



Z9-PC and Z9-PC-SR001 Z9-PC-CC and Z9-PC-SR001-CC Firmware v1.1.2.2

# **User-Reference Manual**



Part Number: LUM0077AA Revision: Oct-2019

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# Preface

## **Contact FreeWave Technical Support**

For up-to-date troubleshooting information, check the **Support** page at <u>www.freewave.com</u>. 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 <a href="mailto:support@freewave.com">support@freewave.com</a>.

# **Additional Information**

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

Registration is required to use this website.

## **Document Styles**

This document uses these styles:

- Products and applications appear as: FreeWave.
- 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: xxxxxxxxx.

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**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.



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.

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# 1. Overview

Thank you for purchasing the FreeWave ZumLink Z9-PC or 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 900 MHz OEM Ethernet radio module.
- **Z9-PC-SR001** is a Board-level 900 MHz 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 or Z9-PC-SR001 900 MHz Series:

- Operates in the unlicensed 900 MHz 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 IQ, 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.

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**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**

The Z9-PC or Z9-PC-SR001 use Listen Before Talk (LBT) and Carrier Sense Multiple Access (CSMA). There are no assigned slots. The radios transmit when the channel is clear.

- The Gateway broadcasts packets to all Endpoints and Endpoint-Repeaters within range.
- Endpoint-Repeaters broadcast packets to all Endpoints and Endpoint-Repeaters within range.
- The Endpoints unicast packets back to the Gateway or downstream Endpoint-Repeaters.
- The Gateway acknowledges the Endpoint or Endpoint-Repeater 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 or link reliability in the most demanding RF environments.

#### **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.

#### **Forward Error Correction**

- The FEC Rate (on page 239) increases the reliability of the data transferred over the air at the cost of some transmission throughput.
  - Improves sensitivity by 3dB to maximize 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.

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### 1.2.1. Packet Aggregation

- The Aggregate Enabled (on page 236) 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.

#### **Packet Compression**

• When the Compression Enabled (on page 237) 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. IQ Application Environment**

ZumLink provides the IQ 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 or Z9-PC-SR001.

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

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# 2. Included & User-supplied Equipment

### 2.1. Included Equipment

#### **Included Equipment**

Qty	Description
1	Z9-PC or Z9-PC-SR001 wireless device

## 2.2. User-supplied Equipment

This list identifies the equipment the user must provide.

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

**Note**: \*\*See Approved Antennas (on page 215) for detailed information. Approved antennas can be purchased directly from FreeWave.

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# 3. Port Connections and Pinout Assignments

### **Port Connections**

• Z9-PC or Z9-PC-SR001 Port Connections (on page 21)

### **Pinout Assignments**

- Z9-PC or Z9-PC-SR001 COM1 and COM2 Pinout Assignments (on page 22)
- Z9-PC or Z9-PC-SR001 J4 Power / Ethernet Pinout Assignments (on page 24)

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### 3.1. Z9-PC or 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

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## 3.2. **Z9-PC** or **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

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Z9-PC / Z9-PC-SR001 Sei	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			

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## 3.3. **Z9-PC** or **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.

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Z9-PC / Z9	Z9-PC / Z9-PC-SR001 J4-Power / Ethernet Pinout Assignments					
Pin Number	Assignment	Signal	Description			
1	B+ (Power Input)	Input	+5 to +12 VDC***			
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			



Warning! \*\*\*The power connection MUST BE aligned correctly on Pin 1.

Permanent and non-recoverable damage can result if power is applied to any other pins.

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# 4. Installation

- The Z9-PC or Z9-PC-SR001 is approved to operate with an input voltage range of +5 to +12 VDC that can supply at least 0.8 Amps at 6 VDC.
- See the Technical Specifications (on page 477) for additional information.

**FREEWAVE Recommends**: All input power supply wires should be at least **20 AWG** 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 Z9-PC or Z9-PC-SR001 from electric shock and provide filtered conditioned power with over-voltage protection.

Note: The images in this procedure are for Windows® 7 and/or Windows® 10 and Firefox®.

### Procedure

- 1. Install an FCC-approved antenna.
- 2. Connect the antenna feed line to the Z9-PC or Z9-PC-SR001.

**Warning!** Only FCC approved antennas may be used. See Approved Antennas (on page 215).



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.

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

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

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



**Warning!** The power connection **MUST BE** aligned correctly on Pin 1. Permanent and non-recoverable damage can result if power is applied to any other pins.

The LEDs (on page 485) blink to show startup.

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

The FreeWave Drivers and ZumLink windows may open.

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

The FreeWave Drivers and ZumLink windows may open.

File Home Share View Ma	nage			- 0	× ^ (?)
Image: Pin to Quick access     Copy     Paste     Copy path       Paste shortcut     Paste shortcut	Move Copy to * Copy	New item *	Properties	Select all	
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( ) N ( ) ( )	fwt_cdc_acm.cat	7/9/2018 10:53 AM Se	curity Catalog	9 KB	
	fwt_cdc_acm.inf	7/9/2018 10:53 AM Se	tup Information	3 KB	
×					

Figure 4: FreeWave Drivers window

**Important!**: The drivers install automatically.

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> " OS (C:) > " FreeWave D	Drivers (D:)	1.80 GB free of 1	.80 GB				822 💌

Figure 5: ZumLink window

- 5. Optional: Use the Ethernet port for data communications.
- 6. Continue with:
  - Firmware Update (on page 29)
  - Drag and Drop Configuration (on page 54)
  - CLI Configuration (on page 60)
  - Web Interface Configuration (on page 65)

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# 5. Firmware Update

Important!: The Download procedure must be completed first.

These are the basic steps to update the Z9-PC or Z9-PC-SR001 firmware:

### 5.1. Z9-PC or Z9-PC-SR001

- A. Download the Z9-PC or Z9-PC-SR001 Update Files (on page 30)
- B. Review the Update from All Previous Firmware Versions (on page 34) to identify the files used to update from a previous firmware version.
- C. Complete either the: Firmware Update - Drag and Drop (on page 35) or Firmware Update - Web Interface (on page 43)

### 5.1.1. Optional: IQ Installation

- D. Download the IQ Application Environment (on page 73)
- E. Complete either the: Drag and Drop Installation of the IQ Application Environment (on page 76) Web Interface - Installation of IQ Application Environment (on page 80)

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## 5.2. Download the Z9-PC or Z9-PC-SR001 Update Files

Note: The images in this procedure are for Windows® 10 and/or Firefox®.

1. Click <u>support.freewave.com</u>. The **Login** window opens. Figure 6

Important!: Registration is required to use this website.



#### Figure 6: Login window

- 2. Enter the User Name and Password.
- 3. Click

A successful Login message briefly appears. The **Help Topics** window opens.

4. Click the Firmware link. Figure 7

		SUPPORT	REGISTER	FREEWAVE COM
	How can we help	?		
Q Search I	ie knowledge base.			
Help Topics	C Accessories		With our net are resetting names and p please	w website we rall user asswords,

#### Figure 7: Help Topics window - Firmware link

The Firmware window opens.

5. Click the ZumLink Firmware link. Figure 8

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FREEWAVE	
	Q. Smarch the knowledge base
Firmware     FGR Firmware     FGR2 Firmware	Can't Find It? Contact us! Phone: 1.865 923.0168 Email: <u>support Officentine.com</u>
ZumLink Firmware ZumLink Firmware	SUPPORT REGISTER FREEWAVE.COM

Figure 8: Firmware window

The ZumLink Firmware window opens. Figure 9

FREEWAVE		SUPPORT REGISTER FREEWAVE COM
		Q Search the knowledge base
ZumLink Firmware ZIO-P or ZIO-PE	29-P or 29-PE	Can't Find it? Contact us! Phone: 1.866.923.6168 Email: support@/reewave.com
Z9-C or Z9-T	Z9-PC or Z9-PC-SR001	Knowledge Base Articles

Figure 9: ZumLink Firmware window

6. Click the Z9-PC or Z9-PC-SR001 link. The released Firmware v1.1.2.2 files appear in the window. Figure 10

FREEWAVE SUPPORT	SUPPORT REGISTER FREEWAVE.COM
	Q Search the knowledge base
Z9-PC and Z9-PC-SR001	Can't Find it? Contact us!
Firmware ZIP files: Z9-PC - Z9-PC-SR001 (v1.1.2.2)	Phone: 1.866.923.6168 Email: <u>support@freewave.com</u>
Upgrade Application Note: ZumLink and ZIQ (Firmware v1.1.2.2)	
Release Notes: Z9-PC - Z9-PC-SR001 (v1.1.2.2)	Knowledge Base Articles

Figure 10: Z9-PC or Z9-PC-SR001 Firmware window

- Click the Firmware ZIP files: link. The Firmware ZIP files window opens for the Z9-PC or Z9-PC-SR001.
- 8. Select and click the Firmware\_v1\_1\_2\_2 attachment. Figure 11

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# Figure 11: Firmware ZIP files window with the selected Firmware\_v1\_1\_2\_2 Attachment

The **Opening** dialog box opens. Figure 12

u have chosen t	to open:
Firmware_v	1_1_2_2.zip
which is: Co	ompressed (zipped) Folder (42.5 MB)
from: https:	//support.freewave.com
hat should fire	tox do with this file?
_	
O Open with	Windows Explorer (default)
○ <u>O</u> pen with	Windows Explorer (default)
<ul> <li><u>O</u>pen with</li> <li><u>Save File</u></li> <li>Do this auto</li> </ul>	Windows Explorer (default)
<ul> <li>Open with</li> <li>Save File</li> <li>Do this auto</li> </ul>	Windows Explorer (default)
○ <u>O</u> pen with	Windows Explorer (default)

Figure 12: Opening Firmware\_v1\_1\_2\_2.zip dialog box

#### 9. Click OK.

The Enter name of file to save to dialog box opens. Figure 13

Enter name of file	to save to							×
← → • ↑ 📙	$\rightarrow~$ This PC $\rightarrow~$ OS (C:)	> _ZumLink Files > Firn	nware v1.1.2.2 Update Files		v ♂ Se	arch Firmware v	1.1.2.2 Upd	9
Organize 🔻 Ne	w folder							•
👻 📙 _ZumLink Fi	iles	* Name	^	Date modified	Туре	Size		
Firmware v	/1.1.2.2 Update Files			No items match your	search.			
		*						
File name:	Firmware_v1_1_2_2.zip							~
Save as type:	Compressed (zipped) Fe	older (*.zip)						~
∧ Hide Folders					E	Save	Cancel	

#### Figure 13: Enter name of file to save to dialog box

- 10. 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.
- 11. Continue with either:

part by any means without written permission from FreeWave Technologies, Inc.

- a. Download the IQ Application Environment (on page 73) or
- b. Open a Windows® Explorer window and find the location where the .zip file was saved.
- 12. Double-click the .zip file.
- 13. Extract the files from the .zip file into the parent location.

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

14. Continue with Update from All Previous Firmware Versions (on page 34)

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### 5.3. Update from All Previous Firmware Versions

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

#### **Required Files for ZumLink**

1\_Device\_Firmware\_v1\_1\_2\_2.pkg 2\_Radio\_Firmware\_v1\_0\_7\_1.fcf

#### **Optional: Files for ZumLink**

3\_Optional\_IQ\_Developer\_Edition\_v1\_1\_2\_2.pkg

• The **ZumIQ** license is preserved.

**Note**: For **ZumLink**, the **IQ Application Environment** can be added anytime in the future. Contact FreeWave Technical Support (on page 14) for the license key file.

#### IQ Developer Edition v1.1.1.2 / v1.1.2.2 Update or Downgrade

- When either updating or downgrading, the IQ Application Environment template is changed but NOT the active IQ Application Environment runtime application environment version.
  - Active applications will continue to run.
- Performing a Rte Reset (on page 332) 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 a runtimeEnvironment.rteReset.

**FREEWAVE Recommends**: Prior to an update or downgrade procedure, save and backup all applications.

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

- Firmware Update Drag and Drop (on page 35)
- Firmware Update Web Interface (on page 43)

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### 5.4. Firmware Update - Drag and Drop

This is the drag-and-drop procedure to update the Z9-PC or Z9-PC-SR001 firmware.

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

- Alternatively, use the Firmware Update Web Interface (on page 43) to update the Z9-PC or Z9-PC-SR001.
- The images in this procedure are for Windows® 10 and/or Firefox®.

**FREEWAVE Recommends**: Update to Firmware v1.1.2.2 to use the enhanced features and updated security of the Z9-PC or Z9-PC-SR001.

Prior to an update or downgrade procedure, save and backup all applications.

**Caution**: This procedure requires the **Windows® File Explorer** file extension to be visible. See the **Microsoft®** topic Windows File Name Extensions to view the extensions.

- 1. Verify the Download the Z9-PC or Z9-PC-SR001 Update Files (on page 30) 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 Z9-PC or Z9-PC-SR001 windows open.

TreeWave Drivers (D:)	: Tools				- 0	×
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S	fwt_cdc_acm.cat	7/9/2018 10:53 AM Se	curity Catalog	9	KB	
	fwt_cdc_acm.inf	7/9/2018 10:53 AM Se	tup Informatio	n 3	KB	
×						
5 items						

Figure 14: FreeWave Drivers window

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SumLink-4026737941					- 0	х
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✓ ● ZurnLink-4026737941	4026737941 1.80 GB free of 1	1.80 GB				
1 item						::: 📰

Figure 15: ZumLink window

3. In the Z9-PC or Z9-PC-SR001 window, double-click the connected device. The files of the Z9-PC or Z9-PC-SR001 appear in the window. Figure 16

<b>4</b> 026737941					- 🗆	×
File Home Share View					/	· ?
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🗹 🍤 🤇 🗙 📑 💱 🖬 📙 📼						
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SumLink-4026737941	Name	Туре		Size	Date Picture Taker	n
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🟪 OS (C:)	config.txt	Text Document		3 KB	1/1/2000 1:33 AM	
茨 FreeWave Drivers (D:)	help.txt	Text Document		65 KB	1/1/2000 1:20 AM	
	layout.txt	Text Document		67 KB	1/1/2000 1:20 AM	
	result.txt	Text Document		1 KB	1/1/2000 1:10 AM	
	sys_info.txt	Text Document		1 KB	1/1/2000 1:33 AM	
	<					>
6 items					85	

Figure 16: 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 update process in case the old **config.txt** file needs to be restored.

 Locate and select the downloaded 1\_Device\_Firmware\_v1\_1\_2\_2.pkg update file. Figure 17

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Firmware v1.1.2.2 Update Files		- 0	×
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_ZumLink Files	Name Date modified Type	Size	
Firmware v1.1.2.2 Update Files	1_Device_Firmware_v1_1_2_2.pkg 4/2/2019 12:57 PM PKG File	43,388 KB	
	2_Radio_Firmware_v1_0_7_1.fcf 4/2/2019 12:57 PM FCF File	117 KB	
	Firmware_v1_1_2_2.zip 5/23/2019 3:34 PM Compressed (zipp.	43,838 KB	
	FREEWAVE-TECHNOLOGIES-MIB.txt 1/2/2019 9:52 AM Text Document	74 KB	
	LRN0016AA-Z9-P-PE-Release-Notes-(v1122-July-2019).pdf 5/16/2019 8:54 AM Adobe Acrobat D	131 KB	
	LRN0018AA-Z9-PC-PC-SR001-Release-Notes-(v1122-July-2019).pdf 5/23/2019 3:33 PM Adobe Acrobat D	195 KB	
	UCD-SNMP-MIB-WP201.txt 1/2/2019 9:52 AM Text Document	10 KB	
	·		
7 items 1 item selected 42.3 MB			

Figure 17: Selected 1\_Device\_Firmware\_v1\_1\_2\_2.pkg File

6. Drag and drop the **.pkg** file on to the **ZumLink** window. Figure 18 The **.pkg** file will disappear after a few minutes.



Figure 18: Drag and Drop the .pkg file to the ZumLink window

Important!: If the .pkg file is NOT accepted, a Windows® error message appears immediately. Figure 19

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#### Figure 19: Failed PKG Message dialog box

Important!: 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, 8.1, and 10.

- a. If the .pkg file was rejected, change the extension of the .pkg file to .pkg.txt and select that file.
- b. Drag and drop the **.pkg.txt** file to the **ZumLink** window. The **.pkg.txt** file will disappear after a few minutes.

The Copying message appears. Figure 20

Copying		×
	.pk	g
To 'ZumLink-40267	27842\4026727842'	
_		

#### Figure 20: Copying .pkg message



**Caution**: DO NOT click the **Cancel** button to stop the drag-n-drop process. If the drag-n-drop process is canceled during the file copy process, the Z9-PC or Z9-PC-SR001 cannot be accessed in **Windows® File Explorer**. If this happens, reboot the Z9-PC or Z9-PC-SR001 and re-start the drag-n-drop process.

When the file is copied, the Z9-PC or Z9-PC-SR001 window is similar to Figure 21:

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STOP

File Home Share View	<b>▲ □</b> × <b>■</b>	New item ▼ 1 Easy access ▼	Deen *	Select all	-	□ × ^ ?
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SumLink-4026737941	^ Name	Туре	Size	Date Picture Taken	Dimensions	
4026737941	1_Device_Firmware_v1_1_2_2	2.pkg PKG File	43,388 K	B 1/1/2000 1:21 AM		
	boot_results.txt	Text Document	1 K	B 1/1/2000 1:00 AM		
	config.txt	Text Document	4 K	B 1/1/2000 1:00 AM		
	fw_upgrade_result.txt	Text Document	1 K	B 1/1/2000 4:20 AM		
	help.txt	Text Document	77 K	B 1/1/2000 1:00 AM		
	ayout.txt	Text Document	81 K	B 1/1/2000 1:00 AM		
	result.txt	Text Document	2 K	B 1/1/2000 4:20 AM		
	sys_info.txt	Text Document	1 K	B 1/1/2000 1:00 AM		
	*					
8 items						



7. **WAIT** for the **FreeWave Drivers** and **ZumLink** windows to close. The Z9-PC or Z9-PC-SR001 automatically reboots.

**Warning! DO NOT** remove power from the Z9-PC or Z9-PC-SR001 during the firmware update process!

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

To recover from a failed Web Interface update, use the Firmware Update - Drag and Drop (on page 35) procedure to reinstall the .pkg file and WAIT for the file update process to complete.

**DO NOT** start another update or configuration change while an update is in progress.

Note: The LEDs (on page 485)LEDs indicated the update process.

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

- 8. In the Z9-PC or Z9-PC-SR001 window, double-click the connected device. The files of the Z9-PC or Z9-PC-SR001 appear in the window.
- Locate and select the downloaded 2\_Radio\_Firmware\_v1\_0\_7\_1.fcf update file. Figure 22

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Firmware v1.1.2.2 Update Files							-		×
File Home Share View									^ ?
Pin to Quick Copy Paste access	Move Copy to Copy	New item ▼ 1 Easy access ▼ 1 folder	Properties	→ Open ▼ > Edit Weistory	Selec	t all t none t selection			
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$\leftarrow \rightarrow \checkmark \uparrow \square$ > This PC > OS (C:) >	_ZumLink Files > Firmware v1.1.	2.2 Update Files	√ Ō	Search Fi	rmware v1.	1.2.2 Update File	5		P
_ZumLink Files	Name	^		Date modi	fied	Туре	Size		
Firmware v1.1.2.2 Update Files	1_Device_Firmware_v1_1_2	_2.pkg		4/2/2019 1	2:57 PM	PKG File	43,38	8 KB	
	2_Radio_Firmware_v1_0_7_	1.fcf		4/2/2019 1	2:57 PM	FCF File	11	7 KB	
	Firmware_v1_1_2_2.zip			5/23/2019	3:34 PM	Compressed (z	tipp 43,83	8 KB	
	FREEWAVE-TECHNOLOGIE	S-MIB.txt		1/2/2019 9	:52 AM	Text Documen	t 7	4 KB	
	👃 LRN0016AA-Z9-P-PE-Rele	ase-Notes-(v1122-July-2019).	pdf	5/16/2019	8:54 AM	Adobe Acroba	t D 13	1 KB	
	LRN0018AA-Z9-PC-PC-SR	001-Release-Notes-(v1122-Ju	ly-2019).pdf	5/23/2019	3:33 PM	Adobe Acroba	t D 19	5 KB	
	UCD-SNMP-MIB-WP201.b	t		1/2/2019 9	:52 AM	Text Documen	t 1	0 KB	
~									
7 items 1 item selected 116 KB									

Figure 22: Selected 2\_Radio\_Firmware\_v1\_0\_7\_1.fcf File

10. Drag and drop the **.fcf** file on to the **ZumLink** window. Figure 24 The **.fcf** file will disappear.



Figure 23: Failed FCF Message dialog box

Important!: 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, 8.1, and 10.

- a. If the .fcf file was rejected, change the extension of the .fcf file to .fcf.txt and select that file.
- b. Drag and drop the .fcf.txt file on to the ZumLink window. The .fcf.txt file will disappear.

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e + + + This PC + ZamLink	4026737941 > 4026737941	<ul> <li>♦ Search #EXETTER</li> </ul>	
[# ZumLink-4026737941	Name	Nye Sice Date Ficture Taken Dimensions	
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		- 7 Annu - 1 Anni subjected 116 AB	

### Figure 24: Drag and Drop the .fcf file to the ZumLink window

11. Wait for the .fcf or .fcf.txt file to be applied.

DO NOT start another update or configuration change while an update is in progress.



12. Optional: Open the sys.info.txt file to verify the update information. Figure 25

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

<pre>ile Edit Format View Help Page=systemInfo] ystemInfo.serialNumber=4026737941 ystemInfo.modelCode=0 ystemInfo.radioModel=AMT0100AA ystemInfo.radioModelCode=0 ystemInfo.radioFirmwareVersion=FWT1071TR.42 ystemInfo.radioSerialNumber=4026737941 ystemInfo.deviceName= ystemInfo.deviceName= ystemInfo.deviceConfiguration=R1 ystemInfo.deviceConfiguration=R1 ystemInfo.deviceId=1 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.hopTableVersion=FWT112TP.55</pre>	×
Page=systemInfo] ystemInfo.serialNumber=4026737941 ystemInfo.modelCode=0 ystemInfo.radioModel=AMT0100AA ystemInfo.radioGerialNumber=4026737941 ystemInfo.deviceName= ystemInfo.deviceName= ystemInfo.deviceConfiguration=R1 ystemInfo.deviceCirmwareVersion=FWT1122TB.66 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT112TP.55	
ystemInfo.serialNumber=4026737941 ystemInfo.modelCode=0 ystemInfo.radioModel=AMT0100AA ystemInfo.radioFirmwareVersion=FWT1071TR.42 ystemInfo.radioSerialNumber=4026737941 ystemInfo.deviceName= ystemInfo.deviceConfiguration=R1 ystemInfo.deviceConfiguration=R1 ystemInfo.deviceId=1 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1122TP.55	
ystemInfo.modelCode=0 ystemInfo.radioModel=AMT0100AA ystemInfo.radioModelCode=0 ystemInfo.radioSerialNumber=4026737941 ystemInfo.deviceName= ystemInfo.deviceConfiguration=R1 ystemInfo.deviceConfiguration=R1 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1122TP.55	
ystemInfo.radioModel=AMT0100AA ystemInfo.radioModelCode=0 ystemInfo.radioFirmwareVersion=FWT1071TR.42 ystemInfo.radioSerialNumber=4026737941 ystemInfo.deviceName= ystemInfo.deviceNodel=Z9- ystemInfo.deviceConfiguration=R1 ystemInfo.deviceFirmwareVersion=FWT1122TB.66 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1112TP.55	
ystemInfo.radioModelCode=0 ystemInfo.radioFirmwareVersion=FWT1071TR.42 ystemInfo.radioSerialNumber=4026737941 ystemInfo.deviceName= ystemInfo.deviceConfiguration=R1 ystemInfo.deviceFirmwareVersion=FWT1122TB.66 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1112TP.55	
ystemInfo.radioFirmwareVersion=FWT1071TR.42 ystemInfo.radioSerialNumber=4026737941 ystemInfo.deviceName= ystemInfo.deviceConfiguration=R1 ystemInfo.deviceFirmwareVersion=FWT1122TB.66 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1112TP.55	
ystemInfo.radioSerialNumber=4026737941 ystemInfo.deviceName= ystemInfo.deviceConfiguration=R1 ystemInfo.deviceFirmwareVersion=FWT1122TB.66 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1112TP.55	
ystemInfo.deviceName= ystemInfo.deviceModel=Z9- ystemInfo.deviceConfiguration=R1 ystemInfo.deviceFirmwareVersion=FWT1122TB.66 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1112TP.55	
ystemInfo.deviceModel=Z9- ystemInfo.deviceConfiguration=R1 ystemInfo.deviceFirmwareVersion=FWT1122TB.66 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1112TP.55	
ystemInfo.deviceConfiguration=R1 ystemInfo.deviceFirmwareVersion=FWT1122TB.66 ystemInfo.deviceId=1 ystemInfo.layoutHash=325426040 ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1112TP.55	
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ystemInfo.resetInfo= ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1112TP.55	
ystemInfo.hopTableVersion=SET0101HT ystemInfo.rteVersion=FWT1112TP.55	
ystemInfo.rteVersion=FWT1112TP.55	
·	
vstemInfo.rteTemplateVersion=FWT1112TP.55	
vstemInfo.licenses=Custom Apps	
vstemInfo.themeVersion=FWT1122TB.66	

#### Figure 25: sys.info.txt file with Updated Firmware

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Important!: For the v1.1.2.2 update, these parameters should have this information: systemInfo.radioFirmwareVersion=FWT1071TR.42. Web Interface - Radio Firmware Version is FWT1071TR.42. systemInfo.deviceFirmwareVersion=FWT1122TB.66 Web Interface - Device Firmware Version is FWT1122TB.66

If these versions are NOT listed in their respective parameters, repeat the update procedure.

#### 13. Continue with:

- Drag and Drop Configuration (on page 54)
- CLI Configuration (on page 60)

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# 5.5. Firmware Update - Web Interface

This procedure uses a web browser window to update the Z9-PC or Z9-PC-SR001 firmware.

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

- Alternatively, use the Firmware Update Drag and Drop (on page 35) to update the Z9-PC or Z9-PC-SR001.
- The images in this procedure are for Windows® 10 and/or Firefox®.

**FREEWAVE Recommends**: Update to Firmware v1.1.2.2 to use the enhanced features and updated security of the Z9-PC or Z9-PC-SR001.

Prior to an update or downgrade procedure, save and backup all applications.

**Caution**: This procedure requires the **Windows® File Explorer** file extension to be visible. See the **Microsoft®** topic Windows File Name Extensions to view the extensions.

The Z9-PC or Z9-PC-SR001 update process requires these basic steps:

- A. Download the Z9-PC or Z9-PC-SR001 Update Files (on page 30)
- B. Setup the Computer IP Address Configuration (on page 44)
- C. Install the Update File using the Web Interface (on page 48)

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

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# 5.5.1. Setup the Computer IP Address Configuration

**Note**: This procedure is required to access the Web Interface of the Z9-PC or Z9-PC-SR001. The images in this procedure are for **Windows**® 10 and/or **Firefox**®.

- 1. Connect the CAT5e / CAT6 Ethernet cable to the Z9-PC or Z9-PC-SR001 Ethernet port and the Ethernet port on the computer.
- 2. On the computer, open the Windows® Control Panel.
- 3. View the **Control Panel** window by **Category** and click **Network and Sharing Center**. Figure 26

All Control Panel Items			>
→ → ↑ 🔄 > Control Panel →	All Control Panel Items >		✓ O Search Control Panel J.
ile Edit View Tools			
Adjust your computer's setting	s		View by: Small icons +
Administrative Tools	a AutoPlay	Backup and Restore (Windows 7)	RitLocker Drive Encryption
Dior Management	Credential Manager	Date and Time	Default Pragrams
Dell Command   Power Manager	Dell Command   Update	Dell Touchpad	📲 Device Manager
Pix Devices and Printers	Ease of Access Center	File Explorer Options	File History
Flash Player (32-bit)	Fonts	Free Fall Data Protection	🔓 Indexing Options
T intrared	😥 Intel(R) Rapid Storage Technology	Intel® Graphics Settings	💮 Internet Options
a lava	E Keyboard	() Mail	() Mouse
Network and Sharing Center	MVIDIA Control Page	S NVIDIA nView Desktop Manager	Phone and Modern
रेके गये		Recovery	🔗 Region
Network an	d Sharing Center	all Sound	🔆 Speech Recognition
B¥		System	Taskbar and Navigation
Troubleshooting	R User Accounts	P Windows Defender Firewall	🖼 Windows Mobility Center
Sa Windows To Go	Work Folders		

Figure 26: Control Panel > Network and Sharing Center

The Network and Sharing Center window opens.

4. Click the Change Adapter Settings link. Figure 27



#### Figure 27: Change Adapter Settings Link

The Network Connections window opens. Figure 28

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

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Network Con	nections    Control Panel > Netv	vork and Internet → Network C	onnections		√ Č S	Search
File Edit Vie	w Advanced Tools					
Organize 👻	Disable this network device	Diagnose this connection	Rename this connection	View status of this connection	>>	
×**	Bluetooth Network Connection Not connected fortissl Disconnected PPPoP WAN Adapter	Ethernet freewave.local Intel(R) Ethern	et Connectio Etherne freeway Intel(R)	ttheoret 2 Network cable unprograd Fortinet Virtual Ethernet Ad t e.local Ethernet Connec	tio	

Figure 28: Network Connections window

The Ethernet Status dialog box opens. Figure 29

6. Click the **Properties** button.

🖗 Ethernet Status		$\times$
General		
Connection		
IPv4 Connectivity:	Internet	
IPv6 Connectivity:	No network access	
Media State:	Enabled	
Duration:	03:27:05	
Speed:	1.0 Gbps	
Details		
Activity		
	Sent — 💭 — Received	
Bytes: 1	12,589,202   193,965,946	
Properties	Disable Diagnose	
	Close	

Figure 29: Ethernet Status dialog box

The Ethernet Properties dialog box opens.

- 7. Select the Internet Protocol Version 4 (TCP/IPv4) option. Figure 30
- 8. Click the **Properties** button.

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Description     Transmissio     wide area r     across dive	on Control Pro network proto	tocol/Internet I col that provide	Protocol s comm		Pro	perties	;
Install				Propertie	s		
<					>		
Micro	osoft LLDP P	rotocol Driver			$\sim$		
	osoft Network	Adapter Multip	lexor Prot	ocol			
Forti	Client NDIS 6	.3 Packet Filter	Driver				
🗹 🚋 QoS	Packet Sche	duler					
File a	and Printer Sh	aring for Micros	oft Netwo	orks			
🔽 🛄 Clien	t for Microsof	Networks			~		
This connecti	on uses the f	ollowing items:		Sonngun			
				Configure	а		
Intel(R)	Ethernet Cor	nection (5) I21	9-LM				
Connect using	g:						
letworking S	Sharing						
LUICHICLEI	roperties				X		

Figure 30: Ethernet Properties dialog box

The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box opens. Figure 31

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

ernet	rotocol version 4 (TCP/IP	v4) Properties
eneral	Alternate Configuration	
/ou car his cap for the	get IP settings assigned au ability. Otherwise, you nee appropriate IP settings.	utomatically if your network suppo d to ask your network administrate
() ()	otain an IP address automat	ically
	e the following IP address:	
IP ac	ldress:	
Subr	et mask:	· · · · · · ·
Defa	ult gateway:	· · · · ·
() ()	otain DNS server address au	utomatically
OUs	e the following DNS server	addresses:
Prefe	erred DNS server:	· · · · · ·
Alter	nate DNS server:	
	alidate settings upon exit	Advanced

#### Figure 31: Default Example of Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

- 10. Select the Use the following IP address option button.
- 11. 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 or Z9-PC-SR001 or all other units in the network. Figure 32

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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 or Z9-PC-SR001 IP Address is **192.168.111.100**. The default subnet mask is **255.255.255.0**.

Internet Protocol Version 4 (TCP/IPv4) Properties	×
General	
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.	
Obtain an IP address automatically Use the following IP address:	
IP address: 192.168.111.125	
Subnet mask: 255 . 255 . 255 . 0	
Default gatowaw	
Obtain Use the following IP add	dress:
Use the IP address:	192 . 168 . 111 . 125
	255.255.255.0
Default gateway:	
V	

# Figure 32: Changed Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

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

- 12. Click **OK** to save the changes and close the dialog box.
- 13. Click **Close** twice to close the **Local Area Connection Properties** and **Local Area Connection Status** dialog boxes.
- 14. Continue with Install the Update File using the Web Interface (on page 48).

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### 5.5.2. Install the Update File using the Web Interface

Caution: This procedure requires the Windows® File Explorer file extension to be visible. See the Microsoft® topic Windows File Name Extensions to view the extensions.

Note: The images in this procedure are for Windows® 10 and/or Firefox®.

- 1. Verify these procedures are completed:
  - a. Download the Z9-PC or Z9-PC-SR001 Update Files (on page 30)
  - b. Setup the Computer IP Address Configuration (on page 44)
- 2. Using a CAT5e / CAT6 Ethernet cable, connect the Z9-PC or 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 connected Z9-PC or Z9-PC-SR001 and press <Enter>.The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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. On the Menu list, click the File Upload link. Figure 33



Figure 33: File Upload link

The Authentication Required (Login) dialog box opens.

6. 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 File Upload window opens. Figure 34

€) → ♂ ŵ [	① 192.168.111.100/upload	🖸 🕁	IN O	•
FREEWAVE Q ZumLink	Upload File			
∎User Data 1 File Upload	Upload and Apply File Browse No file selected.			
Site Option     System Info     Configuration     Network Diagnostics	Send Concel			



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#### 7. Click the **Browse** button. The **File Upload** dialog box opens.

 Locate and select the downloaded 1\_Device\_Firmware\_v1\_1\_2\_2.pkg update file. Figure 35

🧕 File Upload					×
$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ $\blacksquare$ $\rightarrow$ This PC $\rightarrow$ OS (C	:) >	_ZumLink Files > Firmware v1.1.2.2 Update Files >		✓ Ö Search Firmware v1.	1.2.2 Upd 🔎
Organize 🔻 New folder				833	- 🔳 🕐
_ZumLink Files	^	Name	Date modified	Туре	Size
Firmware v1.1.2.2 Update Files		1_Device_Firmware_v1_1_2_2.pkg	4/2/2019 12:57 PM	PKG File	43,388 KB
		2_Radio_Firmware_v1_0_7_1.fcf	4/2/2019 12:57 PM	FCF File	117 KB
		Firmware_v1_1_2_2.zip	5/23/2019 3:34 PM	Compressed (zipped) Folder	43,838 KB
		FREEWAVE-TECHNOLOGIES-MIB.txt	1/2/2019 9:52 AM	Text Document	74 KB
		LRN0016AA-Z9-P-PE-Release-Notes-(v1122-July-2019).pdf	5/16/2019 8:54 AM	Adobe Acrobat Document	131 KB
		LRN0018AA-Z9-PC-PC-SR001-Release-Notes-(v1122-July-2019).pdf	5/23/2019 3:33 PM	Adobe Acrobat Document	195 KB
		UCD-SNMP-MIB-WP201.txt	1/2/2019 9:52 AM	Text Document	10 KB
	¥				
File name: 1_Device	e_Firn	nware_v1_1_2_2.pkg		✓ All Files (*.*)	~
				Open	Cancel:

#### Figure 35: File Upload dialog box with Selected 1\_Device\_Firmware\_v1\_1\_2\_2.pkg File

#### 9. Click Open.

The dialog box closes and the **File Upload** window returns showing the selected file. Figure 36

File Edit View History Bookmarks	looks Help		ŝ	-		×
O File Upload X	+					
(←) ୯ ଘ	① 10.2.4.158/upload	… 🖂 🕁	III\ (	D 🤇	8	≡
FREEWAŸË © ZumLink	Upload File					٦
1.08	Upload and Apply File					1
Diser Data 1 File Upload System Info	Browse 1_Device_Firmware_v1_1_2_2.pkg					
Configuration Configuration Network Diagnostics Help	Send Cancel					
OLogout						

#### Figure 36: File Upload window with Selected 1\_Device\_Firmware\_v1\_1\_2\_2.pkg File

#### 10. Click Send.

The File Upload window refreshes and shows the uploaded file.

**Note**: When using the Web Interface on a computer with **Windows**® 8 or **Windows**® 10, clicking **Cancel** does **not** halt the upload process.

11. Wait for the **.pkg** file to be applied. The Z9-PC or Z9-PC-SR001 automatically reboots.

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STOP

**Warning! DO NOT** remove power from the Z9-PC or Z9-PC-SR001 during the firmware update process!

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

To recover from a failed Web Interface update, use the Firmware Update - Drag and Drop (on page 35) procedure to reinstall the .pkg file and WAIT for the file update process to complete.

DO NOT start another update or configuration change while an update is in progress.



- 12. Refresh the browser window (press <F5>).
- 13. Click the **File Upload** link. The **Authentication Required** (Login) dialog box opens.
- 14. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the File Upload window **File Upload** window opens.

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

- 15. Click the **Browse** button. The **File Upload** dialog box opens.
- Locate and select the downloaded 2\_Radio\_Firmware\_v1\_0\_7\_1.fcf update file. Figure 37



#### Figure 37: 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 38

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#### 5. Firmware Update

File Edit View History Bookmarks	pork Help					0	3	
	T 10.2.4.158/upload	(	I 다	lii1	۵	•	۲	≡
FREEWAVE 않ZumLink	Upload File							1
Pluser Data	Upload and Apply File							
<sup>1</sup> File Upload <sup>©</sup> System Info	Browse 2_Radio_Firmware_v1_0_7_1.fcf							
Configuration Network Diagnostics Help	Send Cancel							
eLogout								

Figure 38: File Upload window with Selected .fcf File

#### 18. Click Send.

The File Upload window refreshes and shows the uploaded file.

**Note**: When using the Web Interface on a computer with **Windows**® 8 or **Windows**® 10, clicking **Cancel** does **not** halt the upload process.

#### 19. Wait for the **.fcf** file to be applied.

DO NOT start another update or configuration change while an update is in progress.



The LEDs (on page 485)LEDs indicated the update process.

20. On the Menu list, 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 or Z9-PC-SR001. Figure 40

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

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Figure 40: System Info window

Important!: For the v1.1.2.2 update, these parameters should have this information: systemInfo.radioFirmwareVersion=FWT1071TR.42. Web Interface - Radio Firmware Version is FWT1071TR.42. systemInfo.deviceFirmwareVersion=FWT1122TB.66 Web Interface - Device Firmware Version is FWT1122TB.66 If these versions are NOT listed in their respective parameters, repeat the update procedure.

21. Optional: Continue with Web Interface Configuration (on page 65).

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# 6. Configuration

- Drag and Drop Configuration (on page 54)
- CLI Configuration (on page 60)
- Web Interface Configuration (on page 65)

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# 6.1. Drag and Drop Configuration

Caution: This procedure requires the Windows® File Explorer file extension to be visible.
 See the Microsoft® topic Windows 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 and/or Windows® 10 and Firefox®.

#### 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.

TreeWave Drivers (D:)	re Tools			– 🗆 X
File Home Share View M	anage			~ 🥊
Pin to Quick Copy Paste	Move Copy to * Copy	New folder	Properties	<ul> <li>Select all</li> <li>Select none</li> <li>Invert selection</li> </ul>
Clipboard	Organize	New	Open	Select
🗹 🍤 🥙 🗙 🖷 🖫 🖬 📗 📼				
← → ✓ ↑ 🏂 > FreeWave Drivers (D:	)		ע טֿ Search	FreeWave Drivers (D:) 🛛 🔎
> 🍊 OneDrive	Name	Date modified Typ	se Siz	e
This DC	autorun.inf	7/9/2018 10:53 AM Set	up Information	1 KB
	DRIVER-INFO	7/9/2018 10:53 AM File	2	1 KB
> 🏂 FreeWave Drivers (D:)	茨 FWLogo.ico	7/9/2018 10:53 AM Ico	n	11 KB
	fwt_cdc_acm.cat	7/9/2018 10:53 AM Sec	urity Catalog	9 KB
> P Network	fwt_cdc_acm.inf	7/9/2018 10:53 AM Set	up Information	3 KB
×.				
o items				

Figure 41: FreeWave Drivers window

SumLink-4026737941					- 0	×
File Home Share View						~ 🔞
	Move Copy to *	New item *	Properties	🛃 Open 👻 🎽 Edit 🍘 History	Select all Select none	
Clipboard	Organize	New	Op	en	Select	
<ul> <li>← → ✓ ↑ I → This PC → ZumLin</li> <li>✓ I </li> <li>✓ ZumLink-4026737941</li> </ul>	-4026737941 4026737941		v ē	Search Zun	nLink-4026737941	P
→ 4026737941 > ☆ OS (C:) > う FreeWave Drivers (D:)	1.80 GB free of 1	.80 GB				
1 item						== 📼

Figure 42: ZumLink window

- 2. In the **ZumLink** window, double-click the connected Z9-PC or Z9-PC-SR001. The files of the Z9-PC or Z9-PC-SR001 appear in the window.
- 3. Select the config.txt file and copy it to the clipboard (press <Ctrl+C>). Figure 43

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4026737941						- 0	×
File Home Share Vie	w						~ 🕐
Pin to Quick Copy Paste	path shortcut	Move Copy to Copy	New item •	Properties	Select all Select none		
Clipboard		Organize	New	Open	Select		
🗹 🍤 🦿 🗙 🗐 💱 💷 📙 📼							
$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ $\blacksquare$ $\rightarrow$ This PC $\rightarrow$	ZumLink	-4026737941 > 4026737941	ٽ ~	Search 4026737941			Q
SumLink-4026737941	^	Name	Type Size	Date Picture Taken	Dimensions		
4026737941		boot_results.txt	Text Document 1	(B 1/1/2000 12:00 AM			
		📄 config.txt	Text Document 3 I	(B 1/1/2000 12:00 AM			
		fw_upgrade_result.txt	Text Document 11	(B 1/1/2000 5:01 AM			
		help.txt	Text Document 77 H	(B 1/1/2000 12:00 AM			
		layout.txt	Text Document 80 H	(B 1/1/2000 12:00 AM			
		result.txt	Text Document 21	(B 1/1/2000 5:01 AM			
		sys_info.txt	Text Document 11	(B 1/1/2000 12:00 AM			
	$\checkmark$						
7 items 1 item selected 2.93 KB							

Figure 43: Opened ZumLink window Showing the Default Files

- 4. Leave the **ZumLink** window open it is used later in the procedures.
- 5. Open a **Windows® File 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.

File Home	Share View					~ (
in to Quick Copy access	Cut Copy path Paste Paste Paste shorte	ut Nove Copy	New item •	Properties	Select all Select none	
C	lipboard	Organize	New	Open	Select	
ð 🄊 🤊 🛪 📑						
← → * ↑	> This PC > OS (C	:) > ZumLink-Config-File	ٽ ~	Search ZumLink-Confi	g-File	Q
🛀 OS (C:)	^	Name	Date modified	Туре	Size	
		config.txt	1/1/2000 12:00	AM Text Document	3 KB	
	- 1					

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

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	Untitled - Notep	ad
File	Edit Format	View Help
	New	Ctrl+N
	Open	Ctrl+O
	Save	Ctrl+S
	Save As	
	Page Setup	
	Print	Ctrl+P
	Exit	
-		

Figure 45: Notepad® window - File > Save As Menu

The Save As dialog box opens.

11. 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.

**Important!**: 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.

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

Save As						×
$\leftarrow \rightarrow \checkmark \uparrow $ his PC $\rightarrow$	OS (C:) > 2	ZumLink-Config-File	2	✓ Ö Se	arch ZumLink-Config-File	Q
Organize 🔻 New folder					== -	?
ZumLink-Config-File	^	Name	Date modified	Туре	Size	
		config.txt	1/1/2000 12:00 AM	Text Document	3 KB	
	- 11					
	~					
File name: config.cfg						~
Save as type: All Files (*.*)						$\sim$
∧ Hide Folders			Encoding: ANSI	~	Save Cance	

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

13. Click Save.

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

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

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**Note**: See the System Info Parameters (on page 354) 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 Radio Settings Parameters (on page 303) for detailed information about these settings.

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

A unique nodeld 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 **networkld**.

**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 Radio Settings Parameters (on page 303).

15. For illustration, the **radioSettings.radioMode** was changed from **Endpoint** to **Gateway**. Figure 47

a config.cfg - Notepad	-	×
File Edit Format View Help		
[Page=systemInfo]		^
systemInfo.deviceName=		
[Page=radioSettings]		
radioSettings.radioMode=Gateway		
radioSettings.rfDataRate=RATE_500K		
radioSettings.txPower=30dbm		
radioSettings.networkId=51966		
radioSettings.nodeId=18131		
radioSettings.radioHoppingMode=Hopping_On		
radioSettings.lnaBypass=0		
radioSettings.maxLinkDistanceInMiles=20		
radioSettings.frequencyMasks=		~

#### Figure 47: radioSettings.radioMode Changed from Endpoint to Gateway

16. After changes are completed, press <Ctrl+S> or, on the **File** menu, click **Save** to save the updated file.

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- 17. Close the text editor.
- 18. Locate and open the **ZumLink** window so it is side-by-side with the changed configuration file window.
- 19. Open the Windows® File Explorer designated folder for changed configuration files.
- 20. Select the changed .cfg or .cfg.txt file. Figure 48



Figure 48: Select the Changed .cfg File

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

4036737641 File Home Share View			- 0	×			
Proto Quick Copy Parts Copy path Aree Statement of the State Statement of the Statement of th	py Detets Rename New folder New W	eess • Properties Open • Properties Properties Properties	Select all Select none Invert selection Select				
Q 2 C × → S + □ ≤ =							
← → × ↑ → This PC → ZumLink-4026737941 →	× 4026737941	- 6 Search 4026737941		A			
SumLink-4026737941 * Name	Type Su	Date Picture Taken	Dimensions				
_ 4026737941 boot_result	Its.txt Text Document	1 KB 1/1/2000 12:00 AM					
config.bt	Text Docum	Link-Config-File Home Share View					- 0 X
layoutat resultat sys_info.tat	Test Docum Test Docum Test Docum Test Docum Test Docum acce	ulick Copy Paste	ath Mave Copy Delete Renar	New item •	Properties	Select all	
~	+ Constant of Homes	Clipboard	Organize	New	Open	Select	
7 items	+ Copy to root of storage	C. X = 1 1 - 1 = 1					
	÷ -	- + 📄 > This PC > O	/S (C:) > ZumLink-Config-File	~ 0	Search ZumLink-Conf	ig-file	p
	1	OS (C:)	^ Name ^	Date modifie	d Type	Sice	
	-	Drivers (Dt)	Config.cfg	1/8/2019 9:5	AM CFG File	3.68	
		Users (Ht) Firmware Repository (H) Main (Nk) Departments (Pt) Products (Qt) Burnin (Rt)	Confight	1/1/2008 12/	20 AM Text Document	310	
	2 item	1 item selected 2.93 KB	1001				Dist as

Figure 49: Drag and Drop the .cfg File to the ZumLink Window

22. 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 or 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.

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

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23. Double-click the **result.txt** file to verify there are **No errors Detected** with the identified changes in the file. Figure 50



#### Figure 50: Opened result.txt File

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

- 24. As appropriate, repeat the Drag and Drop procedure to correct any errors.
- 25. Optional: Double-click the **config.txt** file to view and verify the new Z9-PC or Z9-PC-SR001 configuration.
- 26. Optional: Change the Passwords (on page 187).

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# 6.2. CLI Configuration

This procedure provides a **Tera Term** terminal connection to the FreeWave CLI. Other terminal emulators (e.g., **HyperTerminal**, **PuTTY**) may be used.

The basic steps are:

- A. Connect the Z9-PC or Z9-PC-SR001 to the Computer (on page 60)
- B. Access the CLI and Change the IP Address and nodeld (on page 61)

Note: The images in this procedure are for Windows® 7 and/or Windows® 10 and Firefox®.

## 6.2.1. Connect the Z9-PC or 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 or Z9-PC-SR001.

The FreeWave Drivers and ZumLink windows may open.

🏂 FreeWave Driver	rs (D:)	Drive Tools			- 🗆 X
File Home	Share View	Manage			~ 🔞
Pin to Quick Copy access	Paste	ut Move Copy to * Copy	New folder	Properties	Select all Select none
c	lipboard	Organize	New	Open	Select
	FreeWave Drivers	(D:)		マ ひ Search Fre	eWave Drivers (D:) 🔑
> 🐔 OneDrive		^ Name	Date modified Ty	oe Size	
This PC		autorun.inf	7/9/2018 10:53 AM Set	up Information	1 KB
/ marc		DRIVER-INFO	7/9/2018 10:53 AM File	1	1 KB
> 🏂 FreeWave Dri	ivers (D:)	million FWLogo.ico	7/9/2018 10:53 AM Ico	n	11 KB
Network		fwt_cdc_acm.cat	7/9/2018 10:53 AM Se	curity Catalog	9 KB
/ Pretwork		fwt_cdc_acm.inf	7/9/2018 10:53 AM Set	up Information	3 KB
5 items		~			8== <b>F</b>

Figure 51: FreeWave Drivers window



#### Figure 52: ZumLink window

2. Continue with Access the CLI and Change the IP Address and nodeld (on page 61).

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## 6.2.2. Access the CLI and Change the IP Address and nodeld

**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 FreeWave CLI. Other terminal emulators (e.g., **HyperTerminal**, **PuTTY**) may be used. The images in this procedure are for **Windows**® 7 and/or **Windows**® 10 and **Firefox**®.

- 1. On the computer connected to the Z9-PC or Z9-PC-SR001, open a terminal program (e.g., **Tera Term** <u>http://ttssh2.osdn.jp/</u>).
- 2. In Tera Term, click the File menu and select New Connection. Figure 53

٧T	Tera Te	erm - [di	sconnecte	d] VT
ile	Edit	Setup	Control	Window
	New c	onnecti	on	Alt+N
	Duplic	ate sess	ion	Alt+D
	Cygwi	n conne	ection	Alt+G
	Log			
	Comn	nent to l	.og	
	View L	og		
	Show	Log dial	og	
	Send f	ile		
	Transf	er		>
	SSH S	СР		
	Chang	je direct	ory	
	Replay	Log		
	TTV D	acord		



The Tera Term New Connection dialog box opens.

3. Click the **Port** list box arrow and select the COM port the Z9-PC or Z9-PC-SR001 is connected to. Figure 54

Tera Term: New co	nnection	×
⊖ TCP/IP	Host: 192.168.111	1.100 🗸
	✓ History Service: ○ Telnet © SSH	TCP port#: 22 SSH version: SSH2 ~
	○ Other	Protocol: UNSPEC 🗸
Serial	Port: COM1: Com COM1: Com COM6: USB OK	munications Port (COM1) ~ munications Port (COM1) Serial Device (COM6)

Figure 54: Select the Z9-PC or Z9-PC-SR001 COM Port

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

- 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 55



Figure 55: Setup menu > Serial Port

The Tera Term: Serial Port Setup dialog box opens. Figure 56

Port:	COM6	$\sim$	ОК
Speed:	115200	~	
Data:	8 bit	$\sim$	Cancel
Parity:	none	$\sim$	
Stop bits:	1 bit	$\sim$	Help
Flow control:	none	$\sim$	
Transmit dela	y c/char 0	ms	ec/line

#### Figure 56: Tera Term: Serial Port Setup dialog box with Default Settings

- Using Figure 56 as the example, verify the COM port settings are: Speed (Baud Rate): 115200
   Data (Databits): 8 bit
   Parity: none
   Stop bits: 1 bit
- 7. Click **OK** to save the changes and close the dialog box.

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- 8. In the **Tera Term** window, press <Enter>. The FreeWave CLI Login returns.
- 9. Enter admin for the **Username** and press < Enter>.
- 10. Enter **admin** for the **Password** and press <Enter>.

**Note**: The default username and password is admin. 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 opens. Figure 57

🔟 COM6 - Tera Term VT	_	×
File Edit Setup Control Window Help		
freewave-ib login: admin Password: FreeWave Shell >		

#### Figure 57: FreeWave Shell

At the > prompt, type network and press <Enter>.
 The Z9-PC or Z9-PC-SR001 network settings appear. Figure 58



#### Figure 58: network Page window

Note: Steps 12 to 15 make the IP Address and nodeld unique.

12. At the > prompt, type **ip\_address=nnn.nnn.nnn** and press <Enter>.

Note: Where nnn.nnn.nnn is the IP Address assigned to each Z9-PC or Z9-PC-SR001.

13. Optional: Change the Gateway (on page 282) and the Netmask (on page 286) addresses, if required.

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14. At the > prompt, type **nodeId=nnn** and press <Enter>.

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

- 15. At the > prompt, type **save** and press <Enter>.
- 16. Continue with:
  - Change the Passwords (on page 187).
  - Upgrade to the latest firmware using the Firmware Update (on page 29) procedure.

**Note**: Go to <u>support.freewave.com</u> to login and download the latest firmware for the Z9-PC or Z9-PC-SR001.

Registration is required to use this website.

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# 6.3. Web Interface Configuration

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

The basic steps are:

- A. Setup the Computer IP Address Configuration (on page 66)
- B. Setup the Computer IP Address Configuration (on page 66)

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# 6.3.1. Setup the Computer IP Address Configuration

**Note**: This procedure is required to access the Web Interface of the Z9-PC or Z9-PC-SR001. The images in this procedure are for **Windows**® 10 and/or **Firefox**®.

- 1. Connect the CAT5e / CAT6 Ethernet cable to the Z9-PC or Z9-PC-SR001 Ethernet port and the Ethernet port on the computer.
- 2. On the computer, open the Windows® Control Panel.
- 3. View the **Control Panel** window by **Category** and click **Network and Sharing Center**. Figure 59

All Control Panel Items			- 0
→ → ↑ III > Control Panel >	All Control Panel Items >		<ul> <li>O Search Control Panel</li> </ul>
ile Edit View Tools			
Adjust your computer's setting	s		View by: Small icons •
🗄 Administrative Tools	To AutoPlay	Backup and Restore (Windows 7)	Real BitLocker Drive Encryption
Color Management	Credential Manager	Date and Time	Detault Programs
Dell Command   Power Manager	Dell Command   Update	Dell Touchpad	📲 Device Manager
Te Devices and Printers	Ease of Access Center	File Explorer Options	File History
Flash Player (32-bit)	A Fonts	Free Fall Data Protection	🛃 Indexing Options
T infrared	😥 Intel(R) Rapid Storage Technology	Intel® Graphics Settings	💮 Internet Options
de Java	III Keyboard	Mail	() Mouse
Network and Sharing Center	NVIDIA Control Panel	📾 NVIDIA nView Desktop Manager	Phone and Modern
विग फि		7 Recovery	🔗 Region
Network and	d Sharing Center	a Sound	🖗 Speech Recognition
		System	Taskbar and Navigation
Troubleshooting	R User Accounts	P Windows Defender Firewall	🚰 Windows Mobility Center
🔜 Windows To Go	Work Folders		

Figure 59: Control Panel > Network and Sharing Center

The Network and Sharing Center window opens.

4. Click the Change Adapter Settings link. Figure 60



#### Figure 60: Change Adapter Settings Link

The Network Connections window opens. Figure 61

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

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Figure 61: Network Connections window

The Ethernet Status dialog box opens. Figure 62

6. Click the **Properties** button.

🖗 Ethernet Status		$\times$
General		
Connection		_
IPv4 Connectivity	: Internet	
IPv6 Connectivity	: No network access	
Media State:	Enabled	
Duration:	03:27:05	
Speed:	1.0 Gbps	
Details		
Activity	-	-
	Sent — Received	
Bytes:	12,589,202 193,965,946	
Properties	Diagnose	
Pro	Close	2

Figure 62: Ethernet Status dialog box

The Ethernet Properties dialog box opens.

- 7. Select the Internet Protocol Version 4 (TCP/IPv4) option. Figure 63
- 8. Click the **Properties** button.

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Networking       Sharing         Connect using:	Ethernet Properties	×
Connect using: Install Configure Configure This connection uses the following items: Configure Configure	Networking Sharing	
Intel(R) Ethemet Connection (5) I219-LM Configure This connection uses the following items: Client for Microsoft Networks Client for Microsoft Networks Client for Microsoft Networks File and Printer Sharing for Microsoft Networks Client for Microsoft Networks File and Printer Sharing for Microsoft Networks File and Printer Sharing for Microsoft Networks File and Printer Sharing for Microsoft Networks Microsoft Network Adapter Multiplexor Protocol Install Uninstall Properties Properties Properties Properties	Connect using:	
Configure This connection uses the following items:  Cient for Microsoft Networks  Gient for Microsoft Networks  Gient Scheduler  File and Printer Sharing for Microsoft Networks  File and Printer Sharing for Microsoft Network Adapter Multiplexor Protocol  Finstall  Properties  Properties  Properties	Intel(R) Ethernet Connection (5) I219-LM	
This connection uses the following items:	Configure	
Client for Microsoft Networks  Client for Microsoft Networks  Client for Microsoft Networks  Client for Microsoft Networks  Client for Notice Notice Notice Networks  Internet Protocol Version 4 (TCP/IPv4)  Internet Protocol Version 4 (TCP/IPv4)  Install  Uninstall  Properties  Install  Properties  Properties Propert	This connection uses the following items:	
Instal Uninstal Properties Description Transmission Control Protocol/Internet Protocol wide area network protocol that provides compared to deworks		~
Description Transmission Control Protocol/Internet Protocol wide area network protocol that provides comm aronsa diverse intercompared networks	Install Uninstall Properties	
	Description Transmission Control Protocol/Internet Protocol wide area network protocol that provides common across diverse interconnected networks.	Properties

Figure 63: Ethernet Properties dialog box

The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box opens. Figure 64

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

ternet l	Protocol Version 4 (TCP/IPv	4) Properties	
General	Alternate Configuration		
You car this cap for the	n get IP settings assigned aut ability. Otherwise, you need appropriate IP settings.	comatically if your network su to ask your network administ	pports rator
() ()	otain an IP address automatic	ally	
	e the following IP address: –		
IP ac	ldress:		
Subr	iet mask:		
Defa	ult gateway:		
() ()	otain DNS server address aut	omatically	
	e the following DNS server a	ddresses:	
Pref	erred DNS server:		
Alter	nate DNS server:		
V	alidate settings upon exit	Advan	ced
		ОК	Cancel

Figure 64: Default Example of Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

- 10. Select the Use the following IP address option button.
- 11. 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 or Z9-PC-SR001 or all other units in the network. Figure 65

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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 or Z9-PC-SR001 IP Address is **192.168.111.100**. The default subnet mask is **255.255.255.0**.

nternet Protocol Version 4 (TCP/IPv4) Properties X	
General You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.	
Outlant at P address automatically         Image: State of the following IP address:         Image: I	
Obtain to Use the following IP address:	192 . 168 . 111 . 125
Alternate d Validati Subnet mask:	255 . 255 . 255 . 0
Default gateway:	

# Figure 65: Changed Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

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

- 12. Click **OK** to save the changes and close the dialog box.
- 13. Click **Close** twice to close the **Local Area Connection Properties** and **Local Area Connection Status** dialog boxes.
- 14. Continue with Web Interface Configuration Z9-PC or Z9-PC-SR001 (on page 70).

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# 6.3.2. Web Interface Configuration - Z9-PC or Z9-PC-SR001

Note: The images in this procedure are for Windows® 10 and/or Firefox®.

- 1. Verify the Setup the Computer IP Address Configuration (on page 66) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 66



Figure 66: Configuration 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. In the **Configuration** window, click the **Network** tab. The **Network** parameters are shown in Figure 67:





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

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

**Note**: Where nnn.nnn.nnn is the IP Address assigned to each Z9-PC or Z9-PC-SR001.

- 8. Optional: Change the Gateway (on page 282) and the Netmask (on page 286) addresses, if required.
- 9. Click the **Update** button to save the changed information.



**Warning!** At this point, for Ethernet connections, the connection to the Z9-PC or Z9-PC-SR001 is disabled.

- 10. Re-connect to the Z9-PC or 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 68:

shaatee X +					Radio Settings Helpers     Encryption     Data Path     Local Diagnostics     Config     Services     Network       Com2     Terminal Server Relay     Date     SNMP     Security     Ruttime Environment     Modbus     Io Ex Com       Radio Mode     Endpoint     Image: Config     Services     Network       V8 Data Rate     SAMP     Image: Config     Services     Network       Note fractions     Image: Config     Services     Network       Note fract     Image: Config     Image: Config     Services       Note in Digital     Image: Config     Image: Config     Services       Under Holes     Image: Config     Image: Config     Services										
÷ ଫ ໖ 🛛 🖸	) 192.168.111.100/config	/radioSettings								Stics Config Services Network Runtime Environment Modbus Io Ex Co					
) 🕹 Boulder 🥊 Streaming CPR 🌘	Inty [solarad] job       job       -														
REEWAVE	System Info	Radio Se	ttings	Radio Setti	ngs Helpers	Encryption	Dat	a Path	Local Diagno	stics	Config	Service	es Netw	vork	
ZumLink <sup>®</sup>	Network Stats	NTP	Com1	Com2	Terminal Se	lelpers Encryption Data Path Local Diagnostics Config Services Netw mminol Server Relay Date SNMP Security Runtime Environment Modbus Radio Settings point E_500K bin 66 31. pping_On U	lo Ex Cor	m							
	G				<i></i>		lodio Set	tings							
				Radio Mode	Endpoint				Local Diagnostics Config Services Network      Security Runtime Environment Modbus Io Ex Com      D						
er Data				RF Data Rate	RATE_500K				2						
e Upload				TX Powe	30dbm				×.						
stem Info				Network II	51966										
nfiguration			-	Node IC	18131										
twork Diagnostics			Radio	Hopping Mode	Hopping_On										
lp				LNA Bypas	0				<u> </u>						
gout		N	Tax Link D	istance in Mile	20				_						
			H	equency Mask	۹L										

#### Figure 68: Radio Settings window

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), 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 187).
  - Upgrade to the latest firmware using the Firmware Update (on page 29) procedure.

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# 7. IQ Application Environment

The Z9-PC or Z9-PC-SR001 employs the **IQ Application Environment** to provide application deployment.

# **Download and Install**

- a. Download the IQ Application Environment (on page 73)
- b. Drag and Drop Installation of the IQ Application Environment (on page 76)
- c. Web Interface Installation of IQ Application Environment (on page 80)

# Activation and Usage

- a. CLI Activation of the IQ Application Environment (on page 84)
- b. Web Interface Activation of the IQ Application Environment (on page 93)
- c. Access the IQ Linux Environment (on page 107)

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# 7.1. Download the IQ Application Environment

Complete this procedure if installing the IQ Application Environment.

#### Notes

- Zum products shipped from FreeWave with version v1.1.2.2 firmware have the IQ Application Environment pre-installed but it is not licensed or activated.
- If currently using an IQ Application Environment, an update to 3\_Optional\_IQ\_ Developer\_Edition\_v1\_1\_2\_2.pkg is NOT required.
- The images in this procedure are for Windows® 7 and/or Windows® 10 and Firefox®.

# Procedure

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

**Important!**: If continuing from the Download the Z9-PC or Z9-PC-SR001 Update Files (on page 30) procedure for the Firmware\_v1\_1\_2\_2.zip file, return to the Firmware window. Figure 69

FREEWAVE		SUPPORT REGISTER FREEWAVE COM
		Q Search the knowledge base
ZumLink Firmware     ZIQ-P or ZIQ-PE	Z9-P or Z9-PE	Can't Find It? Contact us! Phone: 1.866.923.6168 Email: support@freewave.com
Z9-C or Z9-T	Z9-PC or Z9-PC-SR001	Knowledge Base Articles

#### Figure 69: Firmware window

2. Click the **ZIQ-P or ZIQ-PE** link.

The released Firmware v1.1.2.2 files appear in the window. Figure 70

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## Figure 70: Z9-PC or Z9-PC-SR001 Firmware Upgrade window

3. Select and click the 3\_Optional\_IQ\_Developer\_Edition\_v1\_1\_2\_2.zip attachment. The Opening dialog box opens. Figure 71

o open: 10 Developer Edition v1 1 2 2 zin	
managed (rinned) Folder (124 MP)	
//cupped/rolder(124 MB)	
Windows Explorer (default)	~
	o open: IQ_Developer_Edition_v1_1_2_2.zip mpressed (zipped) Folder (124 MB) //support.freewave.com fox do with this file? Windows Explorer (default)

Figure 71: Opening 3\_Optional\_IQ\_Developer\_Edition\_v1\_1\_2\_2.zip dialog box

4. Click **OK**.

The Enter name of file to save to dialog box opens. Figure 72

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Enter name of file	to save to	7IO Eiler > 7IO-D-DE I In	adate Filer & v1122 Llod	ste Filer		Search v1122 Up	data Filar	×
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<ul> <li>ZIQ Files</li> <li>ZIQ-P-PE L</li> <li>v1122 Up</li> </ul>	Jpdate Files date Files	Name	^	Date modified No items match you	Type ur search.	Size		
File name:	3_Optional_IQ_Developer	_Edition_v1_1_2_2.zip						~
Save as type:	Compressed (zipped) Fold	fer (*.zip)				Save	Cancel	~

#### Figure 72: 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 .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 IQ Application Environment installation.

- 9. Continue with:
  - Drag and Drop Installation of the IQ Application Environment (on page 76)
  - Web Interface Installation of IQ Application Environment (on page 80)

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# 7.2. Drag and Drop Installation of the IQ Application Environment

**FREEWAVE Recommends**: If currently using an **IQ Application Environment**, an update is not required. All existing IQ environments will work with v1.1.2.2 device firmware.

- 1. Verify the Download the IQ Application Environment (on page 73) procedure is completed.
- 2. **IMPORTANT**: Install the **1\_Device\_Firmware\_v1\_1\_2\_2.pkg** file first. See Firmware Update - Drag and Drop (on page 35).
- 3. Locate and select the downloaded 3\_Optional\_IQ\_Developer\_Edition\_v1\_1\_2\_2.pkg upgrade file. Figure 73

v1122 Update Files					_	
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_ZIQ Files	^	Name ^	Date	modified Type	Size	
ZIQ-P-PE U	Ipdate Files	1_Device_Firmware_v1_1_2_	2.pkg 4/2/	2019 12:57 PM PKG Fil	e 43,388 KB	
		2_Radio_Firmware_v1_0_7_1	.fcf 4/2/	2019 12:57 PM FCF File	e 117 KB	
		3_Optional_IQ_Developer_E	dition_v1_1_2_2.pkg 4/2/	2019 12:57 PM PKG Fil	е 127,276 КВ	
		FREEWAVE-TECHNOLOGIES	-MIB.txt 1/2/	2019 9:52 AM Text Do	ocument 74 KB	
		UCD-SNMP-MIB-WP201.bd	1/2/	2019 9:52 AM Text Do	ocument 10 KB	
5 items 1 item sele	ected 124 MB					

Figure 73: Selected 3\_Optional\_IQ\_Developer\_Edition\_v1\_1\_2\_2.pkg File

 Drag and drop the .pkg file on to the ZumLink window. Figure 74 The .pkg file will disappear after a few minutes.

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	E ave and managed and a state of the second st	
	Sitema Titem selected 124 MB	E R

Figure 74: Drag and Drop the 3\_Optional\_IQ\_Developer\_Edition\_v1\_1\_2\_ 2.pkg File to the ZumLink window

Important!: If the .pkg file is NOT accepted, a Windows® error message appears immediately. Figure 75

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Figure 75: Failed PKG Message dialog box

Important!: 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, 8.1, and 10.

- a. If the .pkg file was rejected, change the extension of the .pkg file to .pkg.txt and select that file.
- b. Drag and drop the **.pkg.txt** file to the **ZumLink** window. The **.pkg.txt** file will disappear after a few minutes.

The Copying message appears. Figure 76

Copying		×
	.pkg	1.00
To 'ZumLink-40267	27842\4026727842'	
-		

## Figure 76: Copying .pkg message



When the file is copied, the Z9-PC or Z9-PC-SR001 window is similar to Figure 77:

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<b>4</b> 026737941						_		×
File Home Share View								^ 🕐
Pin to Quick Copy Paste Action	tcut Nove Copy to v to v	New item •	Propert	Edit Edit Edit Edit	Select all Select none Invert selection			
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$\leftarrow$ $\rightarrow$ $\checkmark$ $\Uparrow$ $\blacksquare$ $\Rightarrow$ This PC $\Rightarrow$ Zum	nLink-4026737941 > 4026737941		<del>ت</del> ~	Search 4026737941				P
SumLink-4026737941	Name	Туре		Size	Date Pict	ure Taken	Dim	ensions
4026737941	3 Optional IQ Developer Edition v1	1 2 2.pkg PKG File		127,27	76 KB 1/1/2000	1:12 AM		
	boot_results.txt	Text Docu	iment		1 KB 1/1/2000	1:00 AM		
	config.txt	Text Docu	ument		4 KB 1/1/2000	1:00 AM		
	fw_upgrade_result.txt	Text Docu	ument		1 KB 1/1/2000	1:00 AM		
	help.txt	Text Docu	ument	7	77 KB 1/1/2000	1:00 AM		
	layout.txt	Text Docu	ument	8	B1 KB 1/1/2000	1:00 AM		
	result.txt	Text Docu	ument		2 KB 1/1/2000	4:20 AM		
	sys_info.txt	Text Docu	ument		1 KB 1/1/2000	1:00 AM		
v -	¢							>
8 items								8==

# Figure 77: 3\_Optional\_IQ\_Developer\_Edition\_v1\_1\_2\_2.pkg File Dropped in the ZumLink window

**Note**: If, after 6-10 minutes, the **.pkg** file has NOT disappeared, refresh the **ZumLink** window.

**Warning! DO NOT** remove power from the Z9-PC or Z9-PC-SR001 during the firmware update process!



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

To recover from a failed Web Interface update, use the Firmware Update - Drag and Drop (on page 35) procedure to reinstall the .pkg file and WAIT for the file update process to complete.

DO NOT start another update or configuration change while an update is in progress.

5. Optional: View the updated Rte Template Version (on page 333) in the sys.info.txt file to verify the update information. Figure 78

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

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×

sys info[1].txt - Notepad File Edit Format View Help [Page=systemInfo] systemInfo.serialNumber=4026737941 systemInfo.modelCode=0 systemInfo.radioModel=AMT0100AA systemInfo.radioModelCode=0 systemInfo.radioFirmwareVersion=FWT1071TR.42 systemInfo.radioSerialNumber=4026737941 systemInfo.deviceName= systemInfo.deviceModel= systemInfo.deviceConfiguration=R1 systemInfo.deviceFirmwareVersion=FWT1122TB.66 systemInfo.deviceId=1 systemInfo.layoutHash=325426040 systemInfo.resetInfo= systemInfo.hopTableVersion=SET0101HT systemInfo.rteVersion=FWT1112TP.55 systemInfo.rteTemplateVersion=FWT1122TP.16 systemInfo.licenses=Custom Apps systemInfo.themeVersion=FWT1122TB.66

# Figure 78: sys.info.txt file with Updated Firmware

Important!: For the v1.1.2.2 update, these settings should have this information: systemInfo.deviceFirmwareVersion=FWT1122TB.66 Web Interface - Device Firmware Version is FWT1122TB.66 systemInfo.rteTemplateVersion=FWT1122TP.16 Web Interface - Rte Template Version is FWT1122TP.16 If neither of these are listed in their respective settings, repeat the upgrade procedure.

- 6. Contact FreeWave Technical Support (on page 14) for the license key file.
- 7. Continue with:
  - CLI Activation of the IQ Application Environment (on page 84)
  - Web Interface Activation of the IQ Application Environment (on page 93)

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# 7.3. Web Interface - Installation of IQ Application Environment

**FREEWAVE Recommends**: If currently using an **IQ Application Environment**, an update is not required. All existing IQ environments will work with v1.1.2.2 device firmware.

- 1. Verify the Download the IQ Application Environment (on page 73) procedure is completed.
- 2. **IMPORTANT**: Install the **1\_Device\_Firmware\_v1\_1\_2\_2.pkg** file first. See Firmware Update Drag and Drop (on page 35).

**Important!**: If continuing from the Firmware Update - Web Interface (on page 43) procedure for the Firmware\_v1\_1\_1\_2.zip file, go to Step 6.

- 3. Using a CAT5e / CAT6 Ethernet cable, connect the Z9-PC or 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 connected Z9-PC or Z9-PC-SR001 and press <Enter>.

Note: If this is the first time the Z9-PC or 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.

The Home window (on page 396) opens.

6. On the Menu list, click the File Upload link. Figure 79



Figure 79: 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 theFile Upload window opens. Figure 80

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

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File Upload × + ← → C* @	③ 192.168.111.100/upload	
FREEWAVE & ZumLink	Upload File	
	Upload and Apply File	
User Data File Upload	Browse No file selected.	
Configuration	Send Cancel	

Figure 80: File Upload window

- Click the Browse button. The File Upload dialog box opens.
- 9. Locate and select the downloaded 3\_Optional\_IQ\_Developer\_Edition\_v1\_1\_2\_2.pkg upgrade file. Figure 81

🖲 File Upload						×
$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ $\square$ $\Rightarrow$ This PC $\Rightarrow$ OS (C:) $\Rightarrow$	_ZIQ Files > ZIQ-P-PE Update Files > v1122 Updat	e Files	`	Search v112	2 Update Files	Ą
Organize 🔻 New folder					EE 👻 [	•
_ZIQ Files	Name	Date modified	Туре	Size		
ZIQ-P-PE Update Files	1_Device_Firmware_v1_1_2_2.pkg	4/2/2019 12:57 PM	PKG File	43,388 KB		
	2_Radio_Firmware_v1_0_7_1.fcf	4/2/2019 12:57 PM	FCF File	117 KB		
	3_Optional_IQ_Developer_Edition_v1_1_2_2.pkg	PKG File	127,276 KB			
	FREEWAVE-TECHNOLOGIES-MIB.txt	1/2/2019 9:52 AM	Text Document	74 KB		
	UCD-SNMP-MIB-WP201.txt	1/2/2019 9:52 AM	Text Document	10 KB		
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File name: 3_Optional_I	Q_Developer_Edition_v1_1_2_2.pkg			✓ All Files (*.*	)	$\sim$
				Open	Ca	ncel .:
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## Figure 81: File Upload dialog box with Selected 3\_Optional\_IQ\_Developer\_Edition\_v1\_1\_2\_2.pkg File

10. Click Open.

The dialog box closes and the **File Upload** window returns showing the selected file. Figure 82

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FREEWAVE	Upload File				
	Upload and Apply File				
Diser Data File Upload System Info	Browse 3_Optional_IQ_Developer_Edition_v1_1_2_2.pkg				
Configuration Network Diagnostics	Send Cancel				
EConfiguration Potework Diagnostics Help Logout	Send Cancel			 	

## Figure 82: File Upload window with Selected .pkg File

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#### 11. Click Send.

The **File Upload** window changes to show the upload percentage to the Z9-PC or Z9-PC-SR001.

**Note**: When using the Web Interface on a computer with **Windows**® 8 or **Windows**® 10, clicking **Cancel** does **not** halt the upload process.

The File Upload window refreshes and shows the uploaded file.

**Warning! DO NOT** remove power from the Z9-PC or Z9-PC-SR001 during the firmware update process!

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

To recover from a failed Web Interface update, use the Firmware Update - Drag and Drop (on page 35) procedure to reinstall the .pkg file and WAIT for the file update process to complete.

DO NOT start another update or configuration change while an update is in progress.

- 12. Refresh the browser window (press <F5>).
- 13. On the Menu list, click the System Info link. Figure 83



#### Figure 83: System Info link

The System Info window opens showing the updated firmware on the Z9-PC or Z9-PC-SR001. Figure 84

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

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& ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Run	time Enviro	nment	Modbus	10 Ex	Com	
				Serial Numbe	4026727899		System Ir	ifs								9
User Data File Uplood			Red	Model Code Radio Mode	AMT0100AA				3							
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orcogour		0	Device Device Firr	Configuration	R1 FWT1122TR.6	6	_			_						
				Device	Firmwar	re Versio	n FV	VT112	22TB.66	5						
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			- Contraction	Rte Te	emplate	Version	FWT	1122	TP.16							
																-

Figure 84: System Info window

Important!: For the v1.1.2.2 update, these settings should have this information: systemInfo.deviceFirmwareVersion=FWT1122TB.66 Web Interface - Device Firmware Version is FWT1122TB.66 systemInfo.rteTemplateVersion=FWT1122TP.16 Web Interface - Rte Template Version is FWT1122TP.16 If neither of these are listed in their respective settings, repeat the upgrade procedure.

- 14. Contact FreeWave Technical Support (on page 14) for the license key file.
- 15. Continue with:
  - CLI Activation of the IQ Application Environment (on page 84)
  - Web Interface Activation of the IQ Application Environment (on page 93)

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# 7.4. CLI Activation of the IQ Application Environment

This procedure uses the CLI to activate the IQ Application Environment for all ZumLink and ZIQ products.

**Note**: See the Web Interface Activation of the IQ Application Environment (on page 93) to use the Web Interface to activate the **IQ Application Environment** 

**Warning!** The process of activating IQ Application Environment activates a fresh copy of the IQ environment.



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

These are the basic steps to license and activate the IQ Application Environment:

- A. Get the License File from FreeWave (on page 84)
- B. Drag and Drop the License File onto the Z9-PC or Z9-PC-SR001 (on page 85)
- C. Activate the IQ Application Environment (on page 88)
- D. Verify Successful Licensing and Activation (on page 91)

# 7.4.1. Get the License File from FreeWave

The Z9-PC or Z9-PC-SR001 must be licensed to activate the **IQ Application Environment**. Licensing can be added in the factory or after purchase.

- 1. Locate the Serial number on the Z9-PC or Z9-PC-SR001 product label.
- 2. Contact FreeWave Technical Support (on page 14) for the license key file.
- 3. Tech Support will ask for the Serial number and an email address to send the license information to.
- 4. An email is sent to the provided address with a License\_nnnnnnnnn.LIC file attached.

Note: Where nnnnnnnn is the 10-digit Serial number of the Z9-PC or Z9-PC-SR001.

- 5. Search for and select a location to save the **.LIC** file to.
- 6. Continue with Drag and Drop the License File onto the Z9-PC or Z9-PC-SR001 (on page 85).

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# 7.4.2. Drag and Drop the License File onto the Z9-PC or Z9-PC-SR001

Note: The images in this procedure are for Windows® 7 and/or Windows® 10 and Firefox®.

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

The **FreeWave Drivers** and Z9-PC or Z9-PC-SR001 windows open. Figure 85 and Figure 86



## Figure 85: FreeWave Drivers window



#### Figure 86: ZumLink window

2. In the Z9-PC or Z9-PC-SR001 window, double-click the connected device. The files of the Z9-PC or Z9-PC-SR001 appear in the window. Figure 87

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SumLink-4026737941	Name	Туре	Size	Date Picture Taken
4026737941	boot_results.txt	Text Document	1 KB	1/1/2000 1:00 AM
🟪 OS (C:)	config.txt	Text Document	3 KB	1/1/2000 1:33 AM
FreeWave Drivers (D:)	help.txt	Text Document	65 KB	1/1/2000 1:20 AM
	ayout.txt	Text Document	67 KB	1/1/2000 1:20 AM
	result.txt	Text Document	1 KB	1/1/2000 1:10 AM
	sys_info.txt	Text Document	1 KB	1/1/2000 1:33 AM
~	<			>
6 items				

Figure 87: Opened ZumLink window showing the Default Files

3. Locate and select the saved License\_nnnnnnnn.LIC file. Figure 88

v1122 Update Files							-	×
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_ZIQ Files	Name		Date modified		Туре	Size		
v1122 Update Files	1_Device_Firmware_v1_1_2_2.pkg		4/2/2019 12:57	PM	PKG File	43,388 KB		
	2_Radio_Firmware_v1_0_7_1.fcf		4/2/2019 12:57	PM	FCF File	117 KB		
	3_Optional_IQ_Developer_Edition_v1_	1_2_2.pkg	4/2/2019 12:57	PM	PKG File	127,276 KB		
	FREEWAVE-TECHNOLOGIES-MIB.txt		1/2/2019 9:52	MA	Text Document	74 KB		
	license_4026737941.lic		1/16/2019 8:39	AM	LIC File	3 KB		
	UCD-SNMP-MIB-WP201.txt		1/2/2019 9:52 /	MA	Text Document	10 KB		
~								_
6 items 1 item selected 2.19 KB								

Figure 88: Selected License\_nnnnnnnn.LIC File

4. Drag and drop the License\_nnnnnnnn.LIC file on to the ZumLink window. Figure 89

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dams.	The second and second s	- □ ×     - □ ×    -

Figure 89: Drag and Drop the License\_nnnnnnnn.LIC file on to the ZumLink window

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Important!: If the License\_nnnnnnnn.LIC file is NOT accepted, a Windows® error message appears immediately. Figure 90



Figure 90: Failed .LIC Message dialog box

Important!: A .LIC file extension is required for Windows® 7.

A .LIC.txt file extension may be required for some versions of Windows® 8, 8.1, and 10.

- a. If the .LIC file was rejected, change the extension of the .LIC file to .LIC.txt and select that file.
- b. Drag and drop the .LIC.txt file to the ZumLink window.

Note: The Z9-PC or Z9-PC-SR001 loads the License\_nnnnnnnn.LIC file immediately.



**Caution**: Do NOT unplug the Z9-PC or Z9-PC-SR001 to reboot.

The **rteReset=Hard** and **reset=now** commands are **required** to reboot of the Z9-PC or Z9-PC-SR001.

6. Continue with Activate the IQ Application Environment (on page 88).

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# 7.4.3. Activate the IQ Application Environment

**Note**: This procedure provides a **Tera Term** terminal connection to the FreeWave CLI. Other terminal emulators (e.g., **HyperTerminal**, **PuTTY**) may be used.

- 1. Open a terminal emulator application (e.g., Tera Term http://ttssh2.osdn.jp/).
- 2. Select the Serial option buttion.
- 3. Click the **Port** list box arrow and select the COM port the Z9-PC or Z9-PC-SR001 is connected to. Figure 91

Tera Term: New cor	nnection		×
○ тсрур	Host: 192.168.111 History Service: O Telnet © SSH O Other	TCP port#: 22 SSH version: SSH2 Protocol: UNSPEC	
) Serial	Port: COM3: USB	Serial Device (COM3) Help	~

#### Figure 91: Tera Term: New Connection window

4. Click OK.

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

- 5. In the **Tera Term** window, press <Enter>. The FreeWave CLI Login returns.
- 6. Enter admin for the Username and press < Enter>.
- 7. 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 92

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#### Figure 92: FreeWave Shell window

- 8. At the > prompt, type, **systemInfo** and press < Enter>.
- 9. Verify the Licenses (on page 358) parameter is licenses=Custom Apps. Figure 93



#### Figure 93: licenses=Custom Apps

10. Type **rteReset=Hard** and press <Enter>. Figure 94

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🔟 COM9 - Tera Term VT	_	×
File Edit Setup Control Window Help		
freewave-ib login: admin		
Password :		<u></u>
FreeWaye Shell		
>systeminfo		
[Page=systemInfo]		
serialNumber=4026772729		
mode1Code=0		
radioModel=AMTØ1ØØAA		
radioModelCode=0		
radioFirmwareVersion=FWT1071TR.42		
radioSerialNumber=4026772729		
deviceName=		
deviceModel=Z9-PE2		
deviceConfiguration=R1		
deviceFirmwareVersion=FWT1122TB.66		
deviceId=1		
LayoutHash=325426040		
reseting =		
hoplableversion=SEI0101H1		
rteversion=		
rtelemplateVersion=FWI11221P.16		
Licenses=Gustom Hpps		
Themeversion=rwill2218.66		
NESOFI - G - OK		
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#### Figure 94: rteReset=Hard window

11. Type **reset=now** and press <Enter>. Figure 95 The Z9-PC or Z9-PC-SR001 reboots.



#### Figure 95: reset=Now window

The FreeWave Drivers and Z9-PC or Z9-PC-SR001 windows open.

12. Continue with Verify Successful Licensing and Activation (on page 91).

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# 7.4.4. Verify Successful Licensing and Activation

1. Re-open the terminal emulator application.

```
💻 COM9 - Tera Term VT
                                                                                    ×
File Edit Setup Control Window Help
   deviceModel=Z9-PE2
                                                                                             ٨
   deviceConfiguration=R1
   deviceFirmwareVersion=FWT1122TB.66
   deviceId=1
layoutHash=325426040
   resetInfo=
   hopTableVersion=SET0101HT
   rteVersion=
   rteTemplateVersion=FWT1122TP.16
   licenses=Custom Apps
themeVersion=FWT1122TB.66
RESULT:0:0K
>rteReset=Hard
rteReset=Runtime environment hard reset scheduled for next boot.
RESULT:0:0K
≻reset=now
The system is going down for reboot NOW!(console) (Sat Jan   1 00:22:47 2000):
freewave-ib login:
freewave-ib login: admin
Password:
FreeWave Shell
```

#### Figure 96: FreeWave Shell window

2. At the > prompt, type **systeminfo** and press < Enter>. Figure 97



#### Figure 97: The rteVersion is FWT1122TP.16

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

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3. Verify these parameters have these values:

Verification Settings	
Parameter	Value
Radio Firmware Version (on page 359)	FWT1071TR.42
Device Firmware Version (on page 355)	FWT1122TB.66
Rte Version (on page 362)	FWT1122TP.16
Rte Template Version (on page 362)	FWT1122TP.16
Licenses (on page 358)	Custom Apps

4. Continue with Access the IQ Linux Environment (on page 107).

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# 7.5. Web Interface Activation of the IQ Application Environment

This procedure uses the Web Interface and the CLI to activate the IQ Application Environment.

**Note**: See the CLI Activation of the IQ Application Environment (on page 84) to use the CLI to activate the **IQ Application Environment**.

**Warning!** The process of activating IQ Application Environment activates a fresh copy of the IQ environment.



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

These are the basic steps to license and activate the IQ Application Environment:

- A. Get the License File from FreeWave (on page 93)
- B. Setup the Computer IP Address Configuration (on page 94)
- C. Download the License File (on page 98)
- D. Activate the IQ Application Environment (on page 101)
- E. Verify Successful Licensing and Activation (on page 105)

# 7.5.1. Get the License File from FreeWave

The Z9-PC or Z9-PC-SR001 must be licensed to activate the **IQ Application Environment**. Licensing can be added in the factory or after purchase.

- 1. Locate the Serial number on the Z9-PC or Z9-PC-SR001 product label.
- 2. Contact FreeWave Technical Support (on page 14) for the license key file.
- 3. Tech Support will ask for the Serial number and an email address to send the license information to.
- 4. An email is sent to the provided address with a License\_nnnnnnnn.LIC file attached.

Note: Where nnnnnnnn is the 10-digit Serial number of the Z9-PC or Z9-PC-SR001.

- 5. Search for and select a location to save the .LIC file to.
- 6. Continue with Setup the Computer IP Address Configuration (on page 94).

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# 7.5.2. Setup the Computer IP Address Configuration

**Note**: This procedure is required to access the Web Interface of the Z9-PC or Z9-PC-SR001. The images in this procedure are for **Windows**® 10 and/or **Firefox**®.

- 1. Connect the CAT5e / CAT6 Ethernet cable to the Z9-PC or Z9-PC-SR001 Ethernet port and the Ethernet port on the computer.
- 2. On the computer, open the Windows® Control Panel.
- 3. View the **Control Panel** window by **Category** and click **Network and Sharing Center**. Figure 98

All Control Panel Items			- 0
→ → ↑ III > Control Panel >	All Control Panel Items >		Search Control Panel
ile Edit View Tools			
Adjust your computer's setting	5		View by: Small icons •
🗄 Administrative Tools	autoPlay	Backup and Restore (Windows 7)	RitLocker Drive Encryption
Color Management	Credential Manager	Date and Time	Detault Programs
Dell Command   Power Manager	Dell Command   Update	Dell Touchpad	📕 Device Manager
Te Devices and Printers	Stase of Access Center	File Explorer Options	File History
Flash Player (32-bit)	A Fonts	Free Fall Data Protection	🛃 Indexing Options
T infrared	😥 Intel(R) Rapid Storage Technology	Intel® Graphics Settings	💮 Internet Options
de Java	E Keyboard	Mail	() Mouse
Network and Sharing Center	NVIDIA Control Page	📾 NVIDIA nView Desktop Manager	Phone and Modern
विग पर्छ		7 Recovery	🔗 Region
Network and	d Sharing Center	a Sound	🔆 Speech Recognition
		System	Taskbar and Navigation
Troubleshooting	R User Accounts	P Windows Defender Firewall	🚰 Windows Mobility Center
🔜 Windows To Go	Work Folders		

Figure 98: Control Panel > Network and Sharing Center

The Network and Sharing Center window opens.

4. Click the Change Adapter Settings link. Figure 99



## Figure 99: Change Adapter Settings Link

The Network Connections window opens. Figure 100

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

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Figure 100: Network Connections window

The Ethernet Status dialog box opens. Figure 101

6. Click the **Properties** button.

🖗 Ethernet Status		$\times$
General		
Connection		
IPv4 Connectivity:	Internet	
IPv6 Connectivity:	No network access	
Media State:	Enabled	
Duration:	03:27:05	
Speed:	1.0 Gbps	
Details		
Activity		
	Sent — 💭 — Received	
Bytes: 1	12,589,202   193,965,946	
Properties	Disable Diagnose	
	Close	



The Ethernet Properties dialog box opens.

- 7. Select the Internet Protocol Version 4 (TCP/IPv4) option. Figure 102
- 8. Click the **Properties** button.

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Networking       Sharing         Connect using:       Intel(R) Ethemet Connection (5) 1219-LM         Configure       Configure         This connection uses the following items:       Configure         This connection uses the following items:       Configure         Ocs Packet Scheduler       Configure         Ocs Packet Scheduler       Configure         FortiClient NDIS 6.3 Packet Filter Driver       Forticlient NDIS 6.3 Packet Filter Driver         Internet Protocol Version 4 (TCP/IPv4)       Microsoft LLDP Protocol Driver         Install       Uninstall         Properties       Properties	Ethernet Properties			×		
Connect using:  Intel(R) Ethemet Connection (5) 1219-LM  Configure  This connection uses the following items:  File and Printer Sharing for Microsoft Networks  Gos Packet Scheduler  File and Printer Sharing for Microsoft Networks	Networking Sharing					
Intel(R) Ethemet Connection (5) I219-LM Configure This connection uses the following items: Configure The following items: Configure Configure The following items: Configure Configure Configure The following items: Configure Configu	Connect using:					
Configure This connection uses the following items:  Configure This connection uses the following items:  Configure Configure.	Intel(R) Ethemet	Connection (5) I219-L	.M			
This connection uses the following items:			Config	gure		
	This connection uses th	e following items:				
	✓       ✓       Client for Micro         ✓       ✓       File and Printer         ✓       ✓       QoS Packet S         ✓       ✓       FortiClient NDI         ✓       Internet Protocol	soft Networks Sharing for Microsoft cheduler S 6.3 Packet Filter Dr ol Version 4 (TCP/IP)	t Networks iver v4)	^		
Install Uninstall Properties P	Microsoft Netw	ork Adapter Multiplex	or Protocol			
Install Uninstall Properties Properties Properties Properties	<	Protocol Driver		>		
Description Transmission Control Protocol/Internet Protocol Properties	Install		Prope	rties		
wide area network protocol that provides comin across diverse interconnected networks.	Description Transmission Control wide area network pr across diverse interce	Protocol/Internet Pro otocol that provides o onnected networks.	togol	Prop	erties	

Figure 102: Ethernet Properties dialog box

The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box opens. Figure 103

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

eneral	Alternate Configuration			
/ou car his cap for the	aget IP settings assigned au ability. Otherwise, you need appropriate IP settings.	tomatically if your to ask your netw	network sup ork administ	oports rator
<ul> <li>O</li> </ul>	otain an IP address automati	cally		
OUs	e the following IP address: -			
IP ac	ldress:			
Subr	iet mask:			
Defa	ult gateway:			
	otain DNS server address aut	tomatically		
	e the following DNS server a	ddresses:		
	erred DNS server:			
Pref				
Prefi Alter	nate DNS server:			
Prefe Alter	nate DNS server: alidate settings upon exit		Advan	ced

Figure 103: Default Example of Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

- 10. Select the Use the following IP address option button.
- 11. 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 or Z9-PC-SR001 or all other units in the network. Figure 104

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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 or Z9-PC-SR001 IP Address is **192.168.111.100**. The default subnet mask is **255.255.255.0**.

Internet Protocol Version 4 (1	CP/IPv4) Properties X	
General		
You can get IP settings assig this capability. Otherwise, yo for the appropriate IP setting	ned automatically if your network supports u need to ask your network administrator ps.	
Obtain an IP address at     Use the following IP address at	Itomatically	
IP address:	192 . 168 . 111 . 125	
Subnet mask:	255.255.255.0	
Default gate		
	e the following IP address	:
Use the referred I IP ac	ldress:	192 . 168 . 111 . 125
	et mask:	255.255.255.0
Defa	ult gateway:	

# Figure 104: Changed Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

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

- 12. Click **OK** to save the changes and close the dialog box.
- 13. Click **Close** twice to close the **Local Area Connection Properties** and **Local Area Connection Status** dialog boxes.
- 14. Continue with Download the License File (on page 98).

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# 7.5.3. Download the License File

Note: The images in this procedure are for Windows® 7 and/or Windows® 10 and Firefox®.

- 1. Verify these procedures are completed:
  - a. Get the License File from FreeWave (on page 93)
  - b. Setup the Computer IP Address Configuration (on page 94)
- 2. Using a CAT5e / CAT6 Ethernet cable, connect the Z9-PC or 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 connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

4. On the Menu list, click the File Upload link. Figure 105



Figure 105: File Upload link

The Authentication Required (Login) dialog box opens.



#### Figure 106: 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.

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



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© ☆	III/	0	
Id       Yww Hojcey (Bookmarks Tools Holp       -         Id       Yww Hojcey (Bookmarks Tools Holp       -			

Figure 107: File Upload window

- 6. Click the **Browse** button. The **File Upload** dialog box opens.
- 7. Locate and select the saved License\_nnnnnnnn.LIC file. Figure 108

v1122 Update Files					_		
File Home Share View							
Pin to Quick Copy Paste	th ortcut	Thew item ▼ The Easy access ▼ Prope	Open      Open     Copen     C	Select all Select none Invert selection			
Clipboard	Organize	New	Open	Select			
- 📑 🖓 🗶 🚽							
← → ∽ ↑ <mark> </mark> « OS (C:) → _2	Q Files → ZIQ-P-PE Update Files → v1122 Update Fi	les v ඊ	Search v1122 Upd	ate Files			
_ZIQ Files	Name	Date modified	Туре	Size			
🔄 v1122 Update Files	1 Device Firmware v1 1 2 2.pkg	4/2/2019 12:57 PM	PKG File	43,388 KB			
	2_Radio_Firmware_v1_0_7_1.fcf	4/2/2019 12:57 PM	FCF File	117 KB			
	3_Optional_IQ_Developer_Edition_v1_1_2_2.pk	g 4/2/2019 12:57 PM	PKG File	127,276 KB			
	FREEWAVE-TECHNOLOGIES-MIB.txt	1/2/2019 9:52 AM	Text Document	74 KB			
	license_4026737941.lic	1/16/2019 8:39 AM	LIC File	3 KB			
	UCD-SNMP-MIB-WP201.txt	1/2/2019 9:52 AM	Text Document	10 KB			
6 items 1 item selected 2.19 KB						[	

Figure 108: Selected License\_nnnnnnnn.LIC File

#### 8. Click Open.

The dialog box closes and the **File Upload** window returns showing the selected file. Figure 109

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<u>File Edit View History Bookmarks</u>	<u>I</u> ools <u>H</u> elp			-		×
O File Upload ×	+					
← → C' ŵ	() Jupload	⊠ ☆	111	1	۲	
FREEWAŸË &ZumLink <sup>™</sup>	Upload File					
	Upload and Apply File					
<ul> <li>User Data</li> <li>File Upload</li> <li>System Info</li> </ul>	Browse license_4026737941.lic					
Configuration Network Diagnostics	Send Cancel					

#### Figure 109: File Upload window with Selected License\_nnnnnnn.LIC File

9. Click Send.

The File Upload window refreshes and shows the uploaded file.

10. Continue with Activate the IQ Application Environment (on page 101).

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# 7.5.4. Activate the IQ Application Environment

**Note**: This procedure provides a **Tera Term** terminal connection to the FreeWave CLI. Other terminal emulators (e.g., **HyperTerminal**, **PuTTY**) may be used.

1. Open a terminal emulator application (e.g., **Tera Term** <u>http://ttssh2.osdn.jp/</u>). The **Security Warning** dialog box opens. Figure 110

	-
SECURITY WARNING	$\times$
Your known hosts list has an entry for the server "192.168.111.100", but the machine you have contacted has presented a DIFFERENT KEY to the one in your known hosts list. A hostile machine may be pretending to be the server.	
If you choose to add this new key to the known hosts list and continue, then you will not receive this warning again.	
The server's host key fingerprint is: Fingerprint hash algorithm: MD5  SHA256 SHA256:FGQvpk3IfC9UXes5odF1Dif3eH1A5sGqu0KXZLxG28c	]
+[RSA 2048]+   .++0 =   o o + .+.%+ + B**   0 o= .++. . S+.*+ . B. E. . o +[SHA256]+	
Replace the exist key with this new key     Continue     Disconnect	,

#### Figure 110: Security Warning dialog box

#### 2. Click Continue.

The Tera Term: New Connection window opens. Figure 111

<ul> <li>терир</li> </ul>	Host: 1921081 ☑ History Service: ○ Telnet ④ SSH ○ Other	TCP port#: 22 SSH version: SSH2 ~ Protocol: UNSPEC ~
O Serial	Port:	



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3. Click OK.

The **Tera Term New Connection** dialog box closes. The **SSH Authentication** window opens. Figure 112

SSH Authentication		_	×
Logging in to 192.168	. 111. 100		
Authentication require	:d.		
User name:	admin		
Passphrase:	••••		
	Remember password in memory		
	Forward agent		
Use plain passwo	ord to log in		
Use RSA/DSA/E	CDSA/ED25519 key to log in Private key file	:	
O Use rhosts to log	g in (SSH1) Local user name;		
	Host private key file:		
O Use keyboard-in	teractive to log in		
O Use Pageant to	log in		
	OK Disconnect		

## Figure 112: SSH Authentication window

5. Enter **admin** for the **User name** and **Passphrase**.

**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.

6. Type **rteReset=Hard** and press <Enter>. Figure 113

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T	192.16	8.111.10	0 - Tera Te	rm VT		_	×
File	Edit	Setup	Control	Window	Help		
Free >rte	Wave Rese	Shell t=Hard	L l				^
							~

#### Figure 113: FreeWave Shell window

The rteReset message appears. Figure 114



Figure 114: rteReset message

7. Type **reset=now** and press <Enter>. Figure 115

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#### Figure 115: reset=Now window

The Z9-PC or Z9-PC-SR001 reboots.

The FreeWave Drivers and Z9-PC or Z9-PC-SR001 windows open.

- 12. Enter admin for the Username and press < Enter>.
- 13. Enter admin for the **Password** and press < Enter>.

The FreeWave Shell returns.



## Figure 116: FreeWave Shell window

14. Continue with Verify Successful Licensing and Activation (on page 105).

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# 7.5.5. Verify Successful Licensing and Activation

1. Re-open the terminal emulator application.

```
💻 COM9 - Tera Term VT
                                                                                    ×
File Edit Setup Control Window Help
   deviceModel=Z9-PE2
                                                                                             ٨
   deviceConfiguration=R1
   deviceFirmwareVersion=FWT1122TB.66
   deviceId=1
layoutHash=325426040
   resetInfo=
   hopTableVersion=SET0101HT
   rteVersion=
   rteTemplateVersion=FWT1122TP.16
   licenses=Custom Apps
themeVersion=FWT1122TB.66
RESULT:0:0K
>rteReset=Hard
rteReset=Runtime environment hard reset scheduled for next boot.
RESULT:0:0K
≻reset=now
The system is going down for reboot NOW!(console) (Sat Jan   1 00:22:47 2000):
freewave-ib login:
freewave-ib login: admin
Password:
FreeWave Shell
```

#### Figure 117: FreeWave Shell window

2. At the > prompt, type **systeminfo** and press < Enter>. Figure 118



#### Figure 118: The rteVersion is FWT1122TP.16

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

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3. Verify these parameters have these values:

Verification Settings				
Parameter	Value			
Radio Firmware Version (on page 359)	FWT1071TR.42			
Device Firmware Version (on page 355)	FWT1122TB.66			
Rte Version (on page 362)	FWT1122TP.16			
Rte Template Version (on page 362)	FWT1122TP.16			
Licenses (on page 358)	Custom Apps			

4. Continue with Access the IQ Linux Environment (on page 107).

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# 7.6. Access the IQ Linux Environment

**Note**: The **Developer Edition IQ Application Environment** is the standard installation on all **Zum** products.

There are different Editions of IQ available that incorporate developer tools and/or 3rd-party software. All IQ Editions allow access to the Linux environment through the **devuser** login.

Once a developer is ready to integrate an application into IQ or build an application within IQ, 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 Successful Licensing and Activation (on page 105) is completed.
- Log in to the FreeWave CLI as devuser.
   The default password is devuser.
   A Linux Bash prompt appears. Figure 119

**Note**: A unique password can be added at the time of purchase. Contact FreeWave Technical Support (on page 14) for this password.





- 3. Open a web browser.
- 4. Go to: <u>https://github.com/FreeWaveTechnologies/ZumIQ</u>. The FreeWave Github IQ Main Page opens. Figure 120

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7 129 commits		S 2 releases	2 contributors	ず BSD-2-Clause
Branch: master   New pull request			F	ind file Clone or download 🔻
FWBob updated for 1.1.0			Latest co	ommit 5d7972c on Oct 4, 2018
💼 full-demos	fixed image links			a year ago
amples	fixed a few more li	ngering IPR references		a year ago
troubleshooting	updated link to kn	own issues		a year ago
.gitignore	updating demo to	1060 WIP		a year ago
LICENSE	Initial commit			2 years ago
README.md	updated for 1.1.0			4 months ago

#### Figure 120: FreeWave GitHub IQ Main Page

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

5. Scroll to the bottom of the **Main** page and click the Wiki link for IQ app development information. Figure 121

EADME.md	
Welcome to the ZumIQ developer site.	
What is ZumIQ? It's a Linux-based programmable application environment running on supported ZumLink Z9-P Series radios.	
To learn more about the ZumIQ, see the product page and check out the FreeWave YouTube Channel. This GitHub repo focuses on the programmability of the radio platform from the perspective of application developers.	
This repository, including all documentation and sample code, references capabilities of firmware version <b>1.0.6.0</b> (FWT1060TB.68). If you've just just obtained a new ZumIQ-enabled radio, start with <b>Activating ZumIQ</b> to enable developer logins, then	
take a look at the documentation resources below. Full Documentation	
See Samples for basic code samples. See Full Demos for examples of complete, distributed applications.	
See Troubleshooting for scripts and procedures to work around known issues. See the Wiki for general developer documentation.	
See Troubleshooting for scripts and procedures to v	vork around known issues.
See the Wiki for general developer documentation.	

Figure 121: Wiki link on the FreeWave GitHub ZumIQ Main Page

 In the Wiki, go to Contents sidebar > Reference to locate the Installed Packages for the version on the Z9-PC or Z9-PC-SR001.

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## 8. Web Interface - Administration

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

- Change the COM Parameters (on page 115)
- Change the Data Path Parameters (on page 118)
- Change the Encryption Parameters (on page 120)
- Change the Io Ex Com Parameters (on page 122)
- Change the Local Diagnostics Monitored Node (on page 123)
- Change the Modbus Parameters (on page 125)
- Change the Network Parameters (on page 127)
- Change the NTP Parameters (on page 129)
- Change the Radio Settings Parameters Endpoint (on page 131)
- Change the Radio Settings Parameters Endpoint-Repeater (on page 133)
- Change the Radio Settings Parameters Gateway (on page 135)
- Change the Radio Settings Parameters Gateway-Repeater (on page 138)
- Change the Security Parameters (on page 141)
- Change the Services Parameters (on page 143)
- Change the SNMP Parameters (on page 145)
- Change the System Info Parameters (on page 147)
- Change the Terminal Server Relay Parameters (on page 149)
- Web Interface Network Diagnostics (on page 151)

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## 8.1. Setup the Computer IP Address Configuration

**Note**: This procedure is required to access the Web Interface of the Z9-PC or Z9-PC-SR001. The images in this procedure are for **Windows**® 10 and/or **Firefox**®.

- 1. Connect the CAT5e / CAT6 Ethernet cable to the Z9-PC or Z9-PC-SR001 Ethernet port and the Ethernet port on the computer.
- 2. On the computer, open the Windows® Control Panel.
- 3. View the **Control Panel** window by **Category** and click **Network and Sharing Center**. Figure 122

→ → ↑ 🔄 > Control Panel →	All Control Panel Items >		→ O Search Control Panel ,
ile Edit View Tools			
Adjust your computer's setting	ŝ		View by: Small icons +
🗄 Administrative Tools	To AutoPlay	Backup and Restore (Windows 7)	RitLocker Drive Encryption
Color Management	Credential Manager	Date and Time	Detault Programs
Dell Command   Power Manager	Dell Command   Update	Dell Touchpad	📕 Device Manager
Te Devices and Printers	Ease of Access Center	File Explorer Options	File History
Flash Player (32-bit)	A Fonts	Free Fall Data Protection	🛃 Indexing Options
T infrared	😥 Intel(R) Rapid Storage Technology	Intel® Graphics Settings	💮 Internet Options
di Java	III Keyboard	Mail	() Mouse
Network and Sharing Center	NVIDIA Control Panel	S NVIDIA nView Desktop Manager	Phone and Modern
वि एव		Recovery	🔗 Region
Network and	d Sharing Center	a Sound	🔆 Speech Recognition
E V		System	Taskbar and Navigation
Troubleshooting	R User Accounts	P Windows Defender Firewall	🚰 Windows Mobility Center
- Windows To Go	B Work Enddam		

Figure 122: Control Panel > Network and Sharing Center

The Network and Sharing Center window opens.

4. Click the Change Adapter Settings link. Figure 123



#### Figure 123: Change Adapter Settings Link

The Network Connections window opens. Figure 124

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

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Figure 124: Network Connections window

The Ethernet Status dialog box opens. Figure 125

6. Click the **Properties** button.

🔋 Ethernet Status		$\times$
General		
Connection		-
IPv4 Connectivity:	Internet	
IPv6 Connectivity:	No network access	
Media State:	Enabled	
Duration:	03:27:05	
Speed:	1.0 Gbps	
Details		
Activity		-
	Sent — Received	
Bytes:	12,589,202   193,965,946	
Properties	Disable Diagnose perties Close	



The Ethernet Properties dialog box opens.

- 7. Select the Internet Protocol Version 4 (TCP/IPv4) option. Figure 126
- 8. Click the **Properties** button.

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Configure	
	~
Install Uninstall Properties	

Figure 126: Ethernet Properties dialog box

The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box opens. Figure 127

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

itemet F	rotocol version 4 (TCP/IP	(4) Properties	
General	Alternate Configuration		
You car this cap for the	a get IP settings assigned au ability. Otherwise, you need appropriate IP settings.	tomatically if your network sup I to ask your network administr	ports ator
() Ot	otain an IP address automati	cally	
	e the following IP address:		
IP ac	ldress:		
Subr	et mask:		
Defa	ult gateway:		
() Ot	tain DNS server address au	tomatically	
OUs	e the following DNS server a	addresses:	
Prefe	erred DNS server:		
Alter	nate DNS server:		
	alidate settings upon exit	Advanc	ed
		OK	Cancel

Figure 127: Default Example of Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

- 10. Select the Use the following IP address option button.
- 11. 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 or Z9-PC-SR001 or all other units in the network. Figure 128

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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 or Z9-PC-SR001 IP Address is **192.168.111.100**. The default subnet mask is **255.255.255.0**.

Internet Protocol Version 4 (	TCP/IPv4) Properties	×	
General			
You can get IP settings assi this capability. Otherwise, y for the appropriate IP settir	ned automatically if your network supports ou need to ask your network administrator gs.		
Obtain an IP address a	utomatically		
IP address:	192.168.111.125		
Subnet mask:	255 . 255 . 255 . 0		
Default gatowaw			
	se the following IP add	ress:	
Use the eferred I	ddress:		192 . 168 . 111 . 125
	net mask:		255.255.255.0
Defa	ult gateway:		

# Figure 128: Changed Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

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

- 12. Click **OK** to save the changes and close the dialog box.
- 13. Click **Close** twice to close the **Local Area Connection Properties** and **Local Area Connection Status** dialog boxes.
- 14. Optional: Continue with these Web Interface administration procedures:
  - Change the COM Parameters (on page 115)
  - Change the Data Path Parameters (on page 118)
  - Change the Encryption Parameters (on page 120)
  - Change the Io Ex Com Parameters (on page 122)
  - Change the Local Diagnostics Monitored Node (on page 123)
  - Change the Modbus Parameters (on page 125)
  - Change the Network Parameters (on page 127)
  - Change the NTP Parameters (on page 129)
  - Change the Radio Settings Parameters Endpoint (on page 131)
  - Change the Radio Settings Parameters Endpoint-Repeater (on page 133)
  - Change the Radio Settings Parameters Gateway (on page 135)
  - Change the Radio Settings Parameters Gateway-Repeater (on page 138)

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- Change the Security Parameters (on page 141)
- Change the Services Parameters (on page 143)
- Change the SNMP Parameters (on page 145)
- Change the System Info Parameters (on page 147)
- Change the Terminal Server Relay Parameters (on page 149)
- 15. Optional: Continue with the Web Interface Network Diagnostics (on page 151).

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## 8.2. Change the COM Parameters

Note: See the COM Parameters (on page 217) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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. See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 129



Figure 129: Configuration 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 to access their respective COM parameters. Figure 130 or Figure 131

**Note**: See the COM Parameters (on page 217) for detailed information about the parameters. The parameters for **COM1** and **COM2** are the same except for the Terminal Server Port (on page 228) parameter setting.

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Ele Edit Yew Higtory Bookmarks Tools Help	5. 5													12		>
O Configuration X +																
← → ♂ ŵ	192.168.111.100/comfig/	/Com1									ľ	©	Ŷ	87	•	
EDEEWAVE	6	De de Co		D					Level Discourse		6 - E -					٦
FREEWAVE	System into	Nuulo Se	tungs	Rualo Secu	igs neipers	Encryption	Date	arom	Local Diagno	sucs	Coning	Service	s Netw	OFK		
<b>Q</b> ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	rver Relay	Date	SNMP	Security	Runtie	me Enviror	ment	Modbus	Io Ex C	am	
	6						Com1									
Commence (Carl				Mode	RS232				5							
DUser Data				Handler	TerminalServe	r			2							
* File Upload				Baudrate	115200				18							
System Info				Databits	8				~							
Configuration				Parity	None				~							
Network Diagnostics				Stopbits	1				2							
Help				Duplex	Full											
OLogout				Flow Control	011				9							
- a man and a second			Delay B	lefore Send MS	0											
			Break B	Before Send Us	0											
			Termi	nal Server Port	5041											
			Terminal S	erver Time Out	300											
				TX Bytes	0											
				RX Bytes	0											
1			Cor	nnection Drops	0											
	Update															



System Info Radio Settings Settings Radio Settings Settings Radio Settings Settings Radio Setting Seting Setting Setting Settings Settings									192.168.111.100/com/htt/	$\rightarrow C^{*} \Omega$ (1)
System Info   Radio Settings   Radio Settings Helpers   Encryption   Data Path   Local Diagnostics   Config     Wetwork Stats   NTP   Com1   Com2   Terminal Server Relay   Data   SNMP   Security   Runtime Environ     Wetwork Stats   NTP   Com1   Com2   Terminal Server   Omega   Omega <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>anna an an</th> <th></th>									anna an	
Network Stats     NTP     Com1     Com2     Terminal Server Relay     Date     SNMP     Security     Runtime Environm       Alser Data     Mode     RS232     Image: Com2     Image: Com	Services Network	ocal Diagnostics Config Services	Data Pat	Encryption	ngs Helpers	Radio Settin	ttings	Radio Set	System Info	REEWAVE
Com2       Mode     R5232     W       Handler     TerminolServer     W       File Upload     Baudrate     115200     W       System Info     Detabits     W     W       Configuration     Ponty None     W       Network Diagnostics     Stopbits     1     W       Netgeut     Four Control Off     W     W	ment Modbus Io Ex Com	Security Runtime Environment	Date St	erver Relay	Terminal S	Com2	Com1	NTP	Network Stats	ZumLink
Mode R522     -       Honder TerminalServer     -       File Upload     Boudrote TerminalServer     -       System Info     Drotots 8     -       Configuration     Partity None     -       Network Diagnostica     Stophist 1     -       Help     Dutex Full     -       Legaut     Flow Control Off     -			Com2		G.				đi.	
User Dota     Honder     TermindServer     >       File Upload     Boudnet     115200     =       System Info     Dotobits (8     =     =       Configuration     Proteity None     =     =       Help     Stoptet (1     =     =       Uplex (Full     =     =     =       Uplex (Full     =     =     =       Upper (Full     =     =     =		*			RS232	Mode				
File Upload     Bountet     115200		9		er	TerminalServ	Hondler				User Data
System Info     Doubits (B     -       Configuration     Portry (None     -       Network Diagnostics     Stophits (1     -       Network Diagnostics     Stophits (1     -       Very     Daylex Full     -       Very     Daylex Full     -		0			115200	Baudrate				File Upload
Configuration     Pority (None        Network Diagnostics     Stophts I     -       Upper Legonstics     Duplex Full     -       Logout     Flow Control     Off     -					8	Databits				System Info
Network Diognostics Stopolits 1		2			None	Parity				Configuration
Help Duplex Full v Logout Flow Control Off v		9			1	Stopbits				Network Diagnostics
Logout Flow Control Off		9			Full	Duplex				Help
		2			Off	Flow Control				Logout
Delay Before Send MS [0					0	lefore Send MS	Delay B			
Break Before Send Us (0					0	Before Send Us	Break E			
Terminal Server Port (5042					5042	nal Server Port	Termi			
Terminol Server Time Out [300					300	erver Time Out	Terminal S	1		
TX Bytes 0		_			0	TX Bytes				
RX Bytes (0		_			0	RX Bytes	- 33			

Figure 131: 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. If applicable for COM2, click the **Flow Control** list box arrow and select **Hardware** to activate **flowControl**.

**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.

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- 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 Port parameter, keep the TCP port numbers as their defaults.

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

**Important!**: TX Bytes (on page 230), RX Bytes (on page 227), and Connection Drops (on page 219) are Read-only parameters.

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

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#### 8.3. Change the Data Path Parameters

Note: See the Data Path Parameters (on page 235) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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. See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 132



Figure 132: Configuration 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 to access the Data Path parameters. Figure 133

**Note**: See the Data Path Parameters (on page 235) for detailed information about the parameters.

→ C @	0 192.168.111.100/config/	dataPath								Œ	] ©	4		IN E	1 4
REEWAVE	System Info	Radio Set	ttings	Radio Sett	ngs Helpers	Encryption	Data Path	Local Diag	nostics	Config	Servic	es Net	work		
FREEWAVE	Network Stats	s NTP Com1 Com2 Ter				erver Relay	Date SNI	AP Security	Run	time Enviro	nment	Modbus	lo E	x Con	
	G				6.		Data Path	- 10							
			Compr	ession Enable	d true			2							
Jser Data ile Upload			UTA MUX	FEC Rot	RATE_1_1			1							
System Info			Agg	regate Enable	false			×.							
Configuration		Route M	/in Signal	Margin Thres	10										

#### Figure 133: Data Path window

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- 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 Radio Bad CRC (on page 260) count is more than 15-20% of the total transmitted packets (the Radio LL Tx (on page 263) count), enabling the FEC Rate (on page 239) setting is beneficial.

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### 8.4. Change the Encryption Parameters

Note: See the Encryption Parameters (on page 249) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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. See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 134



Figure 134: Configuration 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 to access the Encryption parameters. Figure 135

**Note**: See the Encryption Parameters (on page 249) for detailed information about the parameters.

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conduction - Mar														L,	
→ ଫ ŵ	) 192.168.111.100/config/	encryption									C	] @	1 \$	87	
FREEWAVE	System Info	Radio Se	ttings	Radio Setti	ngs Helpers	Encryption	Date	Path	Local Diagna	ostics	Config	Servi	ces Netv	work	
ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	rver Relay	Date	SNMP	Security	Runt	ime Enviror	nment	Modbus	lo Ex Co	m
							Encrypt	on	-						
			En	scryption Mode	AES_CTR				2						
User Data				Active Key	Off				1						
File Upload				Key	Key has not be	en set.									
System Info				Keya	Key has not be	en set.									
Configuration				Key3	Key has not be	en set.									
Network Diagnostics				Keyd	Key has not be	en set.									
Help				Key!	Key has not be	en set.									
Logout				Keye	Key has not be	en set.			_						
				Key7	Key has not be	en set.									
				Keye	Key has not be	en set.			_						
				Keys	Key has not be	en set.		_	_						
				Keyit	Key has not be	en ses.			_						
				Keyl	Key has not be	en set			_						
				Keyli	Key has not be	en set			_						
				Keyli	Key has not be	en set									
				Key1	Key has not be	en set.			_						
				Key16	Key has not be	en set			_						

Figure 135: Encryption window

- 7. Click the Encryption Mode list box arrow and select the designated encryption mode.
- 8. In the **KeyX** text box, enter either the 128- or 256-bit key in 16 or 32 hexadecimal format respectively.

**Note**: Enter Clear to erase a previously enter key. See the Key1 to Key 16 (on page 252) parameter for additional information.

9. Click the Active Key list box arrow and select the designated active key.

Note: See the Active Key (on page 250) parameter for additional information.

10. Click the **Update** button to save the changed information. The encryption changes take effect immediately.

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## 8.5. Change the lo Ex Com Parameters

Note: This parameter is read-only in the Web Interface.

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## 8.6. Change the Local Diagnostics - Monitored Node

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

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 136



Figure 136: Configuration 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 to access the Local Diagnostics parameters.

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

7. Scroll to the Monitored Node text box. Figure 137

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Monitored Node (64206
Resets Sent 0
Resets Detected 2
Interface Bytes RX 37142
Interface Bytes TX 55819
Interface Data RX 0

#### Figure 137: Local Diagnostics window

- 8. In the Monitored Node text box, enter the Node ID (on page 315) to monitor.
- 9. Click the **Update** button to save the changed information.

**FREEWAVE Recommends**: When viewing local diagnostics, if the Radio Bad CRC (on page 260) count is more than 15-20% of the total transmitted packets (the Radio LL Tx (on page 263) count), enabling the FEC Rate (on page 239) setting is beneficial.

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#### 8.7. Change the Modbus Parameters

Note: See the Modbus Parameters (on page 271) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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. See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 138



Figure 138: Configuration 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 Modbus tab to access the Modbus parameters. Figure 139

**Note**: See the Modbus Parameters (on page 271) for detailed information about the parameters.

→ Ĉ ŵ	0 192.168.111.100/config/1	Modbus						0 4	87	•
REEWAVE	System Info	Radio Settings	Radio Setting	s Helpers Encryptio	n Data Path	Local Diagnostics	Config Ser	vices Net	work	
ZumLink	EWAVE     System Info     Radio Settings     Radio Settings     Redipers     E       JMLink     Network Stats     NTP     Cam1     Cam2     Terminal Server       Modbus Device ID [1     Modbus Device ID [1     Modbus TOP [202     Notws TOP [202     Notws TOP [202	Terminal Server Relay	Date SNMP	Security Run	time Environment	Modbus	Io Ex Ci	m		
User Data File Upload System Info	Update	Mod	Modbus Device ID 1 Modbus TCP 50 pus Rtu Over TCP 50	)2 )21	Modbus					

#### Figure 139: Modbus window

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- 7. As applicable, change these parameters:
  - a. In the Modbus Device ID text box, enter a user-defined Modbus device ID.
  - b. In the Modbus TCP text box, enter the TCP port used for the Modbus TCP requests.
  - c. In the **Modbus Rtu Over TCP** text box, enter the TCP port used for the Modbus RTU over TCP requests.
- 8. Click the **Update** button to save the changed information.

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#### 8.8. Change the Network Parameters

Note: See the Network Parameters (on page 281) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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. See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 140



Figure 140: Configuration 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 to access the Network parameters. Figure 141

**Note**: See the Network Parameters (on page 281) for detailed information about the parameters.

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) - C @	(i) 192.168.111.100/comfet	s/network									P		11	IN E	1 1
REEWAVE	System Info	Radio Se	ttings	Radio Sett	ings Helpers	Encryption	Date	a Path	Local Diagno	stics	Config	Services	Networ	k	
ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Runtin	ne Environ	iment N	Modbus	lo Ex Com	1
							Networ	*							
				MAC Address	s 00:07:e7:00:06	6:9b									
User Data				IP Address	s 192.168.111.1	100									
File Upload				Netmasi	k 255.255.255.0	5									
System Info				Gateway	y 192.168.111.1	£									
Configuration				STP Enabled	d folse				<i>u</i>						
Network Diagnostics				Txqueueler	n 25										
Help				MTL	J 1500										
Logout			Namesi	erver Address:	1 8.8.8.8										
			Nomese	erver Address	2 8.8.4.4										
			Netmasi	k Filter Enables	d false				4						
			Arg	p Filter Enables	d folse				6						
				Vian MGM	10										
				Vian Tar	a 0										

#### Figure 141: Network window

Note: The MAC Address (on page 283) 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 or Z9-PC-SR001 assigned by the IT department for the network.
  - b. In the **Netmask** text box, enter the Netmask of the Z9-PC or 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.
- j. Click the Arp Filter Enabled list box arrow and select True to enable the parameter.
- k. In the Vian MGMT text box, enter the Management VLAN ID.
- I. In the VIan Tag text box, enter the VLAN ID.
- 8. Click the **Update** button to save the changed information.

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## 8.9. Change the NTP Parameters

Note: See the NTP Parameters (on page 298) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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. See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 142



Figure 142: Configuration 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 to access the NTP parameters. Figure 143

Note: See the NTP Parameters (on page 298) for detailed information about the parameters.

infiguration X +											<u> </u>
→ C @	0 192.168.111.100/config/r	stp							🖂 🕁		
REEWAVE	System Info	Radio Settings	Radio Setti	ings Helpers	Encryption	Data Path	Local Diagnostics	Config	Services	Network	1
ZumLink	Network Stats	NTP Cor	n1 Com2	Terminal S	erver Relay	Date SNMP	Security Ru	intime Enviro	nment M	odbus lo	Ex Com
	ŝ.					NTP					
loss Date			NTP Reference NTP Address	time nist gov	IME_SERVER		1 m				
ile Upload			NTP Address	2			_				
System Info			NTP Address	-							
Configuration			NTP Address	•							



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- 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 (1 to 5) (on page 299) 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.

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## 8.10. Change the Radio Settings Parameters - Endpoint

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 144



Figure 144: Configuration 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 to access the Radio Settings parameters.
- Click the Radio Mode list box arrow and select the device type to designate the Z9-PC or Z9-PC-SR001 as an Endpoint. Figure 145

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**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.





- 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 or 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 **nodeld** instead of the auto-generated **nodeld**.
  - 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) used to set the maximum expected propagation delay between any Endpoints 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 Frequency Masks (on page 308) for detailed information.

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

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## 8.11. Change the Radio Settings Parameters - Endpoint-Repeater

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 146



Figure 146: Configuration 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 to access the Radio Settings parameters.
- Click the Radio Mode list box arrow and select the device type to designate the Z9-PC or Z9-PC-SR001 as an Endpoint\_Repeater. Figure 147

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

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Streaming   CPE	Cogin - Preswave													
EEWAVE	System Info	Radio Set	tings	Radio Settin	igs Helpers	Encryption	Date	a Path	Local Diagno	stics	Config	Service	es Netw	ork
ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	rver Relay	Date	SNMP	Security	Runt	ime Enviro	nment	Modbus	lo Ex Com
							ladio Set	tings						
	Radio Mode Endpoint_Repeater													
er Data	RF Data Rate RATE_500K													
Upload			Rodio	Repeater Slot	1				0					
tem Info				TX Power	30dbm				~					
nfiguration				Network ID	51966									
twork Diagnostics				Node ID	18131									
lp			Radio H	Hopping Mode	Hopping_On				-					
jout			1000004	LNA Bypass	0				14					
		M	ax Link Dis	stance in Miles	20									
			Fre	quency Masks										



- 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 or 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) used to set the maximum expected propagation delay between any Endpoints 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 Frequency Masks (on page 308) for detailed information.

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

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## 8.12. Change the Radio Settings Parameters - Gateway

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 148



Figure 148: Configuration 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 to access the Radio Settings parameters.
- 7. Accept the Radio Mode default of Gateway. Figure 149

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

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→ C ŵ	192.168.111.100/config	/radioSettings									Œ	🖻	4	II\ 🖸	4
REEWAVE	System Info	Radio Se	ttings	Radio Setti	ngs Helpers	Encryption	Dat	a Path	Local Diagna	ostics	Config	Service	s Netw	ork	
ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Run	time Enviror	ment	Modbus	lo Ex Com	
	8					R	odio Sel	tlings							
				Radio Mode	Gateway				10						
User Data				RF Data Rate	RATE_500K				6						
File Upload			Radio	Max Repeaters	0				1						
System Info				TX Power	30dbm				~						
Configuration				Network ID	51966										
Network Diagnostics				Frequency Key	Key0				10						
Help			Radio	Hopping Mode	Hopping_On				2						
Logout				Beacon Interva	ONE_HUNDR	ED_MS									
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			Aax Link D	istance In Miles	20										
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	Update														



- 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 or 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 Beacon Interval 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) used to set the maximum expected propagation delay between any Endpoints in the network.
- k. In the **Frequency Masks** text box, enter the exact specified format of the frequency range to mask.

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**Caution**: The exact syntax is required in the **Frequency Masks** text box. See Frequency Masks (on page 308) for detailed information.

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

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## 8.13. Change the Radio Settings Parameters - Gateway-Repeater

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 150



Figure 150: Configuration 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 to access the Radio Settings parameters.
- Click the Radio Mode list box arrow and select the device type to designate the Z9-PC or Z9-PC-SR001 as a Gateway\_Repeater. Figure 151

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

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REEWAVE	System Info	Radio Se	ttings	Radio Setti	ngs Helpers	Encryption	Date	a Path	Local Diagno	stics	Config	Services	Networ	k	
ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Runtim	e Environ	ment N	todbus	lo Ex Com	
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				Rodio Mode	Gateway_Rep	eater			6						_
User Data				RF Data Rate	RATE_500K				×.						
File Upload			Radio	Max Repeaters	0				2						
System Info				TX Power	30dbm										
Configuration				Frequency Kes	Keyt				1						
etwork Diagnostics			Radio	Hopping Mode	Hopping_On				0						
ogout			E	Beacon Interva	ONE_HUNDRI	ED_MS			4						
			Beac	on Burst Coun	1 3				4						
				LNA Bypass	0				2						
		M	lax Link D	istance In Miles	20										
			Fr	equency Masks	۱ <u>ــــــــــــــــــــــــــــــــــــ</u>										
	Update														

#### Figure 151: Radio Settings window - Gateway\_Repeater

- 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 or 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 Beacon Interval 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) used to set the maximum expected propagation delay between any Endpoints in the network.
- k. In the **Frequency Masks** text box, enter the exact specified format of the frequency range to mask.

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**Caution**: The exact syntax is required in the **Frequency Masks** text box. See Frequency Masks (on page 308) for detailed information.

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

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#### 8.14. Change the Security Parameters

Note: See the Security Parameters (on page 335) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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. See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 152



Figure 152: Configuration 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 to access the Security parameters. Figure 153

**Note**: See the Security Parameters (on page 335) for detailed information about the parameters.

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REEWAVE	System Info	Radio Set	ttings	Radio Setti	ngs Helpers	Encryption	Data	a Path	Local Diagno	stics	Config	Service	es Netw	ork	
ZumLink	Network Stats	NTP	Com1	Com2	Terminal S	erver Relay	Date	SNMP	Security	Runt	ime Enviror	nment	Modbus	lo Ex	Com
User Data File Upload	Update		Enable	PTP Interface Ethernet Logir	true		Securit	y	0						
System Info Configuration															

#### Figure 153: Security window

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- 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 Enable Ethernet Login (on page 336) 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 Ethernet PTP Interface (on page 336) parameter for additional information.

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

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#### 8.15. Change the Services Parameters

Note: See the Services Parameters (on page 338) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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. See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 154



Figure 154: Configuration 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 to access the Services parameters. Figure 155

**Note**: See the Services Parameters (on page 338) for detailed information about the parameters.

• C O	D 192.168.111.100/con/lig/s	services.										© 1	άr		
REEWAVE	System Info	Rodio Setti	ngs	Radio Setti	ngs Helpers	Encryption	Data	Path	Local Diagno	stics	Config	Services	Netwo	ork	
ZumLink	Network Stats	NTP	Com1	Com2	Terminal S	erver Relay	Date	SNMP	Security	Runt	time Enviror	nment	Modbus	lo Ex	Com
Jser Data	Update			Time Out CL	900		Service								
lle Upload ystem Info															

#### Figure 155: Services window

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- 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.

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## 8.16. Change the SNMP Parameters

Note: See the SNMP Parameters (on page 340) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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. See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 156



Figure 156: Configuration 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 to access the **SNMP** parameters.

**Note**: See the SNMP Parameters (on page 340) for detailed information about the parameters.

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REEWAVE	System Info	Radio Set	tings	Radio Setti	ngs Helpers	Encryption	Data Path	Local Diagno	ostics	Config	Services	s Networ	'k
ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date SNM	Security	Runt	time Enviro	nment	Modbus	lo Ex Com
	81. 1						SNMP	- 18					
				V1 Enabled	false			2					
ser Data				V2C Enabled	false			~					
le Upload				V3 Enabled	folse			1. A					
ystem Info			RO Comr	nunity Name	public								
onfiguration			RW Comr	nunity Name	private			-					



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- 7. As applicable, change these parameters:
  - a. Click the V1 Enabled list box arrow and select True to enable SNMP V1.

**Note**: For security, the protocol **SNMP v1** is read-only. See the V1 Enabled (on page 343) 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 V2C Enabled (on page 344) 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 V3 Enabled (on page 345) 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.

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### 8.17. Change the System Info Parameters

Note: See the System Info Parameters (on page 354) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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. See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 158



Figure 158: Configuration 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 System Info tab to access the System Info parameters. Figure 159

**Note**: See the System Info Parameters (on page 354) for detailed information about the parameters.

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→ C @ 0	192.168.111.100/config/	ohimetzyz										6	2 12	10	0 9
REEWAVE	System Info	Radio Se	ttings	Radio Sett	ings Helpers	Encryption	Data	a Path	Local Diagn	ostics	Config	Servi	ces Netw	vork	
ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Run	time Enviro	nment	Modbus	Io Ex Co	om
							System I	nfo							
	Serial Number 4026737941														_
User Data	Model Code D														
File Upload	Radio Model AMT0100AA														
System Info	Radio Model Code 0														
Configuration		Radio Fin	rmware Version FWT1071TR.42												
Network Diagnostics			Rodio	Serial Numbe	4026737941										
Helo				Device Nam											
onout				Device Mode	29-PE										
Logour			Device	Configuratio	R1			_							
			Device Fin	mware Versio	FWT1122TB.6	6									
				Device II	1										
				Layout Has	325426040										
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			Proc Tes	License	Custom Anns	2			_						
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Figure 159: 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 or Z9-PC-SR001.
  - b. In the **Device ID** text box, enter the user-defined Device ID identifier for the Z9-PC or 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.

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# 8.18. Change the Terminal Server Relay Parameters

**Note**: See the Terminal Server Relay Parameters (on page 365) for detailed information about the parameters.

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 160



Figure 160: Configuration 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 to access the **Terminal Server Relay** parameters. Figure 161

**Note**: See the Terminal Server Relay Parameters (on page 365) for detailed information about the parameters.

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FREEWAVE	System Info	Radio Sett	ings	Radio Setti	ngs Helpers	Encryption	Data	a Path	Local Diagna	ostics	Config	Service	es Netv	vork		
<b>Q</b> ZumLink <sup>®</sup>	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Run	time Enviro	nment	Modbus	lo Ex C	om	
User Data File Upload System Info Rconfiguration Network Diagnostics Help OLogout	Update	Te Remo	ermserv F te Termsi	Relay Mapping erv IP Address	TERMSERV_R	Tem	inal Serv	er Relay				_				

#### Figure 161: 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.
- 9. Restart the Z9-PC or Z9-PC-SR001 for the changes to be implemented.

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# 9. Web Interface - Network Diagnostics

This section provides procedure information about adding, saving, and viewing the Z9-PC or Z9-PC-SR001 **Network Diagnostic** diagrams.

- Add a Gateway Device IP Address (on page 152)
- Download a Support Bundle (on page 155)
- Save Network Diagnostics (on page 158)
- Save a Network Diagram Image (on page 161)
- Show Table in the Network Diagnostics Window (on page 165)
- View the Network Diagnostics Breadthfirst (on page 167)
- View the Network Diagnostics Cose-bilkent (on page 169)
- View the Network Diagnostics Grid (on page 171)
- View the Network Diagnostics Margin (on page 173)
- View the Network Diagnostics Margin with Neighbors (on page 175)
- View the Network Diagnostics RSSI (on page 178)
- View the Network Diagnostics RSSI with Neighbors (on page 180)
- View the Network Diagnostics Rx Rate (on page 183)
- View the Network Diagnostics Tx Rate (on page 185)

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# 9.1. Add a Gateway Device IP Address

Usually the Gateway is auto-detected but sometimes this might not happen. This procedure allows the user to designate a specific Gateway IP address.

Note: The images in this procedure are for Windows® 10 and/or Firefox®.

### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



Figure 162: Network Diagnostics 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.

The **Network Diagnostics** window opens, scanning the network. Figure 163

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

6. Click the Options list box arrow and select the Gateway IP option. Figure 164



Figure 164: Options list box - Gateway IP option Selected

The Add Device IP dialog box opens showing the currently designated Gateway IP address. Figure 165

Note: The image show	vs the IP address blocked out.	
	Add Device IP	×
	IP: Submit	
	Figure 165: Add Device IP	dialog box

Figure 165: Add Device IP dialog box

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7. In the **IP** text box, enter the IP address of the designated a Gateway device and click **Submit**.

Important!: Network settings are NOT changed when the Gateway IP address is specified.

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# 9.2. Download a Support Bundle

Save the current network performance reading to send to FreeWave Technical Support for faster issue resolution.

Note: The images in this procedure are for Windows® 10 and/or Firefox®.

### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



Figure 166: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 167

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

Click the Options list box arrow and select the Download Support Bundle option. Figure 168



Figure 168: Options list box - Download Support Bundle option Selected

The Opening support\_bundle\_nnn.zip dialog box opens. Figure 169

<ul> <li>support_bundle_124.zip</li> <li>which is: Compressed (zipped) Folder (39.7 KB) from: http://10.2.4.124</li> <li>What should Firefox do with this file?</li> <li>O_Open with Windows Explorer (default)</li> <li>Save File</li> </ul>	You have chosen t	o open:					
which is: Compressed (zipped) Folder (39.7 KB) from: http://10.2.4.124 What should Firefox do with this file? O Open with Windows Explorer (default) © Save File	support_bu	ndle_124.zip					
What should Firefox do with this file?         Open with       Windows Explorer (default)         Save File	which is: Co from: http://	which is: Compressed (zipped) Folder (39.7 KB) from: http://10.2.4.124					
Open with Windows Explorer (default)	What should Fire	fox do with this file?					
● Save File	○ <u>O</u> pen with	Windows Explorer (default)	~				
	Save File						
Do this <u>a</u> utomatically for files like this from now on.	Do this <u>a</u> uto	matically for files like this from now on.					

Figure 169: Opening support\_bundle\_nnn.zip dialog box

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Note: Where nnn is the selected device in the Network Diagram.

- 7. Click **OK**. The **Enter name of file to save to** dialog box opens.
- 8. 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.
- 9. Contact FreeWave Technical Support (on page 14) for information on where to send the saved .zip file.

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### 9.3. Save Network Diagnostics

Use this procedure to save the current network performance reading for later review and to monitor network performance over time.

Note: The images in this procedure are for Windows® 10 and/or Firefox®.

#### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



Figure 170: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 171

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

 Click the Options list box arrow and select the Save Network Diagnostics option. Figure 172



Figure 172: Options list box - Save Network Diagnostics option Selected

The Opening network\_diag.json dialog box opens. Figure 173

Opening network_di	ag.json					
You have chosen to	open:					
network_dia	g.json					
which is: JavaScript Object Notation (4 bytes)						
from: blob:	from: blob:					
What should Firef	ox do with this file?					
○ <u>O</u> pen with	<u>B</u> rowse					
Save File						
Do this autor	matically for files like this from now on.					
	ОК	Cancel				

Figure 173: Opening network\_diag.json dialog box

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#### 7. Click OK.

The Enter name of file to save to dialog box opens.

Enter name of file	to save to								×
← → • ↑ <mark> </mark>	> This PC > OS (C	:) > _ZumLink Files	> Zum-Network-Diag	grams		ٽ ~	Search Zun	n-Network-Diagra	٩
Organize 👻 Ne	w folder							== -	?
Zum-Netw	vork-Diagrams	↑ Name	^	Date modified	Туре	Size	Tags		
				No iten	ns match your	search.			
		¥							
File name:	network_diag.json								~
Save as type:	JavaScript Object Not	tation (*.json)							$\sim$
<ul> <li>Hide Folders</li> </ul>							Save	Cancel	

Figure 174: Opening network\_diag.json dialog box

- 8. Search for and select a location to save the **.json** file to and click **Save**. The **Enter name of file to save to** dialog box closes.
- 9. Open a **Windows**® **File Explorer** window and find the location where the .json file was saved.
- 10. Open the .json file to review the current network performance reading and monitor network performance over time.

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## 9.4. Save a Network Diagram Image

This procedure is used to track changes in the network using images of the Network Diagram.

Note: The diagram is saved as a .PNG file.

The images in this procedure are for Windows® 10 and/or Firefox®.

### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



Figure 175: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 176

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

6. Click the Options list box arrow and select the Save Image option. Figure 177



Figure 177: Options list box - Save Image option Selected

The Save Image dialog box opens.

7. In the **Save Image** text box, enter a descriptive name for the network image and click **Submit**. Figure 178

Save Image		×
File Name:		
network_dia	g.png	
Submit		

Figure 178: Save Image dialog box

The Opening \_\_\_\_\_.png dialog box opens. Figure 179

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Note: Where is	he entered name of the image file.	
	Opening EXAMPLE-ntwrkdiag.png     X       You have chosen to open:     S       S EXAMPLE-ntwrkdiag.png     which is: PNG file (122 KB)       from: blob:     What should Firefox do with this file?       Open with Snagit Editor (default)     Image: Save File       Do this automatically for files like this from now on.     OK	
	What should Firefox do with this file?         Open with       Snagit Editor (default)         Save File         Do this automatically for files like this from now on.             OK       Cancel	

Figure 179: Opening \_\_\_\_\_.png dialog box

8. Click OK.

The Enter name of file to save to dialog box opens. Figure 180

Enter name of file	to save to							×
← → • ↑ <mark> </mark>	> This PC > OS (C:)	> _ZumLink Files >	Zum-Network-Diagrams		√ Ö	Search Zum-Net	work-Diagra	9
Organize 👻 New	w folder							•
Zum-Netw	vork-Diagrams	^ Name	^	Date modified	Туре	Size		
				No items match your	r search.			
File name:	EXAMPLE-ntwokdiag	200						~
Save as type:	(* ppg)	Jing						-
save as type.	( ipig)							-
A Hide Folders						Save	Cancel	

#### Figure 180: Enter name of file to save to dialog box

- 9. Search for and select a location to save the .PNG file to and click **Save**.
- 10. Open a Windows® Explorer window and find the location where the .PNG file was saved.
- 11. Open the **.PNG** file to review the changes in the network using the **Network Diagram**. Figure 181

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Figure 181: Opened .PNG File

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### 9.5. Show Table in the Network Diagnostics Window

Use this procedure to view the connection table of the device selected in the Network Diagram.

Note: The images in this procedure are for Windows® 10 and/or Firefox®.

#### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



Figure 182: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 183

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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The Link Margin connections appear in the Network Diagram.

 In the Options list box, select the Show Table option to view the radio connection table of the selected device below the Network Diagram. Figure 184



Figure 184: Network Diagnostics window with Show Tables Selected

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# 9.6. View the Network Diagnostics - Breadthfirst

Use the **Breadthfirst Network Diagram** to view the network in a top-down, organization chartlike view.

- The Gateway is always on top of the network diagram.
- The next layers in the network diagram show Repeaters and Endpoints.

Important!: A Gateway is required in the network to use this window.

#### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



Figure 185: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 186

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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 Click the Options list box arrow and select the Breadthfirst option to show the Breadthfirst connections in the Network Diagram. Figure 187



Figure 187: Network Diagnostics window - Breadthfirst



To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

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# 9.7. View the Network Diagnostics - Cose-bilkent

Use the **Cose-bilkent Network Diagram** to view the Gateway surrounded by the Repeaters and Endpoints.

Important!: A Gateway is required in the network to use this window.

### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



Figure 188: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 189

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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 Click the Options list box arrow and select the Cose-bilkent option to show the Cosebilkent connections in the Network Diagram. Figure 190



Figure 190: Network Diagnostics window - Cose-bilkent



To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

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### 9.8. View the Network Diagnostics - Grid

View a Grid Network Diagram to show the network in a column - row layout.

**Important!**: A Gateway is required in the network to use this window.

#### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



Figure 191: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 192

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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Network Diagnostics Help				þ
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 Click the Options list box arrow and select the Grid option to show the Grid connections in the Network Diagram. Figure 193



Figure 193: Network Diagnostics window - Grid



To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

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### 9.9. View the Network Diagnostics - Margin

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.

#### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



#### Figure 194: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 195

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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Dillow Date				5
File Upload				
System Info				
Configuration Network Diagnostics				
©Help			6	
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The Link Margin connections appear in the Network Diagram Figure 196



Figure 196: Network Diagnostics window - Link Margin

To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

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### 9.10. View the Network Diagnostics - Margin with Neighbors

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.

#### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



#### Figure 197: Network Diagnostics 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.

The **Network Diagnostics** window opens, scanning the network. Figure 198

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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Figure 198: Network Diagnostics window - Scanning Network

 Click the Options list box arrow and select the Margin with Neighbors option to show the Margin with Neighbors connections in the Network Diagram. Figure 199



Figure 199: Network Diagnostics window - Margin with Neighbors



To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

# 7. Optional: Use the cursor to hover over the Gateway-Endpoint link to view the dBm rate. Figure 200

**Note**: The image provides example information only. Each Z9-PC or Z9-PC-SR001 provides its own unique information.

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Figure 200: Network Diagnostics window - Margin with Neighbors -Gateway-Endpoint Link

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### 9.11. View the Network Diagnostics - RSSI

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.

#### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



#### Figure 201: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 202

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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6. Click the **Options** list box arrow and select the **RSSI** option to show the **RSSI** connections in the **Network Diagram**. Figure 203



Figure 203: Network Diagnostics window - RSSI



To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

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### 9.12. View the Network Diagnostics - RSSI with Neighbors

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.

#### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



#### Figure 204: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 205

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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System Info				(
<ul> <li>Network Diagnostics</li> <li>Help</li> <li>Logout</li> </ul>				Î
				ø

Figure 205: Network Diagnostics window - Scanning Network

 Click the Options list box arrow and select the RSSI with Neighbors option to show the RSSI with Neighbors connections in the Network Diagram. Figure 206



Figure 206: Network Diagnostics window - RSSI with Neighbors



To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

# 7. Optional: Use the cursor to hover over the Gateway-Endpoint link to view the dBm rate. Figure 207

**Note**: The image provides example information only. Each Z9-PC or Z9-PC-SR001 provides its own unique information.

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Figure 207: Network Diagnostics window - RSSI with Neighbors - Gateway-Endpoint Link

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# 9.13. View the Network Diagnostics - Rx Rate

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.

### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



#### Figure 208: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 209

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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User Data			3	•••
File Upload     System Info				
Configuration				T
Help				9
OLogout				
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6. Click the **Options** list box arrow and select the **Rx Rate** option to show the **Rx Rate** connections in the **Network Diagram**. Figure 210



Figure 210: Network Diagnostics window - RX Rate



To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

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# 9.14. View the Network Diagnostics - Tx Rate

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.

### Procedure

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



#### Figure 211: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 212

The diagram takes a few moments to render.

The **Options** list box default selection is **Margin**.

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6. Click the **Options** list box arrow and select the **Tx Rate** option to show the **Tx Rate** connections in the **Network Diagram**. Figure 213



Figure 213: Network Diagnostics window - TX Rate



To update the Network Diagnostics window (on page 405), refresh the browser to clear the browser cache.

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# **10. Change the Passwords**

**Important!**: The Z9-PC or Z9-PC-SR001 password is ONLY changed through the CLI. See CLI Configuration (on page 60) 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 188)
- Change the DEVUSER Password (on page 188)

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# **10.1. Change the ADMIN Password**

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

Example: system.password=admin,12345,12345.

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

# **10.2. Change the DEVUSER Password**



**Warning!** Do NOT use the Linux command passwd to change passwords. Passwords **must be changed** using the FreeWave CLI to keep them synchronized between the FreeWave CLI and the Linux Bash shell.

 Login to the FreeWave CLI using admin and the current password. The FreeWave Shell returns. Figure 214

VT	COM6 - Tera 1	Ferm VT		· · · · · · · · ·	_	×
File	Edit Setup	Control	Window	Help		
free Pas: Free >	ewave-ib l sword: eWave Shel	ogin: a	dmin			~
				· · · · · · · · · · · · · · · · · · ·		~

#### Figure 214: FreeWave Shell

 At the > prompt, type system.login=devuser, devuser and press <Enter>. The devuser is now logged in. Figure 215

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VT	COM3 - Tera	ferm VT							_	×
File	Edit Setup	Control	Window	Help						
f re Pas	ewave-ib l sword:	ogin: a	dmin							^
Fre ≻sy RES	eWave Shel stem.login ULT:0:OK	1 =devuse	r,devuse	r						
>∎										

### Figure 215: devuser Logged In

 At the > prompt, type system.password=devuser,nnnnn,nnnnn and press <Enter>.

**Note**: Where devuser is the current password and nnnnn is the new devuser password.

The CLI shows the new password was accepted. Figure 216



Figure 216: Accepted devuser New Password

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# 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 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.

## Procedure

**Note**: This procedure provides a **Tera Term** terminal connection to the FreeWave CLI. Other terminal emulators (e.g., **HyperTerminal**, **PuTTY**) may be used. The images in this procedure are for **Windows**® 7 and/or **Windows**® 10 and **Firefox**®.

- 1. On the computer connected to the Z9-PC or Z9-PC-SR001, open a terminal program (e.g., **Tera Term** <u>http://ttssh2.osdn.jp/</u>).
- 2. In Tera Term, click the File menu and select New Connection. Figure 217

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M	Tera Te	erm - [di	sconnecte	d] VT	
File	Edit	Setup	Control	Window	Help
	New c	onnecti	on	Alt+N	1
	Duplic	ate sess	ion	Alt+D	L
	Cygwi	n conne	ction	Alt+G	L
	Log				
	Comm	nent to l	.og		
	View L	og			
	Show	Log dial	og		
	Send f	ile			
	Transf	er		>	
	SSH SO	СР			
	Chang	e direct	ory		
	Replay	Log			
	TTV D.	scord			l



The Tera Term New Connection dialog box opens.

3. Click the **Port** list box arrow and select the COM port the Z9-PC or Z9-PC-SR001 is connected to. Figure 218

Tera Term: New co	nnection	×
⊖ TCP/IP	Host: 192.168.111.100	~
	History Service: O Telnet	TCP port#; 22
	● SSH SSI	H version: SSH2 $\sim$
	○ Other	Protocol: UNSPEC ~
Serial	Port: COM1: Communic COM1: Communic COM6: USB Seria	cations Port (COM1) cations Port (COM1) I Device (COM6)

Figure 218: Select the Z9-PC or Z9-PC-SR001 COM Port

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

- 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 219

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Figure 219: Setup menu > Serial Port

The Tera Term: Serial Port Setup dialog box opens. Figure 220

Tera Term: Serial port setu	dr		>
Port:	COM6	~	ОК
Speed:	115200	~	
Data:	8 bit	~	Cancel
Parity:	none	~	
Stop bits:	1 bit	~	Help
Flow control:	none	~	
Transmit dela	y c/char O	ms	ec/line

Figure 220: Tera Term: Serial Port Setup dialog box with Default Settings

- Using Figure 220 as the example, verify the COM port settings are: Speed (Baud Rate): 115200
   Data (Databits): 8 bit
   Parity: none
   Stop bits: 1 bit
- 7. Click **OK** to save the changes and close the dialog box.
- 8. In the **Tera Term** window, press <Enter>. The FreeWave CLI Login returns.
- 9. Enter admin for the Username and press < Enter>.
- 10. Enter admin for the **Password** and press < Enter>.

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**Note**: The default username and password is **admin**. 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 opens. Figure 221

File Edit Setup Control Window Help freewave-ib login: admin Password: Evapellaue Shell	VT	COM6 - Ter	a Term VT								_	×
freewave-ib login: admin Password: Ewapdug Shell	File	Edit Setu	p Control	Window	Help	р						
	fre Pas Fre >	ewave-ib sword: eWave She	login: a 11	dmin								

#### Figure 221: FreeWave Shell

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

I COM3 - Tera Term VT File Edit Setup Control Window Help	_	×
		^
<pre>&gt;network] [Page=network] mac_address=00:07:e7:00:06:9b ip_address=192.168.111.100 netmask=255.255.255.0 gateway=192.168.111.1 stpEnabled=false txquewelen=25 mtu=1500 nameserver_address1=8.8.8.8 nameserver_address2=8.8.4.4 netmaskFilterEnabled=false vlanMgmt=0 vlanMgmt=0 RESULT:0:0K &gt;</pre>		
		~

#### Figure 222: network Settings Page

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



The IP Filtering setting 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.

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

Note: See Example: Network Topology with Traffic at the Gateway (on page 194)

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# **11.1. Example: Network Topology with Traffic at the Gateway**

#### In Figure 223:

- 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 223: Network Topology with Traffic at the Gateway but not Desired on the Rest of the Network

Figure 223 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.

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# 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.

Note: An Endpoint-Repeater strongly favors its wired device over Endpoints it's repeating for.

This section has this information:

- Repeater Setup Table (on page 197)
  - Hopping OFF Repeater Setup (on page 197)
  - Hopping ON Repeater Setup (on page 198)
- Basic Gateway and Endpoint-Repeater Setup (on page 200)
  - Open a Terminal Emulator Application (on page 201)
  - Hopping On: Gateway and Endpoint-Repeater Setup (on page 204)
  - Hopping Off: Gateway and Endpoint-Repeater Setup (on page 206)
- Repeater Examples (on page 208)
  - Gateway-Repeater (on page 209)
  - Endpoint-Repeater (on page 210)
  - Multiple Repeaters: Gateway-Repeater and Endpoint-Repeater (on page 211)
  - Multiple Repeaters: Four Endpoint-Repeaters (on page 212)
  - Back-to-Back Repeaters (on page 214)

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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 Beacon Burst Count (on page 304) 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.

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# 12.1. Repeater - Setup Table

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

• Hopping OFF Repeater Setup (on page 197)

• Hopping ON Repeater Setup (on page 198)

Note: For detailed procedures, see Basic Gateway and Endpoint-Repeater Setup (on page 200).

# 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 conlige			
radioSettings Setting*	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
radioMode=	Gateway	Endpoint_Repeater	Endpoint
nodeld=	N/A	= <b>unique</b> Node ID for each device	= <b>unique</b> Node ID for each device
networkId=	= same Network ID for all devices	= <b>same</b> Network ID for all devices	= same Network ID for all devices
rfDataRate=	= <b>same</b> Data Rate for all devices	= <b>same</b> Data Rate for all devices	= <b>same</b> Data Rate for all devices
dataPath Setting*	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
routeMinSignalMarginThresh=	= <b>desired</b> Link Signal Margin minus 4dB	= <b>desired</b> Link Signal Margin minus 4dB	= <b>desired</b> Link Signal Margin minus 4dB
network Setting*	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
ip_address=	= <b>unique</b> IP address for each device.	= <b>unique</b> IP address for each device.	= <b>unique</b> IP address for each device.

#### **Repeater Network Configuration**

**Note**: \*See the Data Path Parameters (on page 235), Network Parameters (on page 281), or Radio Settings Parameters (on page 303) for additional information.

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# 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 Configu											
radioSettings Setting****	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup								
radioMode=	Gateway	Endpoint_Repeater	Endpoint								
nodeld=	N/A	= <b>unique</b> Node ID for each device	= <b>unique</b> Node ID for each device								
networkId=	= same Network ID for all devices	= <b>same</b> Network ID for all devices	= same Network ID for all devices								
rfDataRate=	= <b>same</b> Data Rate for all devices	= <b>same</b> Data Rate for all devices	= <b>same</b> Data Rate for all devices								
radioMaxRepeaters=	0-3 <sup>1</sup>	NA	NA								
radioRepeaterSlot=	NA	1-3 <sup>2</sup>	NA								
beaconBurstCount=	1-7 <sup>3</sup>	NA	NA								
dataPath Setting****	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup								
routeMinSignalMarginThresh=	= <b>desired</b> Link Signal Margin minus 4dB	= <b>desired</b> Link Signal Margin minus 4dB	= <b>desired</b> Link Signal Margin minus 4dB								
network Setting****	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup								
ip_address=	= <b>unique</b> IP address for each device.	= <b>unique</b> IP address for each device.	= <b>unique</b> IP address for each device.								

#### **Repeater Network Configuration**

- 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.

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3. Set the Beacon Burst Count (on page 304) 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 Data Path Parameters (on page 235), Network Parameters (on page 281), or Radio Settings Parameters (on page 303) for additional information.

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# 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 201)
- B. Configure using either: Hopping On: Gateway and Endpoint-Repeater Setup (on page 204) or Hopping Off: Gateway and Endpoint-Repeater Setup (on page 206)

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### 12.2.1. Open a Terminal Emulator Application

**Note**: This procedure provides a **Tera Term** terminal connection to the FreeWave CLI. Other terminal emulators (e.g., **HyperTerminal**, **PuTTY**) may be used. The images in this procedure are for **Windows**® 7 and/or **Windows**® 10 and **Firefox**®.

- 1. On the computer connected to the Z9-PC or Z9-PC-SR001, open a terminal program (e.g., **Tera Term** <u>http://ttssh2.osdn.jp/</u>).
- 2. In Tera Term, click the File menu and select New Connection. Figure 224



Figure 224: 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 or Z9-PC-SR001 is connected to. Figure 225

O TCP/IP	Host:	192.168.11	1.100		$\sim$
	Service:	<ul> <li>✓ History</li> <li>○ Telnet</li> <li>● SSH</li> <li>○ Other</li> </ul>	TCP por SSH version: Protocol:	t#: 22 SSH2 UNSPEC	
● Serial	Port: OK	COM1: Com COM1: Com COM6: USB	munications Po munications Po Serial Device ((	rt (COM1) rt (COM1) COM6)	~

Figure 225: Select the Z9-PC or Z9-PC-SR001 COM Port

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

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- 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 226



Figure 226: Setup menu > Serial Port

Tera Term: Serial port set	up	
Port:	COM6	ОК
Speed:	115200	✓
Data:	8 bit	Cance
Parity:	none	~
Stop bits:	1 bit	√ Help
Flow control:	none	~
Transmit dela	ıy c∕char 0∣	msec/line

The Tera Term:

### Figure 227: Tera Term: Serial Port Setup dialog box with Default Settings

- 6. Using Figure 227 as the example, verify the COM port settings are: Speed (Baud Rate): 115200 Data (Databits): 8 bit Parity: none Stop bits: 1 bit
- 7. Click **OK** to save the changes and close the dialog box.
- 8. In the Tera Term window, press < Enter>. The FreeWave CLI Login returns.
- 9. Enter admin for the Username and press < Enter>.

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10. Enter admin for the **Password** and press < Enter>.

**Note**: The default username and password is **admin**. 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 opens. Figure 228



#### Figure 228: FreeWave Shell

11. At the > prompt, type **radioSettings** and press <Enter>. The current [Page=radioSettings] appears. (Figure 229)



Figure 229: radioSettings Page

- 12. Continue with either:
  - Hopping On: Gateway and Endpoint-Repeater Setup (on page 204)
  - Hopping Off: Gateway and Endpoint-Repeater Setup (on page 206)

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### 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 206).

- 1. On the Gateway ZumLink device:
  - a. Complete the Open a Terminal Emulator Application (on page 201) 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** 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 RF Data Rate (on page 325) 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 201) procedure.
  - b. At the > prompt, type:
    - i. radioSettings.radioMode=Endpoint Repeater and press < Enter>.
    - ii. radioSettings.networkId=nnnnn where nnnnn is the designated Network IDused when configuring the Gateway ZumLink device and press <Enter>.
    - iii. network.ip\_address=nnn.nnn.nnn where 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 RF Data Rate (on page 325) for the correct command format of the RF Data Rate.

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- 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 201) 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** 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 RF Data Rate (on page 325) 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 485) for additional information.



See the Gateway-Repeater (on page 209) example.

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### 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 204).

- 1. On the Gateway ZumLink device:
  - a. Complete the Open a Terminal Emulator Application (on page 201) procedure.
  - b. At the > prompt, type:
    - i. **radioSettings.radioMode=Gateway** and press < Enter>.
    - ii. radioSettings.networkId=nnnnnwhere 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 RF Data Rate (on page 325) 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 IDused 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 Megabytesused when configuring the Gateway **ZumLink** device and press <Enter>.

**Note**: See RF Data Rate (on page 325) for the correct command format of the RF Data Rate.

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- v. **radioSettings.nodeId=nnnn**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 201) procedure.
  - b. At the > prompt, type:
    - i. **radioSettings.radioMode=Endpoint** and press <Enter>.
    - ii. radioSettings.networkId=nnnnnwhere nnnnn is the designated Network IDused 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 Megabytesused when configuring the Gateway **ZumLink** device and press <Enter>.

**Note**: See RF Data Rate (on page 325) 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 485) for additional information.



See the Gateway-Repeater (on page 209) example.

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# 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 209)
- Endpoint-Repeater (on page 210)
- Multiple Repeaters: Gateway-Repeater and Endpoint-Repeater (on page 211)
- Multiple Repeaters: Four Endpoint-Repeaters (on page 212)
- Back-to-Back Repeaters (on page 214)

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## 12.3.1. Gateway-Repeater

**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.

Figure 230 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 230: Gateway-Repeater

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## 12.3.2. Endpoint-Repeater

**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.

Figure 231 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.

Note: An Endpoint-Repeater strongly favors its wired device over Endpoints it's repeating for.



#### Figure 231: Endpoint-Repeater

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## 12.3.3. Multiple Repeaters: Gateway-Repeater and Endpoint-Repeater

**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.

Figure 232 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 increases.
  - When issuing pings of large packet sizes at the lower data rates, such as 115.2K, and a Beacon Interval=TWENTY\_FIVE\_MS, the latency can increase causing the pings to fail.
  - Workaround: Allow an appropriate delay between pings.

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 232: Repeater with Additional Endpoint to Enhance Connectivity

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## 12.3.4. Multiple Repeaters: Four Endpoint-Repeaters

**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.

Figure 233 shows:

- Gateway has radio maximum of three Repeaters 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.

Note: An Endpoint-Repeater strongly favors its wired device over Endpoints it's repeating for.

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### Figure 233: Multiple Repeaters: Four Endpoint-Repeaters

- As Repeaters are chained in the network, round trip delay increases.
  - When issuing pings of large packet sizes at the lower data rates, such as 115.2K, and a Beacon Interval=TWENTY\_FIVE\_MS, the latency can increase causing the pings to fail.
  - Workaround: Allow an appropriate delay between pings.

**FREEWAVE Recommends**: Set the **beaconBurstCount=1** or more and **beaconInterval=ONE\_HUNDRED\_MS** or more for optimal throughput when extended Repeater networks are used.

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# 12.3.5. Back-to-Back Repeaters

**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.

If the network topology requires Repeaters to connect radios over greater distances, use back-toback Repeaters where data is repeated over a wire instead of over the air. This preserves throughput.

Figure 234 shows:

- Each link in the back to back network should be set to a unique Network ID (on page 314).
- At least one of these parameters should be configured differently between each link in the back-to-back network.
  - Beacon Interval (on page 305)
  - Frequency Key (on page 306)
  - Radio Frequency (on page 316)
  - Radio Hopping Mode (on page 317)
  - RF Data Rate (on page 325)



Figure 234: Back-to-Back Repeaters

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# **13. Approved Antennas**

## 13.0.1. Yagi Directional Antennas

The 900 MHz is approved by the FCC for use with directional antennas with a 16.0 dBi gain or less.

900 MHz Yagi Directional Antennas				
Gain (dBd)	Gain (dBi)	Manufacturer	Manufacturer Model Number	FreeWave Part Number
6.45	8.6	WaveLink	PR0890-8-40F02N4	EAN0906YC

# 13.0.2. Omni-directional Antennas

The 900 MHz is approved by the FCC for use with omni-directional antennas with a 10.5dBi gain or less.

Note: These antennas	, including antenna gair	s, are approved for use with the <b>ZumLink</b> device.

900 MHz 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	
0.85	3.0	Mobile Mark	PSKN3-925S	EAN0900SR	
-2.15	0.0	Mobile Mark	PSTG0-915SE	EAN0900SQ	

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### 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.

STOP

**Warning!** A proper combination with the **ZumLink** is required to ensure the system meets FCC requirements.

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# 14. COM Parameters

**Note**: See the COM window (on page 382) for parameter location. The parameters for **COM1** and **COM2** are the same except for the Terminal Server Port (on page 228) parameter setting.

Baudrate (on page 218) Break Before Send Us (on page 218) Connection Drops (on page 219) Databits (on page 220) Delay Before Send MS (on page 221) Duplex (on page 221) Flow Control (on page 222) Handler (on page 223) Mode (on page 225) Parity (on page 226) RX Bytes (on page 227) Stopbits (on page 227) Terminal Server Port (on page 228) Terminal Server Time Out (on page 229) TX Bytes (on page 230)

The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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#### 14.1. Baudrate

Baudrate		
Setting	Description	
CLI / Web Page	<ul><li> [Page=Com1]</li><li> [Page=Com2]</li></ul>	
CLI Command	<ul> <li>Com1.baudrate=nnnn</li> <li>Com2.baudrate=nnnn</li> </ul> Note: Where nnnn is the bar	ud rate value.
Web Interface window	Baudrate 1. Click the <b>Baudrate</b> list be 2. Click the <b>Update</b> button the Note: See the COM window	ox arrow and select a COM port baud rate. to save the change. (on page 382) for parameter location.
Default Setting	115200	
Options	Rate Options	
	1200	38400
	2400	57600
	4800	115200
	9600	230400
	14400	460800
	19200	921600
Description	The <b>Com1.baudrate</b> or <b>Com2.</b> baud rate for COM1 or COM2.	baudrate parameter designates the COM port

#### 14.2. Break Before Send Us

Break Before Send Us	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]
CLI Command	• Coml.breakBeforeSendUs=nnnn
	<ul> <li>Com2.breakBeforeSendUs=nnnn</li> </ul>
	Note: Where nnnn is the break signal value.

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Break Before Send Us	
Setting	Description
Web Interface	Break Before Send Us
window	<ol> <li>In the Break Before Send Us text box, enter the number of milliseconds the COM port will send a break signal.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the COM window (on page 382) for parameter location.
Default Setting	0 (zero)
Options	The maximum value is0 (zero).
	The minimum value is 1000.
Description	The <b>Com1.breakBeforeSendUs</b> or <b>Com2.breakBeforeSendUs</b> parameter designates how long the COM port will send a break signal for at least the number of microseconds specified before sending the data.
	<b>Example</b> : For COM1, enter Com1.breakBeforeSendUs=500 to have the COM1 port send a break signal for 500 microseconds.

## 14.3. Connection Drops

#### **Connection Drops**

Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]
CLI Command	• Coml.connectionDrops
	• Com2.connectionDrops
Web Interface window	Connection Drops           Note: This parameter is read-only in the Web Interface.           See the COM window (on page 382) for parameter location.
Default Setting	N/A
Options	N/A

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Connection Drops	
Setting	Description
Description	The <b>Com1.connectionDrops</b> or <b>Com2.connectionDrops</b> command reports the number of terminal server connections dropped due to inactivity on the network socket.
	• The number of drops only increments if a connection is left open and no data is sent.
	Connections that are closed by either side before the time out are not considered a dropped connection.
	Note: This is a Read-only parameter.

#### 14.4. Databits

Databits	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]
CLI Command	• Coml.databits=7
	• Com2.databits=7
	• Coml.databits=8
	• Com2.databits=8
Web Interface window	<ol> <li>Databits</li> <li>Click the <b>Databits</b> list box arrow and select the number of data bits in the frame for COM1 or COM2.</li> <li>Click the <b>Update</b> button to save the change.</li> <li>Note: See the COM window (on page 382) for parameter location.</li> </ol>
Default Setting	8
Options	• 7
	• 8
Description	The <b>Com1.databits</b> or <b>Com2.databits</b> parameter designates the number of data bits in the frame for COM1 or COM2.

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#### 14.5. Delay Before Send MS

Delay Before Send MS	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]
CLI Command	• Com1.delayBeforeSendMs=nnnn
	• Com2.delayBeforeSendMs=nnnn
	Note: Where nnnn is the amount of time delay in milliseconds.
Web Interface	Delay Before Send MS
window	<ol> <li>In the <b>Delay Before Send MS</b> text box, enter the milliseconds of time delay.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the COM window (on page 382) for parameter location.
Default Setting	0 (zero)
Options	The maximum value is0 (zero).
	The minimum value is 5000.
Description	The <b>Com1.delayBeforeSendMs</b> or <b>Com2.delayBeforeSendMs</b> parameter designates the amount of time delay in milliseconds the Z9-PC or Z9-PC-SR001 waits to allow the device connected to the COM port to switch from transmit (Tx) to receive (Rx) mode.
	<b>Example</b> : For COM1, enter Com1.delayBeforeSendMs=100 for a 100 millisecond delay.
	Increase this delay if the <b>ZumLink</b> is responding <b>before</b> a polling system is ready for a response.

# 14.6. Duplex

Duplex	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]

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Duplex	
Setting	Description
CLI Command	<b>Note</b> : For the Z9-PC or Z9-PC-SR001, this parameter is always designated as Full.
Web Interface window	<ol> <li>Duplex</li> <li>Click the <b>Duplex</b> list box arrow and select the duplex designation.</li> <li>Click the <b>Update</b> button to save the change.</li> </ol>
	Note: See the COM window (on page 382) for parameter location.
Default Setting	Full
Options	N/A
Description	N/A

#### 14.7. Flow Control

Flow Control	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]
CLI Command	The command is:
	• Off:
	• Com1.flowControl=Off
	• Com2.flowControl=Off
	• On:
	• Com1.flowControl=Hardware
	• Com2.flowControl=Hardware
Web Interface	Flow Control
window	<ol> <li>If applicable for COM2, click the Flow Control list box arrow and select Hardware to activate flowControl.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the COM window (on page 382) for parameter location.
Default Setting	Off
Options	• Off
	Hardware
Description	The <b>flowControl</b> parameter designates the hardware flow control as either On (Hardware) or Off.

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## 14.8. Handler

Handler	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]

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Handler	
Setting	Description
CLI Command	CLI
	When <b>CLI</b> is designated, a configuration CLI is on the COM port.
	The command is:
	• Com1.handler=cli
	• Com2.handler=cli
	ModbusPassthru
	When <b>ModbusPassthru</b> is designated, modbus requests are sent out to modbus sensors that are received via Modbus TCP or Modbus RTU.
	The command is:
	• Coml.handler=ModbusPassthru
	• Com2.handler=ModbusPassthru
	ModbusRTU
	When <b>ModbusRTU</b> is designated, receive Modbus RTU requests from a serial modbus RTU device.
	The command is:
	• Com1.handler=ModbusRTU
	• Com2.handler=ModbusRTU
	Off
	When <b>Off</b> is designated, this allows for application use with no setup. A port is never opened.
	The command is:
	• Com1.handler=Off
	• Com2.handler=Off
	Setup
	When <b>Setup</b> is designated, the COM port then frees up the port for application use.
	The command is:
	• Com1.handler=Setup
	• Com2.handler=Setup
	Terminal Server
	When Terminal Server is designated, the COM port acts as a terminal server.
	• The TCP port number is set by the COM1 Terminal Server Port (on page 228).
	The default port number for COM1 is 5041.
	The command is:
	• Com1.handler=TerminalServer

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Handler	
Setting	Description
	• Com2.handler=TerminalServer
	Trace
	When <b>Trace</b> is designated, a configuration CLI with trace is on the COM port.
	• Com1.handler=trace
	• Com2.handler=trace
Web Interface	Handler
window	1. Click the <b>Handler</b> list box arrow and select the designated protocol handler.
	2. Click the <b>Update</b> button to save the change.
	<b>Note:</b> See the COM window (on page 382) for parameter location
Default Setting	TerminalServer
Options	CLI (on page 224)
	ModbusPassthru (on page 224)
	ModbusRTU (on page 224)
	Off (on page 224)
	Setup (on page 224)
	Terminal Server (on page 224)
	Trace (on page 225)
Description	The <b>Com1.handler</b> or <b>Com2.handler</b> parameter designates the protocol of the COM port.
	Notes
	The default port number for COM1 is 5041.
	The default port number for COM2 is 5042.
	<b>FREEWAVE Recommends</b> : If using the Terminal Server Port parameter, keep the TCP port numbers as their defaults.

#### 14.9. Mode

Mode	
Setting	Description
CLI / Web Page	<ul><li> [Page=Com1]</li><li> [Page=Com2]</li></ul>
CLI Command	Note: The COM port is always RS232.

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Mode	
Setting	Description
Web Interface window	Mode         1. Click the Mode list box arrow and select the COM port mode.         2. Click the Update button to save the change.         Note: See the COM window (on page 382) for parameter location.
Default Setting	RS232
Options	N/A
Description	Note: The COM port is always RS232.

# 14.10. Parity

Parity	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]
CLI Command	• Coml.parity=None
	• Com2.parity=None
	• Coml.parity=Even
	• Com2.parity=Even
	• Coml.parity=Odd
	• Com2.parity=Odd
Web Interface window	<ol> <li>Parity</li> <li>Click the <b>Parity</b> list box arrow and select the COM port parity bits for the system.</li> <li>Click the <b>Update</b> button to save the change.</li> </ol>
	<b>Note</b> : See the COM window (on page 382) for parameter location.
Default Setting	None
Options	None
	• Even
	• Odd
Description	The <b>Com1.parity</b> or <b>Com2.parity</b> parameter designates the COM port parity bits for the system.

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#### 14.11. RX Bytes

RX Bytes	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]
CLI Command	• Coml.RxBytes
	• Com2.RxBytes
Web Interface	RX Bytes
window	<b>Note</b> : This parameter is read-only in the Web Interface. See the COM window (on page 382) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>Com1.RxBytes</b> or <b>Com2.RxBytes</b> command reports the total bytes received from the COM port.
	Note: This is a Read-only parameter.

# 14.12. Stopbits

Stopbits	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]
CLI Command	• Coml.stopbits=1
	• Com2.stopbits=1
	• Coml.stopbits=2
	• Com2.stopbits=2
Web Interface	Stopbits
window	<ol> <li>Click the <b>Stopbits</b> list box arrow and select the COM port number of stop bits.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the COM window (on page 382) for parameter location.
Default Setting	1
Options	• 1
	• 2
Web Interface window Default Setting Options	<ul> <li>Conz.scopp105-2</li> <li>Stopbits <ol> <li>Click the Stopbits list box arrow and select the COM port number of st bits.</li> <li>Click the Update button to save the change.</li> </ol> </li> <li>Note: See the COM window (on page 382) for parameter location. <ol> <li>1</li> <li>2</li> </ol> </li> </ul>

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Stopbits	
Setting	Description
Description	The <b>Com1.stopbits</b> or <b>Com2.stopbits</b> parameter designates the COM port number of stop bits.

#### 14.13. Terminal Server Port

Note: See Terminal Server Relay Examples (on page 370) for additional information.

Terminal Server Port	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]
CLI Command	• Coml.TerminalServerPort=nnnn
	• Com2.TerminalServerPort=nnnn
	Note: Where nnnn is the TCP port number.
Web Interface	Terminal Server Port
window	<ol> <li>In the Terminal Server Port text box, enter the designated TCP port number.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the COM window (on page 382) for parameter location.
Default Setting	The default port number for COM1 is 5041.
	The default port number for COM2 is 5042.
Options	The minimum value is 0 (zero).
	The maximum value is 65535.
Description	The <b>Com1.TerminalServerPort</b> or <b>Com2.TerminalServerPort</b> parameter designates the TCP port number to use when Handler (on page 223) is set to <b>TerminalServer</b> .
	<b>FREEWAVE Recommends</b> : If using the Terminal Server Port parameter, keep the TCP port numbers as their defaults.

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#### 14.14. Terminal Server Time Out

Note: See Terminal Server Relay Examples (on page 370) for additional information.		
Terminal Server Time Out		
Setting	Description	
CLI / Web Page	<ul><li> [Page=Com1]</li><li> [Page=Com2]</li></ul>	
CLI Command	<ul> <li>Coml.TerminalServerTimeOut=nnnn</li> <li>Com2.TerminalServerTimeOut=nnnn</li> <li>Note: Where nnnn is the amount of time, in seconds, the Terminal Server remains open.</li> </ul>	
Web Interface window	<ol> <li>Terminal Server Time Out</li> <li>In the Terminal Server Time Out text box, enter the number of seconds the Terminal Server remains open without transmitting or receiving data from the network.</li> <li>Click the Update button to save the change.</li> <li>Reboot the Z9-PC or Z9-PC-SR001 for changes to take effect.</li> <li>Note: See the COM window (on page 382) for parameter location.</li> </ol>	
Default Setting	300	
Options	<ul><li>The minimum value is 5.</li><li>The maximum value is 3600.</li></ul>	
Description	The Com1.TerminalServerTimeOut or Com2.TerminalServerTimeOut parameter designates the amount of time, in seconds, the Terminal Server remains open without transmitting or receiving data from the network. Note: This can prevent an idle socket from remaining open indefinitely and preventing new connections.	

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## 14.15. TX Bytes

TX Bytes	
Setting	Description
CLI / Web Page	• [Page=Com1]
	• [Page=Com2]
CLI Command	• Com1.TxBytes
	• Com2.TxBytes
Web Interface	TX Bytes
window	<b>Note</b> : This parameter is read-only in the Web Interface. See the COM window (on page 382) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>Com1.TxBytes</b> or <b>Com2.TxBytes</b> command reports the total bytes sent out of the COM port.
	Note: This is a Read-only parameter.

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# **15. Config Parameters**

Note: See the Config window (on page 384).

Factory Defaults (on page 232) License State (on page 232) Reset (on page 233) Restore (on page 233) Save (on page 234)



The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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#### 15.1. Factory Defaults

Factory Defaults	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	• config.factoryDefaults=set
	<ul> <li>factoryDefaults=set</li> </ul>
Web Interface	Factory Defaults
window	Note: See the Config window (on page 384) for parameter location.
	Important!: This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	Idle
Description	The <b>config.factoryDefaults</b> command restores the Z9-PC or Z9-PC-SR001 to its factory default configuration.

## 15.2. License State

License State	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	• config.licenseState
	• licenseState
Web Interface window	License State Note: See the Config window (on page 384) for parameter location. Important!: This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	N/A

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License State	
Setting	Description
Description	The <b>config.licenseState</b> command reports the extra feature licenses in the Z9-PC or Z9-PC-SR001.
	Note: This is a Read-only parameter.

#### 15.3. Reset

Reset	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	Reboot the entire Z9-PC or Z9-PC-SR001 device:
	• config.reset=now
	• config.reset=reboot
	Reset to restart the main application:
	• config.reset=reset
Web Interface window	Reset Note: See the Config window (on page 384) for parameter location. Important!: This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The <b>config.reset</b> command restarts or reboots the Z9-PC or Z9-PC-SR001.

#### 15.4. Restore

Restore	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	• config.restore=now
	• config.restore
	• restore

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Restore	
Setting	Description
Web Interface window	Restore Note: See the Config window (on page 384) for parameter location.
	Important!: This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The config.restore command reloads a previously saved setting configuration of the Z9-PC or Z9-PC-SR001.           Note: Restore happens automatically when the Z9-PC or Z9-PC-SR001 starts.

#### 15.5. Save

Save	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	• config.save=now
	• config.save
	• save
Web Interface	Save
window	Note: See the Config window (on page 384) for parameter location.
	Important!: This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The <b>config.save</b> command saves changes made to the Z9-PC or Z9-PC-SR001 configuration.

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# **16. Data Path Parameters**

Note: See the Data Path window (on page 386).

Aggregate Enabled (on page 236) Compression Enabled (on page 237) FEC Rate (on page 239) MAC Table Entry Age Timeout (on page 240) OTA Max Fragment Size (on page 242) Route Min Signal Margin Thresh (on page 242)

K The parameter syntax is: page.parameter=value.

Parameters with unique names can be specified as parameter=value.

**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).

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#### 16.1. Aggregate Enabled

Aggregate Enabled	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	Enable:
	<ul> <li>dataPath.aggregateEnabled=true</li> </ul>
	• aggregateEnabled=true
	Disable:
	<ul> <li>dataPath.aggregateEnabled=false</li> </ul>
	• aggregateEnabled=false
Web Interface	Aggregate Enabled
window	<ol> <li>Click the Aggregate Enabled list box arrow and select True to enable this parameter and increase throughput of small packets.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	<b>Note</b> : By default, the <b>Aggregate Enabled</b> is NOT enabled (set to False). See the Data Path window (on page 386) for parameter location.
Default Setting	False
Options	• True
	• False

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Aggregate Enabled	
Setting	Description
Description	The Aggregate Enabled (on page 236) setting increases throughput of small packets by combining multiple packets into a single packet minimizing the number of packets required for transmission.
	Important!: All radios have the ability to de-aggregate received packets, regardless of the aggregation setting.
	<b>FREEWAVE Recommends</b> : Enable this setting on individual radios that send a high percentage of network data packets that are smaller than 900 bytes.
	Notes
	Increases latency by 20msec and reduces poll rates.
	When enabled, this setting adds 20 msec of latency.
	<ul> <li>However, net throughput may increase due to sending fewer, larger packets.</li> </ul>
	• 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.
	<ul> <li>Packets below 900 bytes are aggregated up to an aggregated packet size of 970 bytes.</li> </ul>

# 16.2. Compression Enabled

Compression Enabled	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	Enable:
	<ul> <li>dataPath.compressionEnabled=true</li> </ul>
	• compressionEnabled=true
	Disable:
	<ul> <li>dataPath.compressionEnabled=false</li> </ul>
	• compressionEnabled=false

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Compression Enabled	
Setting	Description
Web Interface window	<ul> <li>Compression Enabled</li> <li>1. Click the Compression Enabled list box arrow and select False to disable compression of outgoing packets.</li> <li>2. Click the Update button to save the change.</li> <li>Note: By default, the Compression Enabled is enabled (set to True). See the Data Path window (on page 386) for parameter location.</li> </ul>
Default Setting	True
Options	<ul><li>True</li><li>False</li></ul>
Description	When the Compression Enabled (on page 237) 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.           Important!: The compression ratio varies depending on the type of data being transmitted.
	<b>Example</b> : Text data is easily compressible, while video data is not.
	<b>FREEWAVE Recommends</b> : Enable Packet Compression on all <b>ZumLink</b> networks.
	Notes
	<ul> <li>When enabled, the Packet Compression setting increases latency by a maximum of 10msec.</li> </ul>
	• When enabled, the <b>Packet Compression</b> setting ensures that the packet transmitted is no larger than the current packet size.
	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.

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#### 16.3. FEC Rate

FEC Rate	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	Enable:
	<ul> <li>dataPath.fecRate=RATE_7_8</li> </ul>
	• fecRate=RATE_7_8
	Disable:
	<ul> <li>dataPath.fecRate=RATE_1_1</li> </ul>
	• fecRate=RATE_1_1
Web Interface	FEC Rate
window	<ol> <li>Click the FEC Rate list box arrow and select the Forward Error Correction (FEC) rate.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the Data Path window (on page 386) for parameter location.
Default Setting	RATE_1_1
Options	• RATE_1_1
	• RATE_7_8

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FEC Rate	
Setting	Description
Description	The dataPath.fecRate parameter enables the Forward Error Correction (FEC) rate.
	<b>Note</b> : The FEC Rate (on page 239) increases the reliability of the data transferred over the air at the cost of some transmission throughput.
	Notes
	• 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 link range in noisy environments.
	<ul> <li>Adds redundant information to a data stream to detect packet errors and corrects them to avoid retransmission of the packet.</li> </ul>
	Adds resilience in noisy environments.
	FEC reduces the maximum achievable throughput.
	<ul> <li>However, in noisy environments, net throughput may increase due to reduced errors and retries.</li> </ul>
	<b>Caution</b> : 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.
	<b>FREEWAVE Recommends</b> : When viewing local diagnostics, if the Radio Bad CRC (on page 260) count is more than 15-20% of the total transmitted packets (the Radio LL Tx (on page 263) count), enabling the FEC Rate (on page 239) setting is beneficial.

## 16.4. MAC Table Entry Age Timeout

MAC Table Entry Age Timeout	
Setting	Description
CLI / Web Page	[Page=dataPath]

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MAC Table Entry Age Timeout	
Setting	Description
CLI Command	<ul> <li>dataPath.MacTableEntryAgeTimeout=nnnn</li> </ul>
	MacTableEntryAgeTimeout=nnnn
	Note: Where nnnn is the number of seconds.
Web Interface	MAC Table Entry Age Timeout
window	<ol> <li>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.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the Data Path window (on page 386) for parameter location.
Default Setting	120
Options	• The minimum value is 30.
	The maximum value is 86400.
Description	The dataPath.MacTableEntryAgeTimeout parameter designates the number of seconds before an inactive entry in the MAC Table ages out and expires.
	<b>FREEWAVE Recommends</b> : 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 transfers.
	<b>Note</b> : See Mac Table Show (on page 258) to view the MAC to <b>nodeld</b> mapping table.
	Notes
	• The radio network learns the MAC address of devices connected to particular radio Endpoints and stores them in a MAC table.
	<ul> <li>As traffic passes between the Endpoints, the entries in the MAC table are updated.</li> </ul>
	<ul> <li>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.</li> </ul>
	• 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 <b>does</b> 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.

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## 16.5. OTA Max Fragment Size

OTA Max Fragment Size	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	• dataPath.otaMaxFragmentSize=nnnn
	• otaMaxFragmentSize=nnnn
	Note: Where nnnn is the maximum fragment size.
Web Interface	OTA Max Fragment Size
window	<ol> <li>In the OTA Max Fragment Size text box, enter the maximum fragment size, in bytes, sent over the air.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the Data Path window (on page 386) for parameter location.
Default Setting	1000
Options	The minimum value is 64.
	The maximum value is 1000.
Description	The <b>dataPath.otaMaxFragmentSize</b> setting designates the maximum fragment size, in bytes, sent over the air.
	Notes
	This setting does NOT need to match on all radios.
	A smaller Max Fragment Size may increase RF link reliability in highly noisy environments.
	A smaller Max Fragment Size may reduce data throughput.
	A larger Max Fragment Size may increase data throughput.
	<ul> <li>A larger Max Fragment Size may reduce RF link reliability in noisy environments.</li> </ul>

#### 16.6. Route Min Signal Margin Thresh

Route Min Signal Margin Thresh	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	<ul><li>dataPath.routeMinSignalMarginThresh=nnnn</li><li>routeMinSignalMarginThresh=nnnn</li></ul>
	Note: Where nnnn is the minimum signal margin in dB.

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Route Min Signal Margin Thresh	
Setting	Description
Web Interface window	<ul> <li>Route Min Signal Margin Thresh</li> <li>1. In the Route Min Signal Margin Thresh text box, enter the minimum threshold signal margin in dB.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the Data Path window (on page 386) for parameter location.</li> </ul>
Default Setting	• 10
Options	<ul><li>The minimum value is -5.</li><li>The maximum value is 60.</li></ul>
Description	The dataPath.routeMinSignalMarginThresh parameter designates the minimum (threshold) signal margin, in dB, the next hop <b>must be</b> considered part of the packet route. FREEWAVE Recommends: This value should be at least 4 dB lower than the reported link margin to the next hop.
	<b>Example</b> : 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.
	Notes
	<ul> <li>When Repeaters are enabled, the packets take the path through the radio network with the minimum number of hops.</li> </ul>
	• By increasing the threshold value, the possible routes can be reduced to allow a particular routing path to be preferred.

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# **17. Date Parameters**

Note: See the Date window (on page 388).

DC App StartTime (on page 245) DC App Uptime (on page 245) Time (on page 246) Time String (on page 246) Up Time (on page 247) Up Time String (on page 248)



The parameter syntax is: page.parameter=value.

Parameters with unique names can be specified as parameter=value.

**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).

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#### 17.1. DC App StartTime

Important!: Time zones do not apply to the Z9-PC or Z9-PC-SR001.

DC App StartTime	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	• date.dcAppStartTime
	• dcAppStartTime
Web Interface	DC App Start Time
window	<b>Note</b> : This parameter is read-only in the Web Interface. See the Date window (on page 388) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>date.dcAppStartTime</b> parameter reports the time stamp of when the main app started.
	Note: This is a Read-only parameter.

# 17.2. DC App Uptime

Important!: Time zones do not apply to the Z9-PC or Z9-PC-SR001.

DC App Uptime	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	• date.dcAppUptime
	• dcAppUptime
Web Interface window	DC App Uptime           Note: This parameter is read-only in the Web Interface.           See the Date window (on page 388) for parameter location.
Default Setting	N/A
Options	N/A

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DC App Uptime	9
Setting	Description
Description	The <b>date.dcAppUptime</b> parameter reports the number of Days, Hours, Minutes, and 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 or Z9-PC-SR001.

Time	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	<ul><li>date.time</li><li>time</li></ul>
Web Interface window	Time           Note: This parameter is read-only in the Web Interface.           See the Date window (on page 388) for parameter location.
Default Setting	N/A
Options	N/A
Description	The date.time parameter reports the current time in Unix time stamp format.           Note: This is a Read-only parameter.

#### 17.4. Time String

Important!: Time zones do not apply to the Z9-PC or Z9-PC-SR001.

Time String	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	date.timeString=MM/DD/YYYY HH.MM.SS

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Time String	
Setting	Description
Web Interface window	Time String         Note: This parameter is read-only in the Web Interface.         See the Date window (on page 388) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>date.timeString</b> parameter designates the time ONLY if the NTP Reference (on page 301) is set to <b>REFCLK_LOCALCLOCK</b> .
	manually reset.

#### 17.5. Up Time

Important!: Time zones do not apply to the Z9-PC or Z9-PC-SR001.

Up Time	
---------	--

Setting	Description
CLI / Web Page	[Page=date]
CLI Command	• date.upTime
	• upTime
Web Interface	Up Time
window	<b>Note</b> : This parameter is read-only in the Web Interface. See the Date window (on page 388) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>date.upTime</b> parameter reports the number of seconds since the Z9-PC or Z9-PC-SR001 restarted.
	Note: This is a Read-only parameter.

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# 17.6. Up Time String

Important!: Time zones do not apply to the Z9-PC or Z9-PC-SR001.

Up Time String		
Setting	Description	
CLI / Web Page	[Page=date]	
CLI Command	<ul><li>date.upTimeString</li><li>upTimeString</li></ul>	
	<b>Example</b> : A return of <b>Uptime 5 Days 01:36:41</b> means the unit has been up for 5 days, 1 hour, 36 minutes, and 41 seconds.	
Web Interface window	Up Time String	
	<b>Note</b> : This parameter is read-only in the Web Interface. See the Date window (on page 388) for parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The <b>date.upTimeString</b> parameter reports the amount of time in Days, Hours, Minutes, and Seconds the Z9-PC or Z9-PC-SR001 has been powered on without a reboot.	
	Note: This is a Read-only parameter.	

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# **18. Encryption Parameters**

Note: See the Encryption window (on page 390).

Active Key (on page 250) Encryption Mode (on page 251) Key1 to Key 16 (on page 252)



The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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## 18.1. Active Key

**Caution**: Encryption settings **MUST match** on ALL radios in the network to maintain over-theair 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.

#### **Active Key**

Setting	Description
CLI / Web Page	[Page=encryption]
CLI Command	<ul> <li>encryption.activeKey=Off</li> <li>activeKey=Off</li> <li>encryption.activeKey=Key1 to Key16</li> <li>activeKey=Key1 to Key16</li> </ul> Example: encryption.activeKey=Key10.
Web Interface window	<ul> <li>Active Key</li> <li>1. Verify the designated Key1 to Key 16 (on page 252) is set at either a 128- or 256-bit hexadecimal.</li> <li>2. Click the Active Key list box arrow and select the designated active key.</li> <li>3. Click the Update button to save the change.</li> </ul> Note: See the Encryption window (on page 390) for parameter location.
Default Setting	Off
Options	<ul><li>Off</li><li>Key1 to Key16</li></ul>
Description	The encryption.activeKey parameter designates the key used for encryption and decryption.           Important!: Assigning the activeKey to a key that is NOT set will NOT allow communication across the link.           Keys MUST BE set before they can become active keys.

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## **18.2. Encryption Mode**

Caution: Encryption settings MUST match on ALL radios in the network to maintain over-theair 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.

Encryption Mode		
Setting	Description	
CLI / Web Page	[Page=encryption]	
CLI Command	AES Counter Mode:	
	<ul> <li>encryption.encryptionMode=AES_CTR</li> </ul>	
	<ul> <li>encryptionMode=AES_CTR</li> </ul>	
	AES Counter Mode with MIC (Message Integrity Check):	
	<ul> <li>encryption.encryptionMode=AES_CCM</li> </ul>	
	<ul> <li>encryptionMode=AES_CCM</li> </ul>	
Web Interface window	<ul> <li>Encryption Mode</li> <li>1. Click the Encryption Mode list box arrow and select the designated encryption mode.</li> <li>2. Click the Update button to save the change.</li> </ul>	
	Note: See the Encryption window (on page 390) for parameter location.	
Default Setting	AES_CTR	
Options	• AES_CCM	
	AES_CTR	
Description	The <b>encryption.encryptionMode</b> parameter designates the encryption mode.	
	Important!: Use of encryption may affect latency and user throughput.	

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## 18.3. Key1 to Key 16

**Caution**: Encryption settings **MUST match** on ALL radios in the network to maintain over-theair 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.

#### Key1 to Key16 (Get Key)

Setting	Description
CLI / Web Page	[Page=encryption]
CLI Command	<ul> <li>encryption.Key1=Key1 to Key16</li> <li>Key1=Key1 to Key16</li> <li>Example: encryption.getKey=key8.</li> </ul>
Web Interface window	<ul> <li>Get Key</li> <li>1. In the KeyX text box, enter either the 128- or 256-bit key in 16 or 32 hexadecimal format respectively. Enter Clear to erase a previously enter key.</li> <li>2. Click the Update button to save the change.</li> <li>Note: Where X is the designated key number. See the Encryption window (on page 390) for parameter location.</li> </ul>
Default Setting	Key has not been set.
Options	Key1 to Key16
Description	The <b>encryption.Key1</b> parameter designates whether the specified key is a 128- or 256-bit key.
	Example: 128 bit key: Key1=1234567890abcdef1234567890abcdef
	<b>Example</b> : 256 bit key: Key2=1234567890abcdef1234567890abcdef1234567890abcdef1234567890ab cdef

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# **19. IO Ex Com Parameters**

Note: This parameter is read-only.

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# **20. Local Diagnostics Parameters**

Note: See the Local Diagnostics window (on page 399).

Signal Level (on page 255) Signal Margin (on page 255) CNT Bad BCC (on page 256) CNT Bad Sync (on page 256) CNT ETX (on page 256) CNT STX (on page 256) Get Stats (on page 256) Interface Bytes Rx (on page 257) Interface Bytes Tx (on page 257) Interface Data Rx (on page 257) Interface Data Tx (on page 257) Mac Table Clear (on page 257) Mac Table Show (on page 258) Monitored Node (on page 258) Noise Level (on page 259) Radio Ack Tx (on page 260) Radio Bad Ack Rx (on page 260) Radio Bad CRC (on page 260) Radio Bad Sync (on page 261) Radio Contention Drop (on page 262) Radio LL Rx (on page 262)

Radio LL Tx (on page 263) Radio No Ack Tx (on page 263) Radio Reliable Rx (on page 263) Radio Reliable Tx (on page 263) Radio Rexmit (on page 264) Radio Rx (on page 264) Radio Sending Drop (on page 264) Radio Timed Out (on page 264) Radio Too Long (on page 264) Radio Too Short (on page 265) Radio Tx (on page 265) Resets Detected (on page 265) Resets Sent (on page 265) Reset Stats (on page 265) Rx Success (on page 266) Show Channel Diags (on page 266) Show Node Diags (on page 267) Supply Voltage (on page 267) Timestamp (on page 268) Tx Availability (on page 269) Tx Success (on page 269) VSWR (Signal Level) (on page 270)

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# 20.1. Signal Level

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

signalLevel	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.signalLevel
	• signalLevel
Web Interface window	Signal Level         Note: This parameter is read-only in the Web Interface.         See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	0 (zero)
Options	N/A
Description	The localDiagnostics.signalLevel command reports the signal level of the Z9- PC or Z9-PC-SR001, in dBm, of the last received packet. Note: This setting shows -128.00 if no packet has been received since the stats were cleared.

# 20.2. Signal Margin

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

#### signalMargin

Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul><li>localDiagnostics.signalMargin</li><li>signalMargin</li></ul>
Web Interface window	Signal Margin         Note: This parameter is read-only in the Web Interface.         See the Local Diagnostics window (on page 399) for parameter location.

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signalMargin	
Setting	Description
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.signalMargin</b> command reports the amount of signal margin, in dB, the last received packet experienced.
	<b>Note</b> : 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.

# 20.3. CNT Bad BCC

Important!: FreeWave internal use only.

# 20.4. CNT Bad Sync

Important!: FreeWave internal use only.

## 20.5. CNT ETX

Important!: FreeWave internal use only.

# 20.6. CNT STX

Important!: FreeWave internal use only.

### 20.7. Get Stats

#### Get Stats

Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul> <li>localDiagnostics.getStats</li> </ul>
	• getStats
Web Interface window	Note: This parameter is only available in the CLI window.

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Get Stats	
Setting	Description
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.getStats</b> command reports the local diagnostics from the connected Z9-PC or Z9-PC-SR001 immediately.
	Important!: A refresh of the localDiagnostics page is required to see the updates.

# 20.8. Interface Bytes Rx

Important!: FreeWave internal use only.

## 20.9. Interface Bytes Tx

Important!: FreeWave internal use only.

# 20.10. Interface Data Rx

**Important!**: FreeWave internal use only.

### 20.11. Interface Data Tx

Important!: FreeWave internal use only.

# 20.12. Mac Table Clear

#### Mac Table Clear

Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul> <li>localDiagnostics.MacTableClear=Now</li> </ul>
	<ul> <li>localDiagnostics.MacTableClear=</li> </ul>
	• MacTableClear=Now
	• MacTableClear=

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Mac Table Clear	
Setting	Description
Web Interface window	Note: This parameter is only available in the CLI window.
Default Setting	N/A
Options	Now
Description	The <b>localDiagnostics.MacTableClear</b> command clears the MAC to the Node ID (on page 315) mapping table and forces routes to be relearned.

# 20.13. Mac Table Show

MacTableShow	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul> <li>localDiagnostics.MacTableShow</li> </ul>
	• MacTableShow
Web Interface window	Note: This parameter is only available in the CLI window.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.MacTableShow</b> command reports the MAC addresses of the devices connected to the Z9-PC or Z9-PC-SR001 in a Node ID (on page 315) table format.

### 20.14. Monitored Node

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

#### **Monitored Node**

Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul> <li>localDiagnostics.monitoredNode=<node here="" id=""></node></li> <li>monitoredNode=<node here="" id=""></node></li> </ul>

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Monitored Node	
Setting	Description
Web Interface window	<ul> <li>Monitored Node</li> <li>1. In the Monitored Node text box, enter the Node ID (on page 315) to monitor.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the Local Diagnostics window (on page 399) for parameter location.</li> </ul>
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.monitoredNode parameter designates the Node ID (on page 315) to monitor the signal level. Use the Show Node Diags (on page 267) to view the received signal level (RSSI) of this node.

# 20.15. Noise Level

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul><li>localDiagnostics.noiseLevel</li><li>noiseLevel</li></ul>
Web Interface window	Noise Level           Note: This parameter is read-only in the Web Interface.           See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	0.000000
Options	N/A
Description	The <b>localDiagnostics.noiseLevel</b> command reports the amount of link noise measured in dB before the last packet was transmitted.

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# 20.16. Radio Ack Tx

**Important!**: FreeWave internal use only.

## 20.17. Radio Bad Ack Rx

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul><li>localDiagnostics.RadioBadAckRx</li><li>RadioBadAckRx</li></ul>
Web Interface window	Radio Bad Ack RX         Note: This parameter is read-only in the Web Interface.         See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.RadioBadAckRx</b> command reports the number of received ACKs missed in unicast transmissions.

#### Radio Bad Ack Rx

### 20.18. Radio Bad CRC

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Radio Bad CRC	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.RadioBadCRC
	• RadioBadCRC

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Radio Bad CRC	
Setting	Description
Web Interface window	Radio Bad CRC         Note: This parameter is read-only in the Web Interface.         See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.RadioBadCRC</b> command reports the number of radio packets received with data corruption.
	<b>FREEWAVE Recommends</b> : When viewing local diagnostics, if the Radio Bad CRC (on page 260) count is more than 15-20% of the total transmitted packets (the Radio LL Tx (on page 263) count), enabling the FEC Rate (on page 239) setting is beneficial.

# 20.19. Radio Bad Sync

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Radio Bad Sync	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul><li>localDiagnostics.RadioBadSync</li><li>RadioBadSync</li></ul>
Web Interface window	Radio Bad SyncNote: This parameter is read-only in the Web Interface.See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.RadioBadSync</b> command reports the number of times beacons were lost and the Endpoint needed to re-synchronize with the Gateway when <b>radiosettings.radioHoppingMode=Hopping_On</b> .

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# 20.20. Radio Contention Drop

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

#### **Radio Contention Drop**

Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul> <li>localDiagnostics.RadioContentionDrop</li> </ul>
	• RadioContentionDrop
Web Interface window	Radio Contention Drop
	<b>Note</b> : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.RadioContentionDrop</b> command reports the number of times a transmission was backed-off due to contention on the RF channel.

### 20.21. Radio LL Rx

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Radio LL Rx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.RadioLLRx
	• RadioLLRx
Web Interface window	Radio LL RX         Note: This parameter is read-only in the Web Interface.         See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.RadioLLRx</b> command reports the number of packets received over the air without data corruption.

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# 20.22. Radio LL Tx

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Radio LL Tx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul><li>localDiagnostics.RadioLLTx</li><li>RadioLLTx</li></ul>
Web Interface window	Radio LL TXNote: This parameter is read-only in the Web Interface.See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.RadioLLTx command reports the number of packets transmitted over the air. FREEWAVE Recommends: When viewing local diagnostics, if the Radio Bad CRC (on page 260) count is more than 15-20% of the total transmitted packets (the Radio LL Tx (on page 263) count), enabling the FEC Rate (on page 239) setting is beneficial.

# 20.23. Radio No Ack Tx

Important!: FreeWave internal use only.

# 20.24. Radio Reliable Rx

Important!: FreeWave internal use only.

# 20.25. Radio Reliable Tx

Important!: FreeWave internal use only.

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# 20.26. Radio Rexmit

Important!: FreeWave internal use only.

#### 20.27. Radio Rx

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Radio Rx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.RadioRx
	• RadioRx
Web Interface window	Radio RXNote: This parameter is read-only in the Web Interface.See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.RadioRx</b> command reports the number of data packets correctly received over the wireless RF link for this Endpoint.

# 20.28. Radio Sending Drop

Important!: FreeWave internal use only.

### 20.29. Radio Timed Out

Important!: FreeWave internal use only.

### 20.30. Radio Too Long

**Important!**: FreeWave internal use only.

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# 20.31. Radio Too Short

Important!: FreeWave internal use only.

#### 20.32. Radio Tx

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Radio Tx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.RadioTx
	• RadioTx
Web Interface window	Radio TX         Note: This parameter is read-only in the Web Interface.         See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.RadioTx</b> command reports the number of data packets scheduled to be transmitted.

### 20.33. Resets Detected

Important!: FreeWave internal use only.

#### 20.34. Resets Sent

Important!: FreeWave internal use only.

### 20.35. Reset Stats

Reset Stats	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]

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Reset Stats	
Setting	Description
CLI Command	<ul> <li>localDiagnostics.resetStats=Now</li> </ul>
	<ul> <li>localDiagnostics.resetStats=</li> </ul>
	• resetStats=Now
	<pre>• resetStats=</pre>
Web Interface window	Note: This parameter is only available in the CLI window.
Default Setting	N/A
Options	Now
Description	The <b>localDiagnostics.resetStats</b> command resets the local diagnostics counters.

### 20.36. Rx Success

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Rx Success	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.RxSuccess
	• RxSuccess
Web Interface window	Rx Success         Note: This parameter is read-only in the Web Interface.         See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	100
Options	N/A
Description	The <b>localDiagnostics.RxSuccess</b> command reports the percentage of packets correctly received for this Endpoint.

# 20.37. Show Channel Diags

Show Channel Diags	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]

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Show Channel Diags	
Setting	Description
CLI Command	<ul> <li>localDiagnostics.showChannelDiags</li> </ul>
	• showChannelDiags
Web Interface window	Note: This parameter is only available in the CLI window.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.showChannelDiags</b> command reports the received signal level (RSSI) and Node ID (on page 315) of the last packet received on the displayed frequencies.

#### 20.38. Show Node Diags

showNodeDiags	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul> <li>localDiagnostics.showNodeDiags</li> </ul>
	• showNodeDiags
Web Interface window	Note: This parameter is only available in the CLI window.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.showNodeDiags</b> command reports the channel frequency and signal level for the node selected by the Monitored Node (on page 258) parameter.

# 20.39. Supply Voltage

Important!: Most of the localDiagnostics parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

#### Supply Voltage

Setting	Description
CLI / Web Page	[Page=localDiagnostics]

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Supply Voltage	
Setting	Description
CLI Command	<ul> <li>localDiagnostics.SupplyVoltage</li> </ul>
	• SupplyVoltage
Web Interface window	Supply Voltage
	<b>Note</b> : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.SupplyVoltage</b> command reports the supply voltage to the Z9-PC or Z9-PC-SR001 in units of voltage (V).
	<ul> <li>localDiagnostics.SupplyVoltage is NOT supported on Z9-P, Z9-PE, Z9-PC, or Z9-PC-SR001 models.</li> </ul>
	<ul> <li>0 (zero) indicates the individual radio does not support localDiagnostics.SupplyVoltage.</li> </ul>

# 20.40. Timestamp

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Timestamp	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	<ul> <li>localDiagnostics.timestamp</li> </ul>
	• timestamp
Web Interface window	Timestamp         Note: This parameter is read-only in the Web Interface.         See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>localDiagnostics.timestamp</b> command reports the time the Diagnostics Information was collected by the device.

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# 20.41. Tx Availability

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Tx Availability	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.TxAvailability
	• TxAvailability
Web Interface window	Tx Availability           Note: This parameter is read-only in the Web Interface.           See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	100
Options	N/A
Description	The <b>localDiagnostics.TxAvailability</b> command reports the percentage of packets that were transmitted without back-off.

# 20.42. Tx Success

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Tx Success	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.TxSuccess
	• TxSuccess
Web Interface window	Tx Success           Note: This parameter is read-only in the Web Interface.           See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	100
Options	N/A
Description	The <b>localDiagnostics.TxSuccess</b> command reports the percentage of packets that were transmitted with a successful ACK received.

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# 20.43. VSWR (Signal Level)

**Important!**: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-PC or Z9-PC-SR001.

Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.VSWR
	• VSWR
Web Interface window	Signal Level
	<b>Note</b> : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 399) for parameter location.
Default Setting	0 (zero)
Options	N/A
Description	The <b>localDiagnostics.VSWR</b> command reports the value proportional to the VSWR (Voltage Standing Wave Ratio) measured from the last packet transmitted.
	For the antenna port, the value can range from:
	1 to 2 for an excellent match
	• 2 to 10 for a good match
	• 11 to 99 - user discretion
	<ul> <li>&gt; 100 for a poor match</li> </ul>
	Notes
	<ul> <li>VSWR is less accurate at higher power levels (&gt;20 dBm).</li> </ul>
	<ul> <li>The reported VSWR is a value proportional to the VSWR.</li> <li>It is closer to VSWR at lower powers, but at higher power levels, it still increases with reflected power.</li> </ul>
	<ul> <li>VSWR may not function on Z9-PC or Z9-PC-SR001 models manufactured prior to September, 2018.</li> <li>If the Z9-PC or Z9-PC-SR001 always reports a VSWR value of 0 (zero)</li> </ul>
	VSWR is <b>not</b> supported.
	<ul> <li>The VSWR is instantaneous, not averaged.</li> <li>Each measurement can produce a different value; units that do support VSW will occasionally report 0 (zero) due to an invalid measurement.</li> </ul>
	<b>FREEWAVE Recommends</b> : Investigate cable and antenna at higher VSWR levels.

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# 21. Modbus Parameters

Note: See the Modbus window (on page 401).

Modbus Device ID (on page 272) Modbus RTU Over TCP (on page 273) Modbus TCP (on page 274) Modbus Layout (on page 272) Read (on page 274) Read Coils (on page 275) Write (on page 276) Write Coils (on page 277)

The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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# 21.1. Modbus Device ID

Modbus Device ID	
Setting	Description
CLI / Web Page	[Page=modbus]
CLI Command	• modbus.modbusDeviceId=nnn
	• modbusDeviceId=nnn
	Note: Where nnn designates the user-defined Modbus device ID.
Web Interface	Modbus Device ID
window	1. In the <b>Modbus Device ID</b> text box, enter a user-defined Modbus device ID.
	2. Click the <b>Update</b> button to save the change.
	<b>Note</b> : See the Modbus window (on page 401) for parameter location.
Default Setting	1
Options	1 to 247
Description	The <b>modbus.modbusDeviceId</b> parameter designates the Modbus device ID the local device responds to during a Modbus TCP (on page 274) request over the network or a Modbus RTU Over TCP (on page 273) request coming in via COM1 or COM2.

# 21.2. Modbus Layout

Modbus Layout	
Setting	Description
CLI / Web Page	[Page=modbus]
CLI Command	• modbus.modbusLayout
	• modbusLayout
Web Interface window	Modbus Layout          Note: This parameter is visible and read-only in the Web Interface selected from the System Info menu.         See the Modbus window (on page 401) for parameter location.
Default Setting	N/A
Options	N/A

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Modbus Layout	
Setting	Description
Description	The <b>modbus.modbusLayout</b> parameter reports the Modbus map for the local device.
	Example
	>modbusLayout
	<pre>radioSettings.radioMode type:uint32_t Protocol address:31001 Number registers:2 Modbus FC:4 Address:1000</pre>
	radioSettings.rfDataRate type:uint32_t Protocol address:31003 Number registers:2 Modbus FC:4 Address:1002
	<pre>radioSettings.radioMaxRepeaters type:uint32_t Protocol address:31005 Number registers:2 Modbus FC:4 Address:1004</pre>
	rfStats.DownRateAvg2 type:double Protocol address:32121
	Number registers:4 Moabus FC:4 Address:2120
	KESULT:U:UK
	>

# 21.3. Modbus RTU Over TCP

Setting	Description
CLI / Web Page	[Page=modbus]
CLI Command	<ul> <li>modbus.modbusRtuOverTcp=nnnn</li> <li>modbusRtuOverTcp=nnnn</li> <li>Note: Where nnnn designates the TCP port used for the Modbus RTU over TCP requests.</li> </ul>
Web Interface window	<ul> <li>Modbus RTU Over TCP</li> <li>1. In the Modbus Rtu Over TCP text box, enter the TCP port used for the Modbus RTU over TCP requests.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the Modbus window (on page 401) for parameter location.</li> </ul>
Default Setting	5021
Options	0 (zero) to 65535

Modbus RTU Over TCP

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Modbus RTU Over TCP	
Setting	Description
Description	The <b>modbus.modbusRtuOverTcp</b> parameter designates the TCP port used for the Modbus RTU over TCP requests.
	Note: Set to 0 (zero) to disable Modbus RTU over TCP requests.

## 21.4. Modbus TCP

Modbus TCP	
Setting	Description
CLI / Web Page	[Page=modbus]
CLI Command	<ul> <li>modbus.modbusTcp=nnnn</li> <li>modbusTcp=nnnn</li> <li>Note: Where nnnn designates the TCP port used for the Modbus TCP requests.</li> </ul>
Web Interface window	<ul> <li>Modbus TCP</li> <li>1. In the Modbus TCP text box, enter the TCP port used for the Modbus TCP requests.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the Modbus window (on page 401) for parameter location.</li> </ul>
Default Setting	502
Options	0 (zero) to 65535
Description	The modbus.modbusTcp parameter designates the TCP port used for the Modbus TCP requests.           Note: Set to 0 (zero) to disable Modbus TCP.           Important!: A reboot is required when changing the modbus.modbusTcp value for the change to take effect.

# 21.5. Read

read	
Setting	Description
CLI / Web Page	[Page=modbus]

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read		
Setting	Description	
CLI Command	• modbus.read	
	• read	
Web Interface window	Read	
	See the Modbus window (on page 401	) for parameter location.
Default Setting	N/A	
Options	Bool	LongABCD
	Byte	LongBADC
	FloatABCD	LongCDAB
	FloatBADC	LongDCBA
	FloatCDAB	Raw
	FloatDCBA	Unsigned
	IntABCD	IntDCBA
	IntBADC	Signed
	IntCDAB	
Description	The modbus.read parameter creates a l	Modbus request from the CLI.
	Example	
	>readsrcId=1srcAddress type=longABCDnumElements=	=1000srcFc=FC4 4
	Id:1 Fc:4 Address: 1000 Type	: LongABCD Value: 0
	Id:1 Fc:4 Address: 1002 Type	: LongABCD Value: 4000000
	Id:1 Fc:4 Address: 1004 Type	: LongABCD Value: 0
	Id:1 Fc:4 Address: 1006 Type	: LongABCD Value: 1
	RESULT:0:OK	
	>	

## 21.6. Read Coils

Read Coils	
Setting	Description
CLI / Web Page	[Page=modbus]
CLI Command	• modbus.readCoils
	• readCoils

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Read Coils	
Setting	Description
Web Interface window	Read Coils         Note: This parameter is read-only in the Web Interface.         See the Modbus window (on page 401) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>modbus.readCoils</b> parameter creates a Modbus request to read coils from the CLI.
	Example
	<pre>&gt;readCoilssrcId=1srcAddress=100srcFc=FC1 numElements=4</pre>
	Id:1 Fc:1 Address: 100 Value: 1
	Id:1 Fc:1 Address: 101 Value: 1
	Id:1 Fc:1 Address: 102 Value: 1
	Id:1 Fc:1 Address: 103 Value: 1
	RESULT:0:OK

## 21.7. Write

Write	
Setting	Description
CLI / Web Page	[Page=modbus]
CLI Command	<ul><li>modbus.write</li><li>write</li></ul>
Web Interface window	Write           Note: This parameter is read-only in the Web Interface.           See the Modbus window (on page 401) for parameter location.
Default Setting	N/A

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Write		
Setting	Description	
Options	Bool	LongABCD
	Byte	LongBADC
	FloatABCD	LongCDAB
	FloatBADC	LongDCBA
	FloatCDAB	Raw
	FloatDCBA	Unsigned
	IntABCD	IntDCBA
	IntBADC	Signed
	IntCDAB	
Description	The <b>modbus.write</b> parameter creates a write to a holding register.	Modbus write request from the CLI to
	Example	
	>writesrcId=1srcAddres value=1024	s=100type=intabcd
	RESULT:0:OK	

## 21.8. Write Coils

#### Write Coils

Setting	Description
CLI / Web Page	[Page=modbus]
CLI Command	• modbus.writeCoils
	• writeCoils
Web Interface window	Write Coils
	<b>Note</b> : This parameter is read-only in the Web Interface. See the Modbus window (on page 401) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>modbus.writeCoils</b> parameter creates a Modbus write request from the CLI to write to the coils.
	Example
	>writeCoilssrcId=1srcAddress=100value=0x55 numElements=4
	RESULT:0:OK

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#### 21.9. Modbus Use Cases

The Modbus feature allows for radio diagnostics and radio settings to be read via Modbus. Settings are read only.

The three methods of connecting to the radio are:

- Modbus TCP (on page 278),
- Modbus RTU over TCP (on page 278), and
- Modbus RTU using COM1 (on page 279) or

Modbus RTU using COM2 (on page 279) serial ports.

COM1 or COM2 can be configured for Modbus pass thru.

This will take any request that comes in through any one of the three methods and convert it to a serial Modbus RTU request. This request is sent out the configured serial port to a serial Modbus device.

This allows the Z9-PC or Z9-PC-SR001 to act as a Modbus TCP to serial Modbus gateway.

#### 21.9.1. Connecting to a Device via Modbus

#### Modbus TCP

- 1. On the Z9-PC or Z9-PC-SR001, connect to port 502.
- 2. Use the Modbus TCP protocol.
- 3. In the CLI, enter **modbus.modbusTcp=nnnn** to change the port.

**Note**: Where nnnn designates the TCP port used for the Modbus TCP requests. Set to 0 (zero) to disable Modbus TCP. See Modbus TCP (on page 274) for additional information.

#### Modbus RTU over TCP

- 1. On the Z9-PC or Z9-PC-SR001, connect to port 5021.
- 2. Use the Modbus RTU protocol.
- 3. In the CLI, enter **modbus.modbusRtuOverTcp=nnnn** to change the port.

**Note**: Where nnnn designates the TCP port used for the Modbus RTU over TCP requests. Set to 0 (zero) to disable Modbus RTU over TCP requests. See Modbus RTU Over TCP (on page 273) for additional information.

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#### Modbus RTU using COM1

- 1. Connect the device to the COM1 serial port.
- 2. Configure the COM port Baudrate (on page 218) and other settings to match the serial Modbus RTU device.
- 3. Change the COM1 Handler (on page 223) to Com1.handler=ModbusRTU.
- 4. Send in Modbus requests via COM1.

#### Modbus RTU using COM2

- 1. Connect the device to the COM2 serial port.
- 2. Configure the COM port Baudrate (on page 218) and other settings to match the serial Modbus RTU device.
- 3. Change the COM1 Handler (on page 223) to Com2.handler=ModbusRTU.
- 4. Send in Modbus requests via COM2.

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# 21.10. Reading Local Diagnostics and Radio Settings using Modbus

Note: See Modbus Device ID (on page 272) for additional information.

The local device ID is set using modbus.modbusDeviceId=nnnn.

# 21.10.1. Reading from an External Modbus RTU Serial Device using COM1

- 1. Connect the device to the COM1 serial port.
- 2. Configure the COM port Baudrate (on page 218) and other settings to match the serial Modbus device.
- 3. Change the COM1 Handler (on page 223) to Com1.handler=ModbusPassthru.

#### Notes

- Incoming requests that are not for the local Z9-PC or Z9-PC-SR001 device or for IOEX are sent out COM1.
- Responses are returned out the port that the request came in on.
- The protocol is converted from Modbus TCP to Modbus RTU and back where necessary.

# 21.10.2. Reading from the External Modbus RTU Serial Device using COM2

- 1. Connect the device to the COM2 serial port.
- 2. Configure the COM port Baudrate (on page 218) and other settings to match the serial Modbus device.
- 3. Change the COM2 Handler (on page 223) to Com2.handler=ModbusPassthru.

#### Notes

- Incoming requests that are not for the local Z9-PC or Z9-PC-SR001 device or for IOEX are sent out COM2.
- Responses are returned out the port that the request came in on.
- The protocol is converted from Modbus TCP to Modbus RTU and back where necessary.

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# 22. Network Parameters

Note: See the Network window (on page 403).

Arp Filter Enabled (on page 282) Gateway (on page 282) IP Address (on page 283) MAC Address (on page 283) MTU (on page 284) Nameserver Address 1 (on page 285) Nameserver Address 2 (on page 286) Netmask (on page 286) Netmask Filter Enabled (on page 287) STP Enabled (on page 288) Txqueuelen (on page 289) VLAN MGMT (on page 290) VLAN Tag (on page 290)

The parameter syntax is: page.parameter=value.

Parameters with unique names can be specified as parameter=value.

**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).

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# 22.1. Arp Filter Enabled

Arp Filter Enabled	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul> <li>Enable the parameter: <b>network.arpFilterEnabled=True</b></li> </ul>
	<ul> <li>Disable the parameter: <a href="mailto:network.arpFilterEnabled=False">network.arpFilterEnabled=False</a></li> </ul>
Web Interface	Arp Filter Enabled
window	<ol> <li>Click the Arp Filter Enabled list box arrow and select True to enable the parameter.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the Network window (on page 403) for parameter location.
Default Setting	False
Options	• True
	• False
Description	The network.arpFilterEnabled setting enables ARP filter in the bridge firewall.
	This allows only ARP communication that is in the Netmask (on page 286) parameter to enter the radio network.

# 22.2. Gateway

Gateway	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul> <li>network.gateway=nnn.nnn.nnn</li> <li>gateway=nnn nnn nnn</li> </ul>
	Important!: Where nnn.nnn.nnn is the Gateway IP address for the network.
Web Interface window	<ul> <li>Gateway</li> <li>1. In the Gateway text box, enter the Gateway IP address for the network.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the Network window (on page 403) for parameter location.</li> </ul>
Default Setting	192.168.111.1
Options	N/A

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Gateway	
Setting	Description
Description	The network.gateway parameter designates the Gateway IP address for the network.          Important!: The use of a Gateway here is NOT related to the radioSettings.radioMode=Gateway or radioSettings.radioMode=Endpoint.

## 22.3. IP Address

IP Address	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul> <li>network.ip_address=nnn.nnn.nnn</li> </ul>
	<ul> <li>ip_address=nnn.nnn.nnn</li> </ul>
	Important!: Where nnn.nnn.nnn is the IP Address assigned to each Z9-PC or Z9-PC-SR001.
Web Interface	IP Address
window	<ol> <li>In the IP Address text box, enter the IP address of the Z9-PC or Z9-PC- SR001 assigned by the IT department for the network.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the Network window (on page 403) for parameter location.
Default Setting	192.168.111.100
Options	N/A
Description	The <b>network.ip_address</b> parameter designates the IP address of the Z9-PC or Z9-PC-SR001.

## 22.4. MAC Address

MAC Address	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul> <li>network.mac_address</li> </ul>
	• mac_address

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MAC Address	
Setting	Description
Web Interface window	MAC Address Note: This parameter is read-only in the Web Interface. See the Network window (on page 403) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>network.mac_address</b> command reports the MAC Address of the Z9-PC or Z9-PC-SR001.
	Important!: This parameter is read-only and is unique for each radio.
	Notes about the MAC Address Table
	<ul> <li>1024 apps and programs are allowed to talk directly to the Z9-PC or Z9-PC- SR001.</li> </ul>
	• 4096 entries are allowed for the Z9-PC or Z9-PC-SR001 links.
	• If 4096 is exceeded, old entries are deleted but they can be re-learned.

## 22.5. MTU

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IVI		

Setting	Description
CLI / Web Page	[Page=network]
CLI Command	• network.mtu=nnnn
	• mtu=nnnn
	Note: Where nnnn is the maximum transmission unit.
Web Interface	MTU
window	1. In the <b>MTU</b> text box, enter the maximum transmission unit.
	2. Click the <b>Update</b> button to save the change.
	<b>Note</b> : See the Network window (on page 403) for parameter location.
Default Setting	1500
Options	The minimum value is 100.
	The maximum value is 65521.

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MTU	
Setting	Description
Description	The <b>network.mtu</b> parameter designates the maximum transmission unit (MTU) frame size for the Z9-PC or Z9-PC-SR001.
	Notes
	• 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.
	Important!: The value MUST BE increased to support jumbo size frames that exceed the normal 1500 byte MTU.

## 22.6. Nameserver Address 1

Nameserver Address 1	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul> <li>network.nameserver_address1=nnn.nnn.nnn</li> <li>nameserver_address1=nnn.nnn.nnn</li> <li>Note: Where nnn.nnn.nnn is a user-defined DNS IP address.</li> </ul>
Web Interface window	<ul> <li>Nameserver Address 1</li> <li>1. Optional: In the Nameserver Address 1 text box, enter a user-defined DNS IP address.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the Network window (on page 403) for parameter location.</li> </ul>
Default Setting	8.8.8.8 Note: This is a Google Public DNS.
Options	User-defined DNS IP address.
Description	The <b>network.nameserver_address1</b> parameter designates the DNS for name- to-address resolution.

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# 22.7. Nameserver Address 2

Nameserver Address 2	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul> <li>network.nameserver_address2=nnn.nnn.nnn.</li> </ul>
	<ul> <li>nameserver_address2=nnn.nnn.nnn</li> </ul>
	Note: Where nnn.nnn.nnn is a user-defined DNS IP address.
Web Interface	Nameserver Address 2
window	<ol> <li>Optional: In the Nameserver Address 2 text box, enter a user-defined DNS IP address</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the Network window (on page 403) for parameter location.
Default Setting	8.8.4.4
	Note: This is a Google Public DNS.
Options	User-defined DNS IP address.
Description	The <b>network.nameserver_address2</b> parameter designates the DNS for name- to-address resolution.

### 22.8. Netmask

Netmask	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul><li>network.netmask=nnn.nnn.nnn</li><li>netmask=nnn.nnn.nnn</li></ul>
	Note: Where nnn.nnn.nnn is the Netmask of the Z9-PC or Z9-PC-SR001.

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Netmask	
Setting	Description
Web Interface	Netmask
window	<ol> <li>In the Netmask text box, enter the Netmask of the Z9-PC or Z9-PC- SR001.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the Network window (on page 403) for parameter location.
Default Setting	255.255.255.0
Options	N/A
Description	The <b>network.netmask</b> parameter designates the Netmask of the Z9-PC or Z9-PC-SR001.

## 22.9. Netmask Filter Enabled

Netmask Filter Enabled	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	Enable:
	<ul> <li>network.netmaskFilterEnabled=true</li> </ul>
	<ul> <li>netmaskFilterEnabled=true</li> </ul>
	Disable:
	<ul> <li>network.netmaskFilterEnabled=false</li> </ul>
	<ul> <li>netmaskFilterEnabled=false</li> </ul>
Web Interface	Netmask Filter Enabled
window	<ol> <li>Click the Netmask Filter Enabled list box arrow and select True to enable the bridge firewall and restrict network communication to current IPv4 subnet.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	<b>Note</b> : By default, the <b>Netmask Filter Enabled</b> is enabled (set to False). See the Network window (on page 403) for parameter location.
Default Setting	False
Options	True
	• False

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Netmask Filter Enabled	
Setting	Description
Description	The <b>network.netmaskFilterEnabled</b> enables a bridge firewall to restrict network communication to the current IPv4 subnet.
	Notes
	<ul> <li>Allows ONLY IPv4, TCP, UDP, ICMP (ping), and ARP communication that is in the network.netmask parameter subnet to enter into the radio network.</li> </ul>
	<ul> <li>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.</li> </ul>
	Enabling <b>Netmask Filter</b> can prevent non-radio Ethernet traffic from adversely     affecting the performance and capacity of the radio network.
	Important!: ZumLink acts as a layer 2 switch. ALL Ethernet and Multicast packets are passed when IP Netmask Filter is NOT enabled.

## 22.10. STP Enabled

STP Enabled	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	Enable:
	<ul> <li>network.stpEnabled=true</li> </ul>
	• stpEnabled=true
	Disable:
	<ul> <li>network.stpEnabled=false</li> </ul>
	• stpEnabled=false
Web Interface window	STP Enabled
	<ol> <li>Click the STP Enabled list box arrow and select True to enable the Spanning Tree Protocol.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	<b>Note</b> : By default, the <b>STP Enabled</b> is NOT enabled (set to False). See the Network window (on page 403) for parameter location.
Default Setting	False
Options	True
	• False
Description	The network.stpEnabled setting enables the Spanning Tree Protocol.

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### 22.11. Txqueuelen

Txqueuelen	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	• network.txqueuelen=nnnn
	• txqueuelen=nnnn
	<b>Note</b> : Where nnnn is the maximum number of packets to hold in the transmit queue.
Web Interface	Txqueuelen
window	<ol> <li>In the Txqueuelen text box, enter the maximum number of packets to hold in the transmit queue.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the Network window (on page 403) for parameter location.
Default Setting	25
Options	The minimum value is 1.
	The maximum value is 1000.
Description	The <b>network.txqueuelen</b> parameter designates the maximum number of packets that can be buffered before they are rejected by the radio.
	Notes
	<ul> <li>The radio is still trying to send packets as soon as it receives them.</li> </ul>
	<ul> <li>If the queue size is too small in an Ethernet network with a high rate of small packets, then packets could be lost.</li> </ul>
	<ul> <li>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.</li> </ul>
	• <b>Increasing TX Queue Length</b> 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.
	<b>Example</b> : <b>network.txqueuelen=750</b> allows 750 Ethernet packets buffered in the transmit queue.

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# 22.12. VLAN MGMT

VLAN MGMT	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	<ul> <li>network.vlanMgmt=nnnn</li> <li>vlanMgmt=nnnn</li> <li>Note: Where nnnn designates the Management VLAN ID for the Z9-PC or Z9-PC-SR001.</li> </ul>
Web Interface window	<ul> <li>VLAN MGMT</li> <li>1. In the Vian MGMT text box, enter the Management VLAN ID.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the Network window (on page 403) for parameter location.</li> </ul>
Default Setting	0 (zero)
Options	0 (zero) to 4094
Description	<ul> <li>The network.vlanMgmt parameter designates the Management VLAN ID for the Z9-PC or Z9-PC-SR001.</li> <li>If the network.vlanMgmt is set, users can only access the device from the same VLAN ID.</li> <li>If the VLAN Tag (on page 290) is set on an Ethernet port, that port cannot be used to access the network.vlanMgmt.</li> <li>Important!: network.vlanMgmt must be different from any of the network.vlanTag IDs.</li> <li>Note: Set to 0 (zero) to disable Management VLAN.</li> </ul>

# 22.13. VLAN Tag

VLAN Tag	
Setting	Description
CLI / Web Page	[Page=network]

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VLAN Tag	
Setting	Description
CLI Command	• network.vlanTag=nnnn
	• vlanTag=nnnn
	Note: Where nnnn designates the VLAN Tag ID.
Web Interface	VLAN Tag
window	1. In the Vian Tag text box, enter the VLAN ID.
	2. Click the <b>Update</b> button to save the change.
	Note: See the Network window (on page 403) for parameter location.
Default Setting	0 (zero)
Options	0 (zero) to 4094
Description	The network.vlanTag parameter:
	<ul> <li>removes the VLAN ID for traffic transmitted from the Z9-PC or Z9-PC-SR001 to VLAN-incapable equipment and</li> </ul>
	<ul> <li>adds a VLAN ID for traffic received on the Z9-PC or Z9-PC-SR001.</li> </ul>
	Notes
	<ul> <li>Set to 0 (zero) to disable VLAN tagging for the Ethernet port and allow VLAN tags to pass unchanged through the Z9-PC or Z9-PC-SR001.</li> </ul>
	• The VLAN Tag ID is set on the Z9-PC or Z9-PC-SR001 Ethernet port.
	<ul> <li>Egress traffic tagged with the VLAN ID has the tag stripped and sent out the Ethernet port.</li> </ul>
	Ingress traffic to the Ethernet port has the VLAN tag with that ID added.
	<ul> <li>Ingress traffic to the Ethernet port with the VLAN tag has the VLAN tag with that ID added. (802.11ad double tag)</li> </ul>

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# 23. Network StatsParameters

Note: See the Network Stats window (on page 410).

- RX Bytes (on page 293)
- RX Dropped (on page 293)
- RX Errors (on page 294)
- RX Packets (on page 294)

- TX Bytes (on page 295)
- TX Dropped (on page 295)
- TX Errors (on page 296)
- TX Packets (on page 296)

The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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# 23.1. RX Bytes

RX Bytes	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	• networkStats.rx_bytes
	• rx_bytes
Web Interface	RX Bytes
window	<b>Note</b> : This parameter is read-only in the Web Interface. See the Network Stats window (on page 410) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>networkStats.rx_bytes</b> command reports the number of bytes received from the radio network.
	Note: This is a Read-only parameter.

# 23.2. RX Dropped

RX Dropped	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul> <li>networkStats.rx_dropped</li> </ul>
	• rx_dropped
Web Interface	RX Dropped
WINCOW	<b>Note</b> : This parameter is read-only in the Web Interface. See the Network Stats window (on page 410) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>networkStats.rx_dropped</b> command reports the number of Ethernet packets received from the radio network that were dropped at the Ethernet interface.
	Note: This is a Read-only parameter.

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# 23.3. RX Errors

RX Errors	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul> <li>networkStats.rx_errors</li> </ul>
	• rx_errors
Web Interface	RX Errors
window	<b>Note</b> : This parameter is read-only in the Web Interface. See the Network Stats window (on page 410) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>networkStats.rx_errors</b> command reports the number of Ethernet packets received from the radio network that had Ethernet errors.
	Note: This is a Read-only parameter.

# 23.4. RX Packets

RX Packets	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul><li>networkStats.rx_packets</li><li>rx_packets</li></ul>
Web Interface window	RX Packets           Note: This parameter is read-only in the Web Interface.           See the Network Stats window (on page 410) for parameter location.
Default Setting	N/A
Options	N/A
Description	The networkStats.rx_packets command reports the number of Ethernet packets received from the radio network.           Note: This is a Read-only parameter.

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# 23.5. TX Bytes

TX Bytes	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	• networkStats.tx_bytes
	• tx_bytes
Web Interface	TX Bytes
window	<b>Note</b> : This parameter is read-only in the Web Interface. See the Network Stats window (on page 410) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>networkStats.tx_bytes</b> command reports the number of bytes of Ethernet packets received from the Ethernet port and sent over the radio network.
	Note: This is a Read-only parameter.

# 23.6. TX Dropped

TX Dropped	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul> <li>networkStats.tx_dropped</li> </ul>
	• tx_dropped
Web Interface window	TX Dropped         Note: This parameter is read-only in the Web Interface.         See the Network Stats window (on page 410) for parameter location.
Default Setting	N/A
Options	N/A

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TX Dropped	
Setting	Description
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.           Note: An increase of this counter may indicate that increasing the Txqueuelen (on page 289) parameter may improve overall network performance.           Note: This is a Read-only parameter.

# 23.7. TX Errors

TX Errors	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul> <li>networkStats.tx_errors</li> </ul>
	• tx_errors
Web Interface window	TX Errors
	<b>Note</b> : This parameter is read-only in the Web Interface. See the Network Stats window (on page 410) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>networkStats.tx_errors</b> command reports the number of Ethernet packets received from the Ethernet port that were in error.
	Note: This is a Read-only parameter.

# 23.8. TX Packets

TX Packets	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	<ul> <li>networkStats.tx_packets</li> </ul>
	<ul> <li>tx_packets</li> </ul>

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TX Packets	
Description	
TX Packets           Note: This parameter is read-only in the Web Interface.           See the Network Stats window (on page 410) for parameter location.	
N/A	
N/A	
The networkStats.tx_packets command reports the number of Ethernet packets received from the Ethernet port and sent over the radio network.           Note: This is a Read-only parameter.	

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# 24. NTP Parameters

Note: See the NTP window (on page 412).

NTP Address (1 to 5) (on page 299)

NTP Date (on page 300)

NTP Reference (on page 301)

NTP Restart (on page 302)

The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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# 24.1. NTP Address (1 to 5)

NT	ΡΑ	ddres	s (1	to	5)
		uui 63.	3 ( 1	ιU	ν,

	·
Setting	Description
CLI / Web Page	[Page=ntp]
CLI Command	<ul> <li>ntp.ntp_address1=nnn.nnn.nnn</li> </ul>
	<ul> <li>ntp.ntp_address2=nnn.nnn.nnn</li> </ul>
	<ul> <li>ntp.ntp_address3=nnn.nnn.nnn</li> </ul>
	<ul> <li>ntp.ntp_address4=nnn.nnn.nnn</li> </ul>
	<ul> <li>ntp.ntp_address5=nnn.nnn.nnn</li> </ul>
	Note: Where nnn.nnn.nnn is the IP address of the servers used for synchronizing time.
Web Interface	NTP Address 1
window	NTP Address 2
	NTP Address 3
	NTP Address 4
	NTP Address 5
	<ol> <li>In the NTP Address 2 to 5 text boxes, enter the IP address of the servers used for synchronizing time.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	<b>Note</b> : By default, the <b>NTP Address 1</b> is time.nist.gov. See the NTP window (on page 412) for parameter location.
Default Setting	ntp_address1: time.nist.gov
	<ul> <li>ntp_address2-5: 0.0.0.0</li> </ul>
Options	N/A

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NTP Address (1 to 5)		
Setting	Description	
Description	The <b>ntp.ntp_address1-5</b> parameter designates the IP address of the server used for synchronizing time.	
	Notes	
	<ul> <li>This can be a server such as time.nist.gov, time1.google.com or it can be the IP address of another radio in the network.</li> </ul>	
	A maximum of five NTP servers are allowed.	
	• The fields in the NTP Parameters (on page 298) parameters are <b>not</b> validated by the system.	
	<ul> <li>Use 0.0.0 to skip a specific server.</li> </ul>	
	<b>Example</b> : Enter <pre>ntp_address2=0.0.0.0</pre> to skip a second server, if it's available.	
	A common use is to have all of the Endpoints and Repeaters use the IP address of the Gateway radio then the entire network will stay synchronized to the Gateway time.	

### 24.2. NTP Date

NTP Date		
Setting	Description	
CLI / Web Page	[Page=ntp]	
CLI Command	<ul><li>ntp.ntpDate=now</li><li>ntpDate=now</li></ul>	
Web Interface window	<ul> <li>NTP Date</li> <li>1. 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 (1 to 5) (on page 299) settings.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the NTP window (on page 412) for parameter location.</li> </ul>	
Default Setting	N/A	
Options	Now	

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NTP Date	
Setting	Description
Description	The <b>ntp.ntpDate</b> parameter sets the local time from other NTP servers on the network.
	<ul> <li>The server with the best clock, as defined by the NTP protocol, is used.</li> <li>The fields in the NTP Parameters (on page 298) parameters are <b>not</b> validated by the system.</li> </ul>
	by the system.

# 24.3. NTP Reference

NTP Reference		
Setting	Description	
CLI / Web Page	[Page=ntp]	
CLI Command	• ntp.ntpReference=NETWORK_TIME_SERVER	
	The reference is from other systems on the network.	
	<ul> <li>ntp.ntpReference=REFCLK_LOCALCLOCK</li> </ul>	
	The reference is generated by the local clock.	
Web Interface	NTP Reference	
window	<ol> <li>Click the NTP Reference list box arrow and select either NETWORK_</li> </ol>	
	TIME_SERVER or REFCLK_LOCALCLOCK.	
	2. Click the <b>Update</b> button to save the change.	
	Note: See the NTP window (on page 412) for parameter location.	
Default Setting	NETWORK_TIME_SERVER	
Options	NETWORK_TIME_SERVER	
	REFCLK_LOCALCLOCK	
Description	The <b>ntp.ntpReference</b> parameter designates the time correction from either a local clock or over the network clock reference for NTP.	
	Notes	
	NTP is always running.	
	<ul> <li>NETWORK_TIME_SERVER: The clock designation is from a network clock.</li> </ul>	
	<ul> <li>REFCLK_LOCALCLOCK: The clock designation is from the local clock.</li> </ul>	
	<ul> <li>If no server address is set in NTP Address (1 to 5) (on page 299), the reference is to the REFCLK_LOCALCLOCK.</li> </ul>	
	<ul> <li>If any NTP Address (1 to 5) is valid then, at startup and whenever NTP restarts, the system clock is set from the NTP servers over the network.</li> </ul>	
	<ul> <li>The fields in the NTP Parameters (on page 298) parameters are not validated by the system.</li> </ul>	

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### 24.4. NTP Restart

ption ntp] .ntpRestart=now Restart=now estart	
ntp] .ntpRestart=now Restart=now	
.ntpRestart=now Restart=now estart	
estart	
e: This parameter is read-only in the Web Interface. the NTP window (on page 412) for parameter location.	
N/A	
Now	
<b>AntpRestart</b> parameter restarts the NTP system. by NTP Address (1 to 5) (on page 299) is valid, then the system clock is set in the NTP servers over the network at the time the command is run. fields in the NTP Parameters (on page 298) parameters are <b>not</b> validated	

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# 25. Radio Settings Parameters

Note: See the Radio Settings window - Endpoint (on page 414).

Beacon Burst Count (on page 304) Beacon Interval (on page 305) Frequency Key (on page 306) Frequency Masks (on page 308) LNA Bypass (on page 312) Max Link Distance in Miles (on page 313) Network ID (on page 314) Node ID (on page 315) Radio Frequency (on page 316) Radio Hopping Mode (on page 317) Radio Max Repeaters (on page 320) Radio Mode (on page 322) Radio Repeater Slot (on page 323) RF Data Rate (on page 325) TX Power (on page 327)

The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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### 25.1. Beacon Burst Count

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Beacon Burst Count		
Setting	Description	
CLI / Web Page	[Page=radioSettings]	
CLI Command	<ul> <li>radioSettings.beaconBurstCount=n</li> </ul>	
	<ul> <li>beaconBurstCount=n</li> </ul>	
	Note: Where n is any number between 1 and 7.	
Web Interface	Beacon Burst Count	
window	<ol> <li>In the Beacon Burst Count text box, enter the number of consecutive beacons to send per Beacon Interval time.</li> </ol>	
	2. Click the <b>Update</b> button to save the change.	
	<b>Note</b> : See the Radio Settings window - Endpoint (on page 414) for parameter location.	
Default Setting	3	
Options	Any number between 1 and 7.	
Description	The <b>radioSettings.beaconBurstCount</b> setting designates the number of consecutive beacons to send per Beacon Interval time.	
	Notes	
	<ul> <li>The radioSettings.beaconBurstCount is set only on the Gateway device.</li> </ul>	
	<ul> <li>The Endpoint radios obtain this value from a Gateway with the same networkId via the beacon frame.</li> </ul>	
	This setting is only used when	
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>	
	<ul> <li>Increasing the number of beacons may improve RF link reliability in noisy environments.</li> </ul>	
	Decreasing the number of beacons may improve throughput in environments where interference is minimal.	
	<b>FREEWAVE Recommends</b> : Set the Beacon Burst Count (on page 304) 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.	

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### 25.2. Beacon Interval

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Beacon Interval	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul> <li>radioSettings.beaconInterval=TWENTY_FIVE_MS</li> <li>beaconInterval=TWENTY_FIVE_MS</li> <li>radioSettings.beaconInterval=FIFTY_MS</li> <li>beaconInterval=FIFTY_MS</li> <li>radioSettings.beaconInterval=ONE_HUNDRED_MS</li> <li>beaconInterval=ONE_HUNDRED_MS</li> <li>radioSettings.beaconInterval=TWO_HUNDRED_MS</li> <li>beaconInterval=TWO_HUNDRED_MS</li> <li>radioSettings.beaconInterval=FOUR_HUNDRED_MS</li> </ul>
	• beaconInterval=FOUR_HUNDRED_MS
Web Interface window	<ul> <li>Beacon Interval</li> <li>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.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the Radio Settings window - Endpoint (on page 414) for parameter location.</li> </ul>
Default Setting	ONE_HUNDRED_MS
Options	<ul> <li>TWENTY_FIVE_MS</li> <li>FIFTY_MS</li> <li>ONE_HUNDRED_MS</li> <li>TWO_HUNDRED_MS</li> <li>FOUR_HUNDRED_MS</li> </ul>

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Beacon Interval		
Setting	Description	
Description	The <b>radioSettings.beaconInterval</b> controls how often a Gateway radio sends out a beacon packet and changes to the next radio frequency in the hopping pattern.	
	Notes	
	• The radioSettings.beaconInterval is set only on the Gateway device.	
	<ul> <li>The Endpoint radios obtain this value from a Gateway with the same networkId via the beacon frame.</li> </ul>	
	This setting is <b>only</b> used when	
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>	
	<ul> <li>A shorter Beacon Interval may improve the RF link reliability in noisy environments.</li> </ul>	
	A <b>longer Beacon Interval</b> may improve throughput in environments where interference is minimal.	

# 25.3. Frequency Key

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

#### **Frequency Key**

Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul> <li>radioSettings.frequencyKey=Key0</li> <li>frequencyKey=Key0</li> <li>radioSettings.frequencyKey=Key1 to Key16</li> <li>frequencyKey=Key1 to Key16</li> </ul>
Web Interface window	<ul> <li>Frequency Key</li> <li>1. Click the Frequency Key list box arrow and select the Key number used as an index to select a hopping table.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the Radio Settings window - Endpoint (on page 414) for parameter location.</li> </ul>
Default Setting	Key0 (zero)

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Frequency Ke	ey 🤅	
Setting	Description	
Options	Key0 (zero)	
	Key1 to Key16	
	Valid frequencyKey	Values
	Data Rate of 115.2	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 Rat	es
	Frequency Key Values	Description
	Key0	Select standard randomized hop table.
	Key1	Select sequential hop table in reverse order of center frequencies.

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Frequency Key		
Setting	Description	
Description	The <b>radioSettings.frequencyKey</b> setting designates the Key number used as an index to select a hopping table.	
	Notes	
	<ul> <li>Use a unique Frequency Key setting to use different hop patterns for each ZumLink network.</li> </ul>	
	This setting is <b>only</b> used when	
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>	
	<ul> <li>The number of available frequency keys is based on the number of hopping sequences in the hop table.</li> </ul>	
	<ul> <li>An invalid frequency key setting is determined by being outside of the specified range.</li> </ul>	
	<ul> <li>If an invalid frequency key setting is found, the radioSettings.frequencyKey is NOT changed.</li> </ul>	
	• A frequency key setting is also invalid if the frequency key setting is larger than the number of hopping tables configured for a specific RF Data Rate (on page 325).	
	• In this instance, the <b>radioSettings.frequencyKey</b> is set to Key0 (zero).	
	Important!: The Endpoint radios obtain this value from a Gateway with the same Network ID (on page 314) via the beacon frame. After communications are established, any change of this value are picked up by the Endpoints.	
	When using different hop patterns on each network, interference caused by neighboring <b>ZumLink</b> networks can be minimized.	

# 25.4. Frequency Masks

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Frequency Masks	
Setting	Description
CLI / Web Page	[Page=radioSettings]

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Frequency Masks	
Setting	Description
CLI Command	<ul><li>radioSettings.frequencyMasks=nnnn</li><li>frequencyMasks=nnnn</li></ul>
	Note: Where nnnn is the specified format of the frequency range to mask shown in:         A. Single Channel Format,         B. Range of Channels Format, or         C. Combination of Channels Format.
	<b>Important!</b> : Hop table frequency masking masks the channels that fall within the range plus or minus one-half $(\frac{1}{2})$ the channel bandwidth.
Web Interface window	<ul> <li>Frequency Masks</li> <li>In the Frequency Masks text box, enter the exact specified format of the frequency range to mask.</li> <li>Click the Update button to save the change.</li> <li>Wait a few seconds the for the radio to process the command.</li> <li>Refresh the radio Web Interface and review the Frequency Masks text box to verify the mask was accepted.</li> <li>If the frequency mask setting is NOT what was requested, click the Radio Settings Helpers menu. Figure 235</li> <li>Figure 235: Radio Settings Helpers menu</li> <li>In the Radio Settings Helpers window (on page 422), review the Frequency Masks Errors (on page 330) to determine the error that exists in the frequency mask string.</li> <li>Note: See the Radio Settings window - Endpoint (on page 414) for parameter location.</li> </ul>
Default Setting	Blank

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Setting	Description
Options	<b>Caution</b> : ONLY A comma MUST separate the values - NOT a comma with a space.
	Use this information in examples A to C:
	• xxx is a value between 902-927 MHz.
	• yyyy is a value between .00009999 MHz.
	A. Single Channel Format
	<ul> <li>A single entry masks the specified frequency plus the bandwidth on each side of the center frequency as a function of the rfDataRate.</li> </ul>
	<ul> <li>frequencyMasks=xxx.yyyy,xxx.yyyy,xxx.yyyy</li> </ul>
	B. Range of Channels Format
	Important!: If a radio channel intersects with the mask limits, it will be masked and not used.
	• frequencyMasks=xxx.yyyy-xxx.yyyy,xxx.yyyy-xxx.yyyy
	C. Combination of Channels Format
	<ul> <li>frequencyMasks=xxx.yyyy-xxx.yyyy,xxx.yyyy</li> </ul>

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Frequency Masks		
Setting	Description	
Description	The <b>radioSettings.frequencyMasks</b> setting designates specific frequencies or a set of frequencies in the hopping pattern to remove from usage.	
	<b>Caution: radioSettings.frequencyMasks</b> entries MUST BE less than 128 bytes.	
	Notes	
	This setting is <b>only</b> used when	
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>	
	• All radios in the network <b>MUST</b> use the same value for this parameter.	
	When <b>Frequency Masks</b> is enabled, interference fixed at certain frequencies within the spectrum can be avoided by the transmitter.	
	Least significant zeros are NOT required.	
	<ul> <li>.9, .09, .009 are valid entries as well as .9000, .0900, .0090.</li> <li>The radioSettings frequencyMasks parameter needs to be re-entered when</li> </ul>	
	moving between RF Data Rate (on page 325).	
	Type <b>frequencyMasks</b> and press <enter> to clear all <b>Frequency</b> <b>Mask</b> entries.</enter>	
	Important!: Special rules must be applied for the 115.2 and 250 kbps data rates to enforce regulatory rules.	
	Notes for 115.2 and 250 kbps Rates for Regulatory Compliance For 115.2 kbps:	
	<ul> <li>If the number of hopping channels contained in the hop table is &gt; 50, TX Power (on page 327) can be set to values up to and including 30 dBm.</li> </ul>	
	<ul> <li>radioSettings.txPower is NOT automatically changed.</li> </ul>	
	<ul> <li>If the number of hopping channels contained in the hop table is &lt; 50, all masking is removed and all of the channels contained in the hop table are re- enabled.</li> </ul>	
	<ul> <li>radioSettings.txPower is NOT automatically changed.</li> </ul>	
	For 250 kbps:	
	<ul> <li>If the number of hopping channels contained in the hop table is &gt; 50, TX Power (on page 327) can be set to values up to and including 30 dBm.</li> </ul>	
	<ul> <li>radioSettings.txPower is NOT automatically changed.</li> <li>If the number of benning changels contained in the ben table is &gt;= 25, but &lt; 50.</li> </ul>	
	<ul> <li>If the number of hopping channels contained in the hop table is &gt;= 25, but &lt; 50, radioSettings.txPower can be set to values up to and including 24 dBm.</li> </ul>	
	<ul> <li>radioSettings.txPower is automatically reduced to 24 dBm.</li> </ul>	

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Frequency Masks	
Setting	Description
	<ul> <li>If the number of hopping channels contained in the hop table is &lt; 25, all masking is removed and all of the channels contained in the hop table are reenabled.</li> <li>radioSettings.txPower is NOT automatically changed.</li> </ul>

### 25.5. LNA Bypass

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

LNA Bypass		
Setting	Description	
CLI / Web Page	[Page=radioSettings]	
CLI Command	<ul> <li>Enable LNA:</li> <li>radioSettings.lnaBypass=0</li> <li>lnaBypass=0</li> <li>Bypass LNA: <ul> <li>radioSettings.lnaBypass=1</li> <li>lnaBypass=1</li> </ul> </li> </ul>	
Web Interface window	LNA Bypass         1. In the LNA Bypass text box, enter 1 to bypass the Low Noise Amplifier (LNA) and reduce the radio module receive signal by 10dB.         2. Click the Update button to save the change.         Note: See the Radio Settings window - Endpoint (on page 414) for parameter location.	
Default Setting	0 (zero)	
Options	• 0 • 1	
Description	When set to 1, the radioSettings.InaBypass parameter bypasses the Low Noise Amplifier (LNA) and reduces the radio module receive signal by 10 dB.	

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### 25.6. Max Link Distance in Miles

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Max Link Distance in Miles		
Setting	Description	
CLI / Web Page	[Page=radioSettings]	
CLI Command	<ul> <li>radioSettings.maxLinkDistanceinMiles=nnn</li> <li>maxLinkDistanceinMiles=nnn</li> <li>Note: Where nnn is the maximum one-way distance (in miles) between any nodes in the network.</li> </ul>	
Web Interface window	<ul> <li>Max Link Distance in Miles</li> <li>1. In the Max Link Distance in Miles text box, enter the maximum one-way distance (in miles) used to set the maximum expected propagation delay between any Endpoints in the network.</li> <li>2. Click the Update button to save the change.</li> </ul> Note: See the Radio Settings window - Endpoint (on page 414) for parameter location.	
Default Setting	20 miles	
Options	<ul><li>The minimum value is 5 miles.</li><li>The maximum value is 120 miles.</li></ul>	
Description	<ul> <li>The radioSettings.maxLinkDistanceinMiles parameter designates the maximum one-way distance (in miles) used to set the maximum expected propagation delay between any Endpoints in the network.</li> <li>Notes <ul> <li>If the parameter is set too small, then packets are retransmitted unnecessarily and could significantly reduce throughput.</li> <li>If the parameter is set larger than the maximum propagation delay, it will take longer than needed to retransmit lost packets.</li> </ul> </li> <li>FREEWAVE Recommends: Set a slightly larger number than needed. All Endpoints in the network that communicate with each other should use the same distance value.</li> </ul>	

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# 25.7. Network ID

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Network ID		
Setting	Description	
CLI / Web Page	[Page=radioSettings]	
CLI Command	<ul> <li>radioSettings.networkId=nnnn</li> <li>networkId=nnnn</li> </ul> Note: Where nnnn is the network identifier which subdivides traffic on	
	radio units.	
Web Interface	Network ID	
window	<ol> <li>In the <b>Network ID</b> text box, enter the network identifier that subdivides traffic on radio units.</li> </ol>	
	2. Click the <b>Update</b> button to save the change.	
	<b>Note</b> : See the Radio Settings window - Endpoint (on page 414) for parameter location.	
Default Setting	51966	
Options	The minimum value is 2.	
	The maximum value is 65535.	
Description	The <b>radioSettings.networkId</b> parameter designates the network identifier which subdivides traffic on radio units.	
	Notes	
	<ul> <li>Radio units can only communicate with other units that have the same radioSettings.networkId setting.</li> </ul>	
	Important!: If radios are on the same frequency, they still receive data from radios of a different <b>networkId</b> , but the data is dropped.	

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### 25.8. Node ID

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Node ID	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul><li>radioSettings.nodeId=nnnn</li><li>nodeId=nnnn</li></ul>
	<b>Note</b> : Where nnnn is a user-designated nodeld instead of the auto- generated nodeld.
Web Interface	Node ID
window	<ol> <li>In the Node ID text box, enter a user-designated nodeld instead of the auto-generated nodeld.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	<b>Note</b> : See the Radio Settings window - Endpoint (on page 414) for parameter location.
Default Setting	Predetermined by the Z9-PC or Z9-PC-SR001, this is an auto-generated, unique number from 2 through 65533.
Options	N/A
Description	The radioSettings.nodeld parameter designates the unique ID of the device.
	Notes
	<ul> <li>Each radio with the same networkId must have a UNIQUE nodeld.</li> </ul>
	<ul> <li>Otherwise, two or more nodes will unicast an acknowledgment that may collide.</li> </ul>
	<ul> <li>The Gateway or Gateway-Repeater device ALWAYS has a nodeld of value</li> <li>1. It cannot be changed.</li> </ul>

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# 25.9. Radio Frequency

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Radio Frequency		
Setting	Description	
CLI / Web Page	[Page=radioSettings]	
CLI Command	<ul> <li>radioSettings.radioFreq</li> <li>radioFrequency=nnn.nnnr</li> <li>Note: Where nnn.nnnn is the o</li> </ul>	perating center frequency.
Web Interface window	<ul> <li>Radio Frequency</li> <li>1. In the Radio Frequency text</li> <li>2. Click the Update button to sa</li> <li>Note: See the Radio Settings will parameter location.</li> </ul>	box, enter the operating center frequency. ave the change. ndow - Endpoint (on page 414) for
Default Setting	915.0000 for the Standard Hop Set	- 900 MHz Channels (on page 454)
Options Valid Ranges		
	Data Rate	MHz Range
	4 Mbps	904.5504 - 925.7472
	1.5 Mbps (Beta)	903.2562 - 925.8354
	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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Radio Frequency	
Setting	Description
Description	The <b>radioSettings.radioFrequency</b> parameter designates the operating center frequency in MHz.
	Notes
	• All radios in the network <b>MUST</b> use the same value for this parameter.
	Inis setting is only used when     radiosettings, radioHoppingMode=Hopping, Off
	<ul> <li>The range of this parameter is dependent on the RF Data Rate (on page 325) setting.</li> </ul>
	The frequency interval is 100 Hz.
	<ul> <li>The minimum value increases and the maximum value decreases as the radioSettings.rfDataRate increases.</li> </ul>
	The increase in channel bandwidth affects these ranges.
	<ul> <li>If the radioSettings.radioFrequency parameter is set too close to the band edge for the current radioSettings.rfDataRate, the radio module rejects the setting.</li> </ul>
	A minimum of 3 hopping channels are supported when
	radioSettings.rfDataRate = <mark>RATE_4M</mark> , <mark>RATE_1M</mark> , and <mark>RATE_500K</mark> .
	FREEWAVE Recommends: Use a single
	radiosettings.radioHoppingMode=Hopping Off.
	Important!: A few seconds are needed to apply the change; allow some time prior to reading back this value.
	Read back this value after setting it to determine if it was accepted by the Z9-PC or Z9-PC-SR001.

# 25.10. Radio Hopping Mode

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Setting	Description
CLI / Web Page	[Page=radioSettings]

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Radio Hopping Mode	
Setting	Description
CLI Command	<ul> <li>Enable:</li> <li>radiosettings.radioHoppingMode=Hopping_On</li> <li>radioHoppingMode=Hopping_On</li> <li>Disable:</li> </ul>
	<ul><li>radiosettings.radioHoppingMode=Hopping_Off</li><li>radioHoppingMode=Hopping_Off</li></ul>
Web Interface window	<ul> <li>Radio Hopping Mode</li> <li>1. Click the Radio Hopping Mode list box arrow and select Off to disable frequency hopping.</li> <li>2. Click the Update button to save the change.</li> </ul>
	<b>Note</b> : See the Radio Settings window - Endpoint (on page 414) for parameter location.
Default Setting	Hopping_On
Options	<ul><li>Hopping_Off</li><li>Hopping_On</li></ul>

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Radio Hopping Mode		
Setting	Description	
Description	The <b>radioSettings.radioHoppingMode</b> parameter enables frequency hopping. <b>Notes</b>	
	<ul> <li>All radios in the network MUST use the same value for this parameter.</li> <li>For rfDataRate values of 115.2 and 250 kbps, the radioSettings.radioHoppingMode is forced On and CANNOT be set to radiosettings.radioHoppingMode=Hopping_Off.</li> <li>For rfDataRate 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.</li> <li>A Gateway is required when the radiosettings.radioHoppingMode=Hopping_On.</li> <li>A Gateway is NOT required when the radiosettings.radioHoppingMode=Hopping_Off.</li> </ul>	
	<ul> <li>Notes for 115.2 and 250 kbps Rates for Regulatory Compliance</li> <li>For 115.2 kbps: <ul> <li>If the number of hopping channels contained in the hop table is &gt; 50, TX Power (on page 327) can be set to values up to and including 30 dBm.</li> <li>radioSettings.txPower is NOT automatically changed.</li> </ul> </li> <li>If the number of hopping channels contained in the hop table is &lt; 50, all masking is removed and all of the channels contained in the hop table are reenabled.</li> <li>radioSettings.txPower is NOT automatically changed.</li> </ul>	
	<ul> <li>For 250 kbps:</li> <li>If the number of hopping channels contained in the hop table is &gt; 50, TX Power (on page 327) can be set to values up to and including 30 dBm.</li> <li>radioSettings.txPower is NOT automatically changed.</li> <li>If the number of hopping channels contained in the hop table is &gt;= 25, but &lt; 50, radioSettings.txPower can be set to values up to and including 24 dBm.</li> <li>radioSettings.txPower is automatically reduced to 24 dBm.</li> <li>If the number of hopping channels contained in the hop table is &lt; 25, all masking is removed and all of the channels contained in the hop table are reenabled.</li> <li>radioSettings.txPower is NOT automatically changed.</li> </ul>	

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### 25.11. Radio Max Repeaters

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Radio Max Repeaters	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul> <li>radioSettings.radioMaxRepeaters=n</li> </ul>
	<ul> <li>radioMaxRepeaters=n</li> </ul>
	<b>Note</b> : Where $n$ is the number of Repeater slots in the network.
Web Interface	Radio Max Repeaters
window	<ol> <li>In the Radio Max Repeaters text box, enter the number of Repeater slots in the network.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	<b>Note</b> : See the Radio Settings window - Endpoint (on page 414) for parameter location.
Default Setting	0 (zero)
Options	• 0 (zero)
	• 1
	• 2
	• 3

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Radio Max Repeaters	
Setting	Description
Description	The <b>radioSettings.radioMaxRepeaters</b> parameter designates the maximum Repeater slots in the network when the
	radiosettings.radioHoppingMode=Hopping_On.
	Notes
	<ul> <li>The Endpoint radios obtain this value from a Gateway with the same networkId via the beacon frame.</li> </ul>
	<ul> <li>The radioSettings.radioMaxRepeaters is set on the network Gateway device and the Gateway beacon carries this information.</li> </ul>
	<ul> <li>If radioSettings.radioMaxRepeaters=0:</li> </ul>
	<ul> <li>Set the value to 0 (zero) when there are no Endpoint-Repeaters or when radiosettings.radioHoppingMode=Hopping_Off.</li> </ul>
	<ul> <li>If radioSettings.radioMaxRepeaters=n</li> </ul>
	<ul> <li>If the network has one Repeater, set this to 1.</li> </ul>
	<ul> <li>If the network has two Repeaters, set this to 2.</li> </ul>
	<ul> <li>If the network has three or more Repeaters, set this to 3.</li> </ul>
	<ul> <li>Set the value to match the number of overlapping Repeaters, with a maximum of 3.</li> </ul>
	Set the value to the <b>maximum number</b> of repeater slots used in the network when Endpoint-Repeaters are present in the network and when the
	radiosettings.radionoppingMode=nopping_On.
	<b>Note</b> : Setting this value too high adds unnecessary latency to the network.
	Communication Method
	The Z9-PC or Z9-PC-SR001 use Listen Before Talk (LBT) and Carrier Sense Multiple Access (CSMA). There are no assigned slots. The radios transmit when the channel is clear.
	<ul> <li>The Gateway broadcasts packets to all Endpoints and Endpoint-Repeaters within range.</li> </ul>
	<ul> <li>The Endpoints unicast packets back to the Gateway or downstream Endpoint- Repeaters.</li> </ul>
	<ul> <li>The Gateway acknowledges the Endpoint or Endpoint-Repeater packets.</li> </ul>
	FreeWave's traditional protocol has a Gateway Time Slot and an Endpoint Time Slot within a frame.
	<ul> <li>The Gateway transmits in its slot and listens in the Endpoint slot.</li> </ul>
	The Endpoint transmits its slot and listens in the Gateway slot.

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### 25.12. Radio Mode

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Radio Mode	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul> <li>radioSettings.radioMode=Gateway</li> </ul>
	• radioMode=Gateway
	<ul> <li>radioSettings.radioMode=Endpoint</li> </ul>
	<ul> <li>radioMode=Endpoint</li> </ul>
	<ul> <li>radioSettings.radioMode=Gateway_Repeater</li> </ul>
	<ul> <li>radioMode=Gateway_Repeater</li> </ul>
	<ul> <li>radioSettings.radioMode=Endpoint_Repeater</li> </ul>
	<ul> <li>radioMode=Endpoint_Repeater</li> </ul>
Web Interface	Radio Mode
window	<ol> <li>Click the Radio Mode list box arrow and select the device type to designate the Z9-PC or Z9-PC-SR001 as.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	<b>Note</b> : See the Radio Settings window - Endpoint (on page 414) for parameter location.
Default Setting	Endpoint
Options	Endpoint
	Endpoint-Repeater
	Gateway
	Gateway-Repeater

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Radio Mode	
Setting	Description
Description	The radioSettings.radioMode parameter designates the device type.
	Notes
	Each network can have only ONE Gateway or Gateway-Repeater device.
	See Repeaters (on page 195) for additional information.
	<ul> <li>The remaining devices MUST BE configured as Endpoints or Endpoint- Repeaters.</li> </ul>
	<ul> <li>The Gateway or Gateway-Repeater device ALWAYS has a nodeld of value</li> <li>1. It cannot be changed.</li> </ul>
	• The Endpoint or Endpoint-Repeater nodeld values are 2 through 65535.
	A Gateway is required when the
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>
	A Gateway is NOT required when the
	<pre>radiosettings.radioHoppingMode=Hopping_Off.</pre>
	The Gateway-Repeater repeats packets.
	• The Endpoint-Repeater has a unique <b>nodeld</b> and repeats packets and master beacons.
	See Repeaters (on page 195) for additional information.

# 25.13. Radio Repeater Slot

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Radio Repeater Slot	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul><li>radioSettings.radioRepeaterSlot=n</li><li>radioRepeaterSlot=n</li></ul>
	Note: Where n is the Repeater slot.

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Radio Repeater Slot		
Setting	Description	
Web Interface window	<ul> <li>Radio Repeater Slot</li> <li>1. In the Radio Repeater Slot text box, enter which repeater slot the Endpoint-Repeater uses.</li> <li>2. Click the Update button to save the change.</li> <li>Note: The Radio Repeater Slot parameter is only visible when the Z9-PC or Z9-PC-SR001 is designated as an Endpoint-Repeater. See the Radio Settings window - Endpoint (on page 414) for parameter location.</li> </ul>	
Default Setting	1	
Options	• 1 • 2 • 3	
Description	<ul> <li>3</li> <li>The radioSettings.radioRepeaterSlot parameter designates which repeater slot, up to the Radio Max Repeaters setting, the Endpoint-Repeater uses.</li> <li>Important!: This setting is only available when radioSettings.radioMode=Endpoint_Repeater.</li> <li>Notes</li> <li>The radioSettings.radioRepeaterSlot is set on the Endpoint-Repeater device when radiosettings.radioHoppingMode=Hopping_On.</li> <li>This setting does NOT apply when radiosettings.radioHoppingMode=Hopping_Off.</li> <li>Repeater slots must be unique for Repeaters that are in communication range so the beacons do not collide.</li> <li>Endpoint-Repeaters can share a slot number when they do not overlap and form longer repeater chains.</li> <li>The number of entered Repeater slots cannot be larger than the numbered entered in the Padio Max Repeaters (on page 320) setting</li> </ul>	

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## 25.14. RF Data Rate

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

RF Data Rate	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul> <li>radioSettings.rfDataRate=RATE_4M</li> <li>rfDataRate=RATE_4M</li> <li>radioSettings.rfDataRate=RATE_1M</li> <li>rfDataRate=RATE_1M</li> <li>radioSettings.rfDataRate=RATE_1.5M_BETA_FEATURE</li> <li>rfDataRate=RATE_1.5M_BETA_FEATURE</li> <li>radioSettings.rfDataRate=RATE_500K</li> <li>rfDataRate=RATE_500K</li> <li>radioSettings.rfDataRate=RATE_250K</li> <li>rfDataRate=RATE_250K</li> <li>radioSettings.rfDataRate=RATE_115.2K</li> </ul>
Web Interface window	<ul> <li>FIDALARACE-RATE_FID.2R</li> <li>RF Data Rate</li> <li>1. Click the <b>RF Data Rate</b> list box arrow and select the RF link data rate in bits per second.</li> <li>2. Click the <b>Update</b> button to save the change.</li> <li>Note: See the Radio Settings window - Endpoint (on page 414) for parameter location.</li> </ul>
Default Setting	RATE_500K
Options	<ul> <li>RATE_4M (4 Mbps mode)</li> <li>RATE_1M (1 Mbps mode)</li> <li>RATE_1.5M_BETA_FEATURE</li> <li>RATE_500K (500 kbps mode)</li> <li>RATE_250K (250 kbps mode)</li> <li>RATE_115.2K (115.2 kbps mode)</li> </ul>

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RF Data Rate	
Setting	Description
Description	The <b>radioSettings.rfDataRate</b> parameter designates the RF link data rate in bits per second.
	Notes
	• All radios in the network <b>MUST</b> use the same value for this parameter.
	<ul> <li>A higher RF link data rate provides more throughput but at the expense of link distance or fade margin.</li> </ul>
	• When changing from lower data rates to higher ones (e.g., <b>rfDataRate=RATE_115.2K</b> to <b>rfDataRate=RATE_1M</b> ), the Radio Frequency (on page 316) may be set back to the default if the frequency would have been out of band.
	<ul> <li>When selecting data rates of either <pre>rfDataRate=RATE_115.2K</pre> or</li></ul>
	rfDataRate=RATE_250K, radioSettings.radioHoppingMode is
	automatically forced to radiosettings.radioHoppingMode=Hopping_ On and cannot be turned off.
	<ul> <li>For all other data rates, the radioSettings.radioHoppingMode remains at its current setting.</li> </ul>
	Important!: Special rules must be applied for the 115.2 and 250 kbps data rates to enforce regulatory rules.
	Notes for 115.2 and 250 kbps Rates for Regulatory Compliance
	For 115.2 kbps:
	<ul> <li>If the number of hopping channels contained in the hop table is &gt; 50, TX Power (on page 327) can be set to values up to and including 30 dBm.</li> </ul>
	<ul> <li>radioSettings.txPower is NOT automatically changed.</li> </ul>
	<ul> <li>If the number of hopping channels contained in the hop table is &lt; 50, all masking is removed and all of the channels contained in the hop table are re- enabled.</li> </ul>
	<ul> <li>radioSettings.txPower is NOT automatically changed.</li> </ul>
	For 250 kbps:
	<ul> <li>If the number of hopping channels contained in the hop table is &gt; 50, TX Power (on page 327) can be set to values up to and including 30 dBm.</li> </ul>
	<ul> <li>radioSettings.txPower is NOT automatically changed.</li> </ul>
	<ul> <li>If the number of hopping channels contained in the hop table is &gt;= 25, but &lt; 50, radioSettings.txPower can be set to values up to and including 24 dBm.</li> <li>radioSettings.txPower is automatically reduced to 24 dBm.</li> </ul>
	<ul> <li>If the number of hopping channels contained in the hop table is &lt; 25, all masking is removed and all of the channels contained in the hop table are re- enabled.</li> </ul>

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RF Data Rate	
Setting	Description
	<ul> <li>radioSettings.txPower is NOT automatically changed.</li> </ul>
	FREEWAVE Recommends: Use a single radioSettings.radioFrequency if
	<pre>radiosettings.radioHoppingMode=Hopping_Off.</pre>
	<b>Caution</b> : The <b>RATE_1.5M_BETA_FEATURE</b> data rate is a Beta feature NOT recommended for production deployment.

#### 25.15. TX Power

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	<ul> <li>radioSettings.txPower=nn</li> <li>txPower=nn</li> <li>Note: Where nn is the RF output transmit power.</li> <li>Important!: Entering a decimal value changes the txpower to 0 (zero).</li> <li>FREEWAVE Recommends: Use whole numbers only.</li> </ul>
Web Interface window	<ol> <li>TX Power</li> <li>Click the <b>Tx Power</b> list box arrow and select the dB RF output transmit power level for the Z9-PC or Z9-PC-SR001.</li> <li>Click the <b>Update</b> button to save the change.</li> <li>Note: See the Radio Settings window - Endpoint (on page 414) for parameter location.</li> </ol>
Default Setting	• 30

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TX Power	
Setting	Description
Options	The minimum value is 10.
	The maximum value is 30.
Description	The <b>radioSettings.txPower</b> setting designates the dB RF output transmit power for the Z9-PC or Z9-PC-SR001.
	Notes
	Output power is limited to maximum of 30dBm or 1 Watt.
	Use a higher power to increase link margin.
	<ul> <li>Use a lower transmit power to reduce interference when multiple radio links are in close proximity.</li> </ul>
	<ul> <li>The maximum radioSettings.txPower can be limited if the</li> </ul>
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>
	See Frequency Masks (on page 308) for additional details.
	Entering <b>txpower=0</b> or <b>radiosettings.txpower=0</b> changes the output power to the minimum or 10 dB.

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# 26. Radio Settings Helpers Parameters

**Note**: See the Radio Settings Helpers window (on page 422).

• Frequency Masks Errors (on page 330)



The parameter syntax is: page.parameter=value.

Parameters with unique names can be specified as parameter=value.

**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).

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Frequency Masks Errors	
Setting	Description
CLI / Web Page	[Page=radioSettingsHelpers]
CLI Command	<ul><li>radioSettingsHelpers.frequencyMasksErrors</li><li>radioSettingsHelpers</li></ul>
Web Interface window	Frequency Masks Errors           Note: This parameter is read-only in the Web Interface.           See the Radio Settings Helpers window (on page 422) for parameter location.
Default Setting	N/A
Options	N/A
Description	The radioSettingsHelpers.frequencyMasksErrors command reports the results of any errors in the Frequency Masks (on page 308).           Note: This is a Read-only parameter.

#### 26.1. Frequency Masks Errors

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# 27. Runtime Environment Parameters

Note: See the Runtime Environment window (on page 424).

Rte Installed by Apps Version (on page 332)

Rte Reset (on page 332)

Rte Template Version (on page 333)

Rte Version (on page 334)

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The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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Rte Installed by	Rte Installed by Apps Version	
Setting	Description	
CLI / Web Page	[Page=runtimeEnvironment]	
CLI Command	<ul> <li>runtimeEnvironment.rteInstalledByAppsVersion</li> <li>rteInstalledByAppsVersion</li> </ul>	
Web Interface	Rte Installed by Apps Version	
window	<b>Note</b> : This parameter is read-only in the Web Interface. See the Runtime Environment window (on page 424) for parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The <b>runtimeEnvironment.rteInstalledByAppsVersion</b> parameter reports the version number of the firmware used to install the runtime developer environment.	
	Important!: The firmware that installed the runtime developer environment may have a different version than the developer environment itself.	
	Note: This is a Read-only parameter.	

#### 27.1. Rte Installed by Apps Version

#### 27.2. Rte Reset

Rte Reset	
Setting	Description
CLI / Web Page	[Page=runtimeEnvironment]
CLI Command	<ul> <li>runtimeEnvironment.rteReset=Cancel</li> <li>rteReset=Cancel</li> <li>runtimeEnvironment.rteReset=Hard</li> <li>rteReset=Hard</li> <li>runtimeEnvironment.rteReset=Now</li> <li>rteReset=Now</li> </ul>
Web Interface window	Rte Reset           Note: This parameter is read-only in the Web Interface.           See the Runtime Environment window (on page 424) for parameter location.

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Setting	Description
Default Setting	N/A
Options	Cancel
	• Hard
	• Now
Description	The <b>runtimeEnvironment.rteReset</b> parameter designates the update or reset of the runtime application environment.
	Notes
	<ul> <li>runtimeEnvironment.rteReset=Cancel is used to REMOVE the rteReset=Hard command BEFORE the next boot of the Z9-PC or Z9-PC- SR001.</li> </ul>
	<ul> <li>runtimeEnvironment.rteReset=Hard completely resets the file system of the runtime application environment to match the latest installed developer user package.</li> </ul>
	<ul> <li>This will stage the development runtimeEnvironment to be applied on the next reboot.</li> </ul>
	The runtime application environment reset takes place at the time of next boot.
	Warning! ALL User-generated content and settings in Z9-PC or Z9-PC-SR001 ARE DELETED after the next reboot!
	<ul> <li>runtimeEnvironment.rteReset=Now</li> </ul>
	This reboots the Z9-PC or Z9-PC-SR001 and copies the Linux application environment into the runtime location.  This will take asymptote to complete
	The larger the IQ Application Environment, the longer the time needed.

#### 27.3. Rte Template Version

#### Rte Template Version

Setting	Description
CLI / Web Page	[Page=runtimeEnvironment]
CLI Command	<ul> <li>runtimeEnvironment.rteTemplateVersion</li> </ul>
	• rteTemplateVersion

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Rte Template Version	
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 424) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>runtimeEnvironment.rteTemplateVersion</b> parameter reports the version number for the IQ environment template. This is the IQ environment applied when executing the <b>rteReset=hard</b> command.
	<b>Note</b> : See Rte Reset (on page 332) for additional information. This is a Read-only parameter.

## 27.4. Rte Version

Rte Version		
Setting	Description	
CLI / Web Page	[Page=runtimeEnvironment]	
CLI Command	<ul><li>runtimeEnvironment.rteVersion</li><li>rteVersion</li></ul>	
Web Interface window	Rte Version           Note: This parameter is read-only in the Web Interface.           See the Runtime Environment window (on page 424) for parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The runtimeEnvironment.rteVersion parameter reports the version number for the active IQ environment           Note: If this setting is blank, the application environment has not been initialized.           This is a Read-only parameter.	

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# 28. Security Parameters

Note: See the Security window (on page 426).

Enable Ethernet Login (on page 336) Ethernet PTP Interface (on page 336)

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The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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#### 28.1. Enable Ethernet Login

Enable Ethernet Login	
Setting	Description
CLI / Web Page	[Page=security]
CLI Command	<ul> <li>Enable:</li> <li>security.enableEthernetLogin=true</li> <li>enableEthernetLogin=true</li> <li>Disable: <ul> <li>security.enableEthernetLogin=false</li> <li>enableEthernetLogin=false</li> </ul> </li> </ul>
Web Interface window	<ul> <li>Enable Ethernet Login</li> <li>1. Click the Enable Ethernet Login list box arrow and select False to disable SSH logins.</li> <li>2. Click the Update button to save the change.</li> <li>Note: By default, the Enable Ethernet Login is enabled (set to True). See the Security window (on page 426) for parameter location.</li> </ul>
Default Setting	True
Options	<ul><li>True</li><li>False</li></ul>
Description	<ul> <li>The security.enableEthernetLogin parameter enables SSH logins.</li> <li>When Disabled, the device no longer responds to SSH connection requests.</li> <li>This parameter also disables any SSH-based services, such as SCP.</li> <li>Important!: This parameter does NOT affect website logins.</li> <li>This parameter requires a reboot to apply the changes, either by executing the config.reset=now CLI command or power cycling the Z9-PC or Z9-PC-SR001.</li> <li>See Reset (on page 233) for additional information.</li> </ul>

#### 28.2. Ethernet PTP Interface

Ethernet PTP Interface	
Setting	Description
CLI / Web Page	[Page=security]

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Ethernet PTP Interface		
Setting	Description	
CLI Command	<ul> <li>Enable:</li> <li>security.enablePtpInterface=true</li> <li>enablePtpInterface=true</li> <li>Disable: <ul> <li>security.enablePtpInterface=false</li> <li>enablePtpInterface=false</li> </ul> </li> </ul>	
Web Interface window	<ul> <li>Ethernet PTP Interface</li> <li>1. Click the Ethernet PTP Interface list box arrow and select False to disable the PTP (drag-and-drop) interface.</li> <li>2. Click the Update button to save the change.</li> <li>Note: By default, the Ethernet PTP Interface is enabled (set to True). See the Security window (on page 426) for parameter location.</li> </ul>	
Default Setting	True	
Options	<ul><li>True</li><li>False</li></ul>	
Description	The security.enablePtpInterface parameter enables the PTP (drag-and-drop) interface. When Disabled, the Z9-PC or Z9-PC-SR001 no longer appears in Windows® File Explorer as <serialnumber> when connected to a computer using the Micro-USB cable. Note: Where is the name of the Z9-PC or Z9-PC-SR001. Important!: The security.enablePtpInterface setting does NOT disable serial connections through the Micro-USB cable. This parameter requires a reboot to apply the changes, either by executing the config.reset=now CLI command or power cycling the Z9-PC or Z9-PC-SR001. See Reset (on page 233) for additional information</serialnumber>	

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## **29. Services Parameters**

Note: See the Services window (on page 428).

#### Time Out CLI (on page 339)

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The parameter syntax is: page.parameter=value.

Parameters with unique names can be specified as parameter=value.

**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).

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## 29.1. Time Out CLI

Time Out CLI	
Setting	Description
CLI / Web Page	[Page=services]
CLI Command	• services.timeOutCli=nnnn
	• timeOutCli=nnnn
	Note: Where nnnn is the number of seconds of idle time.
Web Interface	Time Out CLI
window	<ol> <li>In the <b>Time Out CLI</b> text box, enter the number of seconds of idle time before the CLI connection is closed.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the Services window (on page 428) for parameter location.
Default Setting	900
Options	<b>FREEWAVE Recommends</b> : Enter any number between 60 and 3600.
Description	The <b>services.timeOutCli</b> parameter designates the number of seconds of idle time before the CLI connection is closed.
	<b>Warning!</b> DO NOT enter 0 (zero). 0 disables the timeout.

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## **30. SNMP Parameters**

Note: See the SNMP window (on page 430).

RO Community Name (on page 341) RW Community Name (on page 341) SNMP User (on page 342) V1 Enabled (on page 343) V2C Enabled (on page 344) V3 Enabled (on page 345)



The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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#### 30.1. RO Community Name

RO Community Name		
Setting	Description	
CLI / Web Page	[Page=SNMP]	
CLI Command	<ul> <li>snmp.roCommunityName=enter_unique_name_here</li> <li>roCommunityName=enter_unique_name_here</li> <li>Note: Where enter_unique_name_here is a user-designated name.</li> </ul>	
Web Interface window	<ul> <li>RO Community Name</li> <li>1. In the RO Community Name text box, enter the user-designated name for SNMP V1/V2C Read-only access.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the SNMP window (on page 430) for parameter location.</li> </ul>	
Default Setting	public	
Options	Maximum of 31 characters.	
Description	The snmp.roCommunityName parameter designates the user-defined name for SNMP V1/V2C read-only access. Important!: Special characters are allowed EXCEPT # but they may not be compatible with 3rd-party SNMP managers.	

#### 30.2. RW Community Name

RW Community Name	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	<ul><li>snmp.rwCommunityName=enter_unique_name_here</li><li>rwCommunityName=enter_unique_name_here</li></ul>
	Note: Where enter_unique_name_here is a user-designated name.

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RW Community Name	
Setting	Description
Web Interface window	<ul> <li>RW Community Name</li> <li>1. In the <b>RW Community Name</b> text box, enter the user-designated name for SNMP V1/V2C Read-Write access.</li> <li>2. Click the <b>Update</b> button to save the change.</li> <li><b>Note</b>: See the SNMP window (on page 430) for parameter location.</li> </ul>
Default Setting	private
Options	Maximum of 31 characters.
Description	The snmp.rwCommunityName parameter designates the user-defined name for SNMP V1/V2C read-write access. Important!: Special characters are allowed EXCEPT # but they may not be compatible with 3rd-party SNMP managers.

#### 30.3. SNMP User

SNMP User	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	<ul> <li>Add User**:</li> <li>snmpUser=add <username></username></li> </ul>
	<b>Example</b> : snmpUser=add <username> <readonly or<br="">ReadWrite&gt; <md5 or="" sha=""> <authentication passphrase=""> <aes des="" or=""> <encryption passphrase=""></encryption></aes></authentication></md5></readonly></username>
	<ul> <li>Modify User**:</li> <li>snmpUser=modify <username></username></li> </ul>
	<b>Example</b> : snmpUser modify <username> <readonly or<br="">ReadWrite&gt; <md5 or="" sha=""> <authentication passphrase=""></authentication></md5></readonly></username>

?assphrase> <AES or DES> <Encryption Passphrase> Remove User:

#### snmpUser=remove <username>

#### • View All Users:

#### snmpUser=show

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SNMP User	
Setting	Description
Web Interface window	SNMP User         Note: This parameter is read-only in the Web Interface.         See the SNMP window (on page 430) for parameter location.
Default Setting	Blank
Options	<ul> <li>Add User</li> <li>Modify User</li> <li>Remove User</li> <li>View All Users</li> </ul>
	Note: **Add or Modify access authorization options are:
	<ul> <li><aes> <encryption passphrase=""></encryption></aes></li> <li><des> <encryption passphrase=""></encryption></des></li> </ul>
	<ul> <li></li> <li></li></ul>
	<ul> <li><readonly></readonly></li> <li><readwrite></readwrite></li> </ul>
	<ul> <li><sha> <authentication passphrase=""></authentication></sha></li> </ul>
Description	The snmp.snmpUser parameter manages the SNMP V3 users.  Example: snmpUser=add <username> <aes> <encryption passphrase="">. snmpUser=modify <username> <readwrite>  Important!: The Passphrase requires a minimum of 8 characters.</readwrite></username></encryption></aes></username>

#### 30.4. V1 Enabled

V1 Enabled	
Setting	Description
CLI / Web Page	[Page=SNMP]

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V1 Enabled	
Setting	Description
CLI Command	Enable SNMP V1:
	• snmp.vlEnabled=true
	• v1Enabled=true
	Disable SNMP V1:
	• snmp.vlEnabled=false
	• v1Enabled=false
Web Interface window	<ul> <li>V1 Enabled</li> <li>1. Click the V1 Enabled list box arrow and select True to enable SNMP V1.</li> <li>2. Click the Update button to save the change.</li> <li>Note: See the SNMP window (on page 430) for parameter location.</li> </ul>
Default Setting	False
Options	False
Description	The snmp.v1Enabled parameter enables SNMP V1.         Important!: For security, the protocol SNMP v1 is read-only.

#### 30.5. V2C Enabled

V2C Enabled	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	Enable SNMP V2C:
	<ul> <li>snmp.v2cEnabled=true</li> </ul>
	• v2cEnabled=true
	Disable SNMP V2C:
	<ul> <li>snmp.v2cEnabled=false</li> </ul>
	• v2cEnabled=false
Web Interface	V2C Enabled
window	<ol> <li>Click the V2C Enabled list box arrow and select True to enable SNMP V2C.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	<b>Note</b> : By default, the <b>v2c Enabled</b> is NOT enabled (set to False). See the SNMP window (on page 430) for parameter location.

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V2C Enabled	
Setting	Description
Default Setting	False
Options	• True
	• False
Description	The snmp.v2cEnabled parameter enables SNMP V2C.

#### 30.6. V3 Enabled

V3 Enabled	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	Enable SNMP V3:
	<ul> <li>snmp.v3Enabled=true</li> </ul>
	• v3Enabled=true
	Disable SNMP V3:
	<ul> <li>snmp.v3Enabled=false</li> </ul>
	• v3Enabled=false
Web Interface window	<ul> <li>V3 Enabled</li> <li>1. Click the V3 Enabled list box arrow and select True to enable SNMP V3.</li> <li>2. Click the Update button to save the change.</li> <li>Note: By default, the v3 Enabled is NOT enabled (set to False). See the SNMP window (on page 430) for parameter location.</li> </ul>
Default Setting	False
Options	<ul><li>True</li><li>False</li></ul>
Description	The snmp.v3Enabled parameter enables SNMP V3.

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# **31. System Parameters**

**Important!**: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.

```
dump (on page 347)
dumpFormat (on page 347)
dumpPage (on page 348)
dumpTag (on page 349)
filter (on page 349)
help (on page 349)
login (on page 350)
```

```
logout (on page 350)
pages (on page 351)
password (on page 351)
passwordRestoreDefaults (on page 352)
showLayout (on page 352)
tags (on page 353)
whoami (on page 353)
```

The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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## 31.1. dump

dump	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	• system.dump
	• dump
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The <b>system.dump</b> command reports all of the device configuration and status values using the format specified in dumpFormat (on page 347).
	Note: This is a Read-only parameter.

## 31.2. dumpFormat

dumpFormat	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	• system.dumpFormat=Full
	• dumpFormat=Full
	• system.dumpFormat=Json
	• dumpFormat=Json
	<ul> <li>system.dumpFormat=Result</li> </ul>
	• dumpFormat=Result
	<ul> <li>system.dumpFormat=Short</li> </ul>
	• dumpFormat=Short
	<ul> <li>system.dumpFormat=Verbose</li> </ul>
	• dumpFormat=Verbose

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dumpFormat	
Setting	Description
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	Short
Options	N/A
Description	The <b>system.dumpFormat</b> parameter designates the format of the output of commands and setting changes.
	Notes
	<ul> <li>dumpFormat=Full - Shows each setting with its fully-qualified name and value (page.setting=value).</li> </ul>
	<ul> <li>dumpFormat=Json - Shows the output results in JavaScript Object Notation (Json).</li> </ul>
	<ul> <li>dumpFormat=Result - This setting is identical to dumpFormat=Full.</li> </ul>
	<ul> <li>dumpFormat=Short - Shows the page name in a header row, then each setting indented with its value.</li> </ul>
	<ul> <li>dumpFormat=Verbose</li> <li>This setting shows:</li> </ul>
	<ul> <li>The fully-quailifed name and value (the same as the dumpFormat=Full).</li> </ul>
	<ul> <li>The header row (the same as the dumpFormat=Short).</li> </ul>

#### 31.3. dumpPage

dumpPage	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul> <li>system.dumpPage=enter_page_name_here</li> </ul>
	<ul> <li>dumpPage=enter_page_name_here</li> </ul>
	Note: Where enter_page_name_here is a CLI page.
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	N/A

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dumpPage	
Setting	Description
Description	The <b>system.dumpPage</b> command reports all device configuration and status values for the specified page, using the format specified in dumpFormat (on page 347).
	<b>Example</b> : Enter dumpPage=SNMP to show the SNMP settings.
	Note: This is a Read-only parameter.

#### 31.4. dumpTag

Important!: FreeWave internal use only.

#### 31.5. filter

Important!: FreeWave internal use only.

#### 31.6. help

#### help

-	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul> <li>system.help</li> <li>help</li> <li>help <parameter></parameter></li> <li>to see help for a specific parameter</li> </ul>
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	N/A

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help	
Setting	Description
Description	The system.help command lists the help.txt file.
	Important!: Help information is only available for active parameters.
	<b>Example</b> : If the <b>ZumLink</b> is designated as a Gateway, the Help information for <b>radioSettings.nodeld</b> is NOT provided since the <b>nodeld</b> parameter cannot be changed.

## 31.7. login

password	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<pre>system.login=[username],[password]</pre>
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The system.login command logs the user into the Z9-PC or Z9-PC-SR001.

# 31.8. logout

logout	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul> <li>system.logout</li> <li>logout</li> </ul>
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A

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logout	
Setting	Description
Options	N/A
Description	The logout command logs out of the CLI session.

#### 31.9. pages

pages	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul><li>system.pages</li><li>pages</li></ul>
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The <b>system.pages</b> command lists all of the pages of settings and commands in the Z9-PC or Z9-PC-SR001.

### 31.10. password

password	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<pre>system.password=[oldpassword], [newpassword], [newpassword]</pre>
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	N/A

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password	
Setting	Description
Description	The system.password parameter designates the password.
	Important!: Must be logged in to the Z9-PC or Z9-PC-SR001.
	Example: <pre>system.password=admin,12345,12345</pre> .
	<b>Note</b> : An error message appears when there is an error in typing the new password command.

## 31.11. passwordRestoreDefaults

passwordRestoreDefaults	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	<ul> <li>system.passwordRestoreDefaults</li> </ul>
	<ul> <li>passwordRestoreDefaults</li> </ul>
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.
Default Setting	N/A
Options	Now
Description	The <b>system.passwordRestoreDefaults</b> command resets both the <b>admin</b> and <b>devuser</b> account passwords to factory defaults.
	<ul> <li>After executing this command, the Z9-PC or Z9-PC-SR001 must be rebooted by either:</li> </ul>
	<ul> <li>executing the reset now command (see Reset (on page 233)) or</li> </ul>
	<ul> <li>power-cycling the Z9-PC or Z9-PC-SR001.</li> </ul>

#### 31.12. showLayout

**Important!**: FreeWave internal use only.

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#### 31.13. tags

Important!: FreeWave internal use only.

#### 31.14. whoami

whoami		
Setting	Description	
CLI / Web Page	[Page=system]	
CLI Command	• system.whoami	
	• whoami	
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access.	
Default Setting	N/A	
Options	N/A	
Description	The system.whoami command reports the user currently logged in.	
	Note: This is a Read-only parameter.	

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# 32. System Info Parameters

Note: See the System Info window (on page 432).

Device Configuration (on page 355) Device Firmware Version (on page 355) Device ID (on page 356) Device Model (on page 356) Device Name (on page 357) Hop Table Version (on page 357) Layout Hash (on page 358) Licenses (on page 358) Model Code (on page 359) Radio Firmware Version (on page 359) Radio Model (on page 360) Radio Model Code (on page 360) Radio Serial Number (on page 361) Reset Info (on page 361) Rte Template Version (on page 362) Rte Version (on page 363) Theme Version (on page 363)

The parameter syntax is: page.parameter=value.

Parameters with unique names can be specified as parameter=value.

**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).

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#### **32.1. Device Configuration**

Device Configuration		
Setting	Description	
CLI / Web Page	[Page=systemInfo]	
CLI Command	• systemInfo.deviceConfiguration	
	• deviceConfiguration	
Web Interface window	Device Configuration	
	<b>Note</b> : This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The <b>systemInfo.deviceConfiguration</b> command reports the device configuration of the Z9-PC or Z9-PC-SR001.	
	Note: This is a Read-only parameter.	

#### 32.2. Device Firmware Version

Device Firmware Version	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul> <li>systemInfo.deviceFirmwareVersion</li> </ul>
	• deviceFirmwareVersion
Web Interface window	Device Firmware Version
	<b>Note</b> : This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>systemInfo.deviceFirmwareVersion</b> command reports the device firmware version of the Z9-PC or Z9-PC-SR001.
	Note: For the IQ Application Environment, see Verify Activation.
	Note: This is a Read-only parameter.

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## 32.3. Device ID

Device ID	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul> <li>systemInfo.deviceId=nnnn</li> <li>deviceId</li> <li>Note: Where nnnn is a user-designated device ID.</li> </ul>
Web Interface window	Device ID Note: This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	1
Options	N/A
Description	The <b>systemInfo.deviceId</b> parameter designates the Device Identifier selected for the Z9-PC or Z9-PC-SR001.

#### 32.4. Device Model

Device Model	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.deviceModel
	• deviceModel
Web Interface window	Device Model
	<b>Note</b> : This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.deviceModeI command reports the device model.
	Note: This is a Read-only parameter.

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#### 32.5. Device Name

Device Name	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.deviceName=nnnn
	• deviceName=nnnn
	Note: Where nnnn is the user-defined name for the Z9-PC or Z9-PC-SR001.
Web Interface	Device Name
window	<ol> <li>In the <b>Device Name</b> text box, enter the user-defined name for the Z9-PC or Z9-PC-SR001.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	Note: See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>systemInfo.deviceName</b> parameter designates the user-defined name for the Z9-PC or Z9-PC-SR001.

#### 32.6. Hop Table Version

Hop Table Version	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul> <li>systemInfo.hopTableVersion</li> </ul>
	• hopTableVersion
Web Interface window	Hop Table Version
	<b>Note</b> : This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>systemInfo.hopTableVersion</b> command reports the radio Hop Table Version of the Z9-PC or Z9-PC-SR001.
	Note: This is a Read-only parameter.

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## 32.7. Layout Hash

Layout Hash	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul><li>systemInfo.layoutHash</li><li>layoutHash</li></ul>
Web Interface window	Layout Hash           Note: This parameter is read-only in the Web Interface.           See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.IayoutHash command reports the Unique Layout Identifier.           Note: This is a Read-only parameter.

## 32.8. Licenses

Licenses	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.licenses
	• licenses
Web Interface	Licenses
window	<b>Note</b> : This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	None
Options	N/A
Description	The systemInfo.licenses command reports all of the license information.
	Note: For the IQ Application Environment, see Verify Activation.
	Note: This is a Read-only parameter.

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## 32.9. Model Code

Model Code	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.modelCode
	• modelCode
Web Interface window	Model Code
	<b>Note</b> : This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>systemInfo.modelCode</b> command reports the model code of the Z9-PC or Z9-PC-SR001.
	Note: This is a Read-only parameter.

#### 32.10. Radio Firmware Version

Radio Firmware Version	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul><li>systemInfo.radioFirmwareVersion</li><li>radioFirmwareVersion</li></ul>
Web Interface window	Radio Firmware Version         Note: This parameter is read-only in the Web Interface.         See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.radioFirmwareVersion command reports the radio firmware version of the Z9-PC or Z9-PC-SR001.         Note: This is a Read-only parameter.

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#### 32.11. Radio Model

Radio Model	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.radioModel
	• radioModel
Web Interface window	Radio Model
	<b>Note</b> : This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	AMT0100AA
Options	N/A
Description	The <b>systemInfo.radioModel</b> command reports the radio model of the Z9-PC or Z9-PC-SR001.
	Note: This is a Read-only parameter.

## 32.12. Radio Model Code

Radio Model Code	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul><li>systemInfo.radioModelCode</li><li>radioModelCode</li></ul>
Web Interface window	Radio Model Code         Note: This parameter is read-only in the Web Interface.         See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>systemInfo.radioModelCode</b> command reports the radio model code of the Z9-PC or Z9-PC-SR001.           Note: This is a Read-only parameter.

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### 32.13. Radio Serial Number

Radio Serial Number	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.radioSerialNumber
	• radioSerialNumber
Web Interface window	Radio Serial Number
	<b>Note</b> : This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>systemInfo.radioSerialNumber</b> command reports the radio serial number of the Z9-PC or Z9-PC-SR001.
	Note: This is a Read-only parameter.

## 32.14. Reset Info

Reset Info	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul><li>systemInfo.resetInfo</li><li>resetInfo</li></ul>
Web Interface window	Reset Info Note: This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>systemInfo.resetInfo</b> parameter commands the radio to reset the information.

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## 32.15. Rte Template Version

Rte Template Version	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systeminfo.rteTemplateVersion
	• rteTemplateVersion
Web Interface	Rte Template Version
window	<b>Note</b> : This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The <b>systeminfo.rteTemplateVersion</b> command reports the version number for the IQ environment template.
	Notes
	<ul> <li>This is the IQ environment applied when executing the <pre>rteReset=hard</pre> command.</li></ul>
	See Rte Reset (on page 332) for additional information.
	<ul> <li>For the IQ Application Environment, see Verify Activation.</li> </ul>
	This is a Read-only parameter.

### 32.16. Rte Version

Rte Version	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systeminfo.rteVersion
	• rteVersion
Web Interface window	Rte Version         Note: This parameter is read-only in the Web Interface.         See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A

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Rte Version	
Setting	Description
Description	The <b>systeminfo.rteVersion</b> command reports the version number for the active IQ environment.
	<b>Note</b> : If this setting is blank, the application environment has not been initialized. For the <b>IQ Application Environment</b> , see Verify Activation.
	Note: This is a Read-only parameter.

### 32.17. Serial Number

Serial Number	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul><li>systemInfo.serialNumber</li><li>serialNumber</li></ul>
Web Interface window	Serial Number         Note: This parameter is read-only in the Web Interface.         See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.serialNumber command reports the serial number of the Z9-PC or Z9-PC-SR001.           Note: This is a Read-only parameter.

## 32.18. Theme Version

Theme Version	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	<ul><li>systemInfo.themeVersion</li><li>themeVersion</li></ul>

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Theme Version	
Setting	Description
Web Interface window	Theme Version
	<b>Note</b> : This parameter is read-only in the Web Interface. See the System Info window (on page 432) for parameter location.
Default Setting	N/A
Options	N/A
Description	<b>Note</b> : FreeWave internal use only. This is a Read-only parameter.

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# **33. Terminal Server Relay Parameters**

Note: See the Terminal Server Relay window (on page 434).

Remote Termserv IP Address (on page 366) Termserv Relay Mapping (on page 366)

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The parameter syntax is: page.parameter=value. Parameters with unique names can be specified as parameter=value.

**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).

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Remote Termserv IP Address	
Setting	Description
CLI / Web Page	[Page=TerminalServerRelay]
CLI Command	<ul> <li>TerminalServerRelay.remote_termserv_ip_ address=nnn.nnn.nnn</li> <li>remote_termserv_ip_address=nnn.nnn.nnn</li> <li>Note: Where nnn.nnn.nnn is the IP address for the remote terminal server.</li> </ul>
Web Interface window	<ul> <li>Remote Termserv IP Address</li> <li>1. In the Remote Termserv IP Address text box, enter the IP address for the remote terminal server.</li> <li>2. Click the Update button to save the change.</li> <li>3. Restart the Z9-PC or Z9-PC-SR001 for the changes to be implemented.</li> <li>Note: See the Terminal Server Relay window (on page 434) for parameter location.</li> </ul>
Default Setting	0.0.0.0
Options	N/A
Description	<ul> <li>The TerminalServerRelay.remote_termserv_ip_address= parameter designates the IP address of the remote terminal server.</li> <li>The TerminalServerRelay.remote_termserv_ip_ address=nnn.nnn.nnn changes the IP address of the remote terminal server.</li> </ul>

### 33.1. Remote Termserv IP Address

## **33.2. Termserv Relay Mapping**

#### **Termserv Relay Mapping**

, , , , , , , , , , , , , , , , , , ,	
Setting	Description
CLI / Web Page	[Page=TerminalServerRelay]

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Termserv Relay Mapping	
Setting	Description
CLI Command	• TerminalServerRelay.termserv_relay_mapping=TERMSERV_ RELAY_DISABLED
	<ul> <li>termserv_relay_mapping=TERMSERV_RELAY_DISABLED</li> </ul>
	<ul> <li>TerminalServerRelay.termserv_relay_mapping=LOCAL_BOTH_ COM_TO_REMOTE_BOTH_COM</li> </ul>
	<ul> <li>termserv_relay_mapping=LOCAL_BOTH_COM_TO_REMOTE_BOTH_ COM</li> </ul>
	<ul> <li>TerminalServerRelay.termserv_relay_mapping=LOCAL_COM1_ TO_REMOTE_COM1</li> </ul>
	<ul> <li>termserv_relay_mapping=LOCAL_COM1_TO_REMOTE_COM1</li> </ul>
	<ul> <li>TerminalServerRelay.termserv_relay_mapping=LOCAL_COM2_ TO_REMOTE_COM2</li> </ul>
	<ul> <li>termserv_relay_mapping=LOCAL_COM2_TO_REMOTE_COM2</li> </ul>
	<ul> <li>TerminalServerRelay.termserv_relay_mapping=LOCAL_BOTH_ COM_TO_REMOTE_COM1</li> </ul>
	<ul> <li>termserv_relay_mapping=LOCAL_BOTH_COM_TO_REMOTE_COM1</li> </ul>
	<ul> <li>TerminalServerRelay.termserv_relay_mapping=LOCAL_BOTH_ COM_TO_REMOTE_COM2</li> </ul>
	<ul> <li>termserv_relay_mapping=LOCAL_BOTH_COM_TO_REMOTE_COM2</li> </ul>
	<ul> <li>TerminalServerRelay.termserv_relay_mapping=LOCAL_COM1_ TO_REMOTE_BOTH_COM</li> </ul>
	<ul> <li>termserv_relay_mapping=LOCAL_COM1_TO_REMOTE_BOTH_COM</li> </ul>
	<ul> <li>TerminalServerRelay.termserv_relay_mapping=LOCAL_COM2_ TO_REMOTE_BOTH_COM</li> </ul>
	<ul> <li>termserv_relay_mapping=LOCAL_COM2_TO_REMOTE_BOTH_COM</li> </ul>
Web Interface	Termserv Relay Mapping
window	<ol> <li>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.</li> </ol>
	2. Click the <b>Update</b> button to save the change.
	3. Restart the Z9-PC or Z9-PC-SR001 for the changes to be implemented.
	<b>Note</b> : See the Terminal Server Relay window (on page 434) for parameter location.
Default Setting	TERMSERV_RELAY_DISABLED

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Termserv Relay Mapping		
Setting	Description	
Options	TERMSERV_RELAY_DISABLED	
	<ul> <li>Data forwarding between local and remote COM ports is disabled.</li> </ul>	
	<ul> <li>LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM (on page 373).</li> </ul>	
	<ul> <li>Data is forwarded between the local COM1 and remote COM1 ports.</li> </ul>	
	Data is forwarded between the local COM2 and remote COM2 ports.	
	<ul> <li>LOCAL_COM1_TO_REMOTE_COM1 (on page 374).</li> </ul>	
	<ul> <li>Data is forwarded between the local COM1 and remote COM1 ports.</li> </ul>	
	LOCAL_COM2_TO_REMOTE_COM2 (on page 375).	
	<ul> <li>Data is forwarded between the local COM2 and remote COM2 ports.</li> </ul>	
	<ul> <li>LOCAL_BOTH_COM_TO_REMOTE_COM1 (on page 376).</li> </ul>	
	<ul> <li>Data is forwarded between the local COM1 and remote COM1 ports.</li> </ul>	
	<ul> <li>Data is forwarded between the local COM2 and remote COM1 ports.</li> </ul>	
	<ul> <li>LOCAL_BOTH_COM_TO_REMOTE_COM2 (on page 377).</li> </ul>	
	<ul> <li>Data is forwarded between the local COM1 and remote COM2 ports.</li> </ul>	
	<ul> <li>Data is forwarded between the local COM2 and remote COM2 ports.</li> </ul>	
	<ul> <li>LOCAL_COM1_TO_REMOTE_BOTH_COM (on page 378).</li> </ul>	
	<ul> <li>Data is forwarded between the local COM1 and remote COM1 ports.</li> </ul>	
	<ul> <li>Data is forwarded between the local COM1 and remote COM2 ports.</li> </ul>	
	LOCAL_COM2_TO_REMOTE_BOTH_COM (on page 379).	
	<ul> <li>Data is forwarded between the local COM2 and remote COM1 ports.</li> </ul>	
	<ul> <li>Data is forwarded between the local COM2 and remote COM2 ports.</li> </ul>	

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I ermserv Relay	y Mapping
Setting	Description
Description	The <b>TerminalServerRelay.termserv_relay_mapping</b> parameter is used to transfer a bi-directional byte stream between two serial device servers.
	Important!: If using Terminal Server Relay Parameters (on page 365),the TCP port numbers designated in the Terminal Server Port (on page 228) MUST BE be consistent across all involved radios.
	<b>FREEWAVE Recommends</b> : If using the Terminal Server Port parameter, keep the TCP port numbers as their defaults.
	Notes
	<ul> <li>The data relay is only supported between the terminal server on this Z9-PC or Z9-PC-SR001 radio and the terminal server on a separate Z9-PC or Z9-PC- SR001 radio in the same IP network.</li> <li>See Terminal Server Relay Examples (on page 370).</li> </ul>
	• For the relay function to operate, COM1 must be assigned to port 5041 and and COM2 must be assigned to port 5042 on both the local and remote terminal servers.
	• The TerminalServerRelay.termserv_relay_mapping should only be enabled on one side of the connection.
	<ul> <li>When the Termserv Relay Mapping (on page 366) parameter is designated and the Flow Control (on page 222) parameter is set to Hardware, the COM port's flow control does not function.</li> </ul>

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# 34. Terminal Server Relay Examples

- Connected Terminal Servers and Terminal Server Relay (on page 371)
- LOCAL\_BOTH\_COM\_TO\_REMOTE\_BOTH\_COM (on page 373)
- LOCAL\_COM1\_TO\_REMOTE\_COM1 (on page 374)
- LOCAL\_COM2\_TO\_REMOTE\_COM2 (on page 375)
- LOCAL\_BOTH\_COM\_TO\_REMOTE\_COM1 (on page 376)
- LOCAL\_BOTH\_COM\_TO\_REMOTE\_COM2 (on page 377)
- LOCAL\_COM1\_TO\_REMOTE\_BOTH\_COM (on page 378)
- LOCAL\_COM2\_TO\_REMOTE\_BOTH\_COM (on page 379)
- Example: Multicast (on page 380)

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### 34.1. Connected Terminal Servers and Terminal Server Relay

Figure 236 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.

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Figure 236: Terminal Servers and Terminal Server Relay (Client) Connected Together through the Bridge

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## 34.2. LOCAL\_BOTH\_COM\_TO\_REMOTE\_BOTH\_COM

Figure 237 illustrates the Terminal Server Relay command: LOCAL BOTH COM TO REMOTE BOTH COM.

- Data is forwarded between the local COM1 and remote COM1 ports.
- Data is forwarded between the local COM2 and remote COM2 ports.



Figure 237: Terminal Server Relay command: LOCAL BOTH COM TO REMOTE BOTH COM

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## 34.3. LOCAL\_COM1\_TO\_REMOTE\_COM1

Figure 238 illustrates the Terminal Server Relay command: LOCAL COM1 TO REMOTE COM1.

• Data is forwarded between the local COM1 and remote COM1 ports.



Figure 238: Terminal Server Relay command: LOCAL COM1 TO REMOTE COM1

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## 34.4. LOCAL\_COM2\_TO\_REMOTE\_COM2

Figure 239 illustrates the Terminal Server Relay command: LOCAL COM2 TO REMOTE COM2.

• Data is forwarded between the local COM2 and remote COM2 ports.



Figure 239: Terminal Server Relay command: LOCAL COM2 TO REMOTE COM2

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## 34.5. LOCAL\_BOTH\_COM\_TO\_REMOTE\_COM1

Figure 240 illustrates the Terminal Server Relay command: **LOCAL BOTH COM TO REMOTE COM1**.

- Data is forwarded between the local COM1 and remote COM1 ports.
- Data is forwarded between the local COM2 and remote COM1 ports.



Figure 240: Terminal Server Relay command: LOCAL BOTH COM TO REMOTE COM1

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## 34.6. LOCAL\_BOTH\_COM\_TO\_REMOTE\_COM2

Figure 241 illustrates the Terminal Server Relay command: **LOCAL BOTH COM TO REMOTE COM2**.

- Data is forwarded between the local COM1 and remote COM2 ports.
- Data is forwarded between the local COM2 and remote COM2 ports.



Figure 241: Terminal Server Relay command: LOCAL BOTH COM TO REMOTE COM2

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## 34.7. LOCAL\_COM1\_TO\_REMOTE\_BOTH\_COM

Figure 242 illustrates the Terminal Server Relay command: LOCAL COM1 TO REMOTE BOTH COM.

- Data is forwarded between the local COM1 and remote COM1 ports.
- Data is forwarded between the local COM1 and remote COM2 ports.



Figure 242: Terminal Server Relay command: LOCAL COM1 TO REMOTE BOTH COM

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## 34.8. LOCAL\_COM2\_TO\_REMOTE\_BOTH\_COM

Figure 243 illustrates the Terminal Server Relay command: LOCAL COM2 TO REMOTE BOTH COM.

- Data is forwarded between the local COM2 and remote COM1 ports.
- Data is forwarded between the local COM2 and remote COM2 ports.



Figure 243: Terminal Server Relay command: LOCAL COM2 TO REMOTE BOTH COM

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### 34.9. Example: Multicast



Figure 244: Example: Multicast

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# 35. Web Interface

The available windows are:

- COM window (on page 382)
- Config window (on page 384)
- Data Path window (on page 386)
- Date window (on page 388)
- Encryption window (on page 390)
- File Upload window (on page 392)
- Help window (on page 394)
- Home window (on page 396)
- Io Ex Com window (on page 397)
- Local Diagnostics window (on page 399)
- Modbus window (on page 401)
- Network window (on page 403)

- Network Diagnostics window (on page 405)
- Network Stats window (on page 410)
- NTP window (on page 412)
- Radio Settings window Endpoint (on page 414)
- Radio Settings Helpers window (on page 422)
- Runtime Environment window (on page 424)
- Security window (on page 426)
- Services window (on page 428)
- SNMP window (on page 430)
- System Info window (on page 432)
- Terminal Server Relay window (on page 434)
- User Data Drag and Drop window (on page 436)

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### 35.1. COM window

The **COM** windows are used to read and change information about the communication settings of the Z9-PC or Z9-PC-SR001.

Note: See the COM Parameters (on page 217) for detailed information about the parameters.

### Access and Window Description

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 245



#### Figure 245: Configuration 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.

5. Click either the **COM1** or **COM2** tab to access their respective COM parameters. Figure 246 or Figure 247

**Note**: The parameters for **COM1** and **COM2** are the same except for the Terminal Server Port (on page 228) parameter setting.

See the COM Parameters (on page 217) for detailed information about the parameters.

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Figure 247: COM2 window

6. Optional: On the **Menu** list, click the **Configuration** link to Change the COM Parameters (on page 115).

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### 35.2. Config window

The Config window is used to reset the radio, restore factory defaults, view IQ license status.

Note: See the Config Parameters (on page 231) for detailed information about the parameters.

#### **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the System Info link. Figure 248



Figure 248: 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 to access the **Config** parameters. Figure 249

Important!: The information in this window is read-only. The parameters in this window can only be changed in the CLI. See the Access the CLI and Change the IP Address and nodeld (on page 61) procedure for CLI access. See the Config Parameters (on page 231) for detailed information about the parameters.

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System Info	Radio Set	tings	Radio Settir	ngs Helpers	Encryption	Date	a Path	Local Diagn	ostics	Config	Service	es Netv	vork	
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Figure 249: Config window

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### 35.3. Data Path window

The Data Path window is used to define more advanced data path features.

Note: See the Data Path Parameters (on page 235) for detailed information about the parameters.

### **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 250



Figure 250: Configuration 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 to access the Data Path parameters. Figure 251

**Note**: The information in this window is read-only. See the Data Path Parameters (on page 235) for detailed information about the parameters.

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REEWAVE	System Info	Radio Set	ttings	Radio Settin	ngs Helpers	Encryption	Data	Path	Local Diagnos	tics	Config	Services	Netw	ork	
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### Figure 251: Data Path window

7. Optional: On the **Menu** list, click the **Configuration** link to Change the Data Path Parameters (on page 118).

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### 35.4. Date window

The Date window is used to view the Z9-PC or Z9-PC-SR001 operation and application uptime.

Note: See the Date Parameters (on page 244) for detailed information about the parameters.

#### **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 252



Figure 252: Configuration 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 to access the **Date** parameters. Figure 253

**Note**: The information in this window is read-only. See the Date Parameters (on page 244) for detailed information about the parameters.

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Figure 253: Date window

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### **35.5. Encryption window**

The **Encryption** window is used to enable or disable encryption on the Z9-PC or Z9-PC-SR001.

Note: See the Encryption Parameters (on page 249) for detailed information about the parameters.

### **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 254



Figure 254: Configuration 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 to access the Encryption parameters. Figure 255

**Note**: See the Encryption Parameters (on page 249) for detailed information about the parameters.

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Key16 Key has not been set.					Key1	Key has not be	en set.											
					Key1	Key has not be	ien set.											

Figure 255: Encryption window

7. Optional: On the **Menu** list, click the **Configuration** link to Change the Encryption Parameters (on page 120).

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### 35.6. File Upload window

The **File Upload** window is used to search for and upload these file types into the Z9-PC or 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 and/or Windows® 10 and Firefox®.

- 1. Verify the Setup the Computer IP Address Configuration procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the File Upload link. Figure 256



Figure 256: 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 257

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

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FREEWAVE & ZumLink	Upload File				]
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User Data File Upload	Browse No file selected.				
Configuration	Send Cancel				J
OLogout					

#### Figure 257: File Upload window

6. Optional: Complete the Firmware Update (on page 29) for the Z9-PC or Z9-PC-SR001.

The opioad white	
Control Title	Control Description
Browse button	Click to open the Microsoft® File Upload dialog box.
	Note: The Browse button title is dependent on the chosen browser.
Send button	Click to start the update process on the Z9-PC or Z9-PC-SR001.
Cancel button	Click to cancel the file transfer if already started or refresh the window and clear the selected file.

#### File Upload window

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### 35.7. Help window

The Help window is used to read information about the settings of the Z9-PC or Z9-PC-SR001.

### Access and Window Description

- 1. Verify the Setup the Computer IP Address Configuration procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Help link. Figure 258



Figure 258: 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 259

Note: The information in this window is read-only.

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BUser Data File Upload System Info RConfiguration %Network Diagnostics %Help OLogout	<ul> <li>Toplays help information on CLI commands and settings.</li> <li>"Anlp" lists information for all settings and commands. To response is identical to the contents of the "alpicuts" file.</li> <li>"Anlp cappe&gt;" lists information for all settings and commands on the species page.</li> <li>"Anlp caprewisers" lists information for the specified setting or command.</li> <li>"Uppersection", "oppication for the specified setting or command.</li> <li>"Uppersection", "oppication for the specified setting or "stock your forbor, "endication" for Uppersection.</li> <li>"The page to the specified base of the specified setting or command.</li> <li>"Inter setting, "store the specified setting or construction", we stall reflections." File store of the specified setting or "stock your forbor, "topication" forbular the specified setting or the specified setting o</li></ul>		
	system.dump Dump "dump" seports all device configuration and status values, using the format specifies in the "dumpformat" estima. Typicem.dumpDage		

Figure 259: Help window

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### 35.8. Home window

The **Home** window is the default window that opens when the Web Interface is used. It is used to:

- View basic System information of the connected Z9-PC or Z9-PC-SR001.
- Provide links to other windows of the Z9-PC or Z9-PC-SR001.

### Access and Window Description

- 1. Open a web browser.
- 2. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Z9-PC or Z9-PC-SR001 Home window opens. Figure 260

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

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FREEVAVE	Serial Number 4026737941	
Tunel inte	Model Code 0	
	Radio Model AMT0100AA	
	Radio Model Code 0	
	Radio Firmware Version FWT1071TR.42	
Street Balance	Radio Serial Number 4026737941	
User Data	Device Name	
File Upload	Device Model 29-PC	
System Info	Device Configuration R1	
Configuration	Device Firmware Version FWT1122TB.66	
Network Diagnostics	Device ID 1	
®Help	Layout Hash 325426040	
●Logout	Reset Info	
	Hop Table Version SET0101HT	
	Rte Version FWT1112TP.55	
	Rte Template Version FWT1112TP.55	
	Licenses Custom Apps	
	Theme Version FWT1122TB.66	

#### Figure 260: Home (System Info) window

Note: The information in this window is read-only.

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# **35.9.** Io Ex Com window

The **ioExCom** window is used to designate the Modbus Device ID (on page 272) of the connected IOEX device that responds to during a Modbus TCP request over the network or a Modbus RTU request coming in via COM1 or COM2.

Note: See the IO Ex Com Parameters (on page 253) for detailed information about the parameters.

### **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 261



Figure 261: Configuration 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 lo Ex Com tab to access the lo Ex Com parameters. Figure 262

**Note**: See the IO Ex Com Parameters (on page 253) for detailed information about the parameters.

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<b>Q</b> ZumLink	Network Stats NTP Com1	Com2 Terminal Server Relay	Date SNMP Security Runt	ime Environment Modbus	Io Ex Com
	la Ex	Device ID 100	o Ex Com		
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Configuration Retwork Diagnostics					
Help     GLogout					

### Figure 262: Io Ex Com window

Note: The information in this window is read-only.

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# **35.10. Local Diagnostics window**

The **Local Diagnostics** window is used to view diagnostic info about the Z9-PC or Z9-PC-SR001.

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

## **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 263



#### Figure 263: Configuration 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 to access the Local Diagnostics parameters. Figure 264

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

7. Optional: On the **Menu** list, click the **Configuration** link to Change the Local Diagnostics - Monitored Node (on page 123).

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EEWAVE	System Info	Radio Se	ttings	Radio Sett	ings Helpers	Encryption	Data	Path	Local Diagna	ostics	Config	Servio	es Netv	work
umLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Run	time Enviro	nment	Modbus	lo Ex Cor
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Figure 264: Local Diagnostics window

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# 35.11. Modbus window

The Modbus window is used to view Modbus information about the Z9-PC or Z9-PC-SR001.

Note: See the Modbus Parameters (on page 271) for detailed information about the parameters.

## **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 265



Figure 265: Configuration 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 Modbus tab to access the Modbus parameters. Figure 266

**Note**: See the Modbus Parameters (on page 271) for detailed information about the parameters.

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FREEWAVE	System Info	Radio Setting	s Radio Sett	ings Helpers	Encryption	Data	Path	Local Diagno	stics	Config	Services	Netw	ork		
<b>Q</b> ZumLink	Network Stats	NTP C	om1 Com2	Terminal Se	erver Relay	Date	SNMP	Security	Run	time Enviror	nment	Modbus	lo Ex C	om	
BUser Data File Upload System Info RConfiguration Network Diagnostics Help	Update	м	Modbus Device II Modbus TC odbus Rtu Over TC	0 502 9 5021		Modbu	5								

#### Figure 266: Modbus window

- 7. Optional: On the **Menu** list, click the **Configuration** link to Change the Modbus Parameters (on page 125).
- 8. Optional:
  - a. On the **Menu** list, click the **System Info** link. The System Info window (on page 432) opens.
  - b. Click the Modbus tab. The Modbus window opens in Read-only mode to view the information for these parameters: 35.11
    - Modbus Layout (on page 272)
    - Read (on page 274)
    - Read Coils (on page 275)
    - Write (on page 276)
    - Write Coils (on page 277)

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# 35.12. Network window

The **Network** window is used to provide network information for the Z9-PC or Z9-PC-SR001.

Note: See the Network Parameters (on page 281) for detailed information about the parameters.

## **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 267



Figure 267: Configuration 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 to access the Network parameters. Figure 268

**Note**: See the Network Parameters (on page 281) for detailed information about the parameters.

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REEWAVE	System Info	Radio Se	ttings	Radio Sett	ings Helpers	Encryption	Date	a Path	Local Diagna	stics Conf	ig Servi	es Netw	ork	
<b>ZumLink</b>	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Runtime En	vironment	Modbus	lo Ex Com	
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Figure 268: Network window

7. Optional: On the **Menu** list, click the **Configuration** link to Change the Network Parameters (on page 127).

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# **35.13. 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. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Network Diagnostics link.



#### Figure 269: Network Diagnostics 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.

The Network Diagnostics window opens, scanning the network. Figure 270

The diagram takes a few moments to render.

The Options list box default selection is Margin.

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#### Figure 270: Network Diagnostics window - Scanning Network

The Link Margin connections appear in the Network Diagram.

Control Area	Control Title	Control Description
Options list box		Click the <b>Options</b> list box arrow and select a connections diagram option.
Options list box	Show Big Graph	Select the <b>Show Big Graph</b> option to view the <b>Network Diagram</b> in a large format.
Options list box	Show Table	In the <b>Options</b> list box, select the <b>Show Table</b> option to view the radio connection table of the selected device below the <b>Network Diagram</b> .
		<b>Note</b> : See Show Table in the Network Diagnostics Window (on page 165) to view network and device information in a table format.
Options list box	Save Image	Select the <b>Save Image</b> option to open the <b>Save Image</b> dialog box.
		<b>Note</b> : See Save a Network Diagram Image (on page 161) to save the Network Diagram as a <b>.PNG</b> file.
Options list box	Gateway IP	Select the <b>Gateway IP</b> option to open the <b>Add Device IP</b> dialog box and add a Gateway IP address.
		<b>Note</b> : See Add a Gateway Device IP Address (on page 152) for additional information.

Network Diagnostics window

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Network Diagnost	ics window	
Control Area	Control Title	Control Description
Options list box	Clear Display	Click <b>Clear Display</b> to erase the network diagram in the window.
		<b>Note</b> : In the <b>Options</b> list box, click <b>Refresh Network</b> <b>Diagnostics</b> to show the network in the window.
Options list box	Save Network	Select the Save Network Diagnostics option to open the Opening network_diag.json dialog box.
	Diagnostics	<b>Note</b> : See Save Network Diagnostics (on page 158) to save the current network performance reading for later review and to monitor network performance over time.
Options list box	Download Support	Select the <b>Download Support Bundle</b> option to open the <b>Opening support_bundle_nnn.zip</b> dialog box.
	Bunale	Note: Where nnn is the selected device in the Network Diagram.
		Use the <b>Opening support_bundle_nnn.zip</b> dialog box to save the current network performance reading to send to FreeWave Technical Support for faster issue resolution.
Options list box	Refresh Network Diagnostics	Select the <b>Refresh Network Diagnostics</b> option to updated the current network performance reading.
Options list box	Clear All Stats	Select the <b>Clear All Stats</b> option to reset the Local Diagnostics Parameters (on page 254), Network StatsParameters (on page 292), and <b>Network Diagnostics</b> .
Options list box	Clear Stats	Select the <b>Clear Stats</b> option to clear <b>only</b> the local diagnostics.
		Important!: This does NOT clear the Network StatsParameters (on page 292) or Network Diagnostics.

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Network Diagnost	cs window	
Control Area	Control Title	Control Description
Options list box	Margin	Click the <b>Options</b> list box arrow and select the <b>Margin</b> option to show the <b>Link Margin</b> connections in the <b>Network Diagram</b> .
		<b>Note</b> : See the View the Network Diagnostics - Margin (on page 173) for a diagram example.
Options list box	RSSI	Click the <b>Options</b> list box arrow and select the <b>RSSI</b> option to show the <b>RSSI</b> connections in the <b>Network Diagram</b> .
		<b>Note</b> : See View the Network Diagnostics - RSSI (on page 178) for a diagram example.
Options list box	Tx Rate	Click the <b>Options</b> list box arrow and select the <b>Tx Rate</b> option to show the <b>Tx Rate</b> connections in the <b>Network Diagram</b> .
		<b>Note</b> : See View the Network Diagnostics - Tx Rate (on page 185) for a diagram example.
Options list box	Rx Rate	Click the <b>Options</b> list box arrow and select the <b>Rx Rate</b> option to show the <b>Rx Rate</b> connections in the <b>Network Diagram</b> .
		<b>Note</b> : See View the Network Diagnostics - Rx Rate (on page 183) for a diagram example.
Options list box	Margin with Neighbors	Click the <b>Options</b> list box arrow and select the Margin with Neighbors option to show the Margin with Neighbors connections in the Network Diagram.
		<b>Note</b> : See View the Network Diagnostics - Margin with Neighbors (on page 175) for a diagram example.
Options list box	RSSI with Neighbors	Click the <b>Options</b> list box arrow and select the <b>RSSI with</b> <b>Neighbors</b> option to show the <b>RSSI with Neighbors</b> connections in the <b>Network Diagram</b> .
		<b>Note</b> : See View the Network Diagnostics - RSSI with Neighbors (on page 180) for a diagram example.

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Network Diagnosti	cs window	
Control Area	Control Title	Control Description
<b>Options</b> list box	Breadthfirst	Click the <b>Options</b> list box arrow and select the <b>Breadthfirst</b> option to show the <b>Breadthfirst</b> connections in the <b>Network Diagram</b> .
		Breadthfirst (on page 167) for a diagram example.
Options list box	Cose- bilkent	Click the <b>Options</b> list box arrow and select the <b>Cose-bilkent</b> option to show the <b>Cose-bilkent</b> connections in the <b>Network Diagram</b> .
		<b>Note</b> : See the View the Network Diagnostics - Cose- bilkent (on page 169) for a diagram example.
Options list box	Grid	Click the <b>Options</b> list box arrow and select the <b>Grid</b> option to show the <b>Grid</b> connections in the <b>Network Diagram</b> .
		<b>Note</b> : See the View the Network Diagnostics - Grid (on page 171) for a diagram example.
Options list box	Dagre	When <b>Dagre</b> is select, the network diagram shows possible loops in a complicated network.
		Note: By default, Dagre is selected.
Options list box	Paused	When <b>Paused</b> is selected, no updates or layout changes are made in the network diagram.
Options list box	Updating Layout	When <b>Updating Layout</b> is select, the node layouts are automatically set by the computer.
		Note: By default, Updating Layout is selected.

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# 35.14. Network Stats window

The **Network Stats** window is used to view received, dropped, or sent Ethernet packet information.

**Note**: See the Network StatsParameters (on page 292) for detailed information about the parameters.

## **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 271



#### Figure 271: Configuration 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 to access the Network Stats parameters. Figure 272

**Note**: The information in this window is read-only. See the Network StatsParameters (on page 292) for detailed information about the parameters.

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)⇒ଙଇ [୍	) 192.168.111.100/config/	networkStats										©	Ŷ			•
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<b>Q</b> ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Run	time Enviro	nment	Modbus	lo Ex	Com	
	ğ				9		letwork S	itots	11							
Liser Data				RX Packets	0				_							
File Upload				RX Dropped	0											
System Info				RX Errors	0											
Configuration				TX Byte:	17996											
Network Diggnostics				TX Packets	329											
Helo				TX Dropped	10											
	-			TX Errors	: 10											

Figure 272: Network Stats window

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# 35.15. NTP window

The NTP window is used to designate the date and time used on the Z9-PC or Z9-PC-SR001.

Note: See the NTP Parameters (on page 298) for detailed information about the parameters.

### **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 273



Figure 273: Configuration 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 to access the NTP parameters. Figure 274

**Note**: The information in this window is read-only. See the NTP Parameters (on page 298) for detailed information about the parameters.

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REEWAVE	System Info	Radio Set	tings	Radio Setti	ngs Helpers	Encryption	Data	Path	Local Diagno	stics	Config	Services	Netwo	ork	
ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Runt	time Enviror	nment	Modbus	lo Ex (	Com
				NTP Reference	NETWORK_TI	ME_SERVER	NTP		9						
Iser Data File Upload System Info				NTP Address2 NTP Address3					=						
Configuration letwork Diagnostics				NTP Address4 NTP Address5					_						

Figure 274: NTP window

7. Optional: On the **Menu** list, click the **Configuration** link to Change the NTP Parameters (on page 129).

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# 35.16. Radio Settings window - Endpoint

The **Radio Settings** window is used to define the key parameters of an Endpoint Z9-PC or Z9-PC-SR001.

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

## **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 275



#### Figure 275: Configuration 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 to access the Radio Settings parameters. Figure 276

**Note**: By default, the Radio Mode (on page 322) parameter is set to **Endpoint**. See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

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FREEWAVE	System Info	Radio Se	ttings	Radio Sett	ings Helpers	Encryption	Date	a Path	Local Diagno	ostics	Config	Servic	es Net	work		
Q ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Run	time Enviror	ment	Modbus	Io Ex	Com	
	6						Radio Set	tings								- 3
				Radio Mod	Endpoint				6							
User Data				TX Powe	r 30dbm				1							- 1
System Info				Network II	51966											- 1
Configuration			Radio	Node II Hopping Mod	Hopping_On				14							- 1
Help				LNA Bypas	s 0				0							- 1
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	Lindate															- 1

### Figure 276: Radio Settings window - Endpoint

7. Optional: On the **Menu** list, click the **Configuration** link to Change the Radio Settings Parameters - Endpoint (on page 131).

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

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## 35.16.1. Radio Settings window - Endpoint-Repeater

The **Radio Settings** window is used to define the key parameters of an Endpoint-Repeater Z9-PC or Z9-PC-SR001.

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

## Access and Window Description

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 277



#### Figure 277: Configuration 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 to access the Radio Settings parameters.

**Note**: By default, the Radio Mode (on page 322) parameter is set to **Endpoint**. See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

7. Click the **Radio Mode** list box arrow and select **Endpoint\_Repeater**. Figure 278

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→ C <sup>e</sup> <sup>(a)</sup>	192.168.111.100/config/	radioSettings								Ð	🖂 🏠		III E	
/00 📚 Boulder 🥊 Streaming   CPR 🕻	Cogin - Freewave													
REEWAVE	System Info	Radio Settings	Radio Setti	ings Helpers	Encryption	Data	a Path	Local Diagno	stics	Config	Services	Netwo	ork	
ZumLink	Network Stats	NTP Cor	n1 Com2	Terminal Se	erver Relay	Date	SNMP	Security	Runtin	ne Environn	nent M	Aodbus	lo Ex Com	
						ladio Sett	lings							
			Radio Mode	Endpoint_Rep	eater			2						
User Data			RF Data Rate	RATE_500K				×.						
File Upload		R	dio Repeater Slo	t 1				2						
System Info			TX Powe	130dbm										
Configuration			Node IE	18131				_						
Help		Ro	tio Hopping Mode	Hopping_On	0									
Logout			LNA Bypas	s (0				5						
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			Frequency Mask	( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )										

#### Figure 278: Radio Settings window - Endpoint\_Repeater

8. Optional: On the **Menu** list, click the **Configuration** link to Change the Radio Settings Parameters - Endpoint-Repeater (on page 133).

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

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## 35.16.2. Radio Settings window - Gateway

The **Radio Settings** window is used to define the key parameters of an Gateway Z9-PC or Z9-PC-SR001.

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

## Access and Window Description

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 279



#### Figure 279: Configuration 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 to access the Radio Settings parameters.

**Note**: By default, the Radio Mode (on page 322) parameter is set to **Endpoint**. See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

 Click the Radio Mode list box arrow and select Gateway. Radio Settings window -Gateway (on page 419)

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→ C @	0 192.168.111.100/config/r	adioSettings									C	🛛 s	2	III\ 0	<b>0</b>
REEWAVE	System Info	Radio Set	ttings	Radio Setti	ngs Helpers	Encryption	Data	Path	Local Diagno	stics	Config	Services	Networ	rk	
ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Runt	ime Enviror	ment	Modbus	lo Ex Cor	n
	8- 					R	odio Setti	ings							
				Radio Mode	Gateway				2						
Jser Data				RF Data Rate	RATE_500K				5						
File Upload			Rodio	Max Repeaters	0				1						
System Info				TX Power	30dbm				~						
Configuration				Network ID	51966										
Network Diagnostics				Frequency Key	Key0				-						
telp			Radio	Hopping Mode	Hopping_On				2						
ogout			E	Beacon Interval	ONE_HUNDRI	ED_MS			-						
			Beac	on Burst Count	3				2						
				LNA Bypass	0				×.						
		M	lax Link Di	istance In Miles	20										

#### Figure 280: Radio Settings window - Gateway

8. Optional: On the **Menu** list, click the **Configuration** link to Change the Radio Settings Parameters - Gateway (on page 135).

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

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## 35.16.3. Radio Settings window - Gateway-Repeater

The **Radio Settings** window is used to define the key parameters of an Gateway-Repeater Z9-PC or Z9-PC-SR001.

**Note**: See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

## Access and Window Description

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 281



#### Figure 281: Configuration 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 to access the Radio Settings parameters.

**Note**: By default, the Radio Mode (on page 322) parameter is set to **Endpoint**. See the Radio Settings Parameters (on page 303) for detailed information about the parameters.

7. Click the Radio Mode list box arrow and select Gateway\_Repeater. Figure 282

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→ ଫ ŵ 🗍	192.168.111.100/com/g	/radicSettings									P	🖾	Ŷ	11/	•
REEWAVE	System Info	Radio Se	ttings	Radio Sett	ings Helpers	Encryption	Date	Path	Local Diagne	ostics	Config	Service	rs Netv	vork	
ZumLink	Network Stats	NTP	Com1	Com2	Terminal Se	erver Relay	Date	SNMP	Security	Runt	ime Environ	ment	Modbus	lo Ex Ce	m
	ŝ.				-0.5		lodio Set	lings	a trace						
				Rodio Mod	Gateway_Reg	leater			2						
User Data				RF Data Rat	RATE_500K				( )						
File Upload			Radio	Max Repeater	s 0				3						
System Info				TX Powe	r 30dbm										
Configuration				Network II	51966										
letwork Diagnostics			Dette	Frequency Ke	Key0										
1elp			Hadio	Reacon Intervi	ONE HUNDE	ED MS			10						
ogout			Beac	on Burst Coun	13	co <sub>n</sub> ma									
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		N. 1	fax Link D	istance In Mile	s 20										
	100		Fr	equency Mask	\$										
	Update														
														_	

### Figure 282: Radio Settings window - Gateway\_Repeater

8. Optional: On the **Menu** list, click the **Configuration** link to Change the Radio Settings Parameters - Gateway-Repeater (on page 138).

**Important!**: Only Radio Settings Parameters (on page 303) that apply to the current Radio Mode (on page 322), RF Data Rate (on page 325), and Radio Hopping Mode (on page 317), and are visible in the CLI and the Web Interface and can be changed.

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# 35.17. Radio Settings Helpers window

The **Radio Settings Helpers** window is used to determine the error that exists in the frequency mask string.

**Note**: This window is only available if the Radio Hopping Mode (on page 317) parameter is set to **Hopping\_On**. See the Radio Settings Helpers Parameters (on page 329) for detailed information about the parameters. See Frequency Masks (on page 308) for usage.

## **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

#### 4. On the Menu list, click the Configuration link. Figure 283



Figure 283: Configuration 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 to access the **Radio Settings Helpers** parameter. Figure 284

Note: The information in this window is read-only.

See the Radio Settings Helpers Parameters (on page 329) for detailed information about the parameters.

See Frequency Masks (on page 308) for usage.

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Figure 284: Radio Settings Helpers window

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# 35.18. Runtime Environment window

The **Runtime Environment** window is used to provide information specific to the Linux Runtime Environment.

**Note**: See the Runtime Environment Parameters (on page 331) for detailed information about the parameters.

## **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 285



#### Figure 285: Configuration 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 to access The **Runtime Environment** parameters. Figure 286

**Note**: The information in this window is read-only. See the Runtime Environment Parameters (on page 331) for detailed information about the parameters.

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Figure 286: Runtime Environment window

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# 35.19. Security window

The Security window is used to enable or disable the drag-n-drop interface and SSH access.

Note: See the Security Parameters (on page 335) for detailed information about the parameters.

### **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 287



Figure 287: Configuration 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.

5. Click the Security tab to access the Security parameters. Figure 288

**Note**: See the Security Parameters (on page 335) for detailed information about the parameters.

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9)												5	٥	×
192.168.111.100/config/	security									© 1	2	11/	•	
System Info	Rodio Setting	s Radio Sett	ings Helpers	Encryption	Date	a Path	Local Diagno	stics	Config	Services	Netw	ork		1
Network Stats	NTP C	om1 Com2	Terminal S	erver Relay	Date	SNMP	Security	Run	time Enviro	nment	Modbus	lo Ex C	om	
Update	E En	nable PTP Interfac able Ethernet Logi	e true n true		Securit	5Y								
	System Info Network Stats	192.168.111.100/uor/fg/security System Info Radio Setting Network Stats NTP Cr E Update	192168.111.100/configheranity System Info Radio Settings Radio Sett Network Stats NTP Com1 Com2 Enable PTP Interfoo Enable Ethernet Logi Update	System Info Radio Settings Radio Settings Helpers Network Stats NTP Com1 Com2 Terminal S Enable PTP Interface <u>true</u> Enable Ethernet Login <u>true</u>	System Info Radio Settings Radio Settings Radio Settings Radio Settings Radio Settings Received R	192168.111.100.confighecurity  System Info Radio Settings Radio Settings Helpers Encyption Date  Encyption	192-163.111.100.torr/ghecurity System Info Radio Settings Radio Settings Helpers Encryption Data Path Network Stats NTP Com1 Com2 Terminal Server Relay Date SHNAP Enable PTP Interface Ince Enable PTP Interface Ince Enable Ethernet Login Ince			System Info Radio Settings Radio Settings Helpers Encryption Data Path Lacal Diagnostics Config Network Stats NTP Com1 Com2 Terminal Server Relay Date SHNMP Security Enable PTP Interface Frue Enable PTP Interface Frue Enable Ethermet Login Frue Update		192-164.111.100.torr/ghecurity ···· · · · · · · · · · · · · · · · ·	192.168.111.100/loor/dp/security ···· ③ ☆ In System Info Network Stats NTP Com1 Com2 Terminal Server Relay Date SNMP Security Runtime Environment Modbus Io Ex C Enable PTP Interface True Enable PTP Interface True Enable Ethernet Login True Update	192.168.111.100.torr/ghtecurity     *** © û     IN     IO       System Info     Radio Settings     Radio Settings Helpers     Encryption     Data Path     Lacal Diagnostics     Config     Services     Network       Network Stats     NTP     Com1     Com2     Terminal Server Relay     Date     SNN/P     Security     Runtime Environment     Modbus     Io Ex Com       Security       Enable PTP Interface Inse       Enable Ethermet Login Inse       Update

### Figure 288: Security window

6. Optional: On the **Menu** list, click the **Configuration** link to Change the Security Parameters (on page 141).

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# 35.20. Services window

The **Services** window is used to enter the number of seconds of idle time before the CLI connection is closed.

Note: See the Services Parameters (on page 338) for detailed information about the parameters.

## Access and Window Description

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 289



#### Figure 289: Configuration 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 to access the Services parameters. Figure 290

**Note**: See the Services Parameters (on page 338) for detailed information about the parameters.

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↔ ♂ @ @	192.168.111.100/config	Services.									© -	άr	87	•	•
FREEWAVE	System Info	Radio Settings	Radio Settin	ngs Helpers	Encryption	Date	a Path	Local Diagno	stics	Config	Service	s Netv	vork		
<b>Q</b> ZumLink	Network Stats	NTP Com	Com2	Terminal S	erver Relay	Date	SNMP	Security	Run	time Enviror	nment	Modbus	lo Ex C	om	
			Time Out CLI	900		Service	li S								
User Data	Update														_
System Info															
Network Diagnostics															
Logout															

### Figure 290: Services window

7. Optional: On the **Menu** list, click the **Configuration** link to Change the Services Parameters (on page 143).

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# 35.21. SNMP window

The **SNMP** window is used to enable, disable, and define SNMP access.

Note: See the SNMP Parameters (on page 340) for detailed information about the parameters.

### **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 291



Figure 291: Configuration 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 to access the **SNMP** parameters.

**Note**: See the SNMP Parameters (on page 340) for detailed information about the parameters.

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→ C @	192.168.111.100/confighting											III/	0
REEWAVE	System Info	Radio Settings	Ags Radio Setti Com1 Com2 V1 Enables V3 Enables	ngs Helpers	Encryption	Data Pat	h Local Diag	nostics	Config	Services	Netwo	rk	
ZumLink	Network Stats	NTP Cor	n1 Com2	Terminal Se	erver Relay	Date SN	MP Security	Run	time Enviror	nment M	odbus	lo Ex Co	m
	<u>4</u>			-		SNMP	1778						
			V1 Enabled	false			6						
Jser Data			V2C Enabled V3 Enabled	false			6.6						
ivstem Info		RO	Community Name	public									
Configuration	1	RW	Community Name	private									
Network Diagnostics	Update												

Figure 292: SNMP window

7. Optional: On the **Menu** list, click the **Configuration** link to Change the SNMP Parameters (on page 145).

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# 35.22. System Info window

The System Info window provides system level information for the Z9-PC or Z9-PC-SR001.

Note: See the System Info Parameters (on page 354) for detailed information about the parameters.

## **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 293



Figure 293: Configuration 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.

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6. Click the System Info tab to access the System Info parameters. Figure 294



Figure 294: System Info window

7. Optional: On the **Menu** list, click the **Configuration** link to Change the System Info Parameters (on page 147).

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## 35.23. Terminal Server Relay window

The **Terminal Server Relay** window is used to connect the local Terminal Servers (hence the COM ports) to any remote Terminal Server.

**Note**: See the Terminal Server Relay Parameters (on page 365) for detailed information about the parameters.

### **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration (on page 110) procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

Note: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the Configuration link. Figure 295



#### Figure 295: Configuration 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 to access the **Terminal Server Relay** parameters. Figure 296

**Note**: See the Terminal Server Relay Parameters (on page 365) for detailed information about the parameters.

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) → C* û	0 192.168.111.100/config/	Termina/ServerRelay	,						E	) © ☆	]	87	•
REEWAVE	System Info	Radio Settin	gs Radio Settin	ngs Helpers	Encryption	Data Pa	th Local Diag	nostics	Config	Services	Netwo	ork	
ZumLink	Network Stats	NTP (	Com1 Com2	Terminal Se	rver Relay	Date S	NMP Security	Run	time Enviro	nment M	odbus	lo Ex Co	m
User Data File Upload	Update	Tem Remote	nserv Relay Mapping Termserv IP Address	TERMSERV_RE	ELAY_DISABLED	ingi server K	erdy E						
System Info Configuration Network Diagnostics													

### Figure 296: Terminal Server Relay window

7. Optional: On the **Menu** list, click the **Configuration** link to Change the Terminal Server Relay Parameters (on page 149).

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## 35.24. User Data - Drag and Drop window

The User Data - Drag and Drop window lists the default files of the Z9-PC or Z9-PC-SR001.

### **Access and Window Description**

- 1. Verify the Setup the Computer IP Address Configuration procedure is completed.
- 2. Open a web browser.
- 3. In the URL address bar, enter the IP address of the connected Z9-PC or Z9-PC-SR001 and press <Enter>.

The Home window (on page 396) opens.

**Note**: If this is the first time the Z9-PC or 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.

See the System Info Parameters (on page 354) for detailed information about the parameters.

4. On the Menu list, click the User Data - Drag and DropUser Data link.



Figure 297: 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 window opens. Figure 298

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🥊 KVOD 😻 Boulder 🛛 🥊 Streaming   CPR 🧔	Dog In ← Freewave —				
FREEWAVE					
	Name +		Last modified	<u>Size</u>	
	boot_results.txt		2000-01-01 00:00:17.261000	438 Bytes	
	Config.txt		2000-01-01 00:52:11.774000	3.0 kB	
User Data	fw_upgrade_result.txt		2000-01-01 02:18:45	638 Bytes	
1 File Upload	help.txt		2000-01-01 00:00:25.539000	78.2 kB	
System Info Configuration	layout.txt		2000-01-01 00:00:25.718000	81.9 kB	
Network Diagnostics	esult.txt		2000-01-01 00:52:11.647000	1.2 kB	
Logout	sys_info.txt		2000-01-01 00:52:11.890000	632 Bytes	

#### Figure 298: User Data window

Files and Descriptions - Z9-PC or Z9-PC-SR001								
File Name	Description							
boot_results.txt	The <b>boot_results.txt</b> file shows the firmware version the device is currently running.							
config.txt	The <b>config.txt</b> file contains all of the configuration parameters of the Z9-PC or Z9-PC-SR001.							
	These parameters determine how the device functions and connects to other devices in the network.							
fw_upgrade_ result.txt	The <b>fw_upgrade_result.txt</b> file shows the status of the update procedure for the device firmware.							
	<b>Note</b> : This file appears after the <b>ZumLink</b> has been updated to a newer version of firmware.							
help.txt	The help.txt file contains online user assistance information using the CLI commands.							
	<b>Example</b> : In a CLI window, enter <b>help=txPower</b> or <b>help txpower</b> to see the help information for the <b>radioSetting.txpower</b> 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.							
result.txt	The <b>result.txt</b> is used to verify the acceptance or rejection of each parameter change applied to the <b>config.txt</b> file.							
	<b>Note</b> : This file appears after the <b>config.txt</b> file of the <b>ZumLink</b> 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.							

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# 36. Release Notes

These sections describe the additions, changes, and known limitations in each software version for the ZumLink Z9-PC or Z9-PC-SR001. The most recent version is listed first.



The latest firmware and software versions and the most recent list of known limitations and workarounds are available on <u>support.freewave.com</u>.

- Version 1.1.2.2 (on page 439)
- Version 1.1.1.2 (on page 440)
- Version 1.1.0.1 (on page 443)
- Version 1.0.7.0 (on page 447)
- Version 1.0.4.3 (Initial Release) (on page 450)

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## 36.1. Version 1.1.2.2

#### Release Date: July 2019

#### Additions and Changes

- The Web Interface has been re-designed for improved usability on the Z9-PC or Z9-PC-SR001.
- Support has been added for:
  - Supply Voltage
    - localDiagnostics.SupplyVoltage is NOT supported on Z9-P, Z9-PE, Z9-PC, or Z9-PC-SR001 models.
    - 0 (zero) indicates the individual radio does not support localDiagnostics.SupplyVoltage.
  - VLAN Management
    - Users can only access the device from the VLAN ID.
    - If the VLAN tag is set on a specific Ethernet port, that port cannot be used to access the Management VLAN ID.

Note: See the VLAN MGMT (on page 290) parameter for additional information.

Corrections have been implemented for:

- The devuser login password and the sudo password were out of sync when loading a new IQ Application Environment when the default password was changed on the existing IQ Application Environment. These passwords are now in sync.
- Files uploaded using the Web Interface cannot be deleted by users.
- After updating the Rte Template Version (on page 362) parameter, a reboot is necessary to update the sys\_info.txt file.

#### Known Limitations and Workarounds

- Setting Time String (on page 246) causes the entire Z9-PC or Z9-PC-SR001 configuration to revert to saved settings.
  - Workaround: Save settings before changing the date.timeString parameter.
- Cannot change the date.timeString once the time is set using NTP.
- The UCD-SNMP-MIB-WP201.txt file is missing definition for dskIndex.
- The Ethernet port can become unresponsive after changing networks and the VLAN Tag (on page 290) IDs.
  - Workaround: Reboot the Z9-PC or Z9-PC-SR001 for changes to take effect.
- Unable to get input voltage via Modbus.
- When using the Web Interface on a computer with **Windows**® 8 or **Windows**® 10, clicking **Cancel** does **not** halt the upload process.

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- Files uploaded using the Web Interface drag-n-drop procedure are now write-protected and cannot be deleted.
- When changing and saving the Radio Settings Parameters (on page 303), the CLI interface may momentarily lock.
- If there is enough space to transfer the update firmware but not enough to facilitate the update, the update fails and the Upgrade Failed LEDs do not function.
  - **Workaround**: Users should verify the available free space before uploading an update firmware file.

At least 2x free space is needed on the Z9-PC or Z9-PC-SR001 for the firmware update file.

- Users should wait at least 30 seconds after a factory default command is issued before making configuration changes.
- The fields in the NTP Parameters (on page 298) parameters are **not** validated by the system.
  - Workaround: Verify the NTP parameter settings are correct.
- Unable to set the time when the NTP Reference (on page 301) parameter <u>=NETWORK</u>
   <u>TIME\_SERVER</u>.
- The highest baud rate supported for RS422 and RS485 is 421 kbps.
- In Firmware v1.1.2.2, when the Flow Control (on page 222) parameter is set to hardware, the COM port's flow control does not function.
- The Signal Level (on page 255) parameter reports a maximum of -42 dBm when the RF Data Rate=RATE 1M.
- Unable to pull support bundles for **Z9-PC** or **Z9-PC-SR001** networks.
  - Workaround: The clock must be set to later than January 1, 2000 to create the bundle.

## 36.2. Version 1.1.1.2

#### **Release Date: December 2018**

#### Additions and Changes

- Improved encryption configuration via the Web Interface.
- At startup, the Z9-PC or Z9-PC-SR001 will synchronize with an NTP server if a server is listed in the NTP Address (1 to 5) (on page 299).

Support has been added for:

- ARP Filtering
  - ARP requests of a device have a path to the desired IP addresses and are filtered from non-desired IP addresses.
- VLAN
  - VLAN tagging 802.1q (ports and services)
- Modbus Registers
  - Connect to device via Modbus
    - Modbus TCP

```
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```

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- Modbus RTU over TCP
- Modbus RTU using COM1 or COM2 serial ports
- Supports Reading from FreeWave IO Expansion Modules.
- Supports requests from external MODBUS RTU serial device using COM1 and COM2.
  - Any Modbus TCP, Modbus RTU over TCP, and Modbus RTU request will convert to a serial Modbus RTU request that is sent out the configured serial port to a serial Modbus device.
  - Acts as a Modbus TCP to serial Modbus Gateway.
- Allows radio diagnostics and settings to be read via Modbus.
- Updated MIB and SNMP agent:
  - Change from type of Float32TC to INTEGER for these OIDs:
    - fwtZumLinkSignalLevel .1.3.6.1.4.1.29956.3.2.10.1.0
    - fwtZumLinkSignalMargin .1.3.6.1.4.1.29956.3.2.10.2.0
    - fwtZumLinkNoiseLevel .1.3.6.1.4.1.29956.3.2.10.40.0

Corrections have been implemented for:

- MIB and SNMP agent:
  - Tx Availability (on page 269) is ONLY available via MIB, not via SNMP.
  - Rx Success (on page 266) is NOT available via SNMP.
  - localDiagnostics.TxAvailability returns localDiagnostics.RxSuccess value via SNMP.
- The Web Interface and CLI windows now show the same value for the Tx Success (on page 269) on the Gateway.
- Netmask (on page 286) value does NOT match the actual value after two value changes.
- IP Address (on page 283) value does NOT match actual value after two value changes
- Options are visible but not active in the Handler (on page 223) parameter.
- Setting Aggregate Enabled (on page 236) on all Endpoints in a network prevents the neighbor table from being populated.
  - The Network Diagnostics window (on page 405) does not appear correctly when dataPath.aggregateEnabled=true.
- Brackets {} or back slashes \ in a Device Name (on page 357) breaks the Network Table.
- The setKey cannot be entered using the Web Interface.
- When Flow Control (on page 222) Hardware is enabled on the COM ports of the Z9-PC or Z9-PC-SR001, the CTS line will go low and does not allow traffic to pass through the COM port.

#### Beta Features

Web Interface

- Improved encryption configuration.
  - Added Encryption Configuration table.

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• The Encryption key is can now be entered in the Web Interface.

**Note**: See the Change the Encryption Parameters (on page 120) procedure for detailed information.

- Network Diagnostics menu
  - Added Network Diagram
    - Visual representation of: Radio Network RF, Communication Path, and Link Quality.
    - Available views are: Link Margin, RSSI, Tx Rate, Rx Rate, Margin with Neighbors, and RSSI with Neighbors.

Note: See the Network Diagnostics window (on page 405) for additional information.

 Available options are: Download support bundle, clear stats, clear all stats, refresh network diagnostics, save image.

#### **Known Limitations and Workarounds**

- Exiting from the CLI may take up to 30 seconds.
- Entering the shortcut text of ModbusTcp and ModbusRtuOverTcp results in a DUPLICATE\_PARAMETER Error.
  - Workaround: The fully-qualified parameter of modbus.modbusTcp and modbus.modbusRtuOverTcp must be entered.
- The encryption.getKey and encryption.setKey parameters are now deprecated.
- When issuing the **factoryDefaults=set** command, after making changes for any of the Network Parameters (on page 281), the user is locked out of the CLI.
  - Workaround: Reboot the Z9-PC or Z9-PC-SR001 for changes to take effect.
- VSWR reading may be inconsistent between the Network Diagram on the Network Diagnostics window (on page 405) and the information reported in the Local Diagnostics window (on page 399).
- The File Upload window (on page 392) shows a 100% upload when the upload file has not completed on **Windows**® 8 and **Windows**® 10 computers.
  - Workaround: Wait the appropriate amount of time or watch the LEDs to indicate completion of file transfer or use the v1112-Firmware Update Drag and Drop procedure.
- When setting the parameter Arp Filter Enabled=true, ARP requests and responses are NOT blocked on VLAN interfaces.
- The Signal Level (on page 255) parameter reports a maximum of -42 dBm when the RF Data Rate=RATE 1M.
- When the Termserv Relay Mapping (on page 366) parameter is designated and the Flow Control (on page 222) parameter is set to Hardware, the COM port's flow control does not function.

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- Unable to pull support bundles for Z9-PC or Z9-PC-SR001 networks.
  - Workaround: The clock must be set to later than January 1, 2000 to create the bundle.

## 36.3. Version 1.1.0.1

#### Release Date: August 2018

#### Additions and Changes

- Support has been added for:
  - Local Diagnostics:
    - Noise Level (on page 259)
    - Rx Success (on page 266)
    - Tx Availability (on page 269)
    - Tx Success (on page 269)
    - VSWR (Signal Level) (on page 270)

**Important!**: VSWR **may not** function on Z9-PC or Z9-PC-SR001 models manufactured prior to September, 2018.

If the Z9-PC or Z9-PC-SR001 always reports a VSWR value of 0 (zero), VSWR is **not** supported.

The VSWR is instantaneous, not averaged.

Each measurement can produce a different value; units that do support VSWR will occasionally report 0 (zero) due to an invalid measurement.

- MTU (on page 284) 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 or 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:
  - Compression Enabled (on page 237) default is now True.
  - Beacon Burst Count (on page 304) default is now 3.
  - Radio Hopping Mode (on page 317) default is now Hopping\_On.
  - RF Data Rate (on page 325) default is now **RATE\_500K**.
  - TX Power (on page 327) default is now 30.

Important!: A Gateway MUST BE configured for the radios to communicate.

- Corrections have been implemented for:
  - Frequency Mask

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- COM ports temporarily stop functioning when passing traffic with certain Termserv Relay Mapping (on page 366) settings enabled.
- When RF Data Rate = **RATE** 4M and Beacon Burst Count = 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 Terminal Server Time Out (on page 229) connection remains open if data is sent or received.
- When an invalid Gateway is entered, the Gateway (on page 282) is set to a null value.
  - When a Z9-PC or 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.
- IQ 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 **IQ Application Environment**. Contact FreeWave Technical Support (on page 14) for the license key.

- The default value for NTP Reference (on page 301) was changed to NETWORK\_TIME\_ SERVER.
  - This causes the Z9-PC or Z9-PC-SR001 to attempt to contact the default external time.nist.gov IP address listed in NTP Address (1 to 5) (on page 299).

#### 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

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- 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 updating or downgrading, the IQ Application Environment template is changed but NOT the active IQ Application Environment runtime application environment version.
    - Active applications will continue to run.

**FREEWAVE Recommends**: Prior to an update or downgrade procedure, save and backup all applications.

- After updating the Rte Template Version (on page 362) parameter, a reboot is necessary to update the sys\_info.txt file.
  - Performing a Rte Reset (on page 332) 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 a runtimeEnvironment.rteReset.
- Changing the IP Address (on page 283) 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 or Z9-PC-SR001.
- VSWR may not function on Z9-PC or Z9-PC-SR001 models manufactured prior to September, 2018.

If the Z9-PC or Z9-PC-SR001 always reports a VSWR value of 0 (zero), VSWR is **not** supported.

• VSWR is less accurate at higher power levels (>20 dBm).

**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.

- Rebooting a pair of radios simultaneously when one of the Z9-PC or Z9-PC-SR001 has the parameter Termserv Relay Mapping=Enabled, the terminal server relay takes up to 6 minutes to become active.
- To update the Network Diagnostics window (on page 405), 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 Aggregate Enabled (on page 236) on all Endpoints in a network prevents the neighbor table from being populated.
  - The Network Diagnostics window (on page 405) does not appear correctly when dataPath.aggregateEnabled=true.
- Tx Availability (on page 269) is ONLY available via MIB, not via SNMP.
- Rx Success (on page 266) is NOT available via SNMP.
- localDiagnostics.TxAvailability returns localDiagnostics.RxSuccess value via SNMP.
- Options are visible but not active in the Handler (on page 223) parameter.
- The Signal Level (on page 255) parameter reports a maximum of -42 dBm when the RF Data Rate=RATE 1M.
- When the Termserv Relay Mapping (on page 366) parameter is designated and the Flow Control (on page 222) parameter is set to Hardware, the COM port's flow control does not function.
- When Flow Control (on page 222) Hardware is enabled on the COM ports of the Z9-PC or 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.
- Unable to pull support bundles for **Z9-PC** or **Z9-PC-SR001** networks.
  - Workaround: The clock must be set to later than January 1, 2000 to create the bundle.
- The setKey cannot be entered using the Z9-PC or Z9-PC-SR001 Web Interface.

Important!: The encryption.setKey MUST BE entered in CLI.

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## 36.4. 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 or 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 (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 Beacon Burst Count (on page 304) 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.

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- 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 Radio Mode (on page 322) was changed.

- Significant data is lost between radios when operating in close proximity (3-6 feet) when **radioSettings.rfDataRate=RATE\_4M** (See RF Data Rate (on page 325)). (See RF Data Rate (on page 325)).
  - Workarounds:
    - Reduce power on radios when operating in close proximity.
    - Enable the LNA Bypass (on page 312).
- When using the USB, the CLI may lock up on units with Termserv Relay Mapping (on page 366) enabled.
  - Workarounds:
    - Re-seat the cable
    - Reconfigure the Termserv Relay Mapping using either of these procedures: Drag and Drop Configuration (on page 54) or Web Interface Configuration (on page 65)

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- Drag and Drop Configuration (on page 54) or
- Web Interface Configuration (on page 65)
- COM ports temporarily stop functioning when passing traffic with certain Terminal Server Relay settings enabled.
- When the Termserv Relay Mapping parameter is in use, the Connection Drops (on page 219) count should be ignored.
- When operating at RF Data Rate = RATE 4M and Beacon Burst Count = 1:
  - Endpoint-Repeaters may lose synchronization with the Gateway and reset themselves.
  - TCP traffic can be intermittent when operating multiple Repeaters.
- When operating at RF Data Rate = <u>RATE\_4M</u> and with multiple Repeaters, if a short Beacon Interval and a high Beacon Burst Count are designated, throughput is very low.
  - Workaround: Use either a longer Beacon Interval or a lower Beacon Burst Count.
- As Repeaters are chained in the network, round trip delay increases.
  - When issuing pings of large packet sizes at the lower data rates, such as 115.2K, and a Beacon Interval=TWENTY\_FIVE\_MS, the latency can increase causing the pings to fail.
    - Workaround: Allow an appropriate delay between pings.

**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.
- The Signal Level (on page 255) parameter reports a maximum of -42 dBm when the RF Data Rate=RATE\_1M.
- When Flow Control (on page 222) Hardware is enabled on the COM ports of the Z9-PC or 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: Workaround: Any device connected to COM1 or COM2 should have flow control disabled.
- Unable to pull support bundles for Z9-PC or Z9-PC-SR001 networks.
  - Workaround: The clock must be set to later than January 1, 2000 to create the bundle.
- ZumIQ application environment is not available.

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## 36.5. 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.

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## 37. Mechanical Drawing - Z9-PC & Z9-PC-SR001

## 37.1. **Z9-PC**



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## 37.2. **Z9-PC-SR001**



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# 38. Z9-PC or Z9-PC-SR001 Hop Tables

- Standard Hop Set 900 MHz Channels (on page 454)
- Brazil Hop Set 900 MHz Channels (on page 457)

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## 38.1. Standard Hop Set - 900 MHz Channels

These are the standard channels supported when the Radio Hopping Mode (on page 317) is **Enabled**.

Note: When the Radio Hopping Mode is Disabled, the frequency can be set manually.

- RF Data Rate: 115.2 kbps (on page 454)
- RF Data Rate: 250 kbps (on page 455)
- RF Data Rate: 500 kbps (on page 455)
- RF Data Rate: 1 Mbps (on page 455)
- RF Data Rate: 1.5 Mbps (Beta) (on page 456)
- RF Data Rate: 4 Mbps (on page 456)

### 38.1.1. RF Data Rate: 115.2 kbps

#### Channel Size (MHz): 0.2304

#### Number of Channels: 110

#### Standard Hop Set - ZumLink 900 MHz Channels

RF Data Rat	e: 115.	2 kbps				
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	

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### 38.1.2. RF Data Rate: 250 kbps

Channel Size (MHz): 0.3456

#### Number of Channels: 73

#### Standard Hop Set - ZumLink900 MHz Channels

RF Data Rat	e: 250	kbps				
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	

### 38.1.3. RF Data Rate: 500 kbps

#### Channel Size (MHz): 0.6912 Number of Channels: 36

#### Standard Hop Set - ZumLink 900 MHz Channels

RF Data Rate	e: 500 l	kbps					
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	

### 38.1.4. RF Data Rate: 1 Mbps

#### Channel Size (MHz): 1.3824

Number of Channels: 18

Standard Hop Set - ZumLink 900 MHz Channels								
RF Data Rate: 1 Mbps								
903.0528	915.4944							
904.4352	916.8768							

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Standard Hop Set - ZumLink 900 MHz Channels									
RF Data Rate: 1 Mbps									
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								

### 38.1.5. RF Data Rate: 1.5 Mbps (Beta)

Channel Size (MHz): 1.3824

Number of Channels: 17

Standard Hop Set - ZumLink 900 MHz Channels									
RF Data Rate: 1.5 Mbps (Beta)									
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									

### 38.1.6. RF Data Rate: 4 Mbps

Channel Size (MHz): 3.2256 Number of Channels: 7

Standard Hop Set - ZumLink 900 MHz Channels

RF Data Rate: 4 Mbps	
	904.5504
	907.7760
	911.0016
	914.2272
	917.4528
	920.6784
	923.9040

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## 38.2. Brazil Hop Set - 900 MHz Channels

These are the standard channels supported when the Radio Hopping Mode (on page 317) is **Enabled**.

Note: When the Radio Hopping Mode is Disabled, the frequency can be set manually.

- RF Data Rate: 115.2 kbps (on page 457)
- RF Data Rate: 250 kbps (on page 458)
- RF Data Rate: 500 kbps (on page 458)
- RF Data Rate: 1 Mbps (on page 458)
- RF Data Rate: 1.5 Mbps (Beta) (on page 459)
- RF Data Rate: 4 Mbps (on page 459)

### 38.2.1. RF Data Rate: 115.2 kbps

Channel Size (MHz): 0.2304

Number of Channels: 75

#### Brazil Hop Set - ZumLink 900 MHz Channels

RF Data Rate:	115.2 kb	ps			
902.4768		905.9328	917.4528	920.9088	924.3648
902.7072		906.1632	917.6832	921.1392	924.5952
902.9376		906.3936	917.9136	921.3696	924.8256
903.1680		906.6240	918.1440	921.6000	925.0560
903.3984		906.8544	918.3744	921.8304	925.2864
903.6288		907.0848	918.6048	922.0608	925.5168
903.8592		915.3792	918.8352	922.2912	925.7472
904.0896		915.6096	919.0656	922.5216	925.9776
904.3200		915.8400	919.2960	922.7520	926.2080
904.5504		916.0704	919.5264	922.9824	926.4384
904.7808		916.3008	919.7568	923.2128	926.6688
905.0112		916.5312	919.9872	923.4432	926.8992
905.2416		916.7616	920.2176	923.6736	927.1296
905.4720		916.9920	920.4480	923.9040	927.3600
905.7024		917.2224	920.6784	924.1344	927.5904

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### 38.2.2. RF Data Rate: 250 kbps

Channel Size (MHz): 0.3456

#### Number of Channels: 49

RF Data Rate: 250 kbps									
902.5344		905.9904		917.7408		921.1968		924.6528	
902.8800		906.3360		918.0864		921.5424		924.9984	
903.2256		906.6816		918.4320		921.8880		925.3440	
903.5712		907.0272		918.7776		922.2336		925.6896	
903.9168		915.6672		919.1232		922.5792		926.0352	
904.2624		916.0128		919.4688		922.9248		926.3808	
904.6080		916.3584		919.8144		923.2704		926.7264	
904.9536		916.7040		920.1600		923.6160		927.0720	
905.2992		917.0496		920.5056		923.9616		927.4176	
905.6448		917.3952		920.8512		924.3072			

### 38.2.3. RF Data Rate: 500 kbps

#### Channel Size (MHz): 0.6912 Number of Channels: 24

Brazil Hop Set - ZumLink 900 MHz Channels								
RF Data Rate: 500 kbps								
902.7072		916.5312		922.0608				
903.3984		917.2224		922.7520				
904.0896		917.9136		923.4432				
904.7808		918.6048		924.1344				
905.4720		919.2960		924.8256				
906.1632		919.9872		925.5168				
906.8544		920.6784		926.2080				
915.8400		921.3696		926.8992				

## 38.2.4. RF Data Rate: 1 Mbps

### Channel Size (MHz): 1.3824

Number of Channels: 11

Brazil Hop Set - ZumLink 900 MHz Channels					
RF Data Rate: 1 Mbps					
903.0528	921.0240				
904.4352	922.4064				
905.8176	923.7888				

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Brazil Hop Set - ZumLink 900 MHz Channels					
RF Data Rate: 1 Mbps					
916.8768	925.1712				
918.2592	926.5536				
919.6416					

### 38.2.5. RF Data Rate: 1.5 Mbps (Beta)

Channel Size (MHz): 1.3824 Number of Channels: 10

Standard Hop Set - ZumLink900 MHz Channels						
RF Data Rate: 1.5 Mbps (Beta)						
903.2562	919.3842					
904.8690	920.9970					
906.4818	922.6098					
916.1586	924.2226					
917.7714	925.8354					

### 38.2.6. RF Data Rate: 4 Mbps

Channel Size (MHz): 3.2256 Number of Channels: 4

Brazil Hop Set - ZumLink 900 MHz Channels						
RF Data Rate: 4 Mbps						
904.5504						
917.4528						
920.6784						
923.9040						

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# 39. Z9-PC or Z9-PC-SR001 MIB

These are the supported item groups in the Z9-PC or Z9-PC-SR001 MIB file:

- CPU Usage (on page 461)
- Disk Usage (on page 461)
- Memory Usage (on page 463)
- FreeWave Technologies MIB-FWT1122TB.66
- SNMP Write Access (on page 475)

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## 39.1. CPU Usage

ZumLink MIB - CF	ZumLink MIB - CPU Usage										
Objective Type Syntax M		MAX Access Status		Description	::=						
ssCpuUser	Integer32 Read		Deprecated	The percentage of CPU time spent processing user-level code, calculated over the last minute.	{systemStats 9}						
ssCpuSystem	Integer32	2 Read-only Deprecat		The percentage of CPU time spent processing system-level code, calculated over the last minute.	{systemStats 10}						
ssCpuldle	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}						

## 39.2. 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}

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Zumelink MiB - Disk Usage										
Objective Type	Syntax	MAX Access	Status	Description	::=					
dskEntry	DskEntry	Not	Current	An entry containing a disk and its statistics.	{dskTable 1}					
		Accessible		Index = { dskIndex }						
				DskEntry ::= SEQUENCE {						
				dskPath DisplayString,						
				dskDevice DisplayString,						
				dskTotal Integer32,						
				dskAvail Integer32,						
				dskUsed Integer32,						
				dskPercent Integer32,						
				dskPercentNode Integer32						
				}						
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}					
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}					

ZumLink MIB - Disk Usage

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## 39.3. 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.	{ memory 13 }
					This object will not be implemented on hosts where the underlying operating system does not explicitly identify memory as specifically reserved for this purpose.	
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 }
memCached	Integer32	kВ	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 }

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ZumLink MIB - N	umLink MIB - Memory Usage								
Objective Type	Syntax	Units	MAX Access	Status	Description	::=			
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 }			

## 39.4. FreeWave Technologies - MIB

FreeWave Technologies - MIB							
Object	Description	Access	Syntax				
fwtZumLinkSerialNumber	Serial Number	Read-only	Unsigned32				
fwtZumLinkModelCode	ModelCode	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				
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				
fwtZumLinkThemeVersion	Theme Version	Read-only	DisplayString				

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Object	Description	Access	Syntax		
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		
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	ZUMLINK_LNA_BYPASS		
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		

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FreeWaye Technologies - MIR

Object	Description	Access	Syntax		
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		
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		

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FreeWave Technologies - MIB			
Object	Description	Access	Syntax
fwtZumLinkRadioContentionDrop	Radio Contention Drop	Read-only	Unsigned32
fwtZumLinkRadioSendingDrop		Read-only	Unsigned32
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 containing diagnostics for a node.	Not Accessible	
fwtZumLinkNodeDiagsNodeId	Node Diagnostics Node ID	Read-only	Unsigned32

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FreeWave Technologies - MIB					
Object	Description	Access	Syntax		
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 nodeld 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		
fwtZumLinkSupplyVoltage	Supply Voltage	Read-only	INTEGER		
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		
fwtZumLinklp_address	IP address of unit.	Read-Write	IpAddress		
fwtZumLinkNetmask	Netmask of unit.	Read-Write	IpAddress		
fwtZumLinkGateway	Gateway of unit.	Read-Write	IpAddress		
fwtZumLinkStpEnabled	Spanning tree protocol is enabled or disabled.	Read-Write	TruthValue		
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		

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Freewave Technologies - MIB			
Object	Description	Access	Syntax
fwtZumLinkNameserver_address1	DNS for name-to-address resolution.	Read-Write	IpAddress
fwtZumLinkNameserver_address2	DNS for name-to-address resolution.	Read-Write	IpAddress
fwtZumLinkArpFilterEnabled	Enable or disable ARP filtering in bridge firewall.	Read-Write	TruthValue
fwtZumLinkVlanMgmt	Management VLAN ID for the device	Read-Write	Unsigned32
fwtZumLinkVlanTag	VLAN Tag ID for the Ethernet port	Read-Write	Unsigned32
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
fwtZumLinkNtpRestart	Cause the NTP system to restart.	Read-Write	ZUMLINK_NOW_ OPTION
fwtZumLinkNtpDate	Set the local time from other NTP servers on the network.	Read-Write	ZUMLINK_NOW_ OPTION

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FreeWave Technologies - MIB			
Object	Description	Access	Syntax
fwtZumLinkNtp_address1	Server to be used for syncing time. Use 0.0.0.0 to skip this server.	Read-Write	DisplayString
fwtZumLinkNtp_address2	Server to be used for syncing time. Use 0.0.0.0 to skip this server.	Read-Write	DisplayString
fwtZumLinkNtp_address3	Server to be used for syncing time. Use 0.0.0.0 to skip this server.	Read-Write	DisplayString
fwtZumLinkNtp_address4	Server to be used for syncing time. Use 0.0.0.0 to skip this server.	Read-Write	DisplayString
fwtZumLinkNtp_address5	Server to be used for syncing time. Use 0.0.0.0 to skip this server.	Read-Write	DisplayString
fwtZumLinkCom1Mode	Com port mode	Read-Write	ZUMLINK_UART_MODE
fwtZumLinkCom1Handler	Protocol of the com port	Read-Write	ZUMLINK_UART_ HANDLER
fwtZumLinkCom1Baudrate	Com port baud rate	Read-Write	ZUMLINK_UART_ BAUDRATES
fwtZumLinkCom1Databits	Com port data bits	Read-Write	ZUMLINK_UART_ DATABITS
fwtZumLinkCom1Parity	Com port parity	Read-Write	ZUMLINK_UART_ PARITY
fwtZumLinkCom1Stopbits	Com port number of stop bits	Read-Write	ZUMLINK_UART_ STOPBITS
fwtZumLinkCom1Duplex	Com port is full or half duplex	Read-Write	ZUMLINK_UART_ DUPLEX
fwtZumLinkCom1FlowControl	Com port hardware flow control is not supported.	Read-Write	ZUMLINK_UART_ FLOWCONTROL_OFF
fwtZumLinkCom1DelayBeforeSendMs	Com port will delay sending in Ms to allow the other side to switch from tx to rx mode.	Read-Write	Unsigned32
fwtZumLinkCom1BreakBeforeSendUs	Com port will send a break signal for at least the number of microseconds specified before sending the data.	Read-Write	Unsigned32
fwtZumLinkCom1TerminalServerPort	The TCP port number to use when handler is set to TerminalServer	Read-Write	Unsigned32

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Object	Description	Access	Syntax
fwtZumLinkCom1TerminalServerTimeOut	Terminal Server TimeOut	Read-Write	Unsigned32
fwtZumLinkCom1TxBytes	The total bytes sent out of the Com port.	Read-only	Unsigned32
fwtZumLinkCom1RxBytes	The total bytes received from the Com port.	Read-only	Unsigned32
fwtZumLinkCom1ConnectionDrops	The number of terminal server connections dropped due to inactivity.	Read-only	Unsigned32
fwtZumLinkCom2Mode	Com port mode	Read-Write	ZUMLINK_UART_MODE
fwtZumLinkCom2Handler	Protocol of the com port	Read-Write	ZUMLINK_UART_ HANDLER
fwtZumLinkCom2Baudrate	Com port baud rate	Read-Write	ZUMLINK_UART_ BAUDRATES
fwtZumLinkCom2Databits	Com port data bits	Read-Write	ZUMLINK_UART_ DATABITS
fwtZumLinkCom2Parity	Com port parity	Read-Write	ZUMLINK_UART_ PARITY
fwtZumLinkCom2Stopbits	Com port number of stop bits	Read-Write	ZUMLINK_UART_ STOPBITS
fwtZumLinkCom2Duplex	Com port is full or half duplex	Read-Write	ZUMLINK_UART_ DUPLEX
fwtZumLinkCom2FlowControl	Com port hardware flow control is on or off	Read-Write	ZUMLINK_UART_ FLOWCONTROL
fwtZumLinkCom2DelayBeforeSendMs	Com port will delay sending in Ms to allow the other side to switch from tx to rx mode.	Read-Write	Unsigned32
fwtZumLinkCom2BreakBeforeSendUs	Com port will send a break signal for at least the number of microseconds specified before sending the data.	Read-Write	Unsigned32
fwtZumLinkCom2TerminalServerPort	The TCP port number to use when handler is set to TerminalServer.	Read-Write	Unsigned32
fwtZumLinkCom2TerminalServerTimeOut	Terminal Server Time Out	Read-Write	Unsigned32
fwtZumLinkCom2TxBytes	The total bytes sent out of the Com port.	Read-only	Unsigned32
fwtZumLinkCom2RxBytes	The total bytes received from the Com port.	Read-only	Unsigned32

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Object	Description	Access	Syntax
fwtZumLinkCom2ConnectionDrops	The number of terminal server connections dropped due to inactivity.	Read-only	Unsigned32
fwtZumLinkTermserv_relay_mapping	Options for streaming between serial device servers.	Read-Write	ZUMLINK_TERMSERV_ RELAY_MAPPING
fwtZumLinkRemote_termserv_ip_address	IP address of remote terminal server.	Read-Write	IpAddress
fwtZumLinkUpTime	The number of seconds since the unit restarted.	Read-only	Unsigned32
fwtZumLinkUpTimeString	The number days, hours:minutes:seconds since the unit restarted.	Read-only	DisplayString
fwtZumLinkDcAppUptime	The number of seconds since the main app restarted.	Read-only	DisplayString
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
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	Not Accessible	

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Object	Description	<b>A</b>	Crimton
Object	Description	Access	Syntax
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
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	

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Object	Description	Access	Syntax
fwtZumLinkNetworkNeighborEntry	A row containing status information for a specific neighbor node.	Not Accessible	
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	
fwtZumLinkNetworkPathRssildx	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

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### **39.5. SNMP Write Access**

- 1. Verify V2C Enabled (on page 344) is enabled.
- 2. Make a note of the RW Community Name (on page 341).

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
```

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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.

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# **Appendix A: Technical Specifications**

**Note**: Specifications are subject to change without notice. For the most up-to-date specifications information, see the product's data sheet available at <a href="http://www.freewave.com">www.freewave.com</a>.

- Computing Resources (on page 478)
- Data Transmission (on page 478)
- General Information (on page 479)
- Interfaces (on page 479)
- Management (on page 480)
- Networking (on page 480)
- Power Requirements (on page 480)
- Receiver (on page 480)
- Transmitter (on page 481)

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## **Computing Resources**

**Note**: Access to the **Computing Resources** for the Z9-PC or Z9-PC-SR001 requires licensing. For information, contact FreeWave Sales at www.freewave.com/how-to-buy.

Computing Resources	
Specification	Description
CPU	ARM Cortex-A8 1 GHz
RAM	512 MB
Storage	1 GB
OS	Debian-based Linux

## **Data Transmission**

Data Transmission	
Specification	Description
Туре	Frequency Hopping Spread Spectrum
Modulation	2 level GFSK
	• 4- and 8-ary FSK
Link Throughput	Maximum of 1.6 Mbps
	4 Mbps with Compression
Error Detection	• ARQ
	• CRC
	Retransmit on error
	Forward Error Correction (FEC)
Hopping Rates	400, 200, 100, 50, 25 ms
Hopping Channels	Maximum of 112 channels
	RF Data Rate (on page 325) dependent
	• See:
	Brazil Hop Set - 900 MHz Channels (on page 457)
Hopping Patterns	Maximum of 16 patterns
	RF Data Rate (on page 325) dependent
Protocol	Adaptive Spectrum Learning (ASL)
User Interface Rate	Ethernet Rate: 10/100 Mbps
	Serial Rate: up to 250 kbps
Data Encryption	128-and 256-bit AES CCM
Advanced Features	Packet Aggregation
	Packet Compression

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## **General Information**

General Information	
Specification	Description
Operating Temperature	• -40°C to +85°C
	<ul> <li>-40°F to +185°F</li> </ul>
Humidity	0 to 95% non-condensing
Dimensions	• Z9-PC:
	<ul> <li>101.60 L x 50.80 W x 12.45 H (mm)</li> </ul>
	• 4.0 L x 2.0 W x 0.49 H (in)
	• Z9-PC-SR001:
	<ul> <li>101.60 L x 50.80 W x 16.51 H (mm)</li> </ul>
	• 4.0 L x 2.0 W x 0.65 H (in)
Weight	• <b>Z9-PC</b> : 41 g (0.09 lbs)
	• <b>Z9-PC-SR001</b> : 45 g (0.10 lbs)
Reliability	MTBF 207,801
Safety	Class I, Division 2, Groups A-D
UL	
RoHS	Directive 2011/65/EU

## Interfaces

Interfaces	
Specification	Description
Data Connectors	<ul> <li>Dual Row 10-pin header</li> <li>1 Ethernet / Power</li> <li>2 Serial</li> </ul>
USB Connector	Micro USB
RF Connector	MMCX

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## Management

Management		
Specification	Description	
Management	Enterprise MIB	
	• HTTP	
	Modbus	
	<ul> <li>SNMPv1/v2c/v3</li> </ul>	
	• SSH	

## Networking

Networking	
Specification	Description
Serial	Modbus RTU
	Modbus/TCP
	TCP client
	TCP server
Traffic Filtering	ARP filter
	Netmask filter
VLAN	802.1Q

## **Power Requirements**

Operating State	Description
Operating Voltage	+5 to +12 VDC
Idle Current	91 mA @ 12 VDC
Receive Current	108 mA @ 12 VDC
Transmit Current	330 mA @ 12 VDC

## Receiver

Receiver	
Specification	Description
IF Selectivity	> 40 dB
System Gain	135 dB

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Receiver			
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

## Transmitter

Transmitter		
Specification	Description	
Frequency Range	902 to 928MHz	
Frequency Stability	15ppm	
Output Power	<ul><li> 10mW to 1W</li><li>User selectable</li></ul>	
Output Impedance	50 ohms	
Range	97 km (60 miles), clear line of sight	
Channel Spacing	<ul> <li>230.4 kHz</li> <li>345.6 kHz</li> <li>691.2 kHz</li> <li>3225.6 kHz</li> </ul>	
RF Data Rate	• 115.2 kbps       • 1 Mbps         • 250 kbps       • 1.5 Mbps (Beta)         • 500 kbps       • 4 Mbps	

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# **Appendix B: OTA Interoperability**

	Model # / Firmware Compatibility						0	TA / Firmwa	re Compa	tibility		
•			Mode	ls Supp	orted				RF Da	ata Rate		
adio FW	Z9-PE2	Z9-P2	Z9-PE	Z9-P	Z9-PC	Z9-PC-SR001	115.2kbps	250kbps	500kbps	1Mbps	1.5Mbps (Beta)	4Mbps
1.0.7.1	х	х	x	x	x	х	х	XX	XX	x	x	x
1.0.7.1	NA	NA	x	х	x	x	х	XX	XX	x	x	x
1.0.7.1	NA	NA	x	х	x	x	х	XX	XX	x	x	x
1.0.7.0	NA	NA	x	х	x	x	х	XX	XX	x	x	x
1.0.4.0	NA	NA	x	х	NA	NA	х	x	х	x	NA	x
1.0.4.0	NA	NA	NA	NA	x	x	x	x	x	x	NA	x
1.0.4.0	NA	NA	х	х	NA	NA	x	x	x	x	NA	x
a 1 1 1 1	dio FW .0.7.1 .0.7.1 .0.7.0 .0.4.0 .0.4.0 .0.4.0	Z9-PE2           .0.7.1         X           .0.7.1         NA           .0.7.1         NA	Z9-PE2         Z9-PE2           .0.7.1         X         X           .0.7.1         NA         NA           .0.7.0         NA         NA           .0.4.0         NA         NA           .0.4.0         NA         NA	Kode           dio FW         Z9-PE2         Z9-PE2         Z9-PE           .0.7.1         X         X         X           .0.7.1         NA         NA         X           .0.7.0         NA         NA         X           .0.4.0         NA         NA         X           .0.4.0         NA         NA         X	Kode         Kode         Supplementation           dio FW         Z9-PE2         Z9-P2         Z9-PE         Z9-PE         Z9-PE           .0.7.1         X         X         X         X         X         X           .0.7.1         NA         NA         X         X         X         X           .0.7.1         NA         NA         X         X         X         X         X           .0.7.0         NA         NA         X         X         X         X         X           .0.4.0         NA         NA         NA         X         X         X         X           .0.4.0         NA         NA         X         X         X         X	Kode         Kode <th< td=""><td>Kodel         Kodel         Supported           dio FW         Z9-PE2         Z9-P2         Z9-PE         Z9-P         Z9-PC         Z9-PC-SR001           .0.7.1         X         X         X         X         X         X         X           .0.7.1         NA         NA         X         X         X         X         X           .0.7.0         NA         NA         X         X         X         X         X           .0.7.0         NA         NA         X         X         X         X         X           .0.4.0         NA         NA         X         X         NA         NA         X         X         X           .0.4.0         NA         NA         X         X         NA         NA         X         X         X</td><td>Model         Superiest         Su</td><td>Modelse supertedSuperse superteddio FWZ9-PE2Z9-P2Z9-PEZ9-PCZ9-PC-SR001115.2kbps250kbps.0.7.1XXXXXXXX.0.7.1NANAXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.4.0NANAXX<td>Model:: SupportedRF Datadio FWZ9-PE2Z9-P2Z9-PEZ9-PZ9-PCZ9-PC-SR001115.2kbps250kbps500kbps.0.7.1XXXXXXXXXXXXXX.0.7.1NANAXXXXXXXXXX.0.7.1NANAXXXXXXXXX.0.7.1NANAXXXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXX<td>Modelse superiedRF Data Ratedio 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     X         X         X         X         X           .0.7.1         NA         NA         X         X         X         X         X           .0.7.0         NA         NA         X         X         X         X         X           .0.7.0         NA         NA         X         X         X         X         X           .0.4.0         NA         NA         X         X         NA         NA         X         X         X           .0.4.0         NA         NA         X         X         NA         NA         X         X         X	Model         Superiest         Su	Modelse supertedSuperse superteddio FWZ9-PE2Z9-P2Z9-PEZ9-PCZ9-PC-SR001115.2kbps250kbps.0.7.1XXXXXXXX.0.7.1NANAXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.7.1NANAXXXXXXX.0.4.0NANAXX <td>Model:: SupportedRF 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Note: XX Enhanced 250kbps & 500kbps RF Data Rates

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## Appendix C: Firmware & Feature Interoperability

Firmware & Feature Interoperability							
Device Firmware Version	v1.1.2.2	v1.1.1.2	v1.1.0.1	v1.0.7.0	v1.0.6.0	v10.4.3	v1.0.4.2
Radio Firmware Version	v1.0.7.1	v1.0.7.1	v1.0.7.1	v1.0.7.0	v1.0.4.0	v1.0.4.0	v1.0.4.0
Feature							
Input Voltage	Z9-P2 Z9-PE2	N/A	N/A	N/A	N/A	N/A	N/A
ZumlQ	Z9-P Z9-PE Z9-PC Z9-PC-SR001 Z9-P2 Z9-PE2	Z9-P Z9-PE Z9-PC Z9-PC-SR001	Z9-P Z9-PE Z9-PC Z9-PC-SR001	N/A	Z9-P Z9-PE	N/A	N/A
VLAN Management	Х	N/A	N/A	N/A	N/A	N/A	N/A
ARPFiltering	Х	Х	N/A	N/A	N/A	N/A	N/A
VLAN (tagging and un-tagging)	Х	Х	N/A	N/A	N/A	N/A	N/A
Encryption Key Radio Web Interface Configuration	Х	Х	N/A	N/A	N/A	N/A	N/A
Network Diagnostics Diagram	Х	Х	N/A	N/A	N/A	N/A	N/A
Modbus	Х	Х	N/A	N/A	N/A	N/A	N/A
VSWR	Х	Х	Х	N/A	N/A	N/A	N/A
Expanded Local Diagnostics Noise level, RX success, TX availability, TX success	х	х	Х	N/A	N/A	N/A	N/A

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#### Appendix C: Firmware & Feature Interoperability

Firmware & Feature Interoperability							
Device Firmware Version	v1.1.2.2	v1.1.1.2	v1.1.0.1	v1.0.7.0	v1.0.6.0	v10.4.3	v1.0.4.2
Radio Firmware Version	v1.0.7.1	v1.0.7.1	v1.0.7.1	v1.0.7.0	v1.0.4.0	v1.0.4.0	v1.0.4.0
Feature							
Expanded MIB	×	×	~	NI/A	NI/A	NI/A	NI/A
Query & configure most statistics and settings	^	^	^	IN/A	IN/A	IN/A	N/A
Network Diagnostics Radio Web Interface	Х	Х	Х	N/A	N/A	N/A	N/A
Enhanced 250 & 500 kbps data rates	×	×	v	v	N1/A	NI/A	N1/A
Improved sensitivity, noise filtering, interference		×	×	^	N/A	N/A	N/A
1.5 Mbps RF Data Rate (Beta)	Х	Х	Х	Х	N/A	N/A	N/A
MacTable Entry-Age Timeout (Beta)	Х	Х	Х	X	N/A	N/A	N/A
	128	128	128	20			
Terminal Server Connections	concurrent	concurrent	concurrent	concurrent	N/A	N/A	N/A
	TCP	TCP	TCP	TCP			
Reneaters	Multiple	Multiple	Multiple	Multiple	Single	Single	Single
Repeaters	Repeaters	Repeaters	Repeaters	Repeaters	Repeater	Repeater	Repeater

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# **Appendix D: LEDs**

These are the LEDs for the Z9-PC or Z9-PC-SR001.

Note: See Z9-PC or Z9-PC-SR001 Port Connections (on page 21) for additional information.

## **Normal Operation**

#### LEDs - Normal Operation

EEBS Monnai oper					
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 😑	• 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.			
		<ul> <li>The pattern continues for 60 seconds after the last received packet before turning back to Off if the link has dropped.</li> </ul>			
D3 - Power	Solid Red (Bright) 🗕	Power is applied.			

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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> <li>Shows Activity.</li> <li>LED will blink / flicker while sending and receiving data on the Ethernet port.</li> <li>Important!: This LED is only installed on the Z9-PC.</li> </ul>		

## **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><li>Shows Activity.</li><li>LED will blink / flicker while sending and receiving data on the Ethernet port.</li></ul>
Ethernet Right		Note: This LED is not used on the <b>Z9-PC-SR001</b> .

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# Appendix E: Z9-PC or Z9-PC-SR001 Files and Descriptions

When the **Windows® File Explorer** window of the Z9-PC or 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 or Z9-PC-SR001 has been updated or rebooted, other files may appear.

ile <u>E</u> dit <u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>T</u> ools	Help			-	
O Index of . × +					
↔ ∀ ♀ ♀ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	D 192.168.111.100/user_data/		⊠ ☆	lii\	E 🐠
🥊 KVOD 😻 Boulder 🛛 🥊 Streaming   CPR	🕒 Log In < Freewave —				
•••0					
FREEWAVE					
тм		<u>Name</u> •		Last modified	Size
	boot_results.txt			2000-01-01 00:00:17.261000	438 Bytes
	config.txt			2000-01-01 00:52:11.774000	3.0 kB
Dilser Data	fw_upgrade_result.txt			2000-01-01 02:18:45	638 Bytes
File Upload	help.txt			2000-01-01 00:00:25.539000	78.2 kB
System Info Configuration	layout.txt			2000-01-01 00:00:25.718000	81.9 kB
Network Diagnostics	result.txt			2000-01-01 00:52:11.647000	1.2 kB
Help     Logout	sys_info.txt			2000-01-01 00:52:11.890000	632 Bytes

Figure 299: Z9-PC or Z9-PC-SR001 Files shown in Windows® File Explorer

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Files and Desc	riptions - Z9-PC or Z9-PC-SR001
File Name	Description
boot_results.txt	The <b>boot_results.txt</b> file shows the firmware version the device is currently running.
config.txt	The <b>config.txt</b> file contains all of the configuration parameters of the Z9-PC or Z9-PC-SR001.
	These parameters determine how the device functions and connects to other devices in the network.
fw_upgrade_ result.txt	The <b>fw_upgrade_result.txt</b> file shows the status of the update procedure for the device firmware.
	<b>Note</b> : This file appears after the <b>ZumLink</b> has been updated to a newer version of firmware.
help.txt	The help.txt file contains online user assistance information using the CLI commands.
	<b>Example</b> : In a CLI window, enter <b>help=txPower</b> or <b>help txpower</b> to see the help information for the <b>radioSetting.txpower</b> 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.
result.txt	The <b>result.txt</b> is used to verify the acceptance or rejection of each parameter change applied to the <b>config.txt</b> file.
	<b>Note</b> : This file appears after the <b>config.txt</b> file of the <b>ZumLink</b> has been changed.
sys_info.txt	The <b>sys_info.txt</b> file provides information about the radio including serial number, model number, firmware versions, and device name.

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# Appendix F: Z9-PC or Z9-PC-SR001 Modbus Register Map

This table provides a register map for the Modbus Input / Output devices.

Note: The Register Names that can be polled using Modbus correspond to the pages of the CLI.

Important!: By design, unused registers return 0 (zero).

#### Z9-PC or Z9-PC-SR001 Modbus Register Map

Register Name	Туре	Protocol Address	Number Registers	Modbus FC	Address
radioSettings.radioMode	uint32_t	31001	2	4	1000
radioSettings.rfDataRate	uint32_t	31003	2	4	1002
radioSettings.radioMaxRepeaters	uint32_t	31005	2	4	1004
radioSettings.radioRepeaterSlot	uint32_t	31007	2	4	1006
radioSettings.txPower	uint32_t	31009	2	4	1008
radioSettings.networkId	uint16_t	31011	1	4	1010
radioSettings.nodeId	uint16_t	31012	1	4	1011
radioSettings.frequencyKey	uint32_t	31013	2	4	1012
radioSettings.radioFrequency	float	31015	2	4	1014
radioSettings.radioHoppingMode	uint32_t	31017	2	4	1016
radioSettings.beaconInterval	uint32_t	31019	2	4	1018

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<b>Z9-PC or Z9-PC-SR001</b>	Modbus	Register	Мар
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Register Name	Туре	Protocol Address	Number Registers	Modbus FC	Address
radioSettings.beaconBurstCount	uint32_t	31021	2	4	1020
radioSettings.InaBypass	uint32_t	31023	2	4	1022
radioSettings.maxLinkDistanceInMiles	uint32_t	31025	2	4	1024
localDiagnostics.signalLevel	int	32001	2	4	2000
localDiagnostics.signalMargin	int	32003	2	4	2002
localDiagnostics.NoiseLevel	int	32005	2	4	2004
localDiagnostics.VSWR	uint32_t	32007	2	4	2006
localDiagnostics.TxSuccess	uint32_t	32009	2	4	2008
localDiagnostics.TxAvailability	uint32_t	32011	2	4	2010
localDiagnostics.RxSuccess	uint32_t	32013	2	4	2012
localDiagnostics.timestamp	uint32_t	32015	2	4	2014
localDiagnostics.RadioTx	uint32_t	32017	2	4	2016
localDiagnostics.RadioRx	uint32_t	32019	2	4	2018
localDiagnostics.RadioReliableTx	uint32_t	32021	2	4	2020
localDiagnostics.RadioReliableRx	uint32_t	32023	2	4	2022
localDiagnostics.RadioRexmit	uint32_t	32025	2	4	2024
localDiagnostics.RadioAckTx	uint32_t	32027	2	4	2026
localDiagnostics.RadioNoAckTx	uint32_t	32029	2	4	2028
localDiagnostics.RadioTimedOut	uint32_t	32031	2	4	2030
localDiagnostics.RadioBadAckRx	uint32_t	32033	2	4	2032
localDiagnostics.RadioTooLong	uint32_t	32035	2	4	2034
localDiagnostics.RadioTooShort	uint32_t	32037	2	4	2036
localDiagnostics.RadioBadSync	uint32_t	32039	2	4	2038
localDiagnostics.RadioBadCRC	uint32_t	32041	2	4	2040
localDiagnostics.RadioContentionDrop	uint32_t	32043	2	4	2042
localDiagnostics.RadioSendingDrop	uint32_t	32045	2	4	2044
localDiagnostics.RadioLLTx	uint32_t	32047	2	4	2046
localDiagnostics.RadioLLRx	uint32_t	32049	2	4	2048
localDiagnostics.cntSTX	uint32_t	32051	2	4	2050
localDiagnostics.cntETX	uint32_t	32053	2	4	2052
localDiagnostics.cntBadSync	uint32_t	32055	2	4	2054
localDiagnostics.cntBadBCC	uint32_t	32057	2	4	2056

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Register Name	Туре	Protocol Address	Number Registers	Modbus FC	Address
localDiagnostics.interfaceDataTx	uint32_t	32059	2	4	2058
localDiagnostics.interfaceDataRx	uint32_t	32061	2	4	2060
localDiagnostics.interfaceBytesTx	uint32_t	32063	2	4	2062
localDiagnostics.interfaceBytesRx	uint32_t	32065	2	4	2064
localDiagnostics.resetsDetected	uint32_t	32067	2	4	2066
localDiagnostics.resetsSent	uint32_t	32069	2	4	2068
networkStats.rx_bytes	uint32_t	32071	2	4	2070
networkStats.rx_packets	uint32_t	32073	2	4	2072
networkStats.rx_dropped	uint32_t	32075	2	4	2074
networkStats.rx_errors	uint32_t	32077	2	4	2076
networkStats.tx_bytes	uint32_t	32079	2	4	2078
networkStats.tx_packets	uint32_t	32081	2	4	2080
networkStats.tx_dropped	uint32_t	32083	2	4	2082
networkStats.tx_errors	uint32_t	32085	2	4	2084
Com1.TxBytes	uint32_t	32087	2	4	2086
Com1.RxBytes	uint32_t	32089	2	4	2088
Com2.TxBytes	uint32_t	32091	2	4	2090
Com2.RxBytes	uint32_t	32093	2	4	2092
date.upTime	uint32_t	32095	2	4	2094
date.time	uint32_t	32097	2	4	2096
rfStats.UpPackets	uint32_t	32099	2	4	2098
rfStats.UpBytes	uint32_t	32101	2	4	2100
rfStats.UpErrors	uint32_t	32103	2	4	2102
rfStats.UpRate	double	32105	4	4	2104
rfStats.UpRateAvg	double	32107	4	4	2106
rfStats.UpRateAvg2	double	32109	4	4	2108
rfStats.DownPackets	uint32_t	32111	2	4	2110
rfStats.DownBytes	uint32_t	32113	2	4	2112
rfStats.DownErrors	uint32_t	32115	2	4	2114
rfStats.DownRate	double	32117	4	4	2116
rfStats.DownRateAvg	double	32119	4	4	2118
rfStats.DownRateAvg2	double	32121	4	4	2120

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# Appendix G: 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.

**Warning!** DO NOT OPEN THE ZumLink Z9-PC or Z9-PC-SR001 WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.

#### **GNU License Notification**

STO

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.

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#### FCC Notifications

#### FCC Supplier's Declaration of Conformity

FreeWave Technologies, Inc.

5395 Pearl Parkway, Boulder, CO 80301

Phone Number: 303.381.9200

Website: www.freewave.com

declare under our sole responsibility that the product Models: Z9-PC or Z9-PC-SR001 complies with Part 15 of 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: KNYPMT0101AB.

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 Part 15 Class A

**Note**: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the User-Reference Manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

#### 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.

#### Argentina CNC

#### Identificación CNC

• **Z9-PC / Z9-PC-SR001**: Contiene CNC ID: C-21612

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#### Brazil

#### ADENDO AO MANUAL

Z9-PE; Z9-P; Z9-PC; Z9-PC-SR001; Z9-P2; Z9-PE2

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



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#### **ISED 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. CAN ICES-3 (A)/NMB-3(A)

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. CAN ICES-3 (A)/NMB-3(A)

#### **ISED Host Installation and Label**

The content of this documentation covers FreeWave Technologies, Inc. models sold under IC: 2329B-PMT0101AB.

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**".

#### **ISED 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 7.9 inches (20cm) 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 7.9 pouces (20cm) séparant l'antenne d'une personne présente en conformité avec les limites permises d'exposition du grand public.

#### **Professional Installation**

All models sold under the listed IC ID must be professionally installed.

#### **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:
  - UL 60950-1
  - IEC/EN 60950-1
  - CAN/CSA C22.2 No. 60950-1-07.
- Input voltage for the Z9-PC or Z9-PC-SR001 is +5 to +12 VDC.

#### **UL and Safety Notification**

Z9-PC / Z9-PC-SR001 is a Recognized component under UL File Numbers: e484141 and e327789.

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#### Power Source

- Z9-PC or Z9-PC-SR001 IS intended to be operated from a Limited Power Source (LPS) or Class 2 power source in accordance with IEC/EN/UL 60950-1 and CAN/CSA C22.2 No. 60950-1-07.
- The Z9-PC or Z9-PC-SR001 IS approved to operate with an input voltage range of +5 to +12 VDC.

#### Standards and Editions

- HazLoc Standards
  - 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
- It is hereby declared that the Z9-PC or 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.

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