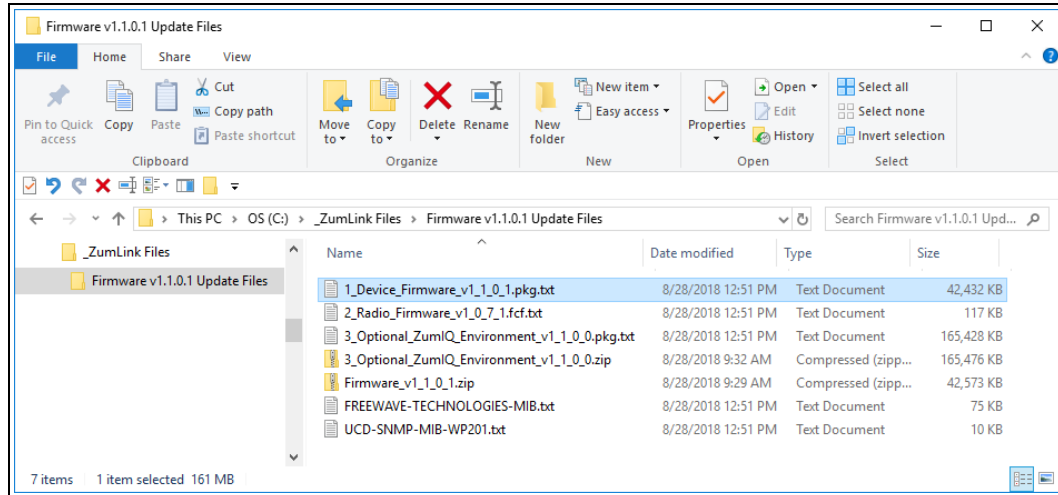


Figure 16: Selected **1_Device_Firmware_v1_1_0_1.pkg.txt** File

7. Drag and drop the **.pkg** or **.pkg.txt** file on to the **ZumLink** window. (Figure 17)

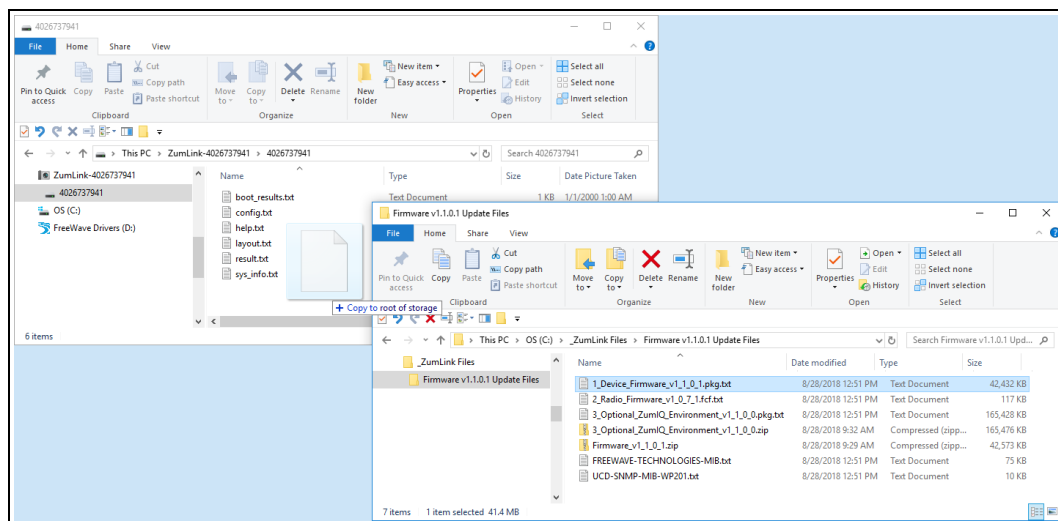


Figure 17: Drag and Drop the **.pkg** or **.pkg.txt** file to the **ZumLink** window

The **ZumLink** window is similar to [Figure 18](#):

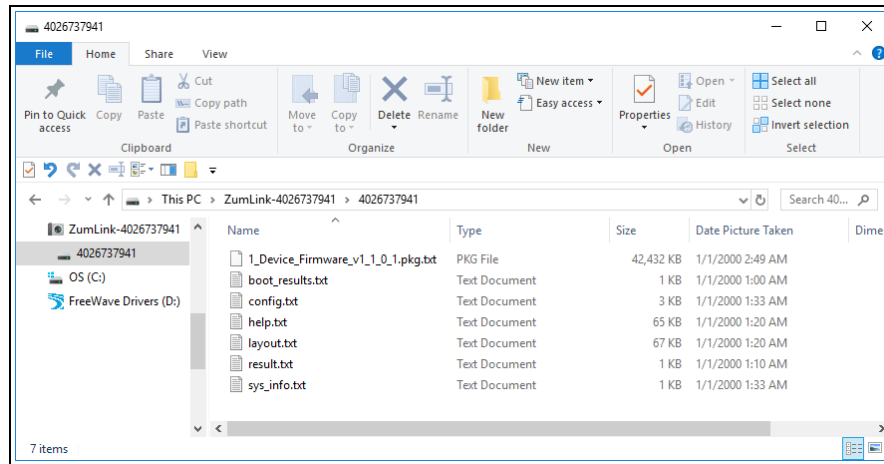


Figure 18: 1_Device_Firmware_v1_1_0_1.pkg.txt File Dropped in the ZumLink window

The **.pkg** or **.pkg.txt** file will disappear after approximately 6-10 minutes.

- WAIT** a few minutes for the **FreeWave Drivers** and **ZumLink** windows to close. The Z9-PC / Z9-PC-SR001 automatically reboots.

Warning! DO NOT remove power from the Z9-PC / Z9-PC-SR001 during the firmware upgrade process!



If power is removed prematurely during the upgrade process, the Web Interface pages may not be accessible.

Reinstall the **.pkg** file and **WAIT for the file upgrade process to complete**.



The **LEDs** ([on page 416](#)) indicated the upgrade process.

The **FreeWave Drivers** and **ZumLink** windows re-open when the **.pkg** or **.pkg.txt** upgrade file is applied.

- In the **ZumLink** window, double-click the connected Z9-PC / Z9-PC-SR001. The files of the Z9-PC / Z9-PC-SR001 appear in the window.
- Locate and select the downloaded **2_Radio_Firmware_v1_0_7_1.fcf** upgrade file. ([Figure 19](#))



Caution: A **.pkg** or **.fcf** file extension is required for Windows® 7. A **.pkg.txt** or **.fcf.txt** file extension may be required for some versions of Windows® 8, Windows® 8.1, and Windows® 10. Failure to save the file with the correct extension type results in the copied file **NOT** integrating with the Z9-PC / Z9-PC-SR001.

- If using some versions of Windows® 8, Windows® 8.1, or Windows® 10, change the extension of the **.fcf** file to **.fcf.txt** and select that file.

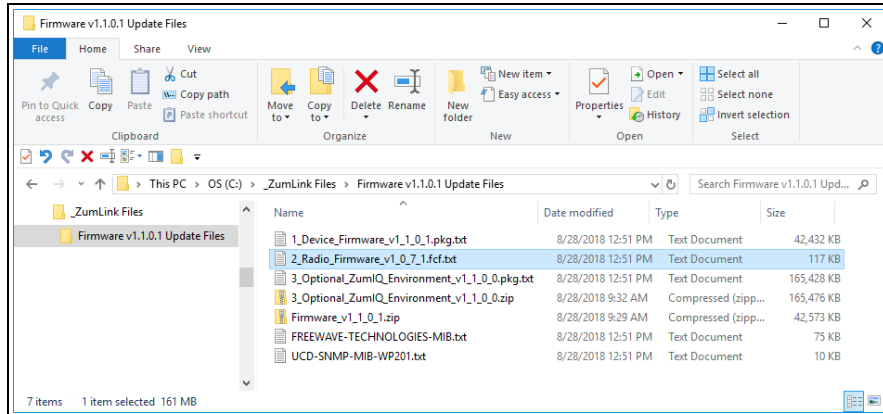


Figure 19: Selected **2_Radio_Firmware_v1_0_7_1.fcf.txt** File

12. Drag and drop the **.fcf** or **.fcf.txt** file on to the **ZumLink** window.

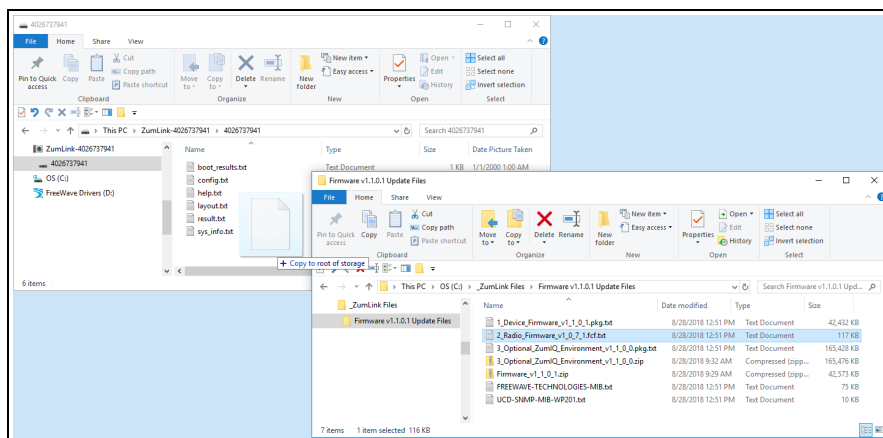


Figure 20: Drag and Drop the **.fcf** or **.fcf.txt** file to the **ZumLink** window

The **.fcf** or **.fcf.txt** file will disappear.

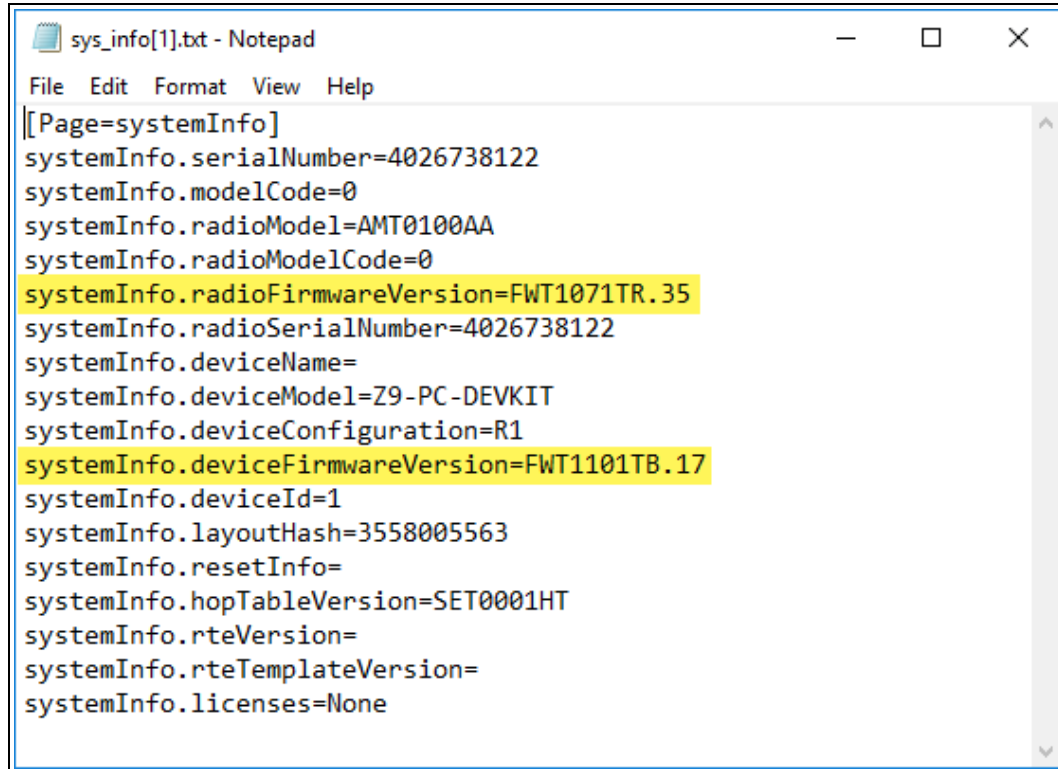
13. Wait for the **.fcf** or **.fcf.txt** file to be applied (\approx 1-2 minutes).



The **LEDs** (on page 416) indicated the upgrade process.

14. Optional: Open the **sys.info.txt** file to verify the upgrade information. (Figure 21)

Important! The image provides example information only.
Each Z9-PC / Z9-PC-SR001 provides its own unique information.



```
sys_info[1].txt - Notepad
File Edit Format View Help
[[Page=systemInfo]
systemInfo.serialNumber=4026738122
systemInfo.modelCode=0
systemInfo.radioModel=AMT0100AA
systemInfo.radioModelCode=0
systemInfo.radioFirmwareVersion=FWT1071TR.35
systemInfo.radioSerialNumber=4026738122
systemInfo.deviceName=
systemInfo.deviceModel=Z9-PC-DEVKIT
systemInfo.deviceConfiguration=R1
systemInfo.deviceFirmwareVersion=FWT1101TB.17
systemInfo.deviceId=1
systemInfo.layoutHash=3558005563
systemInfo.resetInfo=
systemInfo.hopTableVersion=SET0001HT
systemInfo.rteVersion=
systemInfo.rteTemplateVersion=
systemInfo.licenses=None
```

Figure 21: sys.info.txt file with Updated Firmware

Important! For the v1.1.0.1 upgrade, these parameters should have this information:
systemInfo.radioFirmwareVersion=FWT1071TR.35.
Web Interface - Radio Firmware Version is FWT1071TR.35.
systemInfo.deviceFirmwareVersion=FWT1101TB.17
Web Interface - Device Firmware Version is FWT1101TB.17
If these versions are NOT listed in their respective parameters, repeat the upgrade procedure.

15. Continue with:

- [Optional: Drag and Drop - Installation of ZumIQ Application Environment \(on page 89\)](#)
- [Drag and Drop Configuration - ZumLink \(on page 52\)](#)
- [CLI Configuration \(on page 64\)](#)

5.4. Firmware Upgrade - Web Interface

This procedure uses a web browser window to upgrade the Z9-PC / Z9-PC-SR001 firmware.



Warning! The upgrade file names are numbered 1_, 2_, and 3_ and **MUST BE INSTALLED IN A SPECIFIC NUMERIC ORDER** for a successful upgrade.

- Alternatively, use the [Firmware Upgrade - Drag and Drop \(on page 34\)](#) to upgrade the Z9-PC / Z9-PC-SR001.
- The images in this procedure are for Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

FREEWAVE Recommends: Upgrade to v1.1.0.1 to use the enhanced features and updated security of the Z9-PC / Z9-PC-SR001.
Prior to an upgrade or downgrade procedure, save and backup all applications.



Caution: This procedure requires the Windows® Explorer file extension to be visible. See the Microsoft® topic [Show or Hide File Name Extensions](#) to view the extensions.

The Z9-PC / Z9-PC-SR001 upgrade process requires these basic steps:

- A. [Download the Upgrade File \(on page 28\)](#)
- B. [Setup the Computer IP Address Configuration \(on page 41\)](#)
- C. [Install the Upgrade File using the Web Interface \(on page 45\)](#)

Note: This method is used for computers running Windows® 7 and later.

5.4.1. Setup the Computer IP Address Configuration

Note: The images in this procedure are for Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

1. On the computer, click the Windows® **Start** button and select **Control Panel**.
2. View the **Control Panel** window by **Category** and click **Network and Sharing Center**. (Figure 22)

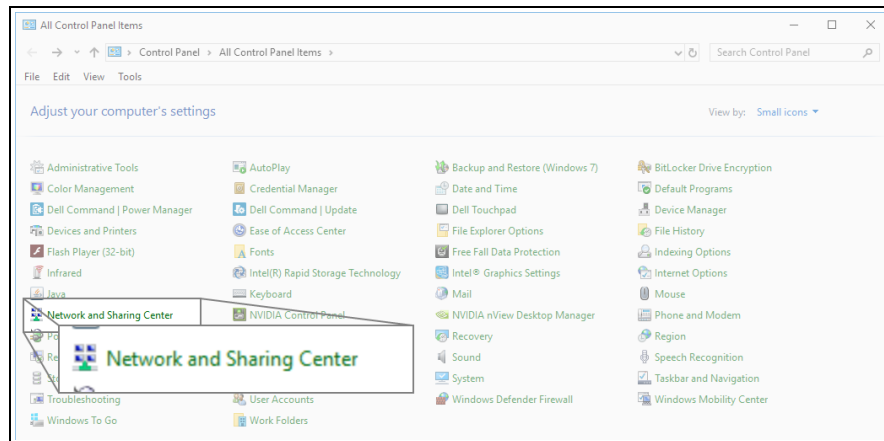


Figure 22: Control Panel > Network and Sharing Center

The **Network and Sharing Center** window opens.

3. Click the **Change Adapter Settings** link. (Figure 23)

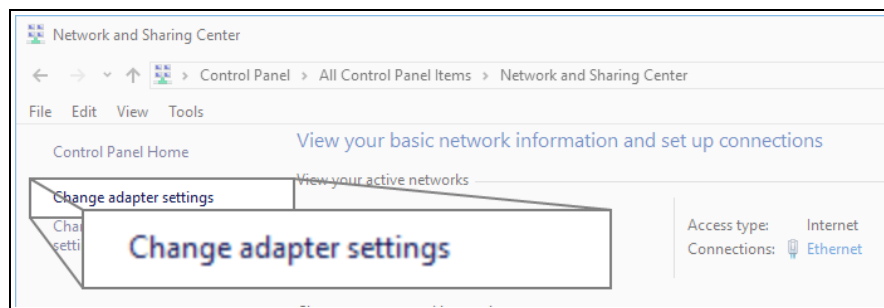


Figure 23: Change Adapter Settings Link

The **Network Connections** window opens. (Figure 24)

4. Double-click the **Local Area Connection** link or the connected **Network Connection**.

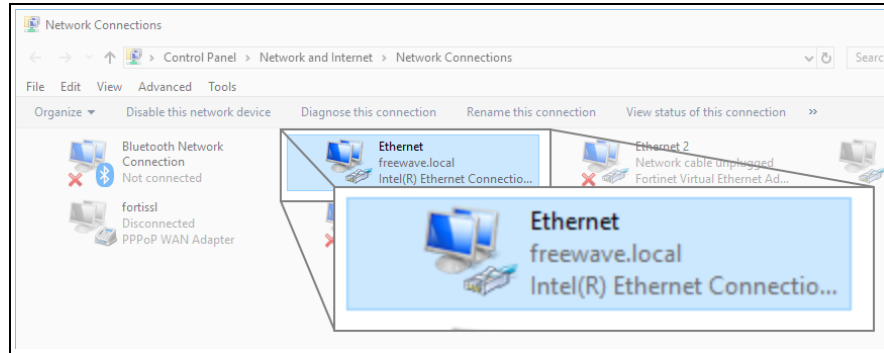


Figure 24: Network Connections window

The **Ethernet Status** dialog box opens. (Figure 25)

5. Click the **Properties** button.

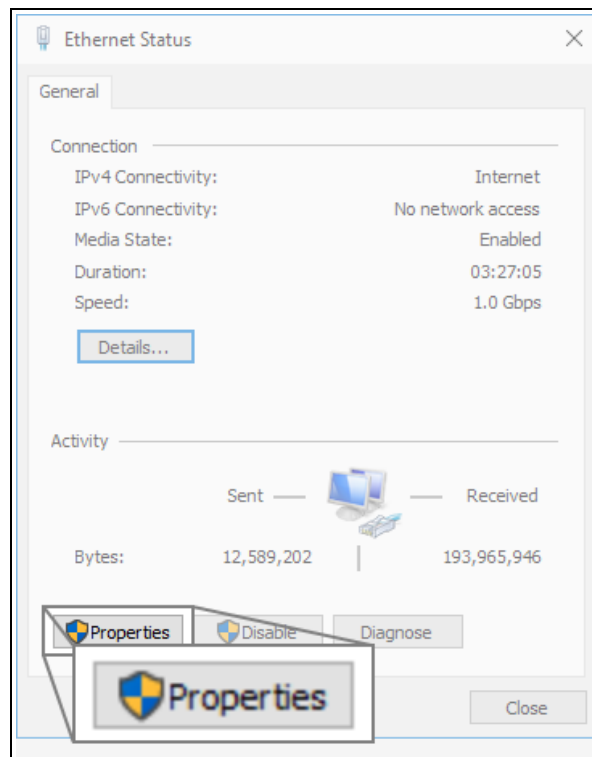


Figure 25: Ethernet Status dialog box

The **Ethernet Properties** dialog box opens.

6. Select the **Internet Protocol Version 4 (TCP/IPv4)** option. (Figure 26)
7. Click the **Properties** button.

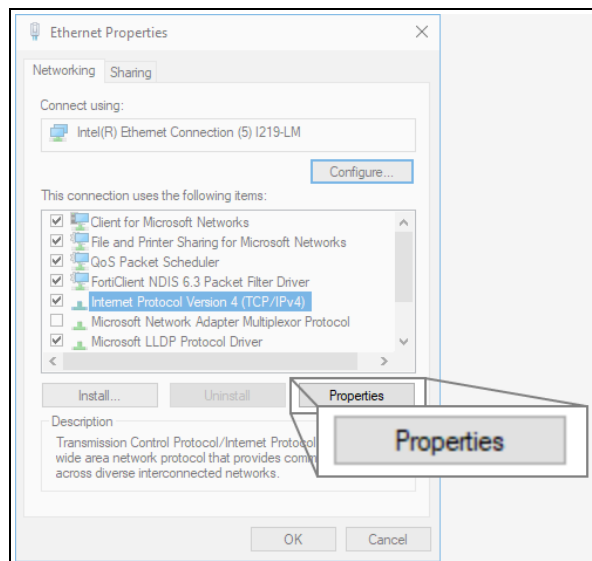


Figure 26: Ethernet Properties dialog box

The **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog box opens. (Figure 27)

- IMPORTANT:** Make a note of the current settings (to reverse this procedure later).

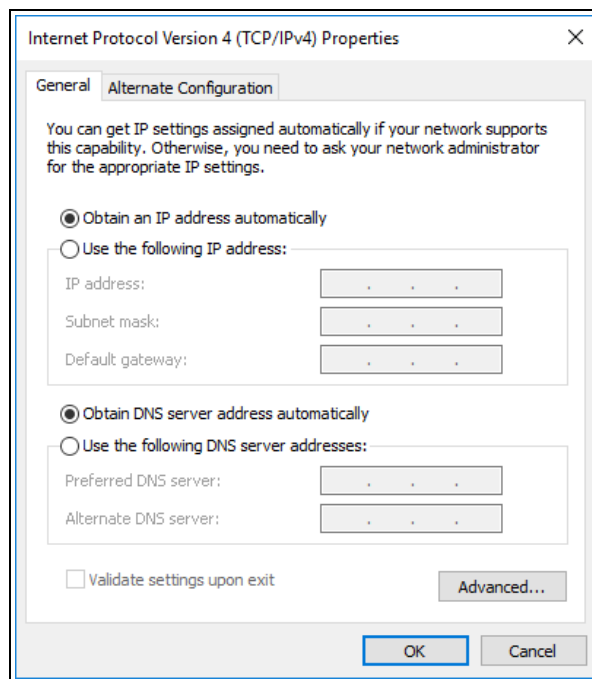


Figure 27: Default Example of Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

- Select the **Use the following IP address** option button.

10. In the **IP Address** text box, enter an IP Address that is **in the same subnet range but a DIFFERENT IP Address** than the Z9-PC / Z9-PC-SR001 or all other units in the network. (Figure 28)

Example: Enter an **IP Address** from **192.168.111.1** to **192.168.111.254** (but NOT **192.168.111.100**) and the **Subnet Mask** to **255.255.255.0**.

Note: The default Z9-PC / Z9-PC-SR001 IP Address is **192.168.111.100**.
The default subnet mask is **255.255.255.0**.

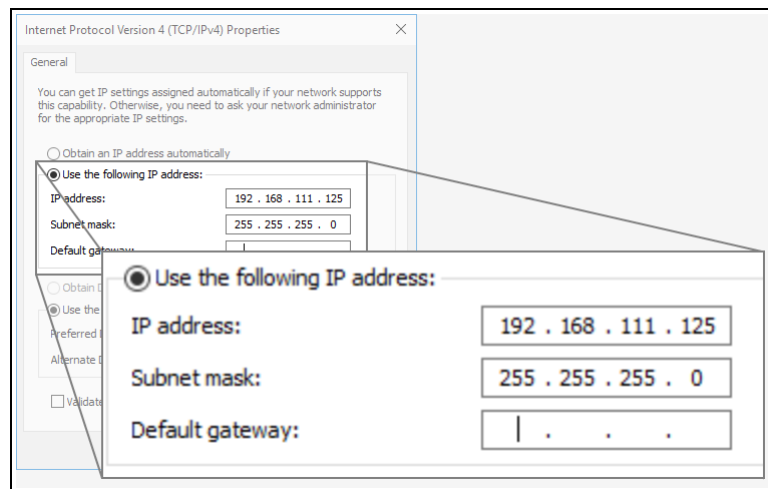


Figure 28: Changed Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

Note: An IP Address is NOT required in the **Default Gateway** text box.

11. Click **OK** to save the changes and close the dialog box.
12. Click **Close** twice to close the **Local Area Connection Properties** and **Local Area Connection Status** dialog boxes.
13. Continue with [Install the Upgrade File using the Web Interface \(on page 45\)](#).

5.4.2. Install the Upgrade File using the Web Interface

Note: The images in this procedure are for Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

1. Verify the [Download the Upgrade File \(on page 28\)](#) procedure is complete.
2. Using a CAT5e / CAT6 Ethernet cable, connect the Z9-PC / Z9-PC-SR001 Ethernet port to the computer's Ethernet port.
3. Open a web browser.
4. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**. If the IP address was changed, enter that IP Address.

5. Refresh the browser window (press <Enter> or <F5>). The [Home window \(on page 343\)](#) opens.
6. On the Menu bar, click the **File Upload** link. ([Figure 29](#))

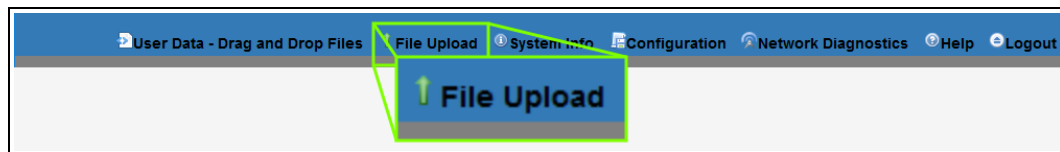


Figure 29: File Upload link

The **Authentication Required** (Login) dialog box opens.

7. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the [File Upload window](#) opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

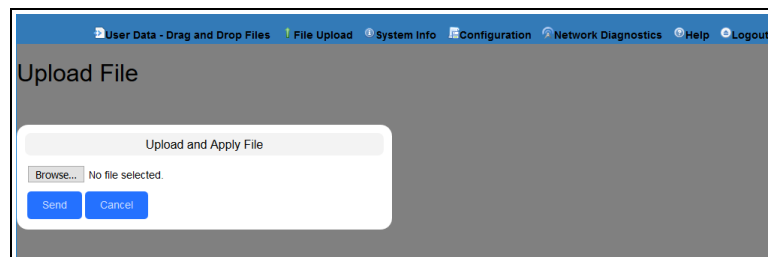


Figure 30: File Upload window

8. Click the **Browse** button. The **File Upload** dialog box opens.
9. Locate and select the downloaded **1_Device_Firmware_v1_1_0_1.pkg** upgrade file. ([Figure 31](#))

Caution: A **.pkg** or **.fcf** file extension is required for Windows® 7. A **.pkg.txt** or **.fcf.txt** file extension may be required for some versions of Windows® 8, Windows® 8.1, and Windows® 10. Failure to save the file with the correct extension type results in the copied file **NOT** integrating with the Z9-PC / Z9-PC-SR001.

10. If using some versions of Windows® 8, Windows® 8.1, or Windows® 10, change the extension of the **.pkg** file to **.pkg.txt** and select that file.

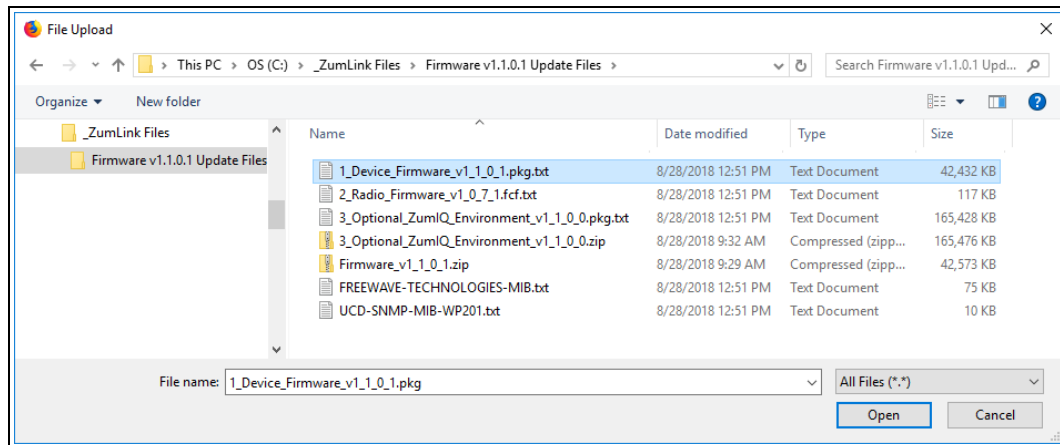


Figure 31: File Upload dialog box with Selected 1_Device_Firmware_v1_1_0_1.pkg.txt File

11. Click **Open**. The dialog box closes and the **File Upload** window returns showing the selected file. (Figure 32)

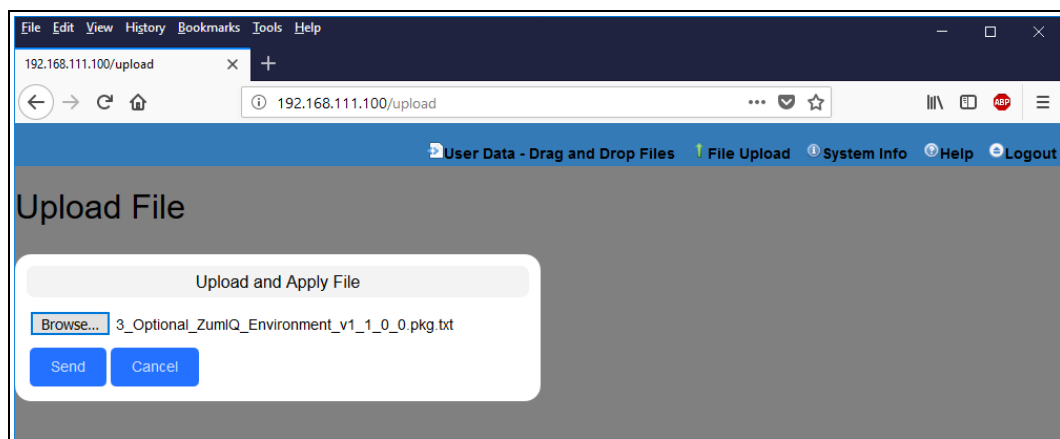


Figure 32: File Upload window with Selected 1_Device_Firmware_v1_1_0_1.pkg.txt File

12. Click **Send**.

The **File Upload** window changes to show the completed upload percentage to the Z9-PC / Z9-PC-SR001. (Figure 33)

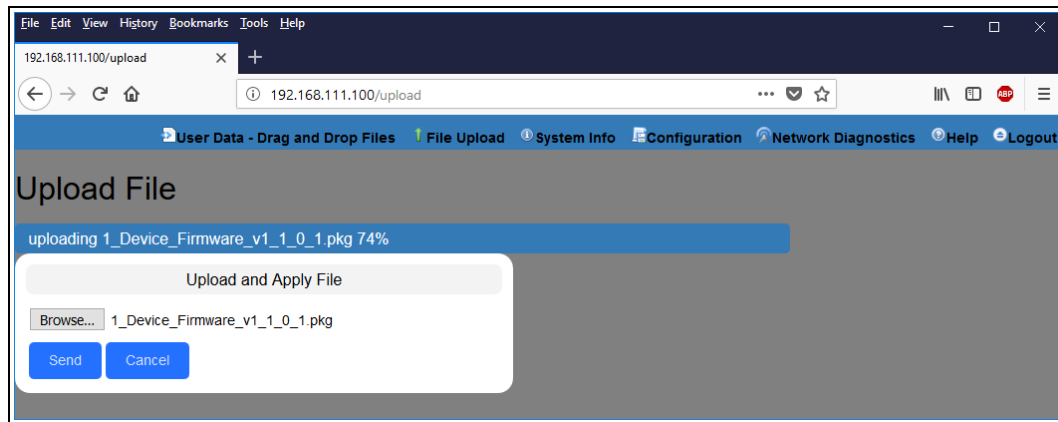


Figure 33: File Upload window Showing Uploading Percentage

13. Wait for the **.pkg** or **.pkg.txt** file to be applied (\approx 6-10 minutes).

Warning! DO NOT remove power from the Z9-PC / Z9-PC-SR001 during the firmware upgrade process!



If power is removed prematurely during the upgrade process, the Web Interface pages may not be accessible.

Reinstall the **.pkg** file and **WAIT for the file upgrade process to complete**.

The **File Upload** window refreshes and shows the completed and uploaded file applied to the Z9-PC / Z9-PC-SR001. (Figure 34)



The **LEDs** (on page 416) indicated the upgrade process.

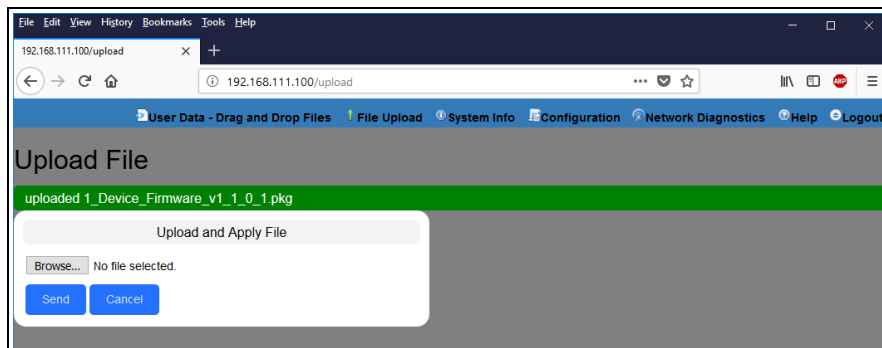


Figure 34: File Upload window Showing Completed Upload of the Selected File

14. Click the **Browse** button.

The **File Upload** dialog box opens.

15. Locate and select the downloaded **2_Radio_Firmware_v1_0_7_1.fcf** upgrade file. (Figure 35)
16. Optional: If using some versions of Windows® 8, Windows® 8.1, or Windows® 10, change the extension of the **.fcf** file to **.fcf.txt** and select that file.

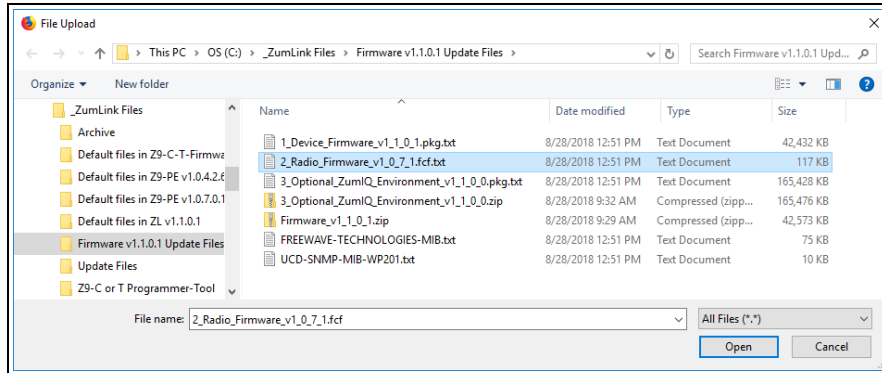


Figure 35: File Upload dialog box with Selected .fcf File

17. Click **Open**.
The dialog box closes and the **File Upload** window returns showing the selected file. (Figure 36)

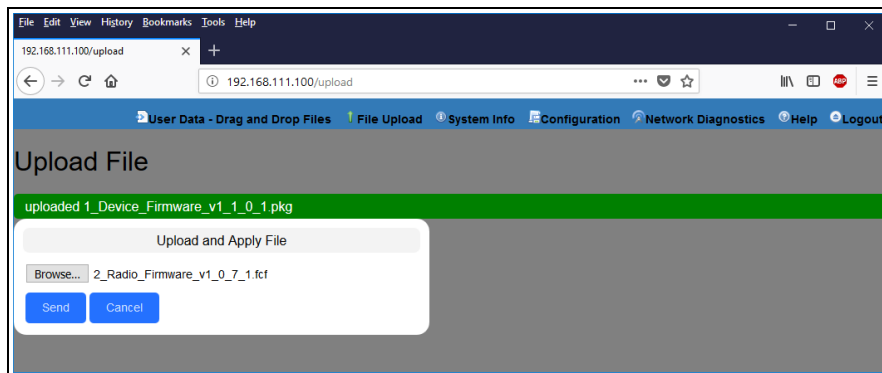


Figure 36: File Upload window with Selected .fcf File

18. Click **Send**.
The **File Upload** window changes to show the completed upload percentage to the Z9-PC / Z9-PC-SR001. (Figure 37)

Note: The **.fcf** file uploads very quickly (\approx 1-2 minutes).



The **LEDs** (on page 416) indicated the upgrade process.

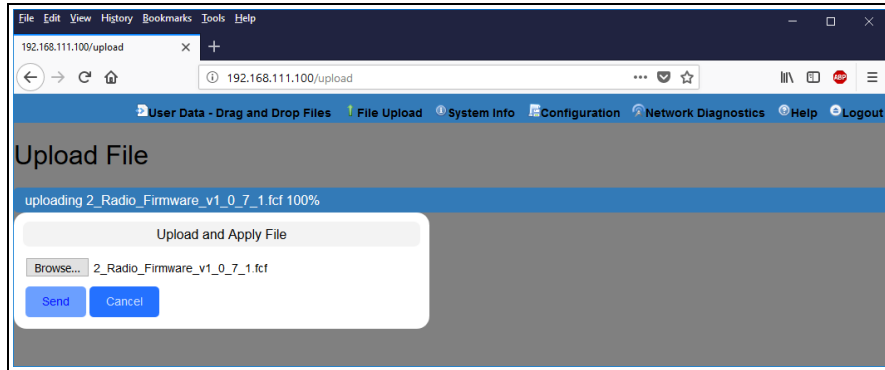


Figure 37: File Upload window Showing Uploading Percentage

The **File Upload** window refreshes and shows the completed and uploaded file applied to the Z9-PC / Z9-PC-SR001. (Figure 38)

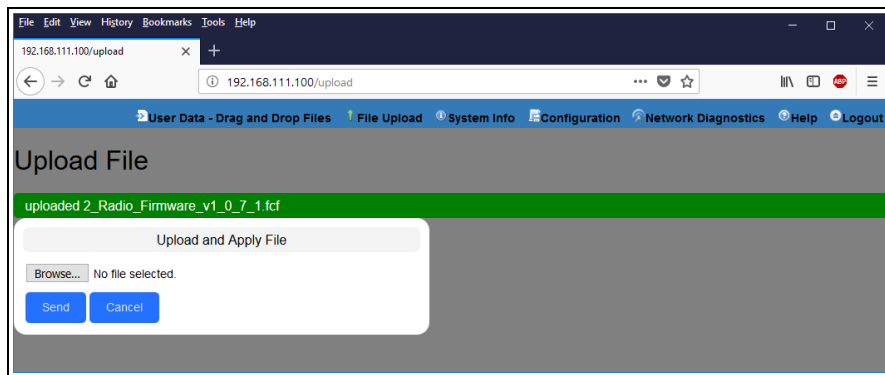


Figure 38: File Upload window Showing Completed Upload of the Selected File

19. Click the **System Info** link. (Figure 39)

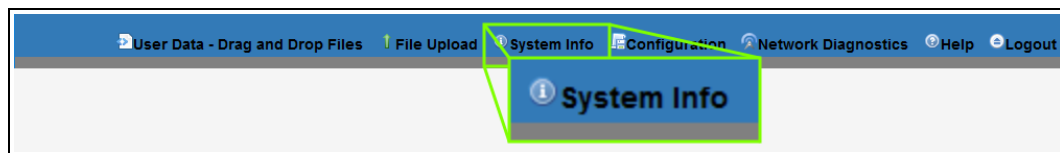
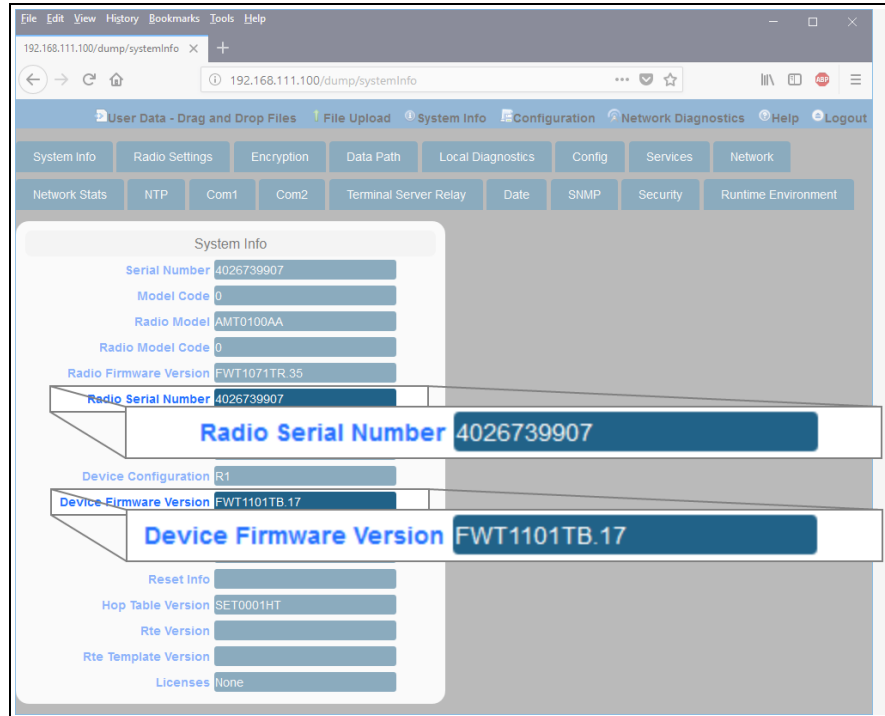


Figure 39: System Info link

The **System Info window** opens showing the updated firmware on the Z9-PC / Z9-PC-SR001. (Figure 40)

Important!: The image provides example information only.
Each Z9-PC / Z9-PC-SR001 provides its own unique information.

**Figure 40: System Info window**

Important! For the v1.1.0.1 upgrade, these parameters should have this information:
systemInfo.radioFirmwareVersion=FWT1071TR.35.
Web Interface - Radio Firmware Version is FWT1071TR.35.
systemInfo.deviceFirmwareVersion=FWT1101TB.17
Web Interface - Device Firmware Version is FWT1101TB.17
If these versions are NOT listed in their respective parameters, repeat the upgrade procedure.

20. Continue with:

- [Optional: Web Interface - Installation of ZumIQ Application Environment \(on page 92\)](#)
- [Web Interface Configuration - Z9-PC / Z9-PC-SR001 \(on page 80\)](#)

6. Configuration

- [Drag and Drop Configuration - ZumLink \(on page 52\)](#)
- [CLI Configuration \(on page 64\)](#)
- [Web Interface Configuration \(on page 74\)](#)

6.1. Drag and Drop Configuration - ZumLink



Caution: This procedure requires the Windows® Explorer file extension to be visible. See the Microsoft® topic [Show or Hide File Name Extensions](#) to view the extensions.

Important!: Windows® 7 or later is required to use the USB Drag and Drop.

Note: The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

Procedure

1. Connect the USB cable to the computer and the micro-USB end to the **ZumLink**. The **FreeWave Drivers** and **ZumLink** windows may open.

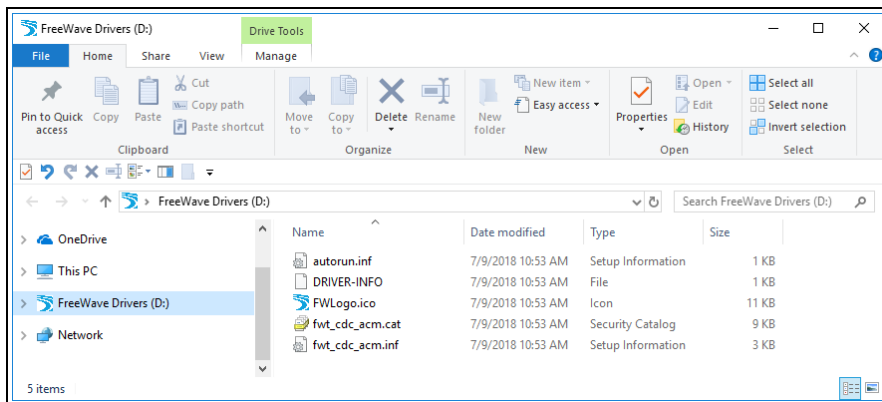


Figure 41: AutoPlay FreeWave Drivers window

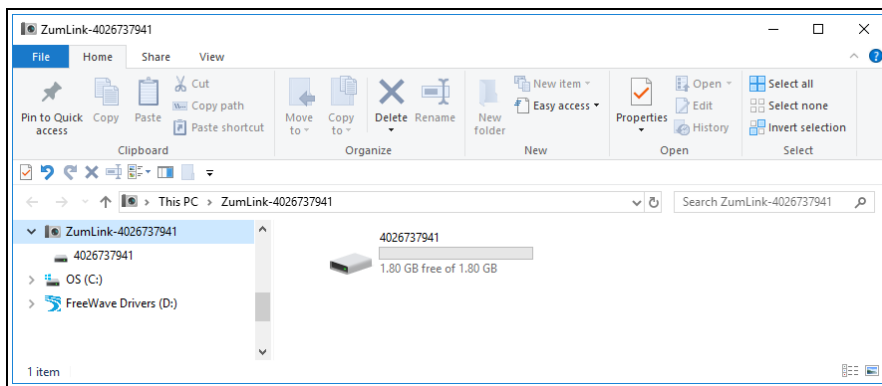


Figure 42: ZumLink window

2. In the **ZumLink** window (Figure 42), double-click the connected Z9-PC / Z9-PC-SR001. The files of the Z9-PC / Z9-PC-SR001 appear in the window.

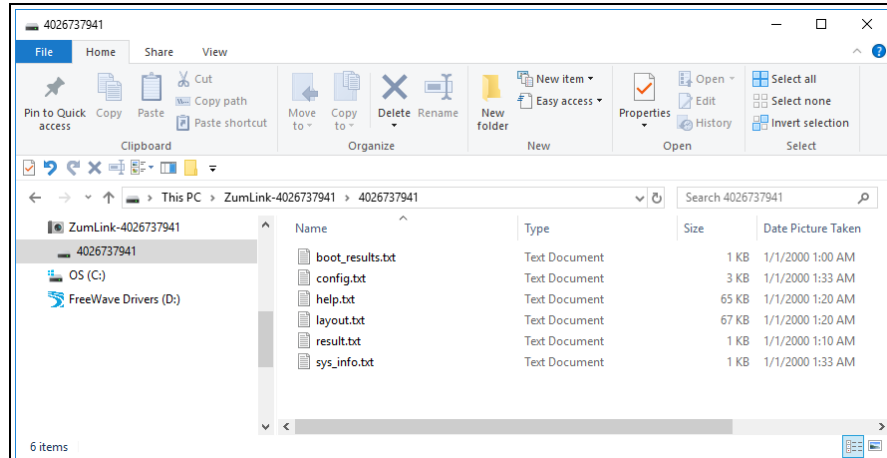


Figure 43: Opened ZumLink window showing the Default Files

3. Select the **config.txt** file and copy it to the clipboard (press <Ctrl+C>).
4. Leave the **ZumLink** window open - it is used later in the procedures.
5. Open a Windows® Explorer window and create a designated folder for changed configuration files.

Example: C:\ZumLink Config File.

6. Paste (press <Ctrl+V>) the copied **config.txt** file into the designated folder.

Important!: The **.txt** file must be copied to a separate location on the computer to edit. The file **CANNOT** be changed directly in the **ZumLink** folder.

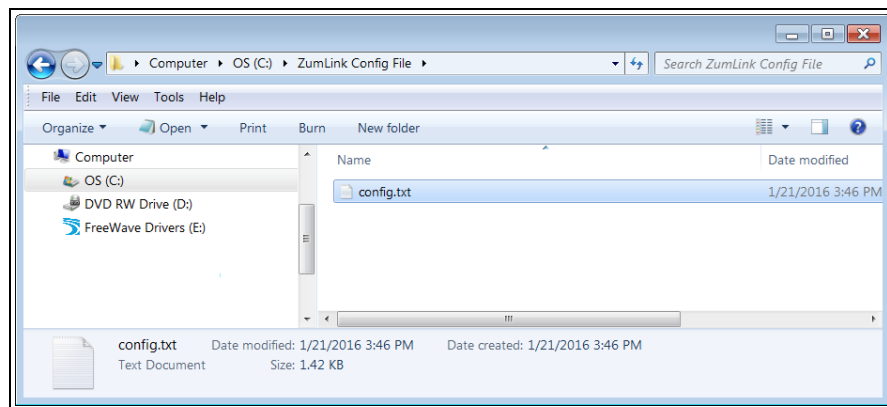


Figure 44: Copied config.txt file in the designated configuration folder.

7. Double-click the **config.txt** to open it in the default text editor.

Note: This example uses Notepad®.

8. Click the Notepad® **File** menu and click **Save As**.

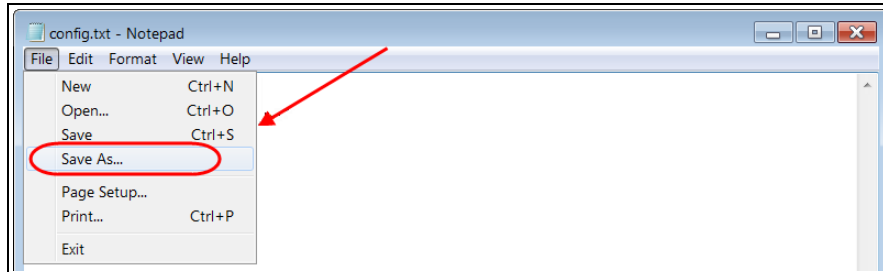


Figure 45: Notepad® window - File > Save As menu.

The **Save As** dialog box opens.

- In the **File Name** text box, enter a file name with either the **.cfg** or **.cfg.txt** extension.

Note: The file name used in this example is for illustration purposes only. Any name can be used. NO SPACES are allowed in the file name.



Caution: A **.cfg** file extension is required for Windows® 7. A **.cfg.txt** file extension may be required for some versions of Windows® 8 and Windows® 10. Failure to save the file with the correct extension type results in the file **NOT** being able to integrate with the **ZumLink config.txt** file when copied to the **ZumLink** window.

- Click the **Save as type** list box arrow and select **All Files**.

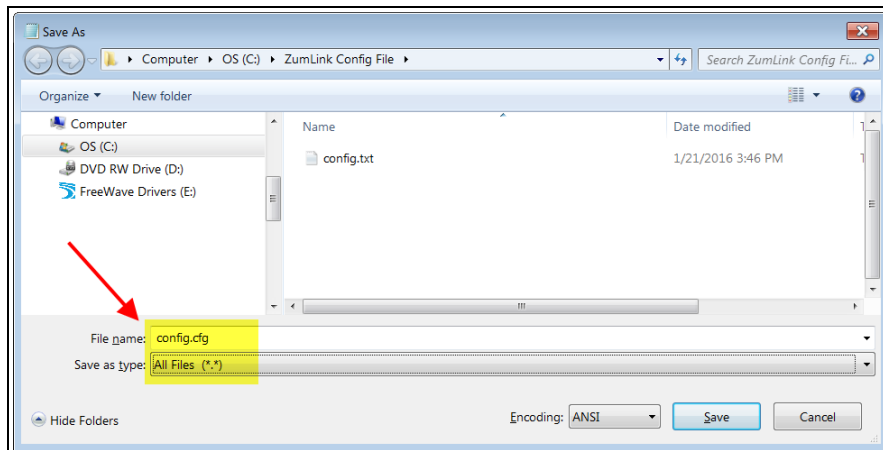


Figure 46: Save As dialog box with All Files (*.*) selected.

- Click .

The dialog box closes and the text editor returns with the new **.cfg** or **.cfg.txt** file open.

- As applicable, change these general settings:
 - [Page=systemInfo]
 - systemInfo.deviceName
 - systemInfo.deviceId

Note: See the [systemInfo Parameters \(on page 304\)](#) for detailed information about the parameters.

- [Page=radioSettings]
 - radioSettings.txPower
 - radioSettings.rfDataRate***
 - radioSettings.radioMode
 - radioSettings.networkId***
 - radioSettings.nodeId**
 - radioSettings.radioFrequency***
 - radioSettings.radioHoppingMode***
 - radioSettings.beaconInterval

Note: See [radioSettings Parameters \(on page 254\)](#) for detailed information about these settings.

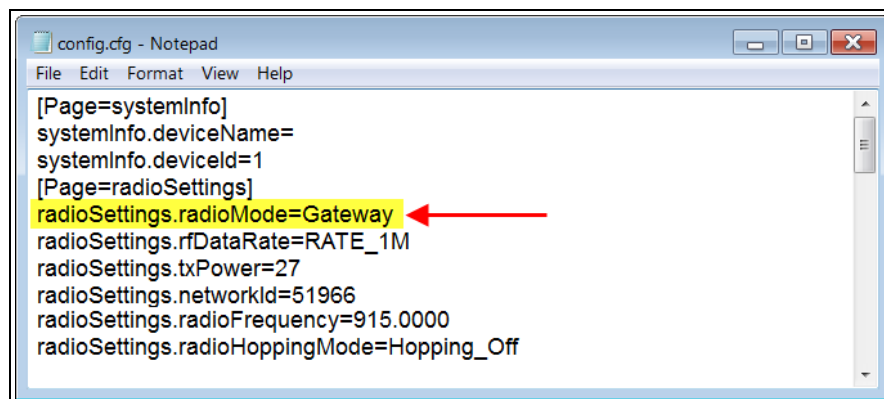
Each radio with the same **networkId must have a UNIQUE **nodeId**.

A unique nodeId is required so that only one node will unicast an acknowledgment. Otherwise, two or more nodes will unicast an acknowledgment that may collide.

***These are the Golden Settings and they MUST match between all radios with the same **networkId**.

Important! With **radioHoppingMode** enabled, only one radio can be designated as a Gateway or Gateway-Repeater. All other radios MUST be designated as Endpoints or Endpoint-Repeaters. For detailed information, see the [radioSettings Parameters \(on page 254\)](#).

Example: For illustration, the **radioSettings.radioMode** was changed from **Endpoint** to **Gateway**.



```
config.cfg - Notepad
File Edit Format View Help
[Page=systemInfo]
systemInfo.deviceName=
systemInfo.deviceId=1
[Page=radioSettings]
radioSettings.radioMode=Gateway
radioSettings.rfDataRate=RATE_1M
radioSettings.txPower=27
radioSettings.networkId=51966
radioSettings.radioFrequency=915.0000
radioSettings.radioHoppingMode=Hopping_Off
```

Figure 47: Notepad® with the **.cfg** file open.

15. Press <Ctrl+S> or, on the **File** menu, click **Save** to save the updated file.
16. Close the text editor.
17. Locate and open the **ZumLink** window so it is side-by-side with the changed configuration file window.
18. Open the Windows® Explorer designated folder for changed configuration files.
19. Select the changed **.cfg** or **.cfg.txt** file.

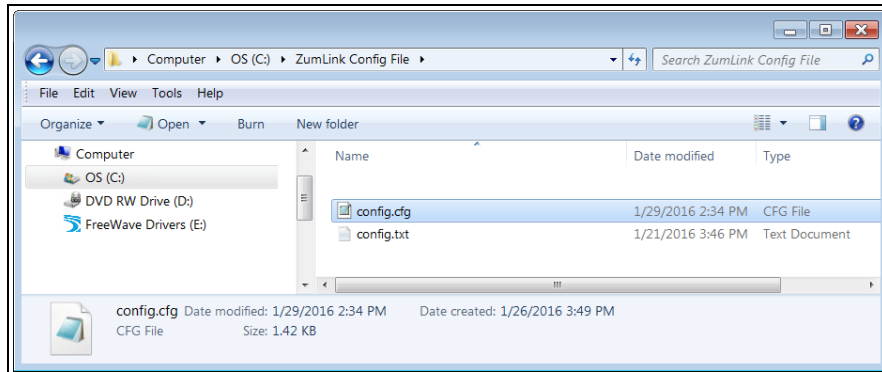


Figure 48: Select the changed .cfg or .cfg.txt file.

20. Drag and drop the **.cfg** or **.cfg.txt** file to the **ZumLink** window.

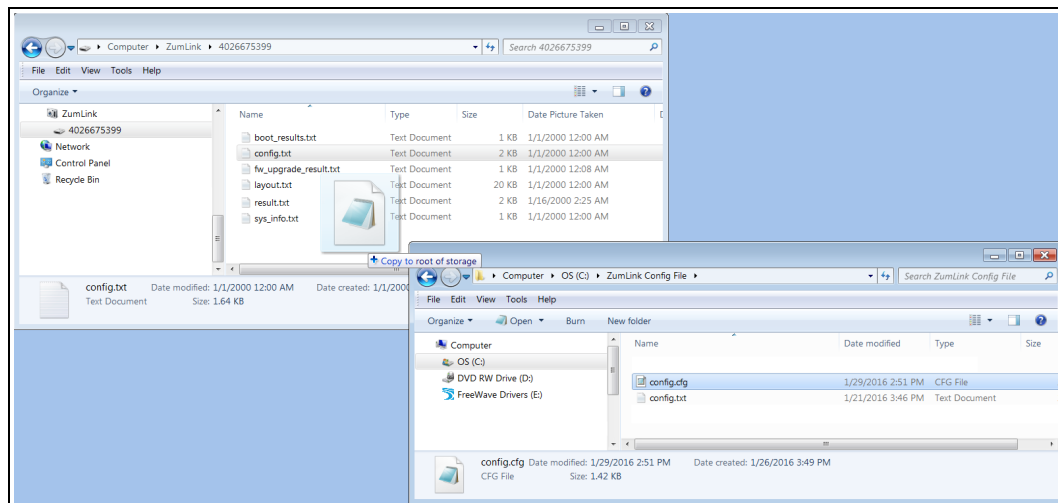


Figure 49: Drag and drop the .cfg or .cfg.txt file to the ZumLink window.

21. Wait for the **.cfg** or **.cfg.txt** file to integrate with the **ZumLink config.txt** file.

Note: The more changes made in the **.cfg** or **.cfg.txt** file, the longer the Z9-PC / Z9-PC-SR001 takes to process the file and update the **config.txt** file.
If very few changes are made, the **.cfg** or **.cfg.txt** file does not appear in the window.

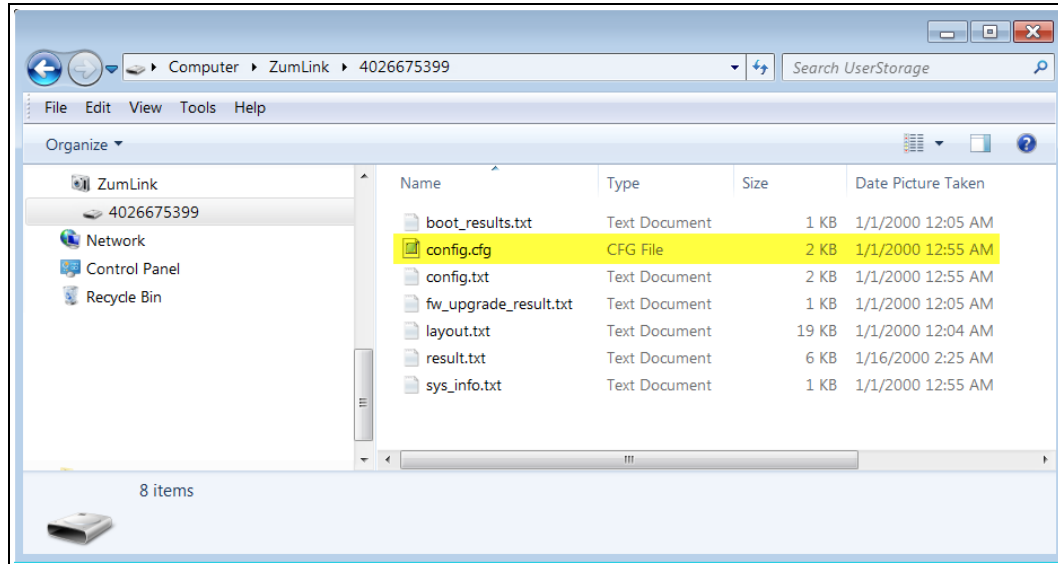


Figure 50: Changed .cfg file copied to the ZumLink window.

When the **config.txt** is updated, the changed **.cfg** or **.cfg.txt** file is removed from the list of files in the **ZumLink** window.

22. Double-click the **result.txt** file to verify there are **No errors Detected** with the identified changes in the file.

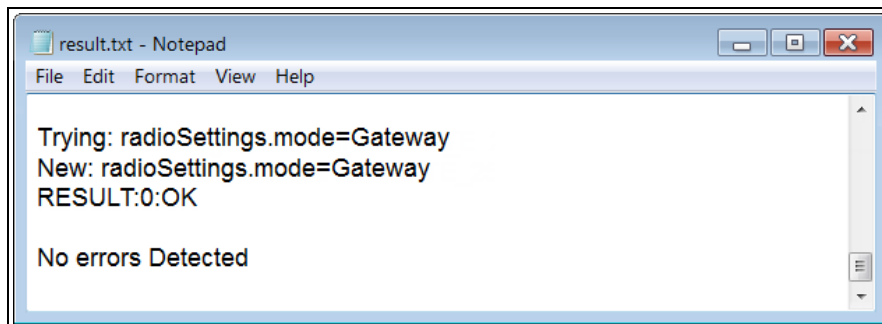


Figure 51: Opened result.txt file.

If an error is detected, the **result.txt** file will indicate that errors are present.

23. As appropriate, repeat the Drag and Drop procedure to correct any errors.
24. Optional: Double-click the **config.txt** file to view and verify the new Z9-PC / Z9-PC-SR001 configuration.
25. Optional: Complete the [Change the Passwords \(on page 156\)](#) procedure.

6.2. Drag and Drop Configuration - ZumIQ



Caution: This procedure requires the Windows® Explorer file extension to be visible. See the Microsoft® topic [Show or Hide File Name Extensions](#) to view the extensions.

Important!: Windows® 7 or later is required to use the USB Drag and Drop.

Note: The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

Procedure

1. Connect the USB cable to the computer and the micro-USB end to the **ZumLink**. The **FreeWave Drivers** and **ZumLink** windows may open.

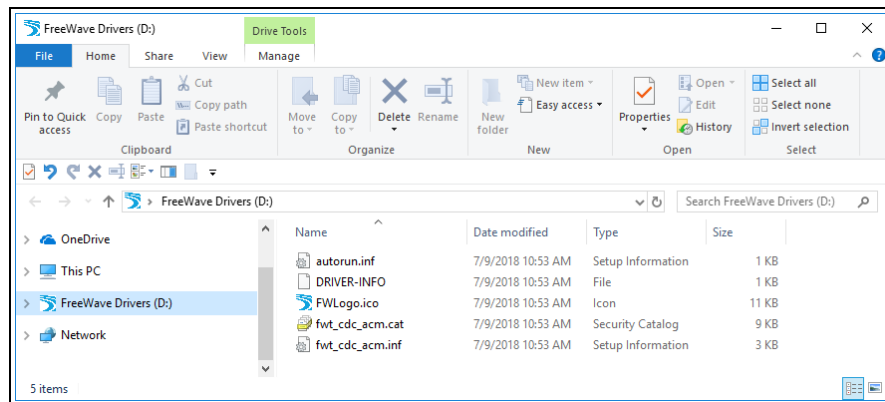


Figure 52: AutoPlay FreeWave Drivers window

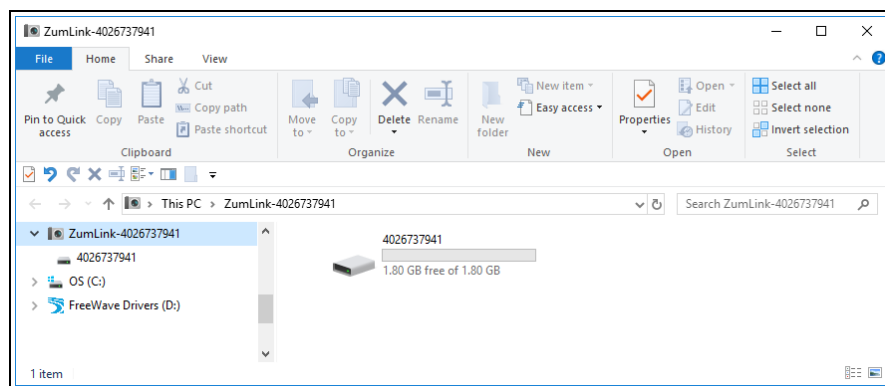


Figure 53: ZumLink window

2. In the **ZumLink** window (Figure 53), double-click the connected Z9-PC / Z9-PC-SR001. The files of the Z9-PC / Z9-PC-SR001 appear in the window.

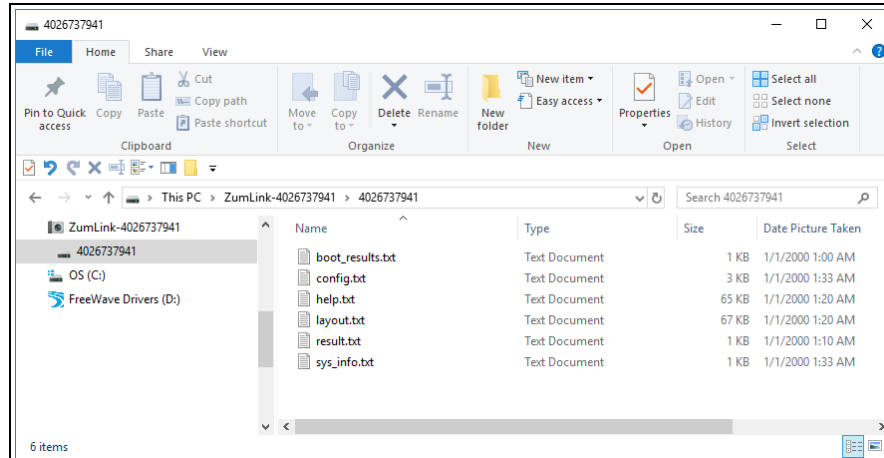


Figure 54: Opened ZumLink window showing the Default Files

3. Select the **config.txt** file and copy it to the clipboard (press <Ctrl+C>).
4. Leave the **ZumLink** window open - it is used later in the procedures.
5. Open a Windows® Explorer window and create a designated folder for changed configuration files.

Example: C:\ZumLink Config File.

6. Paste (press <Ctrl+V>) the copied **config.txt** file into the designated folder.

Important!: The **.txt** file must be copied to a separate location on the computer to edit. The file **CANNOT** be changed directly in the **ZumLink** folder.

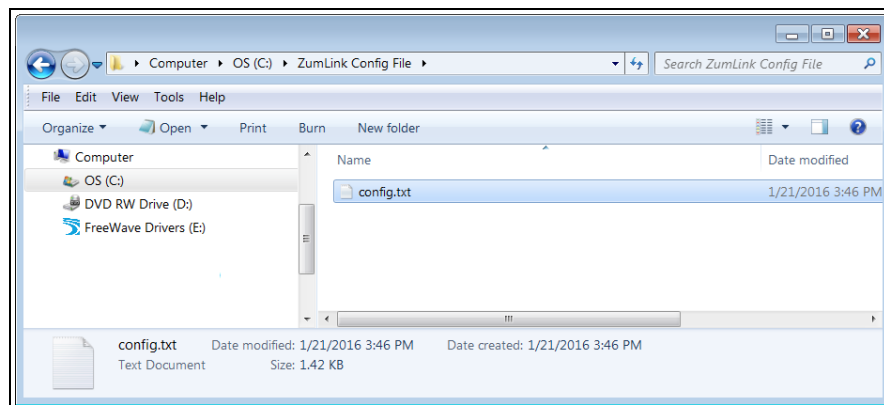


Figure 55: Copied config.txt file in the designated configuration folder.

7. Double-click the **config.txt** to open it in the default text editor.

Note: This example uses Notepad®.

8. Click the Notepad® **File** menu and click **Save As**.

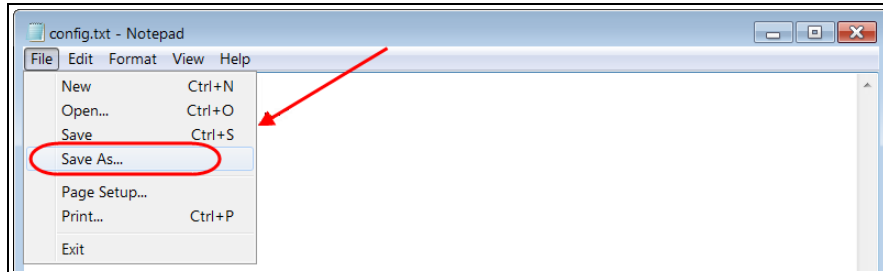


Figure 56: Notepad® window - File > Save As menu.

The **Save As** dialog box opens.

- In the **File Name** text box, enter a file name with either the **.cfg** or **.cfg.txt** extension.

Note: The file name used in this example is for illustration purposes only. Any name can be used. NO SPACES are allowed in the file name.



Caution: A **.cfg** file extension is required for Windows® 7.

A **.cfg.txt** file extension may be required for some versions of Windows® 8 and Windows® 10.

Failure to save the file with the correct extension type results in the file **NOT** being able to integrate with the **ZumLink config.txt** file when copied to the **ZumLink** window.

- Click the **Save as type** list box arrow and select **All Files**.

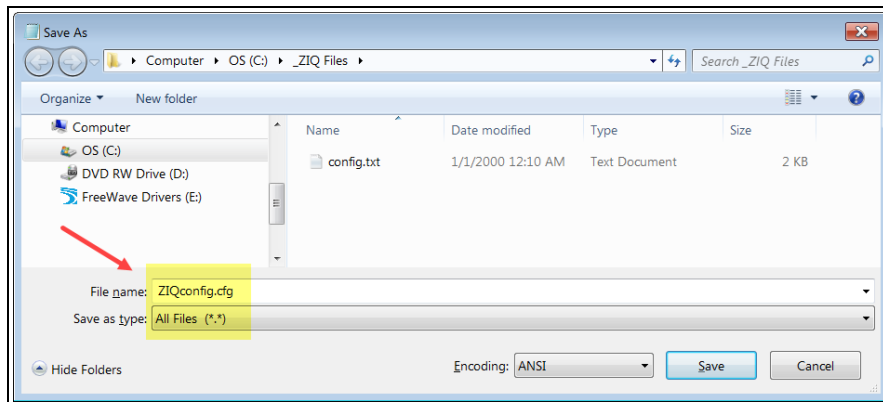
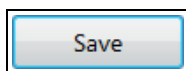


Figure 57: Save As dialog box with All Files (*.*) selected.

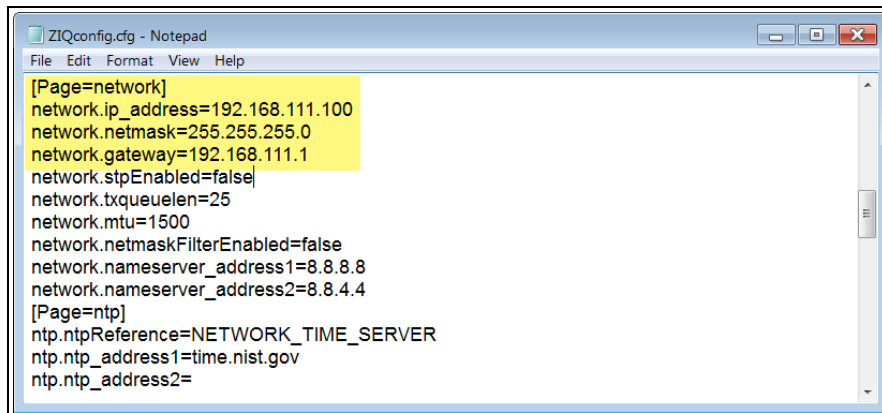
- Click



The dialog box closes and the text editor returns with the new **.cfg** or **.cfg.txt** file open.

- As applicable, change these **Network** settings to meet the network architecture:
 - [Page=network]
 - network.ip_address=nnn.nnn.nnn.nnn
 - network.netmask=nnn.nnn.nnn.nnn
 - network.gateway=nnn.nnn.nnn.nnn

Note: See the [network Parameters \(on page 237\)](#) for detailed information about the parameters.



```
[Page=network]
network.ip_address=192.168.111.100
network.netmask=255.255.255.0
network.gateway=192.168.111.1
network.stpEnabled=false
network.txqueuelen=25
network.mtu=1500
network.netmaskFilterEnabled=false
network.nameserver_address1=8.8.8.8
network.nameserver_address2=8.8.4.4
[Page=ntp]
ntp.ntpReference=NETWORK_TIME_SERVER
ntp.ntp_address1=time.nist.gov
ntp.ntp_address2=
```

Figure 58: ZIQconfig.cfg Network Page

15. Press <Ctrl+S> or, on the **File** menu, click **Save** to save the updated file.
16. Close the text editor.
17. Locate and open the **ZumLink** window so it is side-by-side with the changed configuration file window.
18. Open the Windows® Explorer designated folder for changed configuration files.
19. Select the changed **.cfg** or **.cfg.txt** file.

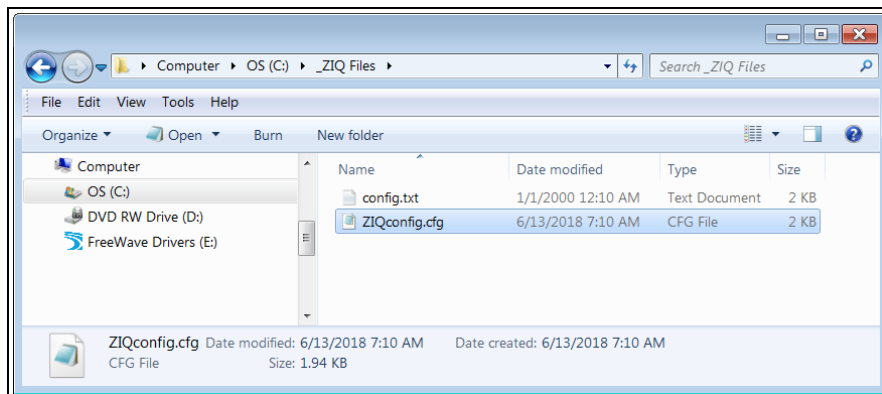


Figure 59: Select the changed **.cfg or **.cfg.txt** file.**

20. Drag and drop the **.cfg** or **.cfg.txt** file to the **ZumLink** window.

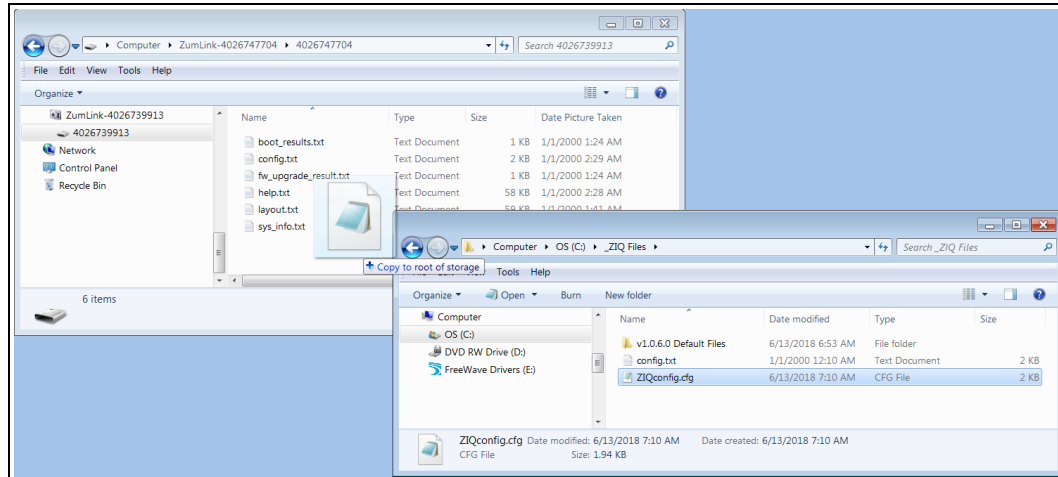


Figure 60: Drag and drop the `.cfg` or `.cfg.txt` file to the ZumLink window.

21. Wait for the `.cfg` or `.cfg.txt` file to integrate with the **ZumLink `config.txt`** file.

Note: The more changes made in the `.cfg` or `.cfg.txt` file, the longer the Z9-PC / Z9-PC-SR001 takes to process the file and update the `config.txt` file. If very few changes are made, the `.cfg` or `.cfg.txt` file does not appear in the window.

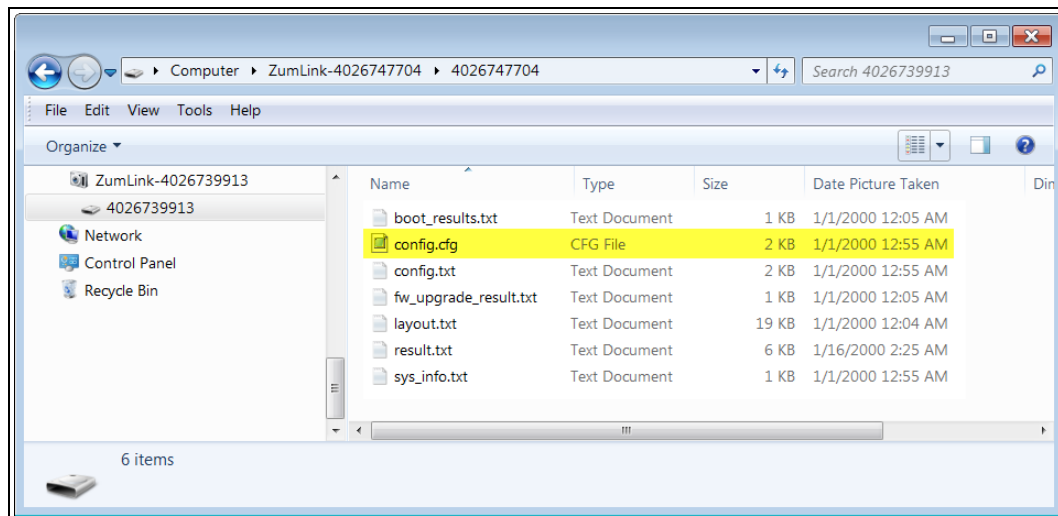


Figure 61: Changed `.cfg` file copied to the ZumLink window.

When the `config.txt` is updated, the changed `.cfg` or `.cfg.txt` file is removed from the list of files in the **ZumLink** window.

During the `.cfg` update process, the LEDs provide status and confirmation of update results.

Note: The LEDs indicate a successful setup. See [LEDs \(on page 416\)](#) for additional information.

22. Optional: Double-click the **config.txt** file to view and verify the new Z9-PC / Z9-PC-SR001 configuration.
23. As appropriate, repeat the Drag and Drop procedure to correct any errors.
24. Continue with [ZumIQ Application Environment \(on page 86\)](#).

6.3. CLI Configuration

This procedure provides a Tera Term terminal connection to the Z9-PC / Z9-PC-SR001 CLI. Other terminal emulators (e.g., HyperTerminal, PuTTY) may be used.

The basic steps are:

- A. [Connect the Z9-PC / Z9-PC-SR001 to the Computer \(on page 64\)](#)
- B. [Tera Term Activation and ZumLink Setup \(on page 65\)](#)

Note: The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

6.3.1. Connect the Z9-PC / Z9-PC-SR001 to the Computer

Note: This procedure is for a Z9-PC OEM module interfaced to a computer. If interfaced to a device other than a computer, some of these procedure steps may not be used.

1. Connect the USB cable to the computer and the Micro USB end to the Z9-PC / Z9-PC-SR001.

The **FreeWave Drivers** and **ZumLink** windows may open.

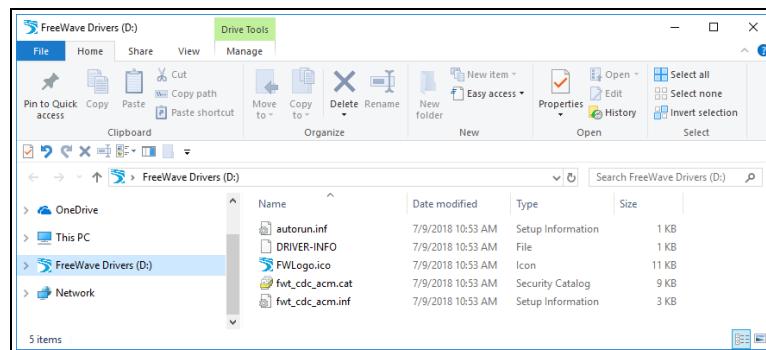


Figure 62: FreeWave Drivers window

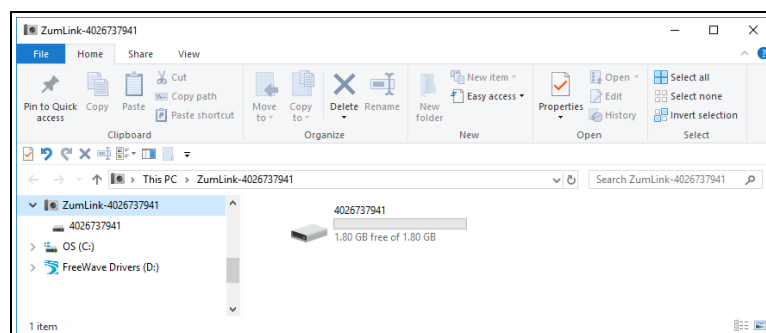


Figure 63: ZumLink window

2. Continue with [Tera Term Activation and ZumLink Setup \(on page 65\)](#).

6.3.2. Tera Term Activation and ZumLink Setup

Note: This procedure is for a Z9-PC OEM module interfaced to a computer.
If interfaced to a device other than a computer, some of these procedure steps may not be used.

Note: This procedure provides a Tera Term terminal connection to the Z9-PC / Z9-PC-SR001 CLI.
Other terminal emulators (e.g., HyperTerminal, PuTTY) may be used.
The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®.
The dialog boxes and windows appear differently on each computer.

1. On the computer connected to the Z9-PC / Z9-PC-SR001 device, open a terminal program (e.g., Tera Term <http://tssh2.osdn.jp/>).
2. In Tera Term, click the **File** menu and select **New Connection**.

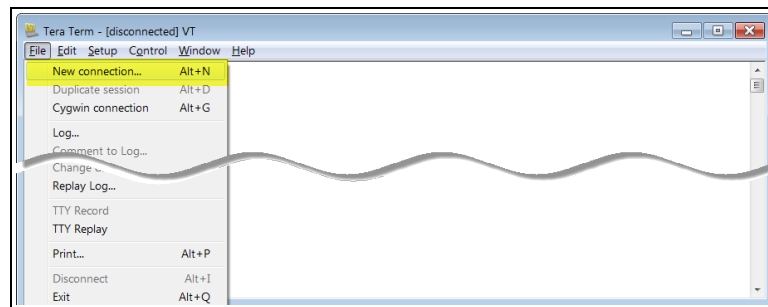


Figure 64: File menu > New Connection

The **Tera Term New Connection** dialog box opens.

3. Click the **Port** list box arrow and select the COM port the Z9-PC / Z9-PC-SR001 is connected to.

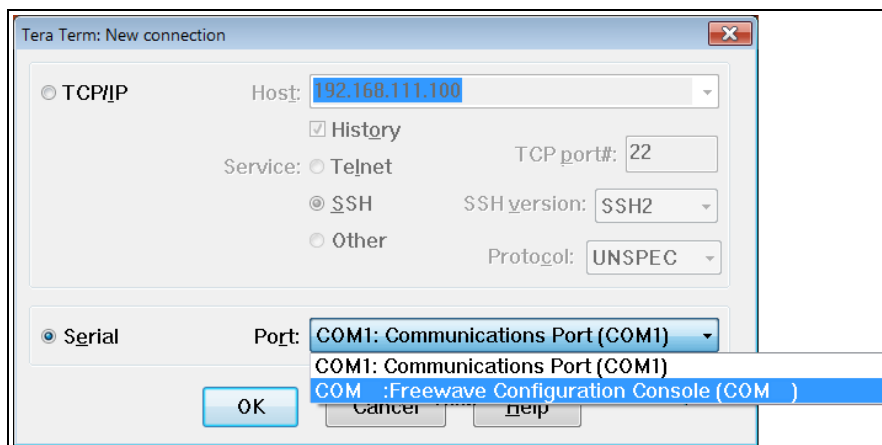


Figure 65: Select the ZumLink COM port

Important!: The **Port** assignment varies from computer to computer.

4. Click **OK** to save the changes and close the dialog box.
The Tera Term window shows the connected COM port and Baud rate in the title bar of the window.
5. In the Tera Term window, click the **Setup** menu and select **Serial Port**.

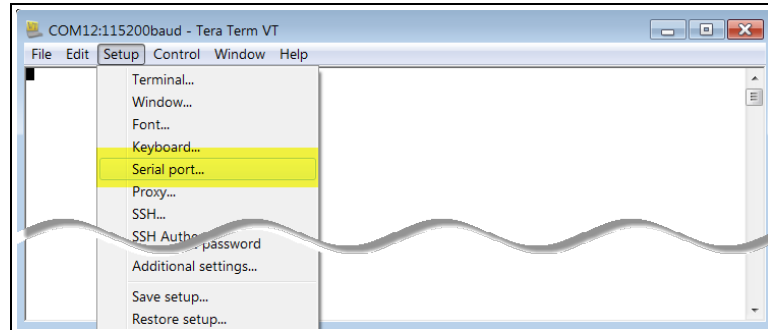


Figure 66: Serial menu > Setup Port

The **Tera Term: Serial Port Setup** dialog box opens.

Note: The image shows the default Z9-PC / Z9-PC-SR001 settings.

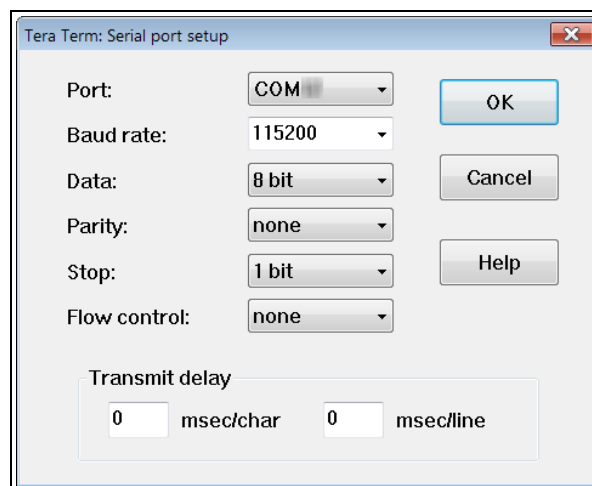


Figure 67: Tera Term: Serial Port Setup dialog box with Default Settings

6. **Important:** Verify, and change if required, the Tera Term serial port settings (except the **Port** setting) of the connected Z9-PC / Z9-PC-SR001 so the settings are the same as the defaults shown in [Figure 67](#).
7. Verify the COM port settings are:
 - Baud Rate / Baudrate:** 115200
 - Data / Databits:** 8 bit
 - Parity:** none
 - Stop / Stopbits:** 1 bit
8. Click **OK** to save the changes and close the dialog box.

9. In the Tera Term window, press <Enter>.
The Z9-PC / Z9-PC-SR001 CLI Login returns.
10. Enter **admin** for the **Username** and press <Enter>.
11. Enter **admin** for the **Password** and press <Enter>.

Note: If the **User Name** or **Password** were changed, enter the applicable information.
The password does not appear when typing - it looks blank.

The **FreeWave Shell** returns.

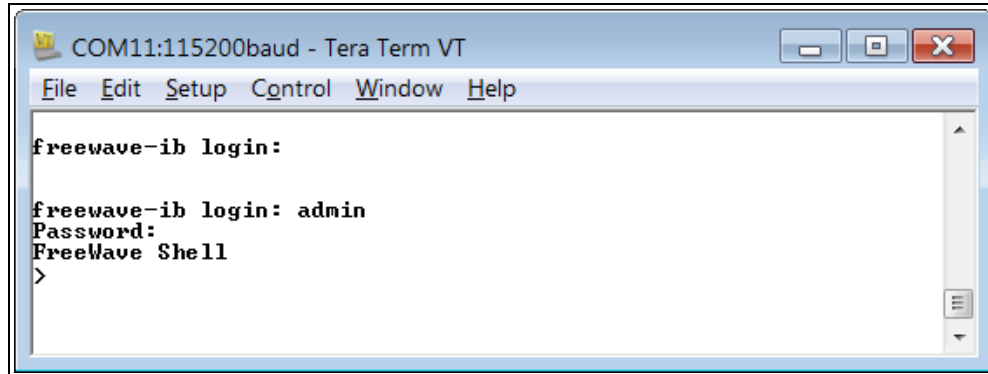


Figure 68: The FreeWave Shell returns.

Note: The login times out after 3600 seconds. Repeat the login procedure if needed.

12. At the > prompt, type **pages** and press <Enter>.
The available Z9-PC / Z9-PC-SR001 information appears.

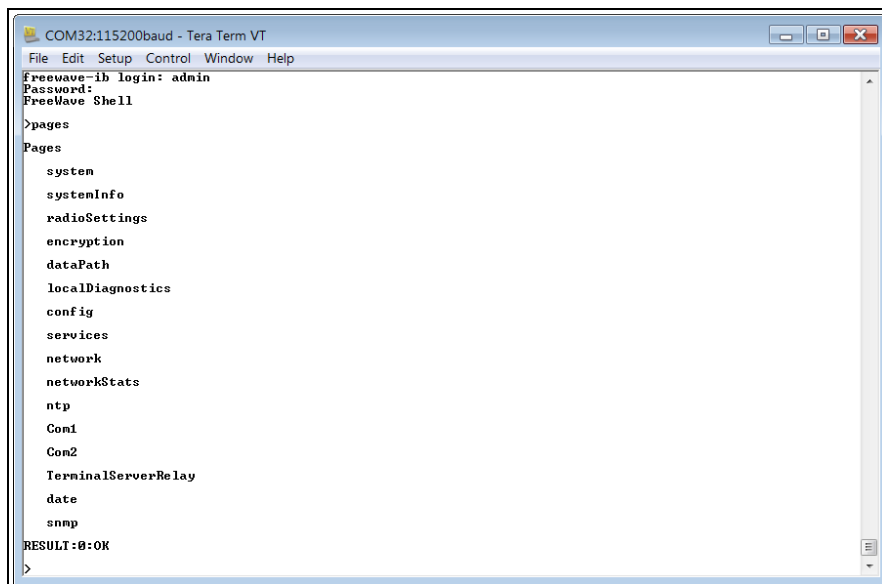
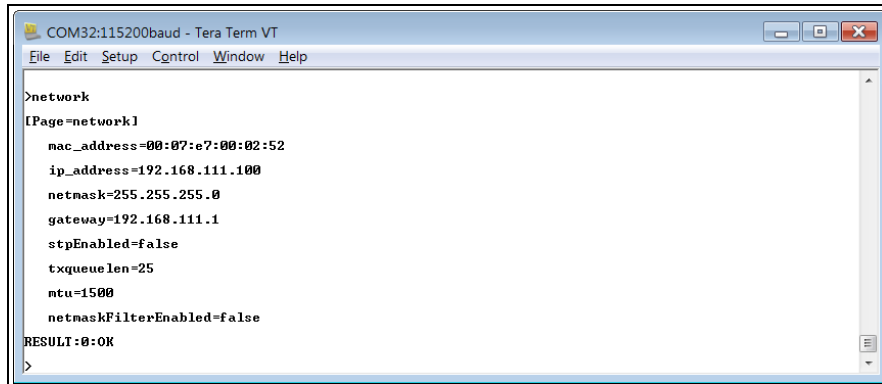


Figure 69: Z9-PC / Z9-PC-SR001 Pages information

- At the > prompt, type **network** and press <Enter>.
The Z9-PC / Z9-PC-SR001 **network** settings appear.

A screenshot of a terminal window titled "COM32:115200baud - Tera Term VT". The window shows the following text:

```
>network
[Page=network]
mac_address=00:07:e7:00:02:52
ip_address=192.168.111.100
netmask=255.255.255.0
gateway=192.168.111.1
stpEnabled=false
txqueuelen=25
mtu=1500
netmaskFilterEnabled=false
RESULT:0:OK
>
```

Figure 70: network Page window

Note: Steps 14 to 17 make the IP Address and nodeId unique to each Z9-PC / Z9-PC-SR001. Other values may be defined as long as they are unique to each Z9-PC / Z9-PC-SR001.

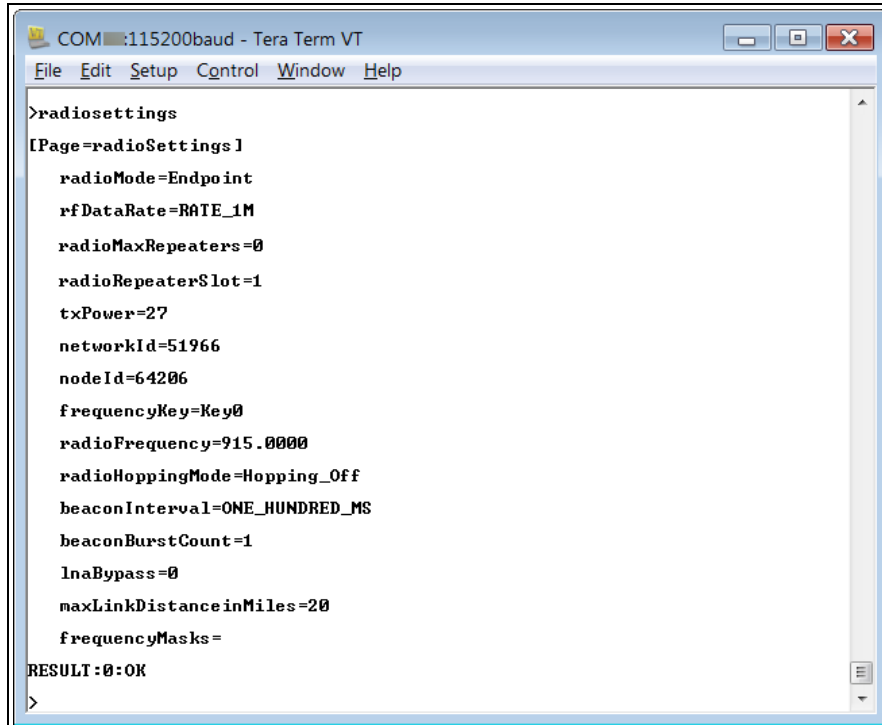
- At the > prompt, type **ip_address=nnn.nnn.nnn.nnn** and press <Enter>.

Note: Where nnn.nnn.nnn.nnn is the IP address assigned by the IT department for the Z9-PC / Z9-PC-SR001 network.

Note:

- Optional: Change the **gateway** (on page 238) and the **netmask** (on page 241) addresses, if required, to meet the Z9-PC / Z9-PC-SR001 network architecture.
- At the > prompt, type **radioSettings** and press <Enter>.
The Z9-PC / Z9-PC-SR001 **radioSettings** appear.

Important! Figure 71 shows **ALL** available settings for the page. Only **radioSettings** that apply to the current **radioMode**, **rfDataRate**, and **radioHoppingMode**, and are visible in the CLI and the Web Interface and can be changed.



```
>radioSettings
[Page=radioSettings]
  radioMode=Endpoint
  rfDataRate=RATE_1M
  radioMaxRepeaters=0
  radioRepeaterSlot=1
  txPower=27
  networkId=51966
  nodeId=64206
  frequencyKey=Key0
  radioFrequency=915.0000
  radioHoppingMode=Hopping_Off
  beaconInterval=ONE_HUNDRED_MS
  beaconBurstCount=1
  InaBypass=0
  maxLinkDistanceinMiles=20
  frequencyMasks =
RESULT:0:OK
>
```

Figure 71: radioSettings Page

- At the > prompt, type `nodeId=nnn` and press <Enter>.

Note: Where `nnn` = a 1 to 5 digit number, unique to the connected radio.
The `nodeId` MUST be unique on each radio within the same `networkId`.

- At the > prompt, type `save` and press <Enter>.



Warning! At this point, the connection to the Z9-PC / Z9-PC-SR001 is disabled.

- Re-connect to the Z9-PC / Z9-PC-SR001 using the new IP Address entered in Step 14.
- Optional: Complete the [Change the Passwords \(on page 156\)](#) procedure.
- Optional: Upgrade to the latest firmware using the [Firmware Upgrade \(on page 27\)](#) procedure.

Important! **ONLY** upgrade the Z9-PC / Z9-PC-SR001 firmware if the user values the new features and fixes within a firmware version.

6.3.3. Tera Term Activation and ZumiQ Setup

Note: This procedure provides a Tera Term terminal connection to the Z9-PC / Z9-PC-SR001 CLI. Other terminal emulators (e.g., HyperTerminal, PuTTY) may be used. The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

1. On the computer connected to the Z9-PC / Z9-PC-SR001 device, open a terminal program (e.g., Tera Term <http://tssh2.osdn.jp/>).
2. In Tera Term, click the **File** menu and select **New Connection**.

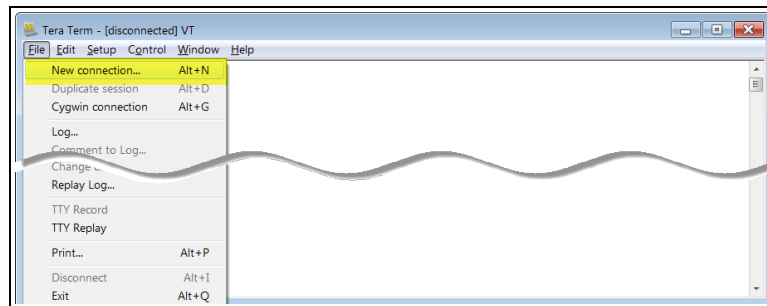


Figure 72: File menu > New Connection

The **Tera Term New Connection** dialog box opens.

3. Click the **Port** list box arrow and select the COM port the Z9-PC / Z9-PC-SR001 is connected to.

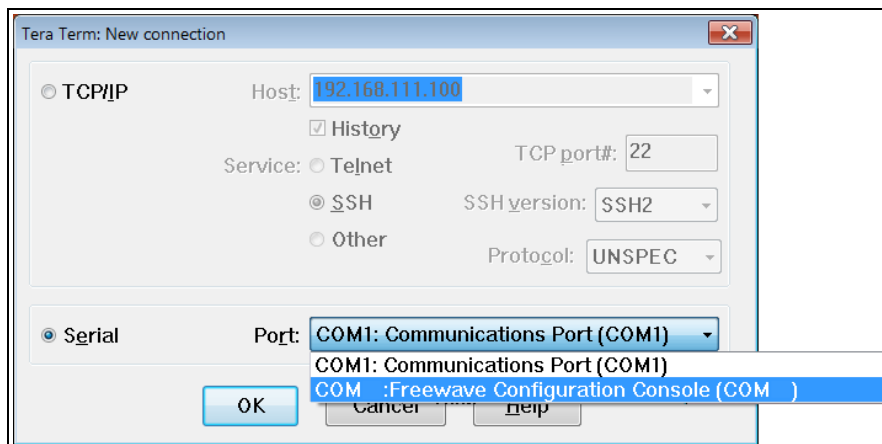


Figure 73: Select the ZumiLink COM port

Important! The **Port** assignment varies from computer to computer.

4. Click **OK** to save the changes and close the dialog box. The Tera Term window shows the connected COM port and Baud rate in the title bar of the window.
5. In the Tera Term window, click the **Setup** menu and select **Serial Port**.

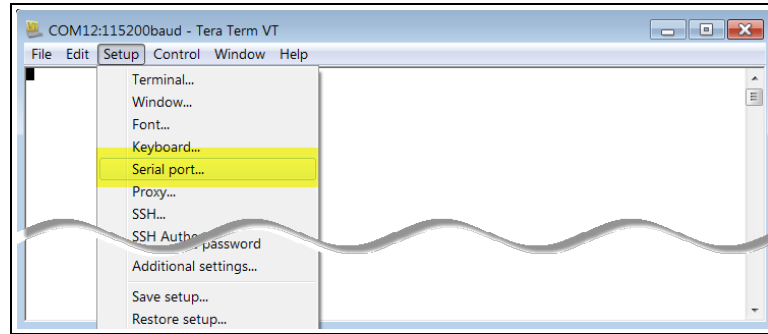


Figure 74: Serial menu > Setup Port

The **Tera Term: Serial Port Setup** dialog box opens.

Note: The image shows the default Z9-PC / Z9-PC-SR001 settings.

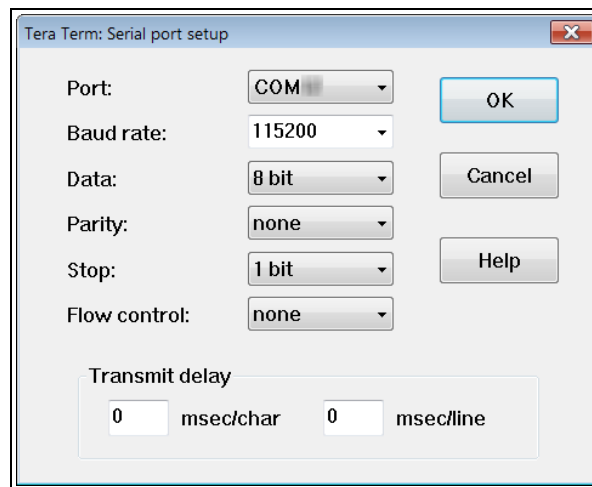


Figure 75: Tera Term: Serial Port Setup dialog box with Default Settings

6. **Important:** Verify, and change if required, the Tera Term serial port settings (except the **Port** setting) of the connected Z9-PC / Z9-PC-SR001 so the settings are the same as the defaults shown in [Figure 75](#).
7. Verify the COM port settings are:
 - Baud Rate / Baudrate:** 115200
 - Data / Databits:** 8 bit
 - Parity:** none
 - Stop / Stopbits:** 1 bit
8. Click **OK** to save the changes and close the dialog box.
9. In the Tera Term window, press <Enter>.
 - The Z9-PC / Z9-PC-SR001 CLI Login returns.
10. Enter **admin** for the **Username** and press <Enter>.
11. Enter **admin** for the **Password** and press <Enter>.

Note: If the **User Name** or **Password** were changed, enter the applicable information. The password does not appear when typing - it looks blank.

The **FreeWave Shell** returns.

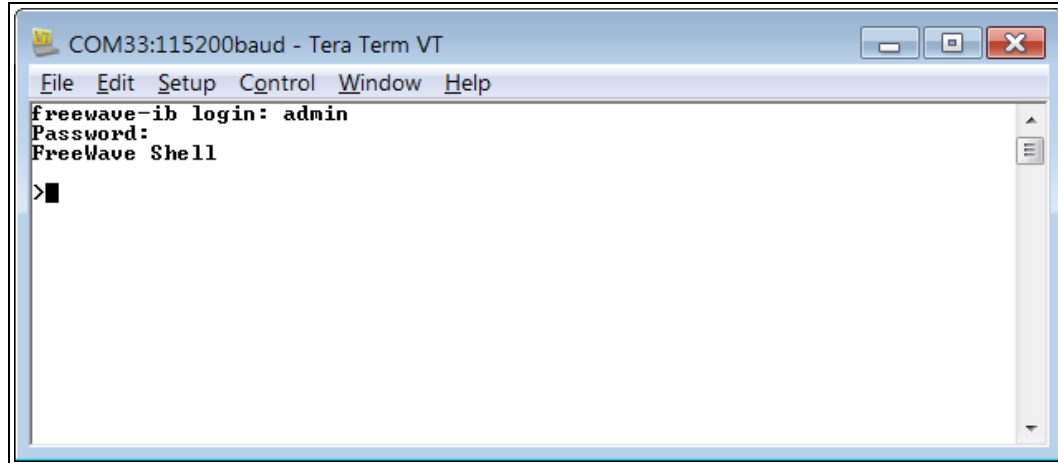


Figure 76: The FreeWave Shell returns.

Note: The login times out after 3600 seconds. Repeat the login procedure if needed.

12. At the > prompt, type **network** and press <Enter>. The Z9-PC / Z9-PC-SR001 **network** settings appear.

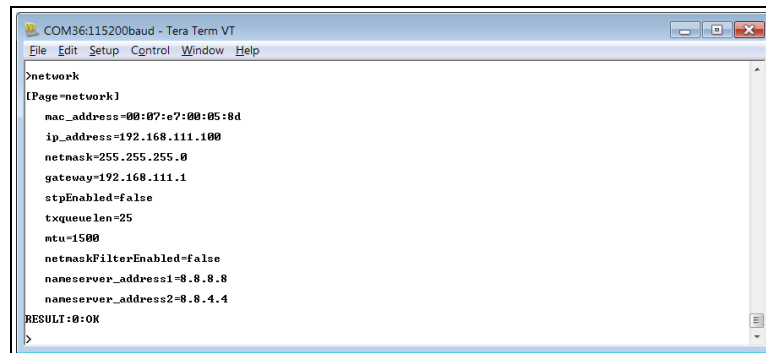


Figure 77: network Page window

Note: Steps 13 to 16 make the IP Address and nodeId unique to each Z9-PC / Z9-PC-SR001. Other values may be defined as long as they are unique to each Z9-PC / Z9-PC-SR001.

13. At the > prompt, type **ip_address=nnn.nnn.nnn.nnn** and press <Enter>.

Note: Where `nnn.nnn.nnn.nnn` is the IP address assigned by the IT department for the Z9-PC / Z9-PC-SR001 network.

14. Optional: Change the [gateway \(on page 238\)](#) and the [netmask \(on page 241\)](#) addresses, if required, to meet the Z9-PC / Z9-PC-SR001 network architecture.
15. At the > prompt, type **save** and press <Enter>.



Warning! At this point, the connection to the Z9-PC / Z9-PC-SR001 is disabled.

16. Re-connect to the Z9-PC / Z9-PC-SR001 using the new IP Address entered in Step 13.
17. Continue with [ZumIQ Application Environment \(on page 86\)](#).

6.4. Web Interface Configuration

This procedure provides a Web Interface connection to the Z9-PC / Z9-PC-SR001.

The basic steps are:

- A. [Connect the Z9-PC / Z9-PC-SR001 to the Computer \(on page 75\)](#)
- B. [Setup the Computer IP Address Configuration \(on page 76\)](#)
- C. [Web Interface Configuration - Z9-PC / Z9-PC-SR001 \(on page 80\)](#)

6.4.1. Connect the Z9-PC / Z9-PC-SR001 to the Computer

Note: The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

Note: This procedure is for a Z9-PC OEM module interfaced to a computer. If interfaced to a device other than a computer, some of these procedure steps may not be used.

1. Connect the USB cable to the computer and the Micro USB end to the Z9-PC / Z9-PC-SR001.

The **FreeWave Drivers** and **ZumLink** windows may open.

Note: One of the **Network Connections** icons may change to show the connected Z9-PC / Z9-PC-SR001.

2. Verify the ZumLink drivers are installed.
See [Install the Driver](#).

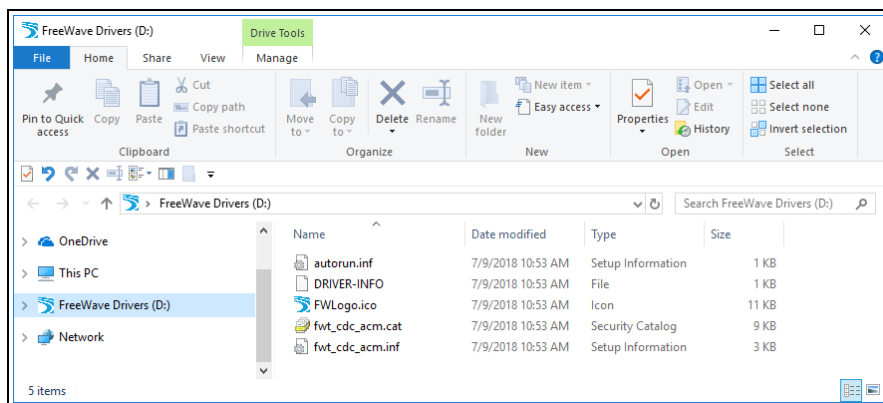


Figure 78: FreeWave Drivers window

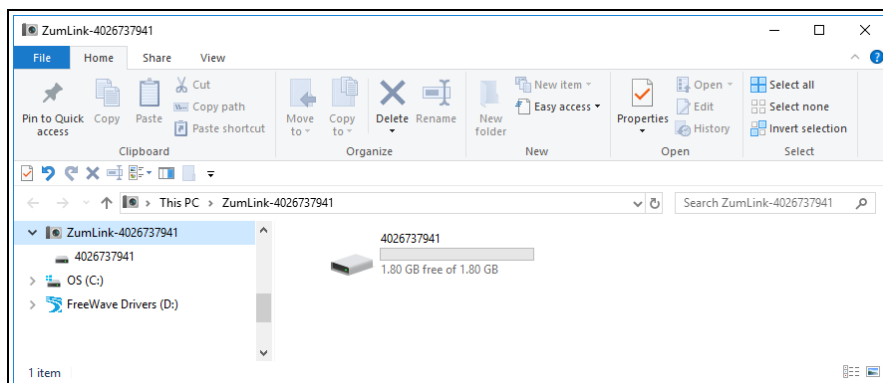


Figure 79: ZumLink window

3. Continue with [Setup the Computer IP Address Configuration \(on page 76\)](#).

6.4.2. Setup the Computer IP Address Configuration

Note: The images in this procedure are for Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

1. On the computer, click the Windows® **Start** button and select **Control Panel**.
2. View the **Control Panel** window by **Category** and click **Network and Sharing Center**. (Figure 80)

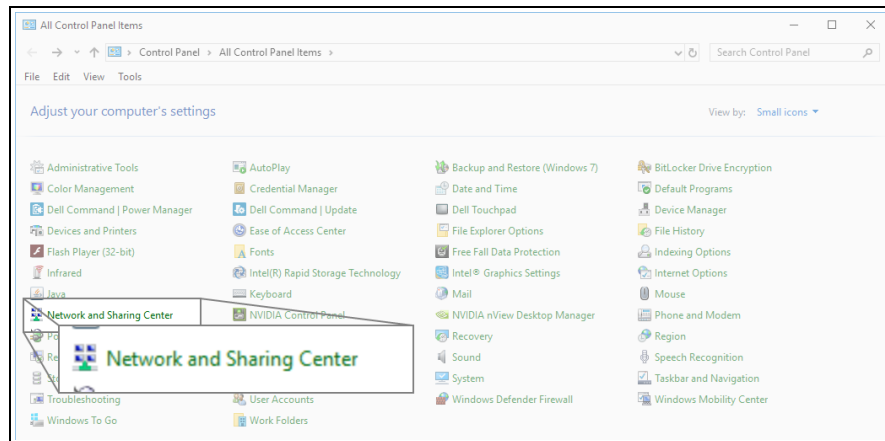


Figure 80: Control Panel > Network and Sharing Center

The **Network and Sharing Center** window opens.

3. Click the **Change Adapter Settings** link. (Figure 81)

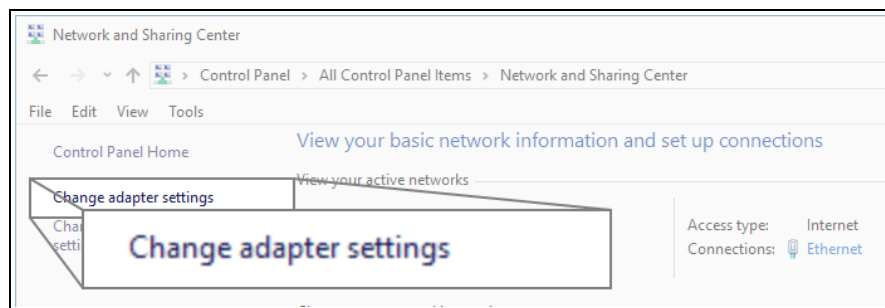


Figure 81: Change Adapter Settings Link

The **Network Connections** window opens. (Figure 82)

4. Double-click the **Local Area Connection** link or the connected **Network Connection**.

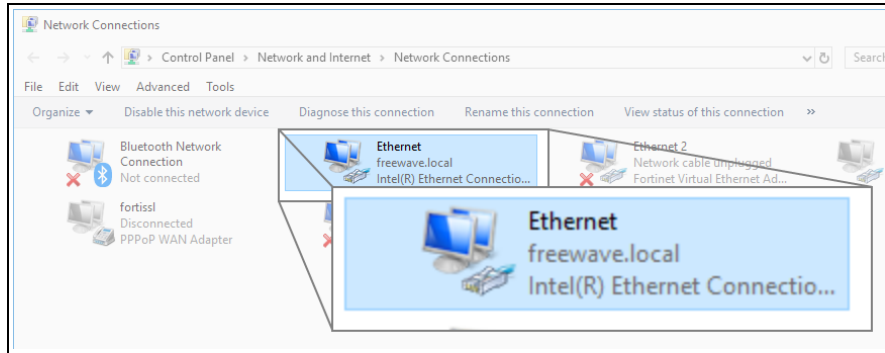


Figure 82: Network Connections window

The **Ethernet Status** dialog box opens. (Figure 83)

5. Click the **Properties** button.

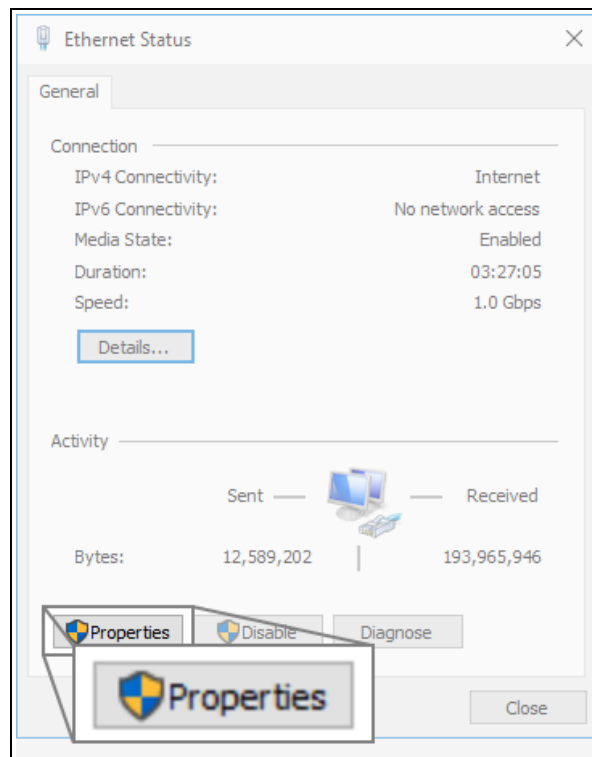


Figure 83: Ethernet Status dialog box

The **Ethernet Properties** dialog box opens.

6. Select the **Internet Protocol Version 4 (TCP/IPv4)** option. (Figure 84)
7. Click the **Properties** button.

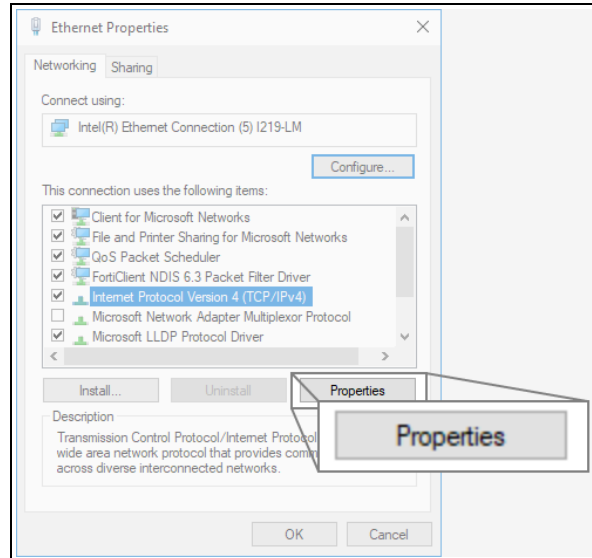


Figure 84: Ethernet Properties dialog box

The **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog box opens. (Figure 85)

8. **IMPORTANT:** Make a note of the current settings (to reverse this procedure later).

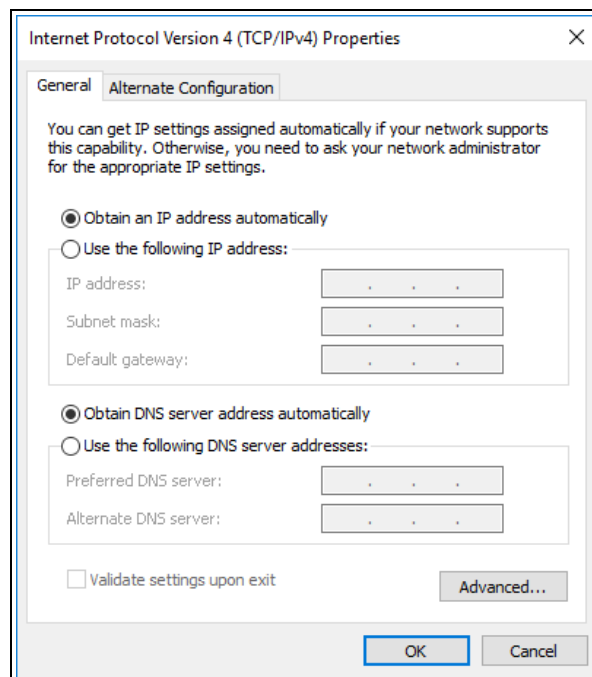


Figure 85: Default Example of Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

9. Select the **Use the following IP address** option button.

10. In the **IP Address** text box, enter an IP Address that is **in the same subnet range but a DIFFERENT IP Address** than the Z9-PC / Z9-PC-SR001 or all other units in the network. (Figure 86)

Example: Enter an **IP Address** from **192.168.111.1** to **192.168.111.254** (but NOT **192.168.111.100**) and the **Subnet Mask** to **255.255.255.0**.

Note: The default Z9-PC / Z9-PC-SR001 IP Address is **192.168.111.100**.
The default subnet mask is **255.255.255.0**.

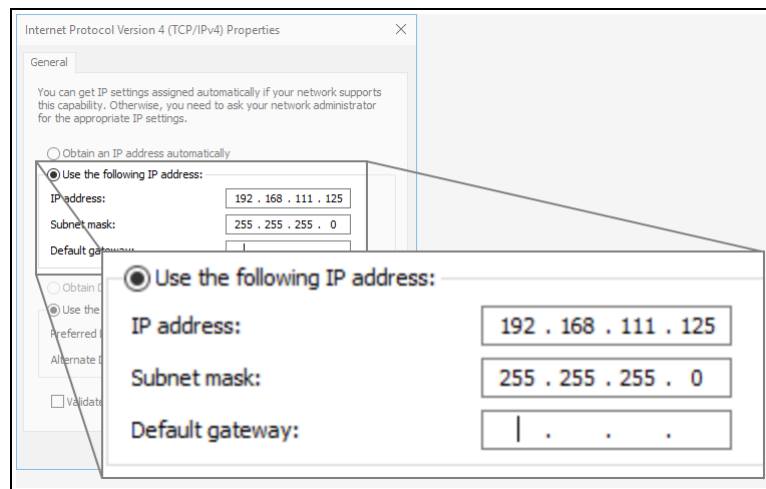


Figure 86: Changed Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

Note: An IP Address is NOT required in the **Default Gateway** text box.

11. Click **OK** to save the changes and close the dialog box.
12. Click **Close** twice to close the **Local Area Connection Properties** and **Local Area Connection Status** dialog boxes.
13. Continue with [Web Interface Configuration - Z9-PC / Z9-PC-SR001 \(on page 80\)](#).

6.4.3. Web Interface Configuration - Z9-PC / Z9-PC-SR001

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

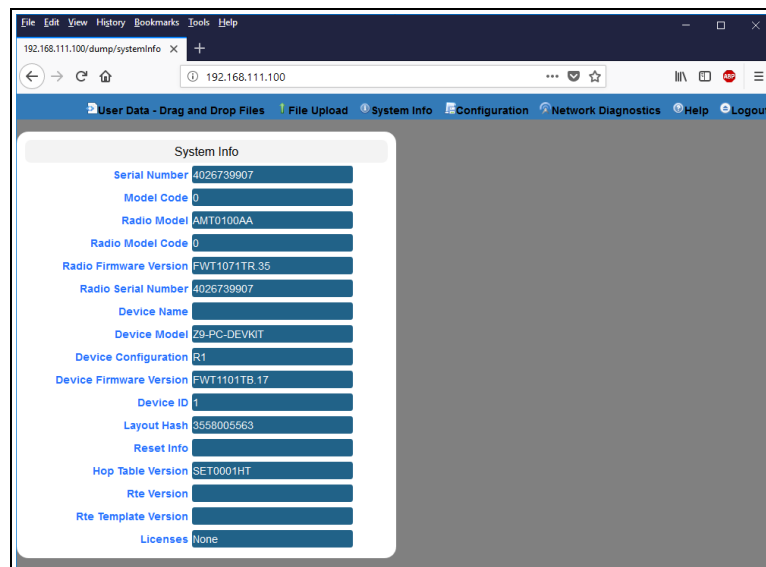


Figure 87: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 88](#))

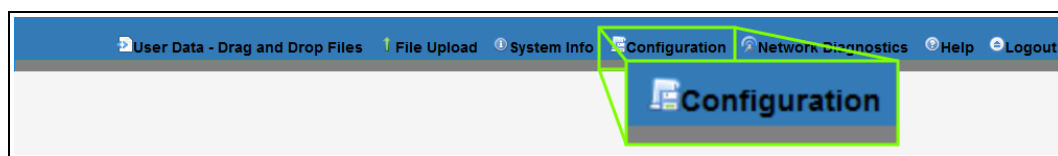
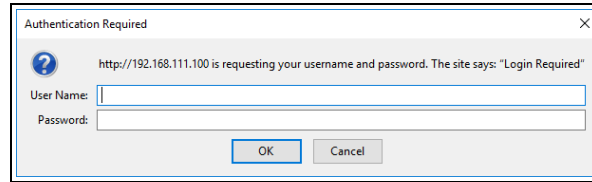


Figure 88: Configuration link

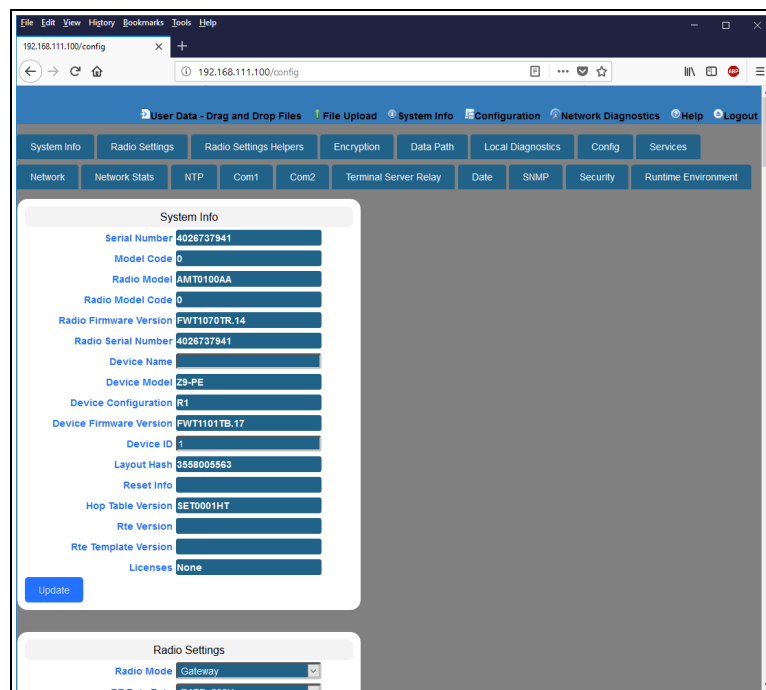
The **Authentication Required** (Login) dialog box opens. ([Figure 89](#))

**Figure 89: Authentication Required (Login) dialog box**

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 90)

**Figure 90: Configuration window**

6. In the **Configuration** window, click the **Network** tab. The **Network** parameters are shown in Figure 91:

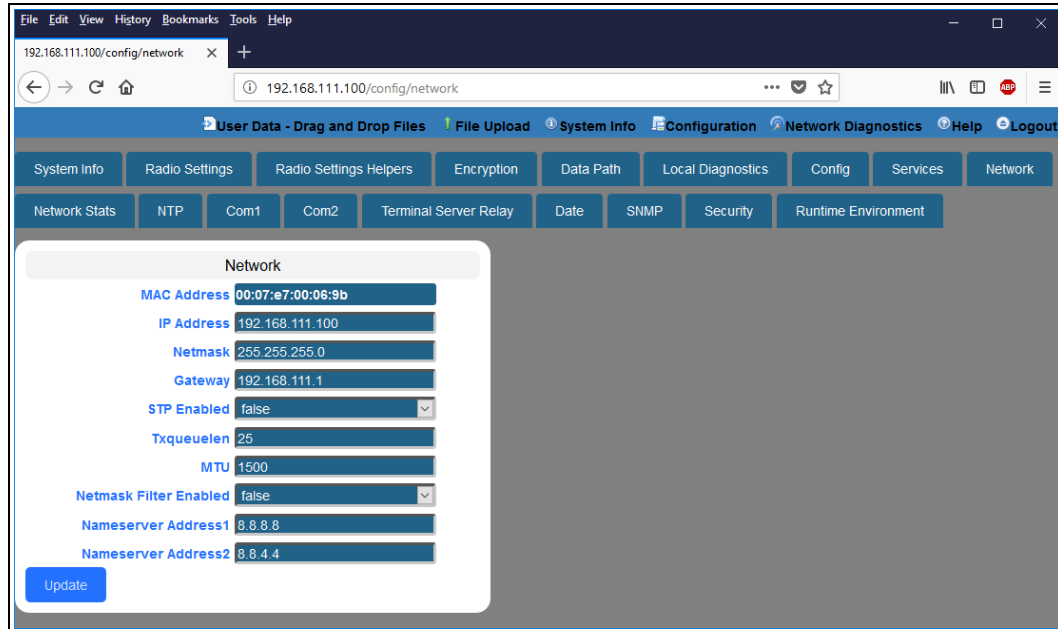


Figure 91: Network window

Note: Steps 7 to 9 make the IP Address and nodeId unique to each Z9-PC / Z9-PC-SR001. Other values may be defined as long as they are unique to each Z9-PC / Z9-PC-SR001.

7. In the **IP Address** text box, enter the new IP Address for the Z9-PC / Z9-PC-SR001.

Note: Where `nnn.nnn.nnn.nnn` is the IP address assigned by the IT department for the Z9-PC / Z9-PC-SR001 network.

8. Optional: Change the [gateway \(on page 238\)](#) and the [netmask \(on page 241\)](#) addresses, if required, to meet the Z9-PC / Z9-PC-SR001 network architecture.
9. Click the **Update** button to save the changed information.



Warning! At this point, the connection to the Z9-PC / Z9-PC-SR001 is disabled.

10. Re-connect to the Z9-PC / Z9-PC-SR001 using the new IP Address entered in Step 7.
11. In the **Configuration** window, click the **Radio Settings** tab. The **Radio Settings** parameters are shown in [Figure 92](#):

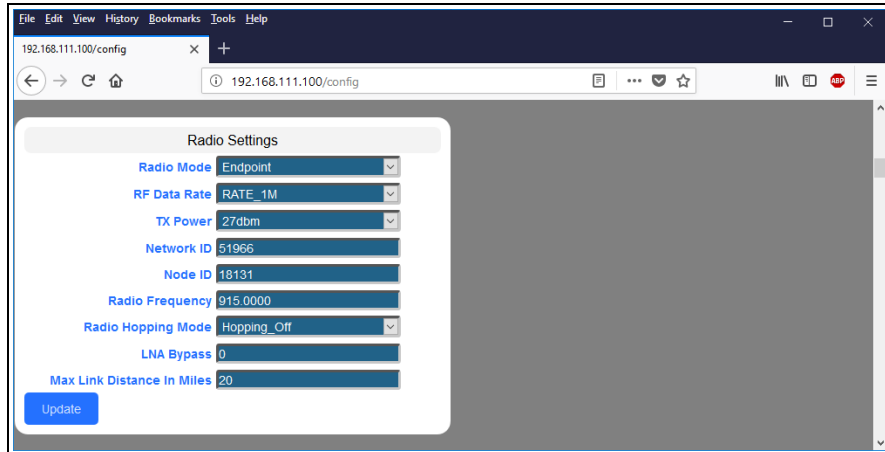


Figure 92: Radio Settings window

Important! Only **radioSettings** that apply to the current **radioMode**, **rfdDataRate**, and **radioHoppingMode**, and are visible in the CLI and the Web Interface and can be changed.

12. In the **Node ID** text box, enter the same unique 3-digit number **used in the last octet** of the IP Address entered in Step 7.
13. Click the **Update** button to save the changed information.
14. Continue with:
 - [Change the Passwords \(on page 156\)](#)
 - [Firmware Upgrade \(on page 27\)](#)

7. Creating a Basic ZumLink Gateway and Endpoint Network

Note: The basic network described in this procedure is created by using either the [Drag and Drop Configuration - ZumLink \(on page 52\)](#) or the [CLI Configuration \(on page 64\)](#) procedure.

Important! [Figure 93](#) shows a basic network setup for the Z9-PC. This network setup assumes all connections are already in place.

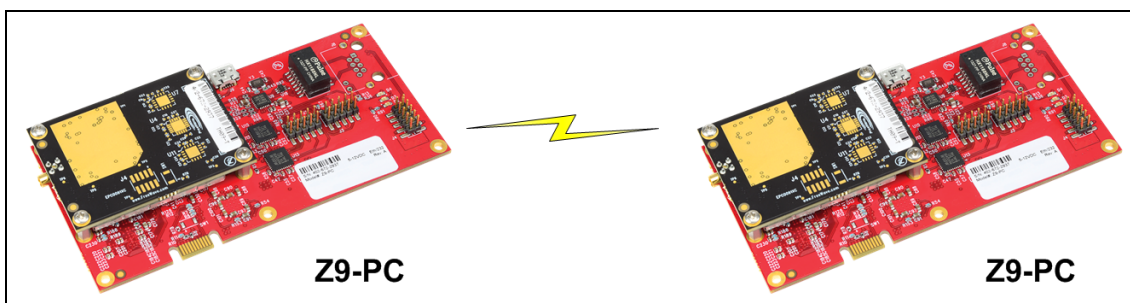


Figure 93: A Basic ZumLink Network

Procedure

Note: This example procedure is specific for CLI configuration.

1. Connect and apply power to the **ZumLink** devices in the network.
2. Optional: Upgrade the devices using the [Firmware Upgrade - Drag and Drop](#) procedure.



Caution: Firmware v1.0.7.0 is **NOT a required** upgrade. **ONLY** upgrade the Z9-PC / Z9-PC-SR001 firmware if the user values the new features and fixes within a firmware version.

3. Complete the procedure.
4. Select one radio and, at the > prompt, type `radioSettings.radioMode=Gateway` and press <Enter>.
5. At the > prompt, type a setting between `10` and `30` for the `radioSettings.txPower` and press <Enter>.

Example: `txPower=30` or `radioSettings.txPower=30`.



Entering `txpower=0` or `radiosettings.txpower=0` changes the output power to the minimum or 10 dB.

Note: See [radioSettings Parameters \(on page 254\)](#) for detailed information.

6. For the other radio in the network, at the > prompt, type `radioSettings.radioMode=Endpoint` and press <Enter>.
7. Verify the `radioSettings.networkId=` setting is the same on ALL radios in the network.

Note: For Endpoints, the `radioSettings.nodeID` is set automatically.

Important! The Gateway `radioSettings.nodeld` defaults to 1 and CANNOT be changed.

8. At the > prompt, type `save` and press <Enter>.
A solid green CD LED indicates that the radios are linked.

Note: See [LEDs \(on page 416\)](#) for additional information.

9. Type `exit` and press <Enter> to exit the FreeWave Shell.

8. ZumIQ Application Environment

The Z9-PC / Z9-PC-SR001 employs the ZumIQ Application Environment to provide application development and deployment for intelligent monitoring and control of remote sensors and devices.

Download and Install

- [Optional: Download the ZumIQ Application Environment \(on page 87\)](#)
- [Optional: Drag and Drop - Installation of ZumIQ Application Environment \(on page 89\)](#)
- [Optional: Web Interface - Installation of ZumIQ Application Environment \(on page 92\)](#)

Activation and Usage

- [Activating ZumIQ \(on page 97\)](#)
- [Verify ZumIQ Activation \(on page 99\)](#)
- [Using ZumIQ as DEVUSER \(on page 101\)](#)

8.1. Optional: Download the ZumIQ Application Environment

Complete this procedure if installing the ZumIQ Application Environment.

Note: The images in this procedure are for Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

1. On the <http://support.freewave.com/> web page, open the **Firmware** window for the Z9-PC / Z9-PC-SR001.

Important! If continuing from the [Download the Upgrade File \(on page 28\)](#) procedure for the **Firmware v1_1_0_1.zip** file, return to the **Firmware** window. (Figure 94)

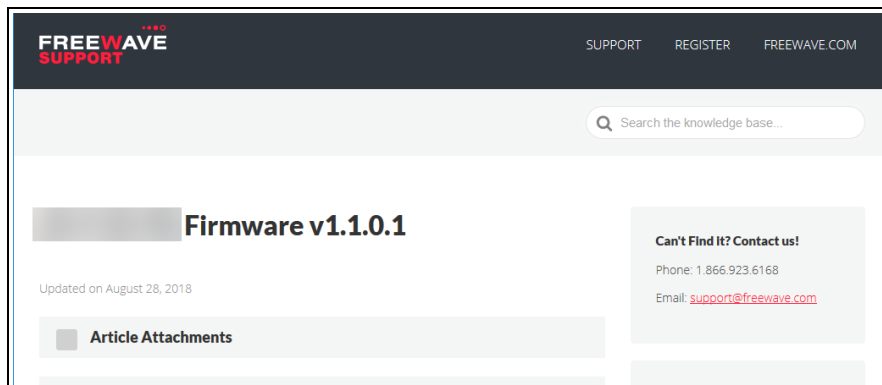


Figure 94: Closed Article Attachments window

2. Click the **Article Attachments** link to re-open the attachment box.
3. Select and click the **3_Optional_ZumIQ_Environment_v1_1_0_0.pkg** attachment. (Figure 95)

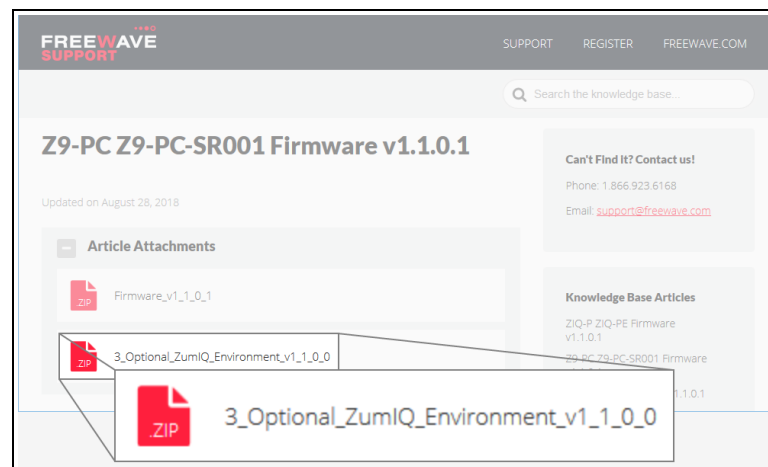


Figure 95: Z9-PC / Z9-PC-SR001 Firmware Upgrade window with 3_Optional_ZumIQ_Environment_v1_1_0_0.pkg Attachment

The **Opening** dialog box opens. (Figure 96)

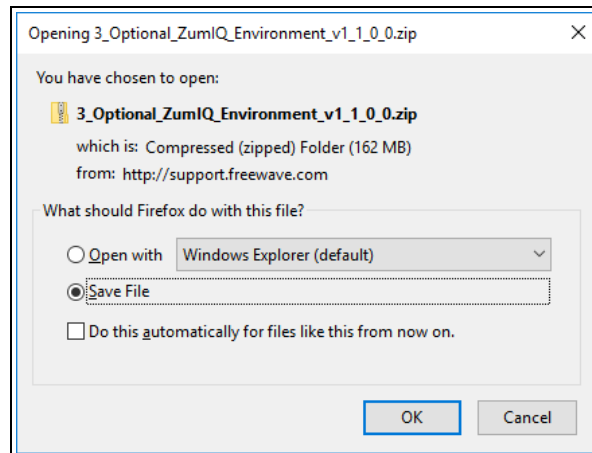


Figure 96: Opening 3_Optional_ZumIQ_Environment_v1_1_0_0.pkg.zip dialog box

4. Click **OK**.

The **Enter name of file to save to** dialog box opens. (Figure 97)

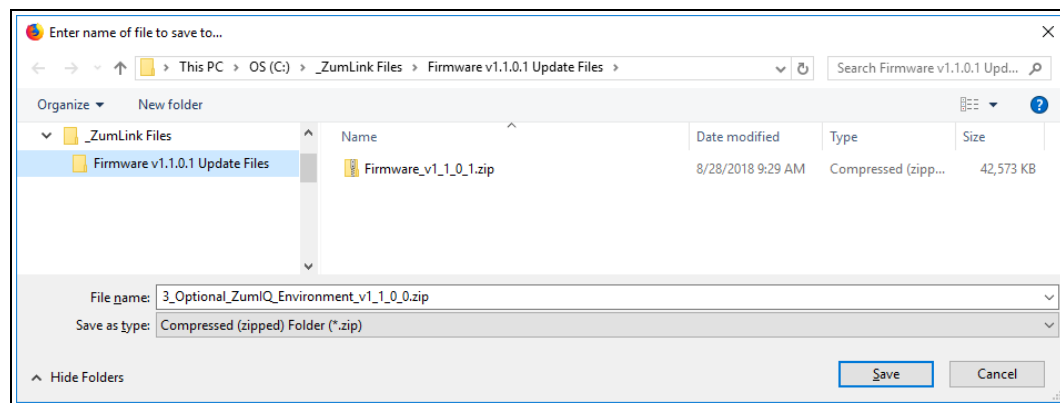


Figure 97: Enter name of file to save to dialog box

5. Search for and select a location to save the **.zip** file to and click **Save**.
The **Enter name of file to save to** dialog box closes.
6. Open a Windows® Explorer window and find the location where the **Firmware v1_1_0_1.zip** file was saved.
7. Double-click the **.zip** file.
8. Extract the files from the **.zip** file into the parent location.

Note: The file includes the **.pkg** file used for the ZumIQ Application Environment installation.

9. Continue with:

- [Optional: Drag and Drop - Installation of ZumIQ Application Environment \(on page 89\)](#)
- [Optional: Web Interface - Installation of ZumIQ Application Environment \(on page 92\)](#)

8.2. Optional: Drag and Drop - Installation of ZumIQ Application Environment

FREEWAVE Recommends: If currently using the v1.0.6.0 developer environment, an upgrade to **3_Optional_ZumIQ_Environment_v1_1_0_0.pkg** is NOT required.

- IMPORTANT:** Install the **1_Device_Firmware_v1_1_0_1.pkg** or **1_Device_Firmware_v1_1_0_1.pkg.txt** file first.
See [Firmware Upgrade - Drag and Drop](#) (on page 34).



Warning! The Z9-PC / Z9-PC-SR001 **MUST BE** upgraded to the **Firmware v1_1_0_1** release or the ZumIQ Application Environment will NOT function.

- Verify the [Download the Upgrade File](#) (on page 28) procedure is completed.
- Locate and select the downloaded **3_Optional_ZumIQ_Environment_v1_1_0_0.pkg** upgrade file. (Figure 98)



Caution: A **.pkg** or **.fcf** file extension is required for Windows® 7. A **.pkg.txt** or **.fcf.txt** file extension may be required for some versions of Windows® 8, Windows® 8.1, and Windows® 10. Failure to save the file with the correct extension type results in the copied file **NOT** integrating with the Z9-PC / Z9-PC-SR001.

- If using some versions of Windows® 8, Windows® 8.1, or Windows® 10, change the extension of the **.pkg** file to **.pkg.txt** and select that file.

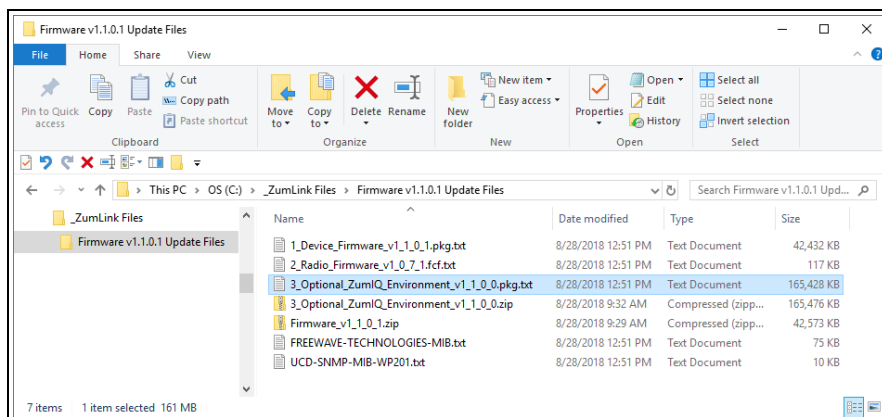


Figure 98: File Upload dialog box with Selected 3_Optional_ZumIQ_Environment_v1_1_0_0.pkg.txt File

- Drag and drop the **.pkg** or **.pkg.txt** file on to the **ZumLink** window. (Figure 99)

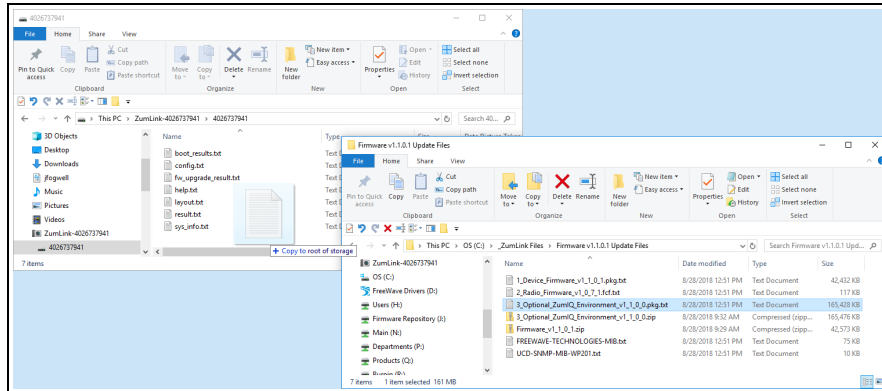


Figure 99: Drag and Drop the `3_Optional_ZumIQ_Environment_v1_1_0_0.pkg.txt` file to the ZumLink window

The ZumLink window is similar to [Figure 100](#):

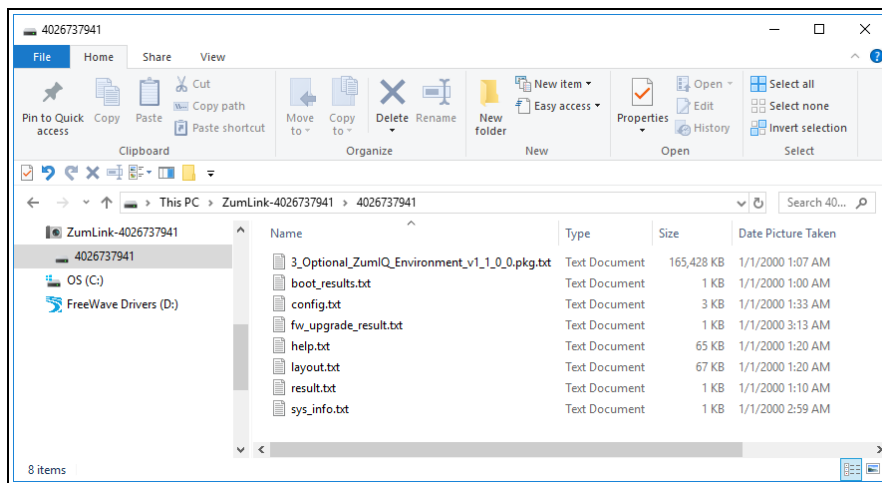


Figure 100: `3_Optional_ZumIQ_Environment_v1_1_0_0.pkg.txt` File Dropped in the ZumLink window

The `.pkg` or `.pkg.txt` file will disappear after approximately 6-10 minutes.

Note: Refresh the **ZumLink** window If, after 10-15 minutes, the `.pkg.txt` file has NOT disappeared.

Warning! DO NOT remove power from the Z9-PC / Z9-PC-SR001 during the firmware upgrade process!

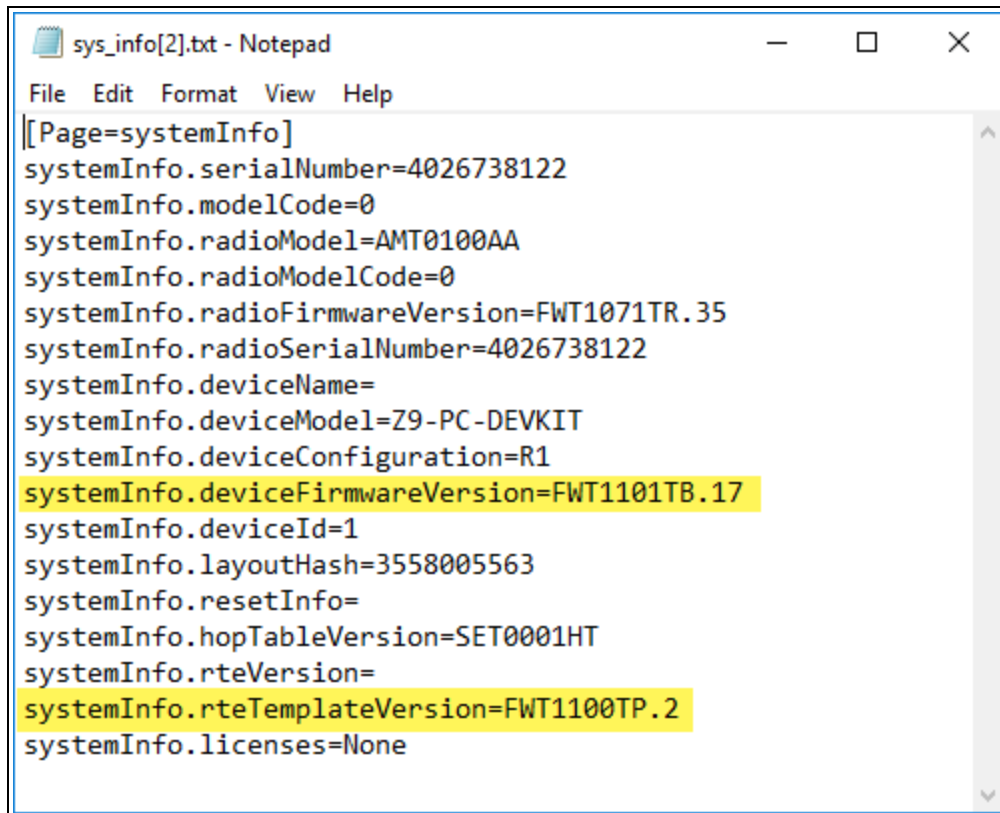


If power is removed prematurely during the upgrade process, the Web Interface pages may not be accessible.

Reinstall the `.pkg` file and **WAIT** for the file upgrade process to complete.

6. Optional: Open the `sys.info.txt` file to verify the upgrade information. ([Figure 101](#))

Important! The image provides example information only.
Each Z9-PC / Z9-PC-SR001 provides its own unique information.



```
sys_info[2].txt - Notepad
File Edit Format View Help
[[Page=systemInfo]
systemInfo.serialNumber=4026738122
systemInfo.modelCode=0
systemInfo.radioModel=AMT0100AA
systemInfo.radioModelCode=0
systemInfo.radioFirmwareVersion=FWT1071TR.35
systemInfo.radioSerialNumber=4026738122
systemInfo.deviceName=
systemInfo.deviceModel=Z9-PC-DEVKIT
systemInfo.deviceConfiguration=R1
systemInfo.deviceFirmwareVersion=FWT1101TB.17
systemInfo.deviceId=1
systemInfo.layoutHash=3558005563
systemInfo.resetInfo=
systemInfo.hopTableVersion=SET0001HT
systemInfo.rteVersion=
systemInfo.rteTemplateVersion=FWT1100TP.2
systemInfo.licenses=None
```

Figure 101: sys.info.txt file with Updated Firmware

Important! For the v1.1.0.1 upgrade, these settings should have this information:
systemInfo.deviceFirmwareVersion=FWT1101TB.17
Web Interface - Device Firmware Version is FWT1101TB.17
systemInfo.rteTemplateVersion=FWT1100TP.2
Web Interface - Rte Template Version is FWT1100TP.2
If neither of these are listed in their respective settings, repeat the upgrade procedure.

8.3. Optional: Web Interface - Installation of ZumIQ Application Environment

FREEWAVE Recommends: If currently using the v1.0.6.0 developer environment, an upgrade to [3_Optional_ZumIQ_Environment_v1_1_0_0.pkg](#) is NOT required.

1. **IMPORTANT:** Install the [1_Device_Firmware_v1_1_0_1.pkg](#) or [1_Device_Firmware_v1_1_0_1.pkg.txt](#) file first.
See [Firmware Upgrade - Web Interface \(on page 40\)](#).



Warning! The Z9-PC / Z9-PC-SR001 **MUST BE** upgraded to the [Firmware v1_1_0_1](#) release or the ZumIQ Application Environment will NOT function.

Important! If continuing from the [Firmware Upgrade - Web Interface \(on page 40\)](#) procedure for the [Firmware v1_1_0_1.zip](#) file, go to Step 7.

2. Verify the [Download the Upgrade File \(on page 28\)](#) procedure is completed.
3. Using a CAT5e / CAT6 Ethernet cable, connect the Z9-PC / Z9-PC-SR001 Ethernet port to the computer's Ethernet port.
4. Open a web browser.
5. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of [192.168.111.100](#).
If the IP address was changed, enter that IP Address.

6. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
7. On the Menu bar, click the **File Upload** link. ([Figure 102](#))

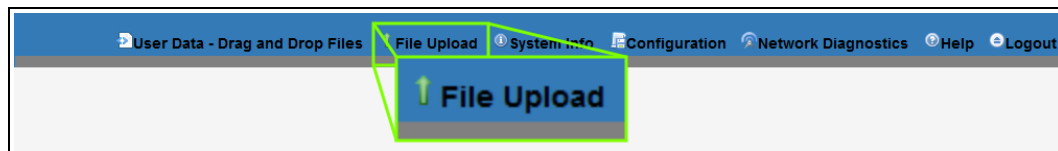


Figure 102: File Upload link

The **Authentication Required (Login)** dialog box opens.

8. Enter [admin](#) in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the [File Upload window](#) opens. ([Figure 103](#))

Note: If the **User Name** or **Password** were changed, enter the applicable information.

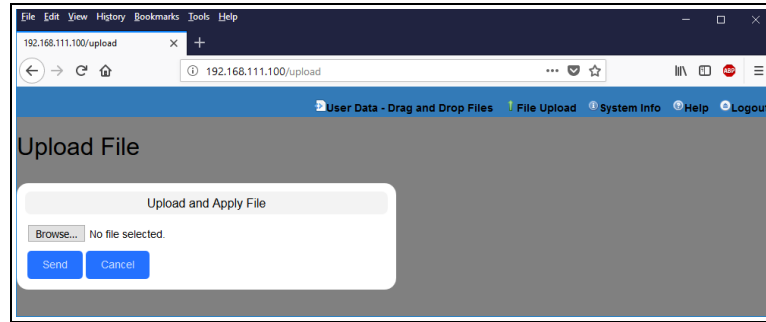
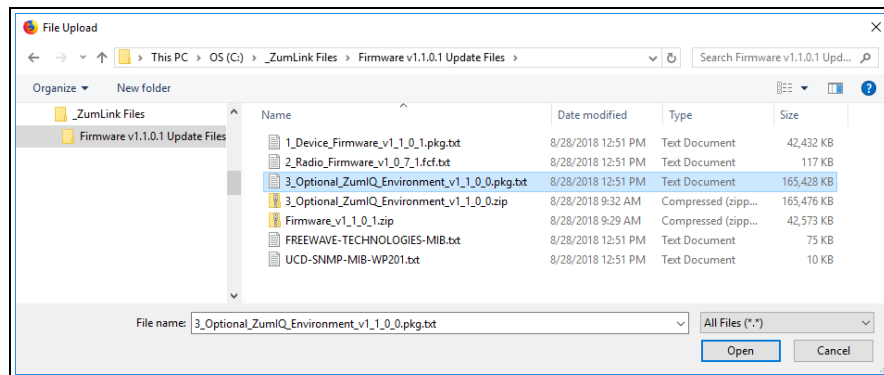


Figure 103: File Upload window

9. Click the **Browse** button.
The **File Upload** dialog box opens.
10. Locate and select the downloaded **3_Optional_ZumIQ_Environment_v1_1_0_0.pkg** upgrade file. (Figure 104)

Caution: A **.pkg** or **.fcf** file extension is required for Windows® 7. A **.pkg.txt** or **.fcf.txt** file extension may be required for some versions of Windows® 8, Windows® 8.1, and Windows® 10. Failure to save the file with the correct extension type results in the copied file **NOT** integrating with the Z9-PC / Z9-PC-SR001.

11. If using some versions of Windows® 8, Windows® 8.1, or Windows® 10, change the extension of the **.pkg** file to **.pkg.txt** and select that file.



**Figure 104: File Upload dialog box with Selected
3_Optional_ZumIQ_Environment_v1_1_0_0.pkg.txt File**

12. Click **Open**.
The dialog box closes and the **File Upload** window returns showing the selected file. (Figure 105)

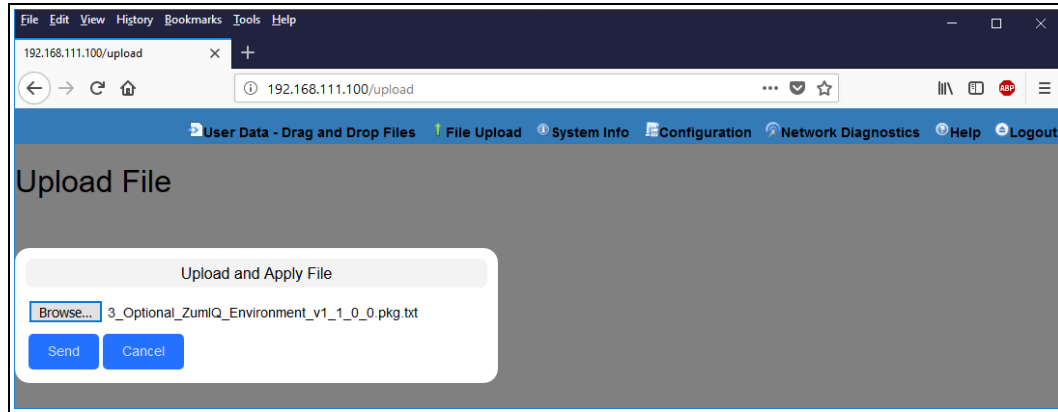


Figure 105: File Upload window with Selected .pkg.txt File

13. Click **Send**.

The **File Upload** window changes to show the completed upload percentage to the Z9-PC / Z9-PC-SR001. (Figure 106)

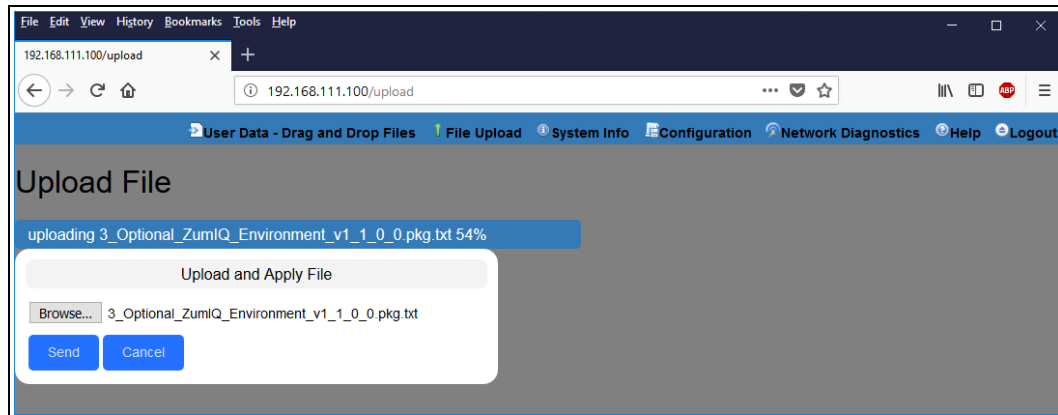


Figure 106: File Upload window Showing Uploading Percentage

14. Wait for the **.pkg** or **.pkg.txt** file to be applied (\approx 6-10 minutes).

Warning! DO NOT remove power from the Z9-PC / Z9-PC-SR001 during the firmware upgrade process!



If power is removed prematurely during the upgrade process, the Web Interface pages may not be accessible.

Reinstall the **.pkg** file and **WAIT** for the file upgrade process to complete.

The **File Upload** window refreshes and shows the completed and uploaded file applied to the Z9-PC / Z9-PC-SR001. (Figure 107)

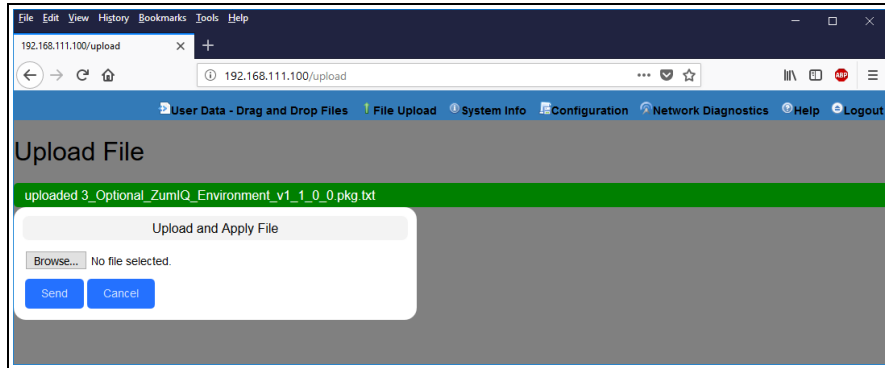


Figure 107: File Upload window Showing Completed Upload of the Selected File

15. Click the **System Info** link. (Figure 108)

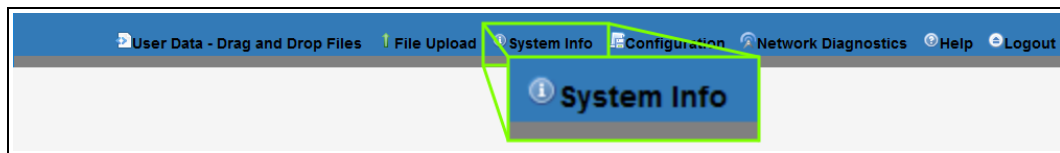
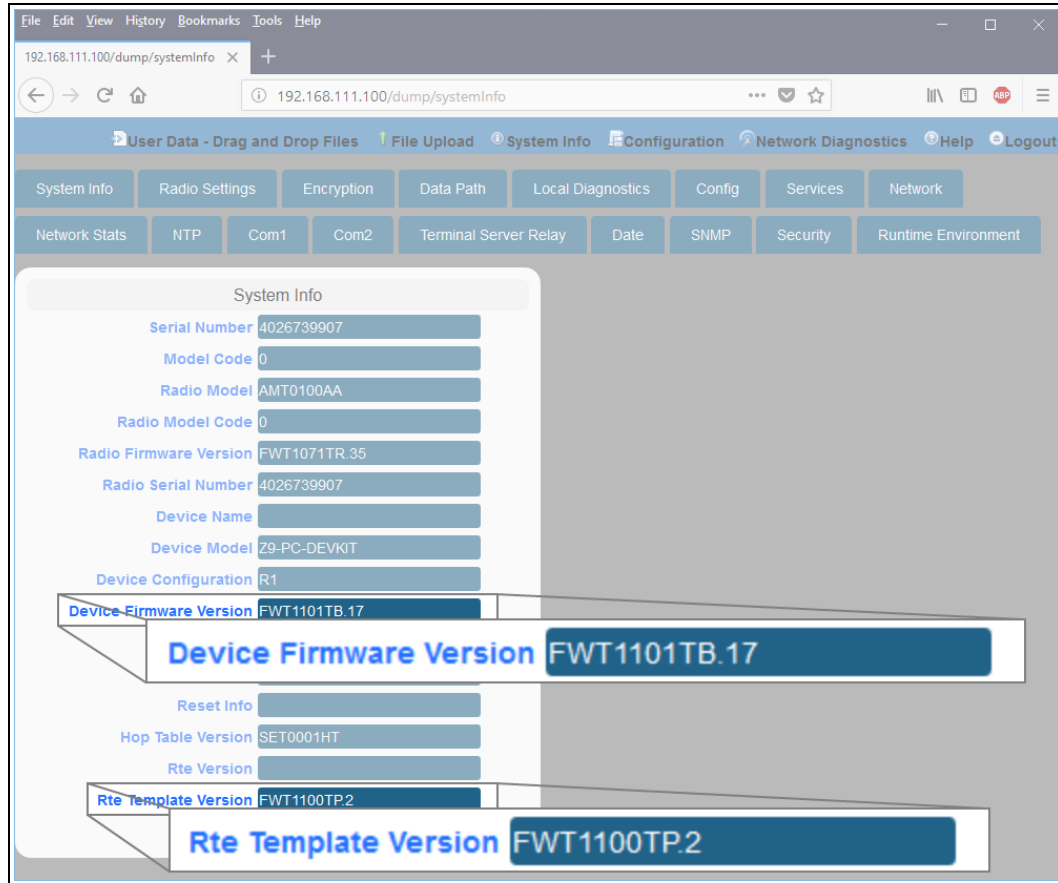


Figure 108: System Info link

The [System Info window](#) opens showing the updated firmware on the Z9-PC / Z9-PC-SR001. (Figure 109)

Important! The image provides example information only.
Each Z9-PC / Z9-PC-SR001 provides its own unique information.

**Figure 109: System Info window**

Important! For the v1.1.0.1 upgrade, these settings should have this information:
systemInfo.deviceFirmwareVersion=FWT1101TB.17
Web Interface - Device Firmware Version is FWT1101TB.17
systemInfo.rteTemplateVersion=FWT1100TP.2
Web Interface - Rte Template Version is FWT1100TP.2
If neither of these are listed in their respective settings, repeat the upgrade procedure.

8.4. Activating ZumIQ

Warning! The process of activating ZumIQ will install a fresh copy of the Linux development environment that supports ZumIQ.



If ZumIQ has already been activated, this procedure will erase any user-generated content and settings in the existing Linux development environment.

Note: The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

Procedure

1. Complete the [Tera Term Activation and ZumIQ Setup \(on page 70\)](#).
2. Log in to the Z9-PC / Z9-PC-SR001 CLI as **admin**.
3. At the > prompt, type **systemInfo** and press <Enter>. The **systemInfo** parameters appear. (Figure 110)

Note: See the [systemInfo Parameters \(on page 304\)](#) for detailed information about the parameters.

A screenshot of a terminal window titled "COM36:115200baud - Tera Term VT". The window shows the output of the "systemInfo" command. The output lists various system parameters such as serialNumber, modelCode, radioMode, deviceName, deviceModel, deviceFirmwareVersion, deviceId, layoutHash, resetInfo, hopTableVersion, rteVersion, and licenses. The output ends with "RESULT: 0:OK" and a prompt ">".

```
COM36:115200baud - Tera Term VT
File Edit Setup Control Window Help
>systemInfo
[Page=systemInfo]
  serialNumber=0
  modelCode=0
  radioMode=Unknown
  radioModeCode=0
  radioFirmwareVersion=Unknown
  radioSerialNumber=0
  deviceName=
  deviceModel=ZIQ-PE
  deviceConfiguration=0
  deviceFirmwareVersion=FWT1060TB.68
  deviceId=1
  layoutHash=529070878
  resetInfo=
  hopTableVersion=Unknown
  rteVersion=
  rteTemplateVersion=FWT1060TB.68
  licenses=Custom Apps
RESULT: 0:OK
>
```

Figure 110: systemInfo Pages information

4. Verify these parameters have these values:

Verification Settings	
Parameter	Value
radioFirmwareVersion (on page 310)	FWT1040TA.11
deviceFirmwareVersion (on page 305)	FWT1060TB.68
rteVersion (on page 312)	(blank)
rteTemplateVersion (on page 312)	FWT1060TB.68
licenses (on page 308)	Custom Apps

5. At the > prompt, type `rteReset=Hard` and press <Enter>. This will stage the development runtimeEnvironment to be applied on the next reboot.
6. At the > prompt, type the **exact command** of `reset=now` and press <Enter>. This reboots the Z9-PC / Z9-PC-SR001 and copies the Linux application environment into the runtime location. This will take ~3-4 minutes to complete.



Warning! At this point, the connection to the Z9-PC / Z9-PC-SR001 is disabled.

7. Close the Tera Term window.
8. Disconnect and reconnect the USB cable from the computer. The **AutoPlay ZumLink** and **ZumLink** windows open again.
9. Continue with [Verify ZumIQ Activation \(on page 99\)](#).

8.5. Verify ZumIQ Activation

Note: The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

Procedure

1. **Important:** Verify the [Activating ZumIQ \(on page 97\)](#) procedure is completed.
2. Open a new Tera Term window.
3. Log in to the Z9-PC / Z9-PC-SR001 CLI as **admin**.
4. At the > prompt, type **systemInfo** and press <Enter>. The **systemInfo** parameters appear. (Figure 111)

```

COM36:115200baud - Tera Term VT
File Edit Setup Control Window Help
RESULT:0:OK
>systemInfo
[Page=systemInfo]
  serialNumber=0
  modelCode=0
  radioModel=Unknown
  radioModelCode=0
  radioFirmwareVersion=Unknown
  radioSerialNumber=0
  deviceName=
  deviceModel=ZIQ-PE
  deviceConfiguration=0
  deviceFirmwareVersion=FWT1060TB.68
  deviceId=1
  layoutHash=529070878
  resetInfo=
  hopTableVersion=Unknown
  rteVersion=FWT1060TB.68
  rteTemplateVersion=FWT1060TB.68
  licenses=Custom Apps
RESULT:0:OK
>

```

Figure 111: systemInfo Pages information

5. Verify the **rteTemplateVersion** and **rteVersion** values match these parameters:

Verify Activation Parameters	
Parameter	Value
radioFirmwareVersion (on page 310)	FWT1040TA.11
deviceFirmwareVersion (on page 305)	FWT1060TB.68

Verify Activation Parameters	
Parameter	Value
rteVersion (on page 312)	FWT1060TB.68 <div style="border: 1px solid black; padding: 5px; margin-top: 5px;">Important!: This value is updated after ZumIQ is activated.</div>
rteTemplateVersion (on page 312)	FWT1060TB.68
licenses (on page 308)	Custom Apps

Important! If the [rteVersion](#) is (blank) then the ZumIQ is NOT activated. Repeat the [Activating ZumIQ \(on page 97\)](#) procedure.

6. Type `exit` and press <Enter> to exit the FreeWave Shell.
7. Continue with [Using ZumIQ as DEVUSER \(on page 101\)](#).

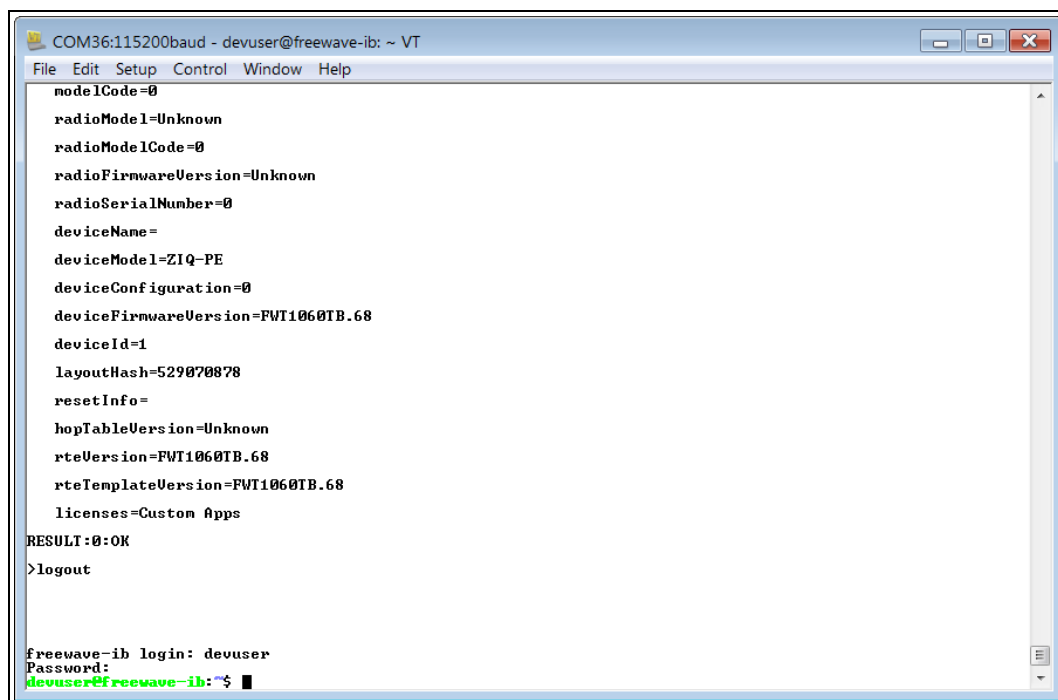
8.6. Using ZumIQ as DEVUSER

Once logged into ZumIQ as **devuser**, developers gain access to the **devuser** home directory where applications and associated tools and services are stored. The directory also has several pre-loaded tools such as Python language support and helper scripts to pull in other external tools and services.

Once a developer is ready to start building an application in ZumIQ, they should first visit FreeWave's GitHub wiki environment that provides guidance on a wide range of topics. (<https://github.com/FreeWaveTechnologies/ZumIQ>)

Procedure

1. [Verify ZumIQ Activation \(on page 99\)](#) is completed.
2. Log in to the Z9-PC / Z9-PC-SR001 CLI as **devuser**.
The default password is **devuser**.
A Linux Bash prompt appears. (Figure 112)



```
COM36:115200baud - devuser@freewave-ib: ~ - VT
File Edit Setup Control Window Help
modelCode=0
radioModel=Unknown
radioModelCode=0
radioFirmwareVersion=Unknown
radioSerialNumber=0
deviceName=
deviceModel=ZIQ-PE
deviceConfiguration=0
deviceFirmwareVersion=FWT1060TB.68
deviceId=1
layoutHash=529070878
resetInfo=
hopTableVersion=Unknown
rteVersion=FWT1060TB.68
rteTemplateVersion=FWT1060TB.68
licenses=Custom Apps
RESULT:0:OK
>logout

freewave-ib login: devuser
Password:
devuser@freewave-ib:~$
```

Figure 112: Linux Bash Prompt for the Z9-PC / Z9-PC-SR001 DEVUSER

3. Go to: <https://github.com/FreeWaveTechnologies/ZumIQ>.
The FreeWave Github ZumIQ Main Page opens. (Figure 113)

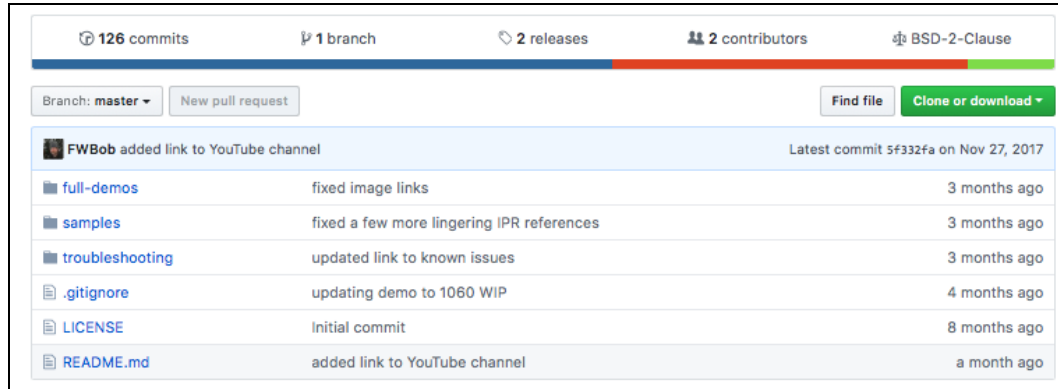


Figure 113: FreeWave GitHub ZumiQ Main Page

Note: The ZumiQ GitHub site contains many valuable tools including demonstrations, sample applications, troubleshooting guides and other information that can be very useful.

4. Scroll to the bottom of the **Main** page and click the Wiki link for ZumiQ app development information. (Figure 114)

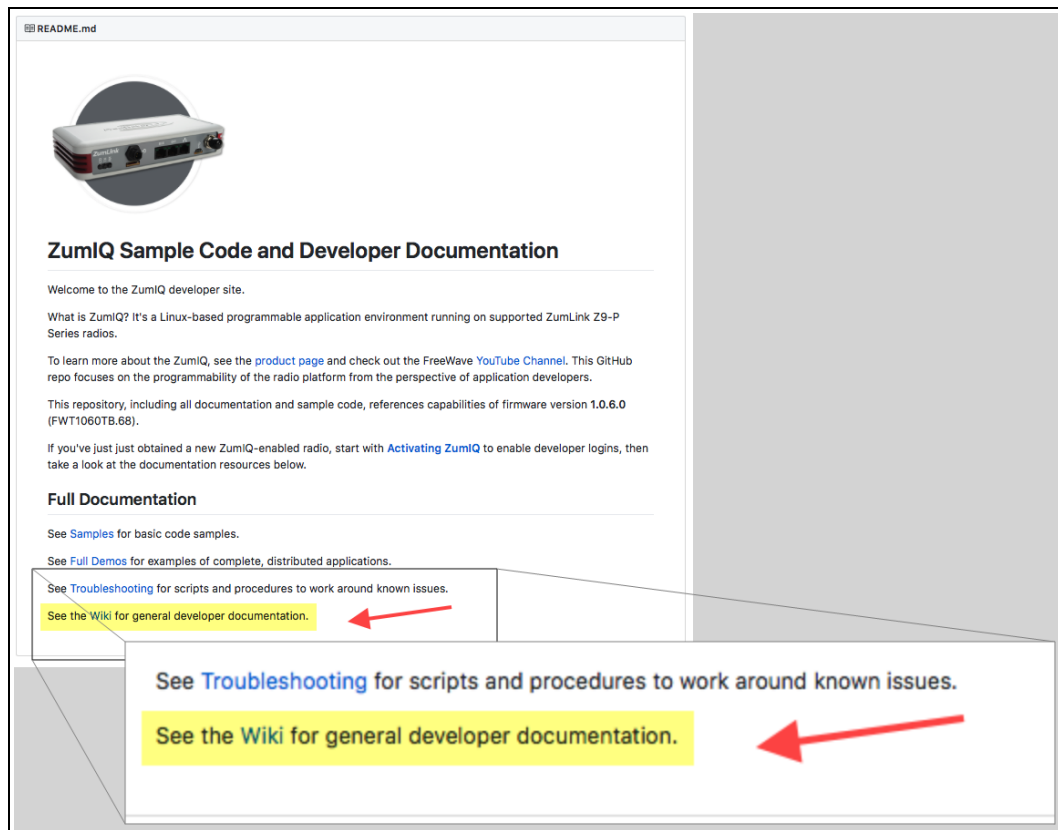


Figure 114: Wiki link on the FreeWave GitHub ZumiQ Main Page

9. Web Interface Administration

This section provides procedure information about administration of the Z9-PC / Z9-PC-SR001 parameters.

- [Change the COM Parameters \(on page 106\)](#)
- [Change the Data Path Parameters \(on page 110\)](#)
- [Change the Encryption Parameters \(on page 113\)](#)
- [Change the Local Diagnostics \(on page 116\)](#)
- [Change the Network Parameters \(on page 119\)](#)
- [Change the NTP Parameters \(on page 122\)](#)
- [Change the Radio Settings Parameters - Endpoints \(on page 125\)](#)
- [Change the Radio Settings Parameters - Endpoint-Repeaters \(on page 129\)](#)
- [Change the Radio Settings Parameters - Gateways \(on page 133\)](#)
- [Change the Radio Settings Parameters - Gateway-Repeaters \(on page 137\)](#)
- [Change the Security Parameters \(on page 141\)](#)
- [Change the Services Parameters \(on page 144\)](#)
- [Change the SNMP Parameters \(on page 147\)](#)
- [Change the System Info Parameters \(on page 150\)](#)
- [Change the Terminal Server Relay Parameters \(on page 153\)](#)

9.1. Access the Web Interface

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window](#) (on page 343) opens.

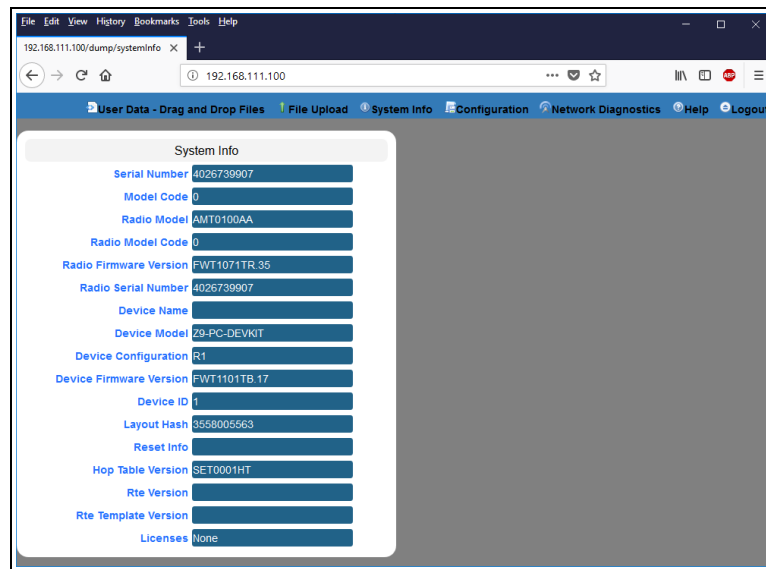


Figure 115: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 116](#))

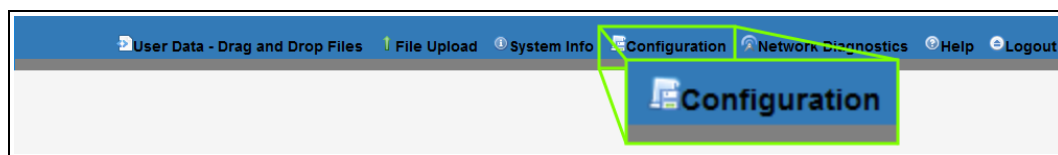


Figure 116: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 117](#))

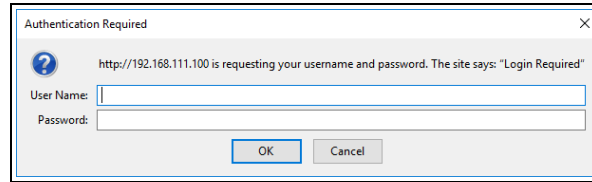


Figure 117: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 118)

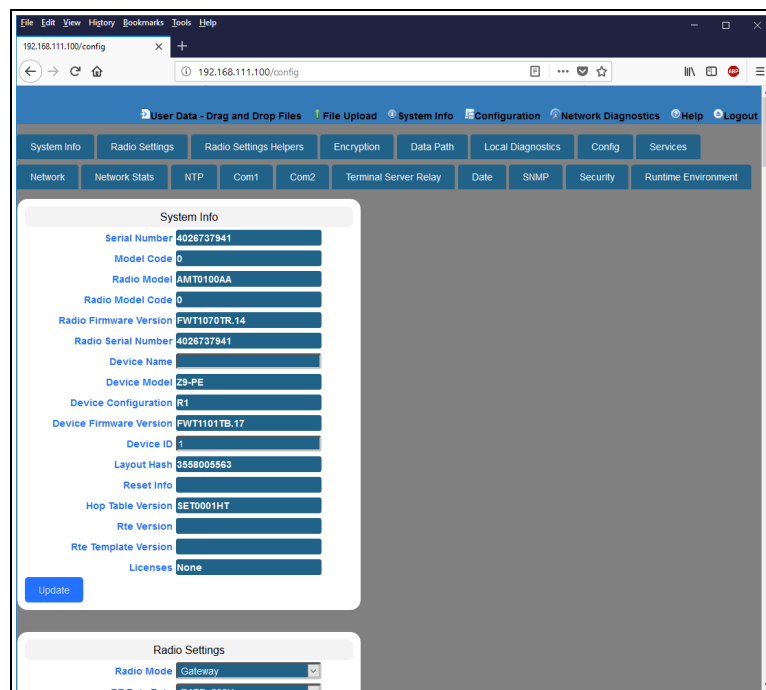


Figure 118: Configuration window

9.2. Change the COM Parameters

Note: See the [COM Parameters \(on page 183\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

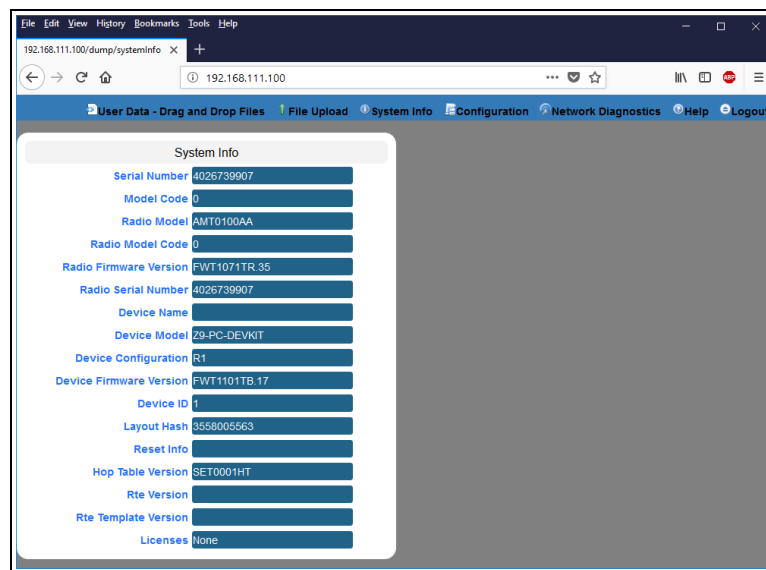


Figure 119: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 120](#))

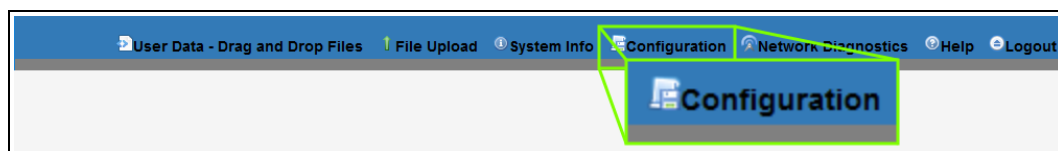


Figure 120: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 121](#))

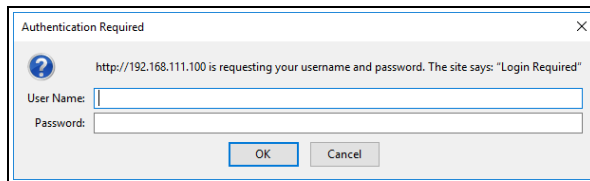


Figure 121: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 122)

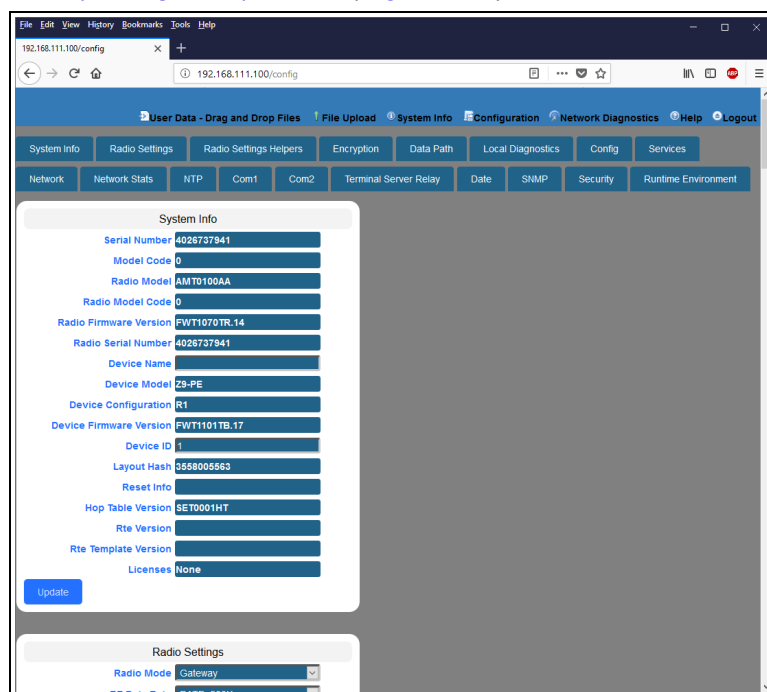


Figure 122: Configuration window

6. Click either the **COM1** or **COM2** tab. The **COM1** or **COM2** parameters are shown in Figure 123 or Figure 124 respectively.

Note: See the **COM Parameters** (on page 183) for detailed information about the parameters. The parameters for **COM1** and **COM2** are the same except for the **TerminalServerPort** parameter setting.

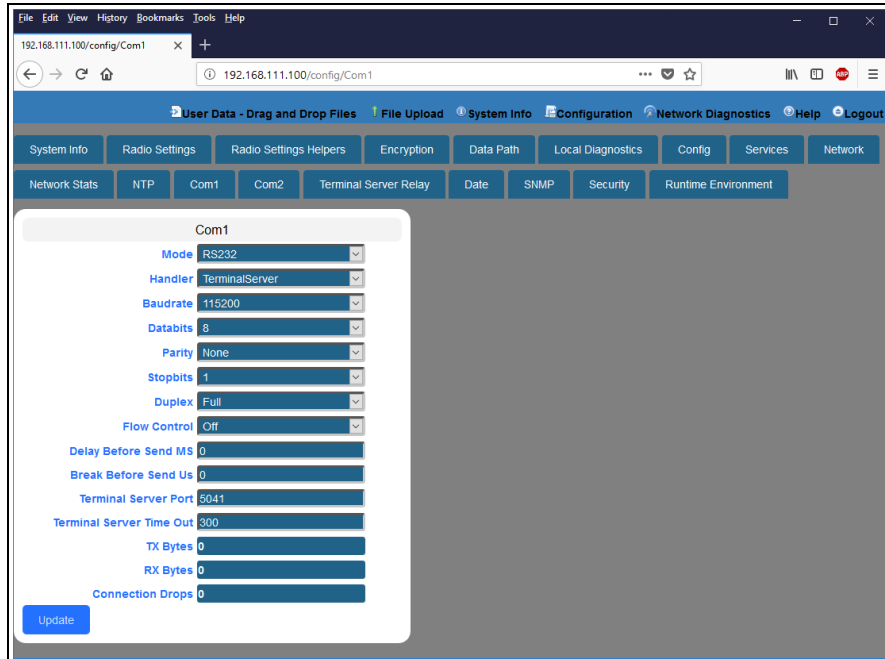


Figure 123: COM1 window

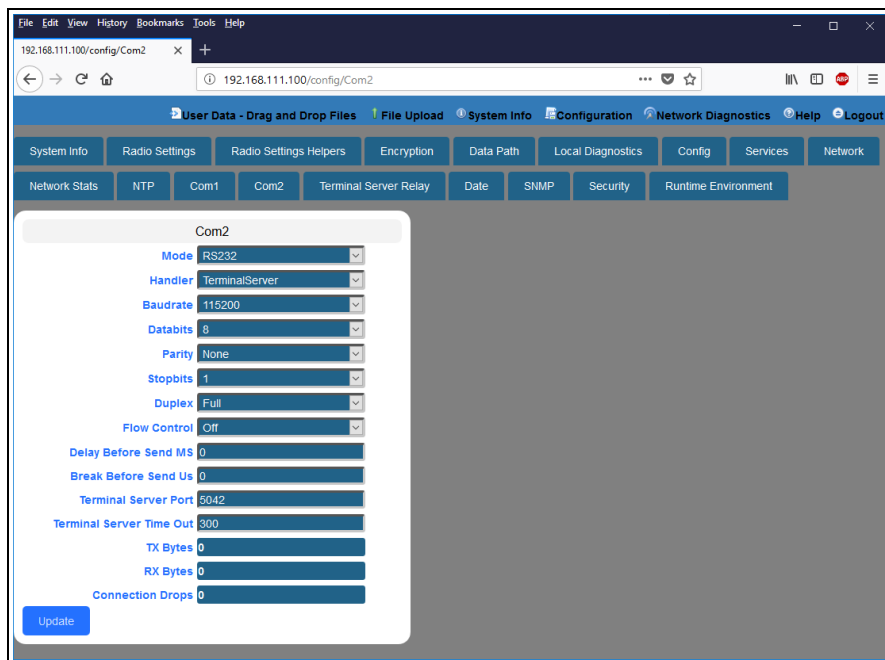


Figure 124: COM2 window

7. As applicable, change these parameters:
 - a. Click the **Mode** list box arrow and select the COM port mode.
 - b. Click the **Handler** list box arrow and select the designated protocol handler.
 - c. Click the **Baudrate** list box arrow and select a COM port baud rate.

- d. Click the **Databits** list box arrow and select the number of data bits in the frame for COM1 or COM2.
- e. Click the **Parity** list box arrow and select the COM port parity bits for the system.
- f. Click the **Stopbits** list box arrow and select the COM port number of stop bits.
- g. Click the **Duplex** list box arrow and select the duplex designation.
- h. Click the **Flow Control** list box arrow and select **Hardware** to activate **flowControl** for COM2.

Important! The RTS and CTS signals are **ONLY** available for COM2.
The RTS and CTS signals are **NOT supported for COM1**.

- i. In the **Delay Before Send MS** text box, enter the milliseconds of time delay.
- j. In the **Break Before Send Us** text box, enter the number of milliseconds the COM port will send a break signal.
- k. In the **Terminal Server Port** text box, enter the designated TCP port number.

FREEWAVE Recommends: If using the **Terminal Server Relay** setting, keep the TCP port numbers as their defaults.

- l. In the **Terminal Server Time Out** text box, enter the number of seconds the Terminal Server remains open without receiving data from the network.

Note: [TxBytes \(on page 194\)](#), [RxBytes \(on page 191\)](#), and [connectionDrops \(on page 185\)](#) are Read-only parameters.

8. Click the **Update** button to save the changed information.

9.3. Change the Data Path Parameters

Note: See the [dataPath Parameters \(on page 201\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

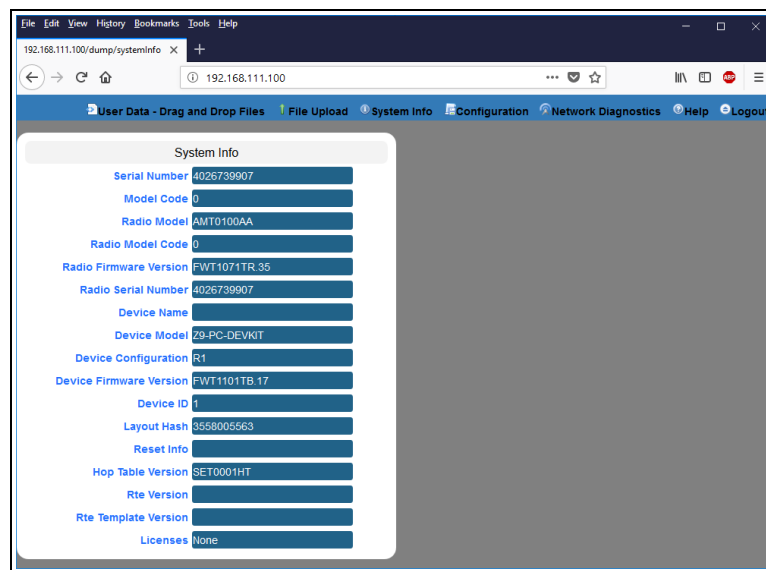


Figure 125: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 126](#))

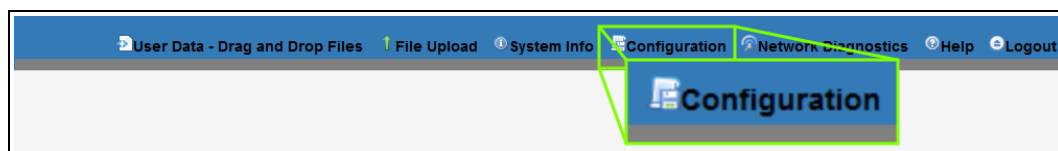


Figure 126: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 127](#))

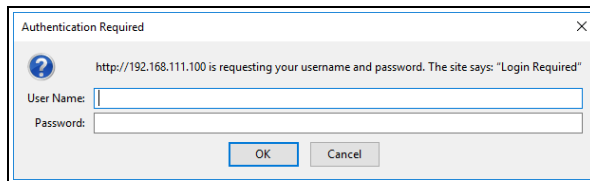


Figure 127: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 128)

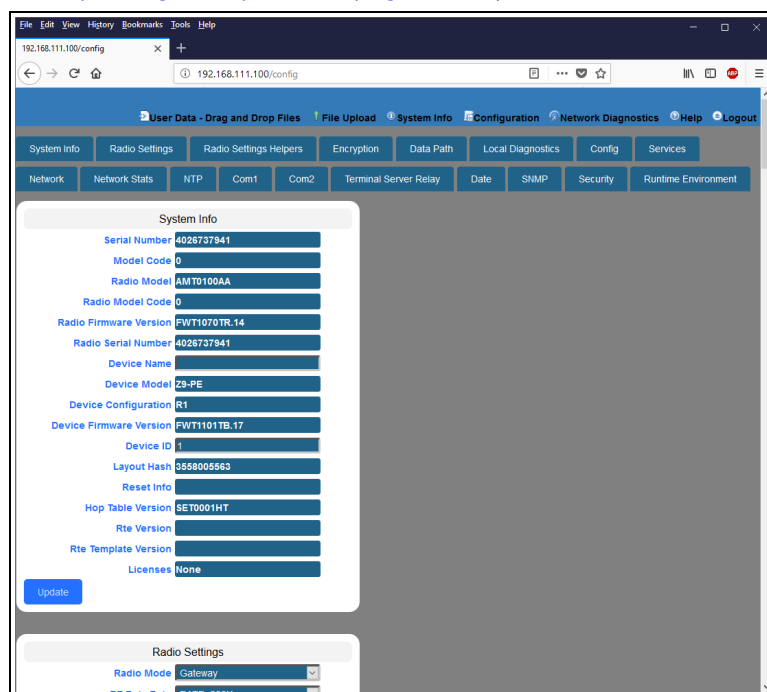


Figure 128: Configuration window

6. Click the **Data Path** tab. The **Data Path** parameters are shown in Figure 129.

Note: See the [dataPath Parameters](#) (on page 201) for detailed information about the parameters.

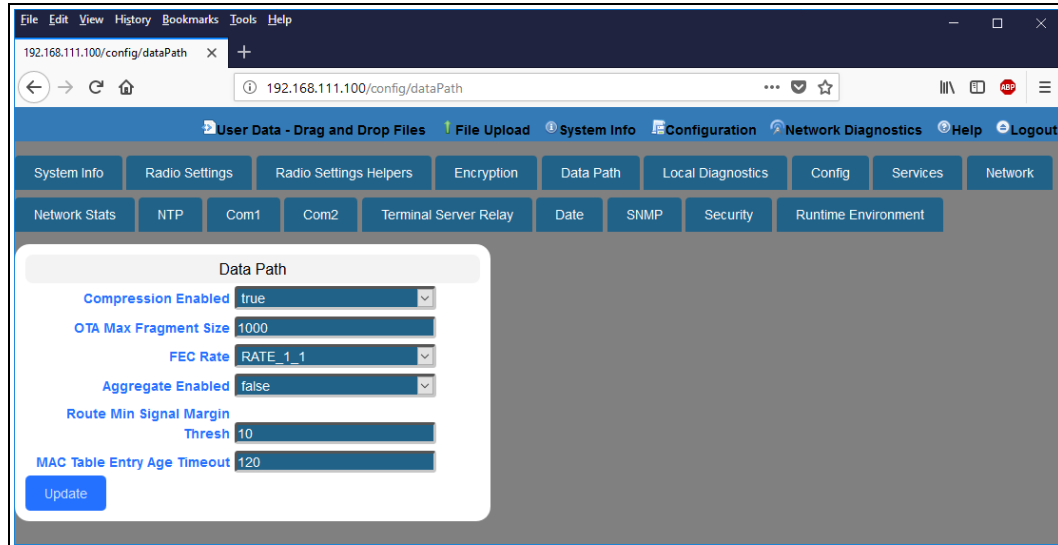


Figure 129: Data Path window

7. As applicable, change these parameters:
 - a. Click the **Compression Enabled** list box arrow and select **False** to disable compression of outgoing packets.

Note: By default, the **Compression Enabled** is enabled (set to True).

- b. In the **OTA Max Fragment Size** text box, enter the maximum fragment size, in bytes, sent over the air.
 - c. Click the **FEC Rate** list box arrow and select the Forward Error Correction (FEC) rate.
 - d. Click the **Aggregate Enabled** list box arrow and select **True** to enable this parameter and increase throughput of small packets.

Note: By default, the **Aggregate Enabled** is NOT enabled (set to False).

- e. In the **Route Min Signal Margin Thresh** text box, enter the minimum threshold signal margin in dB.
 - f. In the **MAC Table Entry Age Timeout** text box, enter the number of seconds before an inactive entry in the MAC Table ages out and expires.
8. Click the **Update** button to save the changed information.

FREEWAVE Recommends: When viewing local diagnostics, if the [RadioBadCRC \(on page 226\)](#) count is more than 15% of the total transmitted packets (the [RadioLLTx \(on page 228\)](#) count), enabling the [fecRate \(on page 204\)](#) setting is beneficial.

9.4. Change the Encryption Parameters

Note: See the [encryption Parameters \(on page 214\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

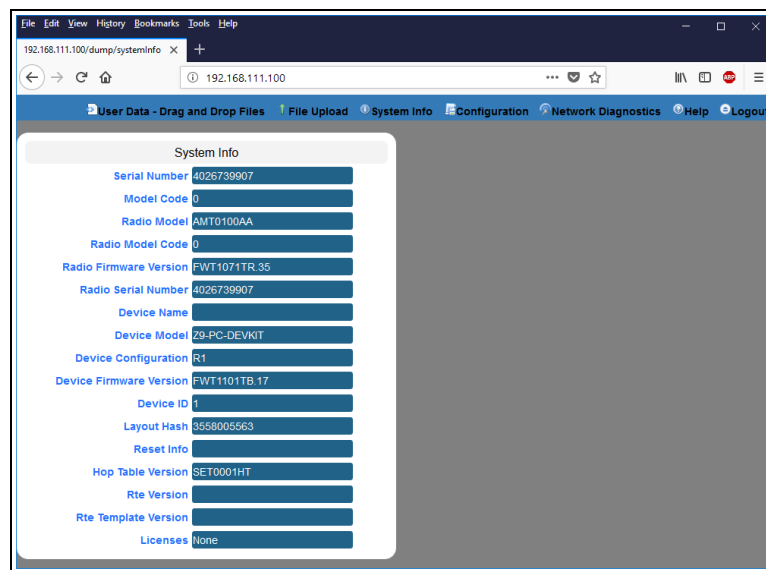


Figure 130: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 131](#))

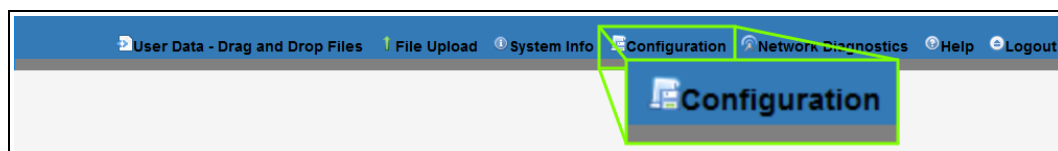


Figure 131: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 132](#))

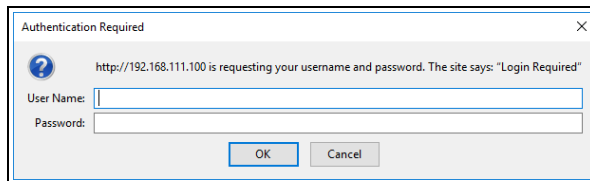


Figure 132: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 133)

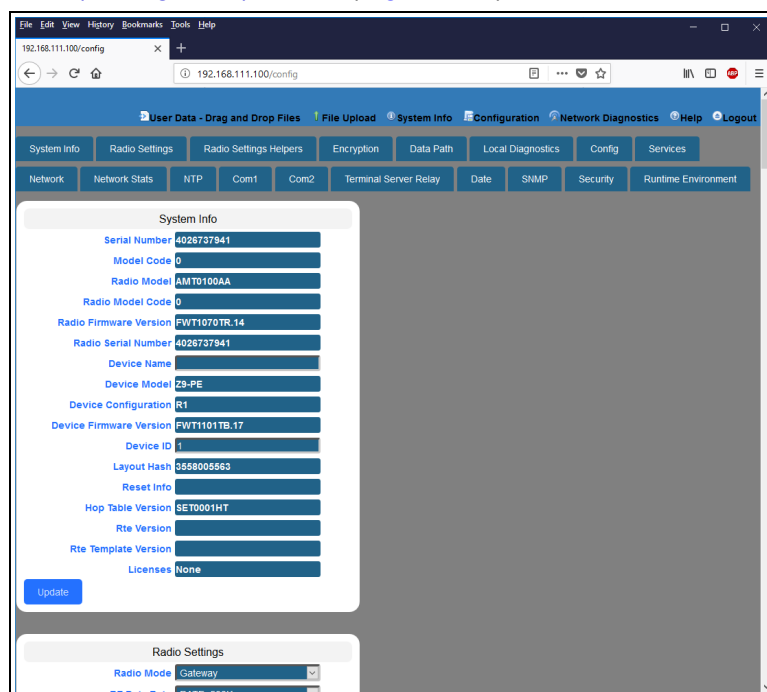


Figure 133: Configuration window

6. Click the **Encryption** tab. The **Encryption** parameters are shown in Figure 134.

Note: See the **encryption Parameters** (on page 214) for detailed information about the parameters.

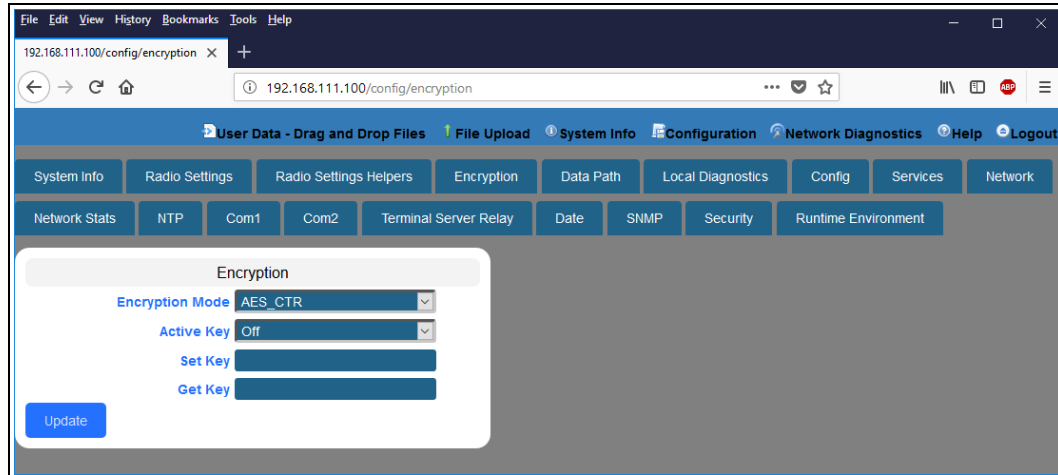


Figure 134: Encryption window

7. Click the **Encryption Mode** list box arrow and select the designated encryption mode.

Note: The [activeKey](#) (on page 215), [setKey](#) (on page 217), and [getKey](#) (on page 216) parameters are read-only in the Web Interface. They can be changed in the CLI.

8. Click the **Update** button to save the changed information.

9.5. Change the Local Diagnostics

Note: See the [localDiagnostics Parameters \(on page 219\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

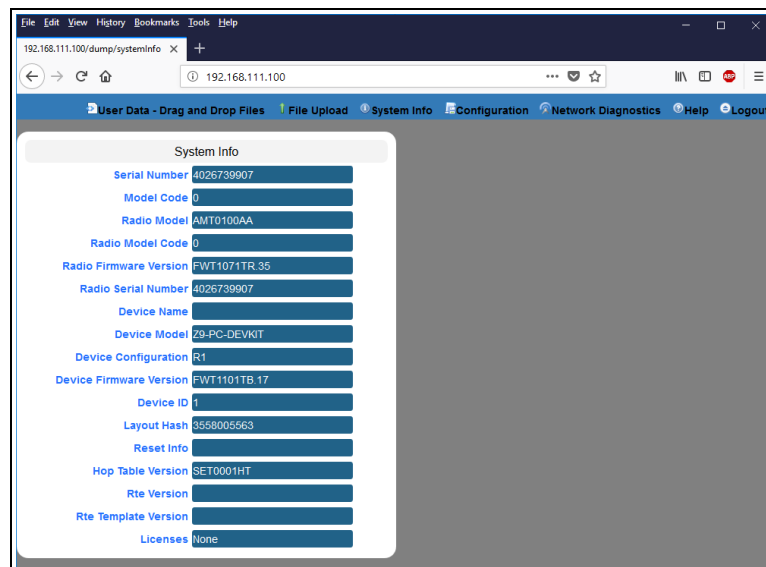


Figure 135: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 136](#))

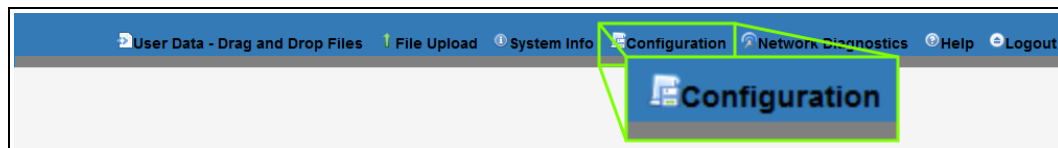


Figure 136: Configuration link

The **Authentication Required (Login)** dialog box opens. ([Figure 137](#))

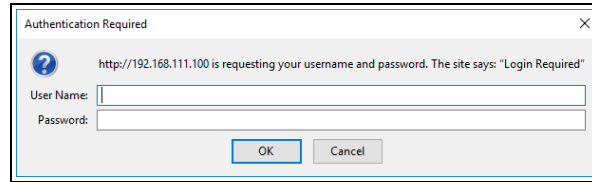


Figure 137: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 138)

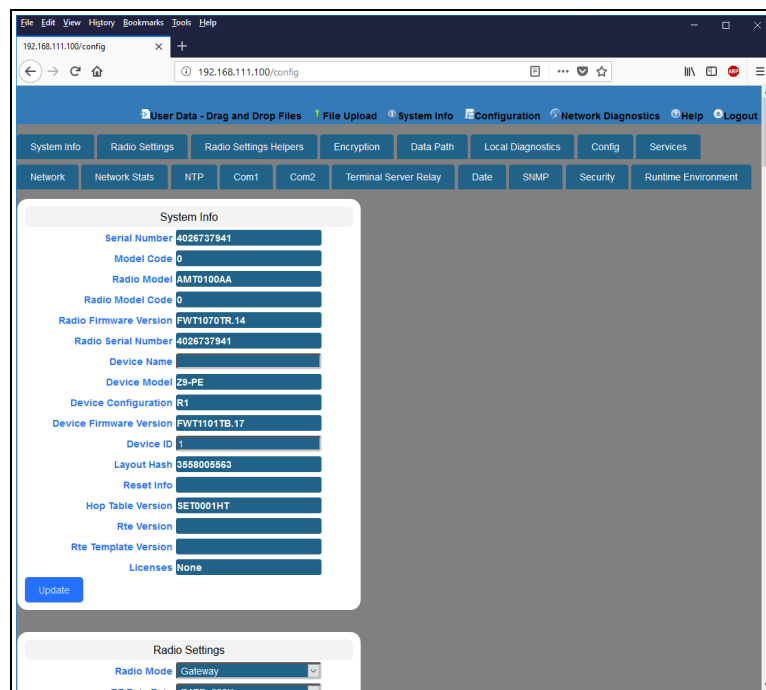


Figure 138: Configuration window

6. Click the **Local Diagnostics** tab. The **Local Diagnostics** window opens.

Note: See the [localDiagnostics Parameters](#) (on page 219) for detailed information about the parameters.

7. Scroll to locate the **Monitored Node** text box. (Figure 139)

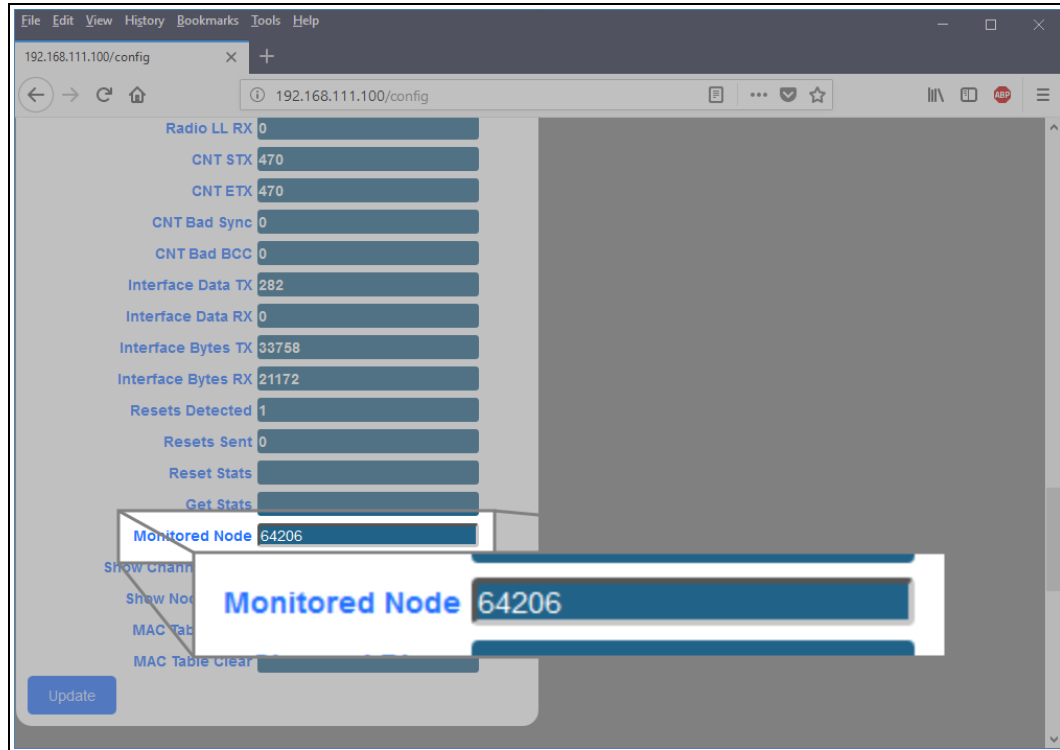


Figure 139: Local Diagnostics window

8. In the **Monitored Node** text box, enter the [nodeId](#) (on page 264) to monitor.
9. Click the **Update** button to save the changed information.

FREEWAVE Recommends: When viewing local diagnostics, if the [RadioBadCRC](#) (on page 226) count is more than 15% of the total transmitted packets (the [RadioLLTx](#) (on page 228) count), enabling the [fecRate](#) (on page 204) setting is beneficial.

9.6. Change the Network Parameters

Note: See the [network Parameters \(on page 237\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

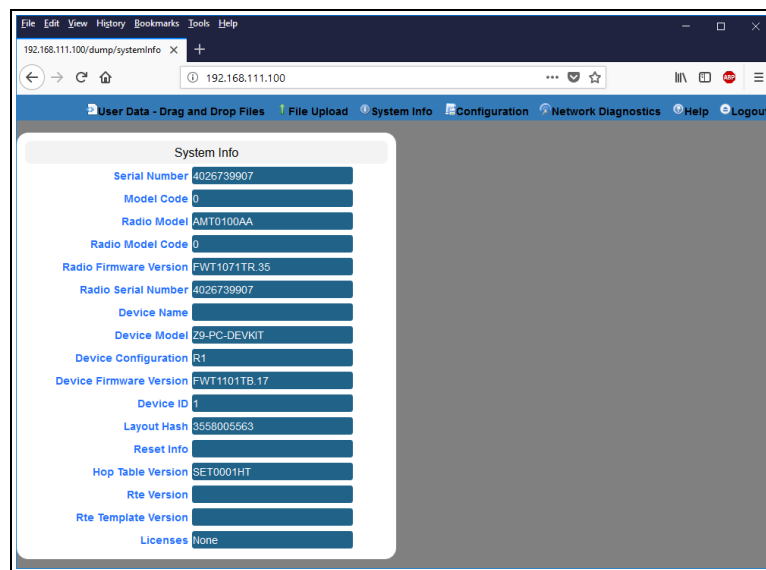


Figure 140: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 141](#))

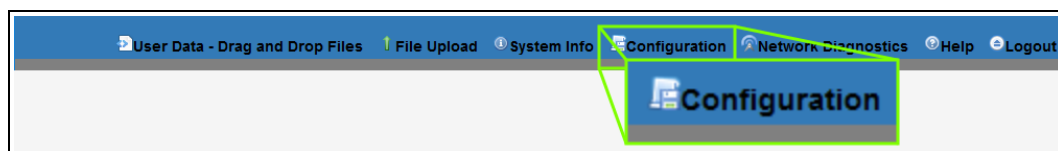


Figure 141: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 142](#))

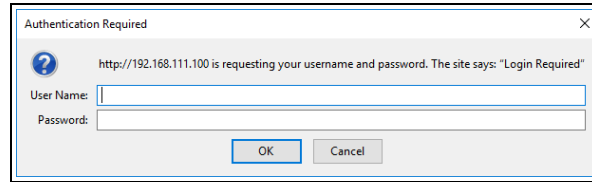


Figure 142: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 143)

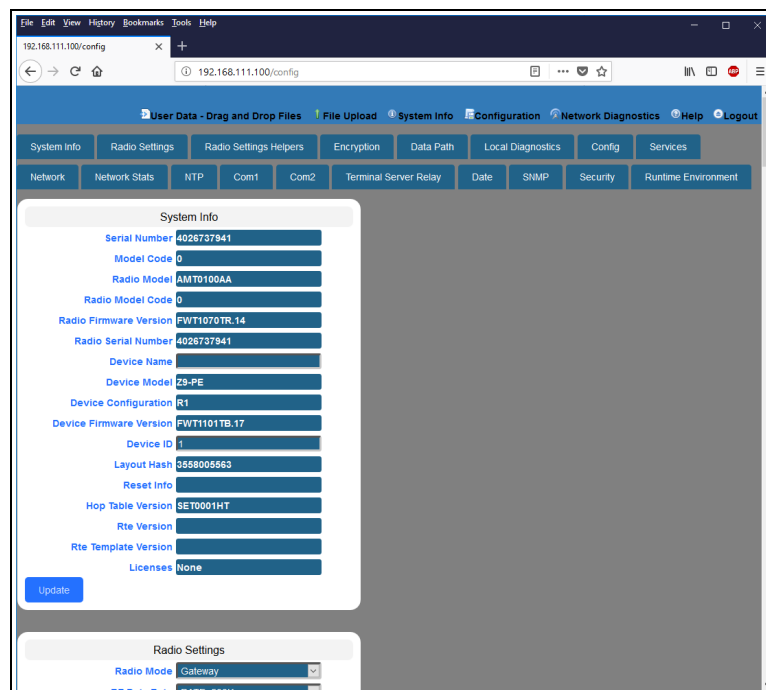


Figure 143: Configuration window

6. Click the **Network** tab. The **Network** parameters are shown in Figure 144.

Note: See the **network Parameters** (on page 237) for detailed information about the parameters.

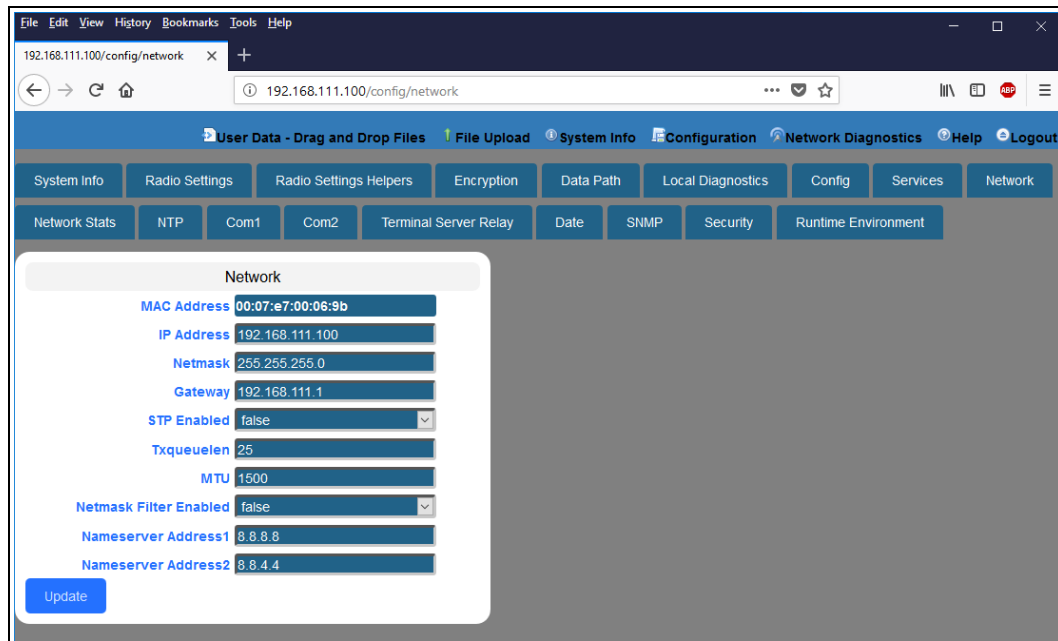


Figure 144: Network window

Note: The `mac_address` (on page 239) parameter is Read-only.

7. As applicable, change these parameters:
 - a. In the **IP Address** text box, enter the IP address of the Z9-PC / Z9-PC-SR001 assigned by the IT department for the network.
 - b. In the **Netmask** text box, enter the Netmask of the Z9-PC / Z9-PC-SR001.
 - c. In the **Gateway** text box, enter the Gateway IP address for the network.
 - d. Click the **STP Enabled** list box arrow and select **True** to enable the Spanning Tree Protocol.

Note: By default, the **STP Enabled** is NOT enabled (set to False).

- e. In the **Txqueuelen** text box, enter the maximum number of packets to hold in the transmit queue.
- f. In the **MTU** text box, enter the maximum transmission unit.
- g. Click the **Netmask Filter Enabled** list box arrow and select **True** to enable the bridge firewall and restrict network communication to current IPv4 subnet.

Note: By default, the **Netmask Filter Enabled** is enabled (set to False).

- h. In the **Nameserver Address 1** text box, enter a user-defined DNS IP address.
 - i. In the **Nameserver Address 2** text box, enter a user-defined DNS IP address..
8. Click the **Update** button to save the changed information.

9.7. Change the NTP Parameters

Note: See the [NTP Parameters \(on page 250\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

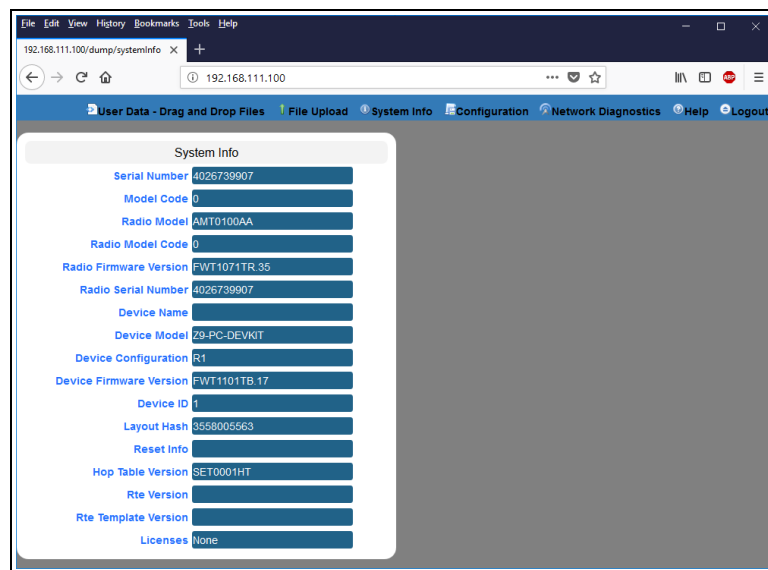


Figure 145: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 146](#))

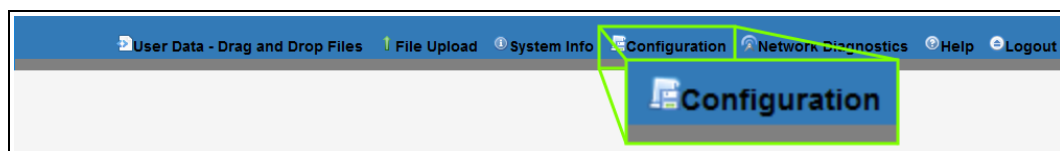


Figure 146: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 147](#))

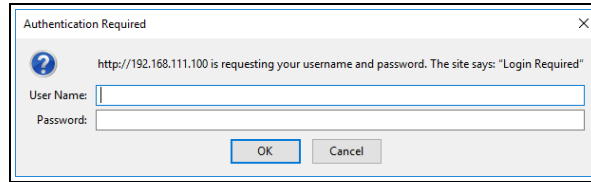


Figure 147: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 148)

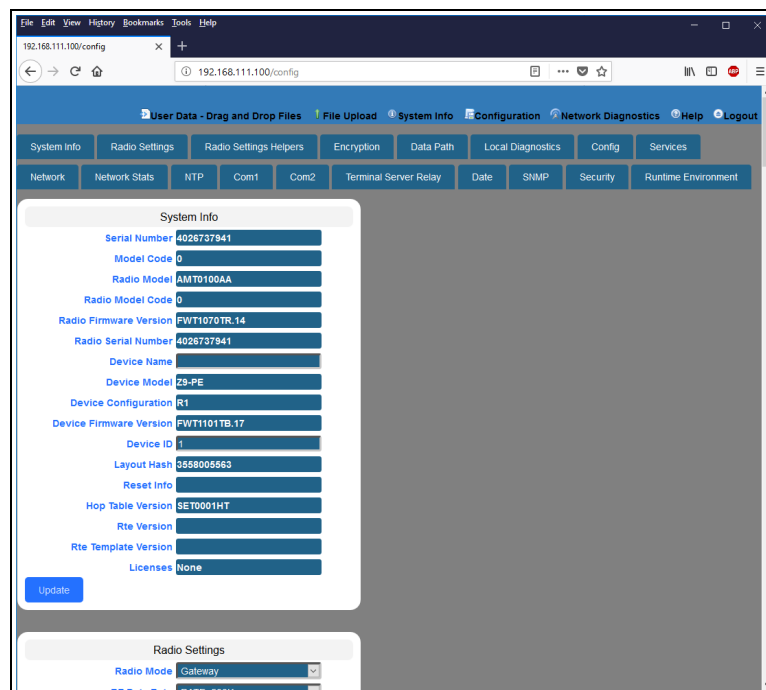
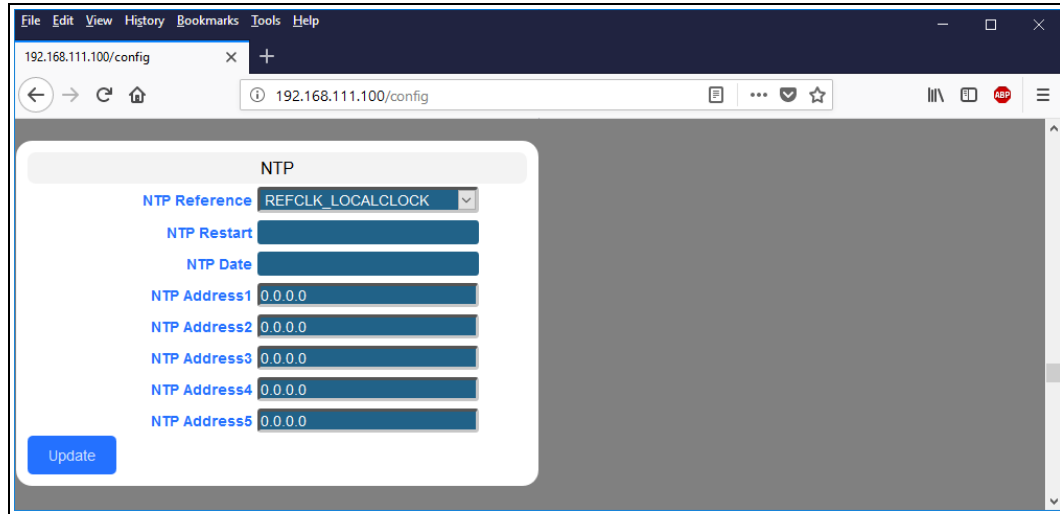


Figure 148: Configuration window

6. Click the **NTP** tab. The **NTP** parameters are shown in Figure 149.

Note: See the **NTP Parameters** (on page 250) for detailed information about the parameters.

**Figure 149: NTP window**

7. As applicable, change these parameters:
 - a. Click the **NTP Reference** list box arrow and select either **NETWORK_TIME_SERVER** or **REFCLK_LOCALCLOCK**.
 - b. In the **NTP Restart** text box, enter **Now** to restart the the NTP system.
 - c. In the **NTP Date** text box, enter **Now** to synchronize the local clock with the time from the NTP servers specified in the [ntp_address \(on page 251\)](#) settings.
 - d. In the **NTP Address 2 to 5** text boxes, enter the IP address of the servers used for synchronizing time.

Note: By default, the **NTP Address 1** is time.nist.gov.

8. Click the **Update** button to save the changed information.

9.8. Change the Radio Settings Parameters - Endpoints

Note: See the [radioSettings Parameters \(on page 254\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

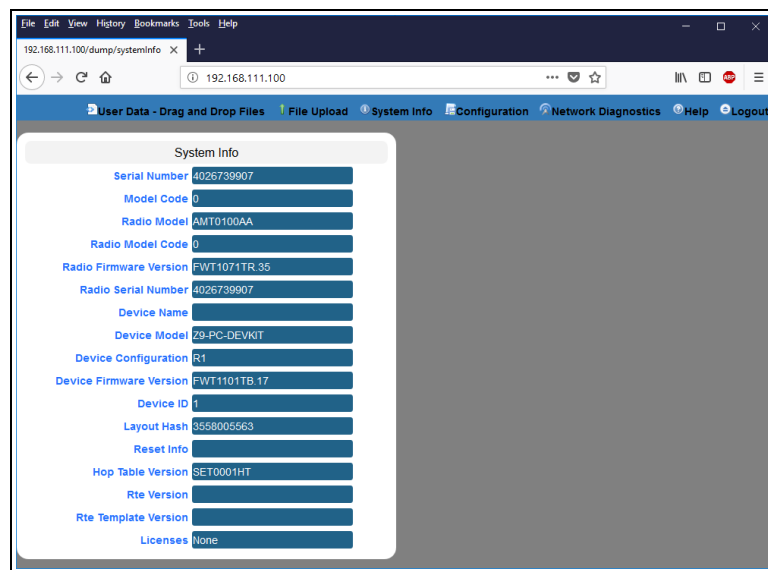


Figure 150: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 151](#))

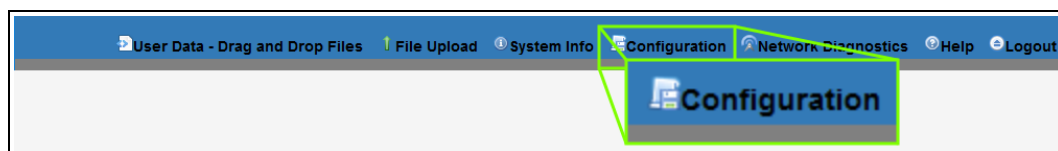


Figure 151: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 152](#))

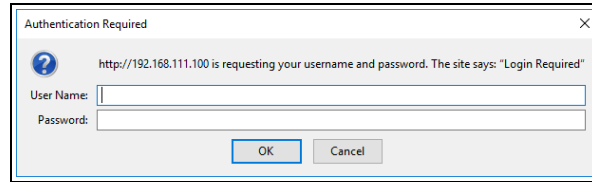


Figure 152: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 153)

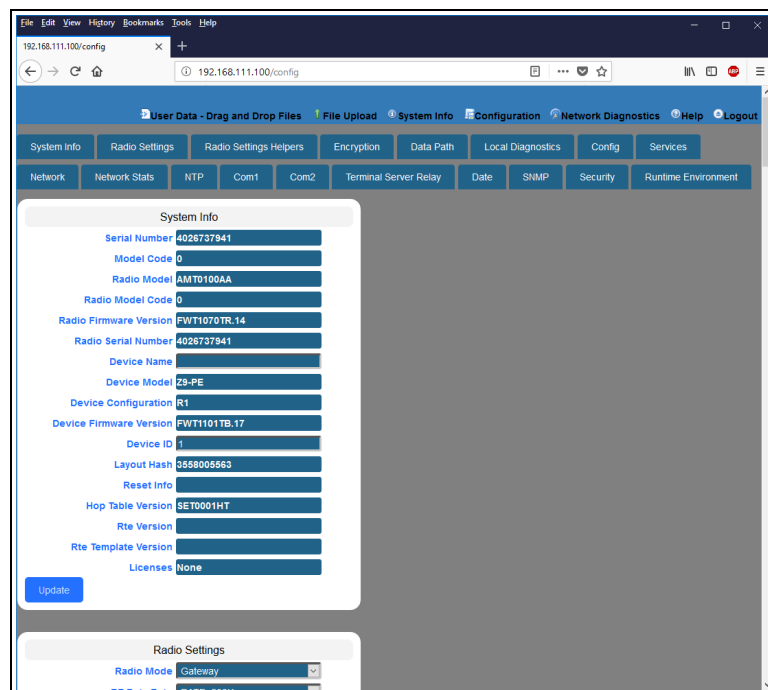


Figure 153: Configuration window

6. Click the **Radio Settings** tab.
7. Click the **Radio Mode** list box arrow and select the device type to designate the Z9-PC / Z9-PC-SR001 as an **Endpoint**. The **Radio Settings** parameters are shown in Figure 154.

Note: See the [radioSettings Parameters](#) (on page 254) for detailed information about the parameters.

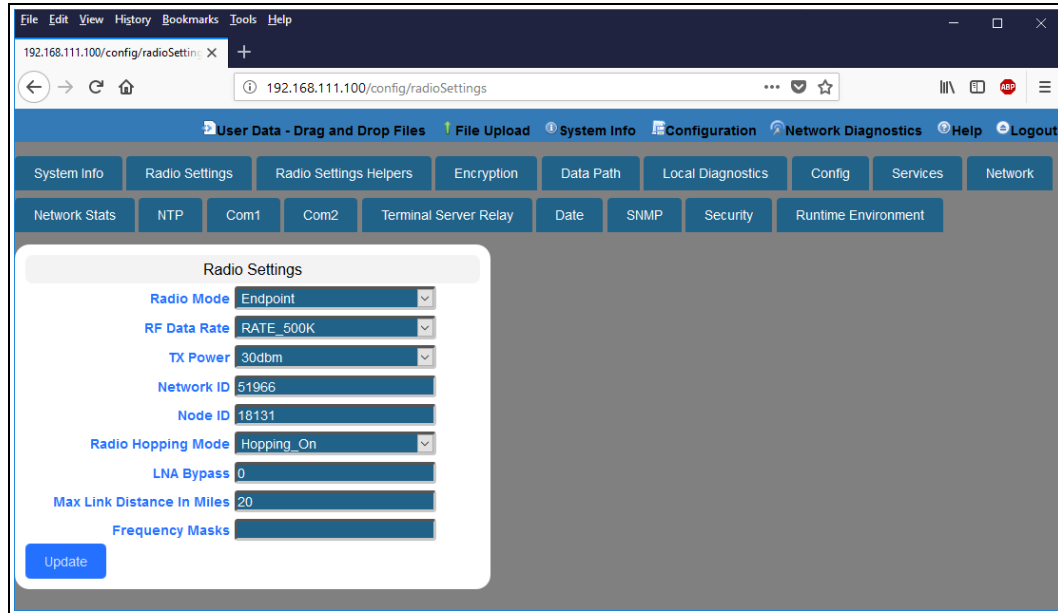


Figure 154: Radio Settings window - Endpoint

8. As applicable, change these parameters:
 - a. Click the **RF Data Rate** list box arrow and select the RF link data rate in bits per second.
 - b. Click the **Tx Power** list box arrow and select the dB RF output transmit power level for the Z9-PC / Z9-PC-SR001.
 - c. In the **Network ID** text box, enter the network identifier that subdivides traffic on radio units.
 - d. In the **Node ID** text box, enter a user-designated **nodeid** instead of the auto-generated **nodeid**.
 - e. Optional: Click the **Radio Hopping Mode** list box arrow and select **Off** to disable frequency hopping.

Note: By default, the **Radio Hopping Mode** is enabled (set to Hopping_On).

- f. Optional: In the **LNA Bypass** text box, enter **1** to bypass the Low Noise Amplifier (LNA) and reduce the radio module receive signal by 10dB.

Note: By default, the **LNA Bypass** is enabled (set to 0 (zero)).

- g. In the **Max Link Distance in Miles** text box, enter the maximum one-way distance (in miles) between any nodes in the network.
- h. In the **Frequency Masks** text box, enter the exact specified format of the frequency range to mask.



Caution: The exact syntax is required in the **Frequency Masks** text box.
See [frequencyMasks \(on page 259\)](#) for detailed information.

9. Click the **Update** button to save the changed information.

9.9. Change the Radio Settings Parameters - Endpoint-Repeaters

Note: See the [radioSettings Parameters \(on page 254\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.

If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

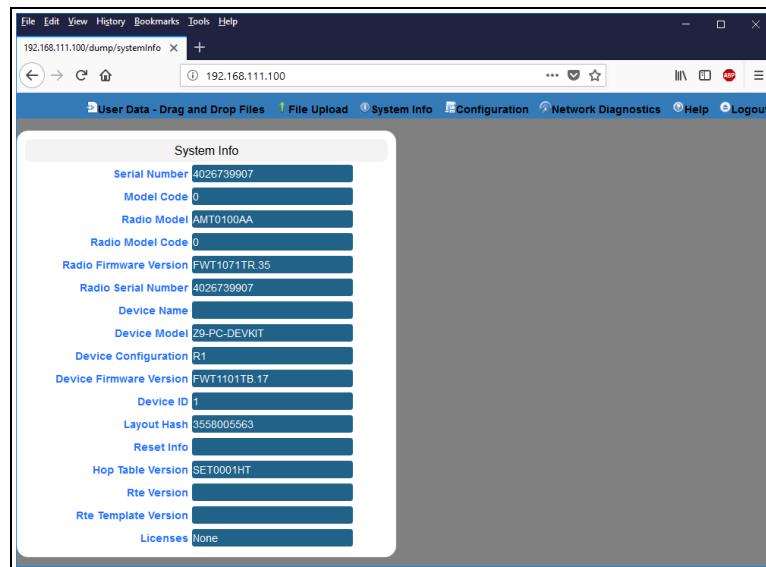


Figure 155: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 156](#))

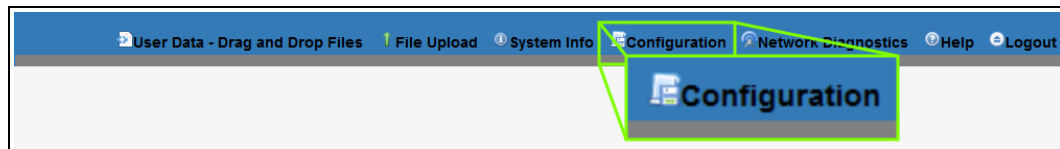


Figure 156: Configuration link

The **Authentication Required (Login)** dialog box opens. ([Figure 157](#))

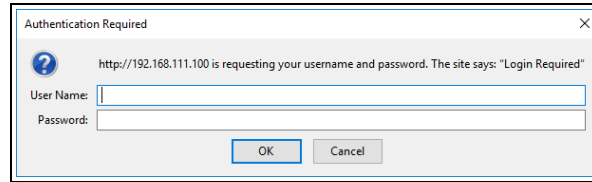


Figure 157: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 158)

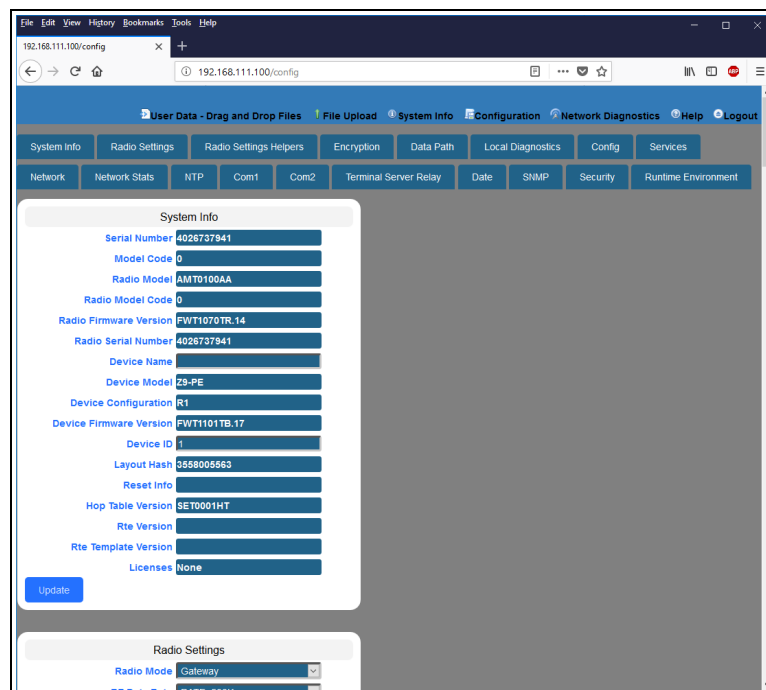


Figure 158: Configuration window

6. Click the **Radio Settings** tab.
7. Click the **Radio Mode** list box arrow and select the device type to designate the Z9-PC / Z9-PC-SR001 as an **Endpoint Repeater**. The **Radio Settings** parameters are shown in Figure 159.

Note: See the **radioSettings Parameters** (on page 254) for detailed information about the parameters.

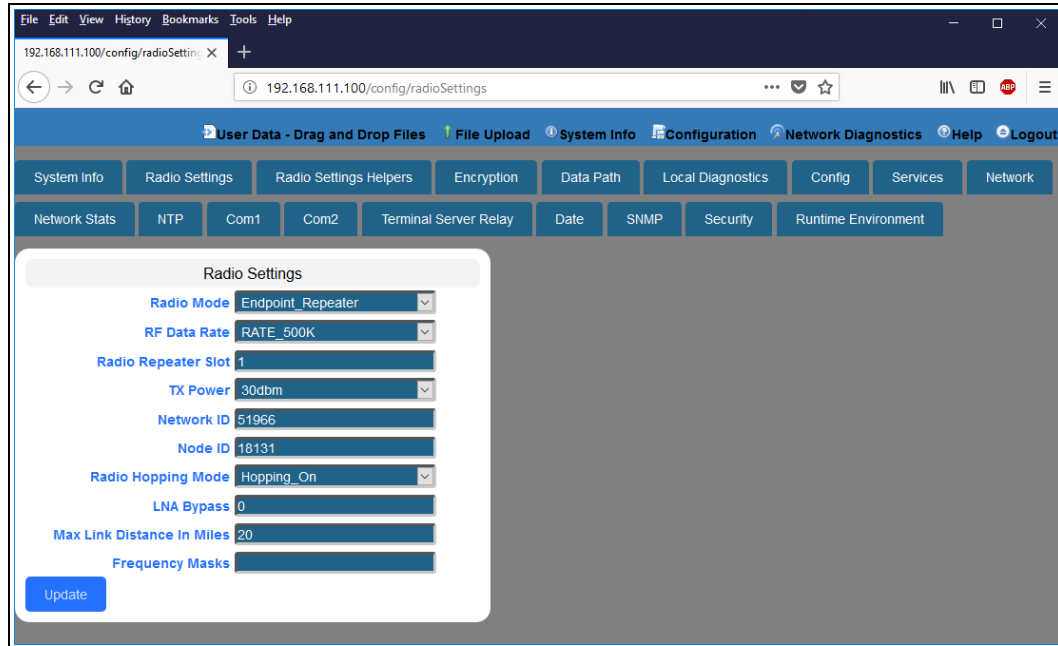


Figure 159: Radio Settings window - Endpoint

8. As applicable, change these parameters:
 - a. Click the **RF Data Rate** list box arrow and select the RF link data rate in bits per second.
 - b. In the **Radio Repeater Slot** text box, enter which repeater slot the Endpoint-Repeater uses.
 - c. Click the **Tx Power** list box arrow and select the dB RF output transmit power level for the Z9-PC / Z9-PC-SR001.
 - d. In the **Network ID** text box, enter the network identifier that subdivides traffic on radio units.
 - e. In the **Node ID** text box, enter a user-designated **nodeld** instead of the auto-generated **nodeld**.
 - f. Optional: Click the **Radio Hopping Mode** list box arrow and select **Off** to disable frequency hopping.

Note: By default, the **Radio Hopping Mode** is enabled (set to Hopping_On).

- g. Optional: In the **LNA Bypass** text box, enter **1** to bypass the Low Noise Amplifier (LNA) and reduce the radio module receive signal by 10dB.

Note: By default, the **LNA Bypass** is enabled (set to 0 (zero)).

- h. In the **Max Link Distance in Miles** text box, enter the maximum one-way distance (in miles) between any nodes in the network.

- i. In the **Frequency Masks** text box, enter the exact specified format of the frequency range to mask.



Caution: The exact syntax is required in the **Frequency Masks** text box. See [frequencyMasks \(on page 259\)](#) for detailed information.

9. Click the **Update** button to save the changed information.

9.10. Change the Radio Settings Parameters - Gateways

Note: See the [radioSettings Parameters \(on page 254\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

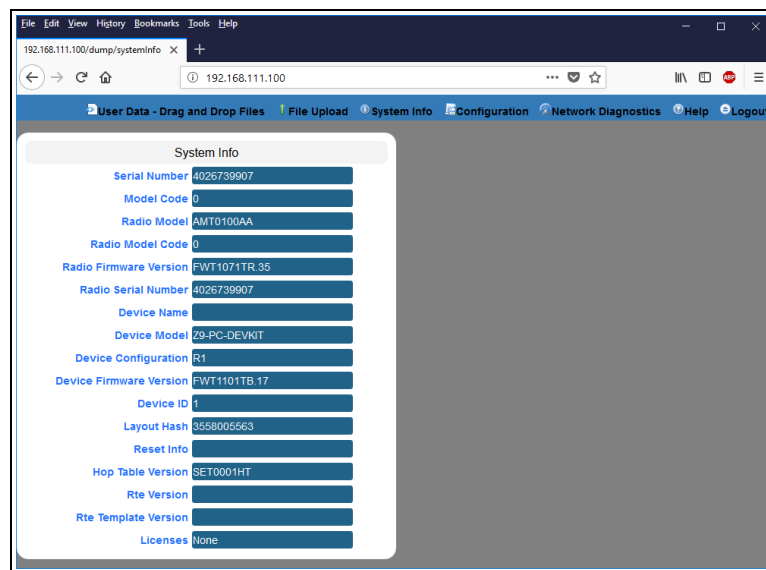


Figure 160: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 161](#))

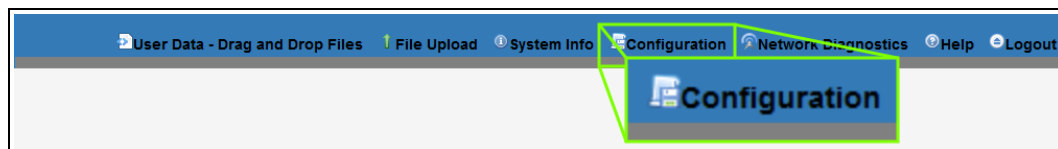


Figure 161: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 162](#))

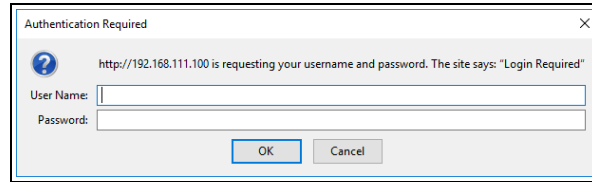


Figure 162: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 163)

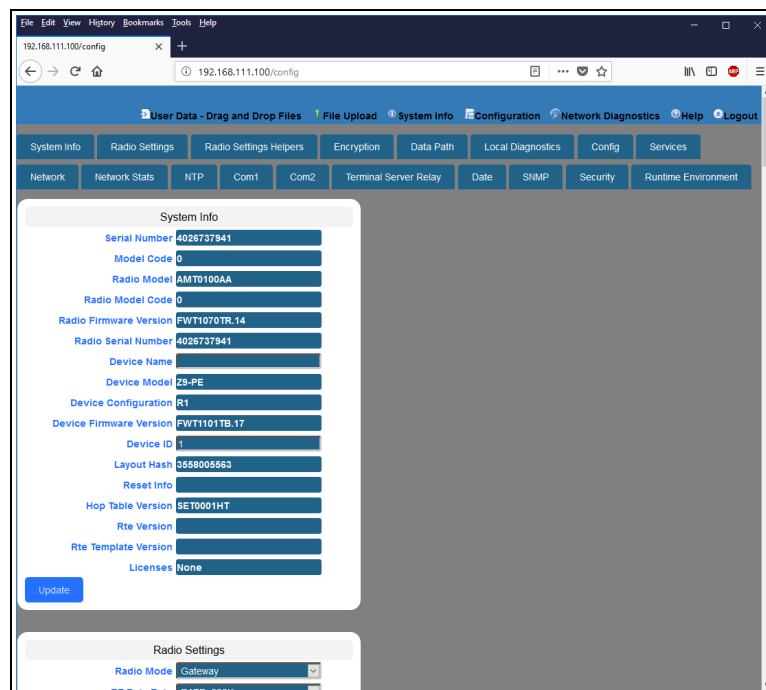


Figure 163: Configuration window

6. Click the **Radio Settings** tab.
7. Accept the **Radio Mode** default of **Gateway**. The **Radio Settings** parameters are shown in Figure 164:

Note: See the [radioSettings Parameters](#) (on page 254) for detailed information about the parameters.

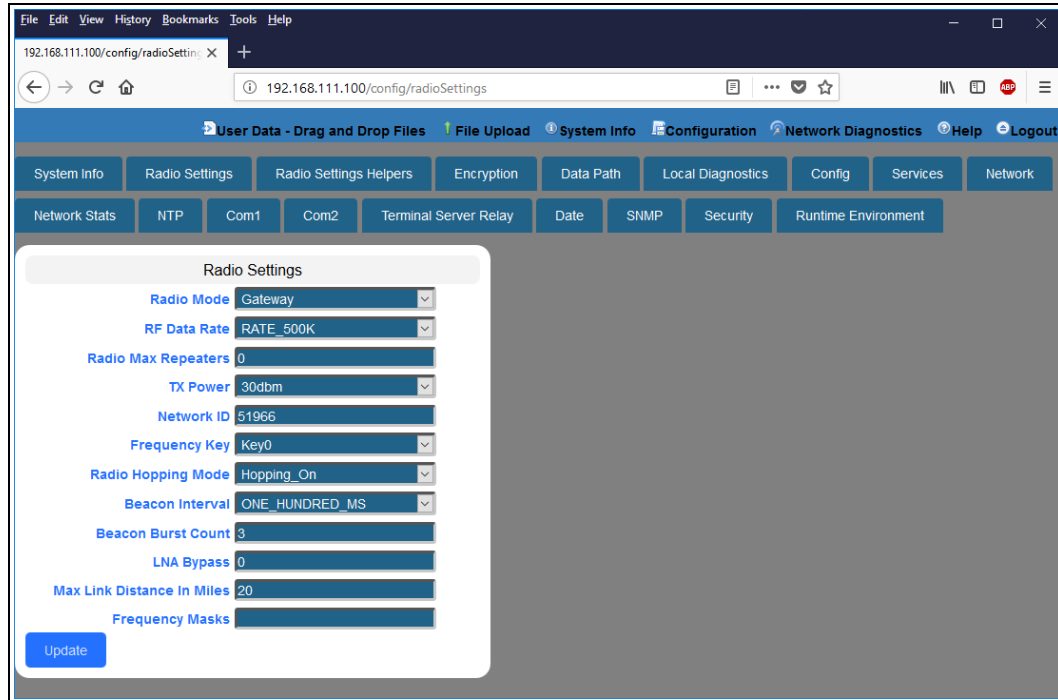


Figure 164: Radio Settings window - Gateway

8. As applicable, change these parameters:
 - a. Click the **RF Data Rate** list box arrow and select the RF link data rate in bits per second.
 - b. In the **Radio Max Repeaters** text box, enter the number of Repeater slots in the network.
 - c. Click the **Tx Power** list box arrow and select the dB RF output transmit power level for the Z9-PC / Z9-PC-SR001.
 - d. In the **Network ID** text box, enter the network identifier that subdivides traffic on radio units.
 - e. Click the **Frequency Key** list box arrow and select the Key number used as an index to select a hopping table.
 - f. Optional: Click the **Radio Hopping Mode** list box arrow and select **Off** to disable frequency hopping.

Note: By default, the **Radio Hopping Mode** is enabled (set to Hopping_On).

- g. Click the **Beacon Interval** list box arrow and select how often a Gateway radio sends out a beacon packet and changes to the next radio frequency in the hopping pattern.
- h. In the **Beacon Burst Count** text box, enter the number of consecutive beacons to send per **beaconInterval** time.

- i. Optional: In the **LNA Bypass** text box, enter **1** to bypass the Low Noise Amplifier (LNA) and reduce the radio module receive signal by 10dB.

Note: By default, the **LNA Bypass** is enabled (set to 0 (zero)).

- j. In the **Max Link Distance in Miles** text box, enter the maximum one-way distance (in miles) between any nodes in the network.
- k. In the **Frequency Masks** text box, enter the exact specified format of the frequency range to mask.



Caution: The exact syntax is required in the **Frequency Masks** text box. See [frequencyMasks \(on page 259\)](#) for detailed information.

9. Click the **Update** button to save the changed information.

9.11. Change the Radio Settings Parameters - Gateway-Repeaters

Note: See the [radioSettings Parameters \(on page 254\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.

If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

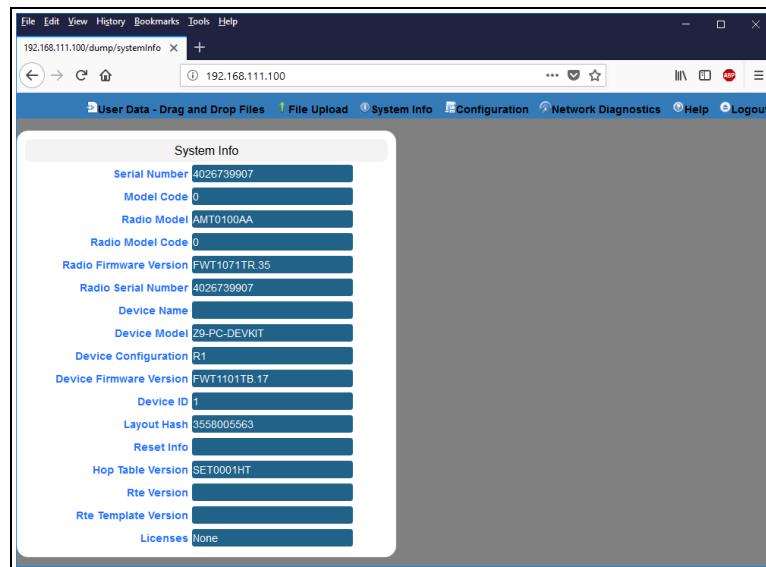


Figure 165: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 166](#))

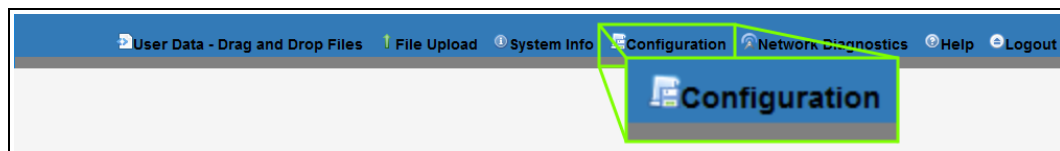


Figure 166: Configuration link

The **Authentication Required (Login)** dialog box opens. ([Figure 167](#))

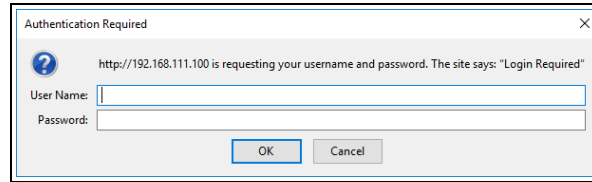


Figure 167: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 168)

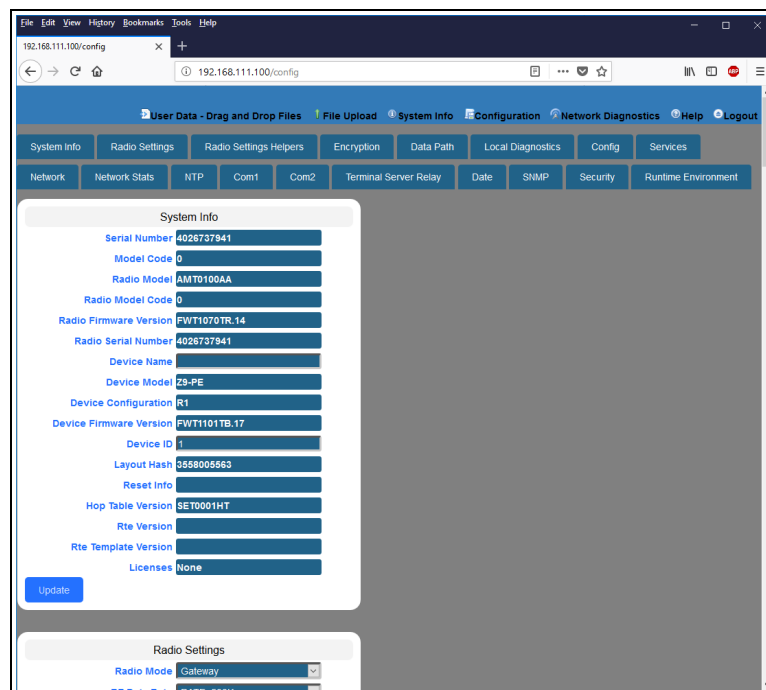


Figure 168: Configuration window

6. Click the **Radio Settings** tab.
7. Click the **Radio Mode** list box arrow and select the device type to designate the Z9-PC / Z9-PC-SR001 as a **Gateway Repeater**. The **Radio Settings** parameters are shown in Figure 169:

Note: See the [radioSettings Parameters](#) (on page 254) for detailed information about the parameters.

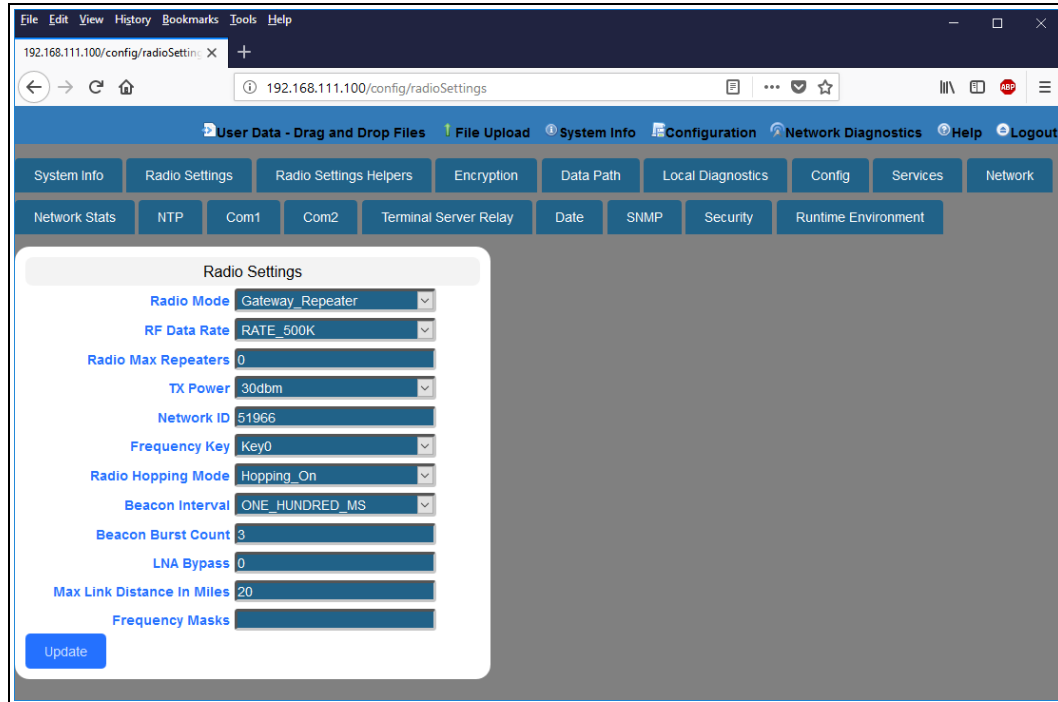


Figure 169: Radio Settings window - Gateway

8. As applicable, change these parameters:
 - a. Click the **RF Data Rate** list box arrow and select the RF link data rate in bits per second.
 - b. In the **Radio Max Repeaters** text box, enter the number of Repeater slots in the network.
 - c. Click the **Tx Power** list box arrow and select the dB RF output transmit power level for the Z9-PC / Z9-PC-SR001.
 - d. In the **Network ID** text box, enter the network identifier that subdivides traffic on radio units.
 - e. Click the **Frequency Key** list box arrow and select the Key number used as an index to select a hopping table.
 - f. Optional: Click the **Radio Hopping Mode** list box arrow and select **Off** to disable frequency hopping.

Note: By default, the **Radio Hopping Mode** is enabled (set to Hopping_On).

- g. Click the **Beacon Interval** list box arrow and select how often a Gateway radio sends out a beacon packet and changes to the next radio frequency in the hopping pattern.
- h. In the **Beacon Burst Count** text box, enter the number of consecutive beacons to send per **beaconInterval** time.

- i. Optional: In the **LNA Bypass** text box, enter **1** to bypass the Low Noise Amplifier (LNA) and reduce the radio module receive signal by 10dB.

Note: By default, the **LNA Bypass** is enabled (set to 0 (zero)).

- j. In the **Max Link Distance in Miles** text box, enter the maximum one-way distance (in miles) between any nodes in the network.
- k. In the **Frequency Masks** text box, enter the exact specified format of the frequency range to mask.



Caution: The exact syntax is required in the **Frequency Masks** text box. See [frequencyMasks](#) (on page 259) for detailed information.

9. Click the **Update** button to save the changed information.

9.12. Change the Security Parameters

Note: See the [security Parameters \(on page 285\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

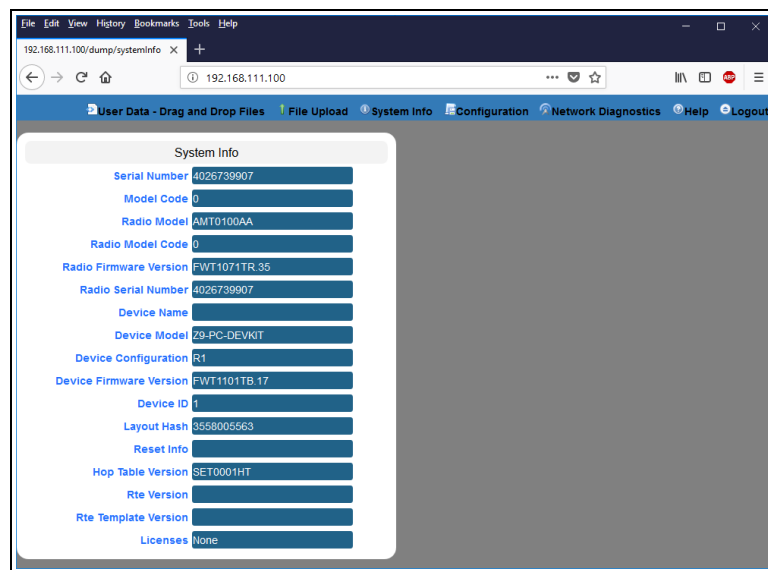


Figure 170: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 171](#))

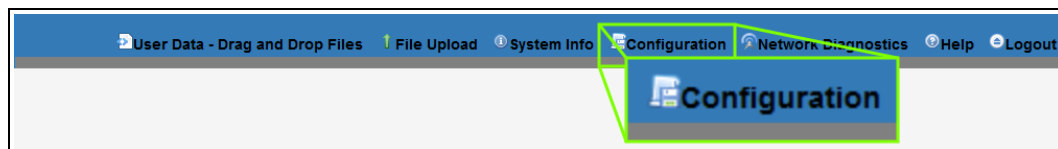


Figure 171: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 172](#))

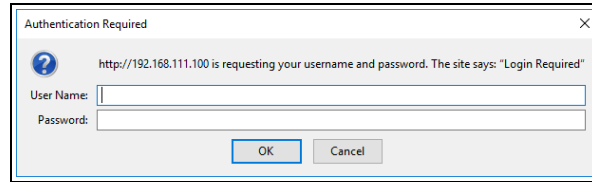


Figure 172: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 173)

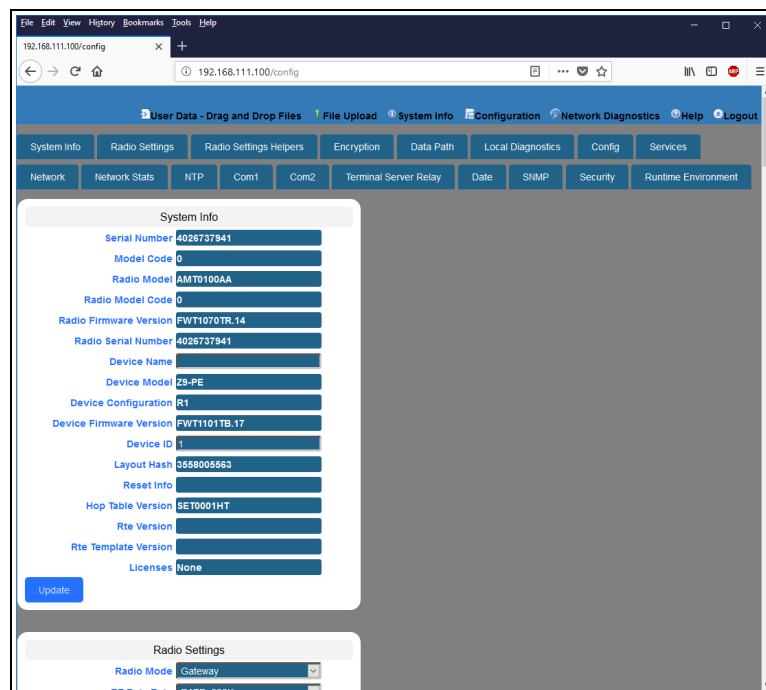
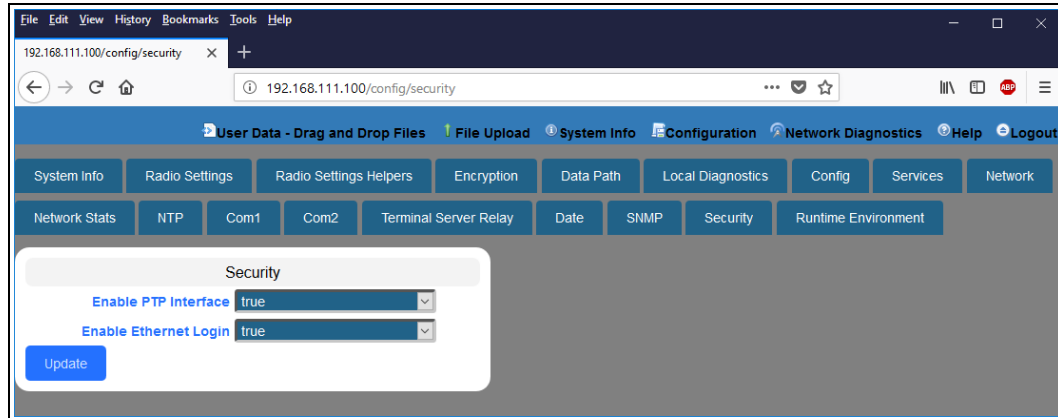


Figure 173: Configuration window

6. Click the **Security** tab. The **Security** parameters are shown in Figure 174.

Note: See the [security Parameters](#) (on page 285) for detailed information about the parameters.

**Figure 174: Security window**

7. As applicable, change these parameters:
 - a. Optional: Click the **Ethernet PTP Interface** list box arrow and select **False** to disable the PTP (drag-and-drop) interface.

Note: By default, the **Enable Ethernet Login** is enabled (set to True).
See the [enableEthernetLogin \(on page 286\)](#) parameter for additional information.

- b. Optional: Click the **Enable Ethernet Login** list box arrow and select **False** to disable SSH logins.

Note: By default, the **Ethernet PTP Interface** is enabled (set to True).
See the [enablePtplInterface \(on page 286\)](#) parameter for additional information.

8. Click the **Update** button to save the changed information.

9.13. Change the Services Parameters

Note: See the [services Parameters \(on page 288\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

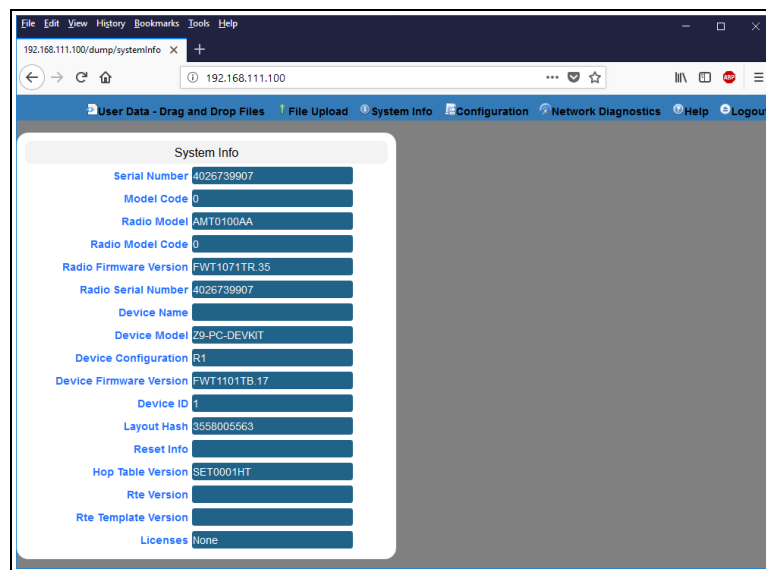


Figure 175: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 176](#))

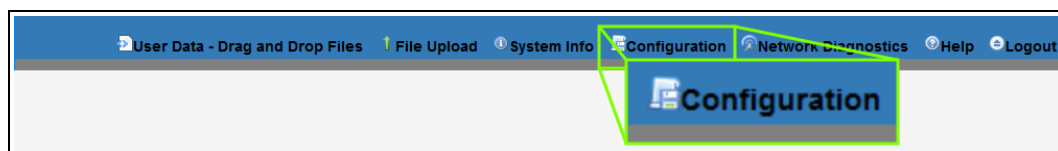


Figure 176: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 177](#))

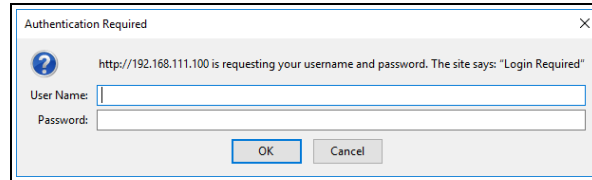


Figure 177: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 178)

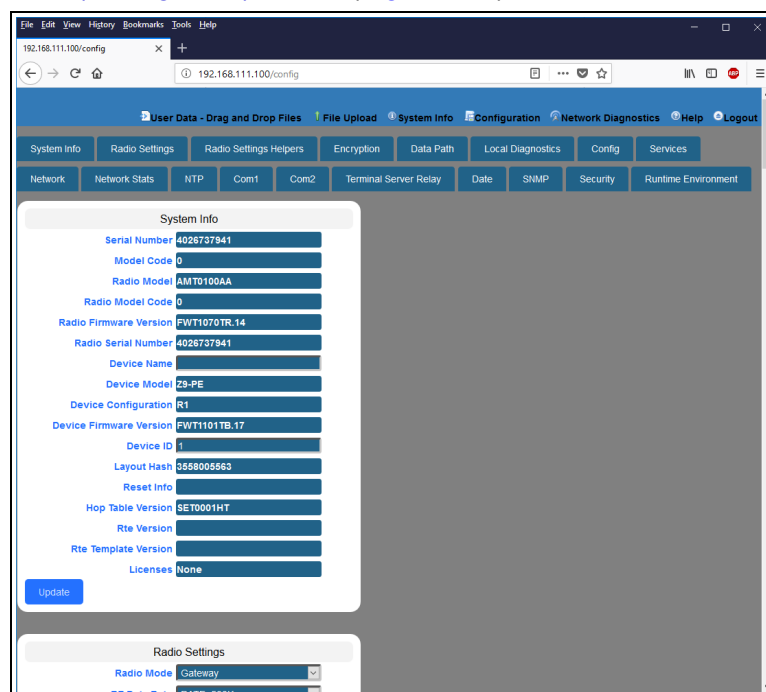


Figure 178: Configuration window

6. Click the **Services** tab. The **Services** parameters are shown in Figure 179.

Note: See the [services Parameters](#) (on page 288) for detailed information about the parameters.

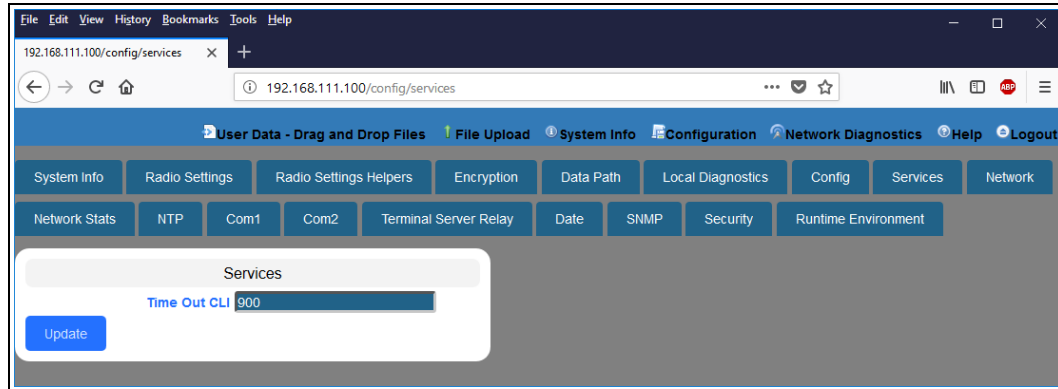


Figure 179: Services window

7. In the **Time Out CLI** text box, enter the number of seconds of idle time before the CLI connection is closed.
8. Click the **Update** button to save the changed information.

9.14. Change the SNMP Parameters

Note: See the [SNMP Parameters \(on page 290\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

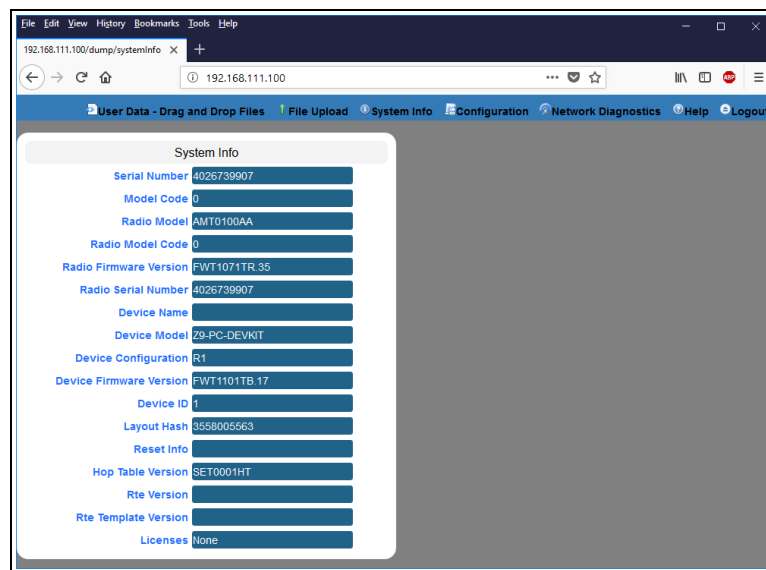


Figure 180: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 181](#))

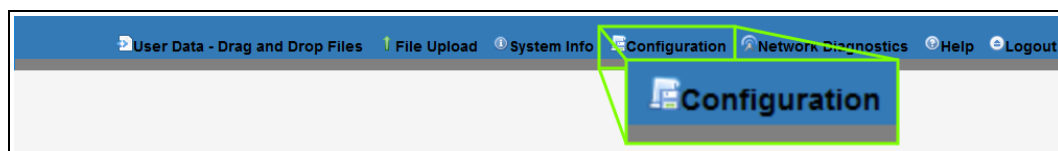


Figure 181: Configuration link

The **Authentication Required** (Login) dialog box opens. ([Figure 182](#))

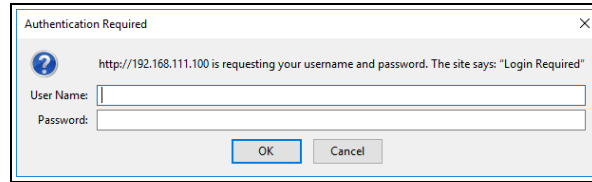


Figure 182: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 183)

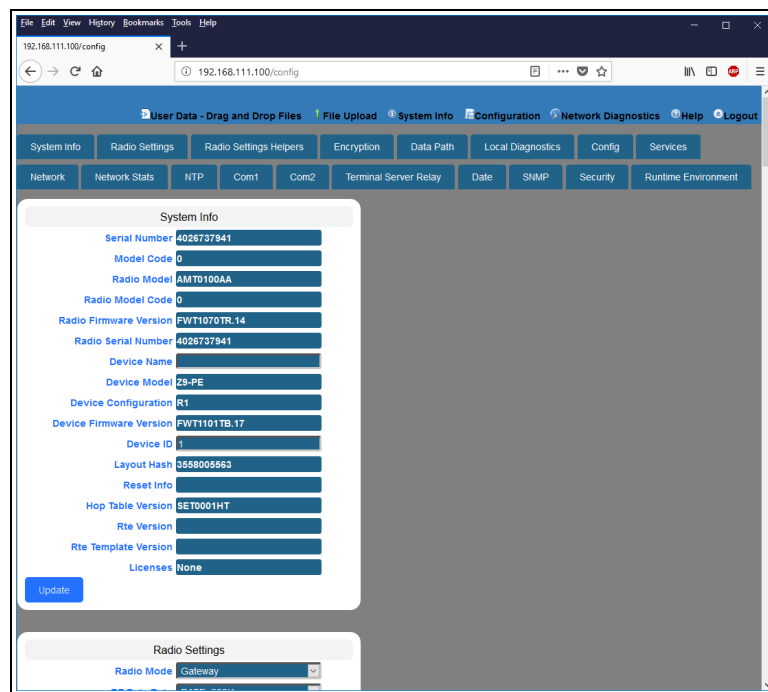
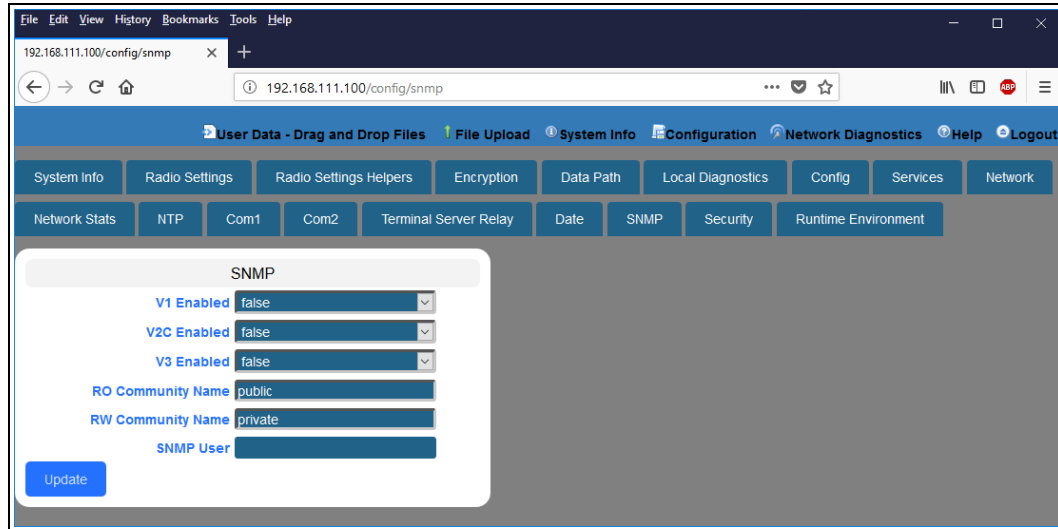


Figure 183: Configuration window

6. Click the **SNMP** tab. The **SNMP** parameters are shown in Figure 184.

Note: See the **SNMP Parameters** (on page 290) for detailed information about the parameters.

**Figure 184: SNMP window**

7. As applicable, change these parameters:

- a. Click the **V1 Enabled** list box arrow and select **True** to enable SNMP V1.

Note: By default, the **v1 Enabled** is NOT enabled (set to False).
See the [v1Enabled \(on page 293\)](#) parameter for additional information.

- b. Click the **V2C Enabled** list box arrow and select **True** to enable SNMP V2C.

Note: By default, the **v2c Enabled** is NOT enabled (set to False).
See the [v2cEnabled \(on page 294\)](#) parameter for additional information.

- c. Click the **V3 Enabled** list box arrow and select **True** to enable SNMP V3.

Note: By default, the **v3 Enabled** is NOT enabled (set to False).
See the [v3Enabled \(on page 294\)](#) parameter for additional information.

- d. In the **RO Community Name** text box, enter the user-designated name for SNMP V1/V2C Read-only access.
- e. In the **RW Community Name** text box, enter the user-designated name for SNMP V1/V2C Read-Write access.

Note: The **SNMP User** text box is Read-only in the Web Interface.
Use the CLI to change this parameter.

8. Click the **Update** button to save the changed information.

9.15. Change the System Info Parameters

Note: See the [systemInfo Parameters \(on page 304\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

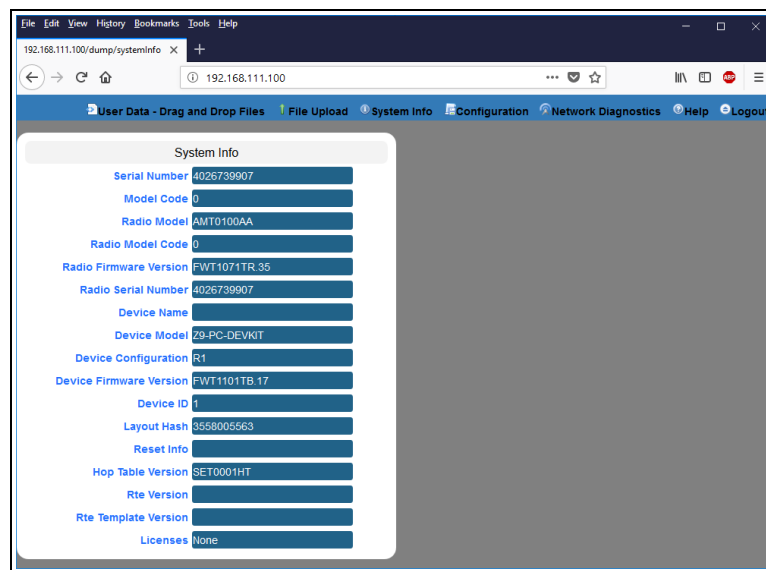


Figure 185: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 186](#))

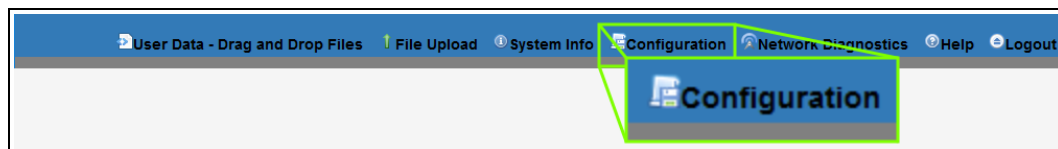
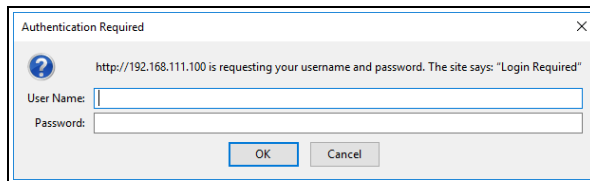


Figure 186: Configuration link

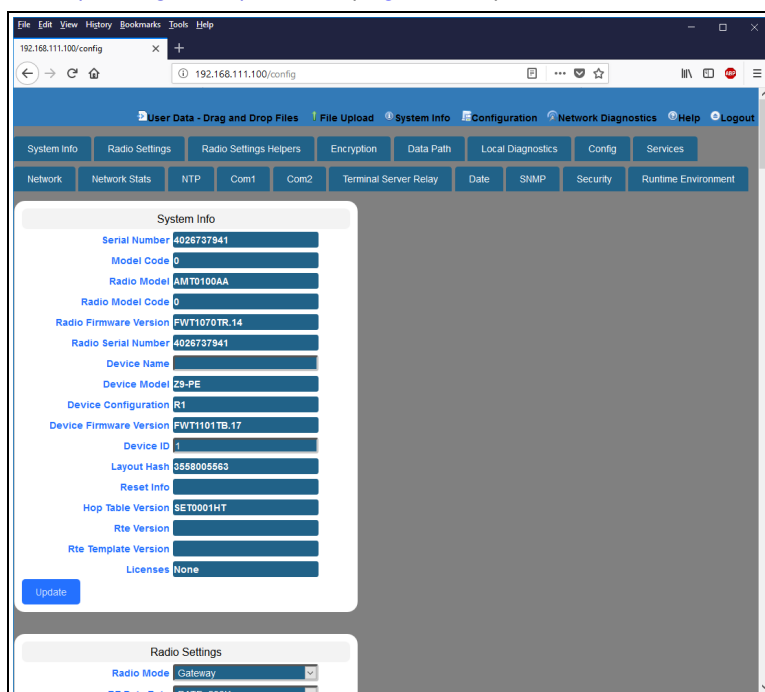
The **Authentication Required** (Login) dialog box opens. ([Figure 187](#))

**Figure 187: Authentication Required (Login) dialog box**

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

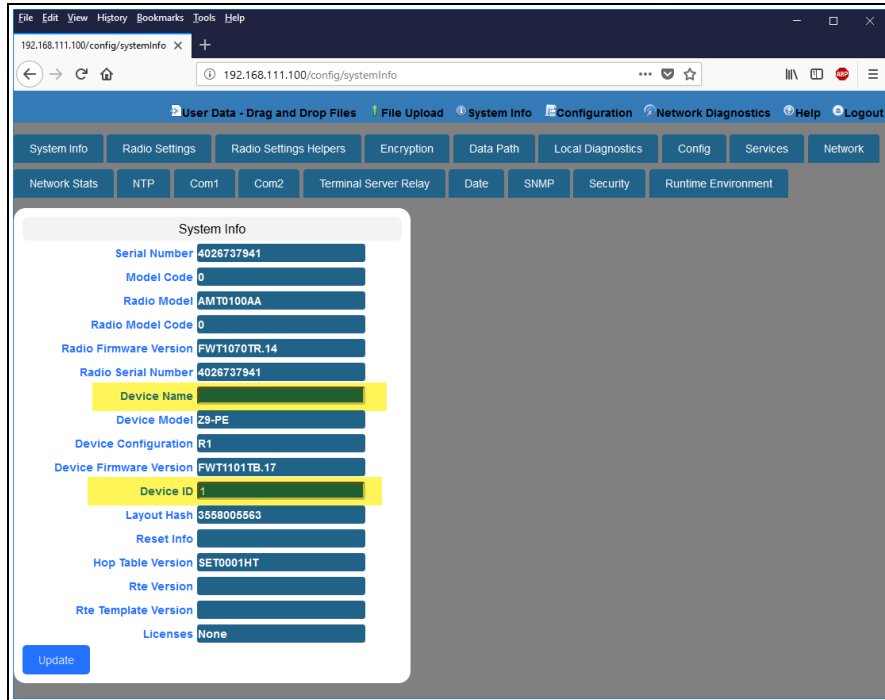
Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 188)

**Figure 188: Configuration window**

6. Click the **System Info** tab. The **System Info** parameters are shown in Figure 189:

Note: See the [systemInfo Parameters](#) (on page 304) for detailed information about the parameters.

**Figure 189: System Info window**

7. As applicable, change these parameters:
 - a. In the **Device Name** text box, enter the user-defined name for the Z9-PC / Z9-PC-SR001.
 - b. In the **Device ID** text box, enter the user-defined Device ID identifier for the Z9-PC / Z9-PC-SR001.

Note: All other parameters in the **System Info** window are Read-only.

8. Click the **Update** button to save the changed information.

9.16. Change the Terminal Server Relay Parameters

Note: See the [TerminalServerRelay Parameters \(on page 314\)](#) for detailed information about the parameters.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.

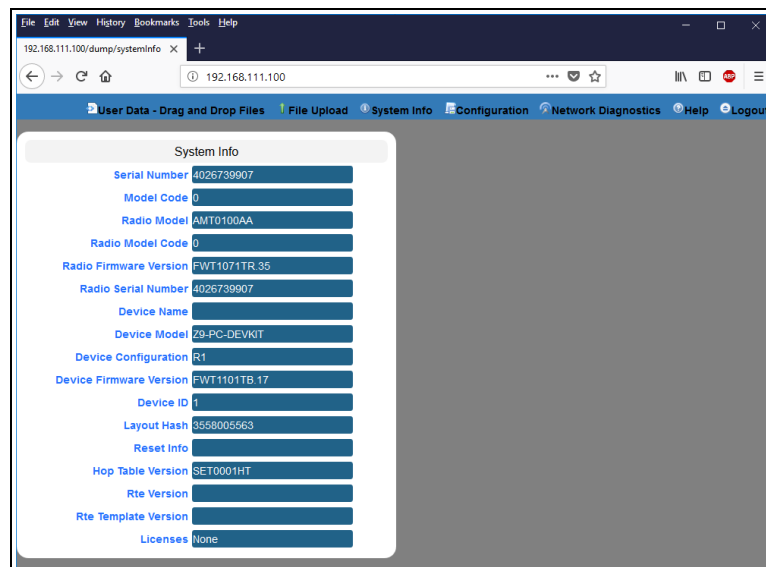


Figure 190: Home window

4. On the Menu bar, click the **Configuration** link. ([Figure 191](#))

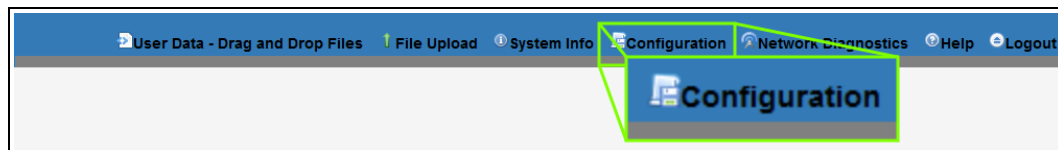


Figure 191: Configuration link

The **Authentication Required (Login)** dialog box opens. ([Figure 192](#))

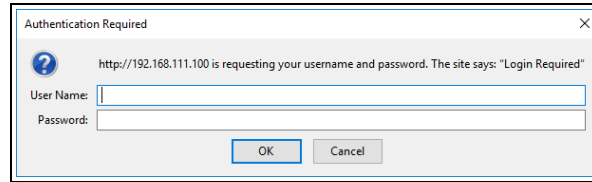


Figure 192: Authentication Required (Login) dialog box

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Config** window (on page 331) opens. (Figure 193)

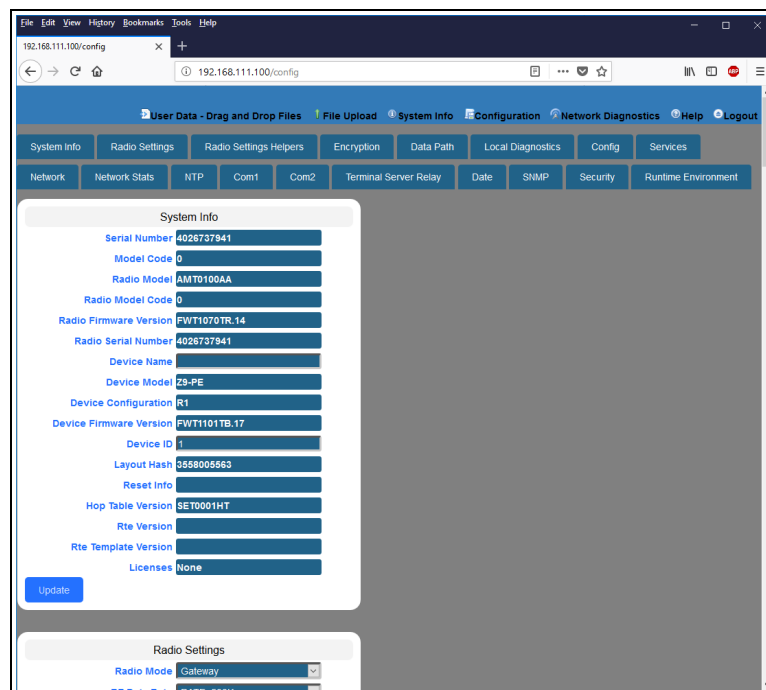


Figure 193: Configuration window

6. Click the **Terminal Server Relay** tab. The **Terminal Server Relay** parameters are shown in Figure 194.

Note: See the [TerminalServerRelay Parameters](#) (on page 314) for detailed information about the parameters.

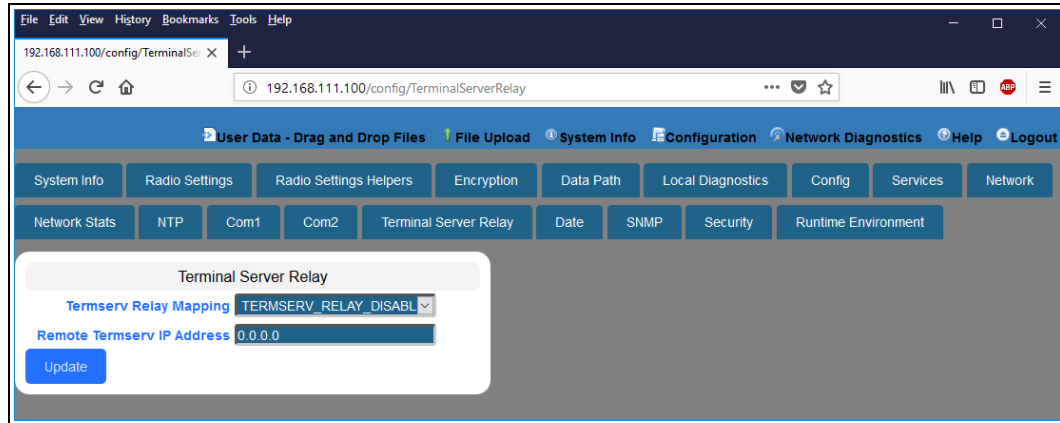


Figure 194: Terminal Server Relay window

7. As applicable, change these parameters:
 - a. Click the **Termserv Relay Mapping** list box arrow and select a setting used for the transfer of a bi-directional byte stream between two serial device servers.
 - b. In the **Remote Termserv IP Address** text box, enter the IP address for the remote terminal server.
8. Click the **Update** button to save the changed information.

10. Change the Passwords

Important! The Z9-PC / Z9-PC-SR001 password is ONLY changed through the CLI.
See [CLI Configuration \(on page 64\)](#) to connect via CLI.

FREEWAVE Recommends: From a security standpoint, it is best practice to change **both** the **admin** password and the **devuser** passwords.

- [Change the ADMIN Password \(on page 157\)](#)
- [Change the DEVUSER Password \(on page 157\)](#)

10.1. Change the ADMIN Password

1. Login to the FreeWave CLI using the current **username** and **password**.
2. Use this command format to change the password:
`system.password=[oldpassword],[newpassword],[newpassword]` and press <Enter>.

Example: The default password is `admin`.
The CLI to change this is:
`system.password=admin,NewPasswrd123,NewPasswrd123.`

Note: An error message appears when there is an error in typing the new password command.

10.2. Change the DEVUSER Password

1. Login to the **devuser** account using the current devuser **password**.
2. Use this command format to change the password:
`password=[oldpassword],[newpassword],[newpassword]` and press <Enter>.

Example: The default password is `devuser`.
The CLI to change this is:
`password=devuser,NewPasswrd123,NewPasswrd123.`

Note: An error message appears when there is an error in typing the new password command.

11. IP Filtering

IP Filtering is used to allow only traffic in a designated IP subnet to traverse the radio network.

- Within the radio subnet, the IPv4, TCP, ICMP (ping), ARP, and UDP traffic is permitted to traverse the radio network, while all other Ethernet traffic is blocked.
- The IP Filtering setting (`network.netmaskFilterEnabled=true`) does NOT need to match on all the radios in the network.
Only enable IP Filtering on individual radios with incoming LAN Ethernet traffic to filter from the network.



IP Filtering can prevent non-radio Ethernet traffic from adversely affecting the performance and capacity of the radio network.

Note: This procedure provides a Tera Term terminal connection to the Z9-PC / Z9-PC-SR001 CLI. Other terminal emulators (e.g., HyperTerminal, PuTTY) may be used. The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

Procedure

1. On the computer connected to the Z9-PC / Z9-PC-SR001 device, open a terminal program (e.g., Tera Term <http://tssh2.osdn.jp/>).
2. In Tera Term, click the **File** menu and select **New Connection**.

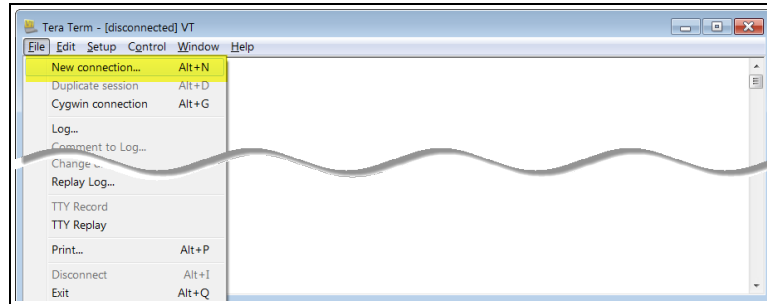


Figure 195: File menu > New Connection

The Tera Term **New Connection** dialog box opens.

3. Click the **Port** list box arrow and select the COM port the Z9-PC / Z9-PC-SR001 is connected to.

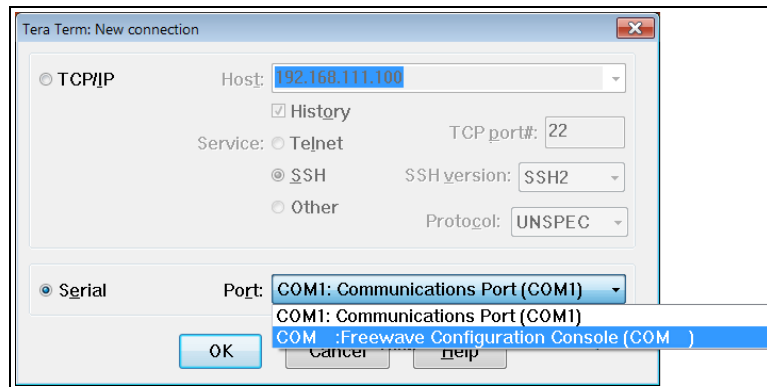


Figure 196: Select the ZumLink COM port

Important! The **Port** assignment varies from computer to computer.

4. Click **OK** to save the changes and close the dialog box.
5. In the Tera Term window, click the **Setup** menu and select **Serial Port**.

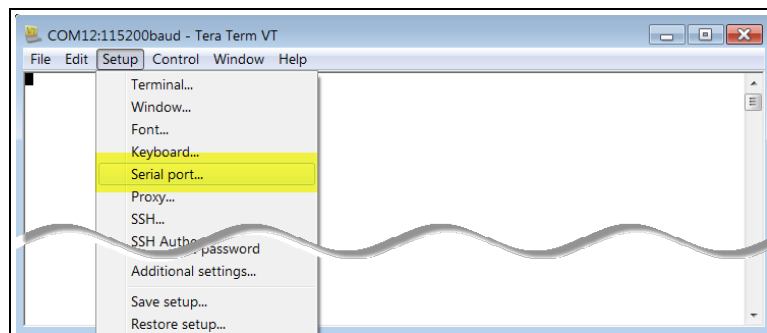


Figure 197: Serial menu > Setup Port

The Tera Term: **Serial Port Setup** dialog box opens.

Note: The image shows the default Z9-PC / Z9-PC-SR001 settings.

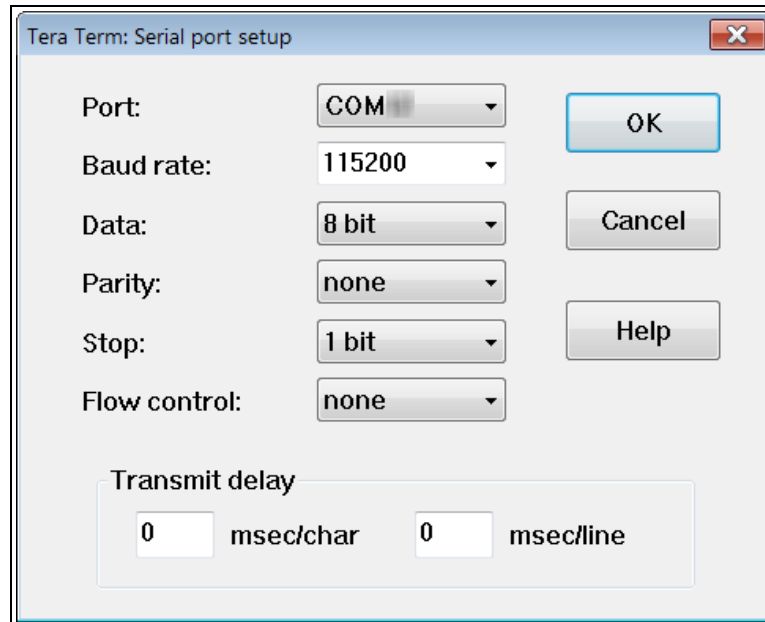


Figure 198: Tera Term: Serial Port Setup dialog box with default settings

6. **Important:** Verify, and change if required, the Tera Term serial port settings (except the **Port** setting) of the connected Z9-PC / Z9-PC-SR001 so the settings are the same as the defaults shown in [Figure 198](#).
7. Verify the COM port settings are:
Baud Rate / Baudrate: 115200
Data / Databits: 8 bit
Parity: none
Stop / Stopbits: 1 bit
8. Click **OK** to save the changes and close the dialog box.
9. In the Tera Term window, press <Enter>.
The Z9-PC / Z9-PC-SR001 CLI Login returns.
10. Login to the FreeWave CLI using the current **username** and **password**.

Note: The password does not appear when typing - it looks blank.

The **FreeWave Shell** returns.


```

COM11:115200baud - Tera Term VT
File Edit Setup Control Window Help
freewave-ib login:
freewave-ib login: admin
Password:
FreeWave Shell
>

```

Figure 199: The FreeWave Shell returns.

Note: The login times out after 3600 seconds.
Repeat the login procedure if needed.

- At the > prompt, type **network** and press <Enter>.
The **ZumLink network** settings appear.

```

COM32:115200baud - Tera Term VT
File Edit Setup Control Window Help
>network
[Page=network]
mac_address=00:07:e7:00:02:52
ip_address=192.168.111.100
netmask=255.255.255.0
gateway=192.168.111.1
stpEnabled=false
txqueueLen=25
mtu=1500
netmaskFilterEnabled=false
RESULT:0:OK
>

```

Figure 200: network Settings Page

- At the > prompt, type **network.netmaskFilterEnabled=true** and press <Enter>.
The IP Filtering is now active on the **ZumLink** device.



The IP Filtering setting (**network.netmaskFilterEnabled=true**) does NOT need to match on all the radios in the network.
Only enable IP Filtering on individual radios with incoming LAN Ethernet traffic to filter from the network.

- At the > prompt, type **save** and press <Enter>.

Note: See [Example: Network Topology with Traffic at the Gateway \(on page 162\)](#).

11.0.1. Example: Network Topology with Traffic at the Gateway

Figure 201 shows:

- The yellow communication link arrows are used to denote which of the radio units can directly communicate.
- Devices in green can communicate with IPv4.
- Devices in red and other traffic is excluded from **ZumLink** network.

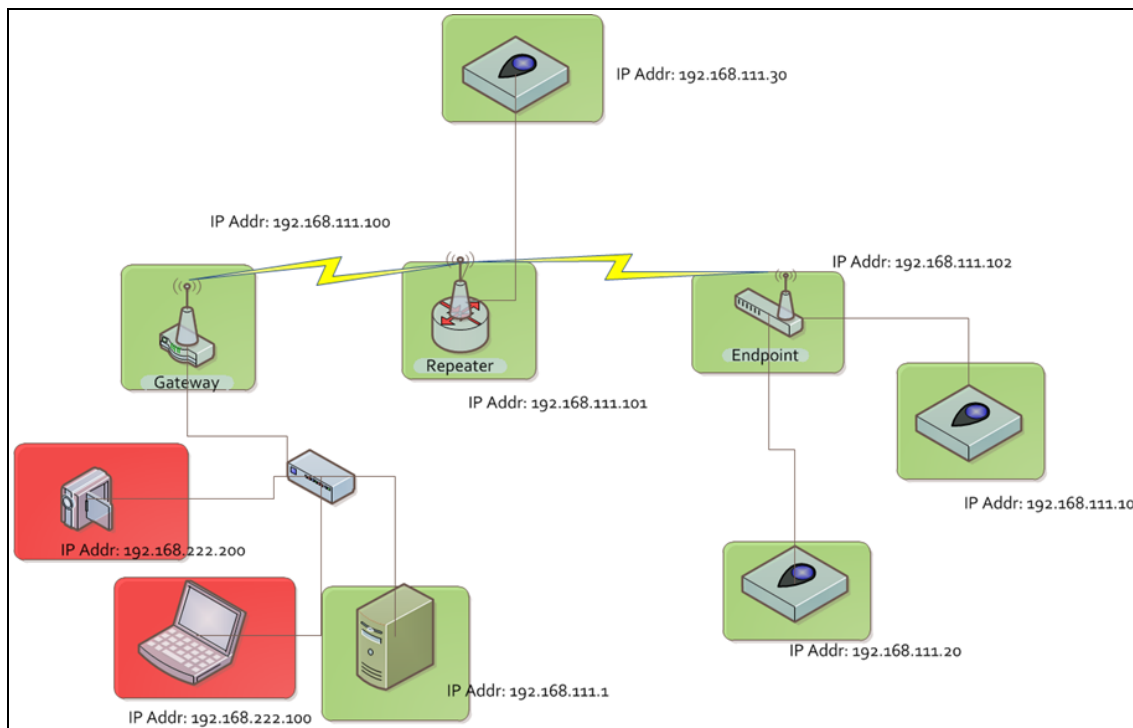


Figure 201: Network Topology with Traffic at the Gateway but not Desired on the Rest of the Network

Figure 201 is a common network topology where IP filtering on the Gateway radio reduces unwanted traffic on the radio network.

In this example:

- Only traffic on the 192.168.111.255 netmask passes over the radio network.
- The red laptop and the camera traffic are on the 222.nnn subnet; their traffic is blocked at the Gateway radio.
- Only IPv4, TCP, UDP, ICMP (ping), and ARP traffic destined to and from the desired subnet is transmitted over the radio network.
- VLAN tagged packets are filtered out because the radio is not considered on the VLAN and therefore VLAN packets cannot be on the same subnet.

12. Repeaters

ZumLink Repeater allows the extension of the **ZumLink** network, forwarding packets between **ZumLink** devices that could otherwise not communicate directly with each other. The advantage of using Repeaters is to reach very long distances and "hop" over or around obstacles like buildings or hills.

The **ZumLink** Repeater can be configured as either a Gateway-Repeater or Endpoint-Repeater.

- The Gateway-Repeater is a Gateway that also repeats packets.
- The Endpoint-Repeater is an Endpoint able to repeat packets and master beacons.

This section has this information:

- [Repeater - Setup Table \(on page 165\)](#)
 - [Hopping OFF Repeater Setup \(on page 165\)](#)
 - [Hopping ON Repeater Setup \(on page 166\)](#)
- [Basic Gateway and Endpoint-Repeater Setup \(on page 168\)](#)
 - [Open a Terminal Emulator Application \(on page 169\)](#)
 - [Hopping On: Gateway and Endpoint-Repeater Setup \(on page 172\)](#)
 - [Hopping Off: Gateway and Endpoint-Repeater Setup \(on page 174\)](#)
- [Repeater - Examples \(on page 176\)](#)
 - [Gateway-Repeater \(on page 177\)](#)
 - [Endpoint-Repeater \(on page 178\)](#)
 - [Multiple Repeaters: Gateway-Repeater and Endpoint-Repeater \(on page 179\)](#)
 - [Multiple Repeaters: Four Endpoint-Repeaters \(on page 180\)](#)

ZumLink Repeaters support all 5 data rates; 115.2kbps, 250kbps, 500kbps, 1Mbps, and 4Mbps.

- At 115.2kbps and 250kbps data rates, hopping capability must be enabled for the ZumLink Repeaters.
- At 500kbps, 1Mbps, and 4Mbps data rates, hopping capability is optional.

When hopping capability is employed, one radio must be configured as the Gateway (or Gateway-Repeater).

- The beacon from the Gateway radio must be heard by the Repeater.
- The Repeater must also re-send the beacon so that the Endpoints, and downstream Repeaters, it communicates with can stay synchronized with the frequency hopping pattern.
- To keep the Gateway and Endpoint-Repeater beacons from colliding, the Endpoint-Repeaters must have their own time slot (radio Repeater slot).
- The Endpoint-Repeater has a radio Repeater slot range from 1-3.
 - A maximum number of 3 Endpoint-Repeaters are supported in an overlapping communication space or RF coverage area.
 - The radio Repeater slot numbers can be reused where there is no RF connectivity or overlap between the reused radio Repeater slots.

Where multiple communication paths are available, the **ZumLink** Repeater can be influenced to a preferred communication path by optimizing the minimum signal level margin. The minimum signal level margin establishes a minimum signal threshold required for a Repeater hop to be considered.

FREEWAVE Recommends: Set the [beaconBurstCount \(on page 255\)](#) to **2** or more for optimal throughput when Repeaters are used and the RF environment is noisy. This increases the number of beacons sent in a beacon interval.



Caution: The repeating operation occurs on the same frequencies normally used for transmit and receive.

This causes the throughput of the communication path utilizing the Repeater to be reduced by approximately 50 percent with each Repeater hop.

Only communication paths via Repeaters are impacted, communication paths that do not utilize the Repeater remain at full throughput.

12.1. Repeater - Setup Table

These tables show the basic setting configurations in a Repeater network with either:

- [Hopping OFF Repeater Setup \(on page 165\)](#)
- [Hopping ON Repeater Setup \(on page 166\)](#)

Note: For detailed procedures, see [Basic Gateway and Endpoint-Repeater Setup \(on page 168\)](#).

12.1.1. Hopping OFF Repeater Setup

The settings in this table assumes that `radioSettings.radioHoppingMode=Hopping_Off`.

- Hopping is required at data rates below 500kbps.
- Hopping is optional at data rate 500kbps or above.
- With hopping disabled, a Gateway or Gateway-Repeater is optional.

Repeater Network Configuration			
radioSettings Setting*	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
radioMode=	Gateway	Endpoint_Repeater	Endpoint
nodeId=	N/A	= unique Node ID for each device	= unique Node ID for each device
networkId=	= same Network ID for all devices	= same Network ID for all devices	= same Network ID for all devices
rfDataRate=	= same Data Rate for all devices	= same Data Rate for all devices	= same Data Rate for all devices
dataPath Setting*	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
routeMinSignalMarginThresh=	= desired Link Signal Margin minus 4dB	= desired Link Signal Margin minus 4dB	= desired Link Signal Margin minus 4dB
network Setting*	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
ip_address=	= unique IP address for each device.	= unique IP address for each device.	= unique IP address for each device.

Note: *See the [dataPath Parameters \(on page 201\)](#), [network Parameters \(on page 237\)](#), or [radioSettings Parameters \(on page 254\)](#) for additional information.

12.1.2. Hopping ON Repeater Setup

The settings in this table assumes that `radiosettings.radioHoppingMode=Hopping_On`.

- Hopping is required at data rates below 500kbps.
- Hopping is optional at data rate 500kbps or above.
- With hopping enabled, a Gateway or Gateway-Repeater must be configured.

Repeater Network Configuration			
radioSettings Setting****	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
radioMode=	Gateway	Endpoint_Repeater	Endpoint
nodeId=	N/A	= unique Node ID for each device	= unique Node ID for each device
networkId=	= same Network ID for all devices	= same Network ID for all devices	= same Network ID for all devices
rfDataRate=	= same Data Rate for all devices	= same Data Rate for all devices	= same Data Rate for all devices
radioMaxRepeaters=	0-3 ¹	NA	NA
radioRepeaterSlot=	NA	1-3 ²	NA
beaconBurstCount=	1-7 ³	NA	NA
dataPath Setting****	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
routeMinSignalMarginThresh=	= desired Link Signal Margin minus 4dB	= desired Link Signal Margin minus 4dB	= desired Link Signal Margin minus 4dB
network Setting****	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
ip_address=	= unique IP address for each device.	= unique IP address for each device.	= unique IP address for each device.

1. Set the **radioMaxRepeaters** to match the number of overlapping Repeaters with a maximum of 3.
 - Setting this value too high adds unnecessary latency to the network.
 - In this example, set this to 1.
2. Set the **radioRepeaterSlot** to designate which Repeater slot to use, up to the **radioMaxRepeaters** setting.
 - In this example, set this to 1.

3. Set the [beaconBurstCount \(on page 255\)](#) to **2** or more for optimal throughput when Repeaters are used and the RF environment is noisy.
This increases the number of beacons sent in a beacon interval.

Note: ****See the [dataPath Parameters \(on page 201\)](#), [network Parameters \(on page 237\)](#), or [radioSettings Parameters \(on page 254\)](#) for additional information.

12.2. Basic Gateway and Endpoint-Repeater Setup

Important! This procedure assumes the user has 3 new **ZumLink** devices.
The number of Endpoint-Repeaters in the network **must be known before** starting this procedure.

The basic setup procedures are:

- A. [Open a Terminal Emulator Application \(on page 169\)](#)
- B. Configure using either:
 - C. [Hopping On: Gateway and Endpoint-Repeater Setup \(on page 172\)](#)
or
[Hopping Off: Gateway and Endpoint-Repeater Setup \(on page 174\)](#)

12.2.1. Open a Terminal Emulator Application

Note: This procedure provides a Tera Term terminal connection to the Z9-PC / Z9-PC-SR001 CLI. Other terminal emulators (e.g., HyperTerminal, PuTTY) may be used. The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

1. On the computer connected to the Z9-PC / Z9-PC-SR001 device, open a terminal program (e.g., Tera Term <http://tssh2.osdn.jp/>).
2. In Tera Term, click the **File** menu and select **New Connection**.

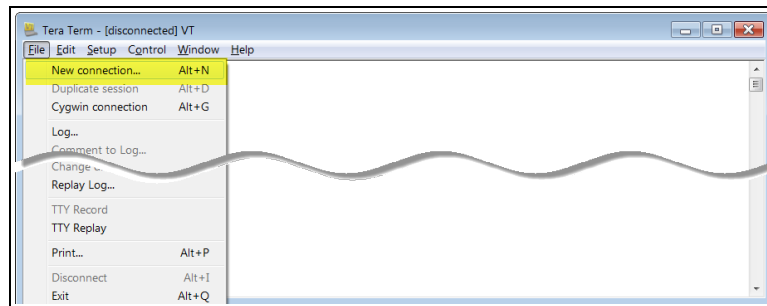


Figure 202: File menu > New Connection

The Tera Term **New Connection** dialog box opens.

3. Click the **Port** list box arrow and select the COM port the Z9-PC / Z9-PC-SR001 is connected to.

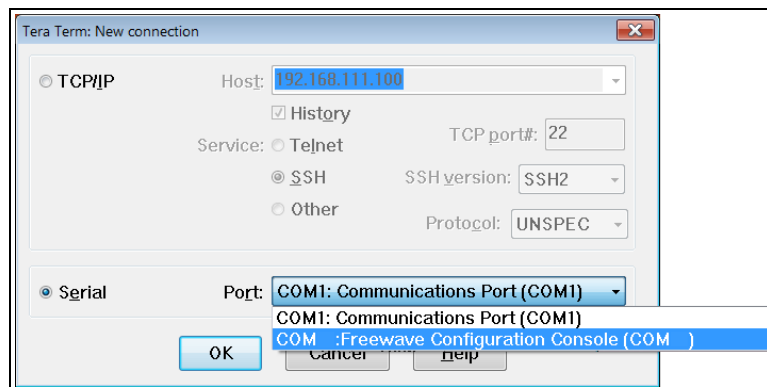


Figure 203: Select the ZumLink COM port

Important! The **Port** assignment varies from computer to computer.

4. Click **OK** to save the changes and close the dialog box. The Tera Term window shows the connected COM port and Baud rate in the title bar of the window.
5. In the Tera Term window, click the **Setup** menu and select **Serial Port**.

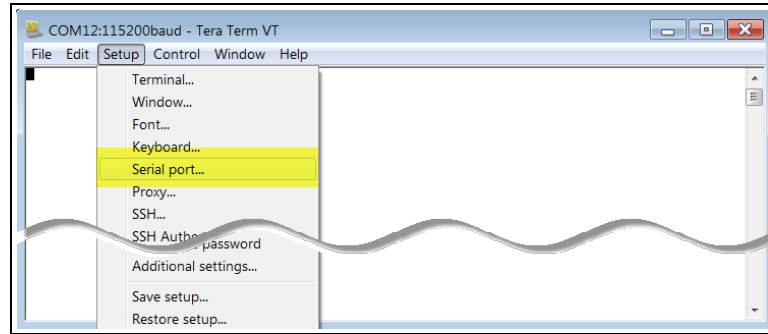


Figure 204: Serial menu > Setup Port

The **Tera Term: Serial Port Setup** dialog box opens.

Note: The image shows the default Z9-PC / Z9-PC-SR001 settings.

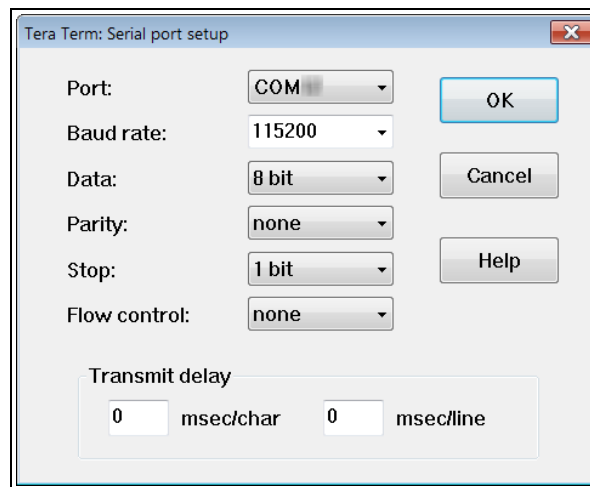
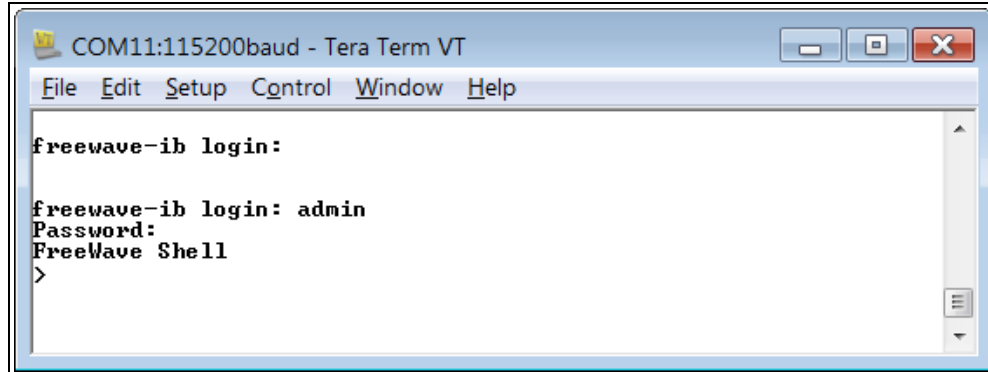


Figure 205: Tera Term: Serial Port Setup dialog box with default settings

6. **Important:** Verify, and change if required, the Tera Term serial port settings (except the **Port** setting) of the connected Z9-PC / Z9-PC-SR001 so the settings are the same as the defaults shown in [Figure 205](#).
7. Verify the COM port settings are:
 - Baud Rate / Baudrate:** 115200
 - Data / Databits:** 8 bit
 - Parity:** none
 - Stop / Stopbits:** 1 bit
8. Click **OK** to save the changes and close the dialog box.
9. In the Tera Term window, press <Enter>.
 - The Z9-PC / Z9-PC-SR001 CLI Login returns.
10. Login to the FreeWave CLI using the current **username** and **password**.

Note: If the **User Name** or **Password** were changed, enter the applicable information. The password does not appear when typing - it looks blank.

The **FreeWave Shell** returns.

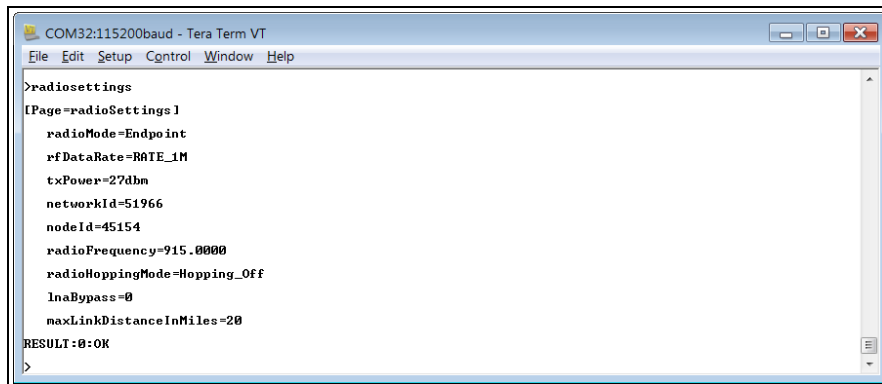


```
COM11:115200baud - Tera Term VT
File Edit Setup Control Window Help
freewave-ib login:
freewave-ib login: admin
Password:
FreeWave Shell
>
```

Figure 206: The FreeWave Shell returns.

Note: The login times out after 3600 seconds. Repeat the login procedure if needed.

- At the > prompt, type **radioSettings** and press <Enter>. The current [Page=radioSettings] appears. (Figure 207)



```
COM32:115200baud - Tera Term VT
File Edit Setup Control Window Help
>radiosettings
[Page=radioSettings]
radioMode=Endpoint
rfDataRate=RATE_1M
txPower=27dbm
networkId=51966
nodeId=45154
radioFrequency=915.0000
radioHoppingMode=Hopping_Off
lnaBypass=0
maxLinkDistanceInMiles=20
RESULT:0:OK
>
```

Figure 207: radioSettings Page

- Continue with either:
 - [Hopping On: Gateway and Endpoint-Repeater Setup \(on page 172\)](#)
 - [Hopping Off: Gateway and Endpoint-Repeater Setup \(on page 174\)](#)

12.2.2. Hopping On: Gateway and Endpoint-Repeater Setup

Important! This procedure has **HOPPING ON**
(`radiosettings.radioHoppingMode=Hopping_On`).

If Hopping is OFF (`radiosettings.radioHoppingMode=Hopping_Off`) go to
Hopping Off: Gateway and Endpoint-Repeater Setup (on page 174).

1. On the **Gateway ZumLink** device:
 - a. Complete the [Open a Terminal Emulator Application \(on page 169\)](#) procedure.
 - b. At the > prompt, type:
 - i. `radioSettings.radioMode=Gateway` and press <Enter>.
 - ii. `radioSettings.networkId=nnnnn` where nnnnn is the designated Network ID and press <Enter>.
 - iii. `network.ip_address=nnn.nnn.nnn.nnn` where nnn.nnn.nnn.nnn is the **unique** IP address for each device and press <Enter>.
 - iv. `radioSettings.rfDataRate=Rate_nnnn.nn` where nnnn.nn is the RF data rate in Kilobytes or Megabytes and press <Enter>.

Note: See [rfDataRate \(on page 274\)](#) for the correct command format of the RF Data Rate.

- v. `radiosettings.radioHoppingMode=Hopping_On` and press <Enter>.
 - vi. `radioSettings.maxRepeater=1` and press <Enter>.
 - vii. `radioSettings.beaconBurstCount=2` and press <Enter>.
 - c. At the > prompt, type `save` and press <Enter>.
2. Disconnect the computer from the **Gateway ZumLink** device.
3. On the **Endpoint-Repeater ZumLink** device:
 - a. Complete the [Open a Terminal Emulator Application \(on page 169\)](#) procedure.
 - b. At the > prompt, type:

- i. `radioSettings.radioMode=Endpoint_Repeater` and press <Enter>.
 - ii. `radioSettings.networkId=nnnnn` where nnnnn is the designated Network ID used when configuring the Gateway **ZumLink** device and press <Enter>.
 - iii. `network.ip_address=nnn.nnn.nnn.nnn` where nnn.nnn.nnn.nnn is the **unique** IP address for each device and press <Enter>.
 - iv. `radioSettings.rfDataRate=Rate_nnnn.nn` where nnnn.nn is the same data rate in Kilobytes or Megabytes used when configuring the Gateway **ZumLink** device and press <Enter>.

Note: See [rfDataRate \(on page 274\)](#) for the correct command format of the RF Data Rate.

- v. `radioSettings.nodeId=nnnnn` where nnnnn is the unique ID of the device and press <Enter>.
 - vi. Verify the `radioSettings.radioRepeaterSlot=1` and press <Enter>.
 - c. At the > prompt, type `save` and press <Enter>.
4. Disconnect the computer from the **Endpoint-Repeater ZumLink** device.
 5. On the **Endpoint ZumLink** device:
 - a. Complete the [Open a Terminal Emulator Application \(on page 169\)](#) procedure.
 - b. At the > prompt, type:
 - i. `radioSettings.radioMode=Endpoint` and press <Enter>.
 - ii. `radioSettings.networkId=nnnnn` where nnnnn is the designated Network ID used when configuring the Gateway **ZumLink** device and press <Enter>.
 - iii. `network.ip_address=nnn.nnn.nnn.nnn` where nnn.nnn.nnn.nnn is the **unique** IP address for each device and press <Enter>.
 - iv. `radioSettings.rfDataRate=Rate_nnnn.nn` where nnnn.nn is the same data rate in Kilobytes or Megabytes used when configuring the Gateway **ZumLink** device and press <Enter>.

Note: See [rfDataRate \(on page 274\)](#) for the correct command format of the RF Data Rate.

- v. `radioSettings.nodeId=nnnnn` where nnnnn is the unique ID of the device and press <Enter>
- c. At the > prompt, type `save` and press <Enter>.

Note: The LEDs indicate a successful setup.
See [LEDs \(on page 416\)](#) for additional information.



See the [Gateway-Repeater \(on page 177\)](#) example.

12.2.3. Hopping Off: Gateway and Endpoint-Repeater Setup

Important!: This procedure has **HOPPING OFF**
(`radiosettings.radioHoppingMode=Hopping_Off`).

If Hopping is ON (`radiosettings.radioHoppingMode=Hopping_On`) go to
Hopping On: Gateway and Endpoint-Repeater Setup (on page 172).

1. On the **Gateway ZumLink** device:
 - a. Complete the [Open a Terminal Emulator Application \(on page 169\)](#) procedure.
 - b. At the > prompt, type:
 - i. `radioSettings.radioMode=Gateway` and press <Enter>.
 - ii. `radioSettings.networkId=nnnnn` where nnnnn is the designated Network ID and press <Enter>.
 - iii. `network.ip_address=nnn.nnn.nnn.nnn` where nnn.nnn.nnn.nnn is the **unique** IP address for each device and press <Enter>.
 - iv. `radioSettings.rfDataRate=Rate_nnnn.nn` where nnnn.nn is the RF data rate in Kilobytes or Megabytes and press <Enter>.

Note: See [rfDataRate \(on page 274\)](#) for the correct command format of the RF Data Rate.

- v. Verify `radiosettings.radioHoppingMode=Hopping_Off` and press <Enter>.
 - c. At the > prompt, type `save` and press <Enter>.
2. Disconnect the computer from the **GatewayZumLink** device.
3. On the **Endpoint-Repeater ZumLink** device:
 - a. Repeat Steps 1 to 12.
 - b. At the > prompt, type:
 - i. `radioSettings.radioMode=Endpoint_Repeater` and press <Enter>.
 - ii. `radioSettings.networkId=nnnnn` where nnnnn is the designated Network ID used when configuring the Gateway **ZumLink** device and press <Enter>.
 - iii. `network.ip_address=nnn.nnn.nnn.nnn` where nnn.nnn.nnn.nnn is the **unique** IP address for each device and press <Enter>.
 - iv. `radioSettings.rfDataRate=Rate_nnnn.nn` where nnnn.nn is the same data rate in Kilobytes or Megabytes used when configuring the Gateway **ZumLink** device and press <Enter>.

Note: See [rfDataRate \(on page 274\)](#) for the correct command format of the RF Data Rate.

- v. `radioSettings.nodeId=nnnnn` where nnnnn is the unique ID of the device and press <Enter>.
 - vi. Verify `radioSettings.radioHoppingMode=Hopping_Off` and press <Enter>.
 - c. At the > prompt, type `save` and press <Enter>.
4. Disconnect the computer from the **Endpoint-Repeater ZumLink** device.
 5. On the **Endpoint ZumLink** device:
 - a. Complete the [Open a Terminal Emulator Application \(on page 169\)](#) procedure.
 - b. At the > prompt, type:
 - i. `radioSettings.radioMode=Endpoint` and press <Enter>.
 - ii. `radioSettings.networkId=nnnnn` where nnnnn is the designated Network ID used when configuring the Gateway **ZumLink** device and press <Enter>.
 - iii. `network.ip_address=nnn.nnn.nnn.nnn` where nnn.nnn.nnn.nnn is the **unique** IP address for each device and press <Enter>.
 - iv. `radioSettings.rfDataRate=Rate_nnnn.nn` where nnnn.nn is the same data rate in Kilobytes or Megabytes used when configuring the Gateway **ZumLink** device and press <Enter>.
- Note:** See [rfDataRate \(on page 274\)](#) for the correct command format of the RF Data Rate.
- v. `radioSettings.nodeId=nnnnn` where nnnnn is the unique ID of the device and press <Enter>.
 - c. At the > prompt, type `save` and press <Enter>.

Note: The LEDs indicate a successful setup.
See [LEDs \(on page 416\)](#) for additional information.



See the [Gateway-Repeater \(on page 177\)](#) example.

12.3. Repeater - Examples

Note: The yellow communication link arrows are used to denote which of the radio units can directly communicate.

Radio units that DO NOT have yellow communication links between them are considered to be in different communication spaces.

- [Gateway-Repeater \(on page 177\)](#)
- [Endpoint-Repeater \(on page 178\)](#)
- [Multiple Repeaters: Gateway-Repeater and Endpoint-Repeater \(on page 179\)](#)
- [Multiple Repeaters: Four Endpoint-Repeaters \(on page 180\)](#)

12.3.1. Gateway-Repeater

Figure 208 shows:

- Endpoints that cannot peer directly can communicate through a Gateway-Repeater, extending the length of a point-to-multipoint network.
- Repeater is operating in Gateway-Repeater mode.
- No performance loss for Gateway-Repeater to Endpoint 1-Endpoint 2-Endpoint 3 communication.
- The throughput for Endpoint 2 to Endpoint 3 communication via Gateway-Repeater is reduced by approximately 50 percent.

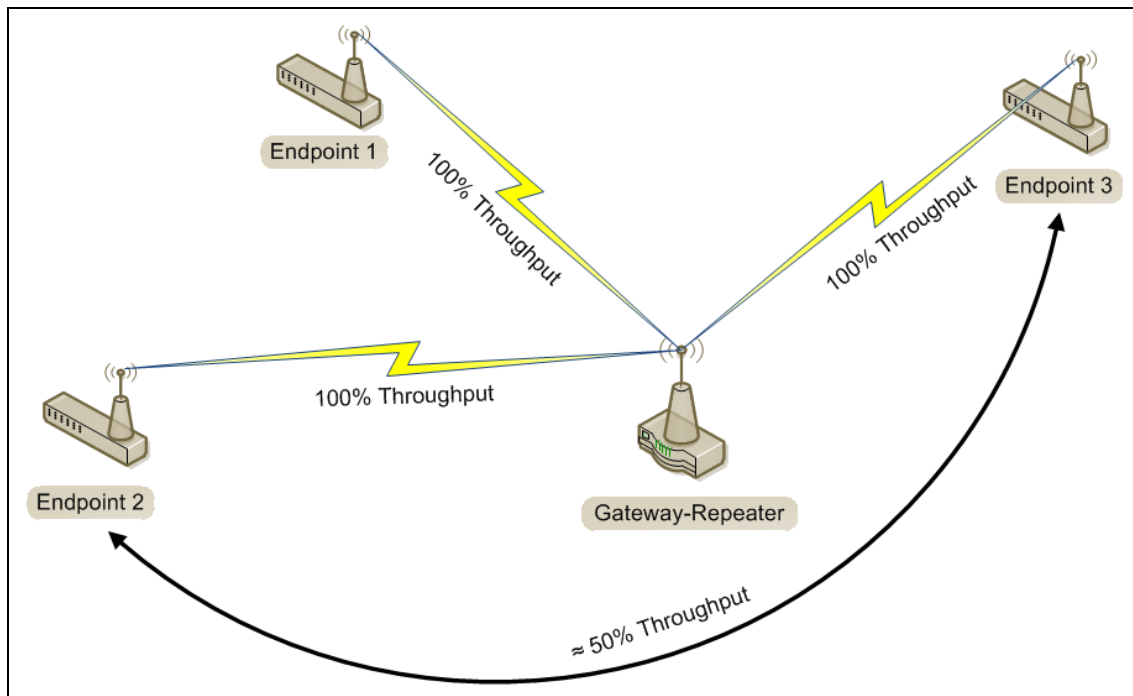


Figure 208: Gateway-Repeater

12.3.2. Endpoint-Repeater

Figure 209 shows:

- Endpoints that cannot peer directly can communicate through an Endpoint-Repeater, extending the length of a point-to-point network.
- Repeater is operating in Endpoint-Repeater mode.
- No performance loss for Gateway to Endpoint 3, Gateway to Endpoint-Repeater, or Endpoint-Repeater to Endpoint 1-Endpoint 2 communication.
- The throughput for Endpoint 1-Endpoint 2 to Gateway communication via Endpoint-Repeater is reduced by approximately 50 percent.



User devices can be physically attached to the Endpoint-Repeater.

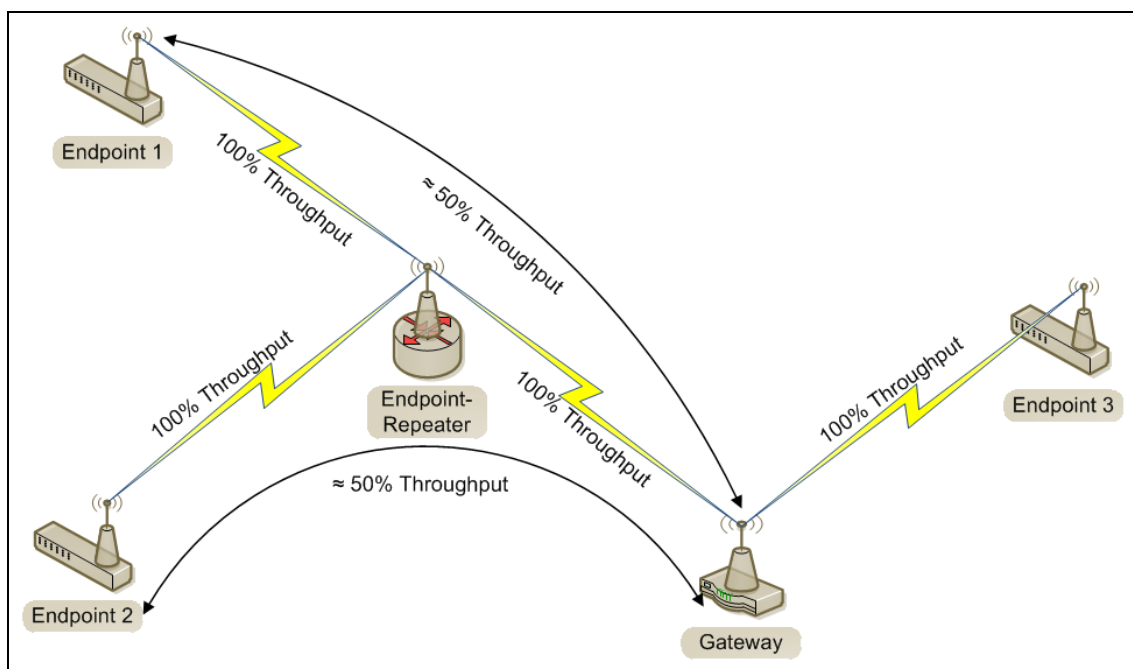


Figure 209: Endpoint-Repeater

12.3.3. Multiple Repeaters: Gateway-Repeater and Endpoint-Repeater

Figure 210 shows:

- Repeaters are operating in Gateway-Repeater and Endpoint-Repeater mode.
- No performance loss for Endpoint-Repeater to Gateway-Repeater, Endpoint 1 to Endpoint-Repeater, Endpoint 2 to Gateway-Repeater communication.
- The throughput for Endpoint 1 to Gateway communication via Endpoint-Repeater is reduced by approximately 50 percent.
- The throughput for Endpoint 2 to Endpoint-Repeater via the Gateway-Repeater is reduced by approximately 50 percent.
- Endpoint 1 to Endpoint 2 communicate via the Endpoint-Repeater and Gateway-Repeater, or 2 repeater hops.
- The throughput for Endpoint 1 to Endpoint 2 communication is approximately 25%.
- As Repeaters are chained in the network, round trip delay will increase.
 - When issuing pings of large packet sizes at the lower data rates, such as 115.2K, and a `beaconInterval = TWENTY_FIVE_MS`, the latency can increase causing the pings to fail.
 - Allowing appropriate delay between pings resolves this issue.

FREEWAVE Recommends: Set the `beaconBurstCount=1` or more and `beaconInterval=ONE_HUNDRED_MS` or more for optimal throughput when extended Repeater networks are used.

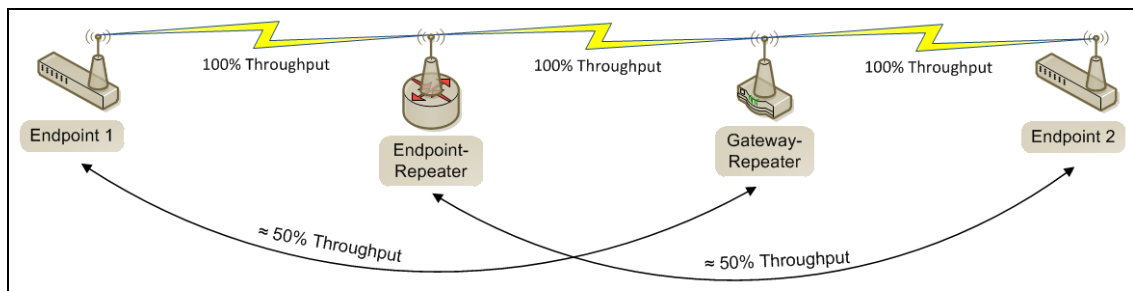


Figure 210: Repeater with Additional Endpoint to Enhance Connectivity

12.3.4. Multiple Repeaters: Four Endpoint-Repeaters

Figure 211 shows:

- Gateway has radio maximum of three Repeater slots.
- Repeaters are operating in Endpoint-Repeater mode.
- Repeaters in the same network that have overlapping RF coverage must have unique radio Repeater slots.
 - Endpoint-Repeater 1 has a Repeater slot of 1.
 - Endpoint-Repeater 2 has a Repeater slot of 2.
 - Endpoint-Repeater 3 has a radio Repeater slot of 3.
 - Endpoint-Repeater 4 has a radio Repeater slot of 1.
- Endpoint-Repeater 1 and Endpoint-Repeater 4 do NOT overlap in RF coverage; therefore they can use the same repeater slot number.
- Endpoint 1 to Gateway communicate via the Endpoint-Repeater 1-2-3-4 or 4 Repeater hops.
- The throughput for Endpoint 1 to Gateway communication will be approximately 6.25%.

Important! Supporting three Repeaters in the same overlapping RF coverage does NOT limit the total number of Repeaters that can be chained together. However, make careful considerations regarding the throughput impact of chained Repeaters.

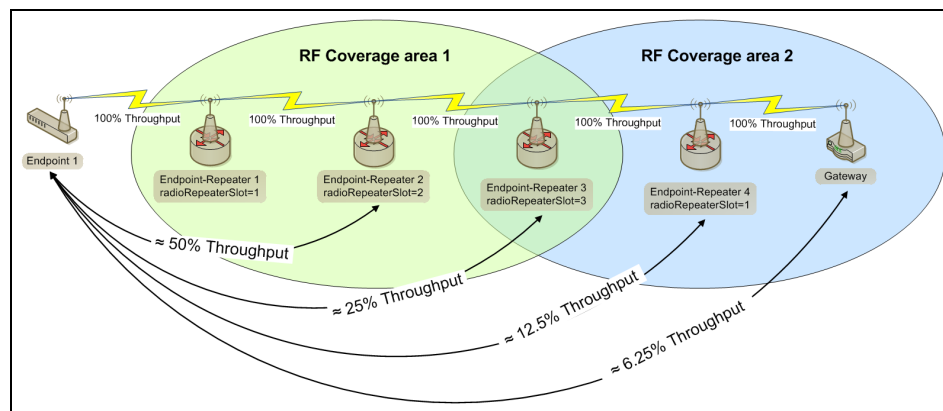


Figure 211: Multiple Repeaters: Four Endpoint-Repeaters

- As Repeaters are chained in the network, round trip delay will increase.
 - When issuing pings of large packet sizes at the lower data rates, such as 115.2K, and a `beaconInterval = TWENTY_FIVE_MS`, the latency can increase causing the pings to fail.
 - Allowing appropriate delay between pings resolves this issue.

FREEWAVE Recommends: Set the `beaconBurstCount=1` or more and `beaconInterval=ONE_HUNDRED_MS` or more for optimal throughput when extended Repeater networks are used.

13. Approved Antennas

13.0.1. Omni-Directional Antennas

The 900MHz is approved by the FCC for use with omni-directional antennas with a 10.5dBi gain or less.

Note: These antennas, including antenna gains, are approved for use with the **ZumLink** device.

900MHz Omni-Directional Antennas				
Gain (dBd)	Gain (dBi)	Manufacturer	Manufacturer Model Number	FreeWave Part Number
3.85	5.0	Antenex	EB8965C	EAN0905WC
3.0	5.15	Maxrad	MAX-9053	EAN0900WC
-0.15	2.0	Mobile Mark	PSKN3-925S	EAN0900SR
-2.15	0.0	Mobile Mark	PSTG0-915SE	EAN0900SQ

13.0.2. Directional Antennas

The 900MHz is approved by the FCC for use with Yagi-directional antennas with a 16.0 dBi gain or less.

900MHz Directional Antennas				
Gain (dBd)	Gain (dBi)	Manufacturer	Manufacturer Model Number	FreeWave Part Number
6.45	8.6	WaveLink	PRO890-8-40F02N4	EAN0906YC

13.0.3. Alternative Antennas

Antennas other than those listed in this section can potentially be used with the **ZumLink** with provisions.

- The antennas must be of a similar type.
- The antenna gain CANNOT exceed 10.5dBi for Omni-directional.
- The antenna gain CANNOT exceed 16.0dBi for Directional antennas.
- The overall system EIRP does not exceed 36dBm.



Warning! A proper combination with the **ZumLink** is required to ensure the system meets FCC requirements.

14. COM Parameters

Note: See the [COM window](#) (on page 329).

The parameters for **COM1** and **COM2** are the same except for the **TerminalServerPort** parameter setting.

- [baudrate](#) (on page 184)
- [breakBeforeSendUs](#) (on page 184)
- [connectionDrops](#) (on page 185)
- [databits](#) (on page 186)
- [delayBeforeSendMs](#) (on page 186)
- [duplex](#) (on page 187)
- [flowControl](#) (on page 188)
- [handler](#) (on page 188)
- [mode](#) (on page 190)
- [parity](#) (on page 191)
- [RxBytes](#) (on page 191)
- [stopbits](#) (on page 192)
- [TerminalServerPort](#) (on page 192)
- [TerminalServerTimeOut](#) (on page 193)
- [TxBytes](#) (on page 194)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.

If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).

Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).

If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

14.1. baudrate

baudrate															
Setting	Description														
CLI / Web Page	[Page=Com1] [Page=Com2]														
CLI Command	<ul style="list-style-type: none"> Com1.baudrate=nnnn Com2.baudrate=nnnn <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where nnnn is the baudrate value.</p> </div>														
Web Interface window	<p>Baudrate</p> <ol style="list-style-type: none"> Click the Baudrate list box arrow and select a COM port baud rate. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the COM window (on page 329) for the parameter location.</p> </div>														
Default Setting	115200														
Options	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Rate Options</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1200</td> <td style="text-align: center;">38400</td> </tr> <tr> <td style="text-align: center;">2400</td> <td style="text-align: center;">57600</td> </tr> <tr> <td style="text-align: center;">4800</td> <td style="text-align: center;">115200</td> </tr> <tr> <td style="text-align: center;">9600</td> <td style="text-align: center;">230400</td> </tr> <tr> <td style="text-align: center;">14400</td> <td style="text-align: center;">250000</td> </tr> <tr> <td style="text-align: center;">19200</td> <td></td> </tr> </tbody> </table>	Rate Options		1200	38400	2400	57600	4800	115200	9600	230400	14400	250000	19200	
Rate Options															
1200	38400														
2400	57600														
4800	115200														
9600	230400														
14400	250000														
19200															
Description	The Com1.baudrate or Com2.baudrate setting designates the COM port baud rate for COM1 or COM2.														

14.2. breakBeforeSendUs

breakBeforeSendUs	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<ul style="list-style-type: none"> Com1.breakBeforeSendUs=nnnn Com2.breakBeforeSendUs=nnnn <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where nnnn is the break signal value.</p> </div>

breakBeforeSendUs	
Setting	Description
Web Interface window	Break Before Send Us <ol style="list-style-type: none"> In the Break Before Send Us text box, enter the number of milliseconds the COM port will send a break signal. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the COM window (on page 329) for the parameter location.</p> </div>
Default Setting	0 (zero)
Options	<ul style="list-style-type: none"> The maximum value is 0 (zero). The minimum value is 1000.
Description	The Com1.breakBeforeSendUs or Com2.breakBeforeSendUs setting designates how long the COM port will send a break signal for at least the number of microseconds specified before sending the data. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Example: For COM1, enter Com1.breakBeforeSendUs=500 to have the COM1 port send a break signal for 500 microseconds.</p> </div>

14.3. connectionDrops


connectionDrops	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<ul style="list-style-type: none"> Com1.connectionDrops Com2.connectionDrops
Web Interface window	Connection Drops <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the COM window (on page 329) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The Com1.connectionDrops or Com2.connectionDrops command reports the number of terminal server connections dropped due to inactivity on the network socket. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

14.4. databits

databits	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<ul style="list-style-type: none"> • Com1.databits=7 • Com2.databits=7 • Com1.databits=8 • Com2.databits=8
Web Interface window	<p>Databits</p> <ol style="list-style-type: none"> 1. Click the Databits list box arrow and select the number of data bits in the frame for COM1 or COM2. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the COM window (on page 329) for the parameter location.</p> </div>
Default Setting	8
Options	7 or 8
Description	The Com1.databits or Com2.databits setting designates the number of data bits in the frame for COM1 or COM2.

14.5. delayBeforeSendMs

delayBeforeSendMs	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<ul style="list-style-type: none"> • Com1.delayBeforeSendMs=nnnn • Com2.delayBeforeSendMs=nnnn <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where nnnn is the amount of time delay in milliseconds.</p> </div>
Web Interface window	<p>Delay Before Send MS</p> <ol style="list-style-type: none"> 1. In the Delay Before Send MS text box, enter the milliseconds of time delay. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the COM window (on page 329) for the parameter location.</p> </div>

delayBeforeSendMs	
Setting	Description
Default Setting	0 (zero)
Options	<ul style="list-style-type: none"> The maximum value is 0 (zero). The minimum value is 5000.
Description	<p>The Com1.delayBeforeSendMs or Com2.delayBeforeSendMs setting designates the amount of time delay in milliseconds the Z9-PC / Z9-PC-SR001 waits to allow the device connected to the COM port to switch from transmit (Tx) to receive (Rx) mode.</p> <div style="border: 1px solid gray; padding: 5px; margin: 10px 0;"> <p>Example: For COM1, enter Com1.delayBeforeSendMs=100 for a 100 millisecond delay.</p> </div> <div style="border: 1px solid gray; padding: 5px; margin: 10px 0;"> <p> Tip Increase this delay if the ZumLink is responding before a polling system is ready for a response.</p> </div>

14.6. duplex

duplex	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<div style="border: 1px solid gray; padding: 5px;"> <p>Note: This setting has no affect. The COM port is always Full duplex.</p> </div>
Web Interface window	<p>Duplex</p> <ol style="list-style-type: none"> Click the Duplex list box arrow and select the duplex designation. Click the Update button to save the change. <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>Note: See the COM window (on page 329) for the parameter location.</p> </div>
Default Setting	Full
Options	N/A
Description	N/A

14.7. flowControl

flowControl	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	The command is: <ul style="list-style-type: none"> • Off: <ul style="list-style-type: none"> • Com1.flowControl=Off • Com2.flowControl=Off • On: <ul style="list-style-type: none"> • Com1.flowControl=Hardware • Com2.flowControl=Hardware
Web Interface window	Flow Control <ol style="list-style-type: none"> 1. Click the Flow Control list box arrow and select Hardware to activate flowControl for COM2. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the COM window (on page 329) for the parameter location.</p> </div>
Default Setting	Off
Options	<ul style="list-style-type: none"> • Off • Hardware
Description	The flowControl setting designates the hardware flow control as either on or off.

14.8. handler

handler	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]

handler	
Setting	Description
CLI Command	<p>CLI</p> <p>The command is:</p> <ul style="list-style-type: none"> • Com1.handler=cli • Com2.handler=cli <p>ModbusPassthru - Option is visible but is not active</p> <p>ModbusRTU - Option is visible but is not active</p> <p>Off - Option is visible but is not active</p> <p>Setup - Option is visible but is not active</p> <p>Terminal Server</p> <p>The command is:</p> <ul style="list-style-type: none"> • Com1.handler=TerminalServer • Com2.handler=TerminalServer <p>Trace</p> <p>A configuration CLI with trace is on the COM port.</p> <ul style="list-style-type: none"> • Com1.handler=trace • Com2.handler=trace
Web Interface window	<p>Handler</p> <ol style="list-style-type: none"> 1. Click the Handler list box arrow and select the designated protocol handler. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the COM window (on page 329) for the parameter location.</p> </div>
Default Setting	TerminalServer
Options	<ul style="list-style-type: none"> • CLI (on page 189) • Terminal Server (on page 189) • Trace (on page 189) <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: ModbusRTU, ModbusPassthru, Setup, and Off are not active.</p> </div>

handler	
Setting	Description
Description	<p>The Com1.handler or Com2.handler setting designates the protocol of the COM port as CLI, Terminal Server, or Trace.</p> <p>Notes</p> <ul style="list-style-type: none"> • The COM port will act as a terminal server. • The TCP port number is determined by the COM TerminalServerPort setting. • The default port number for COM1 is 5041. • The default port number for COM2 is 5042. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! If using Terminal Server Relay, the TCP port numbers MUST BE be consistent across all involved radios.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>FREEWAVE Recommends: If using the Terminal Server Relay setting, keep the TCP port numbers as their defaults.</p> </div>

14.9. mode

mode	
Setting	Description
CLI / Web Page	<p>[Page=Com1] [Page=Com2]</p>
CLI Command	<div style="border: 1px solid black; padding: 5px;"> <p>Note: The COM port is always RS232.</p> </div>
Web Interface window	<p>Mode</p> <ol style="list-style-type: none"> 1. Click the Mode list box arrow and select the COM port mode. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the COM window (on page 329) for the parameter location.</p> </div>
Default Setting	RS232
Options	N/A
Description	<div style="border: 1px solid black; padding: 5px;"> <p>Note: The COM port is always RS232.</p> </div>

14.10. parity

parity	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<ul style="list-style-type: none"> • Com1.parity=None <ul style="list-style-type: none"> • Com2.parity=None • Com1.parity=Even <ul style="list-style-type: none"> • Com2.parity=Even • Com1.parity=Odd <ul style="list-style-type: none"> • Com2.parity=Odd
Web Interface window	Parity <ol style="list-style-type: none"> 1. Click the Parity list box arrow and select the COM port parity bits for the system. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Note: See the COM window (on page 329) for the parameter location. </div>
Default Setting	None
Options	<ul style="list-style-type: none"> • None • Even • Odd
Description	The Com1.parity or Com2.parity setting designates the COM port parity bits for the system.

14.11. RxBytes

RxBytes	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<ul style="list-style-type: none"> • Com1.RxBytes • Com2.RxBytes
Web Interface window	RX Bytes <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Note: This parameter is read-only in the Web Interface. See the COM window (on page 329) for the parameter location. </div>
Default Setting	N/A

RxBytes	
Setting	Description
Options	N/A
Description	The Com1.RxBytes or Com2.RxBytes command reports the total bytes received from the COM port. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Note: This is a Read-only parameter. </div>

14.12. stopbits

stopbits	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<ul style="list-style-type: none"> • Com1.stopbits=1 • Com2.stopbits=1 • Com1.stopbits=2 • Com2.stopbits=2
Web Interface window	Stopbits <ol style="list-style-type: none"> 1. Click the Stopbits list box arrow and select the COM port number of stop bits. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Note: See the COM window (on page 329) for the parameter location. </div>
Default Setting	1
Options	<ul style="list-style-type: none"> • 1 • 2
Description	The Com1.stopbits or Com2.stopbits setting designates the COM port number of stop bits.

14.13. TerminalServerPort

Note: See [Examples - Terminal Server Relay \(on page 318\)](#) for additional information.

TerminalServerPort	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<ul style="list-style-type: none"> Com1.TerminalServerPort=nnnn Com2.TerminalServerPort=nnnn <p>Note: Where nnnn is the TCP port number.</p>
Web Interface window	<p>Terminal Server Port</p> <ol style="list-style-type: none"> In the Terminal Server Port text box, enter the designated TCP port number. Click the Update button to save the change. <p>Note: See the COM window (on page 329) for the parameter location.</p>
Default Setting	<ul style="list-style-type: none"> The default port number for COM1 is 5041. The default port number for COM2 is 5042.
Options	<ul style="list-style-type: none"> The minimum value is 0 (zero). The maximum value is 65535.
Description	<p>The Com1.TerminalServerPort or Com2.TerminalServerPort setting designates the TCP port number.</p> <p>FREEWAVE Recommends: If using the Terminal Server Relay setting, keep the TCP port numbers as their defaults.</p>

14.14. TerminalServerTimeOut

Note: See [Examples - Terminal Server Relay \(on page 318\)](#) for additional information.

TerminalServerTimeOut	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<ul style="list-style-type: none"> Com1.TerminalServerTimeOut=nnnn Com2.TerminalServerTimeOut=nnnn <p>Note: Where nnnn is the amount of time, in seconds, the Terminal Server remains open.</p>

TerminalServerTimeOut	
Setting	Description
Web Interface window	<p>Terminal Server Time Out</p> <ol style="list-style-type: none"> 1. In the Terminal Server Time Out text box, enter the number of seconds the Terminal Server remains open without receiving data from the network. 2. Click the Update button to save the change. 3. Reboot the Z9-PC / Z9-PC-SR001 for the change to take effect. <p>Note: See the COM window (on page 329) for the parameter location.</p>
Default Setting	300
Options	<ul style="list-style-type: none"> • The minimum value is 5. • The maximum value is 3600.
Description	<p>The Com1.TerminalServerTimeOut or Com2.TerminalServerTimeOut setting designates the amount of time, in seconds, the Terminal Server remains open if data is sent or received.</p> <p>Note: This can prevent an idle socket from remaining open indefinitely and preventing new connections.</p> <p>Important! The Com1.TerminalServerTimeOut or Com2.TerminalServerTimeOut connection remains open if data is sent or received.</p>

14.15. TxBytes

TxBytes	
Setting	Description
CLI / Web Page	[Page=Com1] [Page=Com2]
CLI Command	<ul style="list-style-type: none"> • Com1.TxBytes • Com2.TxBytes
Web Interface window	<p>TX Bytes</p> <p>Note: This parameter is read-only in the Web Interface. See the COM window (on page 329) for the parameter location.</p>
Default Setting	N/A
Options	N/A

TxBytes	
Setting	Description
Description	<p>The Com1.TxBytes or Com2.TxBytes command reports the total bytes sent out of the COM port.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">Note: This is a Read-only parameter.</div>

15. config Parameters

Note: See the [Config window](#) (on page 331).

- [addTraceMask](#) (on page 197)
- [factoryDefaults](#) (on page 197)
- [getCurrentConfig](#) (on page 197)
- [handleDragDrop](#) (on page 197)
- [licenseState](#) (on page 197)
- [loadConfig](#) (on page 198)
- [removeTraceMask](#) (on page 198)
- [reset](#) (on page 198)
- [restore](#) (on page 199)
- [save](#) (on page 200)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

15.1. addTraceMask

Important! FreeWave internal use only.

15.2. factoryDefaults

factoryDefaults	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	<code>config.factoryDefaults=set</code>
Web Interface window	Factory Defaults <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: See the Config window (on page 331) for the parameter location.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Important! This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p> </div>
Default Setting	N/A
Options	Idle
Description	The config.factoryDefaults command restores the Z9-PC / Z9-PC-SR001 to its factory default configuration.

15.3. getCurrentConfig

Important! FreeWave internal use only.

15.4. handleDragDrop

Important! FreeWave internal use only.

15.5. licenseState

licenseState	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	<code>config.licenseState</code>

licenseState	
Setting	Description
Web Interface window	License State <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> Note: See the Config window (on page 331) for the parameter location. </div> <div style="border: 1px solid black; padding: 5px;"> Important!: This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access. </div>
Default Setting	N/A
Options	N/A
Description	The config.licenseState command reports the extra feature licenses in the Z9-PC / Z9-PC-SR001. <div style="border: 1px solid black; padding: 5px;"> Note: This is a Read-only parameter. </div>

15.6. loadConfig

Important!: FreeWave internal use only.

15.7. removeTraceMask

Important!: FreeWave internal use only.

15.8. reset

reset	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	<ul style="list-style-type: none"> • Reboot the entire ZumLink device: <ul style="list-style-type: none"> • <code>config.reset=now</code> • <code>config.reset=reboot</code> • Reset to restart the main application: <ul style="list-style-type: none"> • <code>config.reset=reset</code>

reset	
Setting	Description
Web Interface window	Reset <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: See the Config window (on page 331) for the parameter location.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Important! This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p> </div>
Default Setting	N/A
Options	N/A
Description	The config.reset command restarts or reboots the Z9-PC / Z9-PC-SR001.

15.9. restore

restore	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	<ul style="list-style-type: none"> • <code>config.restore=now</code> • <code>config.restore</code> • <code>restore</code>
Web Interface window	Restore <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: See the Config window (on page 331) for the parameter location.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Important! This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p> </div>
Default Setting	N/A
Options	N/A
Description	The config.restore command reloads a previously saved setting configuration of the Z9-PC / Z9-PC-SR001. <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: Restore happens automatically when the Z9-PC / Z9-PC-SR001 starts.</p> </div>

15.10. save

save	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	<ul style="list-style-type: none"> • config.save=now • config.save • save
Web Interface window	<p>Save</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: See the Config window (on page 331) for the parameter location.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Important! This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p> </div>
Default Setting	N/A
Options	N/A
Description	The config.save command saves changes made to the Z9-PC / Z9-PC-SR001 configuration.

16. dataPath Parameters

Note: See the [Data Path window](#) (on page 333).

- [aggregateEnabled](#) (on page 202)
- [compressionEnabled](#) (on page 203)
- [fecRate](#) (on page 204)
- [MacTableEntryAgeTimeout](#) (on page 206)
- [otaMaxFragmentSize](#) (on page 207)
- [routeMinSignalMarginThresh](#) (on page 207)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

16.1. aggregateEnabled

aggregateEnabled	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	<ul style="list-style-type: none"> • Enable: <ul style="list-style-type: none"> • dataPath.aggregateEnabled=true • Disable: <ul style="list-style-type: none"> • dataPath.aggregateEnabled=false
Web Interface window	<p>Aggregate Enabled</p> <ol style="list-style-type: none"> 1. Click the Aggregate Enabled list box arrow and select True to enable this parameter and increase throughput of small packets. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: By default, the Aggregate Enabled is NOT enabled (set to False). See the Data Path window (on page 333) for the parameter location.</p> </div>
Default Setting	False
Options	<ul style="list-style-type: none"> • True • False
Description	<p>The aggregateEnabled (on page 202) setting increases throughput of small packets by combining multiple packets into a single packet minimizing the number of packets required for transmission.</p> <p>Notes</p> <ul style="list-style-type: none"> • Increases latency by 20msec and reduces poll rates. <ul style="list-style-type: none"> • When enabled, this setting adds 20 msec of latency. • However, net throughput may increase due to sending fewer, larger packets. • If another packet is not received within 20 msec, the aggregated packet is transmitted. • This setting does NOT need to match on all radios. • Does NOT affect medium and large packets. • Packets below 900 bytes are aggregated up to an aggregated packet size of 970 bytes. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! All radios have the ability to de-aggregate received packets, regardless of the aggregation setting.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>FREEWAVE Recommends: Enable this setting on individual radios that send a high percentage of network data packets that are smaller than 900 bytes.</p> </div>

16.2. compressionEnabled

compressionEnabled	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	<ul style="list-style-type: none"> • Enable: <ul style="list-style-type: none"> • <code>dataPath.compressionEnabled=true</code> • Disable: <ul style="list-style-type: none"> • <code>dataPath.compressionEnabled=false</code>
Web Interface window	<p>Compression Enabled</p> <ol style="list-style-type: none"> 1. Click the Compression Enabled list box arrow and select False to disable compression of outgoing packets. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: By default, the Compression Enabled is enabled (set to True). See the Data Path window (on page 333) for the parameter location.</p> </div>
Default Setting	True
Options	<ul style="list-style-type: none"> • True • False
Description	<p>When the compressionEnabled (on page 203) setting is enabled, the outgoing packets are analyzed and, if the data packet can be compressed, sent compressed to transmit fewer bits over the air.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! The compression ratio varies depending on the type of data being transmitted.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; background-color: #e6f2ff;"> <p>Example: Text data is easily compressible, while video data is not.</p> </div> <p>Notes</p> <ul style="list-style-type: none"> • When enabled, the Packet Compression setting increases latency by a maximum of 10msec. • Net throughput may increase due to sending more data in each packet. • All radios have the ability to de-compress received packets regardless of their compression setting. • This setting does NOT need to match on all radios. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>FREEWAVE Recommends: Enable Packet Compression on all ZumLink networks.</p> </div>

16.3. fecRate

fecRate	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	<ul style="list-style-type: none"> • Enable: <ul style="list-style-type: none"> • dataPath.fecRate=RATE_7_8 • Disable: <ul style="list-style-type: none"> • dataPath.fecRate=RATE_1_1
Web Interface window	<p>FEC Rate</p> <ol style="list-style-type: none"> 1. Click the FEC Rate list box arrow and select the Forward Error Correction (FEC) rate. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Data Path window (on page 333) for the parameter location.</p> </div>
Default Setting	RATE_1_1
Options	<ul style="list-style-type: none"> • RATE_1_1 • RATE_7_8

fecRate	
Setting	Description
Description	<p>The dataPath.fecRate setting enables the Forward Error Correction (FEC) rate.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Note: The fecRate (on page 204) increases the reliability of the data transferred over the air at the cost of some transmission throughput.</p> </div> <p>Notes</p> <ul style="list-style-type: none"> • The FEC setting MUST match on ALL radios in the network, to maintain over-the-air compatibility. • When enabled, this setting indicates that for every 7 bytes in, the radio sends 8 bytes out, with the 8th byte used for parity / error correction. • Reduces throughput by 13%. • Improves sensitivity by 3dB to maximize range and link range in noisy environments. • Adds redundant information to a data stream to detect packet errors and corrects them to avoid retransmission of the packet. • Adds resilience in noisy environments. • FEC reduces the maximum achievable throughput. <ul style="list-style-type: none"> • However, in noisy environments, net throughput may increase due to reduced errors and retries. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Caution: When enabling FEC, start with the farthest Endpoints, then any Repeaters, then lastly the Gateway. As FEC is enabled on each radio, that radio is temporarily dropped off the network, until any downstream Repeaters and the Gateway also have FEC enabled, at which time all communication will resume.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>FREEWAVE Recommends: When viewing local diagnostics, if the RadioBadCRC (on page 226) count is more than 15-20% of the total transmitted packets (the RadioLLTx (on page 228) count), enabling the FEC setting is beneficial.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>FREEWAVE Recommends: When viewing local diagnostics, if the RadioBadCRC (on page 226) count is more than 15% of the total transmitted packets (the RadioLLTx (on page 228) count), enabling the fecRate (on page 204) setting is beneficial.</p> </div>

16.4. MacTableEntryAgeTimeout

MacTableEntryAgeTimeout	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	MacTableEntryAgeTimeout=nnnn <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where nnnn is the number of seconds.</p> </div>
Web Interface window	MAC Table Entry Age Timeout 1. In the MAC Table Entry Age Timeout text box, enter the number of seconds before an inactive entry in the MAC Table ages out and expires. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Data Path window (on page 333) for the parameter location.</p> </div>
Default Setting	120
Options	<ul style="list-style-type: none"> • The minimum value is 30. • The maximum value is 86400.
Description	<p>The dataPath.MacTableEntryAgeTimeout setting designates the number of seconds before an inactive entry in the MAC Table ages out and expires.</p> <ul style="list-style-type: none"> • The radio network learns the MAC address of devices connected to particular radio Endpoints and stores them in a MAC table. • As traffic passes between the Endpoints, the entries in the MAC table are updated. • If packets have NOT been sent or received to a MAC address within the designated dataPath.MacTableEntryAgeTimeout period, the entry in the table is marked as expired. • Expired entries must be re-learned and generate some extra traffic on the network until the radio Endpoint associated with the MAC address is learned. • The timeout does impact the time it takes to learn the new path. • This value can be optimized with parallel Repeaters to allow for fail over. • Setting this value too small so normal traffic does not keep the MAC table entry from expiring may generate excess network traffic. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>FREEWAVE Recommends: Set this timeout longer than the polling rate on the network. Entries do not use the new timeout value until they are updated when a packet transfer.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See MacTableShow (on page 223) to view the MAC to nodeld mapping table.</p> </div>

16.5. otaMaxFragmentSize

otaMaxFragmentSize	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	<pre>dataPath.otaMaxFragmentSize=nnnn</pre> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <code>nnnn</code> is the maximum fragment size.</p> </div>
Web Interface window	<p>OTA Max Fragment Size</p> <ol style="list-style-type: none"> In the OTA Max Fragment Size text box, enter the maximum fragment size, in bytes, sent over the air. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Data Path window (on page 333) for the parameter location.</p> </div>
Default Setting	1000
Options	<ul style="list-style-type: none"> The minimum value is 64. The maximum value is 1000.
Description	<p>The dataPath.otaMaxFragmentSize setting designates the maximum fragment size, in bytes, sent over the air.</p> <p>Notes</p> <ul style="list-style-type: none"> This setting does NOT need to match on all radios. A smaller Max Fragment Size may increase RF link reliability in highly noisy environments. <ul style="list-style-type: none"> A smaller Max Fragment Size may reduce data throughput. A larger Max Fragment Size may increase data throughput. <ul style="list-style-type: none"> A larger Max Fragment Size may reduce RF link reliability in noisy environments.

16.6. routeMinSignalMarginThresh

routeMinSignalMarginThresh	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	<pre>dataPath.routeMinSignalMarginThresh=nnnn</pre> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <code>nnnn</code> is the minimum signal margin in dB.</p> </div>

routeMinSignalMarginThresh	
Setting	Description
Web Interface window	<p>Route Min Signal Margin Thresh</p> <ol style="list-style-type: none"> 1. In the Route Min Signal Margin Thresh text box, enter the minimum threshold signal margin in dB. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Data Path window (on page 333) for the parameter location.</p> </div>
Default Setting	<ul style="list-style-type: none"> • 10
Options	<ul style="list-style-type: none"> • The minimum value is -5. • The maximum value is 60.
Description	<p>The dataPath.routeMinSignalMarginThresh setting designates the minimum (threshold) signal margin, in dB, the next hop must be considered part of the packet route.</p> <p>Notes</p> <ul style="list-style-type: none"> • When Repeaters are enabled, the packets take the path through the radio network with the minimum number of hops. • By increasing the threshold value, the possible routes can be reduced to allow a particular routing path to be preferred. <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>FREEWAVE Recommends: This value should be at least 4 dB lower than the reported link margin to the next hop.</p> </div> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px; background-color: #e6f2ff;"> <p>Example: If the best-reported link margin for the next hop is 20 dB, this number should be set to 16 or less. This prevents the traffic from choosing an alternative route with lower margin.</p> </div>

17. date Parameters

Note: See the [Date window](#) (on page 335).

- [dcAppStartTime](#) (on page 210)
- [dcAppUptime](#) (on page 210)
- [time](#) (on page 211)
- [timeString](#) (on page 211)
- [upTime](#) (on page 212)
- [upTimeString](#) (on page 212)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

17.1. dcAppStartTime

Important! Time zones **do not** apply to the Z9-PC / Z9-PC-SR001.

dcAppStartTime	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	<ul style="list-style-type: none"> • <code>date.dcAppStartTime</code> • <code>dcAppStartTime</code>
Web Interface window	DC App Start Time <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Date window (on page 335) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The date.dcAppStartTime command reports the time stamp of when the main app started. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

17.2. dcAppUptime

Important! Time zones **do not** apply to the Z9-PC / Z9-PC-SR001.

dcAppUptime	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	<ul style="list-style-type: none"> • <code>date.dcAppUptime</code> • <code>dcAppUptime</code>
Web Interface window	DC App Uptime <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Date window (on page 335) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A

dcAppUptime	
Setting	Description
Description	The date.dcAppUptime command reports the number of seconds since the main app started. Note: This is a Read-only parameter.

17.3. time

Important!: Time zones **do not** apply to the Z9-PC / Z9-PC-SR001.

time	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	<ul style="list-style-type: none"> date.time time
Web Interface window	Time Note: This parameter is read-only in the Web Interface. See the Date window (on page 335) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The date.time command reports the current time in Unix time stamp format. Note: This is a Read-only parameter.

17.4. timeString

Important!: Time zones **do not** apply to the Z9-PC / Z9-PC-SR001.

timeString	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	date.timeString=MM/DD/YYYY HH.MM.SS

timeString	
Setting	Description
Web Interface window	Time String Note: This parameter is read-only in the Web Interface. See the Date window (on page 335) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The date.timeString setting changes the time ONLY if the ntpReference (on page 252) is set to REFCLK_LOCALCLOCK . Important!: If the Z9-PC / Z9-PC-SR001 loses power, the time must be manually reset.

17.5. upTime

Important!: Time zones **do not** apply to the Z9-PC / Z9-PC-SR001.

upTime	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	<ul style="list-style-type: none"> date.upTime upTime
Web Interface window	Up Time Note: This parameter is read-only in the Web Interface. See the Date window (on page 335) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The date.upTime command reports the number of seconds since the ZumLink restarted. Note: This is a Read-only parameter.

17.6. upTimeString

Important!: Time zones **do not** apply to the Z9-PC / Z9-PC-SR001.

upTimeString	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	<ul style="list-style-type: none"> date.upTimeString upTimeString <p>Example: A return of Uptime 5 Days 01:36:41 means the unit has been up for 5 days, 1 hour, 36 minutes, and 41 seconds.</p>
Web Interface window	<p>Up Time String</p> <p>Note: This parameter is read-only in the Web Interface. See the Date window (on page 335) for the parameter location.</p>
Default Setting	N/A
Options	N/A
Description	<p>The date.upTimeString command reports the amount of time in Days, Hours, Minutes, and Seconds the Z9-PC / Z9-PC-SR001 has been powered on without a reboot.</p> <p>Note: This is a Read-only parameter.</p>

18. encryption Parameters

Note: See the [Encryption window \(on page 337\)](#).


- [activeKey \(on page 215\)](#)
- [encryptionMode \(on page 215\)](#)
- [getKey \(on page 216\)](#)
- [remoteRestore \(on page 217\)](#)
- [remoteSave \(on page 217\)](#)
- [setKey \(on page 217\)](#)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

18.1. activeKey

Caution: Encryption settings **MUST match** on ALL radios in the network to maintain over-the-air compatibility.


 When enabling Encryption, start with the farthest Endpoints, then any Repeaters, then lastly the Gateway.

As Encryption is enabled on each radio, that radio temporarily drops off the network, until any downstream Repeaters and the Gateway also have Encryption enabled, at which time all communication will resume.

activeKey	
Setting	Description
CLI / Web Page	[Page=encryption]
CLI Command	<ul style="list-style-type: none"> encryption.activeKey=Off encryption.activeKey=Key1 to Key16 <p>Example: <code>encryption.activeKey=Key10.</code></p>
Web Interface window	<p>Active Key</p> <p>Note: This parameter is read-only in the Web Interface. See the Encryption window (on page 337) for the parameter location.</p>
Default Setting	Off
Options	<ul style="list-style-type: none"> Off Key1 to Key16
Description	<p>The <code>encryption.activeKey</code> setting designates the active key.</p> <p>Important!: Assigning the <code>activeKey</code> to a key that is NOT set will NOT allow communication across the link. Keys MUST BE set before they can become active keys.</p>

18.2. encryptionMode

Caution: Encryption settings **MUST match** on ALL radios in the network to maintain over-the-air compatibility.

 When enabling Encryption, start with the farthest Endpoints, then any Repeaters, then lastly the Gateway.

As Encryption is enabled on each radio, that radio temporarily drops off the network, until any downstream Repeaters and the Gateway also have Encryption enabled, at which time all communication will resume.

encryptionMode	
Setting	Description
CLI / Web Page	[Page=encryption]
CLI Command	<ul style="list-style-type: none"> • AES Counter Mode: <ul style="list-style-type: none"> • <code>encryption.encryptionMode=AES_CTR</code> • AES Counter Mode with MIC (Message Integrity Check): <ul style="list-style-type: none"> • <code>encryption.encryptionMode=AES_CCM</code>
Web Interface window	<p>Encryption Mode</p> <ol style="list-style-type: none"> 1. Click the Encryption Mode list box arrow and select the designated encryption mode. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Encryption window (on page 337) for the parameter location.</p> </div>
Default Setting	AES_CTR
Options	<ul style="list-style-type: none"> • AES_CCM • AES_CTR
Description	<p>The encryption.encryptionMode setting designates the encryption mode.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! Use of encryption may affect latency and user throughput.</p> </div>

18.3. getKey



Caution: Encryption settings **MUST match** on ALL radios in the network to maintain over-the-air compatibility.

When enabling Encryption, start with the farthest Endpoints, then any Repeaters, then lastly the Gateway.

As Encryption is enabled on each radio, that radio temporarily drops off the network, until any downstream Repeaters and the Gateway also have Encryption enabled, at which time all communication will resume.

getKey	
Setting	Description
CLI / Web Page	[Page=encryption]
CLI Command	<code>encryption.getKey=Key1 to Key16</code> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Example: <code>encryption.getKey=key8.</code></p> </div>

getKey	
Setting	Description
Web Interface window	Get Key <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Encryption window (on page 337) for the parameter location.</p> </div>
Default Setting	Off
Options	<ul style="list-style-type: none"> • Off • Key1 to Key16
Description	The encryption.getKey command reports this information about the key: <ul style="list-style-type: none"> • Whether the key is 128- or 256-bit key. • If the key is empty. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

18.4. remoteRestore

Important! FreeWave internal use only.

18.5. remoteSave

Important! FreeWave internal use only.

18.6. setKey




Caution: Encryption settings **MUST match** on ALL radios in the network to maintain over-the-air compatibility.

When enabling Encryption, start with the farthest Endpoints, then any Repeaters, then lastly the Gateway.

As Encryption is enabled on each radio, that radio temporarily drops off the network, until any downstream Repeaters and the Gateway also have Encryption enabled, at which time all communication will resume.

setKey	
Setting	Description
CLI / Web Page	[Page=encryption]

setKey	
Setting	Description
CLI Command	<p>The format of this setting is: <code>setKey [key]</code> [128 or 256 key in hex]</p> <p>Example: 128 bit key: <code>encryption.setKey=key1 1234567890abcdef1234567890abcdef</code></p> <p>Example: 256 bit key: <code>encryption.setKey=key2</code> <code>1234567890abcdef1234567890abcdef1234567890abcdef1234567890abcdef</code></p>
Web Interface window	<p>Set Key</p> <p>Note: This parameter is read-only in the Web Interface. See the Encryption window (on page 337) for the parameter location.</p>
Default Setting	N/A
Options	N/A
Description	<p>The <code>encryption.setKey</code> setting loads the key.</p> <p> Enter <code>encryption.setKey=</code> WITHOUT an actual key to erase or clear the existing key.</p>

19. localDiagnostics Parameters

Note: See the [Local Diagnostics window \(on page 344\)](#).

- [signalLevel \(on page 220\)](#)
- [signalMargin \(on page 220\)](#)
- [cntBadBCC \(on page 221\)](#)
- [cntBadSync \(on page 221\)](#)
- [cntETX \(on page 221\)](#)
- [cntSTX \(on page 221\)](#)
- [getStats \(on page 221\)](#)
- [interfaceBytesRx \(on page 222\)](#)
- [interfaceBytesTx \(on page 222\)](#)
- [interfaceDataRx \(on page 222\)](#)
- [interfaceDataTx \(on page 222\)](#)
- [MacTableClear \(on page 223\)](#)
- [MacTableShow \(on page 223\)](#)
- [monitoredNode \(on page 224\)](#)
- [noiseLevel \(on page 224\)](#)
- [RadioAckTx \(on page 225\)](#)
- [RadioBadAckRx \(on page 225\)](#)
- [RadioBadCRC \(on page 226\)](#)
- [RadioBadSync \(on page 226\)](#)
- [RadioContentionDrop \(on page 227\)](#)
- [RadioLLRx \(on page 227\)](#)
- [RadioLLTx \(on page 228\)](#)
- [RadioNoAckTx \(on page 229\)](#)
- [RadioReliableRx \(on page 229\)](#)
- [RadioReliableTx \(on page 229\)](#)
- [RadioRexmit \(on page 229\)](#)
- [RadioRx \(on page 229\)](#)
- [RadioSendingDrop \(on page 230\)](#)
- [RadioTimedOut \(on page 230\)](#)
- [RadioTooLong \(on page 230\)](#)
- [RadioTooShort \(on page 230\)](#)
- [RadioTx \(on page 230\)](#)
- [resetsDetected \(on page 231\)](#)
- [resetSent \(on page 231\)](#)
- [resetStats \(on page 231\)](#)
- [RxSuccess \(on page 232\)](#)
- [showChannelDiags \(on page 232\)](#)
- [showNodeDiags \(on page 233\)](#)
- [timestamp \(on page 233\)](#)
- [TxAvailability \(on page 234\)](#)
- [TxSuccess \(on page 235\)](#)
- [VSWR \(on page 235\)](#)

19.1. signalLevel

Important! Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

signalLevel	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.signalLevel signalLevel
Web Interface window	Signal Level <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	-128.00
Options	N/A
Description	The localDiagnostics.signalLevel command reports the Signal Level of the radio in dBm of the last received packet. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This setting shows -128.00 if no packet has been received since the stats were cleared.</p> </div>

19.2. signalMargin

Important! Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

signalMargin	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.signalMargin signalMargin

signalMargin	
Setting	Description
Web Interface window	Signal Margin Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.signalMargin command reports the amount of signal margin in dB the last received packet experienced. Note: The signal margin is the difference between the signal level and either the receive sensitivity or the noise level, whichever is higher, for the configured RF data rate.

19.3. cntBadBCC

Important! FreeWave internal use only.

19.4. cntBadSync

Important! FreeWave internal use only.

19.5. cntETX

Important! FreeWave internal use only.

19.6. cntSTX

Important! FreeWave internal use only.

19.7. getStats

getStats	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]

getStats	
Setting	Description
CLI Command	<ul style="list-style-type: none"> • <code>localDiagnostics.getStats</code> • <code>getStats</code>
Web Interface window	Get Stats <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.getStats command reports the localDiagnostics from the radio immediately. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! A refresh of the localDiagnostics page is required to see the updates.</p> </div>

19.8. interfaceBytesRx

Important! FreeWave internal use only.

19.9. interfaceBytesTx

Important! FreeWave internal use only.

19.10. interfaceDataRx

Important! FreeWave internal use only.

19.11. interfaceDataTx

Important! FreeWave internal use only.

19.12. MacTableClear


MacTableClear	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.MacTableClear=Now localDiagnostics.MacTableClear= MacTableClear=Now MacTableClear=
Web Interface window	<p>Mac Table Clear</p> <div style="border: 1px solid black; padding: 5px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	N/A
Options	Now
Description	The localDiagnostics.MacTableClear command clears the MAC to the nodeID mapping table and forces routes to be relearned.

19.13. MacTableShow

MacTableShow	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.MacTableShow MacTableShow
Web Interface window	<p>Mac Table Show</p> <div style="border: 1px solid black; padding: 5px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.MacTableShow command reports the MAC addresses of the devices connected to the Z9-PC / Z9-PC-SR001 in a nodeID table format.

19.14. monitoredNode

Important! Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

monitoredNode	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.monitoredNode=<Node ID here> monitoredNode=<Node ID here>
Web Interface window	<p>Monitored Node</p> <ol style="list-style-type: none"> In the Monitored Node text box, enter the nodelid (on page 264) to monitor. Click the Update button to save the change. <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>Note: See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	<p>The localDiagnostics.monitoredNode setting designates the nodelid (on page 264) to be monitored and reported back by the localDiagnostics.showNodeDiags command.</p> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p> Tip Use the showNodeDiags to view the received signal level (RSSI) of this node.</p> </div>

19.15. noiseLevel

Important! Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

noiseLevel	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.noiseLevel noiseLevel

noiseLevel	
Setting	Description
Web Interface window	Noise Level Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.
Default Setting	0.000000
Options	N/A
Description	The localDiagnostics.noiseLevel command reports the amount of link noise measured in dB before the last packet was transmitted.

19.16. RadioAckTx

Important! FreeWave internal use only.

19.17. RadioBadAckRx

Important! Most of the [localDiagnostics](#) parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

RadioBadAckRx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> <code>localDiagnostics.RadioBadAckRx</code> <code>RadioBadAckRx</code>
Web Interface window	Radio Bad Ack RX Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.RadioBadAckRx command reports the number of received ACKs missed in unicast transmissions.

19.18. RadioBadCRC

Important! Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

RadioBadCRC	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.RadioBadCRC RadioBadCRC
Web Interface window	Radio Bad CRC <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.RadioBadCRC command reports the number of radio packets received with data corruption. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>FREEWAVE Recommends: When viewing local diagnostics, if the RadioBadCRC (on page 226) count is more than 15% of the total transmitted packets (the RadioLLTx (on page 228) count), enabling the fecRate (on page 204) setting is beneficial.</p> </div>

19.19. RadioBadSync

Important! Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

RadioBadSync	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.RadioBadSync RadioBadSync

RadioBadSync	
Setting	Description
Web Interface window	Radio Bad Sync Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.RadioBadSync command reports the number of times beacons were lost and the Endpoint needed to re-synchronize with the Gateway when radiosettings.radioHoppingMode=Hopping_On .

19.20. RadioContentionDrop

Important! Most of the [localDiagnostics](#) parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

RadioContentionDrop	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> <code>localDiagnostics.RadioContentionDrop</code> <code>RadioContentionDrop</code>
Web Interface window	Radio Contention Drop Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.RadioContentionDrop command reports the number of times a transmission was backed-off due to contention on the RF channel.

19.21. RadioLLRx

Important! Most of the [localDiagnostics](#) parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

RadioLLRx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.RadioLLRx RadioLLRx
Web Interface window	Radio LL RX <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.RadioLLRx command reports the number of packets received over the air without data corruption.

19.22. RadioLLTx

Important! Most of the [localDiagnostics](#) parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

RadioLLTx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.RadioLLTx RadioLLTx
Web Interface window	Radio LL TX <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A

RadioLLTx	
Setting	Description
Description	<p>The localDiagnostics.RadioLLTx command reports the number of packets transmitted over the air.</p> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>FREEWAVE Recommends: When viewing local diagnostics, if the RadioBadCRC (on page 226) count is more than 15% of the total transmitted packets (the RadioLLTx (on page 228) count), enabling the fecRate (on page 204) setting is beneficial.</p> </div>

19.23. RadioNoAckTx

Important! FreeWave internal use only.

19.24. RadioReliableRx

Important! FreeWave internal use only.

19.25. RadioReliableTx

Important! FreeWave internal use only.

19.26. RadioRexmit

Important! FreeWave internal use only.

19.27. RadioRx

Important! Most of the [localDiagnostics](#) parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

RadioRx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> • <code>localDiagnostics.RadioRx</code> • <code>RadioRx</code>

RadioRx	
Setting	Description
Web Interface window	Radio RX Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.RadioRx command reports the number of data packets correctly received over the wireless RF link for this node.

19.28. RadioSendingDrop

Important! FreeWave internal use only.

19.29. RadioTimedOut

Important! FreeWave internal use only.

19.30. RadioTooLong

Important! FreeWave internal use only.

19.31. RadioTooShort

Important! FreeWave internal use only.

19.32. RadioTx

Important! Most of the [localDiagnostics](#) parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

RadioTx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]

RadioTx	
Setting	Description
CLI Command	<ul style="list-style-type: none"> • <code>localDiagnostics.RadioTx</code> • <code>RadioTx</code>
Web Interface window	Radio TX <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.RadioTx command reports the number of data packets scheduled to be transmitted.

19.33. resetsDetected

Important!: FreeWave internal use only.

19.34. resetSent

Important!: FreeWave internal use only.

19.35. resetStats

resetStats	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> • <code>localDiagnostics.resetStats=Now</code> • <code>localDiagnostics.resetStats=</code> • <code>resetStats=Now</code> • <code>resetStats=</code>
Web Interface window	Reset Stats <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>

resetStats	
Setting	Description
Default Setting	N/A
Options	Now
Description	The localDiagnostics.resetStats command resets the local diagnostics.

19.36. RxSuccess

Important!: Most of the [localDiagnostics](#) parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

RxSuccess	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> <code>localDiagnostics.RxSuccess=</code> <code>RxSuccess=</code>
Web Interface window	Rx Success <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	100
Options	N/A
Description	The localDiagnostics.RxSuccess command reports the percentage of packets correctly received for this node.

19.37. showChannelDiags

showChannelDiags	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> <code>localDiagnostics.showChannelDiags</code> <code>showChannelDiags</code>

showChannelDiags	
Setting	Description
Web Interface window	Show Channel Diags Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.showChannelDiags command reports the received signal level (RSSI) and node ID of the last packet received on the displayed frequencies.

19.38. showNodeDiags

showNodeDiags	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.showNodeDiags showNodeDiags
Web Interface window	Show Node Diags Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.showNodeDiags command reports the channel frequency and signal level for the node selected by the localDiagnostics.monitoredNode parameter.

19.39. timestamp

Important!: Most of the [localDiagnostics](#) parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

timestamp	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.timestamp timestamp
Web Interface window	Timestamp <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.timestamp command reports the time the Diagnostics Information was collected by the device.

19.40. TxAvailability

Important! Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

TxAvailability	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.TxAvailability= TxAvailability=
Web Interface window	Tx Availability <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	100
Options	N/A
Description	The localDiagnostics.TxAvailability command reports the percentage of packets that were transmitted without back-off.

19.41. TxSuccess

Important! Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

TxSuccess	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.TxSuccess= TxSuccess=
Web Interface window	Tx Success <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	100
Options	N/A
Description	The localDiagnostics.TxSuccess command reports the percentage of packets that were transmitted with a successful ACK received.

19.42. VSWR

Important! Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC / Z9-PC-SR001 device.

VSWR	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul style="list-style-type: none"> localDiagnostics.VSWR= VSWR= <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Example:</p> </div>

VSWR	
Setting	Description
Web Interface window	Signal Level <div style="border: 1px solid black; padding: 5px;"> <p>Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 344) for the parameter location.</p> </div>
Default Setting	0 (zero)
Options	N/A
Description	<p>The localDiagnostics.VSWR command reports the value proportional to the VSWR (Voltage Standing Wave Ratio) measured from the last packet transmitted.</p> <ul style="list-style-type: none"> • For the antenna port, the value can range from: <ul style="list-style-type: none"> • 1 to 2 for an excellent match, • 2 to 10 for a good match, or • > 100 for a poor match. <p>Notes</p> <ul style="list-style-type: none"> • VSWR is less accurate at higher power levels (>20dBm). • The reported VSWR is a value proportional to the VSWR. It is closer to VSWR at lower powers, but at higher power levels, it still increases with reflected power. • VSWR may not function on Z9-PC / Z9-PC-SR001 models manufactured prior to September, 2018. If the Z9-PC / Z9-PC-SR001 reports a VSWR value of 0 (zero), VSWR is not supported.

20. network Parameters

Note: See the [Network window](#) (on page 347).

- [gateway](#) (on page 238)
- [ip_address](#) (on page 238)
- [mac_address](#) (on page 239)
- [MTU](#) (on page 239)
- [nameserver_address1](#) (on page 240)
- [nameserver_address2](#) (on page 241)
- [netmask](#) (on page 241)
- [netmaskFilterEnabled](#) (on page 242)
- [stpEnabled](#) (on page 243)
- [txqueuelen](#) (on page 244)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter.**

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

20.1. gateway

gateway	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<code>network.gateway=nnn.nnn.nnn.nnn</code>
Web Interface window	<p>Gateway</p> <ol style="list-style-type: none"> In the Gateway text box, enter the Gateway IP address for the network. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Network window (on page 347) for the parameter location.</p> </div>
Default Setting	192.168.111.1
Options	N/A
Description	<p>The network.gateway setting designates the Gateway IP address for the network when DHCP is disabled.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! The use of a Gateway here is NOT related to the radioSettings.radioMode=Gateway or radioSettings.radioMode=Endpoint.</p> </div>

20.2. ip_address

ip_address	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<code>network.ip_address=nnn.nnn.nnn.nnn</code>
Web Interface window	<p>IP Address</p> <ol style="list-style-type: none"> In the IP Address text box, enter the IP address of the Z9-PC / Z9-PC-SR001 assigned by the IT department for the network. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Network window (on page 347) for the parameter location.</p> </div>
Default Setting	192.168.111.100
Options	N/A

ip_address	
Setting	Description
Description	The network.ip_address setting designates the IP address of the Z9-PC / Z9-PC-SR001 when DHCP is disabled.

20.3. mac_address

mac_address	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul style="list-style-type: none"> • <code>network.mac_address</code> • <code>mac_address</code>
Web Interface window	MAC Address <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Network window (on page 347) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The network.mac_address command reports the MAC Address of the Z9-PC / Z9-PC-SR001. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! This parameter is read-only and is unique for each radio.</p> </div>

20.4. MTU

mtu	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul style="list-style-type: none"> • <code>network.mtu=nnnn</code> • <code>mtu=nnnn</code> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <code>nnnn</code> is the maximum transmission unit.</p> </div>

mtu	
Setting	Description
Web Interface window	<p>MTU</p> <ol style="list-style-type: none"> 1. In the MTU text box, enter the maximum transmission unit. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Network window (on page 347) for the parameter location.</p> </div>
Default Setting	1500
Options	<ul style="list-style-type: none"> • The minimum value is 100. • The maximum value is 65521.
Description	<p>The network.mtu setting designates the maximum transmission unit (MTU) frame size for the Z9-PC / Z9-PC-SR001.</p> <p>Notes</p> <ul style="list-style-type: none"> • The MTU size only effects communications that originate or terminate on this device, such as the web services or the Terminal Servers. • All other traffic passing through the radio network is affected by this setting. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! The value MUST BE increased to support jumbo size frames that exceed the normal 1500 byte MTU.</p> </div>

20.5. nameserver_address1

nameserver_address1	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<p><code>network.nameserver_address1=nnn.nnn.nnn.nnn</code></p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <code>nnn.nnn.nnn.nnn</code> is a user-defined DNS IP address.</p> </div>
Web Interface window	<p>Nameserver Address 1</p> <ol style="list-style-type: none"> 1. Optional: In the Nameserver Address 1 text box, enter a user-defined DNS IP address. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Network window (on page 347) for the parameter location.</p> </div>
Default Setting	<p>8.8.8.8</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Google Public DNS.</p> </div>

nameserver_address1	
Setting	Description
Options	User-defined DNS IP address.
Description	The network.nameserver_address1 setting designates the DNS for name-to-address resolution.

20.6. nameserver_address2

nameserver_address2	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<pre>network.nameserver_address2=nnn.nnn.nnn.nnn.</pre> <p>Note: Where <code>nnn.nnn.nnn.nnn</code> is a user-defined DNS IP address.</p>
Web Interface window	<p>Nameserver Address 2</p> <ol style="list-style-type: none"> Optional: In the Nameserver Address 2 text box, enter a user-defined DNS IP address.. Click the Update button to save the change. <p>Note: See the Network window (on page 347) for the parameter location.</p>
Default Setting	<p>8.8.4.4</p> <p>Note: This is a Google Public DNS.</p>
Options	User-defined DNS IP address.
Description	The network.nameserver_address2 setting designates the DNS for name-to-address resolution.

20.7. netmask

netmask	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul style="list-style-type: none"> <code>network.netmask=nnn.nnn.nnn.nnn</code> <code>netmask=nnn.nnn.nnn.nnn</code>

netmask	
Setting	Description
Web Interface window	<p>Netmask</p> <ol style="list-style-type: none"> In the Netmask text box, enter the Netmask of the Z9-PC / Z9-PC-SR001. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Network window (on page 347) for the parameter location.</p> </div>
Default Setting	255.255.255.0
Options	N/A
Description	The network.netmask setting designates the Netmask of the Z9-PC / Z9-PC-SR001 when DHCP is disabled.

20.8. netmaskFilterEnabled

netmaskFilterEnabled	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul style="list-style-type: none"> Enable: <ul style="list-style-type: none"> <code>network.netmaskFilterEnabled=true</code> Disable: <ul style="list-style-type: none"> <code>network.netmaskFilterEnabled=false</code>
Web Interface window	<p>Netmask Filter Enabled</p> <ol style="list-style-type: none"> Click the Netmask Filter Enabled list box arrow and select True to enable the bridge firewall and restrict network communication to current IPv4 subnet. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: By default, the Netmask Filter Enabled is enabled (set to False). See the Network window (on page 347) for the parameter location.</p> </div>
Default Setting	False
Options	<ul style="list-style-type: none"> True False

netmaskFilterEnabled	
Setting	Description
Description	<p>The network.netmaskFilterEnabled enables a bridge firewall to restrict network communication to current IPv4 subnet.</p> <p>Notes</p> <ul style="list-style-type: none"> Allows ONLY IPv4, TCP, UDP, ICMP (ping), and ARP communication that is in the network.netmask parameter subnet to enter into the radio network. VLAN tagged packets are filtered out because the radio is not considered on the VLAN and therefore VLAN packets cannot be on the same subnet. Enabling Netmask Filter can prevent non-radio Ethernet traffic from adversely affecting the performance and capacity of the radio network. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! ZumLink acts as a layer 2 switch. ALL Ethernet and Multicast packets are passed when IP Netmask Filter is NOT enabled.</p> </div>

20.9. stpEnabled

stpEnabled	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul style="list-style-type: none"> Enable: <ul style="list-style-type: none"> <code>network.stpEnabled=true</code> Disable: <ul style="list-style-type: none"> <code>network.stpEnabled=false</code>
Web Interface window	<p>STP Enabled</p> <ol style="list-style-type: none"> Click the STP Enabled list box arrow and select True to enable the Spanning Tree Protocol. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: By default, the STP Enabled is NOT enabled (set to False). See the Network window (on page 347) for the parameter location.</p> </div>
Default Setting	False
Options	<ul style="list-style-type: none"> True False
Description	The network.stpEnabled setting enables the Spanning Tree Protocol.

20.10. txqueuelen

txqueuelen	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<pre>network.txqueuelen=nnnn</pre> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <code>nnnn</code> is the maximum number of packets to hold in the transmit queue.</p> </div>
Web Interface window	<p>Txqueuelen</p> <ol style="list-style-type: none"> 1. In the Txqueuelen text box, enter the maximum number of packets to hold in the transmit queue. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Network window (on page 347) for the parameter location.</p> </div>
Default Setting	25
Options	<ul style="list-style-type: none"> • The minimum value is 1. • The maximum value is 1000.
Description	<p>The network.txqueuelen setting designates the maximum number of packets that can be buffered before they are rejected by the radio.</p> <p>Notes</p> <ul style="list-style-type: none"> • The radio is still trying to send packets as soon as it receives them. • If the queue size is too small in an Ethernet network with a high rate of small packets, then packets could be lost. • Increasing TX Queue Length may increase throughput if there is a lot of network chatter that causes packets to be lost at the network layer. • Increasing TX Queue Length can increase latency if the packets are arriving at the Ethernet interface at an average rate that is above the capacity of the radio link. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Example: <code>network.txqueuelen=750</code> allows 750 Ethernet packets buffered in the transmit queue.</p> </div>

21. networkStats Parameters

Note: See the [Network Stats window](#) (on page 351).

- [rx_bytes](#) (on page 246)
- [rx_dropped](#) (on page 246)
- [rx_errors](#) (on page 247)
- [rx_packets](#) (on page 247)
- [tx_bytes](#) (on page 248)
- [tx_dropped](#) (on page 248)
- [tx_errors](#) (on page 249)
- [tx_packets](#) (on page 249)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

21.1. rx_bytes

rx_bytes	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul style="list-style-type: none"> networkStats.rx_bytes rx_bytes
Web Interface window	RX Bytes <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Network Stats window (on page 351) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The networkStats.rx_bytes command reports the number of bytes received from the radio network. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

21.2. rx_dropped

rx_dropped	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul style="list-style-type: none"> networkStats.rx_dropped rx_dropped
Web Interface window	RX Dropped <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Network Stats window (on page 351) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The networkStats.rx_dropped command reports the number of Ethernet packets received from the radio network that were dropped at the Ethernet interface. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

21.3. rx_errors

rx_errors	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul style="list-style-type: none"> networkStats.rx_errors rx_errors
Web Interface window	RX Errors <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Network Stats window (on page 351) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The networkStats.rx_errors command reports the number of Ethernet packets received from the radio network that had Ethernet errors. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

21.4. rx_packets

rx_packets	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul style="list-style-type: none"> networkStats.rx_packets rx_packets
Web Interface window	RX Packets <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Network Stats window (on page 351) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The networkStats.rx_packets command reports the number of Ethernet packets received from the radio network. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

21.5. tx_bytes

tx_bytes	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul style="list-style-type: none"> networkStats.tx_bytes tx_bytes
Web Interface window	TX Bytes <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Network Stats window (on page 351) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The networkStats.tx_bytes command reports the number of bytes of Ethernet packets received from the Ethernet port and sent over the radio network. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

21.6. tx_dropped

tx_dropped	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul style="list-style-type: none"> networkStats.tx_dropped tx_dropped
Web Interface window	TX Dropped <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Network Stats window (on page 351) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The networkStats.tx_dropped command reports the number of Ethernet packets received from the Ethernet port but dropped because the transmit queue is full. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: An increase of this counter may indicate that increasing the txqueuelen parameter may improve overall network performance.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

21.7. tx_errors

tx_errors	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul style="list-style-type: none"> networkStats.tx_errors tx_errors
Web Interface window	TX Errors <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Network Stats window (on page 351) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The networkStats.tx_errors command reports the number of Ethernet packets received from the Ethernet port that were in error. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

21.8. tx_packets

tx_packets	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul style="list-style-type: none"> networkStats.tx_packets tx_packets
Web Interface window	TX Packets <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Network Stats window (on page 351) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The networkStats.tx_packets command reports the number of Ethernet packets received from the Ethernet port and sent over the radio network. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

22. NTP Parameters

Note: See the [NTP window](#) (on page 353).

- [ntp_address](#) (on page 251)
- [ntpDate](#) (on page 252)
- [ntpReference](#) (on page 252)
- [ntpRestart](#) (on page 253)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

22.1. ntp_address

ntp_address	
Setting	Description
CLI / Web Page	[Page=ntp]
CLI Command	<ul style="list-style-type: none"> ntp.ntp_address1=nnn.nnn.nnn.nnn ntp.ntp_address2=nnn.nnn.nnn.nnn ntp.ntp_address3=nnn.nnn.nnn.nnn ntp.ntp_address4=nnn.nnn.nnn.nnn ntp.ntp_address5=nnn.nnn.nnn.nnn <p>Note: Where nnn.nnn.nnn.nnn is the IP address of the servers used for synchronizing time.</p>
Web Interface window	<p>NTP Address 1 NTP Address 2 NTP Address 3 NTP Address 4 NTP Address 5</p> <ol style="list-style-type: none"> In the NTP Address 2 to 5 text boxes, enter the IP address of the servers used for synchronizing time. Click the Update button to save the change. <p>Note: By default, the NTP Address 1 is time.nist.gov. See the NTP window (on page 353) for the parameter location.</p>
Default Setting	<ul style="list-style-type: none"> ntp_address1: time.nist.gov ntp_address2-5: 0.0.0.0
Options	N/A
Description	<p>The ntp.ntp_address1-5 setting designates the IP address of the servers used for synchronizing time.</p> <p>Notes</p> <ul style="list-style-type: none"> A maximum of five NTP servers are allowed. Use 0.0.0.0 to skip a specific server. <p>Example: Enter ntp.ntp_address2=0.0.0.0 to skip a second server, if it's available.</p>

22.2. ntpDate

ntpDate	
Setting	Description
CLI / Web Page	[Page=ntp]
CLI Command	<ul style="list-style-type: none"> ntp.ntpDate=now ntpDate=now
Web Interface window	<p>NTP Date</p> <ol style="list-style-type: none"> In the NTP Date text box, enter Now to synchronize the local clock with the time from the NTP servers specified in the ntp_address (on page 251) settings. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the NTP window (on page 353) for the parameter location.</p> </div>
Default Setting	N/A
Options	Now
Description	<p>The ntp.ntpDate setting synchronizes the local clock with the time from the NTP servers specified in the ntp.ntp_address1 to 5 settings.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: The server with the best clock, as defined by the NTP protocol, is used.</p> </div>

22.3. ntpReference

ntpReference	
Setting	Description
CLI / Web Page	[Page=ntp]
CLI Command	<ul style="list-style-type: none"> ntp.ntpReference=NETWORK_TIME_SERVER <ul style="list-style-type: none"> The reference is from other systems on the network. ntp.ntpReference=REFCLK_LOCALCLOCK <ul style="list-style-type: none"> The reference is generated by the local clock.
Web Interface window	<p>NTP Reference</p> <ol style="list-style-type: none"> Click the NTP Reference list box arrow and select either NETWORK_TIME_SERVER or REFCLK_LOCALCLOCK. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the NTP window (on page 353) for the parameter location.</p> </div>

ntpReference	
Setting	Description
Default Setting	NETWORK_TIME_SERVER
Options	<ul style="list-style-type: none"> • NETWORK_TIME_SERVER • REFCLK_LOCALCLOCK
Description	The ntp.ntpReference setting designates the clock reference for NTP.

22.4. ntpRestart

ntpRestart	
Setting	Description
CLI / Web Page	[Page=ntp]
CLI Command	<code>ntp.ntpRestart=now</code>
Web Interface window	NTP Restart <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the NTP window (on page 353) for the parameter location.</p> </div>
Default Setting	N/A
Options	Now
Description	The ntp.ntpRestart setting restarts the NTP system.

23. radioSettings Parameters

Note: See the [Radio Settings window](#) (on page 355).

- [beaconBurstCount](#) (on page 255)
- [beaconInterval](#) (on page 256)
- [frequencyKey](#) (on page 257)
- [frequencyMasks](#) (on page 259)
- [InaBypass](#) (on page 261)
- [maxLinkDistanceinMiles](#) (on page 262)
- [networkId](#) (on page 263)
- [nodeId](#) (on page 264)
- [radioFrequency](#) (on page 265)
- [radioHoppingMode](#) (on page 267)
- [radioMaxRepeaters](#) (on page 269)
- [radioMode](#) (on page 272)
- [radioRepeaterSlot](#) (on page 273)
- [rfDataRate](#) (on page 274)
- [txPower](#) (on page 277)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

23.1. beaconBurstCount


Important! Only **radioSettings** that apply to the current **radioMode**, **rfDataRate**, and **radioHoppingMode**, and are visible in the CLI and the Web Interface and can be changed.

beaconBurstCount	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> radioSettings.beaconBurstCount=n beaconBurstCount=n <p>Note: Where n is any number between 1 and 7.</p>
Web Interface window	<p>Beacon Burst Count</p> <ol style="list-style-type: none"> In the Beacon Burst Count text box, enter the number of consecutive beacons to send per beaconInterval time. Click the Update button to save the change. <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p>
Default Setting	3
Options	Any number between 1 and 7.
Description	<p>The radioSettings.beaconBurstCount setting designates the number of consecutive beacons to send per beaconInterval time.</p> <p>Notes</p> <ul style="list-style-type: none"> The radioSettings.beaconBurstCount is set on the Gateway device. The Endpoint radios obtain this value from a Gateway with the same networkId via the beacon frame. This setting is only used when radioSettings.radioHoppingMode=Hopping On. Increasing the number of beacons may improve RF link reliability in noisy environments. Decreasing the number of beacons may improve throughput in environments where interference is minimal. <p>FREEWAVE Recommends: Set the beaconBurstCount (on page 255) to 2 or more for optimal throughput when Repeaters are used and the RF environment is noisy. This increases the number of beacons sent in a beacon interval.</p>

23.2. beaconInterval

Important! Only **radioSettings** that apply to the current **radioMode**, **rfDataRate**, and **radioHoppingMode**, and are visible in the CLI and the Web Interface and can be changed.

beaconInterval	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> • <code>radioSettings.beaconInterval=TWENTY_FIVE_MS</code> • <code>radioSettings.beaconInterval=FIFTY_MS</code> • <code>radioSettings.beaconInterval=ONE_HUNDRED_MS</code> • <code>radioSettings.beaconInterval=TWO_HUNDRED_MS</code> • <code>radioSettings.beaconInterval=FOUR_HUNDRED_MS</code>
Web Interface window	<p>Beacon Interval</p> <ol style="list-style-type: none"> 1. Click the Beacon Interval list box arrow and select how often a Gateway radio sends out a beacon packet and changes to the next radio frequency in the hopping pattern. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	ONE_HUNDRED_MS
Options	<ul style="list-style-type: none"> • TWENTY_FIVE_MS • FIFTY_MS • ONE_HUNDRED_MS • TWO_HUNDRED_MS • FOUR_HUNDRED_MS


beaconInterval	
Setting	Description
Description	<p>The radioSettings.beaconInterval controls how often a Gateway radio sends out a beacon packet and changes to the next radio frequency in the hopping pattern.</p> <p>Notes</p> <ul style="list-style-type: none"> The radioSettings.beaconInterval is set on the Gateway device. The Endpoint radios obtain this value from a Gateway with the same networkId via the beacon frame. This setting is only used when radiosettings.radioHoppingMode=Hopping_On. A shorter Beacon Interval may improve the RF link reliability in noisy environments. <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;">  Tip A longer Beacon Interval may improve throughput in environments where interference is minimal. </div>

23.3. frequencyKey

Important! Only [radioSettings](#) that apply to the current [radioMode](#), [rfDataRate](#), and [radioHoppingMode](#), and are visible in the CLI and the Web Interface and can be changed.

frequencyKey	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> <code>radioSettings.frequencyKey=Key0</code> <code>radioSettings.frequencyKey=Key1 to Key16</code>
Web Interface window	<p>Frequency Key</p> <ol style="list-style-type: none"> Click the Frequency Key list box arrow and select the Key number used as an index to select a hopping table. Click the Update button to save the change. <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	Key0 (zero)


frequencyKey																			
Setting	Description																		
Options	<ul style="list-style-type: none"> Key0 (zero) Key1 to Key16 <p>Valid frequencyKey Values</p> <table border="1"> <thead> <tr> <th colspan="2">Data Rate of 115.2K</th> </tr> <tr> <th>Frequency Key Values</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Key0 to Key14</td> <td>Select classic hop tables.</td> </tr> <tr> <td>Key15</td> <td>Select standard randomized hop table.</td> </tr> <tr> <td>Key16</td> <td>Select sequential hop table in reverse order of center frequencies.</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">All Other Data Rates</th> </tr> <tr> <th>Frequency Key Values</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Key0</td> <td>Select standard randomized hop table.</td> </tr> <tr> <td>Key1</td> <td>Select sequential hop table in reverse order of center frequencies.</td> </tr> </tbody> </table>	Data Rate of 115.2K		Frequency Key Values	Description	Key0 to Key14	Select classic hop tables.	Key15	Select standard randomized hop table.	Key16	Select sequential hop table in reverse order of center frequencies.	All Other Data Rates		Frequency Key Values	Description	Key0	Select standard randomized hop table.	Key1	Select sequential hop table in reverse order of center frequencies.
Data Rate of 115.2K																			
Frequency Key Values	Description																		
Key0 to Key14	Select classic hop tables.																		
Key15	Select standard randomized hop table.																		
Key16	Select sequential hop table in reverse order of center frequencies.																		
All Other Data Rates																			
Frequency Key Values	Description																		
Key0	Select standard randomized hop table.																		
Key1	Select sequential hop table in reverse order of center frequencies.																		



frequencyKey	
Setting	Description
Description	<p>The radioSettings.frequencyKey setting designates the Key number used as an index to select a hopping table.</p> <p>Notes</p> <ul style="list-style-type: none"> Use a unique Frequency Key setting to use different hop patterns for each ZumLink network. This setting is only used when radioSettings.radioHoppingMode=Hopping_On. <ul style="list-style-type: none"> The number of available frequency keys is based on the number of hopping sequences in the hop table. An invalid frequency key setting is determined by: <ul style="list-style-type: none"> Being outside of the specified range. <ul style="list-style-type: none"> If an invalid frequency key setting is found, the radioSettings.frequencyKey is NOT changed. The frequency key setting being larger than the number of hopping tables configured for a specific rfDataRate. <ul style="list-style-type: none"> In this instance, the radioSettings.frequencyKey is set to Key0 (zero). <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! The Endpoint radios obtain this value from a Gateway with the same networkId via the beacon frame. After communications are established, any change of this value are picked up by the Endpoints.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p> Tip When using different hop patterns on each network, interference caused by neighboring ZumLink networks can be minimized.</p> </div>

23.4. frequencyMasks

Important! Only **radioSettings** that apply to the current **radioMode**, **rfDataRate**, and **radioHoppingMode**, and are visible in the CLI and the Web Interface and can be changed.

frequencyMasks	
Setting	Description
CLI / Web Page	[Page=radioSettings]


frequencyMasks	
Setting	Description
CLI Command	<p><code>radioSettings.frequencyMasks=nnnn</code></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: Where <code>nnnn</code> is the specified format of the frequency range to mask shown in:</p> <p>A. Single Channel Format, B. Range of Channels Format, or C. Combination of Channels Format.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Important! Hop table frequency masking masks the channels that fall within the range plus or minus one-half ($\frac{1}{2}$) the channel bandwidth.</p> </div>
Web Interface window	<p>Frequency Masks</p> <ol style="list-style-type: none"> In the Frequency Masks text box, enter the exact specified format of the frequency range to mask. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	Blank
Options	<div style="border: 1px solid orange; padding: 5px; margin: 5px 0;"> <p> Caution: ONLY A comma MUST separate the values - NOT a comma with a space.</p> </div> <p>Use this information in examples A to C:</p> <ul style="list-style-type: none"> <code>xxx</code> is a value between 902-927 MHz. <code>yyyy</code> is a value between .0000-.9999 MHz. <p>A. Single Channel Format</p> <ul style="list-style-type: none"> A single entry masks the specified frequency plus the bandwidth on each side of the center frequency as a function of the rfDataRate. <code>frequencyMasks=xxx.yyyy,xxx.yyyy,xxx.yyyy</code> <p>B. Range of Channels Format</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Important! If a radio channel intersects with the mask limits, it will be masked and not used.</p> </div> <ul style="list-style-type: none"> <code>frequencyMasks=xxx.yyyy-xxx.yyyy,xxx.yyyy-xxx.yyyy</code> <p>C. Combination of Channels Format</p> <ul style="list-style-type: none"> <code>frequencyMasks=xxx.yyyy-xxx.yyyy,xxx.yyyy</code>

frequencyMasks	
Setting	Description
Description	<p>The radioSettings.frequencyMasks setting designates specific frequencies or a set of frequencies in the hopping pattern to remove from usage.</p> <div style="border: 1px solid orange; padding: 5px; margin: 10px 0;"> <p>Caution: radioSettings.frequencyMasks entries MUST BE less than 128 bytes.  ONLY A comma MUST separate the values - NOT a comma with a space.</p> </div> <p>Notes</p> <ul style="list-style-type: none"> This setting is only used when radioSettings.radioHoppingMode=Hopping_On. All radios in the network MUST use the same value for this setting. When Frequency Masks is enabled, interference fixed at certain frequencies within the spectrum can be avoided by the transmitter. Least significant zeros are NOT required. <ul style="list-style-type: none"> .9, .09, .009 are valid entries as well as .9000, .0900, .0090. <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p> Type frequencyMasks= and press <Enter> to clear all Frequency Mask entries.</p> </div>

23.5. InaBypass

Important!: Only **radioSettings** that apply to the current **radioMode**, **rfDataRate**, and **radioHoppingMode**, and are visible in the CLI and the Web Interface and can be changed.

InaBypass	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> Enable LNA: <ul style="list-style-type: none"> <code>radioSettings.lnaBypass=0</code> <code>lnaBypass=0</code> Bypass LNA: <ul style="list-style-type: none"> <code>radioSettings.lnaBypass=1</code> <code>lnaBypass=1</code>

InaBypass	
Setting	Description
Web Interface window	<p>LNA Bypass</p> <ol style="list-style-type: none"> In the LNA Bypass text box, enter 1 to bypass the Low Noise Amplifier (LNA) and reduce the radio module receive signal by 10dB. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	0 (zero)
Options	<ul style="list-style-type: none"> 0 1
Description	<p>The radioSettings.InaBypass setting enables the Low Noise Amplifier (LNA) used to boost the radio module receive signal by 10dB.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;">  <p>It can be useful to bypass the LNA if there is a presence of strong signals in band and packet reception is not good.</p> </div>

23.6. maxLinkDistanceinMiles

Important!: Only [radioSettings](#) that apply to the current [radioMode](#), [rfDataRate](#), and [radioHoppingMode](#), and are visible in the CLI and the Web Interface and can be changed.

maxLinkDistanceinMiles	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> <code>radioSettings.maxLinkDistanceinMiles=nnn</code> <code>maxLinkDistanceinMiles=nnn</code> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <code>nnn</code> is the maximum one-way distance (in miles) between any nodes in the network.</p> </div>

maxLinkDistanceinMiles	
Setting	Description
Web Interface window	<p>Max Link Distance in Miles</p> <ol style="list-style-type: none"> 1. In the Max Link Distance in Miles text box, enter the maximum one-way distance (in miles) between any nodes in the network. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	20 miles
Options	<ul style="list-style-type: none"> • The minimum value is 5 miles. • The maximum value is 120 miles.
Description	<p>The radioSettings.maxLinkDistanceinMiles setting designates the maximum one-way distance (in miles) between any nodes in the network.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>FREEWAVE Recommends: All nodes in the network that communicate with each other should use the same distance value.</p> </div>

23.7. networkId

Important!: Only [radioSettings](#) that apply to the current [radioMode](#), [rfDataRate](#), and [radioHoppingMode](#), and are visible in the CLI and the Web Interface and can be changed.

networkId	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> • <code>radioSettings.networkId=nnnn</code> • <code>networkId=nnnn</code> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <code>nnnn</code> is the network identifier which subdivides traffic on radio units.</p> </div>

networkId	
Setting	Description
Web Interface window	<p>Network ID</p> <ol style="list-style-type: none"> In the Network ID text box, enter the network identifier that subdivides traffic on radio units. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	51966
Options	<ul style="list-style-type: none"> The minimum value is 2. The maximum value is 65535.
Description	<p>The radioSettings.networkId setting designates the network identifier which subdivides traffic on radio units.</p> <p>Notes</p> <ul style="list-style-type: none"> Radio units can only communicate with other units that have the same radioSettings.networkId setting. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important!: If radios are on the same frequency, they still receive data from radios of a different networkId, but the data is dropped.</p> </div>

23.8. nodeId

Important!: Only [radioSettings](#) that apply to the current [radioMode](#), [rfDataRate](#), and [radioHoppingMode](#), and are visible in the CLI and the Web Interface and can be changed.

nodeId	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> <code>radioSettings.nodeId=nnnn</code> <code>nodeId=nnnn</code> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <code>nnnn</code> is a user-designated <code>nodeId</code> instead of the auto-generated <code>nodeId</code>.</p> </div>


nodeld	
Setting	Description
Web Interface window	<p>Node ID</p> <ol style="list-style-type: none"> In the Node ID text box, enter a user-designated nodeld instead of the auto-generated nodeld. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	Predetermined by the Z9-PC / Z9-PC-SR001, this is an auto-generated, unique number from 2 through 65533.
Options	N/A
Description	<p>The radioSettings.nodeld setting designates the unique ID of the device.</p> <p>Notes</p> <ul style="list-style-type: none"> Each radio with the same networkId must have a UNIQUE nodeld. Otherwise, two or more nodes will unicast an acknowledgment that may collide. The Gateway or Gateway-Repeater device ALWAYS has a nodeld of value 1. It cannot be changed.

23.9. radioFrequency

Important!: Only [radioSettings](#) that apply to the current [radioMode](#), [rfDataRate](#), and [radioHoppingMode](#), and are visible in the CLI and the Web Interface and can be changed.

radioFrequency	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> <code>radioSettings.radioFrequency=nnn.nnnn</code> <code>radioFrequency=nnn.nnnn</code> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <code>nnn.nnnn</code> is the operating center frequency.</p> </div>

radioFrequency															
Setting	Description														
Web Interface window	<p>Radio Frequency</p> <ol style="list-style-type: none"> 1. In the Radio Frequency text box, enter the operating center frequency. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>														
Default Setting	915.0000 for the Standard Hop Set - ZumLink 900MHz Channels (on page 384)														
Options	<table border="1"> <thead> <tr> <th colspan="2">Valid Ranges</th> </tr> <tr> <th>Data Rate</th> <th>MHz Range</th> </tr> </thead> <tbody> <tr> <td>4 Mbps</td> <td>904.5504 - 925.7472</td> </tr> <tr> <td>1 Mbps</td> <td>903.0528 - 927.0144</td> </tr> <tr> <td>500 kbps</td> <td>902.7072 - 927.3600</td> </tr> <tr> <td>250 kbps</td> <td>902.5344 - 927.4176</td> </tr> <tr> <td>115.2 kbps</td> <td>902.4768 - 927.5904</td> </tr> </tbody> </table>	Valid Ranges		Data Rate	MHz Range	4 Mbps	904.5504 - 925.7472	1 Mbps	903.0528 - 927.0144	500 kbps	902.7072 - 927.3600	250 kbps	902.5344 - 927.4176	115.2 kbps	902.4768 - 927.5904
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250 kbps	902.5344 - 927.4176														
115.2 kbps	902.4768 - 927.5904														

radioFrequency	
Setting	Description
Description	<p>The radioSettings.radioFrequency setting designates the operating center frequency in MHz.</p> <p>Notes</p> <ul style="list-style-type: none"> All radios in the network MUST use the same value for this setting. This setting is only used when radioSettings.radioHoppingMode=Hopping_Off. The range of this setting is dependent on the rfDataRate (on page 274) setting. The frequency interval is 100 Hz. The minimum value increases and the maximum value decreases as the radioSettings.rfDataRate increases. <ul style="list-style-type: none"> The increase in channel bandwidth affects these ranges. If the radioSettings.radioFrequency setting is set too close to the band edge for the current radioSettings.rfDataRate, the radio module rejects the setting. A minimum of 3 hopping channels are supported when radioSettings.rfDataRate = RATE_4M, RATE_1M, and RATE_500K. <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>FREEWAVE Recommends: Use a single radioSettings.radioFrequency if radioSettings.radioHoppingMode=Hopping_Off.</p> </div> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p>Important!: A few seconds are needed to apply the change; allow some time prior to reading back this value.</p> </div> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;"> <p> Tip Read back this value after setting it to determine if it was accepted by the Z9-PC / Z9-PC-SR001.</p> </div>

23.10. radioHoppingMode

Important!: Only [radioSettings](#) that apply to the current [radioMode](#), [rfDataRate](#), and [radioHoppingMode](#), and are visible in the CLI and the Web Interface and can be changed.

radioHoppingMode	
Setting	Description
CLI / Web Page	[Page=radioSettings]

radioHoppingMode	
Setting	Description
CLI Command	<ul style="list-style-type: none"> • Enable: <ul style="list-style-type: none"> • <code>radiosettings.radioHoppingMode=Hopping_On</code> • Disable: <ul style="list-style-type: none"> • <code>radiosettings.radioHoppingMode=Hopping_Off</code>
Web Interface window	<p>Radio Hopping Mode</p> <ol style="list-style-type: none"> 1. Click the Radio Hopping Mode list box arrow and select Off to disable frequency hopping. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	Hopping_On
Options	<ul style="list-style-type: none"> • Hopping_Off • Hopping_On

radioHoppingMode	
Setting	Description
Description	<p>The <code>radioSettings.radioHoppingMode</code> setting enables frequency hopping.</p> <p>Notes</p> <ul style="list-style-type: none"> All radios in the network MUST use the same value for this setting. For <code>rfDataRate</code> values of 115.2 and 250 kbps, the <code>radioSettings.radioHoppingMode</code> is forced On and CANNOT be set to <code>radiosettings.radioHoppingMode=Hopping Off</code>. For <code>rfDataRate</code> values of 500 kbps, 1 Mbps, and 4 Mbps, the choice of the selected hopping mode is based on network frequency planning and channel conditions. A Gateway is required when the <code>radiosettings.radioHoppingMode=Hopping On</code>. A Gateway is NOT required when the <code>radiosettings.radioHoppingMode=Hopping Off</code>. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Important!: Special rules must be applied for the 115.2 and 250 kbps data rates to enforce regulatory rules.</p> </div> <ul style="list-style-type: none"> If the <code>radioSettings.rfDataRate=RATE_250K</code>: <ul style="list-style-type: none"> If the number of hopping channels in the hop table is: <ul style="list-style-type: none"> >=50, the maximum <code>txPower</code> is 30dBm and the <code>txPower</code> is NOT automatically changed. >=25 and <=49, the maximum <code>txPower</code> is 24dBm and the <code>txPower</code> is automatically reduced to 24dBm. <25, all masking is removed. All channels contained in the hop table are re-enabled. <code>txPower</code> is NOT automatically changed. If the <code>radioSettings.rfDataRate=RATE_115.2K</code>: <ul style="list-style-type: none"> If the number of hopping channels in the hop table is: <ul style="list-style-type: none"> >=50, the maximum <code>txPower</code> is 30dBm and the <code>txPower</code> is NOT automatically changed. <50, all masking is removed. All channels are re-enabled. <code>txPower</code> is NOT automatically changed.

23.11. radioMaxRepeaters

Important!: Only `radioSettings` that apply to the current `radioMode`, `rfDataRate`, and `radioHoppingMode`, and are visible in the CLI and the Web Interface and can be changed.

radioMaxRepeaters	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> • <code>radioSettings.radioMaxRepeaters=n</code> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <i>n</i> is the number of Repeater slots in the network.</p> </div>
Web Interface window	<p>Radio Max Repeaters</p> <ol style="list-style-type: none"> 1. In the Radio Max Repeaters text box, enter the number of Repeater slots in the network. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	0 (zero)
Options	<ul style="list-style-type: none"> • 0 (zero) • 1 • 2 • 3

radioMaxRepeaters	
Setting	Description
Description	<p>The <code>radioSettings.radioMaxRepeaters</code> setting designates the maximum Repeater slots in the network when the <code>radioSettings.radioHoppingMode=Hopping_On</code>.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Note: The Endpoint radios obtain this value from a Gateway with the same <code>networkId</code> via the beacon frame.</p> </div> <ul style="list-style-type: none"> • The <code>radioSettings.radioMaxRepeaters</code> is set on the network Gateway device and the Gateway beacon carries this information. • If <code>radioSettings.radioMaxRepeaters=0</code>: <ul style="list-style-type: none"> • Set the value to 0 (zero) when there are no Endpoint-Repeaters or when <code>radioSettings.radioHoppingMode=Hopping_Off</code>. • If <code>radioSettings.radioMaxRepeaters=n</code>: <ul style="list-style-type: none"> • If the network has one Repeater, set this to 1. • If the network has two Repeaters, set this to 2. • If the network has three or more Repeaters, set this to 3. • Set the value to match the number of overlapping Repeaters, with a maximum of 3. • Set the value to the maximum number of repeater slots used in the network when Endpoint-Repeaters are present in the network and when the <code>radioSettings.radioHoppingMode=Hopping_On</code>. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Note: Setting this value too high adds unnecessary latency to the network.</p> </div> <p>Communication Method</p> <p>ZumLink uses Listen Before Talk (LBT) and Carrier Sense Multiple Access (CSMA) where there are no assigned slots. The radios transmit when the channel is clear.</p> <ul style="list-style-type: none"> • The Gateway broadcasts packets to all Endpoints within range. • The Endpoints unicast packets back to the Gateway. • The Gateway acknowledges the Endpoint packets. <p>FreeWave's traditional protocol has a Gateway Time Slot and an Endpoint Time Slot within a frame.</p> <ul style="list-style-type: none"> • The Gateway transmits in its slot and listens in the Endpoint slot. • The Endpoint transmits its slot and listens in the Gateway slot.

23.12. radioMode

Important! Only **radioSettings** that apply to the current **radioMode**, **rfDataRate**, and **radioHoppingMode**, and are visible in the CLI and the Web Interface and can be changed.

radioMode	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> • <code>radioSettings.radioMode=Gateway</code> • <code>radioSettings.radioMode=Endpoint</code> • <code>radioSettings.radioMode=Gateway_Repeater</code> • <code>radioSettings.radioMode=Endpoint_Repeater</code>
Web Interface window	<p>Radio Mode</p> <ol style="list-style-type: none"> 1. Click the Radio Mode list box arrow and select the device type to designate the Z9-PC / Z9-PC-SR001 as. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	Endpoint
Options	<ul style="list-style-type: none"> • Endpoint • Endpoint-Repeater • Gateway • Gateway-Repeater

radioMode	
Setting	Description
Description	<p>The radioSettings.radioMode setting designates the device type.</p> <p>Notes</p> <ul style="list-style-type: none"> Each network can have only ONE Gateway or Gateway-Repeater device. <ul style="list-style-type: none"> See Repeaters (on page 163) for additional information. The remaining devices MUST BE configured as Endpoints or Endpoint-Repeaters. The Gateway or Gateway-Repeater device ALWAYS has a nodeld of value 1. It cannot be changed. The Endpoint or Endpoint-Repeater nodeld values are 2 through 65535. A Gateway is required when the radiosettings.radioHoppingMode=Hopping_On. A Gateway is NOT required when the radiosettings.radioHoppingMode=Hopping_Off. The Gateway-Repeater repeats packets. The Endpoint-Repeater has a unique nodeld and repeats packets and master beacons. <ul style="list-style-type: none"> See Repeaters (on page 163) for additional information.

23.13. radioRepeaterSlot

Important!: Only [radioSettings](#) that apply to the current [radioMode](#), [rfDataRate](#), and [radioHoppingMode](#), and are visible in the CLI and the Web Interface and can be changed.

radioRepeaterSlot	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<pre>radioSettings.radioRepeaterSlot=n</pre> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <i>n</i> is the Repeater slot.</p> </div>

radioRepeaterSlot	
Setting	Description
Web Interface window	<p>Radio Repeater Slot</p> <ol style="list-style-type: none"> In the Radio Repeater Slot text box, enter which repeater slot the Endpoint-Repeater uses. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: The Radio Repeater Slot parameter is only visible when the Z9-PC / Z9-PC-SR001 is designated as an Endpoint-Repeater. See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	1
Options	<ul style="list-style-type: none"> 1 2 3
Description	<p>The radioSettings.radioRepeaterSlot setting designates which repeater slot, up to the radioMaxRepeaters setting, the Endpoint-Repeater uses.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! This setting is only available when radioSettings.radioMode=Endpoint_Repeater.</p> </div> <p>Notes</p> <ul style="list-style-type: none"> The radioSettings.radioRepeaterSlot is set on the Endpoint-Repeater device when radiosettings.radioHoppingMode=Hopping_On. This setting does NOT apply when radiosettings.radioHoppingMode=Hopping_Off. Repeater slots must be unique for Repeaters that are in communication range so the beacons do not collide. Endpoint-Repeaters can share a slot number when they do not overlap and form longer repeater chains. The number of entered Repeater slots cannot be larger than the numbered entered in the radioMaxRepeaters (on page 269) setting.


23.14. rfDataRate

Important! Only [radioSettings](#) that apply to the current [radioMode](#), [rfDataRate](#), and [radioHoppingMode](#), and are visible in the CLI and the Web Interface and can be changed.

rfDataRate	
Setting	Description
CLI / Web Page	[Page=radioSettings]

rfDataRate	
Setting	Description
CLI Command	<ul style="list-style-type: none"> • <code>radioSettings.rfDataRate=RATE_4M</code> • <code>radioSettings.rfDataRate=RATE_1M</code> • <code>radioSettings.rfDataRate=RATE_1.5M_BETA_FEATURE</code> • <code>radioSettings.rfDataRate=RATE_500K</code> • <code>radioSettings.rfDataRate=RATE_250K</code> • <code>radioSettings.rfDataRate=RATE_115.2K</code>
Web Interface window	<p>RF Data Rate</p> <ol style="list-style-type: none"> 1. Click the RF Data Rate list box arrow and select the RF link data rate in bits per second. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p> </div>
Default Setting	RATE_500K
Options	<ul style="list-style-type: none"> • RATE_4M (4Mbps mode) • RATE_1M (1Mbps mode) • RATE_1.5M_BETA_FEATURE (1.5Mbps mode) • RATE_500K (500 kbps mode) • RATE_250K (250 kbps mode) • RATE_115.2K (115.2 kbps mode)


rfDataRate	
Setting	Description
Description	<p>The <code>radioSettings.rfDataRate</code> setting designates the RF link data rate in bits per second.</p> <p>Notes</p> <ul style="list-style-type: none"> All radios in the network MUST use the same value for this setting. A higher RF link data rate provides more throughput but at the expense of link distance or fade margin. When changing from lower data rates to higher ones (e.g., <code>rfDataRate=RATE_115.2K</code> to <code>rfDataRate=RATE_1M</code>), the <code>radioFrequency</code> (on page 265) may be set back to the default if the frequency would have been out of band. When selecting data rates of either <code>rfDataRate=RATE_115.2K</code> or <code>rfDataRate=RATE_250K</code>, <code>radioSettings.radioHoppingMode</code> is automatically forced to <code>radiosettings.radioHoppingMode=Hopping_On</code> and cannot be turned off. For all other data rates, the <code>radioSettings.radioHoppingMode</code> remains at its current setting. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>Important! Special rules must be applied for the 115.2 and 250 kbps data rates to enforce regulatory rules.</p> </div> <ul style="list-style-type: none"> If the <code>radioSettings.rfDataRate=RATE_250K</code>: <ul style="list-style-type: none"> If the number of hopping channels in the hop table is: <ul style="list-style-type: none"> >=50, the maximum <code>txPower</code> is 30dBm and the <code>txPower</code> is NOT automatically changed. >=25 and <=49, the maximum <code>txPower</code> is 24dBm and the <code>txPower</code> is automatically reduced to 24dBm. <25, all masking is removed. All channels contained in the hop table are re-enabled. <code>txPower</code> is NOT automatically changed. If the <code>radioSettings.rfDataRate=RATE_115.2K</code>: <ul style="list-style-type: none"> If the number of hopping channels in the hop table is: <ul style="list-style-type: none"> >=50, the maximum <code>txPower</code> is 30dBm and the <code>txPower</code> is NOT automatically changed. <50, all masking is removed. All channels are re-enabled. <code>txPower</code> is NOT automatically changed. A minimum of 3 hopping channels are supported when <code>radioSettings.rfDataRate =RATE_4M, RATE_1M, and RATE_500K</code>.

rfDataRate	
Setting	Description
	<p>FREEWAVE Recommends: Use a single <code>radioSettings.radioFrequency</code> if <code>radiosettings.radioHoppingMode=Hopping_Off</code>.</p> <p> Caution: The <code>RATE_1.5M_BETA_FEATURE</code> data rate is a Beta feature NOT recommended for production deployment.</p>

23.15. txPower

Important!: Only `radioSettings` that apply to the current `radioMode`, `rfDataRate`, and `radioHoppingMode`, and are visible in the CLI and the Web Interface and can be changed.

txPower	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul style="list-style-type: none"> <code>radioSettings.txPower=nn</code> <code>txPower=nn</code> <p>Note: Where <code>nn</code> is the RF output transmit power.</p> <p>Important!: Entering a decimal value changes the <code>txpower</code> to 0 (zero).</p> <p>FREEWAVE Recommends: Use whole numbers only.</p>
Web Interface window	<p>TX Power</p> <ol style="list-style-type: none"> Click the Tx Power list box arrow and select the dB RF output transmit power level for the Z9-PC / Z9-PC-SR001. Click the Update button to save the change. <p>Note: See the Radio Settings window (on page 355) for the parameter location.</p>
Default Setting	<ul style="list-style-type: none"> 30
Options	<ul style="list-style-type: none"> The minimum value is 10. The maximum value is 30.

txPower	
Setting	Description
Description	<p>The radioSettings.txPower setting designates the dB RF output transmit power for the Z9-PC / Z9-PC-SR001.</p> <p>Notes</p> <ul style="list-style-type: none"> • Output power is limited to maximum of 30dBm or 1 Watt. • Use a higher power to increase link margin. • Use a lower transmit power to reduce interference when multiple radio links are in close proximity. • The maximum radioSettings.txPower can be limited if the radioSettings.radioHoppingMode=Hopping_On. • See frequencyMasks (on page 259) for additional details. <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;">  <p>Entering txpower=0 or radioSettings.txpower=0 changes the output power to the minimum or 10 dB.</p> </div>

24. radioSettingsHelpers Parameters

Note: See the [Radio Settings Helpers window \(on page 358\)](#).

- [frequencyMasksErrors \(on page 280\)](#)
- [rCli \(on page 280\)](#)
- [resetRadio \(on page 280\)](#)
- [setAllRadioSettings \(on page 280\)](#)
- [syncSettingsFromRadio \(on page 280\)](#)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering `frequencyKey` returns the current value of `frequencyKey`.
Entering `frequencyKey=` is an implied change to `frequencyKey`.
If a value is NOT included, it changes `frequencyKey` to 0 (zero).

24.1. frequencyMasksErrors

frequencyMasksErrors	
Setting	Description
CLI / Web Page	[Page=radioSettingsHelpers]
CLI Command	<ul style="list-style-type: none"> radioSettingsHelpers.frequencyMasksErrors frequencyMasksErrors
Web Interface window	Frequency Masks Errors <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the Radio Settings Helpers window (on page 358) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The radioSettingsHelpers.frequencyMasksErrors command reports the results of any errors in the frequency mask. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

24.2. rCli

Important!: FreeWave internal use only.

24.3. resetRadio

Important!: FreeWave internal use only.

24.4. setAllRadioSettings

Important!: FreeWave internal use only.

24.5. syncSettingsFromRadio

Important!: FreeWave internal use only.

25. runtimeEnvironment Parameters

Note: See the [Runtime Environment window \(on page 360\)](#).

- [rteInstalledByAppsVersion \(on page 282\)](#)
- [rteReset \(on page 282\)](#)
- [rteTemplateVersion \(on page 283\)](#)
- [rteVersion \(on page 284\)](#)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.


Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

25.1. rteInstalledByAppsVersion

rteInstalledByAppsVersion	
Setting	Description
CLI / Web Page	[Page=runtimeEnvironment]
CLI Command	<ul style="list-style-type: none"> <code>runtimeEnvironment.rteInstalledByAppsVersion</code> <code>rteInstalledByAppsVersion</code>
Web Interface window	<p>Rte Installed by Apps Version</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: This parameter is read-only in the Web Interface. See the Runtime Environment window (on page 360) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	<p>The runtimeEnvironment.rteInstalledByAppsVersion command reports the version number of the firmware used to install the ZumIQ runtime application environment.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Important! The firmware that installed the ZumIQ runtime application environment may have a different version than the application environment itself.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: This is a Read-only parameter.</p> </div>

25.2. rteReset

rteReset	
Setting	Description
CLI / Web Page	[Page=runtimeEnvironment]
CLI Command	<ul style="list-style-type: none"> <code>runtimeEnvironment.rteReset=Cancel</code> <ul style="list-style-type: none"> <code>rteReset=Cancel</code> <code>runtimeEnvironment.rteReset=Hard</code> <ul style="list-style-type: none"> <code>rteReset=Hard</code> <code>runtimeEnvironment.rteReset=Now</code> <ul style="list-style-type: none"> <code>rteReset=Now</code>

rteReset	
Setting	Description
Web Interface window	<p>Rte Reset</p> <div style="border: 1px solid black; padding: 5px;"> <p>Note: This parameter is read-only in the Web Interface. See the Runtime Environment window (on page 360) for the parameter location.</p> </div>
Default Setting	N/A
Options	<ul style="list-style-type: none"> • Cancel • Hard • Now
Description	<p>The runtimeEnvironment.rteReset setting designates the upgrade or reset of the ZumIQ runtime application environment.</p> <ul style="list-style-type: none"> • runtimeEnvironment.rteReset=Cancel is used to REMOVE the rteReset=Hard command BEFORE the next boot of the Z9-PC / Z9-PC-SR001. • runtimeEnvironment.rteReset=Hard is used to completely reset the file system of the runtime application environment to match the latest installed developer user package. • This will stage the development runtimeEnvironment to be applied on the next reboot. • The runtime application environment reset takes place at the time of next boot. <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p> Warning! ALL User-generated content and settings in ZumIQ ARE DELETED after the next reboot!</p> </div> <ul style="list-style-type: none"> • runtimeEnvironment.rteReset=Now <ul style="list-style-type: none"> • This reboots the Z9-PC / Z9-PC-SR001 and copies the Linux application environment into the runtime location. This will take ~3-4 minutes to complete.

25.3. rteTemplateVersion

rteTemplateVersion	
Setting	Description
CLI / Web Page	[Page=runtimeEnvironment]
CLI Command	<ul style="list-style-type: none"> • <code>runtimeEnvironment.rteTemplateVersion</code> • <code>rteTemplateVersion</code>

rteTemplateVersion	
Setting	Description
Web Interface window	Rte Template Version Note: This parameter is read-only in the Web Interface. See the Runtime Environment window (on page 360) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The runtimeEnvironment.rteTemplateVersion command reports the version number for the template ZumIQ application environment. This is the application environment applied when executing the rteReset=hard command. Note: See rteReset (on page 282) for additional information. Note: This is a Read-only parameter.

25.4. rteVersion

rteVersion	
Setting	Description
CLI / Web Page	[Page=runtimeEnvironment]
CLI Command	<ul style="list-style-type: none"> <code>runtimeEnvironment.rteVersion</code> <code>rteVersion</code>
Web Interface window	Rte Version Note: This parameter is read-only in the Web Interface. See the Runtime Environment window (on page 360) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The runtimeEnvironment.rteVersion command reports the version number for the active ZumIQ application environment Note: If this setting is blank, the application environment has not yet been initialized. Note: This is a Read-only parameter.

26. security Parameters

Note: See the [Security window](#) (on page 361).

- [enableEthernetLogin](#) (on page 286)
- [enablePtpInterface](#) (on page 286)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

26.1. enableEthernetLogin

enableEthernetLogin	
Setting	Description
CLI / Web Page	[Page=security]
CLI Command	<ul style="list-style-type: none"> • Enable: <ul style="list-style-type: none"> • <code>security.enableEthernetLogin=true</code> • Disable: <ul style="list-style-type: none"> • <code>security.enableEthernetLogin=false</code>
Web Interface window	<p>Enable Ethernet Login</p> <ol style="list-style-type: none"> 1. Click the Enable Ethernet Login list box arrow and select False to disable SSH logins. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: By default, the Enable Ethernet Login is enabled (set to True). See the Security window (on page 361) for the parameter location.</p> </div>
Default Setting	True
Options	<ul style="list-style-type: none"> • True • False
Description	<p>The <code>security.enableEthernetLogin</code> setting enables SSH logins.</p> <ul style="list-style-type: none"> • When Disabled, the device no longer responds to SSH connection requests. • This setting also disables any SSH-based services, such as SCP. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! This parameter does NOT affect website logins.</p> <p>This setting requires a reboot to apply the changes, either by executing the <code>config.reset=now</code> CLI command or power cycling the Z9-PC / Z9-PC-SR001. See reset (on page 198) for additional information.</p> </div>

26.2. enablePtpInterface

enablePtpInterface	
Setting	Description
CLI / Web Page	[Page=security]

enablePtpInterface	
Setting	Description
CLI Command	<ul style="list-style-type: none"> • Enable: <ul style="list-style-type: none"> • <code>security.enablePtpInterface=true</code> • Disable: <ul style="list-style-type: none"> • <code>security.enablePtpInterface=false</code>
Web Interface window	<p>Ethernet PTP Interface</p> <ol style="list-style-type: none"> 1. Click the Ethernet PTP Interface list box arrow and select False to disable the PTP (drag-and-drop) interface. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: By default, the Ethernet PTP Interface is enabled (set to True). See the Security window (on page 361) for the parameter location.</p> </div>
Default Setting	True
Options	<ul style="list-style-type: none"> • True • False
Description	<p>The security.enablePtpInterface setting enables the PTP (drag-and-drop) interface.</p> <p>When Disabled, the Z9-PC / Z9-PC-SR001 no longer appears in Windows® Explorer as ZumLink <serialnumber> when connected to a computer using the Micro-USB cable.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! The security.enablePtpInterface setting does NOT disable serial connections through the Micro-USB cable.</p> <p>This setting requires a reboot to apply the changes, either by executing the config.reset=now CLI command or power cycling the Z9-PC / Z9-PC-SR001. See reset (on page 198) for additional information.</p> </div>

27. services Parameters


Note: See the [Services window \(on page 363\)](#).

- [timeOutCli \(on page 289\)](#)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

27.1. timeOutCli

timeOutCli	
Setting	Description
CLI / Web Page	[Page=services]
CLI Command	<ul style="list-style-type: none"> • <code>services.timeOutCli=nnnn</code> • <code>timeOutCli=nnnn</code> <p>Note: Where <code>nnnn</code> is the number of seconds of idle time.</p>
Web Interface window	<p>Time Out CLI</p> <ol style="list-style-type: none"> 1. In the Time Out CLI text box, enter the number of seconds of idle time before the CLI connection is closed. 2. Click the Update button to save the change. <p>Note: See the Services window (on page 363) for the parameter location.</p>
Default Setting	900
Options	<p>FREEWAVE Recommends: Enter any number between 60 and 3600.</p>
Description	<p>The services.timeOutCli setting designates the number of seconds of idle time before the CLI connection is closed.</p> <hr/> <p> Warning! DO NOT enter 0 (zero). 0 disables the timeout.</p>

28. SNMP Parameters

Note: See the [SNMP window](#) (on page 365).

- [roCommunityName](#) (on page 291)
- [rwCommunityName](#) (on page 291)
- [snmpUser](#) (on page 292)
- [v1Enabled](#) (on page 293)
- [v2cEnabled](#) (on page 294)
- [v3Enabled](#) (on page 294)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

28.1. roCommunityName

roCommunityName	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	<ul style="list-style-type: none"> snmp.roCommunityName=enter_unique_name_here roCommunityName=enter_unique_name_here <p>Note: Where <code>enter_unique_name_here</code> is a user-designated name.</p>
Web Interface window	<p>RO Community Name</p> <ol style="list-style-type: none"> In the RO Community Name text box, enter the user-designated name for SNMP V1/V2C Read-only access. Click the Update button to save the change. <p>Note: See the SNMP window (on page 365) for the parameter location.</p>
Default Setting	public
Options	Maximum of 31 characters.
Description	<p>The snmp.roCommunityName setting designates the user-designated name for SNMP V1/V2C read-only access.</p> <p>Important!: Special characters are allowed EXCEPT # but they may not be compatible with 3rd-party SNMP managers.</p>

28.2. rwCommunityName

rwCommunityName	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	<ul style="list-style-type: none"> snmp.rwCommunityName=enter_unique_name_here rwCommunityName=enter_unique_name_here <p>Note: Where <code>enter_unique_name_here</code> is a user-designated name.</p>

rwCommunityName	
Setting	Description
Web Interface window	<p>RW Community Name</p> <ol style="list-style-type: none"> In the RW Community Name text box, enter the user-designated name for SNMP V1/V2C Read-Write access. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the SNMP window (on page 365) for the parameter location.</p> </div>
Default Setting	private
Options	Maximum of 31 characters.
Description	<p>The snmp.rwCommunityName setting designates the user-designated name for SNMP V1/V2C Read-Write access.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important!: Special characters are allowed EXCEPT # but they may not be compatible with 3rd-party SNMP managers.</p> </div>

28.3. snmpUser

snmpUser	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	<ul style="list-style-type: none"> • View All Users: <ul style="list-style-type: none"> • snmpUser=show • Remove User: <ul style="list-style-type: none"> • snmpUser=remove <username> • Add User**: <ul style="list-style-type: none"> • snmpUser=add <username> • Modify User**: <ul style="list-style-type: none"> • snmpUser=modify <username>
Web Interface window	<p>SNMP User</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the SNMP window (on page 365) for the parameter location.</p> </div>
Default Setting	Blank

snmpUser	
Setting	Description
Options	<p>**Add or Modify access authorization options are:</p> <ul style="list-style-type: none"> • <AES> <Encryption Passphrase> • <DES> <Encryption Passphrase> • <MD5> <Authentication Passphrase> • <ReadOnly> • <ReadWrite> • <SHA> <Authentication Passphrase>
Description	<p>The snmp.snmpUser setting manages the SNMP V3 users.</p> <div style="border: 1px solid gray; padding: 5px; margin: 10px 0;"> <p>Example: <code>snmpUser=add <username> <AES> <Encryption Passphrase></code>. <code>snmpUser=modify <username> <ReadWrite></code></p> </div> <div style="border: 1px solid gray; padding: 5px; margin: 10px 0;"> <p>Important! The Passphrase requires a minimum of 8 characters.</p> </div>

28.4. v1Enabled

v1Enabled	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	<ul style="list-style-type: none"> • Enable SNMP V1: <ul style="list-style-type: none"> • <code>snmp.v1Enabled=true</code> • Disable SNMP V1: <ul style="list-style-type: none"> • <code>snmp.v1Enabled=false</code>
Web Interface window	<p>V1 Enabled</p> <ol style="list-style-type: none"> 1. Click the V1 Enabled list box arrow and select True to enable SNMP V1. 2. Click the Update button to save the change. <div style="border: 1px solid gray; padding: 5px; margin: 10px 0;"> <p>Note: By default, the v1 Enabled is NOT enabled (set to False). See the SNMP window (on page 365) for the parameter location.</p> </div>
Default Setting	False
Options	<ul style="list-style-type: none"> • True • False
Description	The snmp.v1Enabled setting enables SNMP V1.

28.5. v2cEnabled

v2cEnabled	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	<ul style="list-style-type: none"> • Enable SNMP V2C: <ul style="list-style-type: none"> • <code>snmp.v2cEnabled=true</code> • Disable SNMP V2C: <ul style="list-style-type: none"> • <code>snmp.v2cEnabled=false</code>
Web Interface window	<p>V2C Enabled</p> <ol style="list-style-type: none"> 1. Click the V2C Enabled list box arrow and select True to enable SNMP V2C. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: By default, the v2c Enabled is NOT enabled (set to False). See the SNMP window (on page 365) for the parameter location.</p> </div>
Default Setting	False
Options	<ul style="list-style-type: none"> • True • False
Description	The snmp.v2cEnabled setting enables SNMP V2C.

28.6. v3Enabled

v3Enabled	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	<ul style="list-style-type: none"> • Enable SNMP V3: <ul style="list-style-type: none"> • <code>snmp.v3Enabled=true</code> • Disable SNMP V3: <ul style="list-style-type: none"> • <code>snmp.v3Enabled=false</code>
Web Interface window	<p>V3 Enabled</p> <ol style="list-style-type: none"> 1. Click the V3 Enabled list box arrow and select True to enable SNMP V3. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: By default, the v3 Enabled is NOT enabled (set to False). See the SNMP window (on page 365) for the parameter location.</p> </div>

v3Enabled	
Setting	Description
Default Setting	False
Options	<ul style="list-style-type: none">• True• False
Description	The snmp.v3Enabled setting enables SNMP V3.

29. system Parameters

Important! The [Page=system] parameters are only available in the CLI window.
See the [Tera Term Activation and ZumLink Setup \(on page 65\)](#) procedure for CLI access.

Note: See the [System Info window \(on page 367\)](#).

- [dump \(on page 297\)](#)
- [dumpConfig](#)
- [dumpFormat \(on page 297\)](#)
- [dumpPage \(on page 298\)](#)
- [dumpTag \(on page 299\)](#)
- [filter \(on page 299\)](#)
- [help \(on page 300\)](#)
- [login \(on page 300\)](#)
- [logout \(on page 300\)](#)
- [modbusLayout \(on page 301\)](#)
- [pages \(on page 301\)](#)
- [password \(on page 301\)](#)
- [passwordRestoreDefaults \(on page 302\)](#)
- [showLayout \(on page 303\)](#)
- [tags \(on page 303\)](#)
- [whoami \(on page 303\)](#)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter.**

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

29.1. dump

dump	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul style="list-style-type: none"> system.dump dump
Web Interface window	<p>Important! The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p>
Default Setting	N/A
Options	N/A
Description	<p>The system.dump command reports all of the device configuration and status values using the format specified in dumpFormat (on page 297).</p> <p>Note: This is a Read-only parameter.</p>

29.2. dumpFormat

dumpFormat	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul style="list-style-type: none"> system.dumpFormat=Full dumpFormat=Full system.dumpFormat=Json dumpFormat=Json system.dumpFormat=Result dumpFormat=Result system.dumpFormat=Short dumpFormat=Short system.dumpFormat=Verbose dumpFormat=Verbose

dumpFormat	
Setting	Description
Web Interface window	<p>Important!: The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p>
Default Setting	N/A
Options	N/A
Description	<p>The system.dumpFormat setting designates the format of the output of commands and setting changes.</p> <ul style="list-style-type: none"> • dumpFormat Short <ul style="list-style-type: none"> • The Short setting shows the page name in a header row, then each setting indented with its value. • This is the default format. • dumpFormat Full <ul style="list-style-type: none"> • The Long setting shows each setting with its fully-qualified name and value (page.setting=value). • dumpFormat Verbose <ul style="list-style-type: none"> • The Verbose setting shows: <ul style="list-style-type: none"> the fully-qualified name and value (the same as the dumpFormat Long) and the header row (the same as the dumpFormat Short). • dumpFormat Result <ul style="list-style-type: none"> • The Result setting is identical to "dumpFormat Full". • dumpFormat Json <ul style="list-style-type: none"> • The Json setting shows the output results in JavaScript Object Notation (Json). <p>Example: Enter <code>dumpPage=SNMP</code> to show the SNMP settings.</p>

29.3. dumpPage

dumpPage	
Setting	Description
CLI / Web Page	[Page=system]

dumpPage	
Setting	Description
CLI Command	<ul style="list-style-type: none"> system.dumpPage=enter_page_name_here dumpPage=enter_page_name_here <p>Note: Where enter_page_name_here is a CLI page.</p>
Web Interface window	<p>Important! The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p>
Default Setting	N/A
Options	N/A
Description	<p>The system.dumpPage command reports all device configuration and status values for the specified page, using the format specified in dumpFormat (on page 297).</p> <p>Example: Enter dumpPage=SNMP to show the SNMP settings.</p> <p>Note: This is a Read-only parameter.</p>

29.4. dumpTag

Important! FreeWave internal use only.

29.5. dumpTopic

Important! FreeWave internal use only.

29.6. filter

Important! FreeWave internal use only.

29.7. help

help	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul style="list-style-type: none"> • <code>system.help</code> • <code>help</code> • <code>help <parameter></code> <ul style="list-style-type: none"> • to see help for a specific parameter
Web Interface window	<p>Important! The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p>
Default Setting	N/A
Options	N/A
Description	<p>The system.help command lists the help.txt file.</p> <p>Important! Help information is only available for active parameters.</p> <p>Example: If the ZumLink is designated as a gateway, the Help information for radioSettings.nodeld is not provided since the nodeld parameter cannot be changed.</p>

29.8. login

Important! FreeWave internal use only.

29.9. logout

logout	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<p>logout</p> <p>Note: Where <code>enter_page_name_here</code> is a CLI page.</p>

logout	
Setting	Description
Web Interface window	<p>Important! The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p>
Default Setting	N/A
Options	N/A
Description	The logout command logs out of the CLI session.

29.10. modbusLayout

Important! FreeWave internal use only.

29.11. pages

pages	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul style="list-style-type: none"> system.pages pages
Web Interface window	<p>Important! The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p>
Default Setting	N/A
Options	N/A
Description	The system.pages command lists all of the pages of settings and commands in the Z9-PC / Z9-PC-SR001.

29.12. password

password	
Setting	Description
CLI / Web Page	[Page=system]

password	
Setting	Description
CLI Command	<code>system.password=[oldpassword],[newpassword],[newpassword]</code>
Web Interface window	<p>Important!: The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p>
Default Setting	N/A
Options	N/A
Description	<p>The system.password setting designates the password.</p> <p>Important!: Must be logged in to the Z9-PC / Z9-PC-SR001.</p> <p>Example: The default password is admin. The CLI to change this is: <code>system.password=admin,NewPasswrld123,NewPasswrld123.</code></p> <p>Note: An error message appears when there is an error in typing the new password command.</p>

29.13. passwordRestoreDefaults

passwordRestoreDefaults	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul style="list-style-type: none"> <code>system.passwordRestoreDefaults=now</code> <code>passwordRestoreDefaults=now</code>
Web Interface window	<p>Important!: The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p>
Default Setting	N/A
Options	Now

passwordRestoreDefaults	
Setting	Description
Description	<p>The system.passwordRestoreDefaults command restores all passwords back the factory default of admin.</p> <ul style="list-style-type: none"> The system.passwordRestoreDefaults resets both the admin and devuser account passwords to factory defaults. After executing this command, the Z9-PC / Z9-PC-SR001 must be rebooted by either: <ul style="list-style-type: none"> executing the reset now command (see reset (on page 198)) or power-cycling the Z9-PC / Z9-PC-SR001.

29.14. showLayout

Important! FreeWave internal use only.

29.15. tags

Important! FreeWave internal use only.

29.16. whoami

whoami	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul style="list-style-type: none"> <code>system.whoami</code> <code>whoami</code>
Web Interface window	<p>Important! The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 65) procedure for CLI access.</p>
Default Setting	N/A
Options	N/A
Description	<p>The system.whoami command reports the user currently logged in.</p> <p>Note: This is a Read-only parameter.</p>

30. systemInfo Parameters

Note: See the [System Info window \(on page 367\)](#).

- [deviceConfiguration \(on page 305\)](#)
- [deviceFirmwareVersion \(on page 305\)](#)
- [deviceId \(on page 306\)](#)
- [deviceModel \(on page 306\)](#)
- [deviceName \(on page 307\)](#)
- [hopTableVersion \(on page 307\)](#)
- [layoutHash \(on page 308\)](#)
- [licenses \(on page 308\)](#)
- [modelCode \(on page 309\)](#)
- [radioFirmwareVersion \(on page 310\)](#)
- [radioModel \(on page 310\)](#)
- [radioModelCode \(on page 311\)](#)
- [radioSerialNumber \(on page 311\)](#)
- [resetInfo \(on page 312\)](#)
- [rteTemplateVersion \(on page 312\)](#)
- [rteVersion \(on page 312\)](#)
- [serialNumber \(on page 313\)](#)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

30.1. deviceConfiguration

deviceConfiguration	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> systemInfo.deviceConfiguration deviceConfiguration
Web Interface window	Device Configuration <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The systemInfo.deviceConfiguration command reports the device configuration of the Z9-PC / Z9-PC-SR001. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

30.2. deviceFirmwareVersion

deviceFirmwareVersion	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> systemInfo.deviceFirmwareVersion deviceFirmwareVersion
Web Interface window	Device Firmware Version <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The systemInfo.deviceFirmwareVersion command reports the device firmware version of the Z9-PC / Z9-PC-SR001. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

30.3. deviceId

deviceId	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> systemInfo.deviceId=nnnn deviceId <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where nnnn is a user-designated device ID.</p> </div>
Web Interface window	<p>Device ID</p> <ol style="list-style-type: none"> In the Device ID text box, enter the user-defined Device ID identifier for the Z9-PC / Z9-PC-SR001. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	1
Options	N/A
Description	<ul style="list-style-type: none"> The systemInfo.deviceId setting designates the Device Identifier selected for the Z9-PC / Z9-PC-SR001. The systemInfo.deviceId=nnnn setting designates the device ID. Where nnnn is a user-designated device ID.

30.4. deviceModel

deviceModel	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> systemInfo.deviceModel deviceModel
Web Interface window	<p>Device Model</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A

deviceModel	
Setting	Description
Description	<p>The systemInfo.deviceModel command reports the device model.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

30.5. deviceName

deviceName	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> • <code>systemInfo.deviceName=nnnn</code> • <code>deviceName</code> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where <code>nnnn</code> is the user-defined name for the Z9-PC / Z9-PC-SR001.</p> </div>
Web Interface window	<p>Device Name</p> <ol style="list-style-type: none"> 1. In the Device Name text box, enter the user-defined name for the Z9-PC / Z9-PC-SR001. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The systemInfo.deviceName setting designates the user-defined name for the Z9-PC / Z9-PC-SR001.

30.6. hopTableVersion

hopTableVersion	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> • <code>systemInfo.hopTableVersion</code> • <code>hopTableVersion</code>

hopTableVersion	
Setting	Description
Web Interface window	Hop Table Version Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.hopTableVersion command reports the radio Hop Table Version of the Z9-PC / Z9-PC-SR001. Note: This is a Read-only parameter.

30.7. layoutHash

layoutHash	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> • <code>systemInfo.layoutHash</code> • <code>layoutHash</code>
Web Interface window	Layout Hash Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.layoutHash command reports the Unique Layout Identifier. Note: This is a Read-only parameter.

30.8. licenses

licenses	
Setting	Description
CLI / Web Page	[Page=systemInfo]

licenses	
Setting	Description
CLI Command	<ul style="list-style-type: none"> • <code>systemInfo.licenses</code> • <code>licenses</code>
Web Interface window	Licenses <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	None
Options	N/A
Description	The systemInfo.licenses command reports all of the license information. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

30.9. modelCode

modelCode	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> • <code>systemInfo.modelCode</code> • <code>modelCode</code>
Web Interface window	Model Code <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The systemInfo.modelCode command reports the model code of the Z9-PC / Z9-PC-SR001. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

30.10. radioFirmwareVersion

radioFirmwareVersion	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> • <code>systemInfo.radioFirmwareVersion</code> • <code>radioFirmwareVersion</code>
Web Interface window	Radio Firmware Version <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The systemInfo.radioFirmwareVersion command reports the radio firmware version of the Z9-PC / Z9-PC-SR001. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

30.11. radioModel

radioModel	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> • <code>systemInfo.radioModel</code> • <code>radioModel</code>
Web Interface window	Radio Model <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	AMT0100AA
Options	N/A
Description	The systemInfo.radioModel command reports the radio model of the Z9-PC / Z9-PC-SR001. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

30.12. radioModelCode

radioModelCode	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> • <code>systemInfo.radioModelCode</code> • <code>radioModelCode</code>
Web Interface window	Radio Model Code <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The systemInfo.radioModelCode command reports the radio model code of the Z9-PC / Z9-PC-SR001. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

30.13. radioSerialNumber

radioSerialNumber	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> • <code>systemInfo.radioSerialNumber</code> • <code>radioSerialNumber</code>
Web Interface window	Radio Serial Number <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	The systemInfo.radioSerialNumber command reports the radio serial number of the Z9-PC / Z9-PC-SR001. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This is a Read-only parameter.</p> </div>

30.14. resetInfo

Important!: FreeWave internal use only.

30.15. rteTemplateVersion

rteTemplateVersion	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> systeminfo.rteTemplateVersion rteTemplateVersion
Web Interface window	N/A <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	<p>The systeminfo.rteTemplateVersion command reports the version number for the template ZumIQ application environment.</p> <p>This is the application environment applied when executing the rteReset=hard command.</p> <p>Notes</p> <ul style="list-style-type: none"> See rteReset (on page 282) for additional information. This is a Read-only parameter.

30.16. rteVersion

rteVersion	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> systeminfo.rteVersion rteVersion
Web Interface window	N/A <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A

rteVersion	
Setting	Description
Options	N/A
Description	<p>The systemInfo.rteVersion command reports the version number for the active ZumIQ application environment.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: If this setting is blank, the application environment has not yet been initialized.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: This is a Read-only parameter.</p> </div>

30.17. serialNumber

serialNumber	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul style="list-style-type: none"> • <code>systemInfo.serialNumber</code> • <code>serialNumber</code>
Web Interface window	<p>Serial Number</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: This parameter is read-only in the Web Interface. See the System Info window (on page 367) for the parameter location.</p> </div>
Default Setting	N/A
Options	N/A
Description	<p>The systemInfo.serialNumber command reports the serial number of the Z9-PC / Z9-PC-SR001.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: This is a Read-only parameter.</p> </div>

31. TerminalServerRelay Parameters

Note: See the [Terminal Server Relay window](#) (on page 369).

- [remote_termserv_ip_address](#) (on page 315)
- [termserv_relay_mapping](#) (on page 315)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.
If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering [frequencyKey](#) returns the current value of [frequencyKey](#).
Entering [frequencyKey=](#) is an implied change to [frequencyKey](#).
If a value is NOT included, it changes [frequencyKey](#) to 0 (zero).

31.1. remote_termserv_ip_address

remote_termserv_ip_address	
Setting	Description
CLI / Web Page	[Page=TerminalServerRelay]
CLI Command	<p>TerminalServerRelay.remote_termserv_ip_address=nnn.nnn.nnn.nnn</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where nnn.nnn.nnn.nnn is the IP address for the remote terminal server.</p> </div>
Web Interface window	<p>Remote Termserv IP Address</p> <ol style="list-style-type: none"> 1. In the Remote Termserv IP Address text box, enter the IP address for the remote terminal server. 2. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Terminal Server Relay window (on page 369) for the parameter location.</p> </div>
Default Setting	0.0.0.0
Options	N/A
Description	<ul style="list-style-type: none"> • The <code>TerminalServerRelay.remote_termserv_ip_address=</code> command reports the IP address of the remote terminal server. • The <code>TerminalServerRelay.remote_termserv_ip_address=nnn.nnn.nnn.nnn</code> changes the IP address of the remote terminal server.

31.2. termserv_relay_mapping

termserv_relay_mapping	
Setting	Description
CLI / Web Page	[Page=TerminalServerRelay]

termserv_relay_mapping	
Setting	Description
CLI Command	<ul style="list-style-type: none"> TerminalServerRelay.termserv_relay_mapping=TERMSERV_RELAY_DISABLED TerminalServerRelay.termserv_relay_mapping=LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM TerminalServerRelay.termserv_relay_mapping=LOCAL_COM1_TO_REMOTE_COM1 TerminalServerRelay.termserv_relay_mapping=LOCAL_COM2_TO_REMOTE_COM2 TerminalServerRelay.termserv_relay_mapping=LOCAL_BOTH_COM_TO_REMOTE_COM1 TerminalServerRelay.termserv_relay_mapping=LOCAL_BOTH_COM_TO_REMOTE_COM2 TerminalServerRelay.termserv_relay_mapping=LOCAL_COM1_TO_REMOTE_BOTH_COM TerminalServerRelay.termserv_relay_mapping=LOCAL_COM2_TO_REMOTE_BOTH_COM
Web Interface window	<p>Termserv Relay Mapping</p> <ol style="list-style-type: none"> Click the Termserv Relay Mapping list box arrow and select a setting used for the transfer of a bi-directional byte stream between two serial device servers. Click the Update button to save the change. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Terminal Server Relay window (on page 369) for the parameter location.</p> </div>
Default Setting	TERMSERV_RELAY_DISABLED

termserv_relay_mapping	
Setting	Description
Options	<ul style="list-style-type: none"> TERMSERV_RELAY_DISABLED <ul style="list-style-type: none"> Data forwarding between local and remote COM ports is disabled. LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM (on page 320). <ul style="list-style-type: none"> Data is forwarded between the local COM1 and remote COM1 or local COM2 and remote COM2 ports. LOCAL_COM1_TO_REMOTE_COM1 (on page 321). <ul style="list-style-type: none"> Data is forwarded between the local COM1 and remote COM1 ports. LOCAL_COM2_TO_REMOTE_COM2 (on page 322). <ul style="list-style-type: none"> Data is forwarded between the local COM2 and remote COM2 ports. LOCAL_BOTH_COM_TO_REMOTE_COM1 (on page 323). <ul style="list-style-type: none"> Data is forwarded between the local COM1 and COM2 and remote COM1 ports. LOCAL_BOTH_COM_TO_REMOTE_COM2 (on page 324). <ul style="list-style-type: none"> Data is forwarded between the local COM1 and COM2 and remote COM2 ports. LOCAL_COM1_TO_REMOTE_BOTH_COM (on page 325). <ul style="list-style-type: none"> Data is forwarded between the local COM1, remote COM1, and COM2 ports. LOCAL_COM2_TO_REMOTE_BOTH_COM (on page 326). <ul style="list-style-type: none"> Data is forwarded between the local COM2, remote COM1, and COM2 ports.
Description	<p>The TerminalServerRelay.termserv_relay_mapping setting is used for the transfer of a bi-directional byte stream between two serial device servers.</p> <p>Notes</p> <ul style="list-style-type: none"> If using Terminal Server Relay, the TCP port numbers must be consistent across all involved radios. The data relay is only supported between the terminal server on this Z9-PC / Z9-PC-SR001 radio and the terminal server on a separate Z9-PC / Z9-PC-SR001 radio in the same IP network. See Examples - Terminal Server Relay (on page 318). <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! The TerminalServerRelay.termserv_relay_mapping should only be enabled on one side of the connection.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>FREEWAVE Recommends: If using the Terminal Server Relay setting, keep the TCP port numbers as their defaults.</p> </div>

32. Examples - Terminal Server Relay

- [Connected Terminal Servers and Terminal Server Relay \(on page 319\)](#)
- [LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM \(on page 320\)](#)
- [LOCAL_COM1_TO_REMOTE_COM1 \(on page 321\)](#)
- [LOCAL_COM2_TO_REMOTE_COM2 \(on page 322\)](#)
- [LOCAL_BOTH_COM_TO_REMOTE_COM1 \(on page 323\)](#)
- [LOCAL_BOTH_COM_TO_REMOTE_COM2 \(on page 324\)](#)
- [LOCAL_COM1_TO_REMOTE_BOTH_COM \(on page 325\)](#)
- [LOCAL_COM2_TO_REMOTE_BOTH_COM \(on page 326\)](#)
- [Example: Multicast \(on page 327\)](#)

32.1. Connected Terminal Servers and Terminal Server Relay

Figure 212 shows the Terminal Servers and the Terminal Server Relay (client) connected together through the Bridge.

- The Bridge connects the Ethernet interface with the radio interface.
- The Terminal Servers are connected to the COM ports.
- From any network interface you can get to the Terminal Servers.

The Terminal Server Relay is designed to connect the local Terminal Servers (hence the COM ports) to any remote Terminal Server.

- This connection could be over the Ethernet or radio interface.
- It does not matter since it is a TCP connection.
- Each terminal server can have 20 concurrent TCP connections.
- Expects COM1 to be on port 5041 for both local and remote units.
- Expects COM2 to be on port 5042 for both local and remote units.

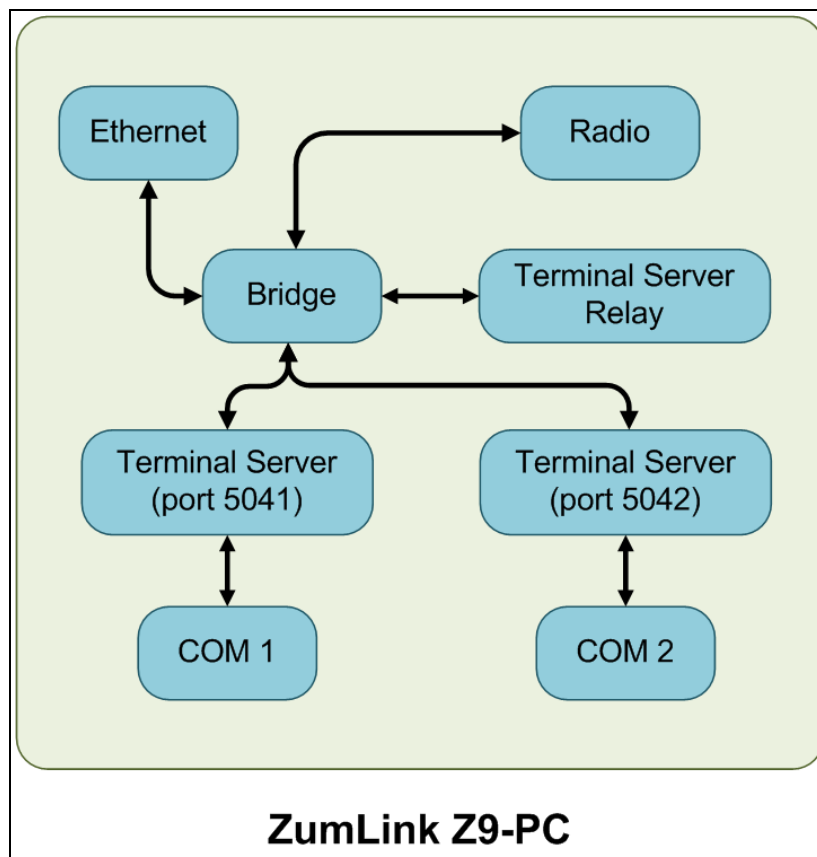


Figure 212: Terminal Servers and Terminal Server Relay (Client) Connected Together through the Bridge

32.2. LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM

Figure 213 illustrates the Terminal Server Relay command:

LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM.

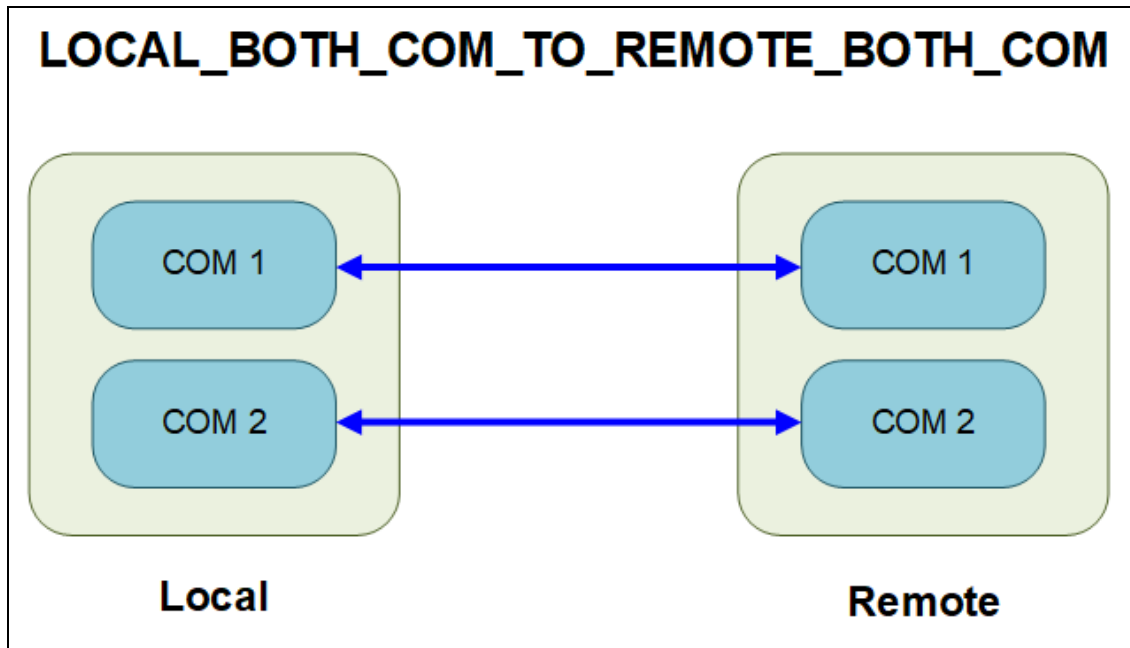


Figure 213: Terminal Server Relay command:

LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM

32.3. LOCAL_COM1_TO_REMOTE_COM1

Figure 213 illustrates the Terminal Server Relay command:

`LOCAL_COM1_TO_REMOTE_COM1`.

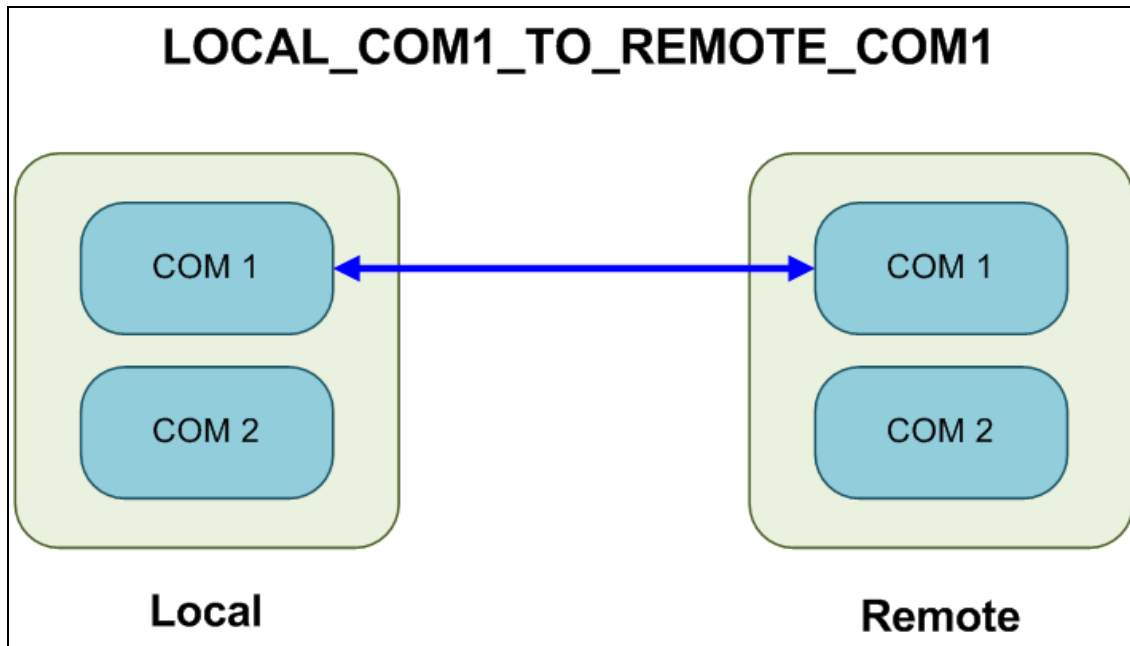


Figure 214: Terminal Server Relay command:

`LOCAL_COM1_TO_REMOTE_COM1`

32.4. LOCAL_COM2_TO_REMOTE_COM2

Figure 213 illustrates the Terminal Server Relay command:

`LOCAL_COM2_TO_REMOTE_COM2`.

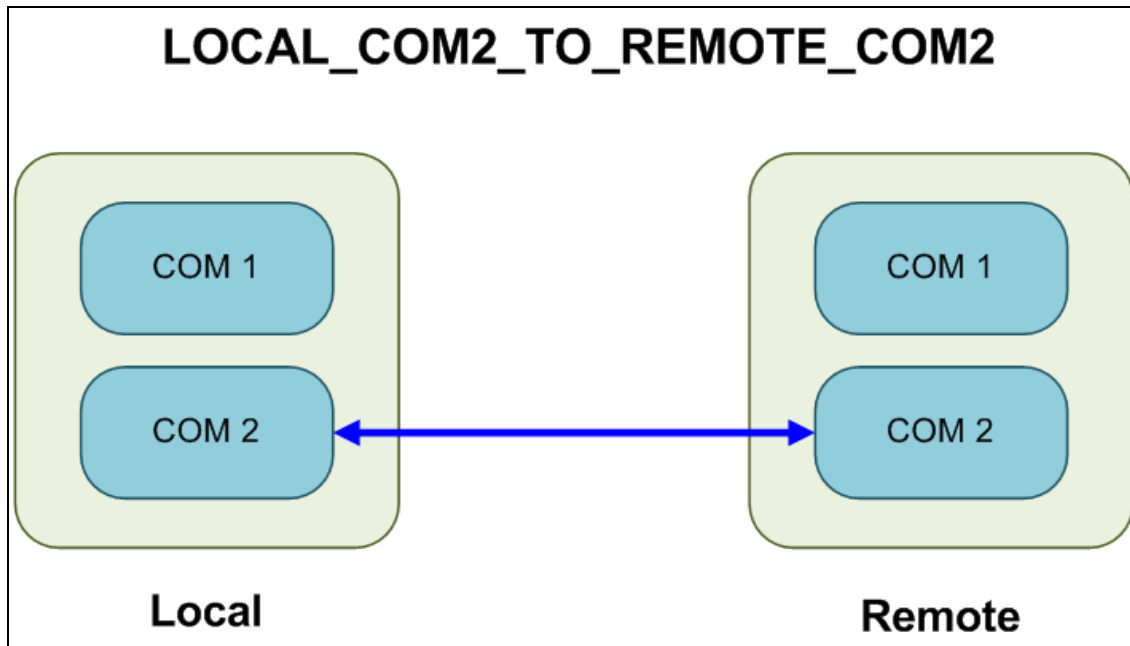


Figure 215: Terminal Server Relay command:

`LOCAL_COM2_TO_REMOTE_COM2`

32.5. LOCAL_BOTH_COM_TO_REMOTE_COM1

Figure 213 illustrates the Terminal Server Relay command:

`LOCAL_BOTH_COM_TO_REMOTE_COM1`.

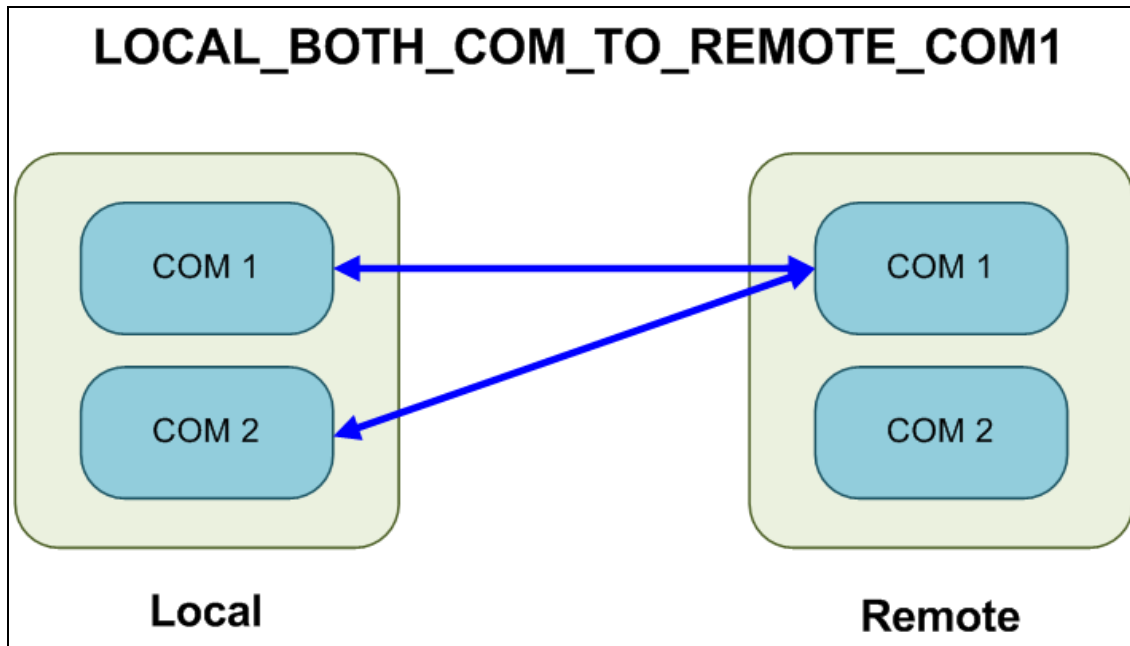


Figure 216: Terminal Server Relay command:

`LOCAL_BOTH_COM_TO_REMOTE_COM1`

32.6. LOCAL_BOTH_COM_TO_REMOTE_COM2

Figure 213 illustrates the Terminal Server Relay command:

`LOCAL_BOTH_COM_TO_REMOTE_COM2`.

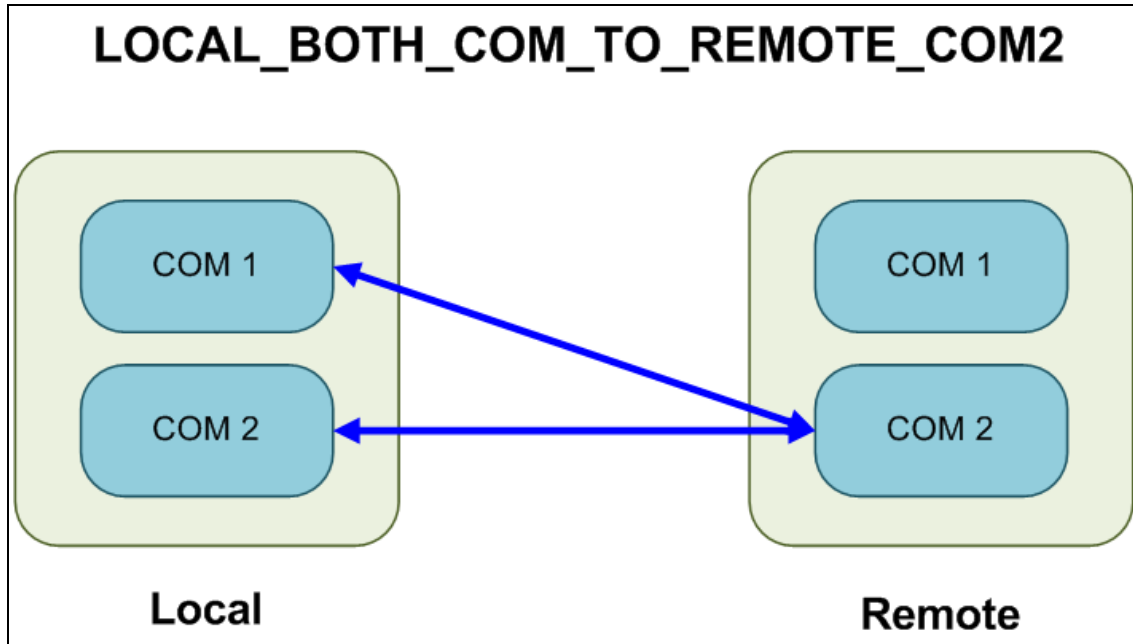


Figure 217: Terminal Server Relay command:

`LOCAL_BOTH_COM_TO_REMOTE_COM2`

32.7. LOCAL_COM1_TO_REMOTE_BOTH_COM

Figure 213 illustrates the Terminal Server Relay command:

LOCAL_COM1_TO_REMOTE_BOTH_COM

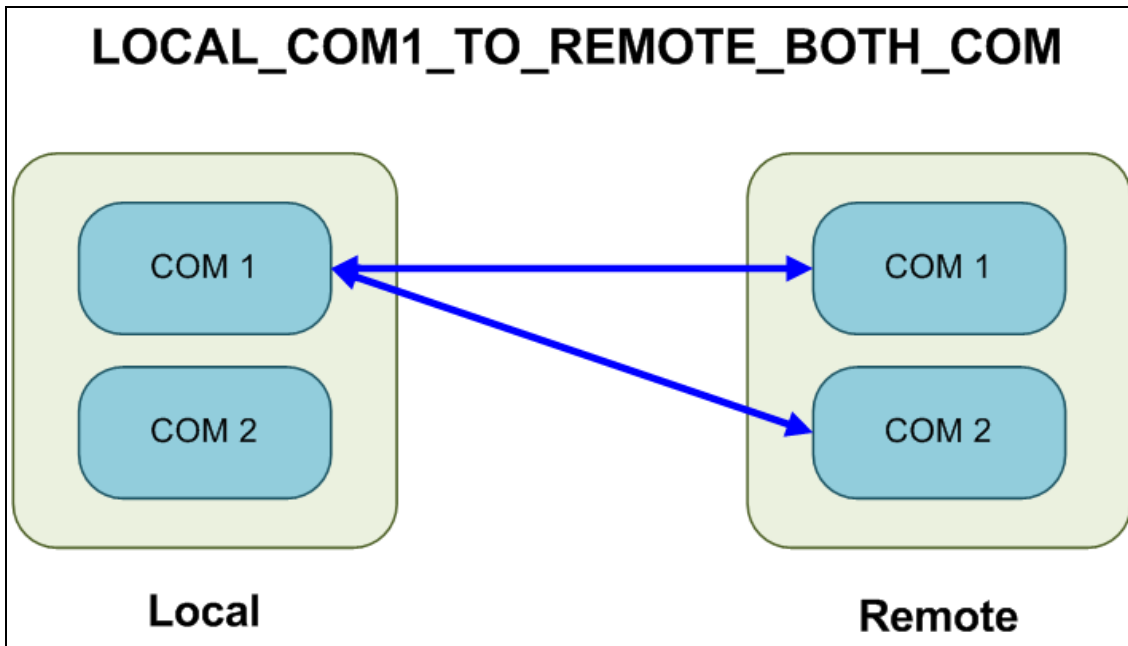


Figure 218: Terminal Server Relay command:

LOCAL_COM1_TO_REMOTE_BOTH_COM

32.8. LOCAL_COM2_TO_REMOTE_BOTH_COM

Figure 213 illustrates the Terminal Server Relay command:

LOCAL_COM2_TO_REMOTE_BOTH_COM.

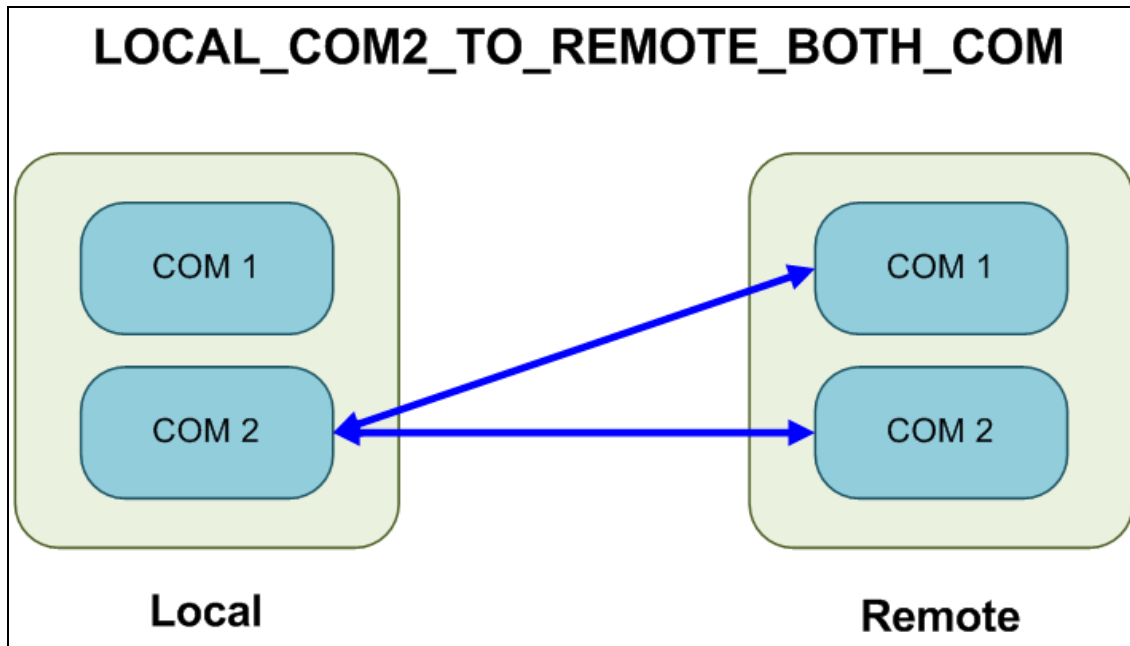


Figure 219: Terminal Server Relay command:

LOCAL_COM2_TO_REMOTE_BOTH_COM

32.9. Example: Multicast

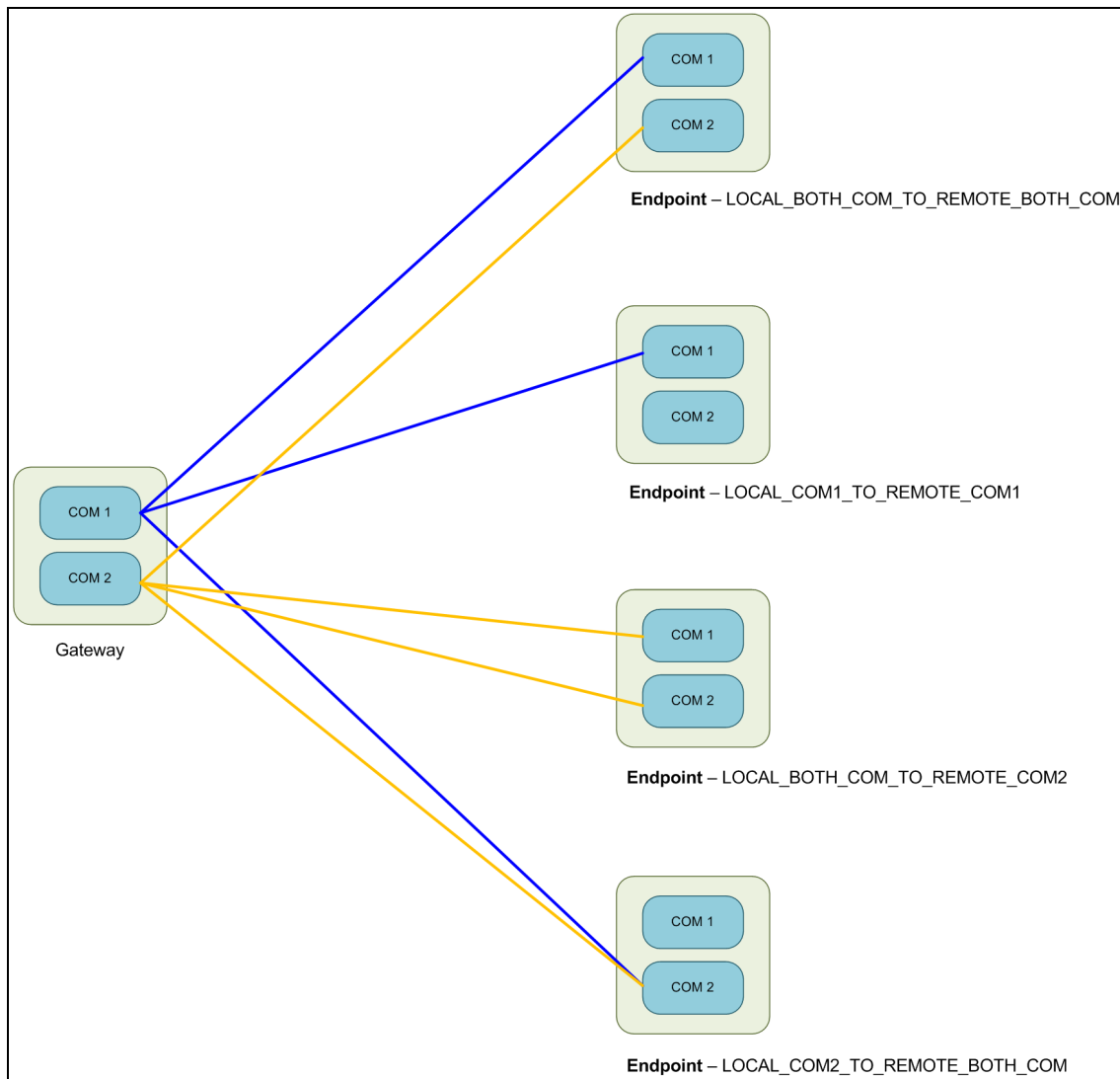


Figure 220: Example: Multicast

33. Web Interface

The available windows are:

- [COM window \(on page 329\)](#)
- [Config window \(on page 331\)](#)
- [Data Path window \(on page 333\)](#)
- [Date window \(on page 335\)](#)
- [Encryption window \(on page 337\)](#)
- [File Upload window \(on page 339\)](#)
- [Help window \(on page 341\)](#)
- [Home window \(on page 343\)](#)
- [Local Diagnostics window \(on page 344\)](#)
- [Network window \(on page 347\)](#)
- [Network Diagnostics window \(on page 349\)](#)
- [Network Stats window \(on page 351\)](#)
- [NTP window \(on page 353\)](#)
- [Radio Settings window \(on page 355\)](#)
- [Radio Settings Helpers window \(on page 358\)](#)
- [Runtime Environment window \(on page 360\)](#)
- [Security window \(on page 361\)](#)
- [Services window \(on page 363\)](#)
- [SNMP window \(on page 365\)](#)
- [System Info window \(on page 367\)](#)
- [Terminal Server Relay window \(on page 369\)](#)
- [User Data - Drag and Drop window \(on page 371\)](#)

33.1. COM window

The **COM** windows are used to read and change information about the communication settings of the Z9-PC / Z9-PC-SR001.

Note: See the [COM Parameters \(on page 183\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 221](#))

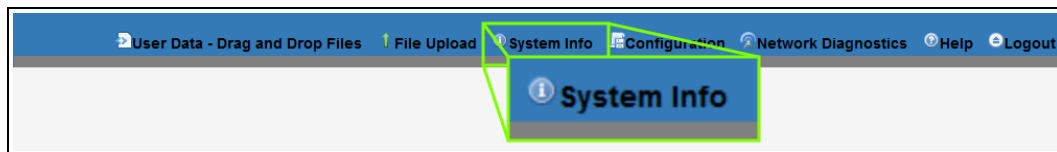


Figure 221: System Info link

The **Authentication Required (Login)** dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click either the **COM1** or **COM2** tab.
The selected COM window opens. ([Figure 222](#))

Note: The parameters for **COM1** and **COM2** are the same except for the **TerminalServerPort** parameter setting.
The information in this window is read-only.
See the [COM Parameters \(on page 183\)](#) for detailed information about the parameters.

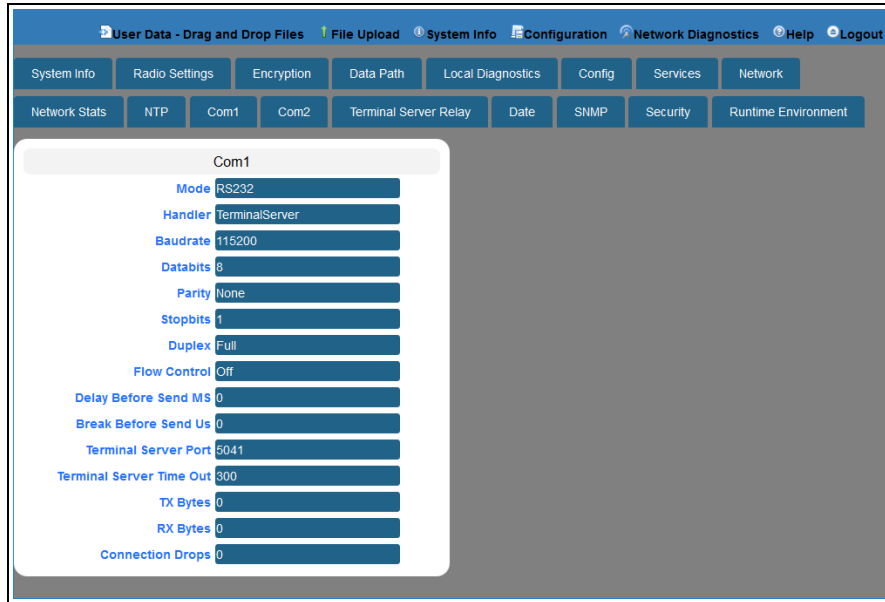


Figure 222: COM1 window

7. On the Menu bar, click the **Configuration** link to [Change the COM Parameters \(on page 106\)](#).

33.2. Config window

Note: See the [config Parameters \(on page 196\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 223](#))

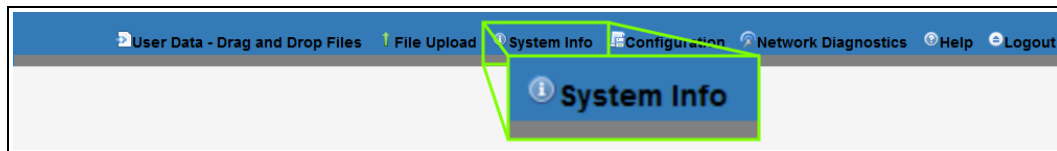


Figure 223: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Config** tab.
The **Config** window opens. ([Figure 224](#))

Important! The information in this window is read-only.
The parameters in this window can only be changed in the CLI.
See the [Tera Term Activation and ZumLink Setup \(on page 65\)](#) procedure for CLI access.
See the [config Parameters \(on page 196\)](#) for detailed information about the parameters.

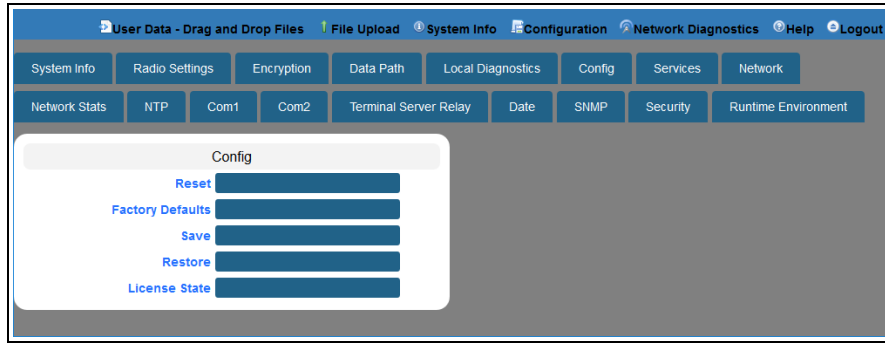


Figure 224: Config window

33.3. Data Path window

Note: See the [dataPath Parameters \(on page 201\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 225](#))

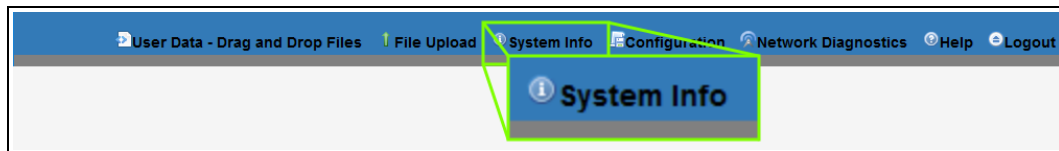


Figure 225: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Data Path** tab.
The **Data Path** window opens. ([Figure 226](#))

Note: The information in this window is read-only.
See the [dataPath Parameters \(on page 201\)](#) for detailed information about the parameters.

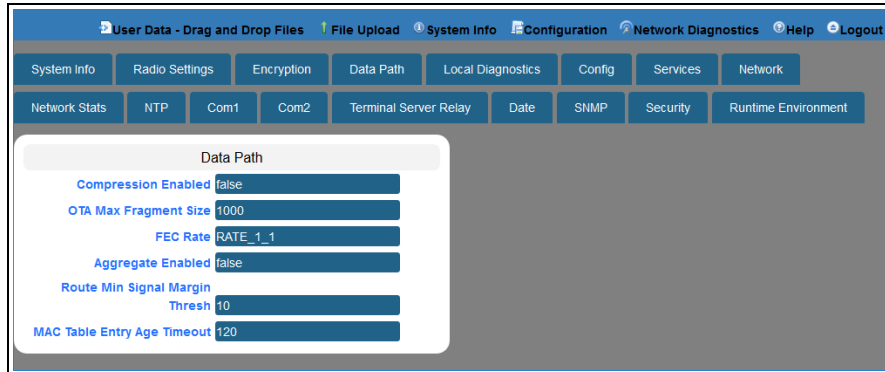


Figure 226: Data Path window

7. On the Menu bar, click the **Configuration** link to [Change the Data Path Parameters \(on page 110\)](#).

33.4. Date window

Note: See the [date Parameters \(on page 209\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 227](#))

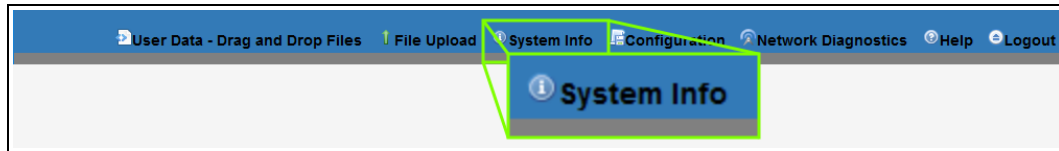


Figure 227: System Info link

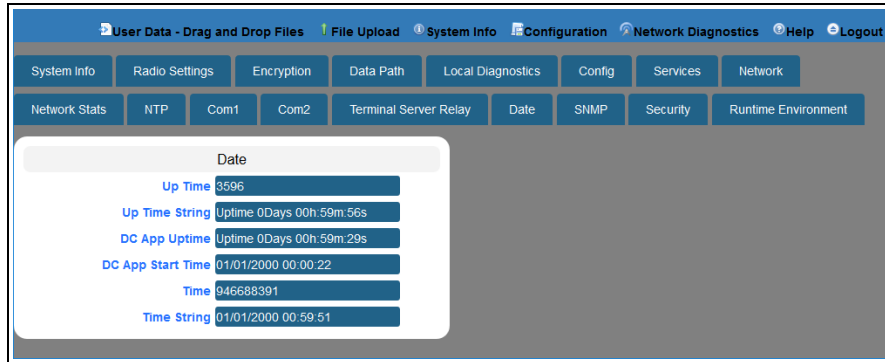
The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Date** tab.
The **Date** window opens. ([Figure 228](#))

Note: The information in this window is read-only.
See the [date Parameters \(on page 209\)](#) for detailed information about the parameters.

**Figure 228: Date window**

33.5. Encryption window

Note: See the [encryption Parameters \(on page 214\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 229](#))

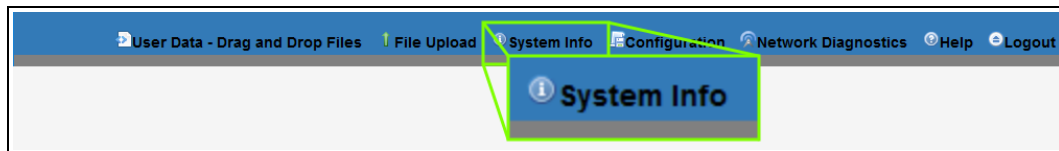


Figure 229: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Encryption** tab.
The **Encryption** window opens. ([Figure 230](#))

Note: The information in this window is read-only.
See the [encryption Parameters \(on page 214\)](#) for detailed information about the parameters.

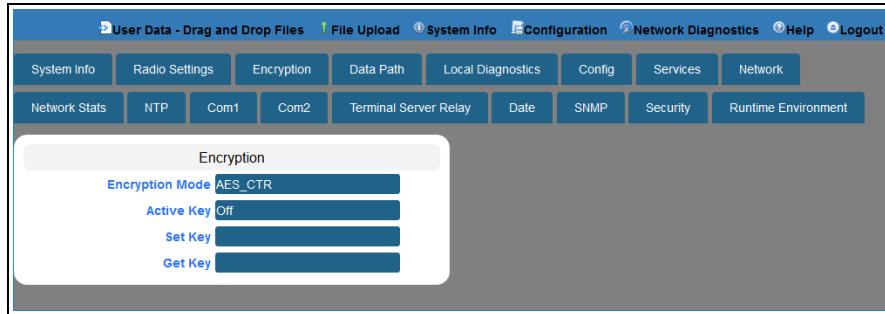


Figure 230: Encryption window

7. On the Menu bar, click the **Configuration** link to [Change the Encryption Parameters \(on page 113\)](#).

33.6. File Upload window

The **File Upload** window is used to search for and upload these file types into the Z9-PC / Z9-PC-SR001:

Extension	File Type
.cfg; .cfg.txt	Configuration changes
.fcf; .fcf.txt	Radio module Firmware updates
.pkg; .pkg.txt	Interface board Firmware updates

Access and Window Description

Note: The images in this procedure are for Windows® 7 or Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. On the Menu bar, click the **File Upload** link. ([Figure 231](#))

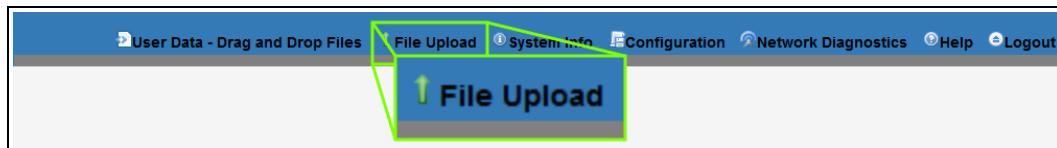


Figure 231: File Upload link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **File Upload** window opens. ([Figure 232](#))

Note: If the **User Name** or **Password** were changed, enter the applicable information.

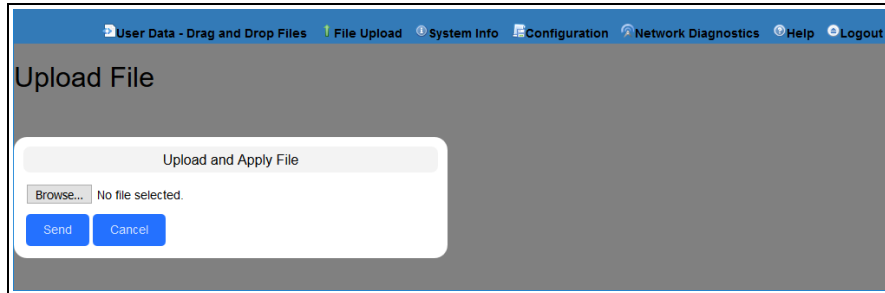


Figure 232: File Upload window

File Upload window	
Control Title	Control Description
Browse button	Click to open the Microsoft® File Upload dialog box. <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Note: The Browse button title is dependent on the chosen browser.</p> </div>
Send button	Click to start the upgrade process on the Z9-PC / Z9-PC-SR001.
Cancel button	Click to cancel the file transfer if already started or refresh the window and clear the selected file.

33.7. Help window

The **Help** window is used to read information about the settings of the Z9-PC / Z9-PC-SR001.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The **Home window** (on page 343) opens.
4. On the Menu bar, click the **Help** link. (Figure 233)

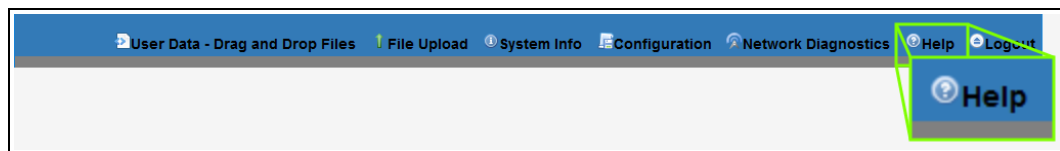


Figure 233: Help link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Login** dialog box closes and the **Help** window opens. (Figure 234)

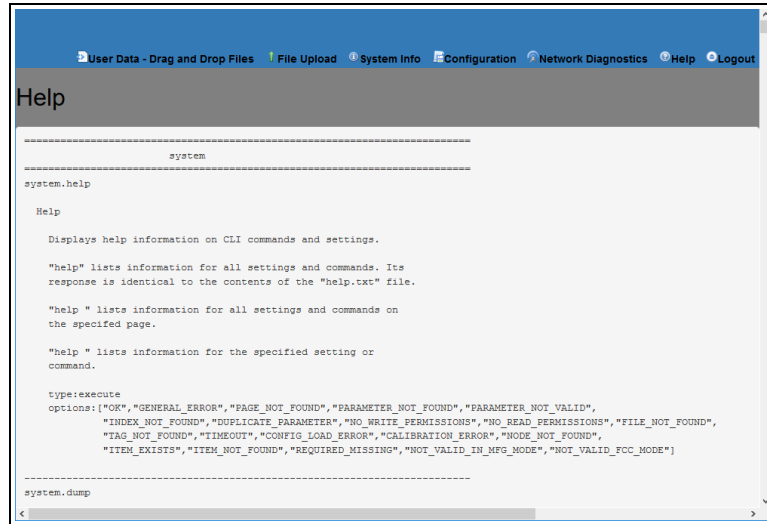


Figure 234: Help window

Note: The information in this window is read-only.

33.8. Home window

The **Home** window is the default window when the Web Interface is used.

It is used to:

- View basic System information of the connected Z9-PC / Z9-PC-SR001.
- Provide links to other windows of the Z9-PC / Z9-PC-SR001.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

3. Refresh the browser window (press <Enter> or <F5>).
The Z9-PC / Z9-PC-SR001 **Home** window opens.

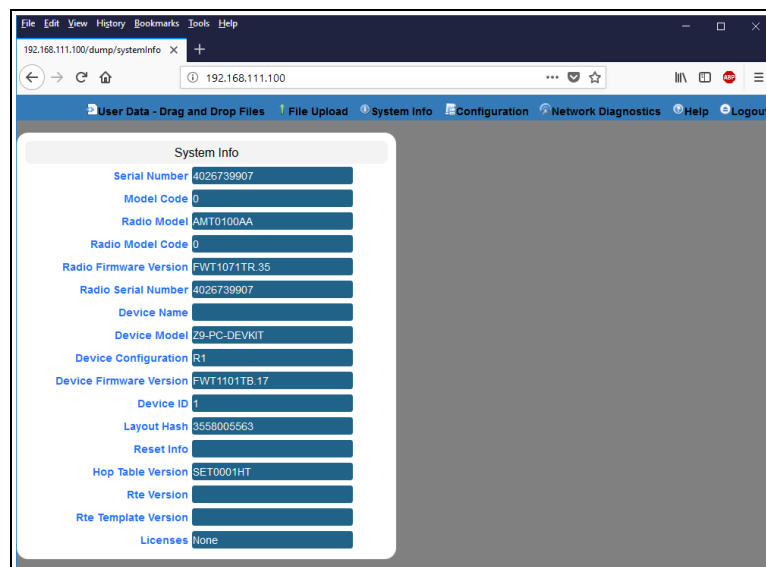


Figure 235: Home window

Note: The information in this window is read-only.

33.9. Local Diagnostics window

Note: See the [localDiagnostics Parameters \(on page 219\)](#) for detailed information about the parameters.

- [Upper Half \(on page 345\)](#)
- [Lower Half \(on page 346\)](#)

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 236](#))

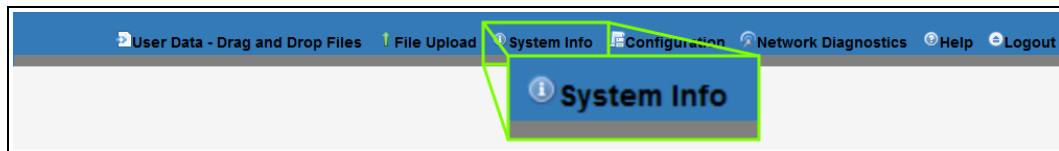


Figure 236: System Info link

The **Authentication Required (Login)** dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Local Diagnostics** tab.
The **Local Diagnostics** window opens. ([Figure 237](#) and [Figure 238](#))

Note: The information in this window is read-only.
See the [localDiagnostics Parameters \(on page 219\)](#) for detailed information about the parameters.

See:

- [Upper Half \(on page 345\)](#)
- [Lower Half \(on page 346\)](#)

7. On the Menu bar, click the **Configuration** link to [Change the Local Diagnostics \(on page 116\)](#).

33.9.1. Upper Half

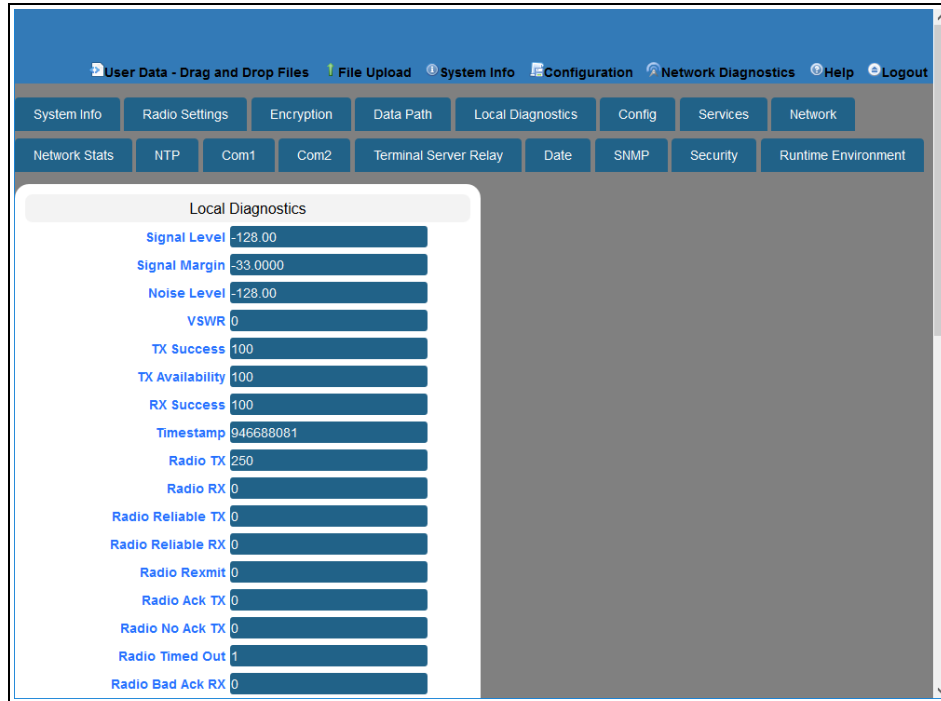


Figure 237: Local Diagnostics window - Upper Half

33.9.2. Lower Half

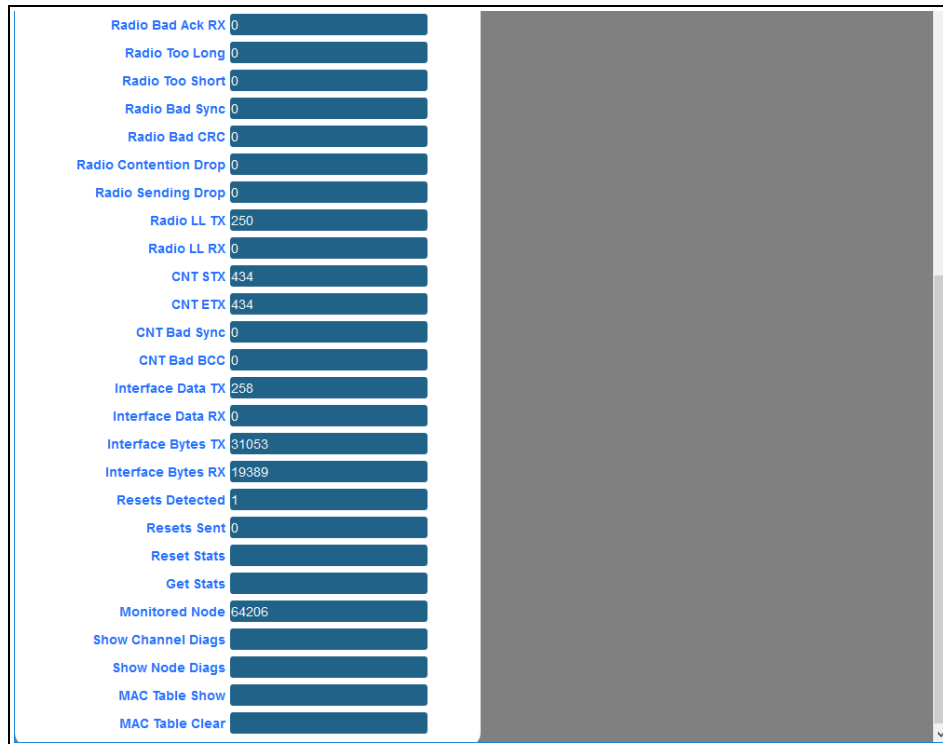


Figure 238: Local Diagnostics window - Lower Half

33.10. Network window

The **Network** window is used to provide network information for the Z9-PC / Z9-PC-SR001.

Note: See the [network Parameters \(on page 237\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 239](#))

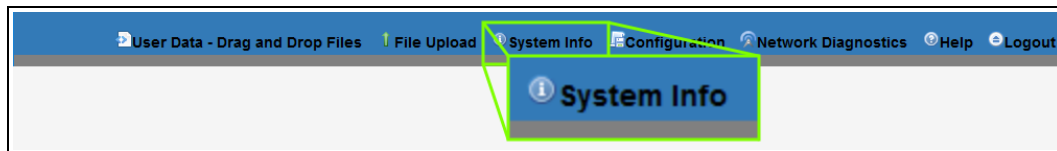


Figure 239: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Network** tab.
The **Network** window opens. ([Figure 240](#))

Note: The information in this window is read-only.
See the [network Parameters \(on page 237\)](#) for detailed information about the parameters.

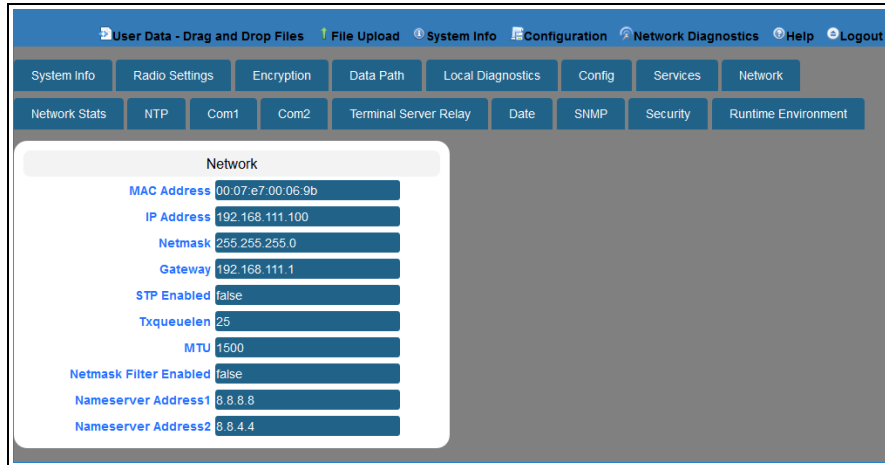


Figure 240: Network window

7. On the Menu bar, click the **Configuration** link to [Change the Network Parameters \(on page 119\)](#).

33.11. Network Diagnostics window

The **Network Diagnostics** window is used to:

- Discover other Endpoints in the network.
- Show hops and their paths from the Gateway.
- Show the link quality (RSSI and Margin).
- Show neighbors.

Important! A Gateway is required in the network to use this window.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. On the Menu bar, click the **Network Diagnostics** link. ([Figure 241](#))

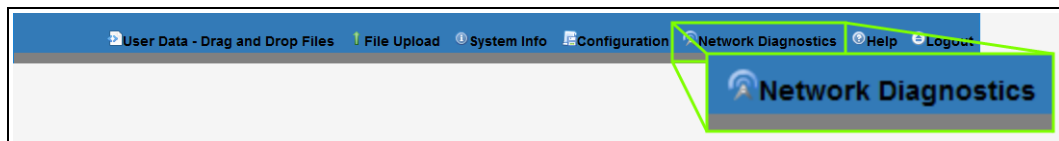


Figure 241: Network Diagnostics link

The **Network Diagnostics** window opens. ([Figure 242](#))

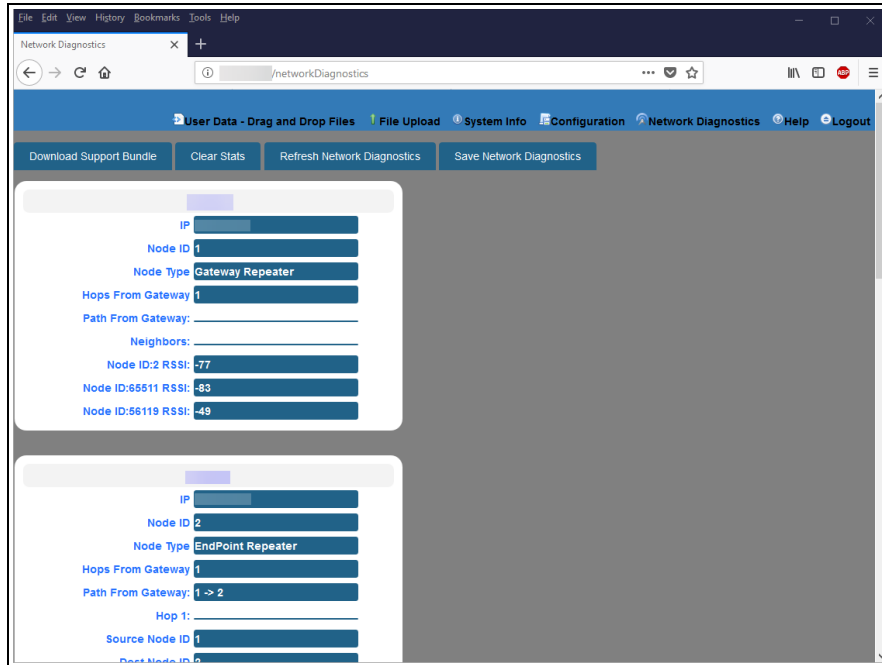


Figure 242: Network Diagnostics window



To update the [Network Diagnostics window \(on page 349\)](#), refresh the browser to clear the browser cache.

Network Diagnostics window	
Control Title	Control Description
Download Support Bundle button	Click the Download Support Bundle button to open the Opening support_bundle_xxx.xxx.xxx.zip dialog box. Use this dialog box to save the current network performance reading to send to FreeWave Technical Support for faster issue resolution.
Clear Status button	Click the Clear Status button to reset the network diagnostics.
Refresh Network Diagnostics button	Click the Refresh Network Diagnostics button to updated the current network performance reading.
Save Network Diagnostics button	Click the Save Network Diagnostics button to open the Opening network_diag.json dialog box. Use this dialog box to save the current network performance reading for later review and to monitor network performance over time.

33.12. Network Stats window

Note: See the [networkStats Parameters \(on page 245\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 243](#))

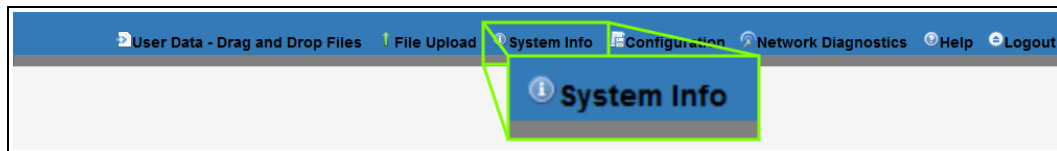


Figure 243: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Network Stats** tab.
The **Network Stats** window opens. ([Figure 244](#))

Note: The information in this window is read-only.
See the [networkStats Parameters \(on page 245\)](#) for detailed information about the parameters.



Figure 244: Network Stats window

33.13. NTP window

The **NTP** window is used to designate the date and time used on the Z9-PC / Z9-PC-SR001.

Note: See the [NTP Parameters \(on page 250\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 245](#))

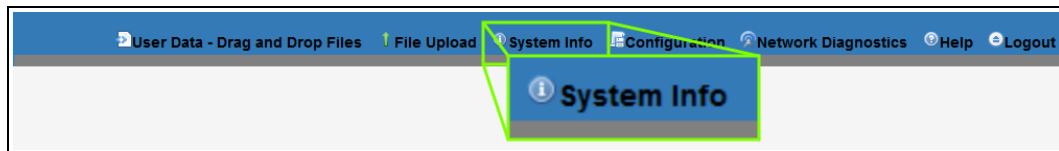


Figure 245: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **NTP** tab.
The **NTP** window opens. ([Figure 246](#))

Note: The information in this window is read-only.
See the [NTP Parameters \(on page 250\)](#) for detailed information about the parameters.

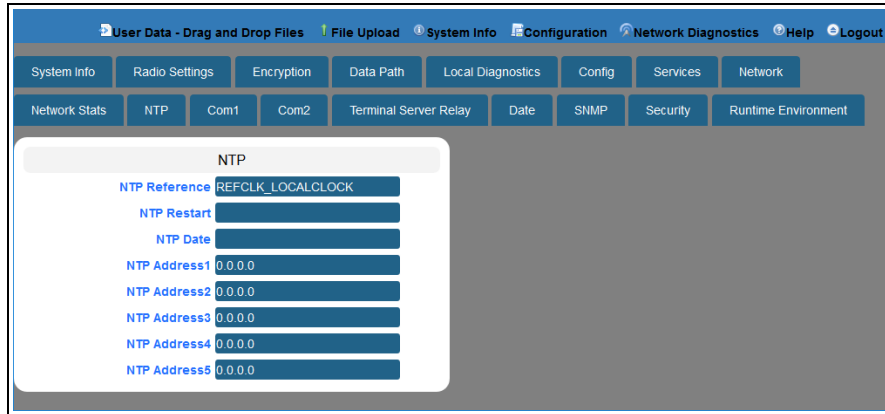


Figure 246: NTP window

7. On the Menu bar, click the **Configuration** link to [Change the NTP Parameters \(on page 122\)](#).

33.14. Radio Settings window

Note: See the [radioSettings Parameters \(on page 254\)](#) for detailed information about the parameters.

- [Gateway Radio Mode \(on page 356\)](#)
- [Endpoint Radio Mode \(on page 357\)](#)

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of [192.168.111.100](#).
If the IP address was changed, enter that IP Address.

Example: For the first time, enter [192.168.111.100/config](#).

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 247](#))

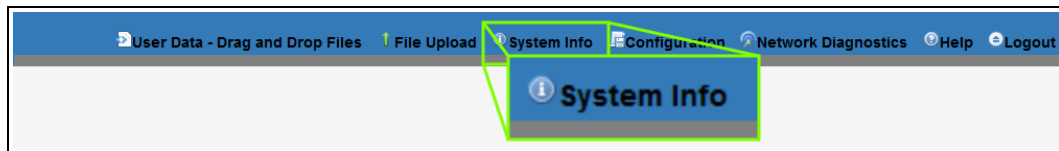


Figure 247: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter [admin](#) in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Radio Settings** tab.
The **Radio Settings** window opens. ([Figure 248](#) or [Figure 249](#))

Note: The information in this window is read-only.
See the [radioSettings Parameters \(on page 254\)](#) for detailed information about the parameters.

See:

- [Gateway Radio Mode \(on page 356\)](#)
- [Endpoint Radio Mode \(on page 357\)](#)

7. On the Menu bar, click the **Configuration** link to [Change the Radio Settings Parameters - Endpoints \(on page 125\)](#).

33.14.1. Gateway Radio Mode

Important! Only **radioSettings** that apply to the current **radioMode**, **rfDataRate**, and **radioHoppingMode**, and are visible in the CLI and the Web Interface and can be changed.

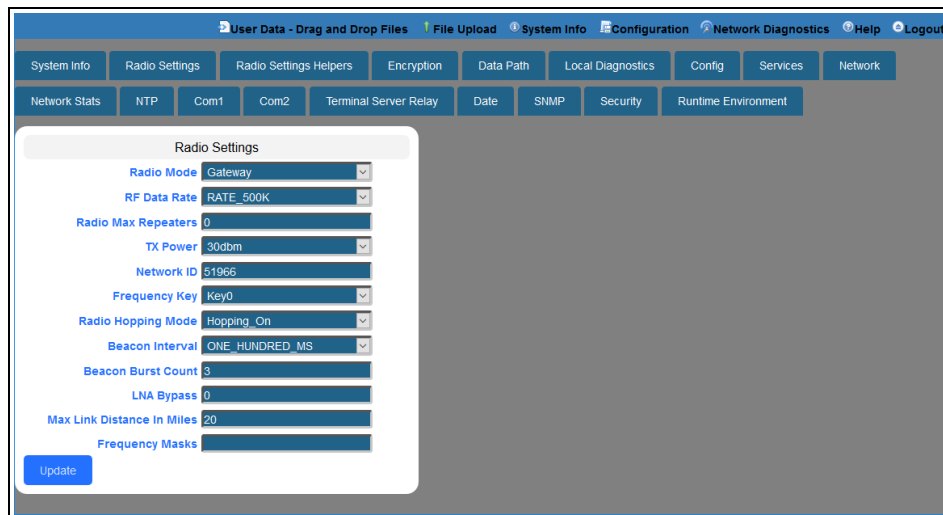


Figure 248: Radio Settings window - Gateway Radio Mode

33.14.2. Endpoint Radio Mode

Important!: Only **radioSettings** that apply to the current **radioMode**, **rfDataRate**, and **radioHoppingMode**, and are visible in the CLI and the Web Interface and can be changed.

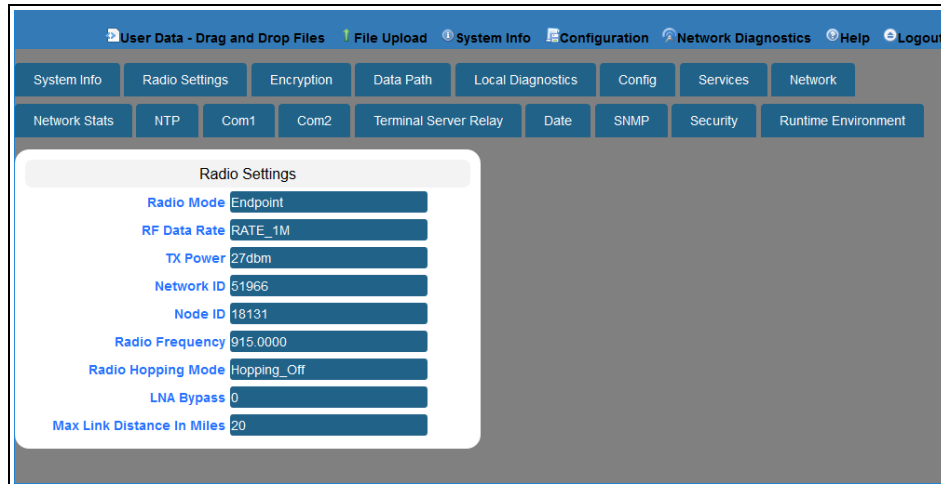


Figure 249: Radio Settings window - Endpoint Radio Mode

33.15. Radio Settings Helpers window

Note: This window is only available if the [radioHoppingMode](#) (on page 267) parameter is set to [Hopping_On](#).

See the [radioSettingsHelpers Parameters](#) (on page 279) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of [192.168.111.100](#).
If the IP address was changed, enter that IP Address.

Example: For the first time, enter [192.168.111.100/config](#).

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window](#) (on page 343) opens.
4. Click the **System Info** link. (Figure 250)

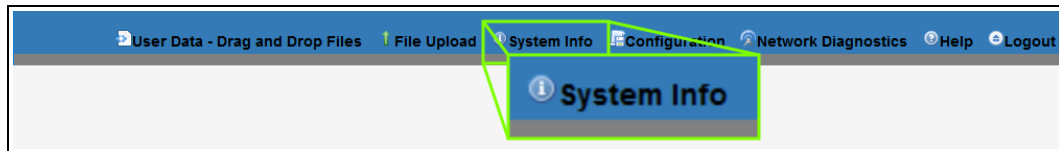


Figure 250: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter [admin](#) in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Radio Settings Helpers** tab.

Note: The information in this window is read-only.
See the [radioSettingsHelpers Parameters](#) (on page 279) for detailed information about the parameters.

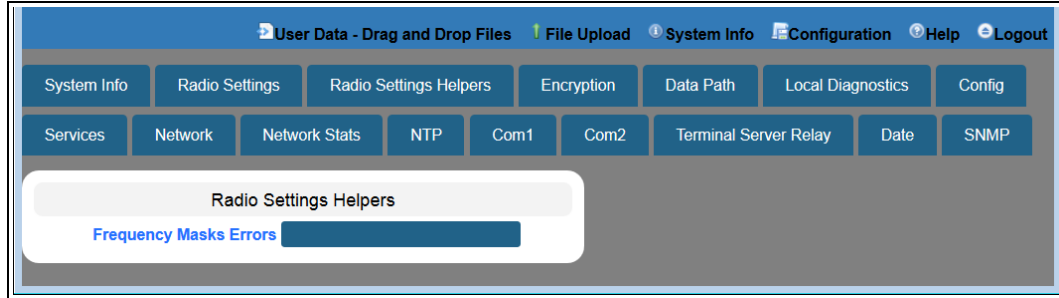


Figure 251: Radio Settings Helpers window

33.16. Runtime Environment window

The **Runtime Environment** window is used to provide information specific to the Linux Runtime Environment.

Note: See the [runtimeEnvironment Parameters \(on page 281\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 252](#))

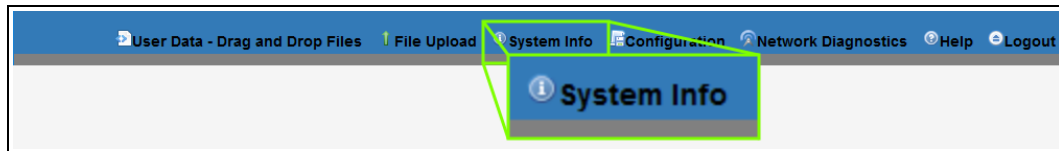


Figure 252: System Info link

The **Authentication Required (Login)** dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Runtime Environment** tab.
The **Runtime Environment** window opens. ([Figure 253](#))

Note: The information in this window is read-only.
See the [runtimeEnvironment Parameters \(on page 281\)](#) for detailed information about the parameters.

Figure 253: Runtime Environment window

33.17. Security window

Note: See the [security Parameters \(on page 285\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 254](#))

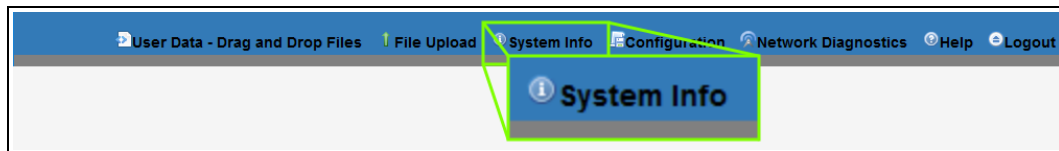


Figure 254: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Security** tab.
The **Security** window opens. ([Figure 255](#))

Note: The information in this window is read-only.
See the [security Parameters \(on page 285\)](#) for detailed information about the parameters.

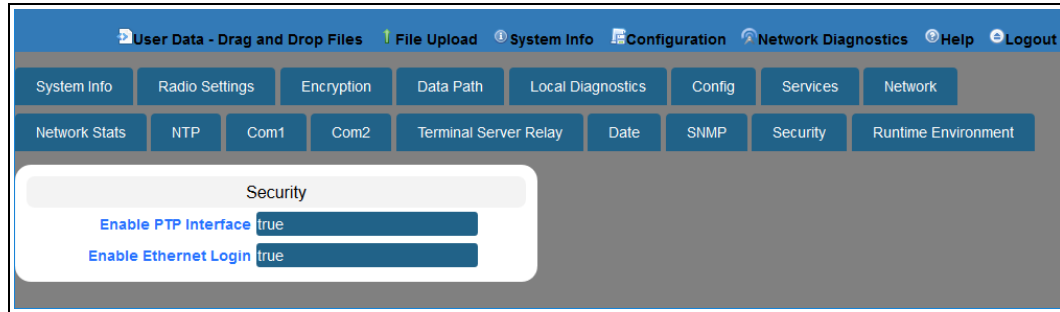


Figure 255: Security window

7. On the Menu bar, click the **Configuration** link to [Change the Security Parameters \(on page 141\)](#).

33.18. Services window

Note: See the [services Parameters \(on page 288\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 256](#))

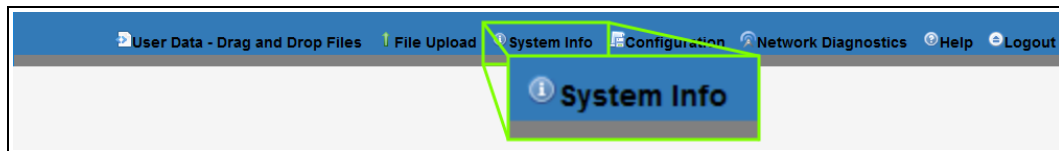


Figure 256: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Services** tab.
The **Services** window opens. ([Figure 257](#))

Note: The information in this window is read-only.
See the [services Parameters \(on page 288\)](#) for detailed information about the parameters.

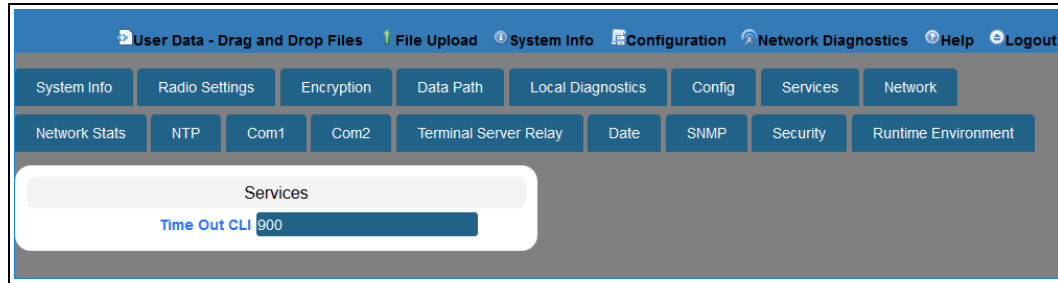


Figure 257: Services window

7. On the Menu bar, click the **Configuration** link to [Change the Services Parameters \(on page 144\)](#).

33.19. SNMP window

Note: See the [SNMP Parameters \(on page 290\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 258](#))

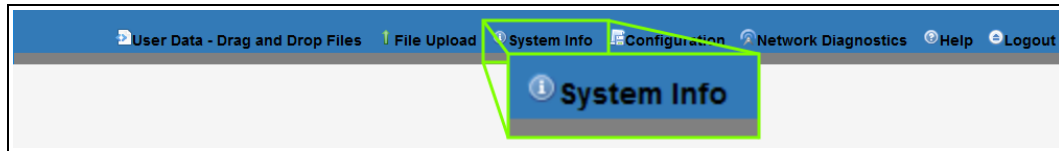


Figure 258: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **SNMP** tab.
The **SNMP** window opens. ([Figure 259](#))

Note: The information in this window is read-only.
See the [SNMP Parameters \(on page 290\)](#) for detailed information about the parameters.

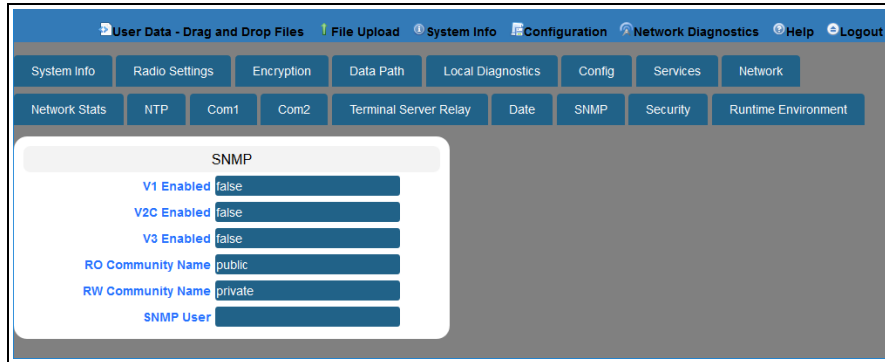


Figure 259: SNMP window

7. On the Menu bar, click the **Configuration** link to [Change the SNMP Parameters \(on page 147\)](#).

33.20. System Info window

The **System Info** window provides system level information for the Z9-PC / Z9-PC-SR001.

Note: See the [systemInfo Parameters \(on page 304\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 260](#))

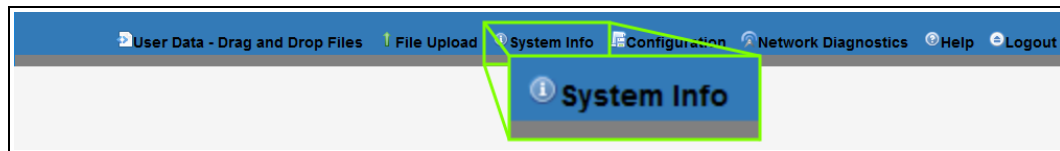


Figure 260: System Info link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens. ([Figure 261](#))

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **System Info** window opens. ([Figure 261](#))



Figure 261: System Info window

6. On the Menu bar, click the **Configuration** link to [Change the System Info Parameters \(on page 150\)](#).

33.21. Terminal Server Relay window

Note: See the [TerminalServerRelay Parameters \(on page 314\)](#) for detailed information about the parameters.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. Click the **System Info** link. ([Figure 262](#))

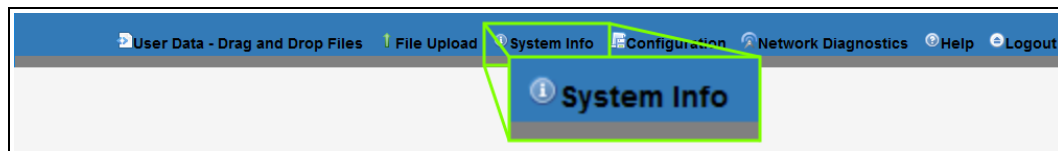


Figure 262: System Info link

The **Authentication Required (Login)** dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.
The **Login** dialog box closes and the **System Info** window opens.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

6. Click the **Terminal Server Relay** tab.
The **Terminal Server Relay** window opens. ([Figure 263](#))

Note: The information in this window is read-only.
See the [TerminalServerRelay Parameters \(on page 314\)](#) for detailed information about the parameters.

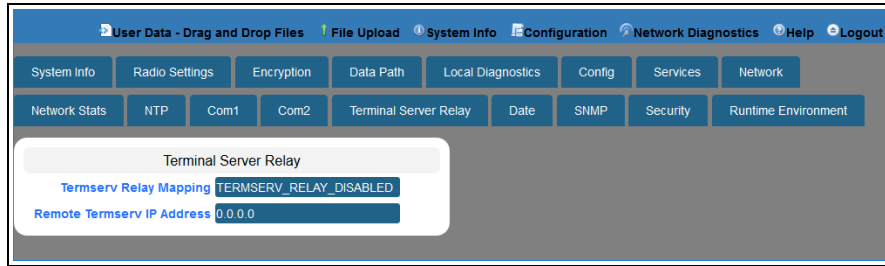


Figure 263: Terminal Server Relay window

7. On the Menu bar, click the **Configuration** link to [Change the Terminal Server Relay Parameters \(on page 153\)](#).

33.22. User Data - Drag and Drop window

The **User Data - Drag and Drop** window lists the default files of the Z9-PC / Z9-PC-SR001.

Access and Window Description

1. Open a web browser.
2. In the URL address bar, enter the IP address of the attached Z9-PC / Z9-PC-SR001.

Note: If this is the first time the Z9-PC / Z9-PC-SR001 is accessed, enter its default IP address of **192.168.111.100**.
If the IP address was changed, enter that IP Address.

Example: For the first time, enter **192.168.111.100/config**.

3. Refresh the browser window (press <Enter> or <F5>).
The [Home window \(on page 343\)](#) opens.
4. On the Menu bar, click the **User Data - Drag and Drop** link.

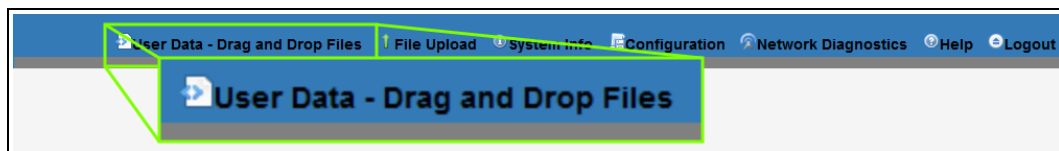


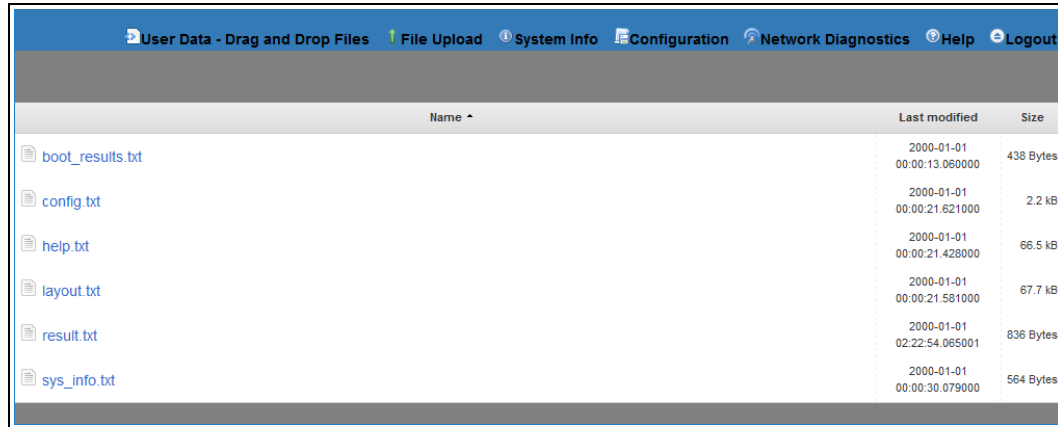
Figure 264: User Data - Drag and Drop Files link

The **Authentication Required** (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**.

Note: If the **User Name** or **Password** were changed, enter the applicable information.

The **Login** dialog box closes and the **User Data - Drag and Drop** window opens. ([Figure 265](#))









Name ^	Last modified	Size
 boot_results.txt	2000-01-01 00:00:13.060000	438 Bytes
 config.txt	2000-01-01 00:00:21.621000	2.2 kB
 help.txt	2000-01-01 00:00:21.428000	66.5 kB
 layout.txt	2000-01-01 00:00:21.581000	67.7 kB
 result.txt	2000-01-01 02:22:54.065001	836 Bytes
 sys_info.txt	2000-01-01 00:00:30.079000	564 Bytes

Figure 265: User Data - Drag and Drop window

Note: See the [Z9-PC / Z9-PC-SR001 Files and Descriptions \(on page 418\)](#) for additional information.

34. Release Notes

These sections describe the additions, changes, known limitations, and workarounds in each software version. The most recent version is listed first.



The latest software versions and the most recent list of known limitations and workarounds are available on www.freewave.com.

34.1. Version 1.1.01

Release Date: August 2018

Additions and Changes

- Support has been added for:
 - Local Diagnostics:
 - [noiseLevel](#) (on page 224)
 - [RxSuccess](#) (on page 232)
 - [TxAvailability](#) (on page 234)
 - [TxSuccess](#) (on page 235)
 - [VSWR](#) (on page 235)

Important! VSWR **may not** function on Z9-PC / Z9-PC-SR001 models manufactured prior to September, 2018.
If the Z9-PC / Z9-PC-SR001 reports a VSWR value of 0 (zero), VSWR is **not** supported.

- [MTU \(on page 239\)](#) 1994 byte size with a VLAN tag.
 - Previously supported an MTU 1400 byte size with a VLAN tag.
- Multicast traffic
- Expanded MIB and SNMP agent for Z9-PC / Z9-PC-SR001:
 - SNMP v2c and v3 write access.
 - Parameters have been added to the MIB and SNMP agent.
- Increase Terminal Server connections from 20 to 128 concurrent TCP connections.
- Default settings were changed to improve field performance:
 - [compressionEnabled \(on page 203\)](#) default is now **True**.
 - [beaconBurstCount \(on page 255\)](#) default is now **3**.
 - [radioHoppingMode \(on page 267\)](#) default is now **Hopping_On**.
 - [rfDataRate \(on page 274\)](#) default is now **RATE_500K**.
 - [txPower \(on page 277\)](#) default is now **30**.

Important! A Gateway MUST BE configured for the radios to communicate.

- Corrections have been implemented for:
 - Frequency Mask
 - COM ports temporarily stop functioning when passing traffic with certain [termserv_relay_mapping \(on page 315\)](#) settings enabled.
 - When [rfDataRate = RATE_4M](#) and [beaconBurstCount = 1](#):
 - Endpoint-Repeaters may lose synchronization with the Gateway and reset themselves.
 - Updated time out behavior for the COM1 and COM2 terminal servers:
 - The connection remains open if data is being sent or received.
- The [TerminalServerTimeout \(on page 193\)](#) connection remains open if data is sent or received.
- When an invalid Gateway is entered, the [gateway \(on page 238\)](#) is set to a null value.
 - When a Z9-PC / Z9-PC-SR001 with a non-default **network.gateway** value (e.g., 194.2.2.2) is upgraded to v1.1.0.1, it is set to a null value after upgrade.
- ZumIQ Application Environment now available
 - This was previously only available as a standard option in the v1.0.6.0 release.

Important! If upgrading to v1.1.0.1 from any previous firmware version, a license key MUST BE requested to activate the ZumIQ Application Environment.
[Contact FreeWave Technical Support \(on page 12\)](#) for the license key.

- The default value for [ntpReference \(on page 252\)](#) was changed to NETWORK_TIME_SERVER.
 - This causes the Z9-PC / Z9-PC-SR001 to attempt to contact the default external **time.nist.gov** IP address listed in [ntp_address \(on page 251\)](#).

Beta Features

Important! Beta Features have not been fully tested by FreeWave.
The intent is to expose the feature and receive early feedback from customers.

- Web Interface
 - Added a **Configuration** menu.
 - Added a **Network Diagnostics** menu

Important! A Gateway is required to use the **Network Diagnostics** menu.

- Network Discovery
 - Discover other Endpoints in the network.
 - Show hops and their paths from the Gateway.
 - Show the link quality (RSSI and Margin).
 - Show neighbors.
- Available options are:
 - Download Support Bundle
 - Clear Status
 - Refresh Network Diagnostics
 - Save Network Diagnostics
- MacTableEntryAgeTimeout
 - The MacTableEntryAgeTimeout is the number of seconds before an inactive entry in the radio MAC Table ages out and expires.
 - This feature:
 - Allows the optimization of the time it takes a unit to learn a new path to allow for Repeater redundancy.
 - Is used to adjust fail-over times with parallel Repeaters.
 - User field sets MacTableEntryAgeTimeout period.
 - The default is 120 seconds, with a Minimum of 30 seconds and a Maximum of 86400 seconds.

Known Limitations and Workarounds

- A downgrade from v1.1.0.1 to v1.0.4.x **requires** an intermediate **downgrade** to v1.0.7.0.

Example: Downgrade v1.1.0.1 to v1.0.7.0, then downgraded to v1.0.4.0.

- v1.0.6.0 / v1.1.0.1 Upgrade or Downgrade
 - When either upgrading or downgrading, the ZumIQ template is changed but NOT the active ZumIQ runtime application environment version.

- Active applications will continue to run.

FREEWAVE Recommends: Prior to an upgrade or downgrade procedure, save and backup all applications.

- Performing an [rteReset \(on page 282\)](#) to copy in the new FW template erases any existing applications in the original runtime application environment.
 - If the new runtime environment is needed, save all applications prior to performing an [runtimeEnvironment.rteReset](#).
- Changing the [ip_address \(on page 238\)](#) to some value other than 192.x.x.x will prevent all subsequent IP address changes.
 - **Workaround:** Enter a Gateway address and reboot the Z9-PC / Z9-PC-SR001.
- VSWR **may not** function on Z9-PC / Z9-PC-SR001 models manufactured prior to September, 2018.
If the Z9-PC / Z9-PC-SR001 reports a VSWR value of 0 (zero), VSWR is **not** supported.
 - VSWR is less accurate at higher power levels (>20dBm).

Note: The reported VSWR is a value proportional to the VSWR. It is closer to VSWR at lower powers, but at higher power levels, it still increases with reflected power.

- After updating the [systemInfo.rteTemplateVersion](#) parameter, a reboot is necessary to update the [sys_info.txt](#) file with the ZumiQ version.
- Rebooting a pair of radios simultaneously when one of the Z9-PC / Z9-PC-SR001 has [termserv_relay_mapping \(on page 315\)](#) enabled, the terminal server relay takes between 2 and 5 minutes to become active.
- To update the [Network Diagnostics window \(on page 349\)](#), refresh the browser to clear the browser cache.
- When upgrading to v1.1.0.1, the [fw_upgrade_result.txt](#) file **does NOT appear** after the upgrade is completed.
 - If the [fw_upgrade_result.txt](#) file does appear in the USB drive after an upgrade, it is now write-protected and cannot be deleted.
- Setting [aggregateEnabled \(on page 202\)](#) on all Endpoints in a network prevents the neighbor table from being populated.
 - The [Network Diagnostics window \(on page 349\)](#) does not appear correctly when [dataPath.aggregateEnabled=true](#).
- [TxAvailability \(on page 234\)](#) is ONLY available via MIB, not via SNMP.
- [RxSuccess \(on page 232\)](#) is NOT available via SNMP.
- [localDiagnostics.TxAvailability](#) returns [localDiagnostics.RxSuccess](#) value via SNMP.
- Options are visible but not active in the [handler \(on page 188\)](#) parameter.

- When [flowControl](#) (on page 188) **Hardware** is enabled on the COM ports of the Z9-PC / Z9-PC-SR001, the CTS line will go low and does not allow traffic to pass through the COM port.

FREEWAVE Recommends: Do NOT use **Com1 and Com2.flowControl=Hardware** for poll-response data.

- **Workaround:** Any device connected to COM1 or COM2 should have flow control disabled.
- The [setKey](#) (on page 217) **cannot** be entered using the Z9-PC / Z9-PC-SR001 Web Interface.

Important! The [encryption.setKey](#) MUST BE entered in CLI.

34.2. Version 1.0.7.0

Release Date: January 2018

Important! The Z9-PC firmware v1.0.7.0 is fully over-the-air compatible with the Z9-P / Z9-PE firmware v1.0.7.0.

Upgrade Notes for Z9-PC / Z9-PC-SR001 - v1.0.7.0

Inside the downloaded [Z9-PC-and-Z9-PC-SR001-v1070-Firmware.zip](#) file, use these **.pkg** and the **.fcf** files when upgrading from v1.0.4.3 firmware:

- The [1_Device_Firmware_v1_0_7_0.pkg](#) file.
- The **.fcf** file for the second part of the upgrade.

Additions and Changes

- Hop table frequency masking masks the channels that fall within the range plus or minus one-half ($\frac{1}{2}$) the channel bandwidth.
- Support has been added for:
 - Multiple Repeaters using a maximum of 3 Repeater slots.
 - The Endpoint-Repeater has a radio Repeater slot range from 1-3.
 - A maximum number of 3 Endpoint-Repeaters are supported in an overlapping communication space or RF coverage area.
 - The radio Repeater slot numbers can be reused where there is no RF connectivity or overlap between the reused radio Repeater slots.

FREEWAVE Recommends: Set the [beaconBurstCount](#) (on page 255) to **2** or more for optimal throughput when Repeaters are used and the RF environment is noisy. This increases the number of beacons sent in a beacon interval.

- The **Terminal Server Relay Client** provides radio-to-radio serial communication.

- Hopping data rates from the Gateway to Endpoint and the Endpoint to Gateway are now more symmetric.
- Improved sensitivity, noise filtering, and interference avoidance for 250 and 500 kbps rates. Throughput rates between the Gateway and Endpoint have been rebalanced.

Important! Data rates 250K and 500K are NOT compatible with previous releases of the ZumLink radio firmware.

- When `network.netmaskFilterEnabled=true`, VLAN tagged packets are filtered out because the radio is not considered on the VLAN and therefore VLAN packets cannot be on the same subnet.
- Multiple FEC-related corrections have been implemented.
- A problem where the Ethernet interface does not work due to pings at boot time has been fixed.
- 250,000 bps is no longer the maximum baud rate for Com1 and Com2.
- After 30 seconds of inactivity on the COM port, the COM ports no longer go into low power mode.

Beta Features

Important! Beta Features have not been fully tested by FreeWave. The intent is to expose the feature and receive early feedback from customers.

- 1.5 Mbps RF Data Rate
 - Sensitivity -90dBm
- MacTableEntryAgeTimeout
 - The MacTableEntryAgeTimeout is the number of seconds before an inactive entry in the radio MAC Table ages out and expires.
 - This feature:
 - Allows the optimization of the time it takes a unit to learn a new path to allow for Repeater redundancy.
 - Is used to adjust fail-over times with parallel Repeaters.
 - User field sets MacTableEntryAgeTimeout period.
 - The default is 120 seconds, with a Minimum of 30 seconds and a Maximum of 86400 seconds.

Known Limitations and Workarounds



Caution: `config.restore` can give inconstant results if the `radioMode` (on page 272) was changed.

- Significant data is lost between radios when operating in close proximity (3-6 feet) when `radioSettings.rfDataRate=RATE_4M`. (See `rfDataRate` (on page 274)).

- **Workaround:** Reduce power on radios when operating in close proximity.
- When using the USB, the CLI may lock up on units with `termserv_relay_mapping` (on page 315) enabled.
 - **Workaround:**
 - Re-seat the cable.
 - Reconfigure the `termserv_relay_mapping` using either of these procedures:
 - [Drag and Drop Configuration - ZumLink](#) (on page 52) or
 - [Web Interface Configuration](#) (on page 74).
- COM ports temporarily stop functioning when passing traffic with certain **Terminal Server Relay** settings enabled.
- When the `termserv_relay_mapping` is in use, the `connectionDrops` (on page 185) count should be ignored.
- When operating at `rfDataRate = RATE_4M` and `beaconBurstCount = 1`:
 - Endpoint-Repeaters may lose synchronization with the Gateway and reset themselves.
 - TCP traffic can be intermittent when operating multiple Repeaters.
- When operating at `rfDataRate = RATE_4M` and with multiple Repeaters, if a **short beaconInterval** and a **high beaconBurstCount** are designated, throughput is very low.
 - **Workaround:** Use either a **longer beaconInterval** or a **lower beaconBurstCount**.
- As Repeaters are chained in the network, round trip delay will increase.
 - When issuing pings of large packet sizes at the lower data rates, such as 115.2K, and a `beaconInterval = TWENTY_FIVE_MS`, the latency can increase causing the pings to fail.
 - **Workaround:** Allowing appropriate delay between pings resolves this issue.

FREEWAVE Recommends: Set the `beaconBurstCount=2` or more and `beaconInterval=ONE_HUNDRED_MS` or more for optimal throughput when extended Repeater networks are used.

- Frequency Mask is not working properly.
- When `flowControl` (on page 188)**Hardware** is enabled on the COM ports of the Z9-PC / Z9-PC-SR001, the CTS line will go low and does not allow traffic to pass through the COM port.

FREEWAVE Recommends: Do NOT use `Com1 and Com2.flowControl=Hardware` for poll-response data.

- **Workaround:** Any device connected to COM1 or COM2 should have flow control disabled.
- ZumIQ application environment is not available.

34.3. Version 1.0.4.3 (Initial Release)

Release Date: September 2017

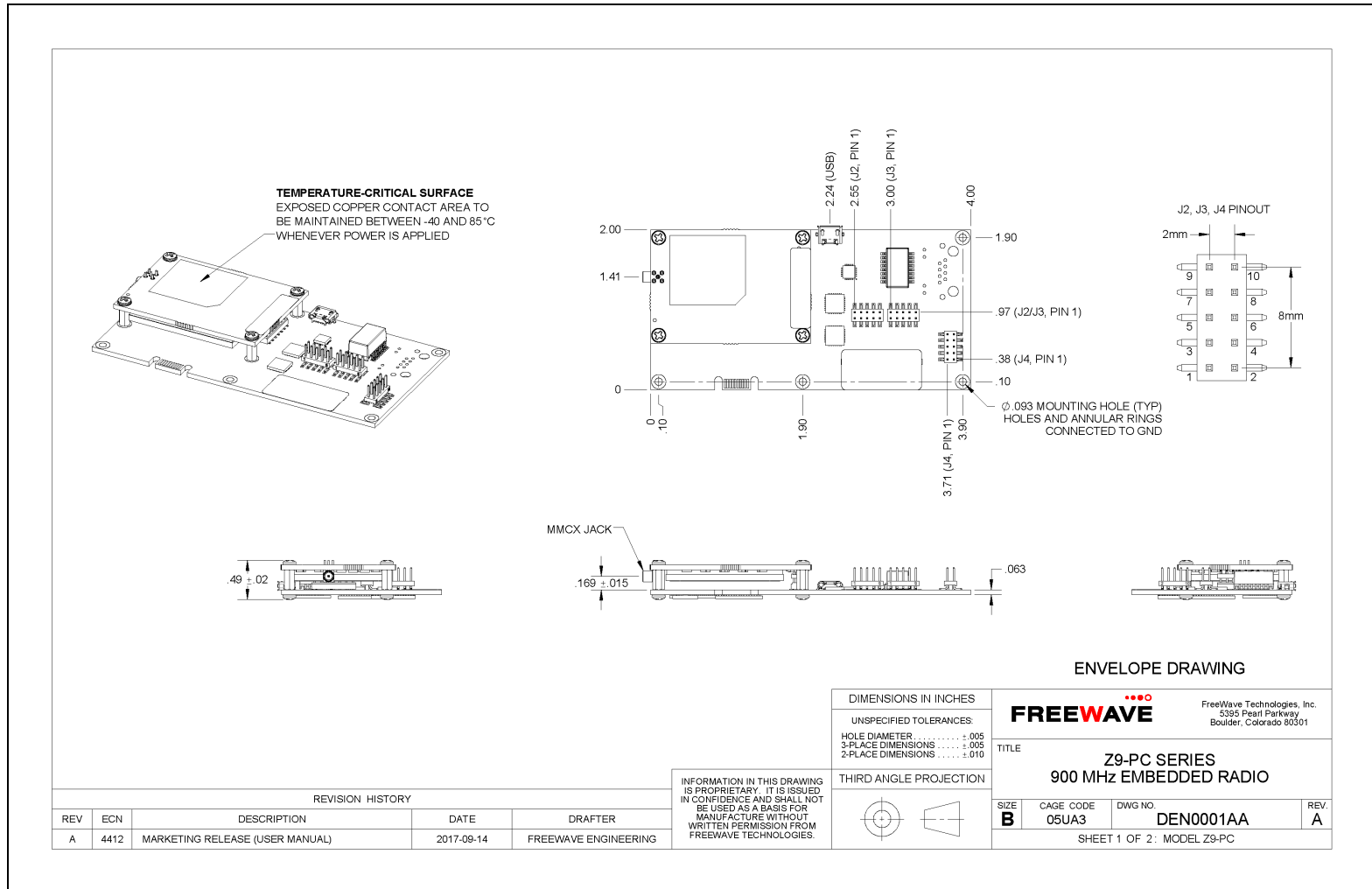
Important! The Z9-PC firmware v1.0.4.3 is fully over-the-air compatible with the Z9-P / Z9-PE firmware v1.0.4.2 and v1.0.4.1 but is NOT compatible with firmware v1.0.3.2 when the `radioSettings.radioHoppingMode` setting is set to **On** (enabled).

Known Limitations and Workarounds

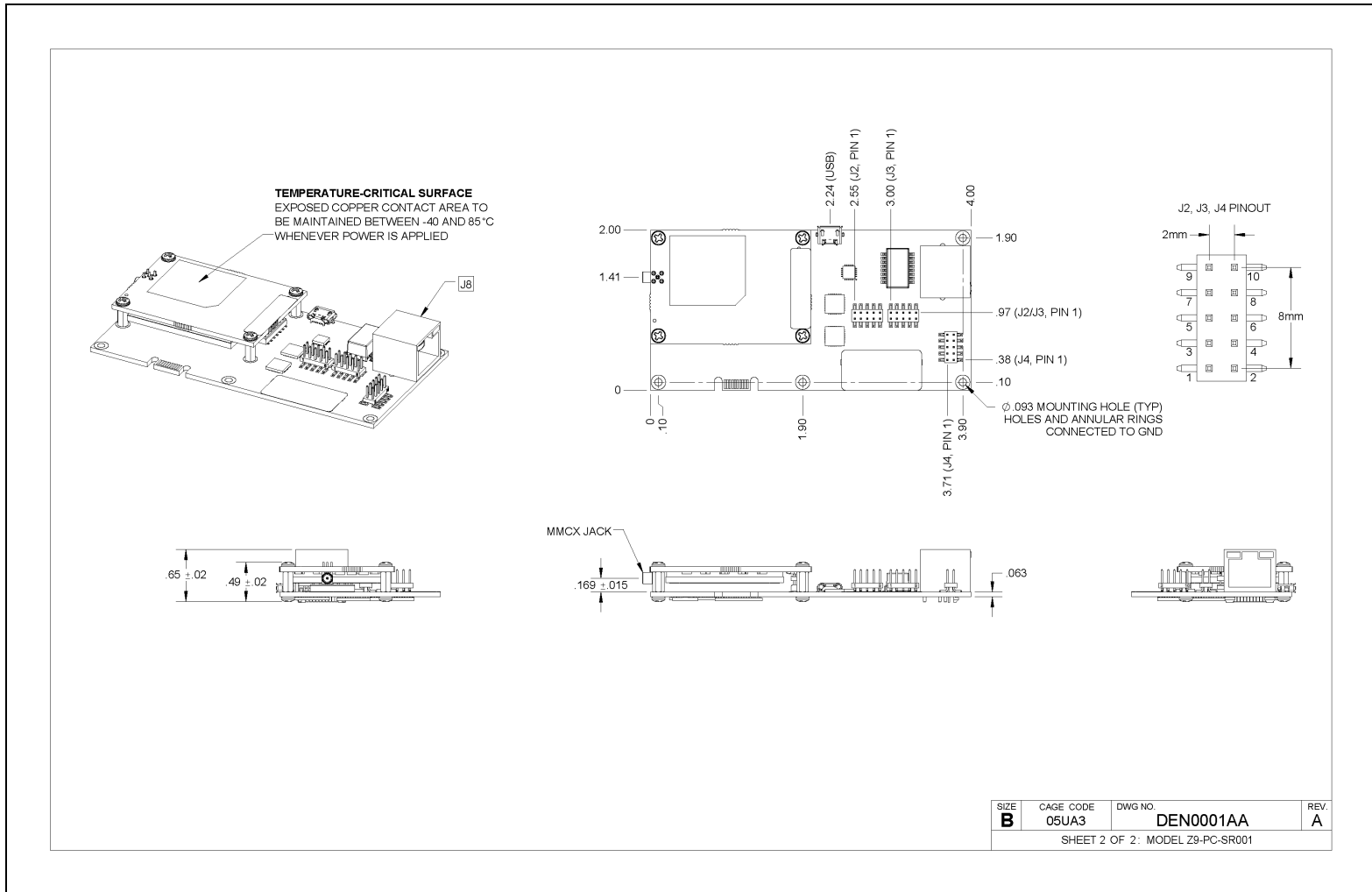
- The COM ports are currently limited to a maximum of 250 kbps.
- After approximately 30 seconds of inactivity on the COM port, it will go into a low power mode.
 - Once the COM port detects activity, it can take up to 100 microseconds to wake up and could result in corrupted data.
 - This can be prevented by actively sending data through the COM port in either direction or actively transitioning the RTS or DTR signals at an interval less than 30 seconds.
- The left LED comes on when powered and blinks when data is being passed while the right LED always remains off.
- Only two LEDs are functional:
 - The CD reflects the state of the RF link.
 - The power is always RED when power is applied.
 - The third LED is non-functional.

35. Mechanical Drawing - Z9-PC

35.1. Z9-PC



35.2. Z9-PC-SR001



36. Hop Tables

- [Standard Hop Set - ZumLink 900MHz Channels \(on page 384\)](#)

36.1. Standard Hop Set - ZumLink 900MHz Channels

These are the standard channels supported when the [radioHoppingMode](#) (on page 267) is **Enabled**.

Note: When the **Radio Hopping Mode** is **Disabled**, the frequency can be set manually.

- RF Data Rate: 115.2 kbps (on page 384)
- RF Data Rate: 250 kbps (on page 385)
- RF Data Rate: 500 kbps (on page 385)
- RF Data Rate: 1 Mbps (on page 386)
- RF Data Rate: 1.5 Mbps (on page 386)
- RF Data Rate: 4 Mbps (on page 387)

36.1.1. RF Data Rate: 115.2 kbps

Channel Size (MHz): 0.2304

Number of Channels: 110

Standard Hop Set - ZumLink 900MHz Channels						
RF Data Rate: 115.2 kbps						
Frequency	Frequency	Frequency	Frequency	Frequency	Frequency	Frequency
MHz	MHz	MHz	MHz	MHz	MHz	MHz
902.4768	907.0848	911.6928	916.3008	920.9088	925.5168	
902.7072	907.3152	911.9232	916.5312	921.1392	925.7472	
902.9376	907.5456	912.1536	916.7616	921.3696	925.9776	
903.1680	907.7760	912.3840	916.9920	921.6000	926.2080	
903.3984	908.0064	912.6144	917.2224	921.8304	926.4384	
903.6288	908.2368	912.8448	917.4528	922.0608	926.6688	
903.8592	908.4672	913.0752	917.6832	922.2912	926.8992	
904.0896	908.6976	913.3056	917.9136	922.5216	927.1296	
904.3200	908.9280	913.5360	918.1440	922.7520	927.3600	
904.5504	909.1584	913.7664	918.3744	922.9824	927.5904	
904.7808	909.3888	913.9968	918.6048	923.2128		
905.0112	909.6192	914.2272	918.8352	923.4432		
905.2416	909.8496	914.4576	919.0656	923.6736		
905.4720	910.0800	914.6880	919.2960	923.9040		
905.7024	910.3104	914.9184	919.5264	924.1344		
905.9328	910.5408	915.1488	919.7568	924.3648		
906.1632	910.7712	915.3792	919.9872	924.5952		
906.3936	911.0016	915.6096	920.2176	924.8256		
906.6240	911.2320	915.8400	920.4480	925.0560		
906.8544	911.4624	916.0704	920.6784	925.2864		

36.1.2. RF Data Rate: 250 kbps**Channel Size (MHz): 0.3456****Number of Channels: 73**

Standard Hop Set - ZumLink900MHz Channels										
RF Data Rate: 250 kbps										
Frequency		Frequency		Frequency		Frequency				
MHz		MHz		MHz		MHz				
902.5344		907.0272		911.5200		916.0128		920.5056		924.9984
902.8800		907.3728		911.8656		916.3584		920.8512		925.3440
903.2256		907.7184		912.2112		916.7040		921.1968		925.6896
903.5712		908.0640		912.5568		917.0496		921.5424		926.0352
903.9168		908.4096		912.9024		917.3952		921.8880		926.3808
904.2624		908.7552		913.2480		917.7408		922.2336		926.7264
904.6080		909.1008		913.5936		918.0864		922.5792		927.0720
904.9536		909.4464		913.9392		918.4320		922.9248		927.4176
905.2992		909.7920		914.2848		918.7776		923.2704		
905.6448		910.1376		914.6304		919.1232		923.6160		
905.9904		910.4832		914.9760		919.4688		923.9616		
906.3360		910.8288		915.3216		919.8144		924.3072		
906.6816		911.1744		915.6672		920.1600		924.6528		

36.1.3. RF Data Rate: 500 kbps**Channel Size (MHz): 0.6912****Number of Channels: 36**

Standard Hop Set - ZumLink 900MHz Channels										
RF Data Rate: 500 kbps										
Frequency		Frequency		Frequency		Frequency				
MHz		MHz		MHz		MHz				
902.7072		906.8544		911.0016		915.1488		919.2960		923.4432
903.3984		907.5456		911.6928		915.8400		919.9872		924.1344
904.0896		908.2368		912.3840		916.5312		920.6784		924.8256
904.7808		908.9280		913.0752		917.2224		921.3696		925.5168
905.4720		909.6192		913.7664		917.9136		922.0608		926.2080
906.1632		910.3104		914.4576		918.6048		922.7520		926.8992

36.1.4. RF Data Rate: 1 Mbps**Channel Size (MHz): 1.3824****Number of Channels: 18**

Standard Hop Set - ZumLink 900MHz Channels		
RF Data Rate: 1 Mbps		
Frequency		Frequency
MHz		MHz
903.0528		915.4944
904.4352		916.8768
905.8176		918.2592
907.2000		919.6416
908.5824		921.0240
909.9648		922.4064
911.3472		923.7888
912.7296		925.1712
914.1120		926.5536

36.1.5. RF Data Rate: 1.5 Mbps**Channel Size (MHz): 1.3824****Number of Channels: 17**

Standard Hop Set - ZumLink 900MHz Channels	
RF Data Rate: 1.5 Mbps	
MHz	
903.2562	916.1586
904.8690	917.7714
906.4818	919.3842
908.0946	920.9970
909.7074	922.6098
911.3202	924.2226
912.9330	925.8354
914.5458	

36.1.6. RF Data Rate: 4 Mbps**Channel Size (MHz): 3.2256****Number of Channels: 7**

Standard Hop Set - ZumLink 900MHz Channels
RF Data Rate: 4 Mbps
Frequency
MHz
904.5504
907.7760
911.0016
914.2272
917.4528
920.6784
923.9040

37. ZumLink MIB

These are the supported item groups in the Z9-PC / Z9-PC-SR001 MIB file:

- [CPU Usage \(on page 389\)](#)
- [Disk Usage \(on page 390\)](#)
- [Memory Usage \(on page 392\)](#)
- [FreeWave Technologies-MIB \(on page 394\)](#)
- [SNMP Write Access \(on page 410\)](#)

37.1. CPU Usage

ZumLink MIB - CPU Usage					
Objective Type	Syntax	MAX Access	Status	Description	::=
ssCpuUser	Integer32	Read-only	Deprecated	The percentage of CPU time spent processing user-level code, calculated over the last minute.	{ systemStats 9 }
ssCpuSystem	Integer32	Read-only	Deprecated	The percentage of CPU time spent processing system-level code, calculated over the last minute.	{ systemStats 10 }
ssCpuIdle	Integer32	Read-only	Deprecated	The percentage of processor time spent idle, calculated over the last minute.	{ systemStats 11 }
ssCpuNice	Integer32	Read-only	Deprecated	The percentage of processor time spent nice, calculated over the last minute.	{ systemStats 12 }

37.2. Disk Usage

ZumLink MIB - Disk Usage					
Objective Type	Syntax	MAX Access	Status	Description	::=
dskTable	Sequence of DskEntry	Not Accessible	Current	Disk watching information. Partitions to be watched are configured by the snmpd.conf file of the agent.	{ ucdavis 9 }
dskEntry	DskEntry	Not Accessible	Current	An entry containing a disk and its statistics. Index = { dskIndex } <pre> DskEntry ::= SEQUENCE { dskPath DisplayString, dskDevice DisplayString, dskTotal Integer32, dskAvail Integer32, dskUsed Integer32, dskPercent Integer32, dskPercentNode Integer32 } </pre>	{ dskTable 1 }
dskPath	DisplayString	Read-only	Current	Path where the disk is mounted.	{ dskEntry 2 }
dskDevice	DisplayString	Read-only	Current	Path of the device for the partition.	{ dskEntry 3 }
dskTotal	Integer32	Read-only	Current	Total size of the disk / partition (kBytes).	{ dskEntry 6 }

ZumLink MIB - Disk Usage					
Objective Type	Syntax	MAX Access	Status	Description	::=
dskAvail	Integer32	Read-only	Current	Available space on the disk.	{ dskEntry 7 }
dskUsed	Integer32	Read-only	Current	Used space on the disk.	{ dskEntry 8 }
dskPercent	Integer32	Read-only	Current	Percentage of space used on disk.	{ dskEntry 9 }
dskPercentNode	Integer32	Read-only	Current	Percentage of nodes used on disk.	{ dskEntry 10 }

37.3. Memory Usage

ZumLink MIB - Memory Usage						
Objective Type	Syntax	Units	MAX Access	Status	Description	::=
memTotalSwap	Integer32	kB	Read-only	Current	The total amount of swap space configured for this host.	{ memory 3 }
memAvailSwap	Integer32	kB	Read-only	Current	The amount of swap space currently unused or available.	{ memory 4 }
memTotalReal	Integer32	kB	Read-only	Current	The total amount of real / physical memory installed on the host.	{ memory 5 }
memAvailReal	Integer32	kB	Read-only	Current	The amount of real / physical memory currently unused or available.	{ memory 7 }
memShared	Integer32	kB	Read-only	Current	The total amount of real or virtual memory currently allocated for use as shared memory. This object will not be implemented on hosts where the underlying operating system does not explicitly identify memory as specifically reserved for this purpose.	{ memory 13 }
memBuffer	Integer32	kB	Read-only	Current	The total amount of real or virtual memory currently allocated for use as memory buffers. This object will not be implemented on hosts where the underlying operating system does not explicitly identify memory as specifically reserved for this purpose.	{ memory 14 }

ZumLink MIB - Memory Usage						
Objective Type	Syntax	Units	MAX Access	Status	Description	::=
memCached	Integer32	kB	Read-only	Current	The total amount of real or virtual memory currently allocated for use as cached memory. This object will not be implemented on hosts where the underlying operating system does not explicitly identify memory as specifically reserved for this purpose.	{ memory 15 }
memUsedReal	Integer32	kB	Read-only	Current	The amount of real / physical memory currently used or available.	{ memory 18 }
memSpeed	Integer32	Hz	Read-only	Current	The Speed of real / physical memory.	{ memory 19 }

37.4. FreeWave Technologies-MIB

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtPlusModemStatusTable	This table gives basic status information for each radio modem in the system.	Not Accessible	
fwtPlusModemStatusTableEntry	A row containing status information for a specific radio modem.	Not Accessible	
fwtPlusModemSerial	The serial number for the radio the given status table entry line is for	Not Accessible	Gauge32
fwtPlusModemSignal	The received signal level for this radio modem, in dBm.	Read-only	Integer32
fwtPlusModemNoise	The detected noise for this radio modem, in dBm.	Read-only	Integer32
fwtPlusModemSupplyVoltage	The supply voltage to this radio modem, in units of 1/100th of a volt.	Read-only	Integer32
fwtPlusModemRxRate	The current receive rate as a percentage of the maximum, in units of one Hundredth of a percent.	Read-only	Gauge32
fwtPlusModemReflectedPower	The current amount of reflected RF power.	Read-only	Gauge32
fwtPlusModemTemperature	The current temperature of this radio modem in degrees Celsius.	Read-only	Integer32
fwtPlusModemRange	The current approximate range of this radio modem from its peer, in meters.	Read-only	Gauge32

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtPlusModemTxRate	The current transmit rate as a percentage of the maximum, in units of one Hundredth of a percent.	Read-only	Gauge32
fwtPlusModemSNDelta	The current margin (absolute) between the received signal and the noise at this radio.	Read-only	Integer32
fwtPlusModemVendorString	The name of the vendor of this radio modem.	Read-only	DisplayString
fwtPlusModemConnectedTo	The serial number of the radio that we currently have an RF link with.	Read-only	Gauge32
fwtPlusModemUpstreamSignal	The received signal level that the upstream radio receives from this radio, in dBm.	Read-only	Integer32
fwtPlusModemUpstreamNoise	The noise level that the upstream radio receives from this radio, in dBm.	Read-only	Integer32
fwtPlusModemDisconnectCount	The number of times this radio has lost its RF link.	Read-only	Gauge32
fwtPlusModemPacketRxCount	The number of Ethernet packets the radio has received over its RF link.	Read-only	Gauge32
fwtPlusModemPacketTxCount	The number of Ethernet packets the radio has sent over its RF link.	Read-only	Gauge32
fwtPlusModemPacketDroppedCount	The number of Ethernet packets the radio has dropped	Read-only	Gauge32
fwtPlusModemPacketBadCount	The number of BAD / corrupt Ethernet packets the radio has received over its RF link.	Read-only	Gauge32
fwtPlusModemControlTable	This table contains some parameters which may be adjusted for each radio modem in the system.	Not Accessible	
fwtPlusModemControlTableEntry	A row containing adjustable parameters for a specific radio modem.	Not Accessible	

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtPlusModemNetworkMode	The network mode to be used by a radio modem.	Read-Write	INTEGER
fwtPlusModemMode	The modem mode to be used by a radio modem.	Read-Write	INTEGER
fwtPlusModemFrequencyKey	The frequency key to be used by a radio modem.	Read-Write	Gauge32
fwtPlusModemMinPacketSize	The minimum packet size to be used by a radio modem.	Read-Write	Gauge32
fwtPlusModemMaxPacketSize	The maximum packet size to be used by a radio modem.	Read-Write	Gauge32
fwtPlusModemTxPower	The transmit power to be used by a radio modem.	Read-Write	Gauge32
fwtPlusModemRetryTimeout	How many times a radio modem should try to transmit a packet before timing out.	Read-Write	Gauge32
fwtPlusModemRFDataRate	The RF data rate to be used by a radio modem. Permissible values are 1200,867,614, 154, or 115, depending on the series of radios.	Read-Write	Gauge32
fwtPlusModemBroadcastRepeat	The number of times a Gateway will send out a packet of information before moving on to the next.	Read-Write	Gauge32
fwtPlusModemNetworkID	A numerical ID that radios use to decide which network they are allowed to link to.	Read-Write	Gauge32
fwtPlusModemRepeaters	Allows for repeaters in the network, or not.	Read-Write	INTEGER
fwtPlusModemRxSubnetID	A numerical ID that radios use to decide which subnet they are allowed to link to.	Read-Write	Gauge32
fwtPlusModemTxSubnetID	A numerical ID that radios use to decide which subnet they will transmit on.	Read-Write	Gauge32

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtPlusModemReboot	Set to 1 to reboot radio. This will force any changes to take effect.	Read-Write	INTEGER
fwtPlusModemMaxSlaveRetry	The maximum number of times an Endpoint can attempt to deliver data to the Gateway before it discards the data.	Read-Write	Gauge32
fwtPlusModemSystemName	A textual identifier for a given system.	Read-Write	DisplayString
fwtPlusModemControlFreqZoneTable	This table describes the available frequency zones for a radio modem and allows them to be selectively enabled and disabled.	Not Accessible	
fwtPlusModemControlFreqZoneTableEntry	A row describing a specific frequency zone and whether it is enabled or disabled.	Not Accessible	
fwtPlusModemFreqZoneIndex	An index used to identify a specific frequency zone for a specific radio modem.	Not Accessible	Gauge32
fwtPlusModemFreqZoneDescr	A textual description of a specific frequency zone for a specific radio modem.	Read-only	DisplayString
fwtPlusModemFreqZoneEnabled	If the value of this object is true(1) then the referenced frequency zone is enabled for the relevant radio modem. If the value of this object is false(2), then the frequency zone is disabled.	Read-Write	TruthValue
fwtZumLinkSerialNumber	Serial Number	Read-only	Unsigned32
fwtZumLinkModelCode	Model Code	Read-only	Unsigned32
fwtZumLinkRadioModel	Radio model	Read-only	DisplayString
fwtZumLinkRadioModelCode	Radio Model Code	Read-only	Unsigned32
fwtZumLinkRadioFirmwareVersion	Radio Firmware Version	Read-only	DisplayString
fwtZumLinkRadioSerialNumber	Radio Serial Number	Read-only	DisplayString

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkDeviceName	Device Name	Read-only	DisplayString
fwtZumLinkDeviceModel	Device Model	Read-only	DisplayString
fwtZumLinkDeviceConfiguration	Device Configuration	Read-only	DisplayString
fwtZumLinkDeviceFirmwareVersion	Device Firmware Version	Read-only	DisplayString
fwtZumLinkDeviceId	Device Identifier	Read-only	Unsigned32
fwtZumLinkLayoutHash	Unique Layout Identifier	Read-only	Unsigned32
fwtZumLinkResetInfo	Reset Information	Read-only	DisplayString
fwtZumLinkHopTableVersion	Radio Hop Table Version	Read-only	DisplayString
fwtZumLinkRteVersion	Runtime Environment Version	Read-only	DisplayString
fwtZumLinkRteTemplateVersion	Runtime Template Environment Version	Read-only	DisplayString
fwtZumLinkLicenses	License Information	Read-only	DisplayString
fwtZumLinkRadioMode	Radio Operational Mode	Read-Write	ZUMLINK_RADIO_MODE_THOR
fwtZumLinkRfDataRate	RF Link Data Rate	Read-Write	ZUMLINK_RF_DATA_RATES
fwtZumLinkRadioMaxRepeaters	Max Repeater slots in the Network	Read-Write	Unsigned32
fwtZumLinkRadioRepeaterSlot	Repeater Slot	Read-Write	Unsigned32
fwtZumLinkTxPower	Transmit Power	Read-Write	ZUMLINK_RADIO_TX_POWER
fwtZumLinkNetworkId	Network Identifier	Read-Write	Unsigned32
fwtZumLinkNodeId	Node ID	Read-Write	Unsigned32
fwtZumLinkFrequencyKey	Frequency Key	Read-Write	ZUMLINK_FREQUENCYKEYS
fwtZumLinkRadioFrequency	Operating Center Frequency in MHz	Read-Write	Float32TC

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkRadioHoppingMode	Radio Hopping Mode	Read-Write	ZUMLINK_RADIO_HOPPING_MODE
fwtZumLinkBeaconInterval	Beacon Interval	Read-Write	ZUMLINK_BEACON_INTERVALS
fwtZumLinkBeaconBurstCount	The number of beacons to send per beacon time.	Read-Write	Unsigned32
fwtZumLinkLnaBypass	LNA Bypass	Read-Write	Unsigned32
fwtZumLinkMaxLinkDistanceInMiles	The max link distance in miles	Read-Write	Unsigned32
fwtZumLinkFrequencyMasks	Frequency Masks	Read-Write	DisplayString
fwtZumLinkFrequencyMasksErrors	Frequency Masks Error	Read-only	DisplayString
fwtZumLinkEncryptionMode	Encryption mode	Read-Write	ZUMLINK_ENCRYPTION_MODE
fwtZumLinkActiveKey	The active selected key.	Read-Write	ZUMLINK_ENCRYPTION_KEYS
fwtZumLinkSetKeySelect	Selection of the next encryption key to be modified.	Read-Write	ZUMLINK_ENCRYPTION_KEYS
fwtZumLinkSetKeyValue	Set the value of the selected key.	Read-Write	DisplayString
fwtZumLinkCompressionEnabled	If compression is enabled out going packets will be sent compressed if the compressed packet is smaller.	Read-Write	TruthValue
fwtZumLinkOtaMaxFragmentSize	OTA Max Fragment Size	Read-Write	Unsigned32
fwtZumLinkFecRate	Sets the FEC (Forward Error Correction) rate.	Read-Write	ZUMLINK_FEC_RATES

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkAggregateEnabled	Enables the aggregation of smaller packets to enhance throughput.	Read-Write	TruthValue
fwtZumLinkRouteMinSignalMarginThresh	The radio route minimum signal level threshold in dB.	Read-Write	INTEGER
fwtZumLinkMacTableEntryAgeTimeout	The number of seconds before an inactive entry in the MAC Table ages out and becomes expired.	Read-Write	INTEGER
fwtZumLinkSignalLevel	Signal Level	Read-only	INTEGER
fwtZumLinkSignalMargin	Signal Margin	Read-only	INTEGER
fwtZumLinkTimestamp	Diagnostics Time Stamp	Read-only	Unsigned32
fwtZumLinkRadioTx	Radio Tx Data Packets	Read-only	Unsigned32
fwtZumLinkRadioRx	Radio Rx Data Packets	Read-only	Unsigned32
fwtZumLinkRadioReliableTx		Read-only	Unsigned32
fwtZumLinkRadioReliableRx		Read-only	Unsigned32
fwtZumLinkRadioRexmit		Read-only	Unsigned32
fwtZumLinkRadioAckTx		Read-only	Unsigned32
fwtZumLinkRadioNoAckTx		Read-only	Unsigned32
fwtZumLinkRadioTimedOut		Read-only	Unsigned32
fwtZumLinkRadioBadAckRx	Radio Bad ACK Received	Read-only	Unsigned32
fwtZumLinkRadioTooLong		Read-only	Unsigned32
fwtZumLinkRadioTooShort		Read-only	Unsigned32
fwtZumLinkRadioBadSync	Radio Bad Synchronization	Read-only	Unsigned32
fwtZumLinkRadioBadCRC	Radio Bad CRC on RX packets.	Read-only	Unsigned32
fwtZumLinkRadioContentionDrop	Radio Contention Drop	Read-only	Unsigned32
fwtZumLinkRadioSendingDrop		Read-only	Unsigned32

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkRadioLLTx	Radio Low Level Transmit	Read-only	Unsigned32
fwtZumLinkRadioLLRx	Radio Low Level Receive	Read-only	Unsigned32
fwtZumLinkCntSTX		Read-only	Unsigned32
fwtZumLinkCntETX		Read-only	Unsigned32
fwtZumLinkCntBadSync		Read-only	Unsigned32
fwtZumLinkCntBadBCC		Read-only	Unsigned32
fwtZumLinkInterfaceDataTx		Read-only	Unsigned32
fwtZumLinkInterfaceDataRx		Read-only	Unsigned32
fwtZumLinkInterfaceBytesTx		Read-only	Unsigned32
fwtZumLinkInterfaceBytesRx		Read-only	Unsigned32
fwtZumLinkResetsDetected		Read-only	Unsigned32
fwtZumLinkResetsSent		Read-only	Unsigned32
fwtZumLinkResetStats	Reset Statistics	Read-Write	ZUMLINK_NOW_ OPTION
fwtZumLinkMonitoredNode	Monitor Node	Read-Write	Unsigned32
fwtZumLinkChannelDiagsTable	Show Channel Diagnostics	Not Accessible	
fwtZumLinkChannelDiagsEntry	A row containing diagnostics for a channel.	Not Accessible	
fwtZumLinkChannelDiagsIdx	Index to a set of diagnostics for a channel	Not Accessible	Unsigned32
fwtZumLinkChannelDiagsFreq	Channel Diagnostics Frequency	Read-only	Float32TC
fwtZumLinkChannelDiagsRSSI	Channel Diagnostics RSSI	Read-only	INTEGER
fwtZumLinkChannelDiagsMargin	Channel Diagnostics Margin	Read-only	INTEGER
fwtZumLinkChannelDiagsNodeID	Channel Diagnostics Node ID	Read-only	Unsigned32
fwtZumLinkNodeDiagsTable	Show Monitored Node Diagnostics	Not Accessible	
fwtZumLinkNodeDiagsEntry	A row containg diagnostics for a node.	Not Accessible	

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkNodeDiagsNodeId	Node Diagnostics Node ID	Read-only	Unsigned32
fwtZumLinkNodeDiagsFreq	Node Diagnostics Frequency	Read-only	Float32TC
fwtZumLinkNodeDiagsRSSI	Node Diagnostics RSSI	Read-only	INTEGER
fwtZumLinkNodeDiagsMargin	Node Diagnostics Margin	Read-only	INTEGER
fwtZumLinkMacTableClear	Clear the MAC to nodeId mapping table and force routes to be relearned.	Read-Write	ZUMLINK_NOW_OPTION
fwtZumLinkNoiseLevel	Noise Level	Read-only	INTEGER
fwtZumLinkVSWR	VSWR	Read-only	Unsigned32
fwtZumLinkTxSuccess	Transmit Success Percentage	Read-only	Unsigned32
fwtZumLinkTxAvailability	Transmit Availability Percentage	Read-only	Unsigned32
fwtZumLinkRxSuccess	Receive Success Percentage	Read-only	Unsigned32
fwtZumLinkReset		Read-Write	ZUMLINK_RESET_OPTIONS
fwtZumLinkFactoryDefaults		Read-Write	ZUMLINK_FDR_OPTIONS
fwtZumLinkSave		Read-Write	ZUMLINK_NOW_OPTION
fwtZumLinkTimeOutCli	The number of seconds of idle before CLI connection will be closed.	Read-Write	Unsigned32
fwtZumLinkMac_address		Read-only	MacAddress
fwtZumLinkIp_address	IP address of unit when DHCP is disabled.	Read-Write	IpAddress
fwtZumLinkNetmask	Netmask of unit when DHCP is disabled.	Read-Write	IpAddress
fwtZumLinkGateway	Gateway of unit when DHCP is disabled.	Read-Write	IpAddress
fwtZumLinkStpEnabled	Spanning tree protocol is enabled or disabled.	Read-Write	TruthValue

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkTxqueueLen	Sets the Ethernet transmit packet queue length.	Read-Write	Unsigned32
fwtZumLinkMtu	Sets the MTU frame size for the unit.	Read-Write	Unsigned32
fwtZumLinkNetmaskFilterEnabled	Enable or disable bridge firewall.	Read-Write	TruthValue
fwtZumLinkNameserver_address1	DNS for name-to-address resolution.	Read-Write	IpAddress
fwtZumLinkNameserver_address2	DNS for name-to-address resolution.	Read-Write	IpAddress
fwtZumLinkRx_bytes	Number bytes of Ethernet packets received from the radio network.	Read-only	Unsigned32
fwtZumLinkRx_packets	Number of Ethernet packets received from the radio network.	Read-only	Unsigned32
fwtZumLinkRx_dropped	Number of Ethernet packets received from the radio network that were dropped at the Ethernet interface.	Read-only	Unsigned32
fwtZumLinkRx_errors	Number of Ethernet packets received from the radio network that were had Ethernet errors.	Read-only	Unsigned32
fwtZumLinkTx_bytes	Number bytes of Ethernet packets received from the Ethernet port and sent over the radio network.	Read-only	Unsigned32
fwtZumLinkTx_packets	Number Ethernet packets received from the Ethernet port and sent over the radio network.	Read-only	Unsigned32
fwtZumLinkTx_dropped	Number Ethernet packets received from the Ethernet port but dropped because the txqueue was full.	Read-only	Unsigned32
fwtZumLinkTx_errors	Number Ethernet packets received from the Ethernet port that were in error.	Read-only	Unsigned32
fwtZumLinkNtpReference	Clock reference for NTP.	Read-Write	ZUMLINK_NTP_REFERENCE

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwZumLinkNtpRestart	Cause the NTP system to restart.	Read-Write	ZUMLINK_NOW_OPTION
fwZumLinkNtpDate	Set the local time from other NTP servers on the network.	Read-Write	ZUMLINK_NOW_OPTION
fwZumLinkNtp_address1	Server to be used for syncing time. Use 0.0.0.0 to skip this server.	Read-Write	DisplayString
fwZumLinkNtp_address2	Server to be used for syncing time. Use 0.0.0.0 to skip this server.	Read-Write	DisplayString
fwZumLinkNtp_address3	Server to be used for syncing time. Use 0.0.0.0 to skip this server.	Read-Write	DisplayString
fwZumLinkNtp_address4	Server to be used for syncing time. Use 0.0.0.0 to skip this server.	Read-Write	DisplayString
fwZumLinkNtp_address5	Server to be used for syncing time. Use 0.0.0.0 to skip this server.	Read-Write	DisplayString
fwZumLinkCom1Mode	Com port mode	Read-Write	ZUMLINK_UART_MODE
fwZumLinkCom1Handler	Protocol of the com port	Read-Write	ZUMLINK_UART_HANDLER
fwZumLinkCom1Baudrate	Com port baud rate	Read-Write	ZUMLINK_UART_BAUDRATES
fwZumLinkCom1Databits	Com port data bits	Read-Write	ZUMLINK_UART_DATABITS
fwZumLinkCom1Parity	Com port parity	Read-Write	ZUMLINK_UART_PARITY
fwZumLinkCom1Stopbits	Com port number of stop bits	Read-Write	ZUMLINK_UART_STOPBITS

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwZumLinkCom1Duplex	Com port is full or half duplex	Read-Write	ZUMLINK_UART_DUPLEX
fwZumLinkCom1FlowControl	Com port hardware flow control is not supported.	Read-Write	ZUMLINK_UART_FLOWCONTROL_OFF
fwZumLinkCom1DelayBeforeSendMs	Com port will delay sending in Ms to allow the other side to switch from tx to rx mode.	Read-Write	Unsigned32
fwZumLinkCom1BreakBeforeSendUs	Com port will send a break signal for at least the number of microseconds specified before sending the data.	Read-Write	Unsigned32
fwZumLinkCom1TerminalServerPort	The TCP port number to use when handler is set to TerminalServer.	Read-Write	Unsigned32
fwZumLinkCom1TerminalServerTimeOut	Terminal Server TimeOut	Read-Write	Unsigned32
fwZumLinkCom1TxBytes	The total bytes sent out of the Com port.	Read-only	Unsigned32
fwZumLinkCom1RxBytes	The total bytes received from the Com port.	Read-only	Unsigned32
fwZumLinkCom1ConnectionDrops	The number of terminal server connections dropped due to inactivity.	Read-only	Unsigned32
fwZumLinkCom2Mode	Com port mode	Read-Write	ZUMLINK_UART_MODE
fwZumLinkCom2Handler	Protocol of the com port	Read-Write	ZUMLINK_UART_HANDLER
fwZumLinkCom2Baudrate	Com port baud rate	Read-Write	ZUMLINK_UART_BAUDRATES
fwZumLinkCom2Databits	Com port data bits	Read-Write	ZUMLINK_UART_DATABITS
fwZumLinkCom2Parity	Com port parity	Read-Write	ZUMLINK_UART_PARITY

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwzZumLinkCom2Stopbits	Com port number of stop bits	Read-Write	ZUMLINK_UART_STOPBITS
fwzZumLinkCom2Duplex	Com port is full or half duplex	Read-Write	ZUMLINK_UART_DUPLEX
fwzZumLinkCom2FlowControl	Com port hardware flow control is on or off	Read-Write	ZUMLINK_UART_FLOWCONTROL
fwzZumLinkCom2DelayBeforeSendMs	Com port will delay sending in Ms to allow the other side to switch from tx to rx mode.	Read-Write	Unsigned32
fwzZumLinkCom2BreakBeforeSendUs	Com port will send a break signal for at least the number of microseconds specified before sending the data.	Read-Write	Unsigned32
fwzZumLinkCom2TerminalServerPort	The TCP port number to use when handler is set to TerminalServer.	Read-Write	Unsigned32
fwzZumLinkCom2TerminalServerTimeOut	Terminal Server Time Out	Read-Write	Unsigned32
fwzZumLinkCom2TxBytes	The total bytes sent out of the Com port.	Read-only	Unsigned32
fwzZumLinkCom2RxBytes	The total bytes received from the Com port.	Read-only	Unsigned32
fwzZumLinkCom2ConnectionDrops	The number of terminal server connections dropped due to inactivity.	Read-only	Unsigned32
fwzZumLinkTermserv_relay_mapping	Options for streaming between serial device servers.	Read-Write	ZUMLINK_TERMSERV_RELAY_MAPPING
fwzZumLinkRemote_termserv_ip_address	IP address of remote terminal server.	Read-Write	IpAddress
fwzZumLinkUpTime	The number of seconds since the unit restarted.	Read-only	Unsigned32
fwzZumLinkUpTimeString	The number days, hours:minutes:seconds since the unit restarted.	Read-only	DisplayString
fwzZumLinkDcAppUptime	The number of seconds since the main app restarted.	Read-only	DisplayString

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkDcAppStartTime	The timestamp of when the main app restarted.	Read-only	DisplayString
fwtZumLinkTimeString	The current time.	Read-Write	DisplayString
fwtZumLinkFileTransferStatus	File Transfer Status	Read-only	DisplayString
fwtZumLinkV1Enabled	SNMP V1 Enable / Disable	Read-Write	TruthValue
fwtZumLinkV2cEnabled	SNMP V2C Enable / Disable	Read-Write	TruthValue
fwtZumLinkV3Enabled	SNMP V3 Enable / Disable	Read-Write	TruthValue
fwtZumLinkRoCommunityName	Read-Only Community Name	Read-Write	DisplayString
fwtZumLinkRwCommunityName	Read-Write Community String	Read-Write	DisplayString
fwtZumLinkEnablePtpInterface	Enable PTP interface	Read-Write	TruthValue
fwtZumLinkEnableEthernetLogin	Enable SSH logins	Read-Write	TruthValue
fwtZumLinkNeighborTableNumNeighbors	Number of Neighbors	Read-only	Unsigned32
fwtZumLinkNeighborTableNodeId	Device Node ID	Read-only	Unsigned32
fwtZumLinkNeighborTableNodeType	Node Type	Read-only	Unsigned32
fwtZumLinkNeighborTableIpAddress	Neighbor IP Address	Read-only	IpAddress
fwtZumLinkNeighborTableMacAddress	Neighbor MAC Address	Read-only	MacAddress
fwtZumLinkNeighborTableDeviceName	Device Name	Read-only	DisplayString
fwtZumLinkNeighborTableFWVersion	Device Node ID	Read-only	DisplayString
fwtZumLinkNeighborTableCounter	Neighbor Table Counter	Read-only	Unsigned32
fwtZumLinkNeighborTable	This table gives detailed status information for each neighbor of this node.	Not Accessible	
fwtZumLinkNeighborEntry	A row containing status information for a specific neighbor.	Not Accessible	
fwtZumLinkNeighborNodeId	Neighbor Node ID	Read-only	Unsigned32
fwtZumLinkNeighborIpAddress	Neighbor IP Address	Read-only	IpAddress

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkNeighborMacAddress	Neighbor MAC Address	Read-only	MacAddress
fwtZumLinkNeighborNodeType	Neighbor Node Type	Read-only	Unsigned32
fwtZumLinkNeighborRSSI	Neighbor RSSI	Read-only	INTEGER
fwtZumLinkNeighborLinkMargin	Neighbor Link Margin	Read-only	INTEGER
fwtZumLinkNeighborCounter	Neighbor Table Counter	Read-only	Unsigned32
fwtZumLinkNeighborTimestamp	Time When Node Info Received	Read-only	Unsigned32
fwtZumLinkNetworkTableDiscoveryState	Start or Stop Network Discovery	read-write	INTEGER
fwtZumLinkNetworkTableDiscoveryStatus	Get Discover Network Status	Read-only	DisplayString
fwtZumLinkNetworkTableNumNodes	Number of nodes in network	Read-only	Unsigned32
fwtZumLinkNetworkTableTimeStamp	Timestamp for when network table was last updated	Read-only	Unsigned32
fwtZumLinkNetworkTable	This table gives detailed status information for each neighbor of this node.	Not Accessible	
fwtZumLinkNetworkEntry	A row containing status information for a specific node.	Not Accessible	
fwtZumLinkNetworkNodeid	Device ID	Read-only	Unsigned32
fwtZumLinkNetworkNodeType	Node Type / Role	Read-only	Unsigned32
fwtZumLinkNetworkIpAddress	IP Address	Read-only	IpAddress
fwtZumLinkNetworkMacAddress	MAC Address	Read-only	MacAddress
fwtZumLinkNetworkDeviceName	Device Name	Read-only	DisplayString
fwtZumLinkNetworkFwVersion	Firmware Version	Read-only	DisplayString
fwtZumLinkNetworkHopCount	number of hops from node id	Read-only	Unsigned32
fwtZumLinkNetworkNeighborTable	Neighbor Nodes	Not Accessible	
fwtZumLinkNetworkNeighborEntry	A row containing status information for a specific neighbor node.	Not Accessible	

FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkNetworkNeighborNodeId	Neighbor Node ID	Read-only	Unsigned32
fwtZumLinkNetworkNeighborRSSI	RSSI From Neighbor Node	Read-only	INTEGER
fwtZumLinkNetworkPathTable	List of nodes in path from current node where info is gathered to current node	Not Accessible	
fwtZumLinkNetworkPathEntry	A row containing status information for a node in the path.	Not Accessible	
fwtZumLinkNetworkPathIdx	Index to a node in the path	Not Accessible	Unsigned32
fwtZumLinkNetworkPathNodeId	Node In Path From Current Node	Read-only	Unsigned32
fwtZumLinkNetworkPathRSSITable	RSSI values between all the nodes along the path	Not Accessible	
fwtZumLinkNetworkPathRSSIEntry	A row containing RSSI for a node along the path.	Not Accessible	
fwtZumLinkNetworkPathRssiIdx	Index to a pair of source and destination nodes along the path	Not Accessible	Unsigned32
fwtZumLinkNetworkPathRssiSrc	Source Node	Read-only	Unsigned32
fwtZumLinkNetworkPathRssiDst	Destination Node	Read-only	Unsigned32
fwtZumLinkNetworkPathRssiSrcDstRSSI	Source Destination RSSI	Read-only	INTEGER
fwtZumLinkNetworkPathRssiDstSrcRSSI	Source Destination RSSI	Read-only	INTEGER

37.5. SNMP Write Access

1. Verify [v2cEnabled \(on page 294\)](#) is enabled.
2. Make a note of the [rwCommunityName \(on page 291\)](#).

Note: The default is private if it was not changed.

```
>snmp
[Page=snmp]
v1Enabled=false
v2cEnabled=true
v3Enabled=false
roCommunityName=public
rwCommunityName=private
snmpUser
RESULT:0:OK
```

3. Perform the Read/Write using the [snmp.rwCommunityName](#) identified in Step 2.

Example

```
~$ snmpset -mFREEWAVE-TECHNOLOGIES-MIB -Pu -v2c -c private 192.168.2.10
fwtZumLinkRadioMode.0 i gateway
FREEWAVE-TECHNOLOGIES-MIB::fwtZumLinkRadioMode.0 = INTEGER: gateway(0)
```

```
~$ snmpget -mFREEWAVE-TECHNOLOGIES-MIB -Pu -v2c -c private 192.168.2.10
fwtZumLinkRadioMode.0
FREEWAVE-TECHNOLOGIES-MIB::fwtZumLinkRadioMode.0 = INTEGER: gateway(0)
~$ snmpset -mFREEWAVE-TECHNOLOGIES-MIB -Pu -v2c -c private 192.168.2.10
fwtZumLinkRadioMode.0 i endpoint
FREEWAVE-TECHNOLOGIES-MIB::fwtZumLinkRadioMode.0 = INTEGER: endpoint(1)
~$ snmpget -mFREEWAVE-TECHNOLOGIES-MIB -Pu -v2c -c private 192.168.2.10
fwtZumLinkRadioMode.0
FREEWAVE-TECHNOLOGIES-MIB::fwtZumLinkRadioMode.0 = INTEGER: endpoint(1)
```

4. After adjusting the settings, issue the `save` command.

Note: This is the same workflow as the CLI.

```
~$ snmpset -mFREEWAVE-TECHNOLOGIES-MIB -Pu -v2c -c private 192.168.2.10
fwtZumLinkSave.0 i now
FREEWAVE-TECHNOLOGIES-MIB::fwtZumLinkSave.0 = INTEGER: now(1)
```



Best practice for **snmp.v2cEnabled** is to change the **snmp.rwCommunityName** for a production network.

Appendix A: Technical Specifications

Note: Specifications may change at any time without notice. For the most up-to-date specifications information, see the product's data sheet available at www.freewave.com.

Technical Specifications	
Specification	Description
Transmitter	
Frequency Range	<ul style="list-style-type: none"> • 902 to 928MHz • Australia: 915-928 MHz
Output Power	<ul style="list-style-type: none"> • 10mW to 1W • User selectable
Range	97 km (60 miles), clear line of sight
Channel Spacing	<ul style="list-style-type: none"> • 230.4 kHz • 345.6 kHz • 691.2 kHz • 1382.4 kHz • 3225.6 kHz
RF Data Rate	User selectable <ul style="list-style-type: none"> • 115.2 kbps • 250 kbps • 500 kbps • 1 Mbps • 4 Mbps
Receiver	
IF Selectivity	> 40 dB
System Gain	136 dB

Technical Specifications			
Specification	Description		
Sensitivity	RF Data Rate	Without FEC	With FEC
	115.2 kbps	-105 dBm	-108 dBm
	250 kbps	-102 dBm	-105 dBm
	500 kbps	-99 dBm	-102 dBm
	1 Mbps	-95 dBm	-98 dBm
	1.5 Mbps (Beta)	-90 dBm	-93 dBm
	4 Mbps	-83 dBm	-86 dBm
Data Transmission			
Type	Frequency Hopping Spread Spectrum		
Modulation	<ul style="list-style-type: none"> • 2 level GFSK • 4- and 8-ary FSK 		
Link Throughput	<ul style="list-style-type: none"> • Maximum of 1.6 Mbps • 4 Mbps with Compression 		
Error Detection	<ul style="list-style-type: none"> • 16-bit CRC, FEC, and ARQ • Retransmit on error 		
Hopping Rates	User selectable <ul style="list-style-type: none"> • 25ms • 50ms • 100ms • 200ms • 400ms 		
Hopping Channels	<ul style="list-style-type: none"> • Maximum of 110 channels • Dependent on the rfDataRate (on page 274) setting • User selectable <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: See the Australia Hop Set - Channels for additional information.</p> </div>		
Hopping Patterns	<ul style="list-style-type: none"> • Maximum of 16 patterns • Dependent on the rfDataRate (on page 274) setting • User selectable 		
Protocol	Adaptive Spectrum Learning (ASL)		
User Interface Rate	<ul style="list-style-type: none"> • Ethernet Rate: 10/100 Mbps • Serial Rate: Maximum of 1 Mbps 		
Data Encryption	128-bit and 256-bit AES Counter Mode		
VLAN	Layer 2, pass tagged and double-tagged packets		

Technical Specifications	
Specification	Description
Advanced Features	<ul style="list-style-type: none"> • Forward Error Correction • Packet Aggregation • Packet Compression • User selectable
Programmability	
CPU	ARM Coretex-A8 1 GHz
RAM	512 MB
Storage	1 GB
OS	Debian (Linux Kernal 3.14.1)
Power Requirements	
Operating Voltage	+5 to +12 VDC ($\pm 10\%$)
Idle Current	110 mA at 12 VDC
Receive Current	125 mA at 12 VDC
Transmit Current	345 mA at 12 VDC
Interfaces	
Data Connector	Dual Row 10-pin header (1 Ethernet / Power, 2 Serial)
USB Connector	Micro USB
RF Connector	MMCX
General Information	
Operating Temperature	-40°C to +85°C -40°F to +185°F
Humidity	0 to 95% non-condensing
Dimensions	<p>Z9-PC</p> <ul style="list-style-type: none"> • 101.60 L x 50.80 W x 12.45 H (mm) • 4.0 L x 2.0 W x 0.49 H (in) <p>Z9-PC-SR001</p> <ul style="list-style-type: none"> • 101.60 L x 50.80 W x 16.51 H (mm) • 4.0 L x 2.0 W x 0.65 H (in)

Technical Specifications	
Specification	Description
Weight	Z9-PC <ul style="list-style-type: none">• 41g• 0.09 lbs Z9-PC-SR001 <ul style="list-style-type: none">• 45g• 0.10 lbs
Reliability	91,328 hour MTBF

Appendix B: LEDs

These are the LEDs for the Z9-PC / Z9-PC-SR001.

Note: See [Z9-PC and Z9-PC-SR001 Port Connections \(on page 19\)](#) for additional information.

Normal Operation

LEDs - Normal Operation		
LED	LED Color	Description
D2 - Status	Off	While operating with Frequency Hopping enabled, this LED indicates the radio has NOT received the beacon within the last 60 seconds.
D2 - Status	Solid Green ■	The radio is linked with a margin of 20dB or greater above sensitivity or noise level, whichever is highest.
D2 - Status	Blinking Green ⊖	<ul style="list-style-type: none"> • There are 4 blink rates for levels 15dB, 10dB, 5dB, and 0dB below sensitivity or noise level, whichever is highest. • The blink rates are faster as the levels decrease from the sensitivity / noise point. • The RSSI level is based on the last packet received. • The pattern continues for 60 seconds after the last received packet before turning back to Off if the link has dropped.
D3 - Power	Solid Red ■	Power is applied.

LEDs - Normal Operation		
LED	LED Color	Description
D4 - Ethernet Link / Activity	Solid Green ■	Shows Ethernet link but no activity.
D4 - Ethernet Link / Activity	Blinking Green ⊖	<ul style="list-style-type: none"> Shows Activity. LED will blink / flicker while sending and receiving data on the Ethernet port. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Important! This LED is only installed on the Z9-PC.</p> </div>

Z9-PC-SR001 RJ-45 Ethernet Connector LEDs

LEDs - Ethernet		
LED	LED Color	Description
Ethernet Left	Solid Green ■	Shows Ethernet link but no activity.
Ethernet Left	Blinking Green ⊖	<ul style="list-style-type: none"> Shows Activity. LED will blink / flicker while sending and receiving data on the Ethernet port.
Ethernet Right		<div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: This LED is not used on the Z9-PC-SR001.</p> </div>

Appendix C: Z9-PC / Z9-PC-SR001 Files and Descriptions

When the Windows® Explorer window of the Z9-PC / Z9-PC-SR001 is opened, there are default files that appear.

This is a list of those files and descriptions of their purpose.

Note: If the Z9-PC / Z9-PC-SR001 has been upgraded or rebooted, other files may appear.

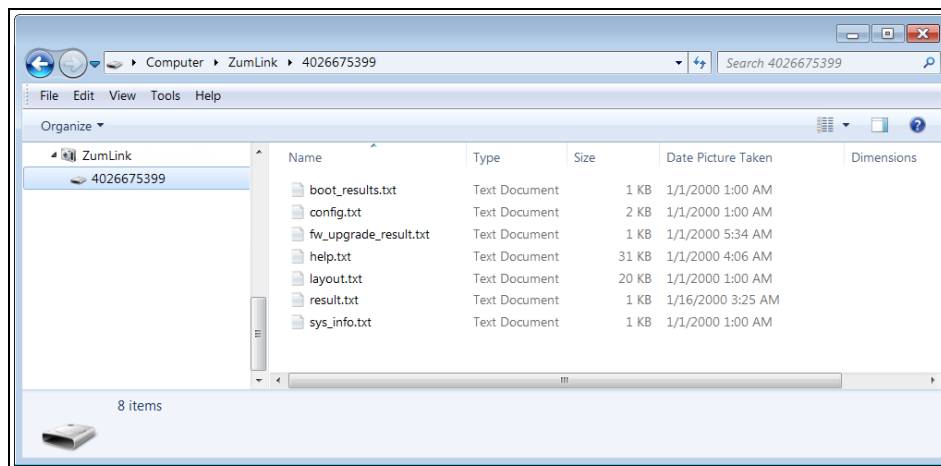


Figure 266: Z9-PC / Z9-PC-SR001 Files shown in Windows® Explorer

Files and Descriptions - Z9-PC / Z9-PC-SR001	
File Name	Description
boot_results.txt	The boot_results.txt file shows the firmware version the device is currently running.
config.txt	The config.txt file contains all of the configuration parameters of the Z9-PC / Z9-PC-SR001. These parameters determine how the device functions and connects to other devices in the network.
fw_upgrade_result.txt	The fw_upgrade_result.txt file shows the status of the upgrade procedure for the device firmware. Note: This file appears after the ZumLink has been upgraded to a newer version of firmware.
help.txt	The help.txt file contains online user assistance information using the CLI commands. Example: In a CLI window, enter help=txPower or help txpower to see the help information for the radioSetting.txpower setting.
layout.txt	The layout.txt file is used for management applications to provide the CLI and config.cfg with a format description of the commands.
modbuslayout.txt	Note: The modbuslayout.txt file is not used.
result.txt	The result.txt is used to verify the acceptance or rejection of each parameter change applied to the config.txt file. Note: This file appears after the config.txt file of the ZumLink has been changed.
sys_info.txt	The sys_info.txt file provides information about the radio including serial number, model number, firmware versions, and device name.

Appendix D: FreeWave Legal Information

Export Notification

FreeWave Technologies, Inc. products may be subject to control by the Export Administration Regulations (EAR) and/or the International Traffic in Arms Regulations (ITAR). Export, re-export, or transfer of these products without required authorization from the U.S. Department of Commerce, Bureau of Industry and Security, or the U.S. Department of State, Directorate of Defense Trade Controls, as applicable, is prohibited. Any party exporting, re-exporting, or transferring FreeWave products is responsible for obtaining all necessary U.S. government authorizations required to ensure compliance with these and other applicable U.S. laws. Consult with your legal counsel for further guidance.

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FreeWave products are designed and manufactured in the United States of America.

FCC Notifications

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1) This device may not cause harmful interference and 2) this device must accept any interference received, including interference that may cause undesired operation.

The content of this guide covers FreeWave Technologies, Inc. models sold under FCC ID: KNYPM0101AB.

All models sold under the listed FCC ID(s) must be installed professionally and are only approved for use when installed in devices produced by FreeWave Technologies or third party OEMs with the express written approval of FreeWave Technologies, Inc. Changes or modifications should not be made to the device.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC NEMA Installation and Label

Where applicable, the models described in this guide must be installed in a NEMA enclosure. When any FreeWave Technologies, Inc. module is placed inside an enclosure, a label must be placed on the outside of the enclosure. The label must include the text: "**Contains Transmitter Module with FCC ID: KNYPMT0101AB.**"

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 52 cm between the radiator and your body.

FCC Notification of Power Warning

The ZumLink Z9-PC or Z9-PC-SR001 covered in this document has a maximum transmitted output power of +30dBm.

The antennas used **MUST** provide a separation distance of at least 52 cm from all persons and **MUST NOT** be co-located or operate in conjunction with any other antenna or transmitter.

IC Notifications

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Ce dispositif est conforme aux normes permis-exemptes du Canada RSS d'industrie. L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence, et (2) ce dispositif doit accepter n'importe quelle interférence, y compris l'interférence qui peut causer le fonctionnement peu désiré du dispositif.

The content of this documentation covers FreeWave Technologies, Inc. models sold under IC: 2329B-PMT0101AB.

IC Host Installation and Label

When any FreeWave Technologies, Inc. module is placed inside a Host, a label must be placed on the outside of the Host. The label must include the text "**Contains IC: 2329B-PMT0101AB**".

IC Radiation Exposure Statement

This system has been evaluated for RF Exposure per RSS-102 and is in compliance with the limits specified by Health Canada Safety Code 6. The system must be installed at a minimum separation distance from the antenna to a general bystander of 7.8 inches (20 cm) to maintain compliance with the General Population limits.

L'exposition aux radiofréquences de ce système a été évaluée selon la norme RSS-102 et est jugée conforme aux limites établies par le Code de sécurité 6 de Santé Canada. Le système doit être installé à une distance minimale de 7.8 pouces (20 cm) séparant l'antenne d'une personne présente en conformité avec les limites permises d'exposition du grand public.

Argentina CNC**Identificación CNC**

- Z9-PC / Z9-PC-SR001: Contiene CNC ID: C-21612

Brazil

ADENDO AO MANUAL
Z9-PE; Z9-P; Z9-PC; Z9-PC-SR001
Atendimento à Regulamentação Anatel

Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

Este produto está homologado pela ANATEL, de acordo com os procedimentos regulamentados pela Resolução 242/2000, e atende aos requisitos técnicos aplicados.

Para maiores informações, consulte o site da ANATEL www.anatel.gov.br



GNU License Notification

Some of the software in the firmware is licensed under the GNU General Public License and other Open Source and Free Software licenses. Contact FreeWave to obtain the corresponding source on CD.

UL Power Source

Input power shall be derived from a certified, Class 2:

- single power source or
- a limited power source (LPS) in accordance with:
 - IEC/EN 60950-1
 - CAN/CSA C22.2 No. 60950-1-07.
- Input voltage for the Z9-PC / Z9-PC-SR001 is +5 to +12 VDC ($\pm 10\%$).

**Standards and Editions**

- HazLoc Standards
 - ANSI/ISA 12.12.01-2013
 - ANSI/ISA-12.12.01-2015
 - CAN/CSA C22.2 No. 213-15
 - Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Division 1 and 2 Hazardous (Classified) Locations
- Ordinary Location Standards
 - UL 60950, 2nd Edition
 - CAN/CSA-C22.2 No. 60950, 2nd Edition
 - IEC 60950, 2nd Edition
 - EN 60950, 2nd Edition
- Essential Health and Safety Requirements related to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to Directive 2014/34/EU of the European Parliament and the Council. Compliance with:
 - EN 60079-0:2012 + A11:2013
 - EN 60079-15:2010
- It is hereby declared that the Z9-PC / Z9-PC-SR001 described in this document is in compliance with RoHS Directive 2011/65/EU of the European Parliament and Council on restriction of the use of certain hazardous substances in electrical and electronic appliances.

...
FREEWAVE