

ZumLink™

Covers Models: Z9-P, Z9-PE, and Z9-PE-GREY Firmware 1.1.0.1

User & Reference Manual



Part Number: LUM0076AA Revision: Sep-2018

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

Warning! Do not remove or insert any of the cables while the unit is powered on unless the area is known to be free of ignition concentrations of flammable gasses or vapors.

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STOP

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- 2. If Product is used outside of FreeWave specifications as stated in the Product's data sheet.
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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 moreinfo@freewave.com.

Additional Information

Note: Use the <u>http://support.freewave.com/</u> website to download the latest documentation for Z9-P / Z9-PE / Z9-PE-GREY.

Registration is required to use this website.

Document Styles

This document uses these styles:

- Parameter setting text appears as: [Page=radioSettings]
- File names appear as: configuration.cfg.
- File paths appear as: C:\Program Files (x86)\FreeWave Technologies.
- User-entered text appears as: 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 Z9-P / Z9-PE / Z9-PE-GREY.

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

- Z9-P is a board level 900MHz Ethernet radio.
- Z9-PE and Z9-PE-GREY are enclosed 900MHz Ethernet radios.

The Z9-P / Z9-PE / Z9-PE-GREY 900MHz Series:

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

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

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1.1. Communication Method

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

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

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

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

1.2. ZumBoost Technology

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

1.2.1. Adaptive Spectrum Learning

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

1.2.2. Forward Error Correction

- The fecRate (on page 212) increases the reliability of the data transferred over the air at the cost of some transmission throughput.
 - Improves sensitivity by 3dB to maximize range and link range in noisy environments.
 - Adds redundant information to a data stream to detect packet errors and corrects them to avoid retransmission of the packet.

1.2.3. Packet Aggregation

- The aggregateEnabled (on page 210) setting increases throughput of small packets by combining multiple packets into a single packet minimizing the number of packets required for transmission.
 - Does NOT affect medium and large packets.

1.2.4. Packet Compression

• When the compressionEnabled (on page 211) 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.

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1.3. ZumIQ Application Environment

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

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

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2. Included & User-supplied Equipment

2.1. Included Equipment

Included Equipment			
Description			
Z9-P / Z9-PE / Z9-PE-GREY wireless device.			
Power Cable with flying leads			
• Z9-P (FreeWave Part Number: ASC2402PT)			
Z9-PE (FreeWave Part Number: ASC0003ZL)			
 Z9-PE-GREY (FreeWave Part Number: ASC0003TH) 			
Quick Start Guide			

Note: See the Available Accessories (on page 392).

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2.2. User-supplied Equipment

- DC power source
- Power cable
- USB to micro-USB cable
- CAT5e / CAT6 Ethernet cable
- FCC approved antenna **
- Computer

Note: **See Approved Antennas (on page 189) for detailed information. Approved antennas can be purchased directly from FreeWave.

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3. Port Connections and Pinout Assignments

Port Connections

- Z9-P Port Connections (on page 21)
- Z9-PE Port Connections (on page 21)
- Z9-PE-GREY Port Connections (on page 22)
- Serial and Ethernet Port Details (on page 22)

Pinout Assignments

• Serial Pinout Assignments (on page 23)

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3.1. Z9-P Port Connections

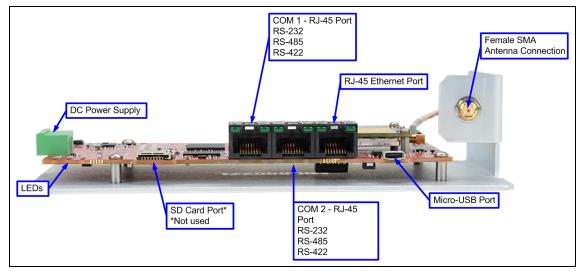


Figure 1: Z9-P Port Connections

3.2. Z9-PE Port Connections

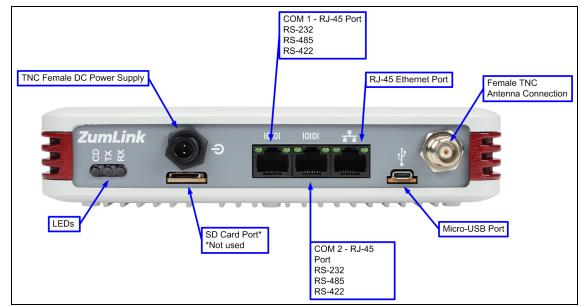


Figure 2: Z9-PE Port Connections

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3.3. Z9-PE-GREY Port Connections

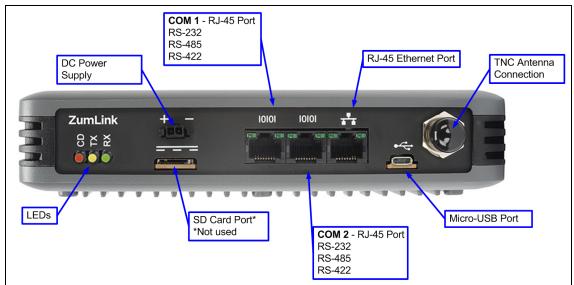


Figure 3: Z9-PE-GREY Port Connections

3.4. Serial and Ethernet Port Details

Note: The RJ-45 Ethernet and the micro USB connectors are standard connectors with industry standard pinout and signals. See the LEDs (on page 435) for additional information.

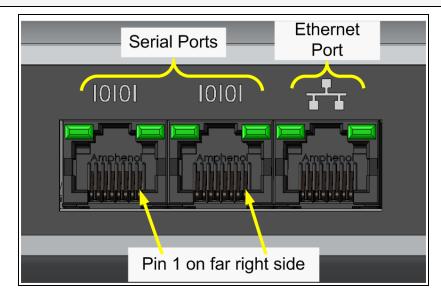


Figure 4: Serial and Ethernet Ports - Z9-P / Z9-PE / Z9-PE-GREY

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3.5. Serial Pinout Assignments

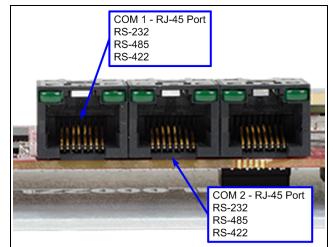


Figure 5: Z9-P Serial Pinout Assignments

(I) - Input

(O) - Output

(B) - Bidirectional

Z9-P Serial Pinout Assignments			
Pin Number	RS232	RS485	RS422
1			
2	CD (O)		
3	DTR (I)		
4	GND	GND	GND
5	RXD (I)		TX+ (A+) (O)
6	TXD (O)	RX+ (Y+) (B)	RX+ (Y+) (I)
7	CTS (O)	RX- (Z-) (B)	RX- (Z-) (I)
8	RTS (I)		TX- (B-) (O)
***Com1.mode=	RS232	RS485	RS485
Com2.mode=			
***Com1.duplex=	Half or Full	Half	Full
Com2.duplex=			

Note: ***See the COM Parameters (on page 191) section for detailed information.

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

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4. Installation

- Power Setup (on page 25)
- Installation (on page 25)

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4.1. Power Setup

- The Z9-P / Z9-PE / Z9-PE-GREY is approved to operate with an input voltage range of +6 to +30 VDC (+/- 10%) that can supply at least 0.8 Amps.
- See the Technical Specifications (on page 430) for additional information.

FREEWAVE Recommends: All input power supply wires should be at least 20AWG wires. A dedicated and stable power supply line is preferred.

The power supply used MUST provide more current than the amount of current drain listed in the specifications for the product and voltage. (at least 355 mA at 12V)

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

4.2. Installation

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

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

Warning! Only FCC approved antennas may be used. See Approved Antennas (on page 189).



The antenna must be professionally installed on a fixed, mounted, and permanent outdoor structure to satisfy RF exposure requirements.

Any antenna placed outdoors must be properly grounded.

Use extreme caution when installing antennas and follow all instructions included with the antenna.



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

3. Connect the Z9-P / Z9-PE / Z9-PE-GREY to a power supply.

Note: The Z9-P / Z9-PE / Z9-PE-GREY is approved to operate with an input voltage range of +6 to +30 VDC (+/- 10%) that can supply at least 0.8 Amps.

FREEWAVE Recommends: All input power supply wires should be at least 20AWG wires. A dedicated and stable power supply line is preferred.

The power supply used MUST provide more current than the amount of current drain listed in the specifications for the product and voltage.

The LED lights blink to show startup.

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Note: See LEDs (on page 435) for more information.

4. Connect the USB cable to the computer and the Micro USB end to the Z9-P / Z9-PE / Z9-PE-GREY.

Important!: The USB does NOT power the Z9-P / Z9-PE / Z9-PE-GREY. It only provides a configuration interface.

Figure 6 is an example of the Z9-PE connected to a laptop.

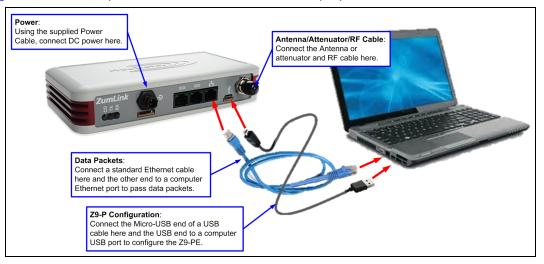


Figure 6: Z9-PE Connected to Laptop

The FreeWave Drivers and ZumLink windows may open.

FreeWave Drivers (D:) File Home Share View	Drive Tools Manage			- ⊔	×
Pin to Quick Copy Paste access	Mova Conv. Delete Ban	Easy access	▼ Properties ▼ Hi	lit Belect none	in
Clipboard	Organize	New	Open	Select	
 	Name	Date modified	マ ひ Sear Гуре	size	م ر
> 🐔 OneDrive	^ Name				
> 💻 This PC	autorun.inf		Setup Information	1 KB	
	DRIVER-INFO	.,	ile	1 KB	
> 🏂 FreeWave Drivers (D:)	5 FWLogo.ico		con	11 KB	
> 💣 Network	fwt_cdc_acm.cat	7/9/2018 10:53 AM	Security Catalog	9 KB	
	fwt_cdc_acm.inf	7/9/2018 10:53 AM	Setup Information	3 KB	
	v				

Figure 7: AutoPlay FreeWave Drivers window

Important!: The driver installs automatically.

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SumLink-402673	37941					- 0	×
File Home	Share View						^ 🕜
Pin to Quick Copy access	Cut Paste Copy path Paste shortcut	Move Copy to * Copy	New item *	Properties	🛃 Open 👻 📝 Edit 🌄 History	Select all Select none	1
C	lipboard	Organize	New	O	pen	Select	
Image: P Iman	S → This PC → ZumLink-	4026737941		~ Ū	Search Zur	nLink-4026737941	Q
 ZumLink-40 402673794 4 OS (C:) FreeWave D 	1	4026737941	.80 GB				
1 item							== 🖿

Figure 8: ZumLink window

- 5. Optional: Use the Ethernet port for data communications.
- 6. Continue with:
 - Firmware Upgrade (on page 28)
 - Drag and Drop Configuration ZumLink (on page 53)
 - CLI Configuration (on page 65)
 - Web Interface Configuration (on page 75)

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5. Firmware Upgrade

Important!: The Download procedure must be completed first.

These are the basic steps to upgrade the Z9-P / Z9-PE / Z9-PE-GREY firmware:

- A. Download the Upgrade File (on page 29)
- B. Optional: Download the ZumIQ Application Environment (on page 88)
- C. Review the Upgrade Summary v1.1.01 (on page 32) to know which files are used to upgrade from a previous firmware version.
- D. Complete either the: Firmware Upgrade - Drag and Drop (on page 35) or Firmware Upgrade - Web Interface (on page 41)

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5.1. Download the Upgrade File

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

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

Important!: Registration is required to use this website.

2. Enter the User Name and Password.

FREEWAVE	SUPPORT REGISTER FREEWAVE.COM
How can we help?	_
Help Topics	Log In
	Username
	Remember Me Log In

Figure 9: FreeWave Login window



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

4. Click the Firmware link. (Figure 10)

		SUPPORT REGISTER FREEWAVE.COM
	How can we help?	
	Q Search the knowledge base	
Help Topics		
Accessories	() Warranty Status Portal	With our new website we are resetting all user names and passwords, please <u>create a new account</u>
(Amplifiers	S Firmware	

Figure 10: Help Topics window

The Firmware window opens.

5. Click the ZumLink Firmware link. (Figure 11)

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FREEWAVE	SUPPORT REGISTER FREEWAVE.COM
	Q. Search the knowledge base
Sirmware	Can't Find It? Contact us! Phone: 1.866 923 6168
WaveContact Firmware	ZumLink Firmware

Figure 11: Firmware window

The available firmware/software appears in the window. (Figure 12)

FREEWAVE SUPPORT	SUPPORT REGISTER FREEWAVE.COM
	Q Search the knowledge base
ZumLink Firmware	Can't Find it? Contact us!
Z9-P Z9-PE Firmware v1.1.0.1	Phone: 1.866.923.6168 Email: support@freewave.com
Z9-P Z9-P Z9-PE Firmware v1.1.0.1	

Figure 12: Z9-P / Z9-PE / Z9-PE-GREY Firmware window

- 6. Click the firmware/software link. The **Firmware Upgrade** window opens.
- 7. Select and click the Firmware_v1_1_0_1 attachment. (Figure 13)



Figure 13: Z9-P / Z9-PE / Z9-PE-GREY Firmware Upgrade window with selected Firmware v1_1_0_1 Attachment

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The Opening dialog box opens. (Figure 14)

Firmware_v1_1_0_1.zip which is: Compressed (zipped) Folder (41.6 MB) from: http://support.freewave.com What should Firefox do with this file?	
from: http://support.freewave.com What should Firefox do with this file?	
What should Firefox do with this file?	
_	
Open with Windows Explorer (default)	~
● Save File	
Do this automatically for files like this from now on.	
-	

Figure 14: Opening Firmware v1_1_0_1.zip dialog box

8. Click OK.

The Enter name of file to save to dialog box opens. (Figure 15)

ۏ Enter name of file t	to save to								×
← → ~ ↑ <mark> </mark>	> This PC > OS (C:)	> _2	ZumLink Files →	Firmware v1.1.0.1 Update Files		~ Ū	Search Firmware v	1.1.0.1 Upd	9
Organize 👻 New	w folder							-	•
Y 📙 _ZumLink Fil	les	^	Name	^		Date modified	Туре	Size	
Firmware v	1.1.0.1 Update Files			Ν	lo items mat	ch your search.			
		~				-			
File <u>n</u> ame:	Firmware_v1_1_0_1.zip	•							~
Save as <u>t</u> ype:	Compressed (zipped)	Folder	(*.zip)						~
∧ Hide Folders							§ave	Cancel	

Figure 15: Enter name of file to save to dialog box

- 9. Search for and select a location to save the .zip file to and click **Save**. The **Enter name of file to save to** dialog box closes.
- 10. Either:
 - a. Continue with Optional: Download the ZumIQ Application Environment (on page 88) or
 - b. Open a Windows® Explorer window and find the location where the Firmware v1_1_ 0_1.zip file was saved.
- 11. Double-click the .zip file.
- 12. Extract the files from the .zip file into the parent location.

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

13. Continue with Upgrade Summary - v1.1.01 (on page 32).

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5.2. Upgrade Summary - v1.1.01

5.2.1. Downgrade

Contact FreeWave Technical Support (on page 13) for firmware DOWNGRADE assistance.

5.2.2. Upgrade

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

The **UPGRADE** options are:

- Upgrade from Firmware v1.0.7.0 (on page 33)
- Upgrade from Firmware v1.0.6.0 (on page 33)
- Upgrade from Firmware v1.0.4.3 (Z9-PC and Z9-PC-SR001) (on page 34)
- Upgrade from Firmware v1.0.4.2 (Z9-P and Z9-PE) (on page 34)

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

- Firmware Upgrade Drag and Drop (on page 35)
- Firmware Upgrade Web Interface (on page 41)

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5.2.3. Upgrade from Firmware v1.0.7.0

Required Files

1_Device_Firmware_v1_1_0_1.pkg 2_Radio_Firmware_v1_0_7_1.fcf

Optional: ZumIQ Files

3_Optional_ZumIQ_Environment_v1_1_0_0.pkg

Important!: Contact FreeWave Technical Support (on page 13) for the ZumIQ license.

5.2.4. Upgrade from Firmware v1.0.6.0

Required Files

1_Device_Firmware_v1_1_0_1.pkg 2_Radio_Firmware_v1_0_7_1.fcf

Optional: ZumIQ Files

- 3_Optional_ZumIQ_Environment_v1_1_0_0.pkg
 - The ZumIQ license is preserved

Note: ZumIQ can be added anytime in future.

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

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

Required Files

1_Device_Firmware_v1_1_0_1.pkg 2_Radio_Firmware_v1_0_7_1.fcf

Optional: ZumIQ Files

3_Optional_ZumIQ_Environment_v1_1_0_0.pkg

Note: ZumIQ can be added anytime in future. Contact FreeWave Technical Support (on page 13) for the ZumIQ license.

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

Required Files

- 1_Device_Firmware_v1_1_0_1.pkg
- 2_Radio_Firmware_v1_0_7_1.fcf

Optional: ZumIQ Files

3_Optional_ZumIQ_Environment_v1_1_0_0.pkg

Note: ZumIQ can be added anytime in future. Contact FreeWave Technical Support (on page 13) for the ZumIQ license.

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

- Firmware Upgrade Drag and Drop (on page 35)
- Firmware Upgrade Web Interface (on page 41)

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5.3. Firmware Upgrade - Drag and Drop

This is the drag-and-drop procedure to upgrade the Z9-P / Z9-PE / Z9-PE-GREY firmware.

STOP

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

- Alternatively, use the Firmware Upgrade Web Interface (on page 41) to upgrade the Z9-P / Z9-PE / Z9-PE-GREY.
- The images in this procedure are for Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

FREEWAVE Recommends: Upgrade to v1.1.0.1 to use the enhanced features and updated security of the Z9-P / Z9-PE / Z9-PE-GREY.

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

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

- 1. Verify the Download the Upgrade File (on page 29) procedure is complete.
- 2. Connect the USB cable to the computer and the Micro USB end to the Z9-P / Z9-PE / Z9-PE-GREY Micro-USB port.

The FreeWave Drivers and ZumLink windows open.

TreeWave Drivers (D:)	re Tools			- 0	×
File Home Share View Ma	anage				^ 🕐
Image: Pin to Quick access Copy Paste Image: Copy path Paste shortcut Image: Copy path	Move Copy to v to v	New item *	Properties	Select all Select none Invert selection	
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> 💻 This PC	DRIVER-INFO	7/9/2018 10:53 AM Fil	e	1 KB	
> 🏂 FreeWave Drivers (D:)	茨 FWLogo.ico	7/9/2018 10:53 AM Ico	on	11 KB	
	fwt_cdc_acm.cat	7/9/2018 10:53 AM Se	curity Catalog	9 KB	
> 💣 Network	fwt_cdc_acm.inf	7/9/2018 10:53 AM Se	tup Information	3 KB	
↓ S items					==

Figure 16: FreeWave Drivers window

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SumLink-402673	37941					- 0	Х
File Home	Share View						~ 🕐
Pin to Quick Copy access	Paste ↓ Cut ∞ Copy path Paste shortcut	Move Copy to *	New item *	Properties	🛃 Open 👻 📝 Edit 🌄 History	Select all	1
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✓ ♥ ♥ × ➡ ← → * ↑ ■	S → This PC → ZumLink-	4026737941		√ Ō	Search Zur	mLink-4026737941	٩
 ZumLink-40 402673794 US (C:) FreeWave D 	11	4026737941 1.80 GB free of 1	.80 GB				
1 item	*						

Figure 17: ZumLink window

3. In the **ZumLink** window, double-click the connected Z9-P / Z9-PE / Z9-PE-GREY. The files of the Z9-P / Z9-PE / Z9-PE-GREY appear in the window. (Figure 18)

File Home Share View					^
Image: Second system Image: Second system Image: Second system Image: Second system Pin to Quick access Copy Paste Image: Second system Pin to Quick access Copy Paste Image: Second system	t Move Copy to ~ to ~	New item ▼ ↑ New folder	Properties	Edit	Select all Select none Invert selection
Clipboard	Organize	New	Ope	n	Select
🤄 🍤 🥲 🗙 🚎 🕼 - 💷 📙 📼					
\leftarrow \rightarrow \checkmark \uparrow \blacksquare \rightarrow This PC \rightarrow ZumLi	nk-4026737941 > 4026737941		~ Ū	Search 40267	37941 🔎
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
茨 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

Figure 18: Opened ZumLink window showing the Default Files

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

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

 Locate and select the downloaded 1_Device_Firmware_v1_1_0_1.pkg upgrade file. (Figure 19)

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

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

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Image: Pin to Quick access Copy Paste Image: Copy path Image: Pin to Quick access Copy Paste Image: Paste shortcut	Move Copy to v to v	New item ▼ T Easy access ▼ folder	Properties	🔡 Select none	n	
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← → ∽ ↑ 🔄 > This PC > OS (C:) >	_ZumLink Files > Firmware v1.1.0	.1 Update Files	ٽ ~	Search Firmware v	1.1.0.1 Upd	م .
ZumLink Files	· · ·					
	Name	Date	modified Type	s Size		
Firmware v1.1.0.1 Update Files	Name			xt Document	42,432 KB	
	_	okg.txt 8/	28/2018 12:51 PM Te			
-	1_Device_Firmware_v1_1_0_1.	okg.txt 8/.	28/2018 12:51 PM Te 28/2018 12:51 PM Te	xt Document xt Document	42,432 KB	
-	1_Device_Firmware_v1_1_0_1. 2_Radio_Firmware_v1_0_7_1.fc	bkg.txt 8// f.txt 8// ent_v1_1_0_0.pkg.txt 8//	28/2018 12:51 PM Te 28/2018 12:51 PM Te 28/2018 12:51 PM Te	xt Document xt Document xt Document	42,432 KB 117 KB	
	1_Device_Firmware_v1_1_0_1, 2_Radio_Firmware_v1_0_7_1.fc 3_Optional_ZumIQ_Environm	okg.txt 8/ f.txt 8/ ent_v1_1_0_0.pkg.txt 8/ ent_v1_1_0_0.pkg.txt 8/	28/2018 12:51 PM Te 28/2018 12:51 PM Te 28/2018 12:51 PM Te 28/2018 9:32 AM Co	xt Document xt Document xt Document	42,432 KB 117 KB 165,428 KB	
	1_Device_Firmware_v1_1_0_1, 2_Radio_Firmware_v1_0_7_1.fc 3_Optional_ZumIQ_Environm 3_Optional_ZumIQ_Environm	pkg.txt 8// .f.txt 8/ ent_v1_1_0_0.pkg.txt 8/ ent_v1_1_0_0.zip 8/ 8/ 8/	28/2018 12:51 PM Te 28/2018 12:51 PM Te 28/2018 12:51 PM Te 28/2018 9:32 AM Co 28/2018 9:29 AM Co	xt Document xt Document xt Document ompressed (zipp	42,432 KB 117 KB 165,428 KB 165,476 KB	
-	1_Device_Firmware_v1_1_1_0_1, 2_Radio_Firmware_v1_0_7_1.ft 3_Optional_ZumIQ_Environm 3_Optional_ZumIQ_Environm Firmware_v1_1_0_1.zip	pkg.bd 8// .f.bd 8// ent_v1_1_0_0.pkg.bd 8// ent_v1_1_0_0.zip 8// WIB.bd 8//	28/2018 12:51 PM Te 28/2018 12:51 PM Te 28/2018 12:51 PM Te 28/2018 9:32 AM Co 28/2018 9:32 AM Co 28/2018 9:32 AM Co 28/2018 9:29 AM Co 28/2018 12:51 PM Te	xt Document xt Document xt Document ompressed (zipp ompressed (zipp	42,432 KB 117 KB 165,428 KB 165,476 KB 42,573 KB	

Figure 19: Selected 1_Device_Firmware_v1_1_0_1.pkg.txt File

7. Drag and drop the .pkg or .pkg.txt file on to the ZumLink window. (Figure 20)

A026737941 Home Share View More Copy path Pinto Quick. Copy Pathe Copy path Copy pathe Copy pathe	
	new Open select
← → × ↑ → This PC > ZumLink-4026737941 > 4026737941	v 0 Search 4026737941 p
S ZumLink-4026737941	Type Size Date Picture Taken
4026737941	Text Document 1 KB 1/1/2000 1:00 AM
Sol (C:)	Firmware v1.1.0.1 Update Files -
TreeWave Drivers (D:)	File Home Share View
isyouttet result.tet sys_info.bet	
+ Copy1	oroot of storage Dipboard Organize New Open Select
6 items	🗧 🚊 👻 🛧 📙 > This PC > OS (C:) > _ZumLink Files > Firmware v1.1.0.1 Update Files 🛛 🗸 💿 Search Firmware v1.1.0.1 Upd 🥬
	_ZumLink Files A Name Date modified Type Size
	Firmware v1.1.0.1 Update Files
	2_Radio_Firmware_v1_0_7_14cf.txt 8/28/2018 12:51 PM Text Document 117 KB
	3_Optional_ZumIQ_Environment_v1_1_0_0.pkg.bt 8/28/2018 12:51 PM Text Document 165,428 KB
	3_Optional_ZumIQ_Environment_v1_1_0_0.zip 8/28/2018 9:32 AM Compressed (zipp 165,476 KB Firmware v1 1 0 1.zip 8/28/2018 9:29 AM Compressed (zipp 42,573 KB
	Firmware_v1_1_0_1.zip 8/28/2018 9:29 AM Compressed (zipp 42,573 KB FREEWAVE-TECHNOLOGIES-MIB.txt 8/28/2018 12:51 PM Text Document 75 KB
	UCD-SNMP-MIB-WP201.bt 8/28/2018 12:51 PM Text Document 10 KB
	v
	7 items 1 item selected 41.4 MB

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

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The **ZumLink** window is similar to Figure 21:

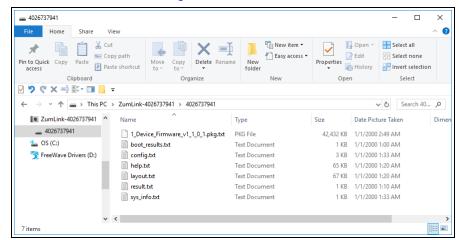


Figure 21: 1_Device_Firmware_v1_1_0_1.pkg.txt File Dropped in the ZumLink window

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

8. **WAIT** a few minutes for the **FreeWave Drivers** and **ZumLink** windows to close. The Z9-P / Z9-PE / Z9-PE-GREY automatically reboots.

Warning! DO NOT remove power from the Z9-P / Z9-PE / Z9-PE-GREY during or immediately after the firmware upgrade process!

Wait until the Home window (on page 351) Web Interface is accessible before removing power from the **ZumLink** device (approximately 6-8 minutes).

STOP

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

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



The LEDs (on page 435) indicated the upgrade process.

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

- 9. In the **ZumLink** window, double-click the connected Z9-P / Z9-PE / Z9-PE-GREY. The files of the Z9-P / Z9-PE / Z9-PE-GREY appear in the window.
- 10. Locate and select the downloaded 2_Radio_Firmware_v1_0_7_1.fcf upgrade file. (Figure 22)

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

integrating with the Z9-P / Z9-PE / Z9-PE-GREY.

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

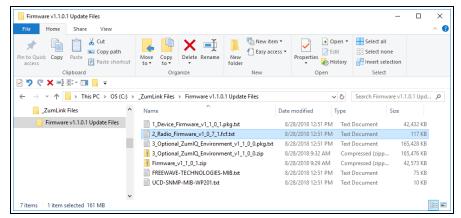


Figure 22: Selected 2_Radio_Firmware_v1_0_7_1.fcf.txt File

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

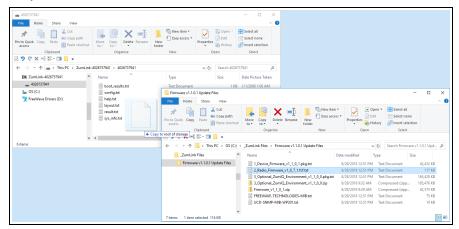


Figure 23: Drag and Drop the .fcf or .fcf.txt file to the ZumLink window

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

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

The LEDs (on page 435) indicated the upgrade process.

14. Optional: Open the sys.info.txt file to verify the upgrade information. (Figure 24)

Important!: The image provides example information only. Each Z9-P / Z9-PE / Z9-PE-GREY 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.35 systemInfo.radioSerialNumber=4026737941 systemInfo.deviceName= systemInfo.deviceModel=Z9-PE systemInfo.deviceConfiguration=R1 systemInfo.deviceFirmwareVersion=FWT1101TB.17 systemInfo.deviceId=1 systemInfo.layoutHash=3558005563 systemInfo.resetInfo= systemInfo.hopTableVersion=SET0001HT systemInfo.rteVersion= systemInfo.rteTemplateVersion= systemInfo.licenses=None

Figure 24: sys.info.txt file with Updated Firmware

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

15. Continue with:

- Optional: Drag and Drop Installation of ZumIQ Application Environment (on page 90)
- Drag and Drop Configuration ZumLink (on page 53)
- CLI Configuration (on page 65)

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5.4. Firmware Upgrade - Web Interface

This procedure uses a web browser window to upgrade the Z9-P / Z9-PE / Z9-PE-GREY firmware.

STOP

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

- Alternatively, use the Firmware Upgrade Drag and Drop (on page 35) to upgrade the Z9-P / Z9-PE / Z9-PE-GREY.
- The images in this procedure are for Windows® 10 and/or Firefox®. The dialog boxes and windows appear differently on each computer.

FREEWAVE Recommends: Upgrade to v1.1.0.1 to use the enhanced features and updated security of the Z9-P / Z9-PE / Z9-PE-GREY.

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



Caution: This procedure requires the Windows® Explorer file extension to be visible. See the Microsoft® topic <u>Show or Hide File Name Extensions</u> to view the extensions.

The Z9-P / Z9-PE / Z9-PE-GREY upgrade process requires these basic steps:

- A. Download the Upgrade File (on page 29)
- B. Setup the Computer IP Address Configuration (on page 42)
- C. Install the Upgrade File using the Web Interface (on page 46)

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

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5.4.1. Setup the Computer IP Address Configuration

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

- 1. On the computer, click the Windows® Start button and select Control Panel.
- View the Control Panel window by Category and click Network and Sharing Center. (Figure 25)

🛃 All Control Panel Items			- 🗆 X
← → · ↑ 🖾 · Control Panel ›	All Control Panel Items >		✓ ♂ Search Control Panel
File Edit View Tools			
Adjust your computer's settings	5		View by: Small icons 🔻
Administrative Tools	📑 AutoPlay	🐌 Backup and Restore (Windows 7)	🏘 BitLocker Drive Encryption
🔽 Color Management	Credential Manager	鹶 Date and Time	befault Programs
💽 Dell Command Power Manager	🐱 Dell Command Update	Dell Touchpad	📇 Device Manager
R Devices and Printers	Ease of Access Center	File Explorer Options	ka File History
Flash Player (32-bit)	A Fonts	Free Fall Data Protection	🚑 Indexing Options
🖉 Infrared	🔯 Intel(R) Rapid Storage Technology	🔜 Intel® Graphics Settings	党 Internet Options
Java	E Keyboard	Mail	Mouse
Network and Sharing Center	NVIDIA Control Panel	🧠 NVIDIA nView Desktop Manager	Phone and Modem
Po Se Se		Recovery	🔗 Region
🔍 Re 💶 Network and	d Sharing Center	🖷 Sound	Speech Recognition
	2	🔛 System	Taskbar and Navigation
Troubleshooting	💐 User Accounts	🔐 Windows Defender Firewall	Windows Mobility Center
kindows To Go	Work Folders		

Figure 25: Control Panel > Network and Sharing Center

The Network and Sharing Center window opens.

3. Click the Change Adapter Settings link. (Figure 26)

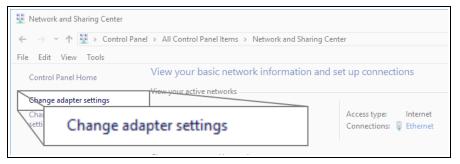


Figure 26: Change Adapter Settings Link

The Network Connections window opens. (Figure 27)

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

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😰 Network Con	nections		
$\leftarrow \rightarrow - \uparrow$	👰 > Control Panel > Net	work and Internet > Network Connections	✓ Ċ Search
File Edit View	v Advanced Tools		
Organize 🔻	Disable this network device	Diagnose this connection Rename this connection View status of this connection	»
×8	Bluetooth Network Connection Not connected	Ethernet freewave.local Intel(R) Ethernet Connectio	
	fortissl Disconnected PPPoP WAN Adapter	Ethernet freewave.local Intel(R) Ethernet Connect	tio

Figure 27: Network Connections window

The Ethernet Status dialog box opens. (Figure 28)

5. 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	
Properties	2

Figure 28: Ethernet Status dialog box

The Ethernet Properties dialog box opens.

- 6. Select the Internet Protocol Version 4 (TCP/IPv4) option. (Figure 29)
- 7. Click the **Properties** button.

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Ethernet Properties	\times	
Networking Sharing		
Connect using:		
Intel(R) Ethemet Connection (5) I219-LM		
Configure	1	
This connection uses the following items:	- 1	
Client for Microsoft Networks		
File and Printer Sharing for Microsoft Networks GoS Packet Scheduler		
 Gos Packet Scheduler FortiClient NDIS 6.3 Packet Filter Driver 		
✓ Internet Protocol Version 4 (TCP/IPv4)		
Microsoft Network Adapter Multiplexor Protocol		
Microsoft LLDP Protocol Driver	'	
	_	
Install Uninstall Properties		
Description		
Transmission Control Protocol/Internet Protocol wide area network protocol that provides comin	rop	erties
across diverse interconnected networks.		
OK Cancel		
UK Cance		

Figure 29: Ethernet Properties dialog box

The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box opens. (Figure 30)

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

Internet F	Protocol Version 4 (TCP/IPv4	4) Properties	×
General	Alternate Configuration		
this cap	n get IP settings assigned auto ability. Otherwise, you need appropriate IP settings.		
() Ot	otain an IP address automatic	ally	
OUs	e the following IP address: —		
IP ac	ldress:		
Subr	iet mask:		
Defa	ult gateway:		
() Ot	otain DNS server address auto	omatically	
	e the following DNS server ad	dresses:	
Prefe	erred DNS server:		
Alter	nate DNS server:	· · · · · ·	
V.	alidate settings upon exit	Ad	dvanced
		ОК	Cancel

Figure 30: Default Example of Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

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

10. In the **IP Address** text box, enter an IP Address that is **in the same subnet range but a DIFFERENT IP Address** than the Z9-P / Z9-PE / Z9-PE-GREY or all other units in the network. (Figure 31)

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-P / Z9-PE / Z9-PE-GREY 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	
OUse the following IP address:	
IP address: 192 . 168 . 111 . 125	
Subnet mask: 255 . 255 . 0	
Default gatowsw	
Obtain (Obt	SS:
Preferred IP address:	192 . 168 . 111 . 125
Alternate C Subnet mask:	255.255.255.0
Default gateway:	
V	

Figure 31: Changed Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

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

- 11. Click **OK** to save the changes and close the dialog box.
- 12. Click **Close** twice to close the **Local Area Connection Properties** and **Local Area Connection Status** dialog boxes.
- 13. Continue with Install the Upgrade File using the Web Interface (on page 46).

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5.4.2. Install the Upgrade File using the Web Interface

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

- 1. Verify the Download the Upgrade File (on page 29) procedure is complete.
- 2. Using a CAT5e / CAT6 Ethernet cable, connect the Z9-P / Z9-PE / Z9-PE-GREY Ethernet port to the computer's Ethernet port.
- 3. Open a web browser.
- 4. In the URL address bar, enter the IP address of the attached Z9-P / Z9-PE / Z9-PE-GREY.

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

- 5. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 6. On the Menu bar, click the File Upload link. (Figure 32)

Duser Data - Drag and Drop Files	File Upload	O System info	Configuration	Retwork Diagnostics	⊛Help	⊖Logout
	¹ File	e Upload				

Figure 32: File Upload link

The Authentication Required (Login) dialog box opens.

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

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

Figure 33: File Upload window

- Click the Browse button. The File Upload dialog box opens.
- Locate and select the downloaded 1_Device_Firmware_v1_1_0_1.pkg upgrade file. (Figure 34)

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

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

	> OS (C:)	→ _ZumLink Files → Firmware v1.1.0.1 Update Files →	`	 Bearch Firmw 	vare v1.1.0.1 Upd.	. >
Organize 🔻 New folder						(
_ZumLink Files	^	Name	Date modified	Туре	Size	
📙 Firmware v1.1.0.1 Updat	te Files	1_Device_Firmware_v1_1_0_1.pkg.txt	8/28/2018 12:51 PM	Text Document	42,432 KB	
		2_Radio_Firmware_v1_0_7_1.fcf.txt	8/28/2018 12:51 PM	Text Document	117 KB	
		3_Optional_ZumlQ_Environment_v1_1_0_0.pkg.txt	8/28/2018 12:51 PM	Text Document	165,428 KB	
		3_Optional_ZumIQ_Environment_v1_1_0_0.zip	8/28/2018 9:32 AM	Compressed (zipp	165,476 KB	
		Firmware_v1_1_0_1.zip	8/28/2018 9:29 AM	Compressed (zipp	42,573 KB	
		FREEWAVE-TECHNOLOGIES-MIB.txt	8/28/2018 12:51 PM	Text Document	75 KB	
		UCD-SNMP-MIB-WP201.txt	8/28/2018 12:51 PM	Text Document	10 KB	
	~					
File name:	1_Device_Fir	mware_v1_1_0_1.pkg		 ✓ All Files (*.*) 		~

Figure 34: File Upload dialog box with Selected 1_Device_Firmware_v1_1_0_1.pkg.txt File

11. Click Open.

The dialog box closes and the **File Upload** window returns showing the selected file. (Figure 35)

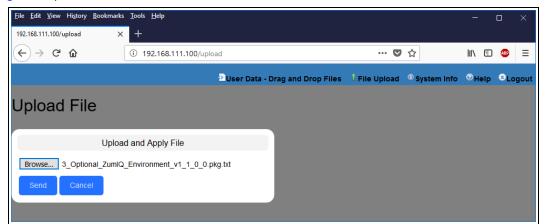


Figure 35: File Upload window with Selected 1_Device_Firmware_v1_1_0_1.pkg.txt File

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12. Click Send.

The **File Upload** window changes to show the completed upload percentage to the Z9-P / Z9-PE / Z9-PE-GREY. (Figure 36)

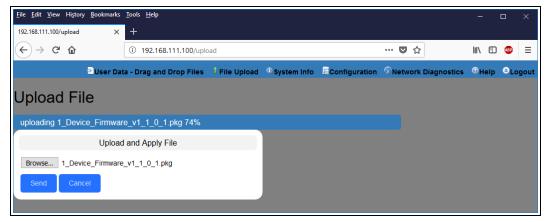


Figure 36: File Upload window Showing Uploading Percentage

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

Warning! DO NOT remove power from the Z9-P / Z9-PE / Z9-PE-GREY during or immediately after the firmware upgrade process!

Wait until the Home window (on page 351) Web Interface is accessible before removing power from the **ZumLink** device (approximately 6-8 minutes).

STOP

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

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

The **File Upload** window refreshes and shows the completed and uploaded file applied to the Z9-P / Z9-PE / Z9-PE-GREY. (Figure 37)



The LEDs (on page 435) indicated the upgrade process.

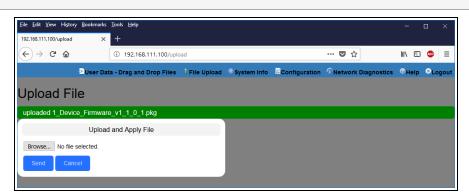


Figure 37: File Upload window Showing Completed Upload of the Selected File

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- 14. Click the **Browse** button. The **File Upload** dialog box opens.
- 15. Locate and select the downloaded 2_Radio_Firmware_v1_0_7_1.fcf upgrade file. (Figure 38)
- 16. Optional: If using some versions of Windows® 8, Windows® 8.1, or Windows® 10, change the extension of the .fcf file to .fcf.txt and select that file.

- → ✓ ↑ 📙 > This PC > OS (C:)	→ _ZumLink Files → Firmware v1.1.0.1 Update Files →		V ひ Search Firmw	مare v1.1.0.1 Upd
Organize 🔻 New folder				= • 🔳 🤅
_ZumLink Files	Name	Date modified	Туре	Size
Archive	1_Device_Firmware_v1_1_0_1.pkg.txt	8/28/2018 12:51 PM	Text Document	42,432 KB
Default files in Z9-C-T-Firmwa	2_Radio_Firmware_v1_0_7_1.fcf.txt	8/28/2018 12:51 PM	Text Document	117 KB
Default files in Z9-PE v1.0.4.2.6	3_Optional_ZumIQ_Environment_v1_1_0_0.pkg.txt	8/28/2018 12:51 PM	Text Document	165,428 KB
Default files in Z9-PE v1.0.7.0.1	3_Optional_ZumIQ_Environment_v1_1_0_0.zip	8/28/2018 9:32 AM	Compressed (zipp	165,476 KB
Default files in ZL v1.1.0.1	Firmware_v1_1_0_1.zip	8/28/2018 9:29 AM	Compressed (zipp	42,573 KB
Firmware v1.1.0.1 Update Files	FREEWAVE-TECHNOLOGIES-MIB.txt	8/28/2018 12:51 PM	Text Document	75 KB
Update Files	UCD-SNMP-MIB-WP201.txt	8/28/2018 12:51 PM	Text Document	10 KB
Z9-C or T Programmer-Tool 🗸				
File name: 2_Radio_Fir	rmware_v1_0_7_1.fcf		✓ All Files (*.*)	~

Figure 38: 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 39)

<u>File Edit View Histor</u> 192.168.111.100/upload	y <u>B</u> ookmarks ×						-	
(←) → ⊂		i 192.168.111.100/uplo	ad			♥ ☆	III\ 🗉	
	User Dat	a - Drag and Drop Files	l File Upload	• System Info	Configuration	Retwork Diagnostics	() Help	Cogout
Upload Fi	le							
uploaded 1_Devie	ce_Firmware	e_v1_1_0_1.pkg						
	Upload	and Apply File						
Browse 2_Rad		v1_0_7_1.fcf						



18. Click Send.

The **File Upload** window changes to show the completed upload percentage to the Z9-P / Z9-PE / Z9-PE-GREY. (Figure 40)

Note: The .fcf file uploads very quickly (≈ 1-2 minutes).

p) The LEDs (on page 435) indicated the upgrade process.

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<u>File Edit V</u> iew Higton	y <u>B</u> ookmarks	<u>I</u> ools <u>H</u> elp					-		×
192.168.111.100/upload	×	+							
← → ♂ ŵ		i 192.168.111.100/uplo	ad			… ◙ ☆	lii\ (D 🐵	≡
	Duser Dat	a - Drag and Drop Files	¹ File Upload	① System Info	Configuration	Retwork Diagnostics	⊙Hel	p ⊜L	ogout
Upload Fi	le								
uploading 2_Rad	io_Firmware	_v1_0_7_1.fcf 100%							
	Upload	and Apply File							
Browse 2_Rac		v1_0_7_1.fcf							

Figure 40: File Upload window Showing Uploading Percentage

The **File Upload** window refreshes and shows the completed and uploaded file applied to the Z9-P / Z9-PE / Z9-PE-GREY. (Figure 41)

<u>F</u> ile <u>E</u> dit <u>V</u> iew Histo	ry <u>B</u> ookmarks	<u>T</u> ools <u>H</u> elp					-		×
192.168.111.100/upload	×	+							
$\overleftarrow{\bullet}$ \rightarrow \overleftarrow{c}		(i) 192.168.111.100/uplo	ad			… ♥ ☆	III\ 🗉) 🐵	≡
	Duser Dat	a - Drag and Drop Files	[†] File Upload	• System Info	Configuration	Retwork Diagnostics	⊖Help	GLO	ogout
Upload Fi	ile								
uploaded 2_Radi	o_Firmware	_v1_0_7_1.fcf							
	Upload	and Apply File							
Browse No file	selected.								
Send Car	ncel								

Figure 41: File Upload window Showing Completed Upload of the Selected File

19. Click the **System Info** link. (Figure 42)

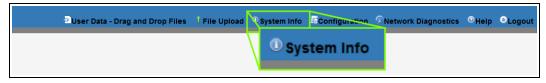


Figure 42: System Info link

The System Info window opens showing the updated firmware on the Z9-P / Z9-PE / Z9-PE-GREY. (Figure 43)

Important!: The image provides example information only. Each Z9-P / Z9-PE / Z9-PE-GREY provides its own unique information.

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	History <u>B</u> ookmarks									-	□ ×
192.168.111.100/c	dump/systemInfo 🗙										
$\overleftarrow{\leftarrow} \rightarrow \ C^{i}$	۵	i) 192.1	68.111.100/	dump/system	Info			•••	☑ ☆	lii\ E	□ 🚥 😑
	Diser	Data - Dr	ag and Drop	Files 🕴 F	ile Upload	System Info	Config	uration 🔊	letwork Diagn	ostics [©] Help	o ⊜Logout
System Info											
Network											ironment
	Sy	stem Info									
	Serial Number	40267379	941		_						
	Model Code	0									
	Radio Model	AMT0100	AA								
	Radio Model Code	0									
Radio	Firmware Version	FWT1071	TR.35								_
Ra	Radi	o Fir	mware	e Vers	ion FW	/T1071 ⁻	TR.35				
	Device Model	Z9-PE									_
Dev	vice Configuration	R1									
Device	Firmware Version	FWT1101	TB.17								_
	Devic	e Fir	mwar	e Vers	ion FW	/T1101 ⁻	TB.17				
	Reset Info										
	Hop Table Version	SET0001	нт								
	Rte Version										
Rte	e Template Version										
	Licenses	None									

Figure 43: System Info window

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

20. Continue with:

- Optional: Web Interface Installation of ZumIQ Application Environment (on page 93)
- Web Interface Configuration Z9-P / Z9-PE / Z9-PE-GREY (on page 81)

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6. Configuration

- Drag and Drop Configuration ZumLink (on page 53)
- CLI Configuration (on page 65)
- Web Interface Configuration (on page 75)

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6.1. Drag and Drop Configuration - ZumLink

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

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

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

Procedure

1. Connect the USB cable to the computer and the Micro USB end to the Z9-P / Z9-PE / Z9-PE-GREY.

The FreeWave Drivers and ZumLink windows may open.

	ve Tools anage			- 0	× ~ (?
★ ↓ </th <th>Move Copy to * Copy</th> <th>New item ~</th> <th>Properties Ec</th> <th>dit Belect none</th> <th></th>	Move Copy to * Copy	New item ~	Properties Ec	dit Belect none	
Image: Copy path Image: Copy path					
← → · ↑ Š → FreeWave Drivers (D)			✓ Ö Sear	ch FreeWave Drivers (D:)	Q
> 🧥 OneDrive	Name				
> 💻 This PC			1 State 1 Stat		
> 🏂 FreeWave Drivers (D:)	🏂 FWLogo.ico	7/9/2018 10:53 AM Ic	on	11 KB	
Network		7/9/2018 10:53 AM S	ecurity Catalog	9 KB	
5 items	ivt_cdc_acm.inf	7/9/2018 10:53 AM S	etup Information	_	

Figure 44: AutoPlay FreeWave Drivers window

File Home Share View						~ (
Pin to Quick Copy Paste	b.t.e		New item *	Properties	Select all Select none	
Clipboard		Organize	New	Open	Select	
← → ~ ↑ I → This PC → 2 ✓ I ✓ ZumLink-4026737941	CumLink-40267			ע פֿ Search Zu	mLink-4026737941	م
 20mini: 4020737941 4026737941 S OS (C:) FreeWave Drivers (D:) 		4026737941	.80 GB			
	~					

Figure 45: ZumLink window

2. In the **ZumLink** window (Figure 45), double-click the connected Z9-P / Z9-PE / Z9-PE-GREY.

The files of the Z9-P / Z9-PE / Z9-PE-GREY appear in the window.

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File Home Share View					^
Pin to Quick Copy Paste access	utu Move Copy to * to *	New folder New	Properties	📝 Edit	Select all Select none
Clipboard	Organize	New	Op	en	Select
🤄 🍤 🦿 🗙 🚎 🖫 - 🎞 📙 =					
\leftarrow \rightarrow \checkmark \Uparrow \blacksquare \Rightarrow This PC \Rightarrow Zum	Link-4026737941 > 4026737941		~ Ū	Search 40267	737941
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
茨 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
	v <			_	

Figure 46: Opened ZumLink window showing the Default Files

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

Example: C:\ZumLink Config File.

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

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

File Edit View Tools Help	ZumLink Config File 🕨 👻 🍫	Search ZumLink Config File
Organize 🔻 🦪 Open 🔻 Print	Burn New folder	
Computer COS (C:) DVD RW Drive (D:) FreeWave Drivers (E:)	Name Config.txt	Date modified 1/21/2016 3:46 PM
	: 1/21/2016 3:46 PM Date created: 1/21/2016 3:46 PM : 1.42 KB	

Figure 47: 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.

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	config.txt - Note	pad	
Fi	le Edit Format	View Help	
	New	Ctrl+N	*
	Open	Ctrl+O	
	Save	Ctrl+S	
	Save As		
	Page Setup		
	Print	Ctrl+P	
	Exit		

Figure 48: 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.

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

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

Save As		×
Computer + OS (C:) ► ZumLink Config File ►	Search ZumLink Config Fi 👂
Organize 🔻 New folder		III - Q
- Computer	^ Name	Date modified 1
S (C:)	Config.txt	1/21/2016 3:46 PM 1
TreeWave Drivers (E:)	E	=
	* <	• •
File <u>n</u> ame: config.cfg		•
Save as <u>t</u> ype: All Files (*.*)		
Hide Folders	Encoding: ANSI •	Save Cancel

Figure 49: 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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```

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Note: See the systemInfo Parameters (on page 312) for detailed information about the parameters.

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

Note: See radioSettings Parameters (on page 262) for detailed information about these settings.

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

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 **networkId**.

Important!: With **radioHoppingMode** enabled, only one radio can be designated as a Gateway or Gateway-Repeater. All other radios MUST be designated as Endpoints or Endpoint-Repeaters. For detailed information, see the radioSettings Parameters (on page 262).

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

🔄 config.cfg - Notepad	
File Edit Format View Help	
[Page=systemInfo] systemInfo.deviceName= systemInfo.deviceId=1 [Page=radioSettings] radioSettings.rfDataRate=RATE_1M radioSettings.r	L II



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

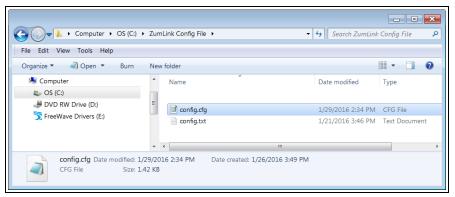


Figure 51: Select the changed .cfg or .cfg.txt file.

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

🔼 🕞 🚽 🥃 🕨 Computer 🕨 ZumLin	402675200	• 49 Search 4026675399	
	16 4020075555	• • • • • • • • • • • • • • • • • • •	
File Edit View Tools Help			
Organize 🔻		III • 🖬 😡	
🗃 ZumLink	^ Name	Type Size Date Picture Taken E	
4026675399	boot results.txt	Text Document 1 KB 1/1/2000 12:00 AM	
🚯 Network	a config.txt	Text Document 2 KB 1/1/2000 12:00 AM	
😝 Control Panel	fw_upgrade_result.txt	Text Document 1 KB 1/1/2000 12:08 AM	
💈 Recycle Bin	ayout.txt	Text Document 20 KB 1/1/2000 12:00 AM	
	esult.txt	Text Document 2 KB 1/16/2000 2:25 AM	
	sys_info.txt	Text Document 1 KB 1/1/2000 12:00 AM	
	 ✓ ✓	Copy to root of storage (* 1/1/200 File Edit View Tools Help	• 49 Search ZumLink Config File
		Organize 🔻 🦪 Open 🔻 Burn New folder	II • 🗌 🔞
		Somputer Name	Date modified Type Size
		OS (C) DVD RW Drive (D:) Config.cfg	1/29/2016 2:51 PM CFG File
		S FreeWave Drivers (E:)	1/21/2016 3:46 PM Text Document
		Config.cfg Date modified: 1/29/2016 2:51 PM Date created: 1/26/2016 3:49 CFG File Size: 1.42 KB	

Figure 52: Drag and drop the .cfg or .cfg.txt file to the ZumLink window.

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

Note: The more changes made in the **.cfg** or **.cfg.txt** file, the longer the Z9-P / Z9-PE / Z9-PE-GREY 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.

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→	imLink ▶ 402	6675399		✓ ⁴ → Search	UserStorage	
Organize 🔻					· ·	6
💐 ZumLink	*	Name	Туре	Size	Date Picture Taken	
4026675399		boot_results.txt	Text Document	1 KB	1/1/2000 12:05 AM	
📵 Network		config.cfg	CFG File	2 KB	1/1/2000 12:55 AM	
🐖 Control Panel		config.txt	Text Document	2 KB	1/1/2000 12:55 AM	
😻 Recycle Bin		fw_upgrade_result.txt	Text Document	1 KB	1/1/2000 12:05 AM	
		layout.txt	Text Document	19 KB	1/1/2000 12:04 AM	
		result.txt	Text Document	6 KB	1/16/2000 2:25 AM	
	=	sys_info.txt	Text Document	1 KB	1/1/2000 12:55 AM	
New Contraction of the Contracti	-	•	m			
8 items						

Figure 53: Changed .cfg file copied to the ZumLink window.

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

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

result.txt - Notepad	
File Edit Format View Help	
Trying: radioSettings.mode=Gateway New: radioSettings.mode=Gateway RESULT:0:OK No errors Detected	· · · · ·

Figure 54: Opened result.txt file.

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

- 23. As appropriate, repeat the Drag and Drop procedure to correct any errors.
- 24. Optional: Double-click the config.txt file to view and verify the new Z9-P / Z9-PE / Z9-PE-GREY configuration.
- 25. Optional: Complete the Change the Passwords (on page 157) procedure.

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6.2. Drag and Drop Configuration - ZumIQ

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

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

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

Procedure

1. Connect the USB cable to the computer and the Micro USB end to the Z9-P / Z9-PE / Z9-PE-GREY.

The FreeWave Drivers and ZumLink windows may open.

	ve Tools anage			- 🗆 X
Pin to Quick Copy Paste	Move Copy to * Copy	New item *	Properties	Select none
Clipboard	Organize	New	Open	Select
 ♥ ♥ × ■ ≣ + □ ■ = + ← → × ↑ > FreeWave Drivers (D) 			ע פֿ Search F	reeWave Drivers (D:)
> 🧥 OneDrive	Name	Date modified Ty	pe Size	2
> 💻 This PC	autorun.inf	7/9/2018 10:53 AM Se	tup Information	1 KB
	DRIVER-INFO	7/9/2018 10:53 AM Fil	e	1 KB
> 🏂 FreeWave Drivers (D:)	茨 FWLogo.ico	7/9/2018 10:53 AM Ico	on	11 KB
> 🧀 Network	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
5 items				

Figure 55: AutoPlay FreeWave Drivers window

File Home Share View						\sim
Pin to Quick Copy Paste Copy Paste		Move to v	New item ~	Properties ▼ History	Select all Select none Invert selection	
Clipboard		Organize	New	Open	Select	
$\leftrightarrow \rightarrow \vee \uparrow \blacksquare $ This PC > 2	ZumLink-402	:6737941		✓ ♂ Search Zur	mLink-4026737941	Q
 ZumLink-4026737941 	^	4026737941				
4026737941		1.80 GB free of 1	90 CP			
> 🏪 OS (C:)		1.00 GB free of f	.00 00			
> 🏂 FreeWave Drivers (D:)						

Figure 56: ZumLink window

2. In the **ZumLink** window (Figure 56), double-click the connected Z9-P / Z9-PE / Z9-PE-GREY.

The files of the Z9-P / Z9-PE / Z9-PE-GREY appear in the window.

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File Home Share View					^
Pin to Quick Copy Paste access	tut Move Copy to * Copy	New item ▼ New folder	Properties	Edit	Select all Select none
Clipboard	Organize	New	Ope	en	Select
🖻 🍤 🥙 🗙 🚎 🕼 - 🔟 📙 📼					
\leftarrow \rightarrow \checkmark \Uparrow \blacksquare \Rightarrow This PC \Rightarrow Zuml	ink-4026737941 > 4026737941		√ Ū	Search 40267	737941
SumLink-4026737941	^ Name	Туре		Size	Date Picture Taken
4026737941	boot_results.txt	Text Document		1 KB	1/1/2000 1:00 AM
🏪 OS (C:)	i 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
	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
	~ <			_	

Figure 57: Opened ZumLink window showing the Default Files

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

Example: C:\ZumLink Config File.

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

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

File Edit View Tools Help	ZumLink Config File 🔸 🔹 📢	Search ZumLink Config File
Organize 🔻 🧳 Open 🔻 Print	Burn New folder	III - 🗌 🔞
Computer CS (C:) DVD RW Drive (D:) FreeWave Drivers (E:)	Name	Date modified 1/21/2016 3:46 PM
-	: 1/21/2016 3:46 PM Date created: 1/21/2016 3:46 PM : 1.42 KB	

Figure 58: 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.

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	config.txt - Noter	bad		
File	Edit Format	View Help		
	New	Ctrl+N		*
	Open	Ctrl+O		
	Save	Ctrl+S	–	
C	Save As			
	Page Setup			
	Print	Ctrl+P		
	Exit			

Figure 59: 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.

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

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

Save As						×
Computer + C	S (C:) ►	_ZIQ Files 🕨		▼ 4	Search _ZIQ Files	٩
Organize New folder					•	0
le Computer	*	Name	Date modified	Туре	Size	
& OS (C:)	E	i config.txt	1/1/2000 12:10 AM	Text Document	2 KB	
	-					
File <u>n</u> ame: ZIQconfig.cfg						-
Save as <u>t</u> ype: All Files (*.*)						-
Hide Folders			Encoding: ANSI	<u>•</u>	ave Cance	2

Figure 60: 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 **Network** settings to meet the network architecture:
 - [Page=network]
 - network.ip_address=nnn.nnn.nnn
 - network.netmask=nnn.nnn.nnn
 - network.gateway=nnn.nnn.nnn

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Note: See the network Parameters (on page 245) for detailed information about the parameters.

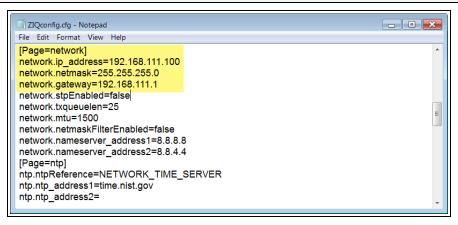


Figure 61: ZIQconfig.cfg Network Page

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

Computer > OS (C:)	• _	ZIQ Files 🕨	 ✓ ✓	Search_ZIQ Files	X
File Edit View Tools Help					
Organize 🔻 🗳 Open 👻 Burn	Ν	lew folder			• 🗌 🔞
Scomputer	*	Name	Date modified	Туре	Size
🧆 OS (C:)		config.txt	1/1/2000 12:10 AM	Text Document	2 KB
🥔 DVD RW Drive (D:) 🏹 FreeWave Drivers (E:)		ZIQconfig.cfg	6/13/2018 7:10 AM	CFG File	2 KB
ZIQconfig.cfg Date modified CFG File Size	6/1 1.94		eated: 6/13/2018 7:10 A	М	

Figure 62: Select the changed .cfg or .cfg.txt file.

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

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Computer + Zu	mLink-4026747704 > 4026747704		• 4 9 Se	arch 4026739913						
File Edit View Tools Help										
Organize 🔻					0					
ZumLink-4026739913	^ Name	Туре	Size	Date Picture Tak	en					
4026739913	boot_results.txt	Text Document	1 KB	1/1/2000 1:24 A	M					
Network Gontrol Panel	config.txt	Text Document	2 KB	1/1/2000 2:29 A	M			• • • Search _ZIQ Files P Type Size File folder Tet Document 2 KB effect for an an		
Recycle Bin	fw_upgrade_result.txt	Text Document	1 KB	1/1/2000 1:24 A						
	elp.txt	Text Document		1/1/2000 2:28 A					Q Files ۶	
	sys_info.txt				10.51					
	= + C	opy to root of stor		r + OS (C:) + _i ielp	CIQ Files 🔸			Search _2	2 Files	4
6 items	• •	Organize -	Open	Burn N	ew folder				•	0
~		🥾 Comp	uter	*	Name	^	Date modified	Туре	Size	
		🕹 OS (🗼 v1.0.6.0 De	ault Files	6/13/2018 6:53 AM	File folder		
) RW Drive (D:) Wave Drivers (E:)	E	i config.txt		1/1/2000 12:10 AM			
			wave Drivers (L.)		ZIQconfig.c	fg	6/13/2018 7:10 AM	CFG File		2 KB
				-						
			ZIQconfig.cfg D. DFG File	ate modified: 6/13 Size: 1.94		Date create	d: 6/13/2018 7:10 AM			

Figure 63: Drag and drop the .cfg or .cfg.txt file to the ZumLink window.

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

Note: The more changes made in the .cfg or .cfg.txt file, the longer the Z9-P / Z9-PE / Z9-PE-GREY 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.

	nLink-40	26747704 • 4026747704		▼ 4 ₂	Search 4026739913	,
File Edit View Tools Help Organize						0
🕡 ZumLink-4026739913	*	Name	Туре	Size	Date Picture Taken	0
4026739913		boot_results.txt	Text Document	1 KB	1/1/2000 12:05 AM	
🔨 Network		config.cfg	CFG File	2 KB	1/1/2000 12:55 AM	
🤛 Control Panel		📄 config.txt	Text Document	2 KB	1/1/2000 12:55 AM	
😻 Recycle Bin		fw_upgrade_result.txt	Text Document	1 KB	1/1/2000 12:05 AM	
		layout.txt	Text Document	19 KB	B 1/1/2000 12:55 AM B 1/1/2000 12:05 AM B 1/1/2000 12:04 AM	
	_	result.txt	Text Document	6 KB	1/16/2000 2:25 AM	Image: Constraint of the second sec
	=	sys_info.txt	Text Document	1 KB	1/1/2000 12:55 AM	
6 items	-	•	ш			

Figure 64: Changed .cfg file copied to the ZumLink window.

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

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

Note: The LEDs indicate a successful setup. See LEDs (on page 435) for additional information.

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- 22. Optional: Double-click the config.txt file to view and verify the new Z9-P / Z9-PE / Z9-PE-GREY configuration.
- 23. As appropriate, repeat the Drag and Drop procedure to correct any errors.
- 24. Continue with ZumIQ Application Environment (on page 87).

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6.3. CLI Configuration

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

The basic steps are:

- A. Connect the Z9-P / Z9-PE / Z9-PE-GREY to the Computer (on page 65)
- B. Tera Term Activation and ZumLink Setup (on page 66)

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

6.3.1. Connect the Z9-P / Z9-PE / Z9-PE-GREY to the Computer

1. Connect the USB cable to the computer and the Micro USB end to the Z9-P / Z9-PE / Z9-PE-GREY.

The FreeWave Drivers and ZumLink windows may open.

File Home	Share View Mar	nage			^
Pin to Quick Copy	Paste Cut Paste Paste shortcut	Move Copy to to to to	New item *	Properties	Select all Select none
CI	ipboard	Organize	New	Open	Select
┘ ♡ ୯ × 	FreeWave Drivers (D:)			マ ひ Search Fre	eWave Drivers (D:) 🔎
ConeDrive	^	Name	Date modified T	ype Size	
📃 This PC		autorun.inf		etup Information	1 KB 1 KB
🗧 🏂 FreeWave Dri	vers (D:)	TWLogo.ico		con	11 KB
🕨 💣 Network		fwt_cdc_acm.cat fwt_cdc_acm.inf		ecurity Catalog etup Information	9 KB 3 KB

Figure 65: FreeWave Drivers window

File Home	Share View						^
in to Quick Copy access	Cut Paste Paste shortcut	Move Copy to *	Rename New folder	Properties	I Open ▼ DEdit History	Select all Select none Invert selection	
c	lipboard	Organize	New	Op	en	Select	
$\leftarrow \rightarrow \checkmark \uparrow$	This PC > ZumLink- 026737941	4026737941 402673	70.41	v Ö	Search Zum	Link-4026737941	۶
402673794			3 free of 1.80 GB				
> 🏪 OS (C:) > ኝ FreeWave E	Nitrana (Da)						
		1.80 GE	3 free of 1.80 GB				

Figure 66: ZumLink window

2. Continue with Tera Term Activation and ZumLink Setup (on page 66).

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6.3.2. Tera Term Activation and ZumLink Setup

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

- 1. On the computer connected to the Z9-P / Z9-PE / Z9-PE-GREY device, open a terminal program (e.g., Tera Term http://ttssh2.osdn.jp/).
- 2. In Tera Term, click the File menu and select New Connection.

2	Tera Term - [dis	connected	I] VT
Eil	e <u>E</u> dit <u>S</u> etup	C <u>o</u> ntrol	<u>W</u> indow
	New connecti		Alt+N
	Duplicate ses		Alt+D
	Cygwin conne	ection	Alt+G
	Log		
	Comment to	Log	
	Change	-	
	Replay Log		
	TTY Record		
	TTY Replay		
	Print		Alt+P
	Disconnect		Alt+I
	Exit		Alt+Q

Figure 67: 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-P / Z9-PE / Z9-PE-GREY is connected to.

Tera Term: New con	nection			×
© TCP/ <u>I</u> P	Hos <u>t</u> : [192.168.111.	100	-
	[√ Hist <u>o</u> ry	T 0.D 1.4 0.0	_
	Service: (⊙ Te <u>l</u> net	TCP port#: 22	
	(⊚ <u>s</u> sh	SSH version: SSH2	-
		0 Other	Proto <u>c</u> ol: UNSPEC	-
	,			
Serial	- ,		munications Port (COM1)	-
	ОК		munications Port (COM1) ewave Configuration Conso neup	ole (CO

Figure 68: Select the ZumLink COM port

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

4. Click **OK** to save the changes and close the dialog box. The Tera Term window shows the connected COM port and Baud rate in the title bar of the window.

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5. In the Tera Term window, click the Setup menu and select Serial Port.

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🧶 сом12	:115200baud - Tera Term VT	3
File Edit	Setup Control Window Help	
P	Terminal Window	-
	Font	
	Keyboard	
	Serial port	
	Proxy	
	SSH	
	SSH Author password	
	Additional settings	
	Save setup	
1	Restore setup	÷

Figure 69: Serial menu > Setup Port

The Tera Term: Serial Port Setup dialog box opens.

Note: The image shows the default Z9-P / Z9-PE / Z9-PE-GREY settings.

Port:	СОМ	• ок
Baud rate:	115200	•
Data:	8 bit	Cancel
Parity:	none	•
Stop:	1 bit	✓ Help
Flow control:	none	•
Transmit delay	y c/char 0	msec/line

Figure 70: Tera Term: Serial Port Setup dialog box with Default Settings

- 6. **Important**: Verify, and change if required, the Tera Term serial port settings (except the **Port** setting) of the connected Z9-P / Z9-PE / Z9-PE-GREY so the settings are the same as the defaults shown in Figure 70.
- Verify the COM port settings are: Baud Rate / Baudrate: 115200 Data / Databits: 8 bit Parity: none Stop / Stopbits: 1 bit
- 8. Click **OK** to save the changes and close the dialog box.
- 9. In the Tera Term window, press <Enter>. The Z9-P / Z9-PE / Z9-PE-GREY CLI Login returns.
- 10. Enter admin for the **Username** and press < Enter>.
- 11. Enter admin for the **Password** and press < Enter>.

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

The FreeWave Shell returns.

🐣 COM11:115200baud - Tera Term VT	- • ×
<u>File E</u> dit <u>S</u> etup C <u>o</u> ntrol <u>W</u> indow <u>H</u> elp	
freewave-ib login:	•
freewave-ib login: admin Password: FreeWave Shell >	II.

Figure 71: The FreeWave Shell returns.

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

12. At the > prompt, type pages and press <Enter>. The available Z9-P / Z9-PE / Z9-PE-GREY information appears.

患 COM32:115200baud - Tera Term VT	_ 0 💌
File Edit Setup Control Window Help	
freewave-ib login: admin Password: FreeWave Shell	*
>pages	
Pages	
system	
systemInfo	
radioSettings	
encryption	
dataPath	
localDiagnostics	
config	
services	
network	
networkStats	
nty	
Com1	
Com2	
TerminalServerRelay	
date	
snmp	
RESULT:0:0K	=
>	*

Figure 72: Z9-P / Z9-PE / Z9-PE-GREY Pages information

At the > prompt, type network and press <Enter>.
 The Z9-P / Z9-PE / Z9-PE-GREY network settings appear.

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SCOM32:115200baud - Tera Term VT	
<u>F</u> ile <u>E</u> dit <u>S</u> etup C <u>o</u> ntrol <u>W</u> indow <u>H</u> elp	
network	
Page=network]	
mac_address=00:07:e7:00:02:52	
ip_address=192.168.111.100	
netmask=255.255.05.0	
gateway=192.168.111.1	
stpEnabled=false	
txqueuelen=25	
mtu=1500	
netmaskFilterEnabled=false	
RESULT:0:0K	

Figure 73: network Page window

Note: Steps 14 to 17 make the IP Address and nodeId unique to each Z9-P / Z9-PE / Z9-PE-GREY.

Other values may be defined as long as they are unique to each Z9-P / Z9-PE / Z9-PE-GREY.

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

Note: Where nnn.nnn.nnn is the IP address assigned by the IT department for the Z9-P / Z9-PE / Z9-PE-GREY network.

Note:

- 15. Optional: Change the gateway (on page 246) and the netmask (on page 249) addresses, if required, to meet the Z9-P / Z9-PE / Z9-PE-GREY network architecture.
- At the > prompt, type radiosettings and press <Enter>. The Z9-P / Z9-PE / Z9-PE-GREY radioSettings appear.

Important!: Figure 74 shows ALL available settings for the page. Only radioSettings that apply to the current radioMode, rfDataRate, and radioHoppingMode, and are visible in the CLI and the Web Interface and can be changed.

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COM 115200baud - Tera Term VT	
File Edit Setup Control Window Help	
>radiosettings	
[Page=radioSettings]	
radioMode=Endpoint	
rfDataRate=RATE_1M	
radioMaxRepeaters=0	
radioRepeaterSlot=1	
txPower=27	
networkId=51966	
node I d=6 4206	
frequencyKey=KeyØ	
radioFrequency=915.0000	
radioHoppingMode=Hopping_Off	
beaconInterval=ONE_HUNDRED_MS	
beaconBurstCount=1	
lnaBypass=0	
maxLinkDistanceinMiles=20	
frequencyMasks=	
RESULT : 0 : OK	H
>	-

Figure 74: radioSettings Page

17. 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**.

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

STOP Warning! At this point, the connection to the Z9-P / Z9-PE / Z9-PE-GREY is disabled.

- 19. Re-connect to the Z9-P / Z9-PE / Z9-PE-GREY using the new IP Address entered in Step 14.
- 20. Optional: Complete the Change the Passwords (on page 157) procedure.
- 21. Optional: Upgrade to the latest firmware using the Firmware Upgrade (on page 28) procedure.

Important!: **ONLY** upgrade the Z9-P / Z9-PE / Z9-PE-GREY firmware if the user values the new features and fixes within a firmware version.

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6.3.3. Tera Term Activation and ZumIQ Setup

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

- 1. On the computer connected to the Z9-P / Z9-PE / Z9-PE-GREY device, 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.

2	Tera Term - [dis	connected	I] VT
Eil	e <u>E</u> dit <u>S</u> etup	C <u>o</u> ntrol	<u>W</u> indow
	New connecti		Alt+N
	Duplicate ses		Alt+D
	Cygwin conne	ection	Alt+G
	Log		
	Comment to	Log	
	Change	-	
	Replay Log		
	TTY Record		
	TTY Replay		
	Print		Alt+P
	Disconnect		Alt+I
	Exit		Alt+Q

Figure 75: 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-P / Z9-PE / Z9-PE-GREY is connected to.

Tera Term: New con	nection			×
© TCP/ <u>I</u> P	Hos <u>t</u> : [192.168.111.	100	-
	[√ Hist <u>o</u> ry	T 0.D 1.4 0.0	_
	Service: (⊙ Te <u>l</u> net	TCP port#: 22	
	(⊚ <u>s</u> sh	SSH version: SSH2	-
		0 Other	Proto <u>c</u> ol: UNSPEC	-
	,			
Serial	- ,		munications Port (COM1)	-
	ОК		munications Port (COM1) ewave Configuration Conso neup	ole (CO

Figure 76: Select the ZumLink 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.

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🧶 сом12	:115200baud - Tera Term VT	3
File Edit	Setup Control Window Help	
P	Terminal Window	-
	Font	
	Keyboard	
	Serial port	
	Proxy	
	SSH	
	SSH Author password	
	Additional settings	
	Save setup	
1	Restore setup	÷

Figure 77: Serial menu > Setup Port

The Tera Term: Serial Port Setup dialog box opens.

Note: The image shows the default Z9-P / Z9-PE / Z9-PE-GREY settings.

Port:	СОМ	-	ок
Baud rate:	115200	•	
Data:	8 bit	•	Cancel
Parity:	none	•	
Stop:	1 bit	•	Help
Flow control:	none	-	
Transmit dela	y c/char 0	msec	/line

Figure 78: Tera Term: Serial Port Setup dialog box with Default Settings

- 6. **Important**: Verify, and change if required, the Tera Term serial port settings (except the **Port** setting) of the connected Z9-P / Z9-PE / Z9-PE-GREY so the settings are the same as the defaults shown in Figure 78.
- Verify the COM port settings are: Baud Rate / Baudrate: 115200 Data / Databits: 8 bit Parity: none Stop / Stopbits: 1 bit
- 8. Click **OK** to save the changes and close the dialog box.
- 9. In the Tera Term window, press <Enter>. The Z9-P / Z9-PE / Z9-PE-GREY CLI Login returns.
- 10. Enter **admin** for the **Username** and press < Enter>.
- 11. Enter admin for the **Password** and press < Enter>.

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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.

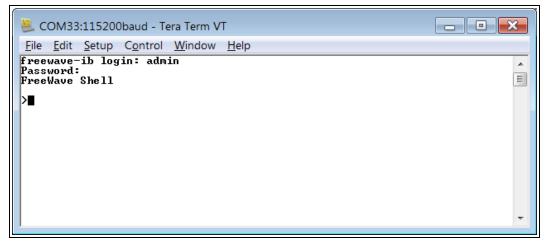


Figure 79: The FreeWave Shell returns.

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

At the > prompt, type network and press <Enter>.
 The Z9-P / Z9-PE / Z9-PE-GREY network settings appear.

E COM36:115200baud - Tera Term VT	- • 💌
<u>File Edit Setup Control Window H</u> elp	
Inetwork	*
[Page=network]	
mac_address=00:07:e7:00:05:8d	
ip_address=192.168.111.100	
netmask=255.255.255.0	
gateway=192.168.111.1	
stpEnabled=false	
t×queuelen=25	
mtu=1500	
netmaskFilterEnabled=false	
nameserver_address1=8.8.8.8	
nameserver_address2=8.8.4.4	
RESULT:0:0K	=
	-

Figure 80: network Page window

Note: Steps 13 to 16 make the IP Address and nodeId unique to each Z9-P / Z9-PE / Z9-PE-GREY.

Other values may be defined as long as they are unique to each Z9-P / Z9-PE / Z9-PE-GREY.

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

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Note: Where nnn.nnn.nnn is the IP address assigned by the IT department for the Z9-P / Z9-PE / Z9-PE-GREY network.

- 14. Optional: Change the gateway (on page 246) and the netmask (on page 249) addresses, if required, to meet the Z9-P / Z9-PE / Z9-PE-GREY network architecture.
- 15. At the > prompt, type **save** and press <Enter>.

STOP Warning! At this point, the connection to the Z9-P / Z9-PE / Z9-PE-GREY is disabled.

- 16. Re-connect to the Z9-P / Z9-PE / Z9-PE-GREY using the new IP Address entered in Step 13.
- 17. Continue with ZumIQ Application Environment (on page 87).

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6.4. Web Interface Configuration

This procedure provides a Web Interface connection to the Z9-P / Z9-PE / Z9-PE-GREY. The basic steps are:

- A. Connect the Z9-P / Z9-PE / Z9-PE-GREY to the Computer (on page 76)
- B. Setup the Computer IP Address Configuration (on page 77)
- C. Web Interface Configuration Z9-P / Z9-PE / Z9-PE-GREY (on page 81)

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6.4.1. Connect the Z9-P / Z9-PE / Z9-PE-GREY to the Computer

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

 Connect the CAT5e / CAT6 Ethernet cable to the Z9-P / Z9-PE / Z9-PE-GREY Ethernet port and the Ethernet port on the computer. The FreeWave Drivers and ZumLink windows may open.

Note: One of the **Network Connections** icons may change to show the connected Z9-P / Z9-PE / Z9-PE-GREY.

2. Verify the ZumLink drivers are installed. See Install the Driver.

	ve Tools lanage			- 0	× ^ (?)			
Pin to Quick access Copy Paste Paste		New item *	Properties	it it Select none				
Clipboard	Organize	New	Open	Select				
Ø ♥ ♥ × ➡ B:- □□ ■ =								
← → ✓ ↑ 🏂 > FreeWave Drivers (D)	:)		✓ [™] Searce	ch FreeWave Drivers (D:)	P			
> 🝊 OneDrive	Name	Date modified Typ	be	Size				
> 🛄 This PC	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				
A 11 - 1	fwt_cdc_acm.cat	7/9/2018 10:53 AM Sec	urity Catalog	9 KB				
> 🚅 Network	fwt_cdc_acm.inf	7/9/2018 10:53 AM Set	up Information	3 KB				
,	·			_	_			
5 items					==			

Figure 81: FreeWave Drivers window

File Home	Share View							\sim
Pin to Quick Copy access	Paste Cut Paste Paste shortcut	Move Copy to * to *	Delete Rename	New item *	Properties	🛃 Open 👻 📝 Edit 🌄 History	Select all Select none	
0	lipboard	Or	ganize	New	O	pen	Select	
$\leftrightarrow \rightarrow \uparrow \uparrow$ \checkmark [0 ZumLink-4	● > This PC > ZumLinl 026737941		4026737941		√ Č	Search Zur	nLink-4026737941	Q
 40267379 S (C:) FreeWave 		~	1.80 GB free of 1	1.80 GB				

Figure 82: ZumLink window

3. Continue with Setup the Computer IP Address Configuration (on page 77).

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6.4.2. Setup the Computer IP Address Configuration

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

- 1. On the computer, click the Windows® Start button and select Control Panel.
- View the Control Panel window by Category and click Network and Sharing Center. (Figure 83)

🛃 All Control Panel Items			- 🗆 X
← → · ↑ 🖾 · Control Panel ›	All Control Panel Items >		✓ ♂ Search Control Panel
File Edit View Tools			
Adjust your computer's settings	5		View by: Small icons 🔻
Administrative Tools	📑 AutoPlay	🐌 Backup and Restore (Windows 7)	🏘 BitLocker Drive Encryption
🔽 Color Management	Credential Manager	鹶 Date and Time	befault Programs
💽 Dell Command Power Manager	🐱 Dell Command Update	Dell Touchpad	📇 Device Manager
R Devices and Printers	Ease of Access Center	File Explorer Options	ka File History
Flash Player (32-bit)	A Fonts	Free Fall Data Protection	🚑 Indexing Options
🖉 Infrared	🔯 Intel(R) Rapid Storage Technology	🔜 Intel® Graphics Settings	党 Internet Options
Java	E Keyboard	Mail	Mouse
Network and Sharing Center	NVIDIA Control Panel	🧠 NVIDIA nView Desktop Manager	Phone and Modem
Po Se Se		Recovery	🔗 Region
🔍 Re 💶 Network and	d Sharing Center	🖷 Sound	Speech Recognition
	2	🔛 System	Taskbar and Navigation
Troubleshooting	💐 User Accounts	🔐 Windows Defender Firewall	Windows Mobility Center
kindows To Go	Work Folders		

Figure 83: Control Panel > Network and Sharing Center

The Network and Sharing Center window opens.

3. Click the Change Adapter Settings link. (Figure 84)

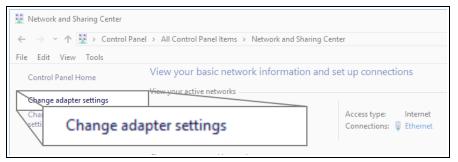


Figure 84: Change Adapter Settings Link

The Network Connections window opens. (Figure 85)

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

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Vetwork Conr	nections		
$\langle \leftarrow \rangle \rightarrow \rangle \sim \uparrow$	😰 > Control Panel > Net	vork and Internet > Network Connections	✓ Ö Search
File Edit View	Advanced Tools		
Organize 🔻	Disable this network device	Diagnose this connection Rename this connection View status of this connection	»
	Bluetooth Network Connection Not connected	Ethernet 2 freewave.local Intel(R) Ethernet Connectio	
	fortissl Disconnected PPPoP WAN Adapter	Ethernet freewave.local Intel(R) Ethernet Connect	tio

Figure 85: Network Connections window

The Ethernet Status dialog box opens. (Figure 86)

5. Click the **Properties** button.

🔋 Ethernet Status	\times
General	
Connection	_
IPv4 Connectivity: Interne	et
IPv6 Connectivity: No network acces	s
Media State: Enable	d
Duration: 03:27:0	5
Speed: 1.0 Gbp	os
Details	
Activity	
Sent — 💭 — Receive	d
Bytes: 12,589,202 193,965,94	ю
Properties Disable Diagnose	
	se

Figure 86: Ethernet Status dialog box

The Ethernet Properties dialog box opens.

- 6. Select the Internet Protocol Version 4 (TCP/IPv4) option. (Figure 87)
- 7. Click the **Properties** button.

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Ethernet Properties	\times	
Networking Sharing		
Shaling		
Connect using:		
Intel(R) Ethemet Connection (5) I219-LM		
Configure		
This connection uses the following items:		
Client for Microsoft Networks		
🗹 🐙 File and Printer Sharing for Microsoft Networks		
🗹 🐙 QoS Packet Scheduler		
FortiClient NDIS 6.3 Packet Filter Driver		
Internet Protocol Version 4 (TCP/IPv4)		
Image: International Adapter Multiplexor Protocol Image: International Adapter Multiplexor Protocol Image: International Adapter Multiplexor Protocol		
Microsoft LLDP Protocol Driver		
Install Uninstall Properties		
Description		
Transmission Control Protocol/Internet Protocol	rop	perties
wide area network protocol that provides commander across diverse interconnected networks.		
	_	
OK Cancel		

Figure 87: Ethernet Properties dialog box

The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box opens. (Figure 88)

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

Internet F	Internet Protocol Version 4 (TCP/IPv4) Properties							
General	Alternate Configuration							
this cap		omatically if your network supports to ask your network administrator						
() Ot	otain an IP address automatic	ally						
OUs	e the following IP address: –							
IP ac	ldress:							
Subr	iet mask:							
Defa	ult gateway:							
() Ot	otain DNS server address aut	omatically						
OUs	e the following DNS server a	ddresses:						
Prefe	erred DNS server:							
Alter	nate DNS server:							
V	alidate settings upon exit	Advanced						
		OK Cance	I					

Figure 88: Default Example of Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

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

10. In the **IP Address** text box, enter an IP Address that is **in the same subnet range but a DIFFERENT IP Address** than the Z9-P / Z9-PE / Z9-PE-GREY or all other units in the network. (Figure 89)

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-P / Z9-PE / Z9-PE-GREY 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 garage	
Obtain I O Use the following IP add	ress:
Use the IP address:	192 . 168 . 111 . 125
Alternate	
Subnet mask:	255.255.255.0
Default gateway:	
V	

Figure 89: Changed Internet Protocol Version 4 (TCP/IPv4) Properties dialog box

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

- 11. Click **OK** to save the changes and close the dialog box.
- 12. Click Close twice to close the Local Area Connection Properties and Local Area Connection Status dialog boxes.
- 13. Continue with Web Interface Configuration Z9-P / Z9-PE / Z9-PE-GREY (on page 81).

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6.4.3. Web Interface Configuration - Z9-P / Z9-PE / Z9-PE-GREY

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

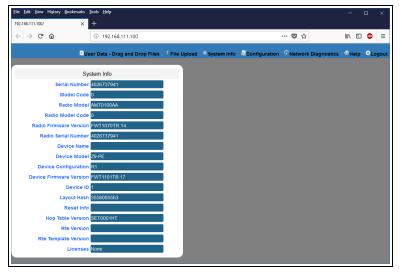


Figure 90: Home window

4. On the Menu bar, click the **Configuration** link. (Figure 91)

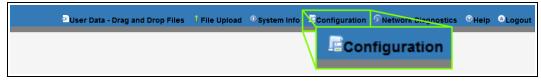


Figure 91: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 92)

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Authenticatio	n Required	×
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Requir	ed"
User Name: Password:		-
1 4330014.	OK Cancel	

Figure 92: Authentication Required (Login) dialog box

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

Note: If the l	Jser Name or Password were change	ed, enter the applicable inform
ne Config w	indow (on page 339) opens. (Figur	re 93)
	Eile Edit View Higtory Bookmarts Iools Help 192.168.111.100/config X +	- 🗆 :
	← → C ŵ ③ 192.168.111.100/config	e V 🏠 💷 🥮
		m Info EConfiguration Retwork Diagnostics ®Help OLogou ta Path Local Diagnostics Config Services
	Network Network Stats NTP Com1 Com2 Terminal Server Re	elay Date SNMP Security Runtime Environment
	System Info	
	Serial Number 4026737941 Model Code 0	
	Radio Model AMT0100AA	
	Radio Model Code 0	
	Radio Firmware Version FWT1070TR.14	
	Radio Serial Number 4026737941	
	Device Name	
	Device Model Z9-PE	
	Device Configuration R1	
	Device Firmware Version FWT1101TB.17	
	Layout Hash 3558005563	
	Reset Info	

Figure 93: Configuration window

6. In the **Configuration** window, click the **Network** tab. The **Network** parameters are shown in Figure 94:

Radio Setting

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6. Configuration

<u>File Edit View His</u> 192.168.111.100/confi		arks <u>T</u> ools × +	<u>H</u> elp							-	- 🗆 X
(←) → ⊂ @	r	()	192.168.111.10	0/config/net	work			•	·· 🛡 🕁	lii\	• • =
		Duser D	ata - Drag and	Drop Files	Î File Upload	() System	Info 📠	Configuration	Network Dia	gnostics 🐵 I	lelp [©] Logout
System Info	Radio Sel	ttings	Radio Setting	s Helpers	Encryption	Data Pa	ith L	ocal Diagnostics	Config	Services	Network
Network Stats	NTP	Com1	Com2	Terminal	Server Relay	Date	SNMP	Security	Runtime En	vironment	
		Netw	ork								
	MAC Add		7:e7:00:06:9b								
			.168.111.100								
	Netn	nask 255	.255.255.0								
	Gate	eway 192	.168.111.1								
	STP Ena	bled fais	e	~							
	Txqueu	elen 25									
		MTU 150									
	Filter Ena			~							
	erver Addre	_									
Namese Update	erver Addre	ess2 <u>8</u> .8.	4.4								

Figure 94: Network window

Note: Steps 7 to 9 make the IP Address and nodeld unique to each Z9-P / Z9-PE / Z9-PE-GREY.

Other values may be defined as long as they are unique to each Z9-P / Z9-PE / Z9-PE-GREY.

7. In the IP Address text box, enter the new IP Address for the Z9-P / Z9-PE / Z9-PE-GREY.

Note: Where nnn.nnn.nnn is the IP address assigned by the IT department for the Z9-P / Z9-PE / Z9-PE-GREY network.

- 8. Optional: Change the gateway (on page 246) and the netmask (on page 249) addresses, if required, to meet the Z9-P / Z9-PE / Z9-PE-GREY network architecture.
- 9. Click the **Update** button to save the changed information.

STOP Warning! At this point, the connection to the Z9-P / Z9-PE / Z9-PE-GREY is disabled.

- 10. Re-connect to the Z9-P / Z9-PE / Z9-PE-GREY 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 95:

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-)→ C' û	192.168.111.100/config	F 🛡 🕻	z	lii\	E 4	Þ
Rad	lio Settings					
Radio Mode	Endpoint 🗸					
RF Data Rate	RATE_1M					
TX Power	27dbm					
Network IE	51966					
Node IE	18131					
Radio Frequency	915.0000					
Radio Hopping Mode	Hopping_Off					
LNA Bypass	0					
Max Link Distance In Miles	20					



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

- 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 157)
 - Firmware Upgrade (on page 28)

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7. Creating a Basic ZumLink Gateway and Endpoint Network

Note: The basic network described in this procedure is created by using either the Drag and Drop Configuration - ZumLink (on page 53), the CLI Configuration (on page 65), or the Web Interface Configuration (on page 75) procedure.

Figure 96 shows a basic network setup for the **ZumLink** device.

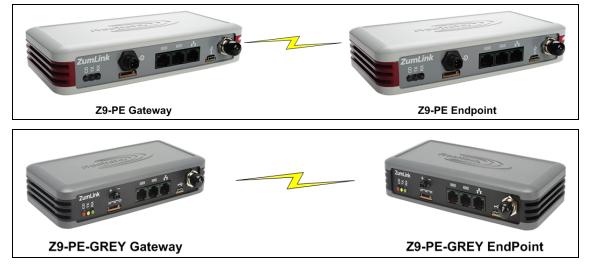


Figure 96: A Basic ZumLink Network

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Procedure

Note: This example procedure is specific for CLI configuration.

- 1. Connect and apply power to the **ZumLink** devices in the network.
- 2. Optional: Upgrade the devices using one of these procedures:
 - Firmware Upgrade Drag and Drop
 - Firmware Upgrade Web Interface



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

- 3. Complete the CLI Configuration (on page 65) procedure.
- Select one radio and, at the > prompt, type radioSettings.radioMode=Gateway and press <Enter>.
- 5. At the > prompt, type a setting between **10** and **30** for the **radioSettings.txPower** and press <Enter>.

Example: txPower=30 Or radioSettings.txPower=30.



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

Note: See radioSettings Parameters (on page 262) for detailed information.

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

Note: For Endpoints, the **radioSettings.nodelD** is set automatically.

ImportantI: The Gateway radioSettings.nodeld defaults to 1 and CANNOT be changed.

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

Note: See LEDs (on page 435) for additional information.

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

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8. ZumIQ Application Environment

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

Download and Install

- Optional: Download the ZumIQ Application Environment (on page 88)
 - Optional: Drag and Drop Installation of ZumIQ Application Environment (on page 90)
 - Optional: Web Interface Installation of ZumIQ Application Environment (on page 93)

Activation and Usage

- Activating ZumIQ (on page 98)
- Verify ZumIQ Activation (on page 100)
- Using ZumIQ as DEVUSER (on page 102)

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8.1. Optional: Download the ZumIQ Application Environment

Complete this procedure if installing the ZumIQ Application Environment.

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

1. On the <u>http://support.freewave.com/</u> web page, open the **Firmware** window for the Z9-P / Z9-PE / Z9-PE-GREY.

Important!: If continuing from the Download the Upgrade File (on page 29) procedure for the **Firmware v1_1_0_1.zip** file, return to the **Firmware** window. (Figure 97)

FREEWAVE SUPPORT	SUPPORT REGISTER FREEWAVE.COM
	Q Search the knowledge base
Firmware v1.1.0.1	Can't Find It? Contact us! Phone: 1.866.923.6168 Email: <u>support@freewave.com</u>
Article Attachments	

Figure 97: Closed Article Attachments window

- 2. Click the Article Attachments link to re-open the attachment box.
- Select and click the 3_Optional_ZumIQ_Environment_v1_1_0_0.pkg attachment. (Figure 98)



Figure 98: Z9-P / Z9-PE / Z9-PE-GREY Firmware Upgrade window with 3_Optional_ZumlQ_Environment_v1_1_0_0.pkg Attachment

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The **Opening** dialog box opens. (Figure 99)

Opening 3_Optional	ZumlQ_Environment_v1_1_0_0.zip									
You have chosen to	open:									
🕌 3_Optional_Z	umIQ_Environment_v1_1_0_0.zip									
which is: Con	which is: Compressed (zipped) Folder (162 MB)									
from: http://s	upport.freewave.com									
What should Firefo	x do with this file?									
○ <u>O</u> pen with	Windows Explorer (default) $$									
● <u>S</u> ave File										
Do this <u>a</u> uto	matically for files like this from now on.									
	OK Cancel									

Figure 99: Opening 3_Optional_ZumlQ_Environment_v1_1_0_0.pkg.zip dialog box

4. Click OK.

The Enter name of file to save to dialog box opens. (Figure 100)

6 Enter name of file	to save to						×
$\leftarrow \rightarrow \land \uparrow$	→ This PC → OS (C:)	>_;	ZumLink Files > Firmware v1.1.0.1 Update Files >	ٽ ~	Search Firmware v1	.1.0.1 Upd 🎉	2
Organize 🔻 Ne	ew folder					☷ -	?
👻 📙 _ZumLink Fi	iles	^	Name	Date modified	Туре	Size	
Firmware v	v1.1.0.1 Update Files		Firmware_v1_1_0_1.zip	8/28/2018 9:29 AM	Compressed (zipp	42,573 KB	.
		~					
File <u>n</u> ame:	3_Optional_ZumIQ_Env	viron	ment_v1_1_0_0.zip				~
Save as <u>t</u> ype:	Compressed (zipped) F	older	/ (*.zip)				~
 Hide Folders 					Save	Cancel	

Figure 100: 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.
- Open a Windows® Explorer window and find the location where the Firmware v1_1_0_
 1.zip file was saved.
- 7. Double-click the .zip file.
- 8. Extract the files from the .zip file into the parent location.

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

- 9. Continue with:
 - Optional: Drag and Drop Installation of ZumIQ Application Environment (on page 90)
 - Optional: Web Interface Installation of ZumIQ Application Environment (on page 93)

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

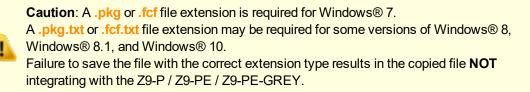
FREEWAVE Recommends: If currently using the v1.0.6.0 developer environment, an upgrade to **3_Optional_ZumIQ_Environment_v1_1_0_0.pkg** is NOT required.

 IMPORTANT: Install the 1_Device_Firmware_v1_1_0_1.pkg or 1_Device_Firmware_v1_1_0_1.pkg.txt file first. See Firmware Upgrade - Drag and Drop (on page 35).



Warning! The Z9-P / Z9-PE / Z9-PE-GREY **MUST BE** upgraded to the **Firmware v1_ 1_0_1** release or the ZumIQ Application Environment will NOT function.

- 2. Verify the Download the Upgrade File (on page 29) procedure is completed.
- 3. Locate and select the downloaded 3_Optional_ZumlQ_Environment_v1_1_0_0.pkg upgrade file. (Figure 101)



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

File Home Share View								\sim
Pin to Quick Copy Paste		Move Copy to to to to	New item •	Properties	it	Select all Select none Invert selecti	on	
Clipboard		Organize	New	Open		Select		
🕑 🎔 🍳 🗙 📑 🖫 💷 📙 📼								
\leftarrow \rightarrow \checkmark \uparrow \blacksquare \rightarrow This PC \rightarrow OS (C:) →	_ZumLink Files > Firmware v1.1.0	.1 Update Files	~	Ō	Search Firmware	v1.1.0.1 Upd.	,o
_ZumLink Files	^	Name		Date modified	Туре		Size	
📙 Firmware v1.1.0.1 Update Files		1_Device_Firmware_v1_1_0_1.	pkg.txt (8/28/2018 12:51 PM	Text D	ocument	42,432 KB	
		2_Radio_Firmware_v1_0_7_1.f	cf.txt	8/28/2018 12:51 PM	Text D	ocument	117 KB	
		3_Optional_ZumIQ_Environm	ient_v1_1_0_0.pkg.txt	8/28/2018 12:51 PM	Text D	ocument	165,428 KB	
		🔋 3_Optional_ZumIQ_Environm	ient_v1_1_0_0.zip	8/28/2018 9:32 AM	Comp	ressed (zipp	165,476 KB	
		Firmware_v1_1_0_1.zip	1	8/28/2018 9:29 AM	Comp	ressed (zipp	42,573 KB	
		FREEWAVE-TECHNOLOGIES-	MIB.txt	8/28/2018 12:51 PM	Text D	ocument	75 KB	
		UCD-SNMP-MIB-WP201.txt	1	8/28/2018 12:51 PM	Text D	ocument	10 KB	

Figure 101: File Upload dialog box with Selected 3_Optional_ZumlQ_ Environment_v1_1_0_0.pkg.txt File

5. Drag and drop the .pkg or .pkg.txt file on to the **ZumLink** window. (Figure 102)

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4026737941 File Home Share View					~ 0						
Rin to Quick Copy Paste access	rtcut to + to + to + fold	r	Properties History	Select all Select none Invert selection							
Clipboard	Organize	New	Open	Select							
	nLink-4026737941 > 4026737941		~	Ö Search 40	ρ						
 3D Objects Desktop Downloads 	Name ^	Type Text I	Firmware v1.1.0.1 Update F	les View	Tabas					- 0	>
Jogwell Music Pictures Videos	fw_upgrade_result.txt help.txt layout.txt result.txt	Text (Text (Text (Text (7 H 🗆 🔒	Cut Copy path Paste shortcut	Move Ci to • ti	Organize	New item *	Properties Open	it 🔠 Select non		
E ZumLink-4026737941	sys_info.txt	Text 🕻 🔛	9 🥂 🗙 🖷 💷 🗔 → 🔹 ↑ 🚺 → This						Search Firmiva	are v1.1.0.1 Upd	
4026737941	< + Cop	to root of storage	→ ↑ → 1his	PC > US (C:) >	Name	-nes > Hirmware VI.I.U	LT Update Files	Date modified	Type	Size	
			LOS (C:)			vice_Firmware_v1_1_0_1 dio_Firmware_v1_0_7_1.1		8/28/2018 12:51 PM 8/28/2018 12:51 PM	Text Document Text Document	42,432 KB 117 KB	
			🛫 Users (H:) 🜩 Firmware Repository (tional_ZumIQ_Environn tional_ZumIQ_Environn		8/28/2018 12:51 PM 8/28/2018 9:32 AM	Text Document Compressed (zipp	165,428 KB 165,476 KB	
			T Main (N:)	· ·	📕 Firm	ware_v1_1_0_1.zip WAVE-TECHNOLOGIES-		8/28/2018 9:29 AM 8/28/2018 12:51 PM	Compressed (zipp Text Document		в
			Departments (P:) Products (Q:)		UCD 🗐	-SNMP+MIB+WP201.txt		8/28/2018 12:51 PM	Text Document	10 KB	8
		78	ems 1 item selected 16	1 MB						1	8::

Figure 102: Drag and Drop the 3_Optional_ZumIQ_Environment_v1_1_0_ 0.pkg.txt file to the ZumLink window

The **ZumLink** window is similar to Figure 103:

➡ 4026737941 File Home Share View				- 🗆 X
Pin to Quick Copy Paste	Move Conv Delete Pename New		roperties	Select all
Clipboard	Organize	New	Open	Select
🗹 🍤 🦿 🗙 🖷 🕼 - 💷 📙 📼				
$\leftarrow \rightarrow \checkmark \uparrow \implies $ This PC \rightarrow Z	umLink-4026737941 > 4026737941			✓ ひ Search 40
SumLink-4026737941	^ Name ^	Туре	Size	Date Picture Taken
4026737941	3_Optional_ZumIQ_Environment_v1_1_0	0.pkg.txt Text Docum	ient 165,428 KB	1/1/2000 1:07 AM
🏪 OS (C:)	boot_results.txt	Text Docum	ient 1 KB	1/1/2000 1:00 AM
🏂 FreeWave Drivers (D:)	📄 config.txt	Text Docum	nent 3 KB	1/1/2000 1:33 AM
	fw_upgrade_result.txt	Text Docum	nent 1 KB	1/1/2000 3:13 AM
	help.txt	Text Docum	ient 65 KB	1/1/2000 1:20 AM
	ayout.txt	Text Docum	ient 67 KB	1/1/2000 1:20 AM
	result.txt	Text Docum	ient 1 KB	1/1/2000 1:10 AM
	sys_info.txt	Text Docum	ient 1 KB	1/1/2000 2:59 AM
	V <			

Figure 103: 3_Optional_ZumIQ_Environment_v1_1_0_0.pkg.txt File Dropped in the ZumLink window

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

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

Warning! DO NOT remove power from the Z9-P / Z9-PE / Z9-PE-GREY during or immediately after the firmware upgrade process!

Wait until the Home window (on page 351) Web Interface is accessible before removing power from the **ZumLink** device (approximately 6-8 minutes).

STOP

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

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

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6. Optional: Open the **sys.info.txt** file to verify the upgrade information. (Figure 104)

Important!: The image provides example information only. Each Z9-P / Z9-PE / Z9-PE-GREY provides its own unique information.

sys_info[2].txt - Notepad —	Х
File Edit Format View Help	
<pre>File Edit Format View Help [Page=systemInfo] systemInfo.serialNumber=4026737941 systemInfo.modelCode=0 systemInfo.radioModel=AMT0100AA systemInfo.radioFirmwareVersion=FWT1071TR.35 systemInfo.radioSerialNumber=4026737941 systemInfo.deviceName= systemInfo.deviceConfiguration=R1 systemInfo.deviceFirmwareVersion=FWT1101TB.17 systemInfo.deviceId=1 systemInfo.layoutHash=3558005563 systemInfo.resetInfo= systemInfo.reVersion= SystemInfo.rteVersion= SystemInfo.rteVersion= SystemInfo.rteTemplateVersion=FWT1100TP.2 systemInfo.licenses=None</pre>	~
	~

Figure 104: sys.info.txt file with Updated Firmware

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

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

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

IMPORTANT: Install the 1_Device_Firmware_v1_1_0_1.pkg or 1_Device_Firmware_v1_1_0_1.pkg.txt file first.
 See Firmware Upgrade - Web Interface (on page 41).

Warning! The Z9-P / Z9-PE / Z9-PE-GREY MUST BE upgraded to the Firmware v1_ 1_0_1 release or the ZumIQ Application Environment will NOT function.

Important!: If continuing from the Firmware Upgrade - Web Interface (on page 41) procedure for the Firmware v1_1_0_1.zip file, go to Step 7.

- 2. Verify the Download the Upgrade File (on page 29) procedure is completed.
- 3. Using a CAT5e / CAT6 Ethernet cable, connect the Z9-P / Z9-PE / Z9-PE-GREY Ethernet port to the computer's Ethernet port.
- 4. Open a web browser.

STOP

5. In the URL address bar, enter the IP address of the attached Z9-P / Z9-PE / Z9-PE-GREY.

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

- 6. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 7. On the Menu bar, click the File Upload link. (Figure 105)



Figure 105: File Upload link

The Authentication Required (Login) dialog box opens.

8. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and theFile Upload window opens. (Figure 106)

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

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Figure 106: File Upload window

- 9. Click the **Browse** button. The **File Upload** dialog box opens.
- 10. Locate and select the downloaded 3_Optional_ZumlQ_Environment_v1_1_0_0.pkg upgrade file. (Figure 107)



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

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

File Upload					
\rightarrow \checkmark \uparrow \rightarrow This PC \rightarrow OS (C:)	> _ZumLink Files > Firmware v1.1.0.1 Update Files >	`	・ ^で Search Firmwa	are v1.1.0.1 Upd	, p
Organize 🔻 New folder				EE 🔹 🔲	•
_ZumLink Files	Name	Date modified	Туре	Size	
Firmware v1.1.0.1 Update Files	1_Device_Firmware_v1_1_0_1.pkg.txt	8/28/2018 12:51 PM	Text Document	42,432 KB	
	2_Radio_Firmware_v1_0_7_1.fcf.txt	8/28/2018 12:51 PM	Text Document	117 KB	
	3_Optional_ZumIQ_Environment_v1_1_0_0.pkg.txt	8/28/2018 12:51 PM	Text Document	165,428 KB	
	3_Optional_ZumIQ_Environment_v1_1_0_0.zip	8/28/2018 9:32 AM	Compressed (zipp	165,476 KB	
	Firmware_v1_1_0_1.zip	8/28/2018 9:29 AM	Compressed (zipp	42,573 KB	
	FREEWAVE-TECHNOLOGIES-MIB.txt	8/28/2018 12:51 PM	Text Document	75 KB	
	UCD-SNMP-MIB-WP201.txt	8/28/2018 12:51 PM	Text Document	10 KB	
~					
File name: 3_Optional	_ZumIQ_Environment_v1_1_0_0.pkg.txt		✓ All Files (*.*)		~
			Open	Cancel	

Figure 107: File Upload dialog box with Selected 3_Optional_ZumlQ_Environment_v1_1_0_0.pkg.txt File

12. Click Open.

The dialog box closes and the **File Upload** window returns showing the selected file. (Figure 108)

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Figure 108: File Upload window with Selected .pkg.txt File

13. Click Send.

The **File Upload** window changes to show the completed upload percentage to the Z9-P / Z9-PE / Z9-PE-GREY. (Figure 109)

<u>File Edit View History B</u>	<u>B</u> ookmarks <u>T</u> ools	Help					-		×
192.168.111.100/upload	× +								
$\overleftarrow{\bullet}$ \rightarrow C $\widehat{\bullet}$	i	192.168.111.100/upload				… ◙ ☆	١١١/	•	
	User Data	a - Drag and Drop Files	Î File Upload	Osystem Info	Configuration	Retwork Diagnostics	®не	elp 🤤	Logout
Upload File	;								
uploading 3_Optiona	al_ZumIQ_Env	rironment_v1_1_0_0.pkg	.txt 54%						
	Upload and	Apply File							
Browse 3_Optiona		onment_v1_1_0_0.pkg.txt							

Figure 109: File Upload window Showing Uploading Percentage

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

Warning! DO NOT remove power from the Z9-P / Z9-PE / Z9-PE-GREY during or immediately after the firmware upgrade process!



Wait until the Home window (on page 351) Web Interface is accessible before removing power from the **ZumLink** device (approximately 6-8 minutes).

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

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

The **File Upload** window refreshes and shows the completed and uploaded file applied to the Z9-P / Z9-PE / Z9-PE-GREY. (Figure 110)

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<u>File Edit View His</u> tory	Bookmarks	Iools <u>H</u> elp	-	- 1	n x
192.168.111.100/upload	×	+			
← → ⊂ û		③ 192.168.111.100/upload … ♥ ☆	lii1\		a =
	Dise	Data - Drag and Drop Files 🕴 File Upload 🔍 System Info 📕 Configuration 🔗 Network Diagnos	stics 🔍 H	lelp	⊖Logo
Upload File	9				
uploaded 3_Optiona	al_ZumIQ_	Environment_v1_1_0_0.pkg.txt			
	Upload	and Apply File			
Browse No file se					

Figure 110: File Upload window Showing Completed Upload of the Selected File

15. Click the **System Info** link. (Figure 111)

Duser Data - Drag and Drop Files	🕯 File Upload	System Info	Configuration	Network Diagnostics	©Help	⊖Logout
		() Sys	stem Info			

Figure 111: System Info link

The System Info window opens showing the updated firmware on the Z9-P / Z9-PE / Z9-PE-GREY. (Figure 112)

Important!: The image provides example information only. Each Z9-P / Z9-PE / Z9-PE-GREY provides its own unique information.

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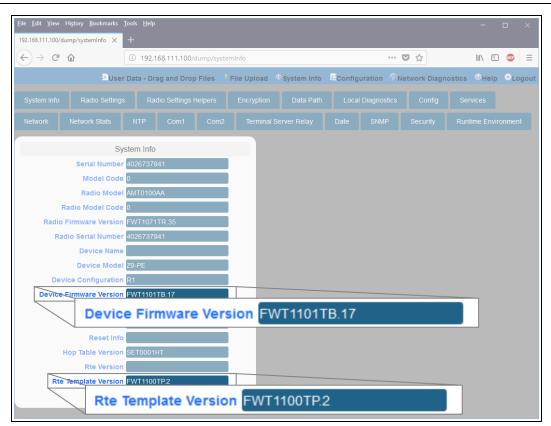


Figure 112: System Info window

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

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8.4. Activating ZumIQ

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

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

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

Procedure

STOP

- 1. Complete the Tera Term Activation and ZumIQ Setup (on page 71).
- 2. Log in to the Z9-P / Z9-PE / Z9-PE-GREY CLI as admin.
- At the > prompt, type systemInfo and press <Enter>. The systemInfo parameters appear. (Figure 113)

Note: See the systemInfo Parameters (on page 312) for detailed information about the parameters.

Le COM36:115200baud - Tera Term VT	- • ×
<u>File Edit Setup Control Window Help</u>	
>systeminfo	^
[Page=systemInfo]	
serialNumber=0	
mode 1Code =0	
radioModel=Unknown	
radioModelCode=0	
radioFirmwareVersion=Unknown	
radioSerialNumber=0	
deviceName=	
deviceModel=ZIQ-PE	
deviceConfiguration=0	
deviceFirmwareVersion=FWT1060TB.68	
deviceId=1	
layoutHash=529070878	
resetInfo=	
hopTableVersion=Unknown	
rteVersion=	
rteTemplateVersion=FWT1060TB.68	
licenses=Custom Apps	
RESULT:0:0K	E
	•

Figure 113: systemInfo Pages information

4. Verify these parameters have these values:

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Verification Settings	
Parameter	Value
radioFirmwareVersion (on page 318)	FWT1040TA.11
deviceFirmwareVersion (on page 313)	FWT1060TB.68
rteVersion (on page 320)	(blank)
rteTemplateVersion (on page 320)	FWT1060TB.68
licenses (on page 316)	Custom Apps

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



Warning! At this point, the connection to the Z9-P / Z9-PE / Z9-PE-GREY is disabled.

- 7. Close the Tera Term window.
- 8. Disconnect and reconnect the USB cable from the computer. The **AutoPlay ZumLink** and **ZumLink** windows open again.
- 9. Continue with Verify ZumIQ Activation (on page 100).

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8.5. Verify ZumIQ Activation

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

Procedure

- 1. Important: Verify the Activating ZumIQ (on page 98) procedure is completed.
- 2. Open a new Tera Term window.
- 3. Log in to the Z9-P / Z9-PE / Z9-PE-GREY CLI as admin.
- At the > prompt, type systemInfo and press <Enter>. The systemInfo parameters appear. (Figure 114)

SOM36:115200baud - Tera Term VT	- • •
File Edit Setup Control Window Help	
RESULT : 0 : OK	*
>systeminfo	
[Page=systemInfo]	
serialNumber=0	
mode 1Code =0	
radioModel=Unknown	
radioModelCode=0	
radioFirmwareVersion=Unknown	
radioSerialNumber=0	
deviceName=	
deviceModel=ZIQ-PE	
deviceConfiguration=0	
deviceFirmwareVersion=FWI1060TB.68	
deviceId=1	
layoutHash=529070878	
resetInfo=	
hopTableVersion=Unknown	
rteVersion=FWT1060TB.68	
rteTemplateVersion=FWT1060TB.68	
licenses=Custom Apps	
RESULT:0:0K	=
>	*

Figure 114: systemInfo Pages information

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

Verify Activation Para	neters
Parameter	Value
radioFirmwareVersion (on page 318)	FWT1040TA.11
deviceFirmwareVersion (on page 313)	FWT1060TB.68

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Verify Activation Parar	neters
Parameter	Value
rteVersion (on page	FWT1060TB.68
320)	Important!: This value is updated after ZumIQ is activated.
rteTemplateVersion (on page 320)	FWT1060TB.68
licenses (on page 316)	Custom Apps

Important!: If the rteVersion is (blank) then the ZumIQ is NOT activated. Repeat the Activating ZumIQ (on page 98) procedure.

- 6. Type **logout** and press <Enter> to exit the FreeWave Shell.
- 7. Continue with Using ZumIQ as DEVUSER (on page 102).

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8.6. Using ZumIQ as DEVUSER

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

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

Procedure

- 1. Verify ZumIQ Activation (on page 100) is completed.
- Log in to the Z9-P / Z9-PE / Z9-PE-GREY CLI as devuser.
 The default password is devuser.

A Linux Bash prompt appears. (Figure 115)

💄 COM36:115200baud - devuser@freewave-ib: ~ VT	
File Edit Setup Control Window Help	
modelCode=0	•
radioModel=Unknown	
radioModelCode=0	
radioFirmwareVersion=Unknown	
radioSerialNumber=0	
deviceName=	
deviceMode1=ZIQ-PE	
deviceConfiguration=0	
deviceFirmwareUersion=FW11060TB.68	
deviceId=1	
layoutHash=529070878	
resetInfo=	
hopTableVersion=Unknown	
rteVersion=FW11060TB.68	
rteTemplateVersion=FWT1060TB.68	
licenses=Custom Apps	
RESULT : 0: OK	
>logout	
freewave-ib login: devuser	1
rassword: devuser@freewave-ih:*\$	٣
Password:	-

Figure 115: Linux Bash Prompt for the Z9-P / Z9-PE / Z9-PE-GREY DEVUSER

3. Go to: <u>https://github.com/FreeWaveTechnologies/ZumIQ</u>. The FreeWave Github ZumIQ Main Page opens. (Figure 116)

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126 commits	I branch	eases 2 contributors	কাু BSD-2-Clause
Branch: master - New pull	request		Find file Clone or download
FWBob added link to YouT	ube channel	Late	est commit 5f332fa on Nov 27, 2017
full-demos	fixed image links		3 months ago
samples	fixed a few more lingering IPR refe	erences	3 months ago
troubleshooting	updated link to known issues		3 months ago
.gitignore	updating demo to 1060 WIP		4 months ago
LICENSE	Initial commit		8 months ago
README.md	added link to YouTube channel		a month age

Figure 116: FreeWave GitHub ZumIQ Main Page

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

4. Scroll to the bottom of the **Main** page and click the Wiki link for ZumIQ app development information. (Figure 117)

README.md	The Code and Developer Desumentation	
Welcome to the Zur	mple Code and Developer Documentation	
	a Linux-based programmable application environment running on supported ZumLink Z9-P	
To learn more abou	t the ZumIQ, see the product page and check out the FreeWave YouTube Channel. This GitHub a programmability of the radio platform from the perspective of application developers.	
(FWT1060TB.68).	uding all documentation and sample code, references capabilities of firmware version 1.0.6.0	
	stained a new ZumIQ-enabled radio, start with Activating ZumIQ to enable developer logins, then ocumentation resources below.	
See Samples for ba		
See Full Demos for	examples of complete, distributed applications.	
See Troubleshootin	g for scripts and procedures to work around known issues.	
See the Wiki for ger	neral developer documentation.	
	See Troubleshooting for scripts and procedures to	work around known issues.
	See the Wiki for general developer documentation.	

Figure 117: Wiki link on the FreeWave GitHub ZumIQ Main Page

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9. Web Interface Administration

This section provides procedure information about administration of the Z9-P / Z9-PE / Z9-PE-GREY parameters.

- Change the COM Parameters (on page 107)
- Change the Data Path Parameters (on page 111)
- Change the Encryption Parameters (on page 114)
- Change the Local Diagnostics (on page 117)
- Change the Network Parameters (on page 120)
- Change the NTP Parameters (on page 123)
- Change the Radio Settings Parameters Endpoints (on page 126)
- Change the Radio Settings Parameters Endpoint-Repeaters (on page 130)
- Change the Radio Settings Parameters Gateways (on page 134)
- Change the Radio Settings Parameters Gateway-Repeaters (on page 138)
- Change the Security Parameters (on page 142)
- Change the Services Parameters (on page 145)
- Change the SNMP Parameters (on page 148)
- Change the System Info Parameters (on page 151)
- Change the Terminal Server Relay Parameters (on page 154)

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9.1. Access the Web Interface

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

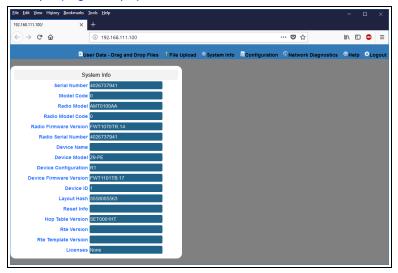


Figure 118: Home window

4. On the Menu bar, click the Configuration link. (Figure 119)



Figure 119: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 120)

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Authenticatio	n Required	×
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Required	
User Name:]
Password:		
	OK Cancel	

Figure 120: Authentication Required (Login) dialog box

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

Note: If the User Name or Password were changed, enter the applicable information							nation	
The Config wind	low (on pag	ge 339) ope	ns. (<mark>Fi</mark>	gure 1	21)			
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	∋u	lser Data - Drag and Drop Files	🖁 File Upload	0 System Info	Configuration	Network Diag	nostics [®] Help [©] Logo	out
	System Info Radio Setti	ings Radio Settings Helpers	Encryption	Data Path	Local Diagnostic	s Config	Services	
	Network Network Stats	NTP Com1 Con	n2 Terminal S	Server Relay	Date SNMP	Security	Runtime Environment	
	Serial Numi Model Co Radio Model Co Radio Firmware Versi Radio Serial Numi Device Na Device Na Device Configurati Device Configurati Device Firmware Versi	del AMT0100AA odd 0 ber 4026737941 ber 4026737941 del 25-PE del 25-PE del 741 del 75-PE del 78-PE del 1 del 1						

Figure 121: Configuration window

Radio Settings

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9.2. Change the COM Parameters

Note: See the COM Parameters (on page 191) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

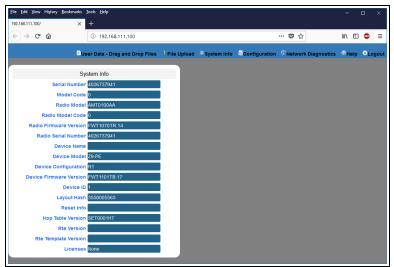


Figure 122: Home window

4. On the Menu bar, click the Configuration link. (Figure 123)



Figure 123: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 124)

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Authenticatio	n Required	×
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Require	ed"
User Name:		
Password:		
1	OK Cancel	

Figure 124: Authentication Required (Login) dialog box

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

Note: If the User Name or Password were changed, enter the applicable informati Fhe Config window (on page 339) opens. (Figure 125)							
<u>File</u> Edit	<u>V</u> iew Hi <u>s</u> tory <u>B</u> ookmarks <u>1</u> 1.100/config X	<i>,</i> .	(5	,		- • ×	
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Syster		Data - Drag and Drop Files Radio Settings Helpers	File Upload			ostics [®] Help [©] Logout Services	
Netwo	k Network Stats	NTP Com1 Com2	Terminal Server Relay	Date :	SNMP Security	Runtime Environment	
	Syy Serial Number Model Code Radio Model Code Radio Firmware Version Radio Serial Number Device Name Device Name Device Model Device Configuration	0 AMTD100AA 0 FWT1070TR.14 4026737941 29-PE 29-PE R1					

Figure 125: Configuration window

Click either the COM1 or COM2 tab.
 The COM1 or COM2 parameters are shown in Figure 126 or Figure 127 respectively.

Radio Setting

Note: See the COM Parameters (on page 191) for detailed information about the parameters. The parameters for **COM1** and **COM2** are the same except for the **TerminalServerPort** parameter setting.

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Eile Edit View History Bookmarks I 192.168.111.100/config/Com1 ×	iools <u>H</u> elp +					-	۵	×
$(\leftarrow) \rightarrow C^{\prime} \hat{\mathbf{u}} $	 192.168.111.100/config/Co 	m1		•	· 🛡 🏠	1111	•	≡
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	TerminalServer							
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Parity								
Stopbits								
Flow Control								
Delay Before Send MS								
Break Before Send Us								
Terminal Server Port								
Terminal Server Time Out	300							
TX Bytes	0							
RX Bytes	0							
Connection Drops	0							
Update								

Figure 126: COM1 window

22.168.111.100/config/Com2 → C ^a G	× +	192.168.111.10	0/config/Com	2			♥ ☆	101	E 🐵 :
					① System Info	Configuration			
System Info Radio S	_	Radio Setting		Encryption	Data Path	Local Diagnostics		Services	Network
Network Stats NTP	Com1	Com2	Terminal	Server Relay	Date SI	NMP Security	Runtime Env	rironment	
	Com	2							
	Mode RS2	32	~						
На	ndler Term	inalServer	~						
	drate 1152	200	~						
Da	tabits 8		<u> </u>						
	Parity None	e	×						
	opbits 1		~						
	uplex Full		<u> </u>						
	ontrol Off		<u> </u>						
Delay Before Ser									
Break Before Se Terminal Serve									
Terminal Serve									
	Bytes 0								
	Bytes 0								
			_						
Connection I									

Figure 127: 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.

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

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

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

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

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

Note: TxBytes (on page 202), RxBytes (on page 200), and connectionDrops (on page 193) are Read-only parameters.

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

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9.3. Change the Data Path Parameters

Note: See the dataPath Parameters (on page 209) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

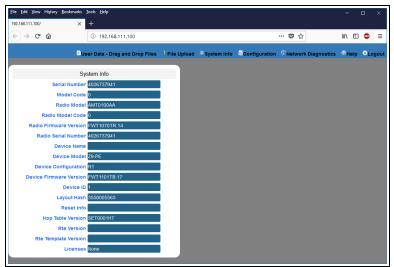


Figure 128: Home window

4. On the Menu bar, click the Configuration link. (Figure 129)



Figure 129: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 130)

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Authenticatio	n Required	\times
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Require	d"
User Name:		
Password:		
	OK Cancel	

Figure 130: Authentication Required (Login) dialog box

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

Note: If the Use	User Name or Password were changed, enter the applicable informatic											
he Config wind	dow (on pag	e 33	<mark>9)</mark> op	ens	. (Fi	gure 1	<mark>31</mark>)				
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		Sj	rstem Info									
		Serial Number Model Code		41								
		Radio Mode		AA								
	F	adio Model Code	0									
		Firmware Version										
	Rad	dio Serial Number		41	_							
		Device Name										
	Dov	Device Mode										
		Firmware Version		18.17								
		Device ID										
		Layout Hash		63								

Figure 131: Configuration window

6. Click the **Data Path** tab.

The Data Path parameters are shown in Figure 132.

Radio Setting

Note: See the dataPath Parameters (on page 209) for detailed information about the parameters.

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→ ♂ ৫	g∕dataPath ×	+	92.168.111.10	0/config/data	aPath			•••	☑ ☆	lii\	E 🐠
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System Info	Radio Setting	;	Radio Setting	s Helpers	Encryption	Data Path	Loc	al Diagnostics	Config	Services	Netwo
Network Stats	NTP	Com1	Com2	Terminal	Server Relay	Date S	NMP	Security	Runtime Env	ironment	
	D ession Enabled Fragment Size FEC Rate	1000		~							
	regate Enabled n Signal Margin Thresh			~							
MAC Table Ent	ry Age Timeout										

Figure 132: Data Path window

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

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

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

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

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

FREEWAVE Recommends: When viewing local diagnostics, if the RadioBadCRC (on page 234) count is more than 15% of the total transmitted packets (the RadioLLTx (on page 236) count), enabling the fecRate (on page 212) setting is beneficial.

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9.4. Change the Encryption Parameters

Note: See the encryption Parameters (on page 222) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

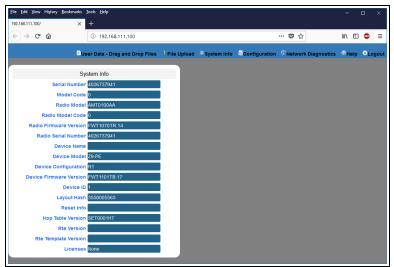


Figure 133: Home window

4. On the Menu bar, click the Configuration link. (Figure 134)



Figure 134: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 135)

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Authenticatio	n Required	×
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Required	d"
User Name:		
Password:		
	OK Cancel	

Figure 135: Authentication Required (Login) dialog box

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

Note: If the User Name or Password were changed, enter the applicable information											
he Config w	indow (on pa	<mark>ge 339)</mark> opens.	(Figure 13	6)							
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	System Info Radio Sett Network Network Stats	÷	ncryption Data Path	Configuration Network Diagn Local Diagnostics Config tate SNMP Security	Services Runtime Environment						
		System Info									
	Serial Num	ber 4026737941									
	Model Co										
	Radio Mo Radio Model Co	del AMT0100AA									
	Radio Firmware Vers										
	Radio Serial Num	ber 4026737941									
	Device Na	me									
	Device Mo	del Z9-PE									
	Device Configurat										
	Device Firmware Vers	ion FWT1101TB.17									

Figure 136: Configuration window

6. Click the **Encryption** tab.

The Encryption parameters are shown in Figure 137.

Radio Setting

Note: See the encryption Parameters (on page 222) for detailed information about the parameters.

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System Info	Radio Set	tings	Radio Settings	s Helpers	Encryption	Data Pa	ath	Local Diagno	stics	Config	Service	s	Netwo	ork
Network Stats	NTP	Com1	Com2	Terminal	Server Relay	Date	SNM	/IP Securi	ty R	untime Env	vironment			
En	Set	Encrypt ode AES Key Off Key Key		× ×										

Figure 137: Encryption window

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

Note: The activeKey (on page 223), setKey (on page 225), and getKey (on page 224) parameters are read-only in the Web Interface. They can be changed in the CLI.

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

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9.5. Change the Local Diagnostics

Note: See the localDiagnostics Parameters (on page 227) for detailed information about the parameters.

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

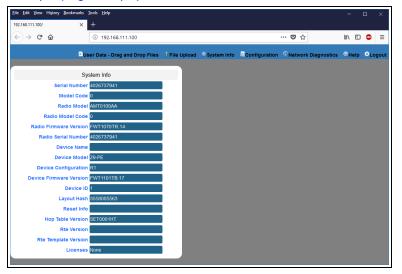


Figure 138: Home window

4. On the Menu bar, click the Configuration link. (Figure 139)



Figure 139: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 140)

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Authenticatio	n Required	\times
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Require	d"
User Name:		
Password:		
	OK Cancel	

Figure 140: Authentication Required (Login) dialog box

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

Note: If the U	ser Nar	ne or Pa	assword v	were cha	anged, e	enter the a	applic	able inf	ormation.
The Config wir	ndow (d	on page	e 339) op	ens. (<mark>F</mark> i	gure 1	<mark>41</mark>)			
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	System Info	Radio Settings	Radio Settings Helpe	ers Encryption	Data Path	Local Diagnostics	Config	Services	
	Network	Network Stats	NTP Com1 (Com2 Terminal	Server Relay	Date SNMP	Security	Runtime Environ	ment
		Sys	tem Info						
		Serial Number							
		Model Code Radio Model		_					
	Ra	Radio Model		_					
		irmware Version	-						
	Rad	io Serial Number	4026737941						
		Device Name		_					
		Device Model	Z9-PE						
	Devi	ce Configuration	R1						
	Device F	irmware Version		_					
		Device ID		_					
		Layout Hash	3558005563	_					
		Reset Info							

Figure 141: Configuration window

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

Note: See the localDiagnostics Parameters (on page 227) for detailed information about the parameters.

7. Scroll to locate the Monitored Node text box. (Figure 142)

Radio Setting

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CNT ST	K 470				
CNTET	K 470				
CNT Bad Syn	c 0				
CNT Bad BC	0				
Interface Data T	K 282				
Interface Data R	K D				
Interface Bytes T					
Interface Bytes R					
Resets Detected					
Resets Sen					
Reset State					
Get State					
Monitored Node	e <u>64206</u>			-	
Show Chann					
Shew Not	onitored Node 642	06			
MAC Tab					
MAC Table Clea					
Update					
					~

Figure 142: Local Diagnostics window

- 8. In the Monitored Node text box, enter the nodeld (on page 272) to monitor.
- 9. Click the **Update** button to save the changed information.

FREEWAVE Recommends: When viewing local diagnostics, if the RadioBadCRC (on page 234) count is more than 15% of the total transmitted packets (the RadioLLTx (on page 236) count), enabling the fecRate (on page 212) setting is beneficial.

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9.6. Change the Network Parameters

Note: See the network Parameters (on page 245) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

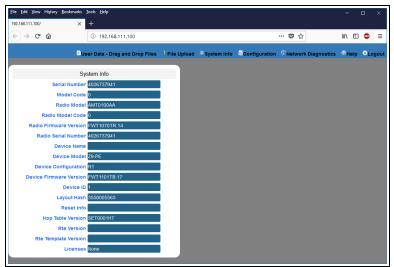


Figure 143: Home window

4. On the Menu bar, click the Configuration link. (Figure 144)

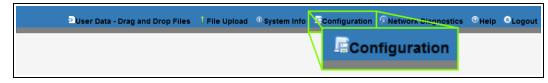


Figure 144: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 145)

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Authenticatio	n Required	×
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Required	٣
User Name:		
Password:		
	OK Cancel	

Figure 145: Authentication Required (Login) dialog box

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

Note: If the U	ser Name or P	assword we	re changed, o	enter the applic	able information.	
The Config wir	ndow (on pag	<mark>e 339)</mark> open	s. (Figure 1	<mark>46</mark>)		
	File Edit View Higtory Bookmarks 192.168.111.100/config X	Iools Help +			- • ×	
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	[⊉] User	Data - Drag and Drop Files	File Upload ①System Info	EConfiguration Retwork Diagr	nostics [®] Help [©] Logout	
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	Network Network Stats	NTP Com1 Com2	Terminal Server Relay	Date SNMP Security	Runtime Environment	
	Sy	stem Info				
	Serial Number					
	Model Code Radio Model					
	Radio Model Code					
	Radio Firmware Version	FWT1070TR.14				
	Radio Serial Number	4026737941				
	Device Name					
	Device Mode					
	Device Configuration Device Firmware Version					
	Device Filliware version					

Figure 146: Configuration window

6. Click the Network tab.

The Network parameters are shown in Figure 147.

Radio Setting

Note: See the network Parameters (on page 245) for detailed information about the parameters.

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System Info	Radio Settings	Radio Setting	s Helpers Encrypt	tion Data Path	Local Diagnostic	s Config Ser	vices Network
Network Stats	NTP Com	1 Com2	Terminal Server Rel	ay Date	SNMP Security	Runtime Environme	nt
	IP Address 19 Netmask 25 Gateway 19 STP Enabled 1a	5.255.255.0 2.168.111.1					
	Txqueuelen 25 MTU 15						
	k Filter Enabled fa						

Figure 147: Network window

Note: The mac_address (on page 247) parameter is Read-only.

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

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

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

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

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

9.7. Change the NTP Parameters

Note: See the NTP Parameters (on page 258) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

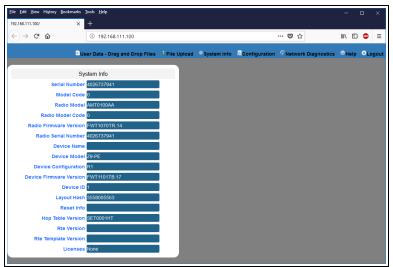


Figure 148: Home window

4. On the Menu bar, click the Configuration link. (Figure 149)



Figure 149: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 150)

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Authenticatio	n Required	\times
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Require	d"
User Name:		
Password:		
	OK Cancel	

Figure 150: Authentication Required (Login) dialog box

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

Note: If the Us	ser Nan	ne or Pa	assword we	re changed,	enter the a	applic	able informa	ation.
The Config wir	ndow (o	on page	e 339) oper	ns. (Figure 1	51)			
	<u>File Edit View Hig</u> 192.168.111.100/conf	<u>s</u> tory <u>B</u> ookmarks <u>T</u> o iig X -	xols <u>H</u> elp +				- 🗆 ×	
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	System Info	Radio Settings	Radio Settings Helpers	Encryption Data Path	Local Diagnostics	Config	Services	
	Network M	Vetwork Stats	NTP Com1 Com2	Terminal Server Relay	Date SNMP	Security	Runtime Environment	
		Syst	tem Info					
		Serial Number	4026737941					
		Model Code)					
		Radio Model	AMT0100AA					
	Rad	dio Model Code)					
	Radio Fi	rmware Version	WT1070TR.14					
	Radio	o Serial Number	4026737941					
		Device Name						
		Device Model						
		e Configuration						
	Device Fi	rmware Version	FWT1101TB.17					
		Device ID	1					
		Layout Hash Reset Info	5558005565					
	Но	p Table Version	SET0001HT					

Figure 151: Configuration window

6. Click the **NTP** tab.

The NTP parameters are shown in Figure 152.

Radio Setting

Note: See the NTP Parameters (on page 258) for detailed information about the parameters.

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NTP Resta	urt 👘		
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NTP Address	s1 <u>0.0.0.0</u>		
NTP Address			
NTP Address			
NTP Address			
NTP Address	<mark>55</mark> 0.0.0.0		
Update			
			v

Figure 152: NTP window

- 7. As applicable, change these parameters:
 - a. Click the NTP Reference list box arrow and select either NETWORK_TIME_ SERVER or REFCLK_LOCALCLOCK.
 - b. In the **NTP Restart** text box, enter **Now** to restart the the NTP system.
 - c. In the **NTP Date** text box, enter **Now** to synchronize the local clock with the time from the NTP servers specified in the ntp_address (on page 259) 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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9.8. Change the Radio Settings Parameters - Endpoints

Note: See the radioSettings Parameters (on page 262) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

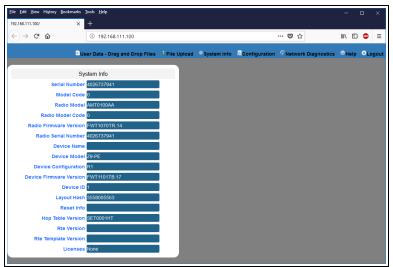


Figure 153: Home window

4. On the Menu bar, click the Configuration link. (Figure 154)



Figure 154: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 155)

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Authenticatio	n Required	\times
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Require	d"
User Name:		
Password:		
	OK Cancel	

Figure 155: Authentication Required (Login) dialog box

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

Note: If the User Name or Password were changed, enter the applicable informatio										
he Config windo	w (on pa	<mark>ge 339</mark>) oper	ns. (Figure	156)						
	dit Yiew History Bookmar 3.111.100/config	rks <u>I</u> ools <u>H</u> elp × +			- • ×					
(\	→ C' ûr	(i) 192.168.111.100/config		F 🛡 🏠	III\ 🖸 🐵 😑					
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	Serial Num	System Info								
	Model Co									
	Radio Mo Radio Model Ci	odel AMT0100AA								
	Radio Firmware Vers									
	Radio Serial Num									
	Device Na Device Mo									

Figure 156: Configuration window

- 6. Click the Radio Settings tab.
- 7. Click the **Radio Mode** list box arrow and select the device type to designate the Z9-P / Z9-PE / Z9-PE-GREY as an **Endpoint**.

The Radio Settings parameters are shown in Figure 157.

Radio Setting

Note: See the radioSettings Parameters (on page 262) for detailed information about the parameters.

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⊖ → ୯ G	1	(i) 192.	168.111.100)/config/radi	oSettings			•	♥ ☆	li	\ 🗈 🐵
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System Info	Radio Settings	Ra	dio Settings	Helpers	Encryption	Data Pati	h	Local Diagnostics	Config	Services	Network
Network Stats	NTP C	om1	Com2	Terminal	Server Relay	Date	SNMF	P Security	Runtime En	vironment	
	Dadi	. Cotting									
	Radio Mode	o Setting									
				×							
	RF Data Rate		00K	<u> </u>							
	TX Power			~							
	Network ID										
	Node ID	18131									
Radio	Hopping Mode	Hopping	_On	×							
	LNA Bypass	0									
	stance In Miles	20									
Max Link Di											

Figure 157: Radio Settings window - Endpoint

- 8. As applicable, change these parameters:
 - a. Click the **RF Data Rate** list box arrow and select the RF link data rate in bits per second.
 - b. Click the **Tx Power** list box arrow and select the dB RF output transmit power level for the Z9-P / Z9-PE / Z9-PE-GREY.
 - 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)).

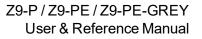
- g. In the **Max Link Distance in Miles** text box, enter the maximum one-way distance (in miles) between any nodes in the network.
- h. In the **Frequency Masks** text box, enter the exact specified format of the frequency range to mask.

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Caution: The exact syntax is required in the **Frequency Masks** text box. See frequencyMasks (on page 267) for detailed information.

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

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9.9. Change the Radio Settings Parameters - Endpoint-Repeaters

Note: See the radioSettings Parameters (on page 262) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.



Figure 158: Home window

4. On the Menu bar, click the Configuration link. (Figure 159)



Figure 159: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 160)

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Authenticatio	n Required	\times
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Require	d"
User Name:		
Password:		
	OK Cancel	

Figure 160: Authentication Required (Login) dialog box

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

Note: If the U	Iser Name or F	Password were cl	hanged, ent	ter the applic	able information
The Config wi	ndow (on pag	<mark>je 339)</mark> opens. (l	Figure 161	1)	
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	System Info Radio Setting Network Network Stats			ocal Diagnostics Config	Services Runtime Environment
		system Info 4026737941			
	Model Cod Radio Mode Radio Model Cod	амто100АА			
	Radio Firmware Versio Radio Serial Numbe	n FWT1070TR.14			
	Device Nam Device Mode				
	Device Configuratio				



- 6. Click the Radio Settings tab.
- Click the Radio Mode list box arrow and select the device type to designate the Z9-P / Z9-PE / Z9-PE-GREY as an Endpoint_Repeater. The Radio Settings parameters are shown in Figure 162.

Radio Setting

Note: See the radioSettings Parameters (on page 262) for detailed information about the parameters.

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-) → C' G	6	i) 192.168.111.1	00/config/radio	oSettings			••	· 🛡 🕁	hi v	. 🗉 🐠 E
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System Info	Radio Settings	Radio Setting	gs Helpers	Encryption	Data Path	Loc	al Diagnostics	Config	Services	Network
Network Stats	NTP C	Com1 Com2	Terminal	Server Relay	Date	SNMP	Security	Runtime Env	vironment	
	Ded									
		io Settings Endpoint Repeate								
	RF Data Rate									
Radi	o Repeater Slot		`							
	TX Power		~							
	Network ID	51966								
	Node ID	18131								
Radio	Hopping Mode	Hopping_On	~							
	LNA Bypass	0								
	stance In Miles	20								
Max Link Di	stance in miles									

Figure 162: Radio Settings window - Endpoint

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

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

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

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

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

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



Caution: The exact syntax is required in the **Frequency Masks** text box. See frequencyMasks (on page 267) for detailed information.

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

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9.10. Change the Radio Settings Parameters - Gateways

Note: See the radioSettings Parameters (on page 262) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

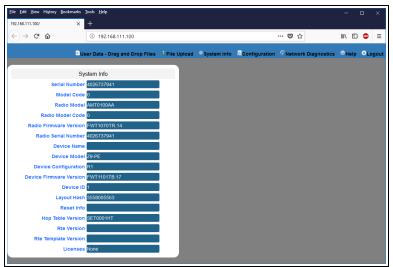


Figure 163: Home window

4. On the Menu bar, click the Configuration link. (Figure 164)



Figure 164: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 165)

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Authenticatio	n Required	\times
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Require	d"
User Name:		
Password:		
	OK Cancel	

Figure 165: Authentication Required (Login) dialog box

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

Note: If the User Name or Password were changed, enter the applicable information												
he Config wir	ndow	(on pag	e 3	<mark>39</mark>) o	pen	s. (<mark>Fig</mark>	jure ⁻	1 <mark>66</mark>)				
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	Network	Network Stats	NTP	Com1	Com2	Terminal Se	rver Relay	Date	SNMP	Security	Runtime Envi	ronment
		Sj	/stem In	fo								
		Serial Number		7941								
		Model Code Radio Mode		0044								
		Radio Model Code		UVAA								
	Radi	o Firmware Versior	FWT10	70TR.14								
	R	adio Serial Numbe	402673	7941								
		Device Name Device Mode										

Figure 166: Configuration window

- 6. Click the Radio Settings tab.
- Accept the Radio Mode default of Gateway. The Radio Settings parameters are shown in Figure 167:

Radio Setting

Note: See the radioSettings Parameters (on page 262) for detailed information about the parameters.

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System Info	Radio Settings	Rad	dio Settings	Helpers	Encryption	Data Path	Loc	al Diagnostics	Config	Services	Network
Network Stats	NTP Co	m1	Com2	Terminal	Server Relay	Date	SNMP	Security	Runtime Env	vironment	
	-	Setting	S								
	Radio Mode			~							
_	RF Data Rate		10K	~							
Radio	Max Repeaters										
	Network ID			~							
	Frequency Key			×							
	Hopping Mode		On								
	Beacon Interval			~							
	on Burst Count										
	LNA Bypass 0										
Max Link Di	stance In Miles 2	10									

Figure 167: Radio Settings window - Gateway

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

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

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

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

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

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



Caution: The exact syntax is required in the **Frequency Masks** text box. See frequencyMasks (on page 267) for detailed information.

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

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9.11. Change the Radio Settings Parameters - Gateway-Repeaters

Note: See the radioSettings Parameters (on page 262) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.



Figure 168: Home window

4. On the Menu bar, click the Configuration link. (Figure 169)

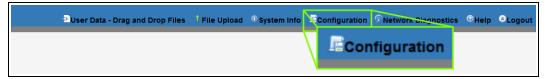


Figure 169: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 170)

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Authenticatio	n Required	×
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Required	ł"
User Name:		
Password:		
	OK Cancel	

Figure 170: Authentication Required (Login) dialog box

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

he Config window (on page 339) opens. (Figure 171)
Edie Edit View Higtory Bookmarks Book Help × 192.168.111.100/config × +
(←) → C û 192.168.111.100/config 🗄 … 🛡 ☆ 🔤 🗉
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System Info Radio Settings Radio Settings Helpers Encryption Data Path Local Diagnostics Config Services
Network Network Stats NTP Com1 Com2 Terminal Server Relay Date SNMP Security Runtime Environment
System Info Serial Number 4025737341 Model Code 0 Radio Model AMT0100AA Radio Model Code 0 Radio Firmware Version FWT1070TR.14 Radio Serial Number 1025737941 Device Name Device Name Device Configuration R1 Device Configuration R1 Device Configuration R1 Device I 1 Layout Ham 565800565

Figure 171: Configuration window

- 6. Click the Radio Settings tab.
- Click the Radio Mode list box arrow and select the device type to designate the Z9-P / Z9-PE / Z9-PE-GREY as a Gateway_Repeater.
 The Radio Settings percentation are shown in Figure 172:

The **Radio Settings** parameters are shown in Figure 172:

Radio Setting

Note: See the radioSettings Parameters (on page 262) for detailed information about the parameters.

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Radio IV	Iax Repeaters 0	Odlam								
	Network ID 51		•							
	requency Key K									
	lopping Mode H	<i>.</i>	· ·							
	eacon Interval		3							
	n Burst Count 3									
Deaco	LNA Bypass 0									
Max Link Dis	tance in Miles 20)								

Figure 172: Radio Settings window - Gateway

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

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

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

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

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

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



Caution: The exact syntax is required in the **Frequency Masks** text box. See frequencyMasks (on page 267) for detailed information.

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

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9.12. Change the Security Parameters

Note: See the security Parameters (on page 293) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

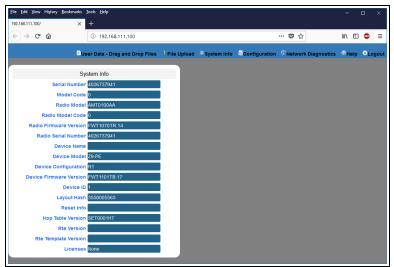


Figure 173: Home window

4. On the Menu bar, click the Configuration link. (Figure 174)



Figure 174: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 175)

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Authenticatio	n Required	×
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Required	d"
User Name:		
Password:		
	OK Cancel	

Figure 175: Authentication Required (Login) dialog box

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

Note: If the User Name or P	assword we	re changed,	enter the a	ıpplicab	le informat
he Config window (on pag	<mark>e 339)</mark> open	s. (Figure 1	<mark>76</mark>)		
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Network Network Stats	NTP Com1 Com2	Terminal Server Relay	Date SNMP	Security Rui	untime Environment
Sy Serial Number Model Code Radio Model Radio Model Code Radio Firmware Version Radio Serial Number Device Name Device Model Device Firmware Version Device Firmware Version	0 AMTD100AA 0 FWT1070TR.14 4028737941 29-PE 29-PE R1				

Figure 176: Configuration window

6. Click the Security tab.

The Security parameters are shown in Figure 177.

Radio Setting

Note: See the security Parameters (on page 293) for detailed information about the parameters.

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Network Stats	NTP	Com1	Com2	Com2 Terminal Server Relay Date SNMP Security Runtime Environment									
		Securi	ty										
Enable	e PTP Interfac	true		~									
Enable	Ethernet Logii	true		~									
Update													



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

Note: By default, the **Enable Ethernet Login** is enabled (set to True). See the enableEthernetLogin (on page 294) 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 enablePtpInterface (on page 294) parameter for additional information.

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

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9.13. Change the Services Parameters

Note: See the services Parameters (on page 296) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

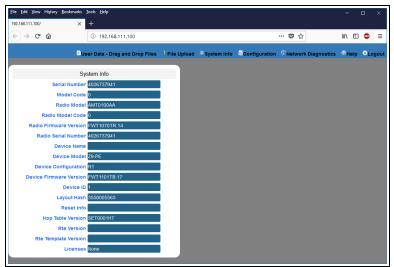


Figure 178: Home window

4. On the Menu bar, click the Configuration link. (Figure 179)



Figure 179: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 180)

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Authenticatio	n Required	×
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Require	ed"
User Name:		
Password:		
1	OK Cancel	

Figure 180: Authentication Required (Login) dialog box

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

Note: If the L	Jser Name or	Password we	re changed,	enter the applic	able informat
he Config w	indow (on pa	<mark>ge 339)</mark> open	s. (Figure 1	81)	
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	Model C				
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	Radio Firmware Ver				
	Radio Serial Num	ber 4026737941			
	Device N				
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	Device Firmware vers				
		arb 2559005562			

Figure 181: Configuration window

6. Click the **Services** tab.

The Services parameters are shown in Figure 182.

Radio Setting

Note: See the services Parameters (on page 296) for detailed information about the parameters.

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		Service	s											
Update	Time Out	CLI 900												

Figure 182: Services window

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

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9.14. Change the SNMP Parameters

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

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

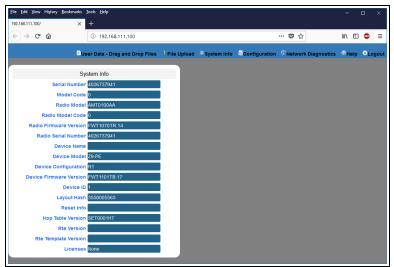


Figure 183: Home window

4. On the Menu bar, click the Configuration link. (Figure 184)



Figure 184: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 185)

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Authenticatio	n Required	\times
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Require	d"
User Name:		
Password:		
	OK Cancel	

Figure 185: Authentication Required (Login) dialog box

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

Note: If the U	ser Name	or Password w	vere changed,	enter the applic	cable information.
The Config wi	ndow (on p	page 339) ope	ens. (Figure	186)	
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		I Number 4026737941			
	Rad	AMT0100AA			
		e Version FWT1070TR.14			
		I Number 4026737941 ice Name			
		ce Model Z9-PE			

Figure 186: Configuration window

6. Click the SNMP tab.

The **SNMP** parameters are shown in Figure 187.

Radio Setting

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

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Figure 187: SNMP window

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

Note: By default, the **v1 Enabled** is NOT enabled (set to False). See the v1Enabled (on page 301) parameter for additional information.

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

Note: By default, the **v2c Enabled** is NOT enabled (set to False). See the v2cEnabled (on page 302) parameter for additional information.

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

Note: By default, the **v3 Enabled** is NOT enabled (set to False). See the v3Enabled (on page 302) 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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9.15. Change the System Info Parameters

Note: See the systemInfo Parameters (on page 312) for detailed information about the parameters.

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

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

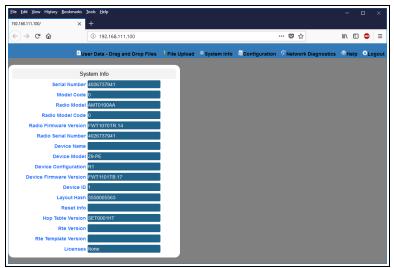


Figure 188: Home window

4. On the Menu bar, click the Configuration link. (Figure 189)

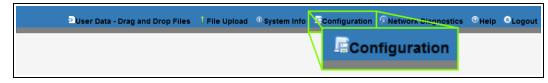


Figure 189: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 190)

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Authenticatio	n Required	×
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Required	d"
User Name:		
Password:		
	OK Cancel	

Figure 190: Authentication Required (Login) dialog box

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

Note: If the	User Name or Password were changed, enter the applicable informat
he Config v	window (on page 339) opens. (Figure 191)
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	System Info
	Serial Number 4026737941
	Model Code 0
	Radio Model AMT0100AA
	Radio Model Code 0
	Radio Firmware Version FWT1070TR.14
	Radio Serial Number 4026737341
	Device Name
	Device Configuration R1
	Device Firmware Version FWT1101TB.17
	Device ID 1
	Layout Hash 3558005563

Radio Settings Radio Mode Galeeray

Figure 191: Configuration window

6. Click the **System Info** tab.

The System Info parameters are shown in Figure 192:

Note: See the systemInfo Parameters (on page 312) for detailed information about the parameters.

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Serial Number											
Model Code											
Radio Model	AMT0100AA										
Radio Model Code	0										
Radio Firmware Version	FWT1070TR.14										
Radio Serial Number	4026737941										
Device Name											
Device Model	Z9-PE										
Device Configuration	R1										
Device Firmware Version	FWT1101TB.17										
Device ID	1										
Layout Hash											
Reset Info											
Hop Table Version											
Rte Version											
Rte Template Version											
Update	None										

Figure 192: System Info window

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

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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9.16. Change the Terminal Server Relay Parameters

Note: See the TerminalServerRelay Parameters (on page 322) for detailed information about the parameters.

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.

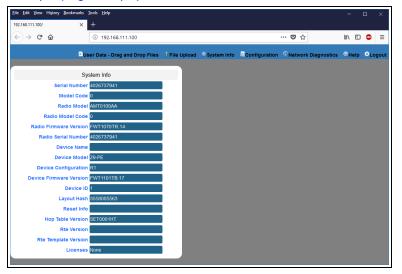


Figure 193: Home window

4. On the Menu bar, click the Configuration link. (Figure 194)

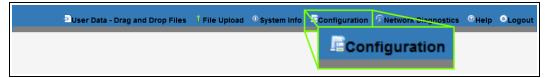


Figure 194: Configuration link

The Authentication Required (Login) dialog box opens. (Figure 195)

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Authenticatio	n Required	×
?	http://192.168.111.100 is requesting your username and password. The site says: "Login Require	ed"
User Name:		
Password:		
	OK Cancel	

Figure 195: Authentication Required (Login) dialog box

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

ser Name or	Password were cha	nged, enter the appli	cable information
n <mark>dow (on p</mark> a	ige 339) opens. (Fi	gure 196)	
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System Info Radio Set	ttings Radio Settings Helpers Encryption	Data Path Local Diagnostics Config	
Model C Radio M Radio Model C Radio Firmware Veri Radio Serial Nur Device N Device M	Code 0 Odel AMT0100AA Store 0 FWT1070TR.14 ber 4025707341 ame Odel 29-PE		
	System Info Reduce Kigery Redund 192.163.111.100/config ⓒ ⇒ ⊄ ✿ System Info Radio Set Network Network Stats Serial Nun Model C Radio Mindel C Radio Firmware Ver Radio Firmware Ver	ndow (on page 339) opens. (Fig 19216111.100/config ← → C ŵ ○ 192168.111.100/config © User Data - Drag and Drop Files ↓ File Upload System Info Radio Settings Radio Settings Helpers Encryption Network Network Stats NTP Com1 Com2 Terminal S	192.168.11.100/config × + ← → C

Figure 196: Configuration window

 Click the Terminal Server Relay tab. The Terminal Server Relay parameters are shown in Figure 197.

Radio Setting

Note: See the TerminalServerRelay Parameters (on page 322) for detailed information about the parameters.

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- 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.

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10. Change the Passwords

Important!: The Z9-P / Z9-PE / Z9-PE-GREY password is ONLY changed through the CLI. See CLI Configuration (on page 65) 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 158)
- Change the DEVUSER Password (on page 158)

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10.1. Change the ADMIN Password

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

press <Enter>.

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

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

10.2. Change the DEVUSER Password

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

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

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

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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 (network.netmaskFilterEnabled=true) does NOT need to match on all the radios in the network.

Only enable IP Filtering on individual radios with incoming LAN Ethernet traffic to filter from the network.



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

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

Procedure

- 1. On the computer connected to the Z9-P / Z9-PE / Z9-PE-GREY device, 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.

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🐣 Tera Term - [disconnecte	d] VT		
<u>File</u> <u>E</u> dit <u>Setup</u> Control	Window Hel	ip	
New connection	Alt+N		
Duplicate session	Alt+D		
Cygwin connection	Alt+G		
Log			
Comment to Log			
Change .			
Replay Log			
TTY Record			
TTY Replay			
Print	Alt+P		
Disconnect	Alt+I		
Exit	Alt+Q		

Figure 198: 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-P / Z9-PE / Z9-PE-GREY is connected to.

Tera Term: New con	nection			×
© TCP/ <u>I</u> P	Hos <u>t</u> : <mark>192</mark>	.168.111	.100	-
	☑ H Service: ○ Te	ist <u>o</u> ry e <u>l</u> net	TCP <u>p</u> ort#: 22	
	@ <u>S</u>	SH	SSH version: SSH2	-
	0	ther	Proto <u>c</u> ol: UNSPEC	~
⊚ S <u>e</u> rial	- CO	M1: Com	nmunications Port (COM1) nmunications Port (COM1) ewaye Configuration Conso ਸੁਖਾਸ	▼ Die (CO

Figure 199: Select the ZumLink COM port

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

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

Eilo Edit		
The Luit J	etup Control Window Help	
	Terminal Window Font Keyboard Serial port Proxy SSH SSH SSH Author password Additional settings Save setup Restore setup	

Figure 200: Serial menu > Setup Port

The Tera Term: Serial Port Setup dialog box opens.

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Note: The ima	ge shows the default Z9-F	P / Z9-PE / Z9-PE-GR	EY settings.
	Tera Term: Serial port setup		
	Port:	COM -	οκ
	Baud rate:	115200 -	
	Data:	8 bit 🔹	Cancel
	Parity:	none •	
	Stop:	1 bit 🔹	Help
	Flow control:	none •	
	Transmit delay 0 msec/	'char 0 ms	ec/line

Figure 201: Tera Term: Serial Port Setup dialog box with default settings

- 6. **Important**: Verify, and change if required, the Tera Term serial port settings (except the **Port** setting) of the connected Z9-P / Z9-PE / Z9-PE-GREY so the settings are the same as the defaults shown in Figure 201.
- Verify the COM port settings are: Baud Rate / Baudrate: 115200 Data / Databits: 8 bit Parity: none Stop / Stopbits: 1 bit
- 8. Click **OK** to save the changes and close the dialog box.
- 9. In the Tera Term window, press <Enter>. The Z9-P / Z9-PE / Z9-PE-GREY CLI Login returns.
- 10. Login to the FreeWave CLI using the current username and password.

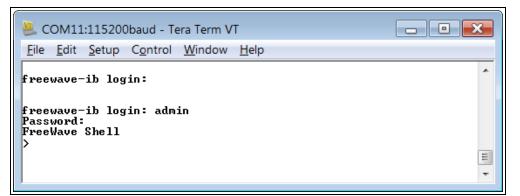
Note: The password does not appear when typing - it looks blank.

The FreeWave Shell returns.

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

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

SCOM32:115200baud - Tera Term VT	- • ×
<u>File Edit Setup Control Window H</u> elp	
	*
>network	
[Page=network]	
mac_address=00:07:e7:00:02:52	
ip_address=192.168.111.100	
netmask=255.255.255.0	
gateway=192.168.111.1	
stpEnabled=false	
txqueuelen=25	
mtu=1500	
netmaskFilterEnabled=false	
RESULT:0:0K	Ξ
>	*

Figure 203: 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 (network.netmaskFilterEnabled=true) does NOT need to match on all the radios in the network.

Only enable IP Filtering on individual radios with incoming LAN Ethernet traffic to filter from the network.

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

Note: See Example: Network Topology with Traffic at the Gateway (on page 163).

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11.0.1. Example: Network Topology with Traffic at the Gateway

Figure 204 shows:

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

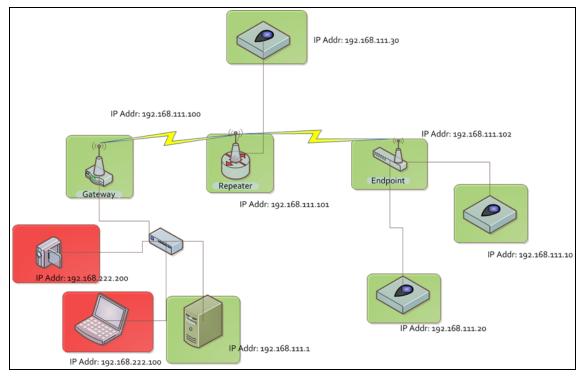


Figure 204: Network Topology with Traffic at the Gateway but not Desired on the Rest of the Network

Figure 204 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.

This section has this information:

- Repeater Setup Table (on page 166)
 - Hopping OFF Repeater Setup (on page 166)
 - Hopping ON Repeater Setup (on page 167)
- Basic Gateway and Endpoint-Repeater Setup (on page 169)
 - Open a Terminal Emulator Application (on page 170)
 - Hopping On: Gateway and Endpoint-Repeater Setup (on page 173)
 - Hopping Off: Gateway and Endpoint-Repeater Setup (on page 175)
- Repeater Examples (on page 177)
 - Gateway-Repeater (on page 178)
 - Endpoint-Repeater (on page 179)
 - Multiple Repeaters: Gateway-Repeater and Endpoint-Repeater (on page 180)
 - Multiple Repeaters: Four Endpoint-Repeaters (on page 181)

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

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

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

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

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

FREEWAVE Recommends: Set the beaconBurstCount (on page 263) 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 166)

• Hopping ON Repeater Setup (on page 167)

Note: For detailed procedures, see Basic Gateway and Endpoint-Repeater Setup (on page 169).

12.1.1. Hopping OFF Repeater Setup

The settings in this table assumes that **radiosettings.radioHoppingMode=Hopping_Off**.

- Hopping is required at data rates below 500kbps.
- Hopping is optional at data rate 500kbps or above.
- With hopping disabled, a Gateway or Gateway-Repeater is optional.

Repeater Network Configuration						
radioSettings Setting*	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup			
radioMode=	Gateway	Endpoint_Repeater	Endpoint			
nodeld=	N/A	= unique Node ID for each device	= unique Node ID for each device			
networkId=	= same Network ID for all devices	= same Network ID for all devices	= same Network ID for all devices			
rfDataRate=	= same Data Rate for all devices	= same Data Rate for all devices	= same Data Rate for all devices			
dataPath Setting*	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup			
routeMinSignalMarginThresh=	= desired Link Signal Margin minus 4dB	= desired Link Signal Margin minus 4dB	= desired Link Signal Margin minus 4dB			
network Setting*	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup			
ip_address=	= unique IP address for each device.	= unique IP address for each device.	= unique IP address for each device.			

Note: *See the dataPath Parameters (on page 209), network Parameters (on page 245), or radioSettings Parameters (on page 262) 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 Configura	tion		
radioSettings Setting****	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
radioMode=	Gateway	Endpoint_Repeater	Endpoint
nodeld=	N/A	= unique Node ID for each device	= unique Node ID for each device
networkId=	= same Network ID for all devices	= same Network ID for all devices	= same Network ID for all devices
rfDataRate=	= same Data Rate for all devices	= same Data Rate for all devices	= same Data Rate for all devices
radioMaxRepeaters=	0-3 ¹	NA	NA
radioRepeaterSlot=	NA	1-3 ²	NA
beaconBurstCount=	1-7 ³	NA	NA
dataPath Setting****	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
routeMinSignalMarginThresh=	= desired Link Signal Margin minus 4dB	= desired Link Signal Margin minus 4dB	= desired Link Signal Margin minus 4dB
network Setting****	Gateway Setup	Endpoint-Repeater Setup	Endpoint Setup
ip_address=	= unique IP address for each device.	= unique IP address for each device.	= unique IP address for each device.

1. Set the radioMaxRepeaters to match the number of overlapping Repeaters with a maximum of 3.

- Setting this value too high adds unnecessary latency to the network.
- In this example, set this to 1.
- 2. Set the radioRepeaterSlot to designate which Repeater slot to use, up to the radioMaxRepeaters setting.
 - In this example, set this to 1.

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3. Set the beaconBurstCount (on page 263) to 2 or more for optimal throughput when Repeaters are used and the RF environment is noisy.

This increases the number of beacons sent in a beacon interval.

Note: ****See the dataPath Parameters (on page 209), network Parameters (on page 245), or radioSettings Parameters (on page 262) 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 170)
- B. Configure using either:
 - C. Hopping On: Gateway and Endpoint-Repeater Setup (on page 173) or

Hopping Off: Gateway and Endpoint-Repeater Setup (on page 175)

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12.2.1. Open a Terminal Emulator Application

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

- 1. On the computer connected to the Z9-P / Z9-PE / Z9-PE-GREY device, 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.

2	Tera Term - [di	sconnected	I] VT
E	le <u>E</u> dit <u>S</u> etup	C <u>o</u> ntrol	<u>W</u> indow
	New connect		Alt+N
	Duplicate ses	sion	Alt+D
	Cygwin conn	ection	Alt+G
	Log		
	Comment to	Log	
	Change		
	Replay Log		
	TTY Record		
	TTY Replay		
	Print		Alt+P
	Disconnect		Alt+I
	Exit		Alt+Q

Figure 205: 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-P / Z9-PE / Z9-PE-GREY is connected to.

© TCP/ <u>I</u> P Hos <u>t</u> : <u>192.168.111.100</u>	
● <u>SSH</u> SSH <u>version</u> : SSH2 -	Proto <u>c</u> ol: UNSPEC *

Figure 206: Select the ZumLink 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.

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. сом12	115200baud - Tera Term VT	
File Edit	Setup Control Window Help	
•	Terminal	*
	Window	E
	Font	
	Keyboard	
	Serial port	
	Proxy	
	SSH	
	SSH Author password	
	Additional settings	
	Save setup	
1	Restore setup	•

Figure 207: Serial menu > Setup Port

The Tera Term: Serial Port Setup dialog box opens.

Note: The image shows the default Z9-P / Z9-PE / Z9-PE-GREY settings.

Port:	СОМ	•	ок
Baud rate:	115200	•	
Data:	8 bit	•	Cancel
Parity:	none	•	
Stop:	1 bit	•	Help
Flow control:	none	•	
Transmit dela	y c/char 0	ms	ec/line

Figure 208: Tera Term: Serial Port Setup dialog box with default settings

- 6. **Important**: Verify, and change if required, the Tera Term serial port settings (except the **Port** setting) of the connected Z9-P / Z9-PE / Z9-PE-GREY so the settings are the same as the defaults shown in Figure 208.
- Verify the COM port settings are: Baud Rate / Baudrate: 115200 Data / Databits: 8 bit Parity: none Stop / Stopbits: 1 bit
- 8. Click **OK** to save the changes and close the dialog box.
- 9. In the Tera Term window, press <Enter>. The Z9-P / Z9-PE / Z9-PE-GREY CLI Login returns.
- 10. Login to the FreeWave CLI using the current username and password.

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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.

Scom11:115200baud - Tera Term VT	
<u>F</u> ile <u>E</u> dit <u>S</u> etup C <u>o</u> ntrol <u>W</u> indow <u>H</u> elp	
freewave-ib login:	*
freewave-ib login: admin Password: FreeWave Shell >	II.

Figure 209: The FreeWave Shell returns.

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

11. At the > prompt, type**radioSettings** and press <Enter>. The current [Page=radioSettings] appears. (Figure 210)

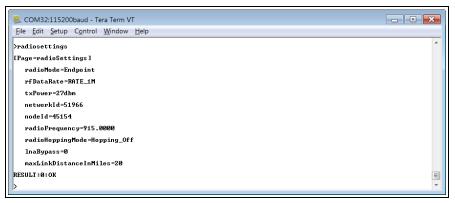


Figure 210: radioSettings Page

- 12. Continue with either:
 - Hopping On: Gateway and Endpoint-Repeater Setup (on page 173)
 - Hopping Off: Gateway and Endpoint-Repeater Setup (on page 175)

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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 175).

- 1. On the Gateway ZumLink device:
 - a. Complete the Open a Terminal Emulator Application (on page 170) 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 rfDataRate (on page 282) 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 170) 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 rfDataRate (on page 282) 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 170) 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 rfDataRate (on page 282) 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 435) for additional information.



See the Gateway-Repeater (on page 178) 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 173).

- 1. On the Gateway ZumLink device:
 - a. Complete the Open a Terminal Emulator Application (on page 170) 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 rfDataRate (on page 282) 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 rfDataRate (on page 282) 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 170) 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 rfDataRate (on page 282) for the correct command format of the RF Data Rate.

- v. radioSettings.nodeId=nnnnnwhere 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 435) for additional information.



See the Gateway-Repeater (on page 178) 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 178)
- Endpoint-Repeater (on page 179)
- Multiple Repeaters: Gateway-Repeater and Endpoint-Repeater (on page 180)
- Multiple Repeaters: Four Endpoint-Repeaters (on page 181)

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12.3.1. Gateway-Repeater

Figure 211 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.

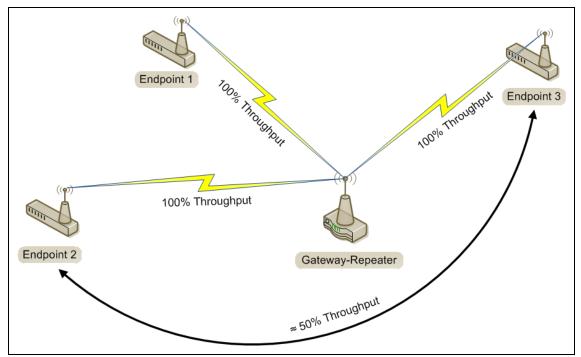


Figure 211: Gateway-Repeater

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12.3.2. Endpoint-Repeater

Figure 212 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.

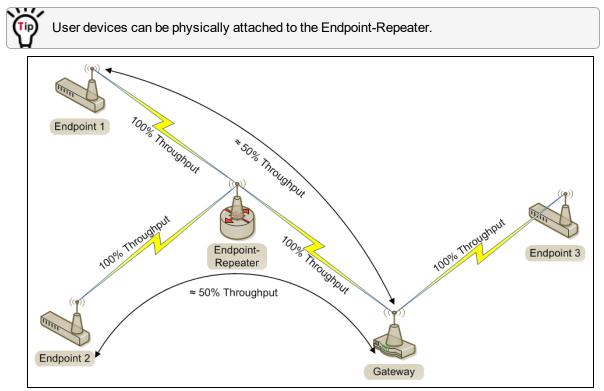


Figure 212: Endpoint-Repeater

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12.3.3. Multiple Repeaters: Gateway-Repeater and Endpoint-Repeater

Figure 213 shows:

- Repeaters are operating in Gateway-Repeater and Endpoint-Repeater mode.
- No performance loss for Endpoint-Repeater to Gateway-Repeater, Endpoint 1 to Endpoint-Repeater, Endpoint 2 to Gateway-Repeater communication.
- The throughput for Endpoint 1 to Gateway communication via Endpoint-Repeater is reduced by approximately 50 percent.
- The throughput for Endpoint 2 to Endpoint-Repeater via the Gateway-Repeater is reduced by approximately 50 percent.
- Endpoint 1 to Endpoint 2 communicate via the Endpoint-Repeater and Gateway-Repeater, or 2 repeater hops.
- The throughput for Endpoint 1 to Endpoint 2 communication is approximately 25%.
- As Repeaters are chained in the network, round trip delay will increase.
 - When issuing pings of large packet sizes at the lower data rates, such as 115.2K, and a beaconInterval = **TWENTY FIVE MS**, the latency can increase causing the pings to fail.
 - Allowing appropriate delay between pings resolves this issue.

FREEWAVE Recommends: Set the **beaconBurstCount=1** or more and **beaconInterval=ONE_HUNDRED_MS** or more for optimal throughput when extended Repeater networks are used.

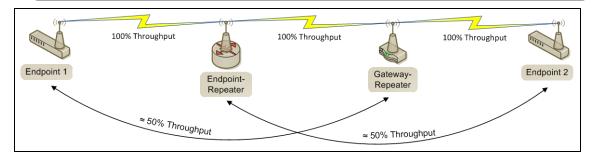


Figure 213: Repeater with Additional Endpoint to Enhance Connectivity

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12.3.4. Multiple Repeaters: Four Endpoint-Repeaters

Figure 214 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.

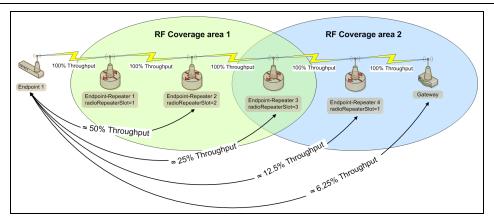


Figure 214: Multiple Repeaters: Four Endpoint-Repeaters

- As Repeaters are chained in the network, round trip delay will increase.
 - When issuing pings of large packet sizes at the lower data rates, such as 115.2K, and a beaconInterval = **TWENTY FIVE MS**, the latency can increase causing the pings to fail.
 - Allowing appropriate delay between pings resolves this issue.

FREEWAVE Recommends: Set the **beaconBurstCount=1** or more and **beaconInterval=ONE_HUNDRED_MS** or more for optimal throughput when extended Repeater networks are used.

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13. Mounting the Z9-P / Z9-PE / Z9-PE-GREY

Separate mounting kits are available for purchase from FreeWave.

- Z9-P
 - FreeWave Part Number: AOH0001HT
- Z9-PE or Z9-PE-GREY
 - FreeWave Part Number: AOH4003SP

Mounting Procedures

- Z9-P Mounting (on page 183)
- Z9-PE Mounting (on page 185)
- Z9-PE-GREY Mounting (on page 187)

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13.1. Z9-P Mounting

13.1.1. Z9-P Mounting Kit - Included Equipment

Z9-P	Z9-P Mounting Kit - Included Equipment		
Qty	Description		
1	DIN Rail Spring Clip		
3	Flat-head machine screws, Phillips, M4 x 0.7, 12mm Long		
1	DIN Rail Bracket		
4	Pan-head machine screws, Phillips, 4-40, 1/4" Long, Lock Patch		
1	Mounting Instruction Sheet		

User-supplied Equipment

- Medium Phillips-head screwdriver
- Medium Flat-head screwdriver

Procedure

- 1. Use the Pan-head machine screws to attach the DIN Rail Bracket to the Z9-P.
- 2. Orient the DIN Rail Bracket / DIN Rail Spring Clip assembly so:
 - a. The spring-loaded end of the DIN Rail Spring Clip is on the bottom lip of the rail.
 - b. The **fixed (not spring-loaded)** end of the DIN Rail Spring Clip is on the top.



Caution: Per the manufacturer's instructions, the DIN Rail Spring Clip is oriented with **spring-loaded end on the bottom lip of the rail**.

- 3. Using Figure 215 as an example:
 - a. Use the Flat-head machine screws to attach the DIN Rail Spring Clip to the DIN Rail Bracket.
 - b. Mount the Z9-P to the 35mm DIN rail using the rail slide on the enclosure.

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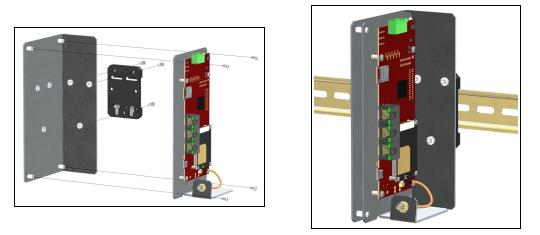


Figure 215: Z9-P Attached to a DIN Rail with the Power Connection on Top

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13.2. Z9-PE Mounting

13.2.1. **Z9-PE** Mounting Kit - Included Equipment

Z9-PE Mounting Kit - Included Equipment		
Qty	Description	
1	DIN Rail Spring Clip	
3	Flat-head machine screws, Phillips, M4 x 0.7, 12mm Long	
1	DIN Rail Bracket	
3	Pan-head machine screws, Phillips, 6-32 Unc, 1/4" Long	
1	Mounting Instruction Sheet	

User-supplied Equipment

- Medium Phillips-head screwdriver
- Medium Flat-head screwdriver

Procedure

- 1. Use the Pan-head machine screws to attach the DIN Rail Bracket to the Z9-PE.
- 2. Orient the DIN Rail Bracket / DIN Rail Spring Clip assembly so:
 - a. The spring-loaded end of the DIN Rail Spring Clip is on the bottom lip of the rail.
 - b. The **fixed (not spring-loaded)** end of the DIN Rail Spring Clip is on the top.

Caution: Per the manufacturer's instructions, the DIN Rail Spring Clip is oriented with **spring-loaded end on the bottom lip of the rail**.

- 3. Using either Figure 216 or Figure 217 as an example:
 - a. Use the Flat-head machine screws to attach the DIN Rail Spring Clip to the DIN Rail Bracket.
 - b. Mount the Z9-PE to the 35mm DIN rail using the rail slide on the enclosure.

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Figure 216: Z9-PE Attached to a DIN Rail with the Power Connection on Top

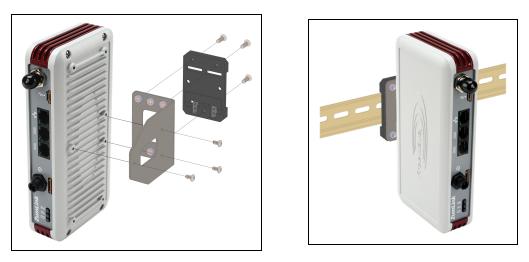


Figure 217: Z9-PE Attached to a DIN Rail with the Antenna Connection on Top

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13.3. **Z9-PE-GREY Mounting**

13.3.1. Z9-PE-GREY Mounting Kit - Included Equipment

Z9-PE-GREY Mounting Kit - Included Equipment		
Qty	Description	
1	DIN Rail Spring Clip	
3	Flat-head machine screws, Phillips, M4 x 0.7, 12mm Long	
1	DIN Rail Bracket	
3	Pan-head machine screws, Phillips, 6-32 Unc, 1/4" Long	
1	Mounting Instruction Sheet	

User-supplied Equipment

- Medium Phillips-head screwdriver
- Medium Flat-head screwdriver

Procedure

- 1. Use the Pan-head machine screws to attach the DIN Rail Bracket to the Z9-PE-GREY.
- 2. Orient the DIN Rail Bracket / DIN Rail Spring Clip assembly so:
 - a. The spring-loaded end of the DIN Rail Spring Clip is on the bottom lip of the rail.
 - b. The **fixed (not spring-loaded)** end of the DIN Rail Spring Clip is on the top.



Caution: Per the manufacturer's instructions, the DIN Rail Spring Clip is oriented with **spring-loaded end on the bottom lip of the rail**.

- 3. Using Figure 218 as an example:
 - a. Use the Flat-head machine screws to attach the DIN Rail Spring Clip to the DIN Rail Bracket.
 - b. Mount the Z9-PE-GREY to the 35mm DIN rail using the rail slide on the enclosure.

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Figure 218: Z9-PE-GREY Attached to a DIN Rail with the Power Connection on Top

13.4. Removing the Z9-P / Z9-PE / Z9-PE-GREY from the DIN Rail

- 1. Push upwards on the DIN Rail Spring Clip (compressing the springs in the bottom).
- 2. Pivot the top of the DIN Rail Bracket / DIN Rail Spring Clip assembly off of the rail.
- 3. Move the whole DIN Rail Spring Clip down to release the bottom of the clip.

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14. Approved Antennas

14.0.1. Omni-Directional Antennas

The 900MHz is approved by the FCC for use with omni-directional antennas with a 10.5dBi gain or less.

900MHz Omni-Directional Antennas				
Gain (dBd)	Gain (dBi)	Manufacturer	Manufacturer Model Number	FreeWave Part Number
3.85	5.0	Antenex	EB8965C	EAN0905WC
3.0	5.15	Maxrad	MAX-9053	EAN0900WC
-0.15	2.0	Mobile Mark	PSKN3-925S	EAN0900SR
-2.15	0.0	Mobile Mark	PSTG0-915SE	EAN0900SQ

Note: These antennas, including antenna gains, are approved for use with the ZumLink device.

14.0.2. Directional Antennas

The 900MHz is approved by the FCC for use with Yagi-directional antennas with a 16.08.6 dBi gain or less.

900MHz Directional Antennas				
Gain (dBd)	Gain (dBi)	Manufacturer	Manufacturer Model Number	FreeWave Part Number
6.45	8.6	WaveLink	PRO890-8-40F02N4	EAN0906YC

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14.0.3. Alternative Antennas

Antennas other than those listed in this section can potentially be used with the **ZumLink** with provisions.

- The antennas must be of a similar type.
- The antenna gain CANNOT exceed 10.5dBi for Omni-directional.
- The antenna gain CANNOT exceed 16.0dBi for Directional antennas.
- The overall system EIRP does not exceed 36dBm.



Warning! A proper combination with the **ZumLink** is required to ensure the system meets FCC requirements.

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15. COM Parameters

Note: See the COM window (on page 337).

The parameters for **COM1** and **COM2** are the same except for the **TerminalServerPort** parameter setting.

- baudrate (on page 192)
- breakBeforeSendUs (on page 192)
- connectionDrops (on page 193)
- databits (on page 194)
- delayBeforeSendMs (on page 194)
- duplex (on page 195)
- flowControl (on page 196)
- handler (on page 197)

- mode (on page 198)
- parity (on page 199)
- RxBytes (on page 200)
- stopbits (on page 200)
- TerminalServerPort (on page 201)
- TerminalServerTimeOut (on page 201)
- TxBytes (on page 202)

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. baudrate

baudrate			
Setting	Description		
CLI / Web Page	[Page=Com1]		
	[Page=Com2]		
CLI Command	• Com1.baudrate=nnnn		
	• Com2.baudrate=nnnn		
	Note: Where nnnn is the baudrate value.		
Web Interface	Baudrate		
window	1. Click the Baudrate list box arrow and select a COM port baud rate.		
	2. Click the Update button to save the change.		
	Note : See the COM window (on page 337) for the parameter location.		
Default Setting	115200		
Options	Rate Options		
	1200 38400		
	2400 57600		
	4800 115200		
	9600 230400		
	14400 250000		
	19200		
Description	The Com1.baudrate or Com2.baudrate setting designates the COM port baud rate for COM1 or COM2.		

15.2. breakBeforeSendUs

breakBeforeSendUs		
Setting	Description	
CLI / Web Page	[Page=Com1]	
	[Page=Com2]	
CLI Command	 Com1.breakBeforeSendUs=nnnn 	
	• Com2.breakBeforeSendUs=nnnn	
	Note: Where nnnn is the break signal value.	

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breakBeforeSendUs		
Setting	Description	
Web Interface	Break Before Send Us	
window	 In the Break Before Send Us text box, enter the number of milliseconds the COM port will send a break signal. 	
	2. Click the Update button to save the change.	
	Note : See the COM window (on page 337) for the parameter location.	
Default Setting	0 (zero)	
Options	The maximum value is0 (zero).	
	The minimum value is 1000.	
Description	The Com1.breakBeforeSendUs or Com2.breakBeforeSendUs setting designates how long the COM port will send a break signal for at least the number of microseconds specified before sending the data.	
	Example : For COM1, enter Com1.breakBeforeSendUs=500 to have the COM1 port send a break signal for 500 microseconds.	

15.3. connectionDrops

connectionDrop	connectionDrops	
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 337) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The Com1.connectionDrops or Com2.connectionDrops command reports the number of terminal server connections dropped due to inactivity on the network socket. Note: This is a Read-only parameter.	

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15.4. 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	Databits
window	 Click the Databits list box arrow and select the number of data bits in the frame for COM1 or COM2.
	2. Click the Update button to save the change.
	Note : See the COM window (on page 337) for the parameter location.
Default Setting	8
Options	7 or 8
Description	The Com1.databits or Com2.databits setting designates the number of data bits in the frame for COM1 or COM2.

15.5. delayBeforeSendMs

delayBeforeSendMs		
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	 In the Delay Before Send MS text box, enter the milliseconds of time delay. 	
	2. Click the Update button to save the change.	
	Note : See the COM window (on page 337) for the parameter location.	

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delayBeforeSendMs		
Setting	Description	
Default Setting	0 (zero)	
Options	The maximum value is0 (zero).	
	The minimum value is 5000.	
Description	The Com1.delayBeforeSendMs or Com2.delayBeforeSendMs setting designates the amount of time delay in milliseconds the Z9-P / Z9-PE / Z9-PE-GREY waits to allow the device connected to the COM port to switch from transmit (Tx) to receive (Rx) mode.	
	Example : For COM1, enter Com1.delayBeforeSendMs=100 for a 100 millisecond delay.	
	Increase this delay if the ZumLink is responding before a polling system is ready for a response.	

15.6. duplex

duplex	duplex	
Setting	Description	
CLI / Web Page	[Page=Com1]	
	[Page=Com2]	
CLI Command	• Com1.duplex=Half	
	• Com2.duplex=Half	
	• Com1.duplex=Full	
	• Com2.duplex=Full	
Web Interface	Duplex	
window	1. Click the Duplex list box arrow and select the duplex designation.	
	2. Click the Update button to save the change.	
	Note : See the COM window (on page 337) for the parameter location.	
Default Setting	Full	
Options	Half or Full	

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duplex	duplex	
Setting	Description	
Description	Important!: This setting ONLY applies to the RS485 mode.	
	The Com1.duplex or Com2.duplex setting designates whether the COM port is Full or Half duplex.	
	The command is:	
	Note : See Ports and Pinouts for input and output information.	
	Note: The default value is Full.	

15.7. flowControl

flowControl	
Setting	Description
CLI / Web Page	[Page=Com1]
	[Page=Com2]
CLI Command	For Com2, the command is:
	• Off : Com2.flowControl=Off
	• On :Com2.flowControl=Hardware
Web Interface	Flow Control
window	 Click the Flow Control list box arrow and select Hardware to activate flowControl for COM2.
	2. Click the Update button to save the change.
	Note : See the COM window (on page 337) for the parameter location.
Default Setting	Off
Options	• Off
	Hardware
Description	Important!: The RTS and CTS signals are ONLY available for COM2. The RTS and CTS signals are NOT supported for COM1.
	The Com2.flowControl setting designates the hardware flow control as either on or off.

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15.8. handler

handler	
Setting	Description
CLI / Web Page	[Page=Com1]
	[Page=Com2]
CLI Command	CLI
	The command is:
	• Com1.handler=cli
	• Com2.handler=cli
	ModbusPassthru - Option is visible but is not active
	ModbusRTU - Option is visible but is not active
	Off - Option is visible but is not active
	Setup - Option is visible but is not active
	Terminal Server
	The command is:
	• Com1.handler=TerminalServer
	• Com2.handler=TerminalServer
	Trace
	A configuration CLI with trace is on the COM port.
	Com1.handler=traceCom2.handler=trace
Web Interface window	Handler 1. Click the Handler list box arrow and select the designated protocol handler.
Wildow	 Click the Update button to save the change.
	Note: See the COM window (on page 337) for the parameter location.
Default Setting	TerminalServer
Options	CLI (on page 197)
	Terminal Server (on page 197)
	Trace (on page 197)
	Note: ModbusRTU, ModbusPassthru, Setup, and Off are not active.

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handler	handler	
Setting	Description	
Description	The Com1.handler or Com2.handler setting designates the protocol of the COM port as CLI, Terminal Server, or Trace.	
	Notes	
	The COM port will act as a terminal server.	
	 The TCP port number is determined by the COM TerminalServerPort setting. 	
	• The default port number for COM1 is 5041.	
	• The default port number for COM2 is 5042.	
	Important!: If using Terminal Server Relay, the TCP port numbers MUST BE be consistent across all involved radios.	
	FREEWAVE Recommends : If using the Terminal Server Relay setting, keep the TCP port numbers as their defaults.	

15.9. mode

mode	
Setting	Description
CLI / Web Page	[Page=Com1]
	[Page=Com2]
CLI Command	• Com1.mode=RS232
	• Com2.mode=RS232
	• Coml.mode=RS485
	• Com2.mode=RS485
Web Interface	Mode
window	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 337) for the parameter location.
Default Setting	RS232
Options	• RS232
	• RS485

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mode	
Setting	Description
Description	The Com1.mode or Com2.mode setting designates the COM port mode as either RS232 or RS485. Note: When Com1.mode=RS485 or Com2.mode=RS485 AND Com1.duplex=Full or Com2.duplex=Full, the COM supports RS422.

15.10. 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	 Parity Click the Parity list box arrow and select the COM port parity bits for the system. Click the Update button to save the change.
	Note : See the COM window (on page 337) for the parameter location.
Default Setting	None
Options	None
	• Even
	• Odd
Description	The Com1.parity or Com2.parity setting designates the COM port parity bits for the system.

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15.11. RxBytes

RxBytes	
Setting	Description
CLI / Web Page	[Page=Com1]
	[Page=Com2]
CLI Command	• Coml.RxBytes
	• Com2.RxBytes
Web Interface	RX Bytes
window	Note : This parameter is read-only in the Web Interface. See the COM window (on page 337) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The Com1.RxBytes or Com2.RxBytes command reports the total bytes received from the COM port.
	Note: This is a Read-only parameter.

15.12. stopbits

stopbits	
Setting	Description
CLI / Web Page	[Page=Com1]
	[Page=Com2]
CLI Command	• Coml.stopbits=1
	• Com2.stopbits=1
	• Com1.stopbits=2
	• Com2.stopbits=2
Web Interface window	 Stopbits 1. Click the Stopbits list box arrow and select the COM port number of stop bits. 2. Click the Update button to save the change. Note: See the COM window (on page 337) for the parameter location.
Default Setting	1

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stopbits	
Setting	Description
Options	• 1
	• 2
Description	The Com1.stopbits or Com2.stopbits setting designates the COM port number of stop bits.

15.13. TerminalServerPort

Note: See Examples - Terminal Server Relay (on page 326) for additional information.

TerminalServerPort	
Setting	Description
CLI / Web Page	[Page=Com1]
	[Page=Com2]
CLI Command	 Com1.TerminalServerPort=nnnn
	• Com2.TerminalServerPort=nnnn
	Note: Where nnnn is the TCP port number.
Web Interface	Terminal Server Port
window	 In the Terminal Server Port text box, enter the designated TCP port number.
	2. Click the Update button to save the change.
	Note : See the COM window (on page 337) for the parameter location.
Default Setting	The default port number for COM1 is 5041.
	The default port number for COM2 is 5042.
Options	The minimum value is0 (zero).
	The maximum value is 65535.
Description	The Com1.TerminalServerPort or Com2.TerminalServerPort setting designates the TCP port number.
	FREEWAVE Recommends : If using the Terminal Server Relay setting, keep the TCP port numbers as their defaults.

15.14. TerminalServerTimeOut

Note: See Examples - Terminal Server Relay (on page 326) for additional information.

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TerminalServerTimeOut	
Setting	Description
CLI / Web Page	[Page=Com1]
	[Page=Com2]
CLI Command	 Coml.TerminalServerTimeOut=nnnn
	• Com2.TerminalServerTimeOut=nnnn
	Note : Where nnnn is the amount of time, in seconds, the Terminal Server remains open.
Web Interface	Terminal Server Time Out
window	 In the Terminal Server Time Out text box, enter the number of seconds the Terminal Server remains open without receiving data from the network.
	2. Click the Update button to save the change.
	3. Reboot the Z9-P / Z9-PE / Z9-PE-GREY for the change to take effect.
	Note: See the COM window (on page 337) for the parameter location.
Default Setting	300
Options	The minimum value is 5.
	The maximum value is 3600.
Description	The Com1.TerminalServerTimeOut or Com2.TerminalServerTimeOut setting designates the amount of time, in seconds, the Terminal Server remains open if data is sent or received.
	Note : This can prevent an idle socket from remaining open indefinitely and preventing new connections.
	ImportantI: The Com1.TerminalServerTimeOut or Com2.TerminalServerTimeOut connection remains open if data is sent or received.

15.15. TxBytes

TxBytes	
Setting	Description
CLI / Web Page	[Page=Com1]
	[Page=Com2]
CLI Command	• Coml.TxBytes
	• Com2.TxBytes

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TxBytes	
Setting	Description
Web Interface window	TX Bytes Note: This parameter is read-only in the Web Interface. See the COM window (on page 337) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The Com1.TxBytes or Com2.TxBytes command reports the total bytes sent out of the COM port. Note: This is a Read-only parameter.

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16. config Parameters

Note: See the Config window (on page 339).

- addTraceMask (on page 205)
- factoryDefaults (on page 205)
- getCurrentConfig (on page 205)
- handleDragDrop (on page 205)
- licenseState (on page 205)
- loadConfig (on page 206)
- removeTraceMask (on page 206)
- reset (on page 206)
- restore (on page 207)
- save (on page 208)

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. addTraceMask

Important!: FreeWave internal use only.

16.2. factoryDefaults

factoryDefaults	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	config.factoryDefaults=set
Web Interface window	Important!: This parameter is read-only in the Web Interface. The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	Idle
Description	The config.factoryDefaults command restores the Z9-P / Z9-PE / Z9-PE-GREY to its factory default configuration.

16.3. getCurrentConfig

Important!: FreeWave internal use only.

16.4. handleDragDrop

Important!: FreeWave internal use only.

16.5. licenseState

licenseState	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	config.licenseState

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licenseState	
Setting	Description
Web Interface window	License State Note: See the Config window (on page 339) for the 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 Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The config.licenseState command reports the extra feature licenses in the Z9-P / Z9-PE / Z9-PE-GREY.
	Note: This is a Read-only parameter.

16.6. loadConfig

Important!: FreeWave internal use only.

16.7. removeTraceMask

Important!: FreeWave internal use only.

16.8. reset

reset	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	Reboot the entire ZumLink device:
	• config.reset=now
	• config.reset=reboot
	Reset to restart the main application:
	• config.reset=reset

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reset	
Setting	Description
Web Interface window	Reset
	Note : See the Config window (on page 339) for the 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 Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The config.reset command restarts or reboots the Z9-P / Z9-PE / Z9-PE-GREY.

16.9. restore

restore	
Setting	Description
CLI / Web Page	[Page=config]
CLI Command	• config.restore=now
	• config.restore
	• restore
Web Interface	Restore
window	Note : See the Config window (on page 339) for the 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 Tera Term Activation and ZumLink Setup (on page 66) 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-P / Z9-PE / Z9-PE-GREY.
	Note : Restore happens automatically when the Z9-P / Z9-PE / Z9-PE-GREY starts.

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16.10. 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 339) for the 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 Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The config.save command saves changes made to the Z9-P / Z9-PE / Z9-PE-GREY configuration.

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17. dataPath Parameters

Note: See the Data Path window (on page 341).

- aggregateEnabled (on page 210)
- compressionEnabled (on page 211)
- fecRate (on page 212)
- MacTableEntryAgeTimeout (on page 214)
- otaMaxFragmentSize (on page 215)
- routeMinSignalMarginThresh (on page 215)

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. aggregateEnabled

aggregateEnable	ed
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	Enable:
	 dataPath.aggregateEnabled=true
	Disable:
	 dataPath.aggregateEnabled=false
Web Interface	Aggregate Enabled
window	 Click the Aggregate Enabled list box arrow and select True to enable this parameter and increase throughput of small packets.
	2. Click the Update button to save the change.
	Note : By default, the Aggregate Enabled is NOT enabled (set to False). See the Data Path window (on page 341) for the parameter location.
Default Setting	False
Options	• True
	• False
Description	The aggregateEnabled (on page 210) setting increases throughput of small packets by combining multiple packets into a single packet minimizing the number of packets required for transmission.
	Notes
	 Increases latency by 20msec and reduces poll rates.
	 When enabled, this setting adds 20 msec of latency.
	 However, net throughput may increase due to sending fewer, larger packets.
	 If another packet is not received within 20 msec, the aggregated packet is transmitted.
	 This setting does NOT need to match on all radios.
	Does NOT affect medium and large packets.
	 Packets below 900 bytes are aggregated up to an aggregated packet size of 970 bytes.
	Important!: All radios have the ability to de-aggregate received packets, regardless of the aggregation setting.
	FREEWAVE Recommends : Enable this setting on individual radios that send a high percentage of network data packets that are smaller than 900 bytes.

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17.2. compressionEnabled

compressionEna	abled
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	Enable:
	 dataPath.compressionEnabled=true
	Disable:
	 dataPath.compressionEnabled=false
Web Interface window	 Compression Enabled 1. Click the Compression Enabled list box arrow and select False to disable compression of outgoing packets.
	2. Click the Update button to save the change.
	Note : By default, the Compression Enabled is enabled (set to True). See the Data Path window (on page 341) for the parameter location.
Default Setting	True
Options	• True
	• False
Description	When the compressionEnabled (on page 211) 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.
	Example : Text data is easily compressible, while video data is not.
	Notes
	 When enabled, the Packet Compression setting increases latency by a maximum of 10msec.
	Net throughput may increase due to sending more data in each packet.
	 All radios have the ability to de-compress received packets regardless of their compression setting.
	 This setting does NOT need to match on all radios.
	FREEWAVE Recommends : Enable Packet Compression on all ZumLink networks.

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17.3. fecRate

fecRate	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	Enable:
	 dataPath.fecRate=RATE_7_8
	Disable:
	 dataPath.fecRate=RATE_1_1
Web Interface	FEC Rate
window	 Click the FEC Rate list box arrow and select the Forward Error Correction (FEC) rate.
	2. Click the Update button to save the change.
	Note : See the Data Path window (on page 341) for the parameter location.
Default Setting	RATE_1_1
Options	• RATE_1_1
	• RATE_7_8

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fecRate	
Setting	Description
Description	The dataPath.fecRate setting enables the Forward Error Correction (FEC) rate.
	Note : The fecRate (on page 212) 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 range and link range in noisy environments.
	 Adds redundant information to a data stream to detect packet errors and corrects them to avoid retransmission of the packet.
	Adds resilience in noisy environments.
	FEC reduces the maximum achievable throughput.
	 However, in noisy environments, net throughput may increase due to reduced errors and retries.
	Caution : When enabling FEC, start with the farthest Endpoints, then any Repeaters, then lastly the Gateway. As FEC is enabled on each radio, that radio is temporarily dropped off the network, until any downstream Repeaters and the Gateway also have FEC enabled, at which time all communication will resume.
	FREEWAVE Recommends : When viewing local diagnostics, if the RadioBadCRC (on page 234) count is more than 15-20% of the total transmitted packets (the RadioLLTx (on page 236) count), enabling the FEC setting is beneficial.
	FREEWAVE Recommends : When viewing local diagnostics, if the RadioBadCRC (on page 234) count is more than 15% of the total transmitted packets (the RadioLLTx (on page 236) count), enabling the fecRate (on page 212) setting is beneficial.

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17.4. MacTableEntryAgeTimeout

MacTableEntryA	MacTableEntryAgeTimeout		
Setting	Description		
CLI / Web Page	[Page=dataPath]		
CLI Command	MacTableEntryAgeTimeout=nnnn		
	Note: Where nnnn is the number of seconds.		
Web Interface	MAC Table Entry Age Timeout		
window	 In the MAC Table Entry Age Timeout text box, enter the number of seconds before an inactive entry in the MAC Table ages out and expires. 		
	2. Click the Update button to save the change.		
	Note : See the Data Path window (on page 341) for the parameter location.		
Default Setting	120		
Options	The minimum value is 30.		
	The maximum value is 86400.		
Description	The dataPath.MacTableEntryAgeTimeout setting designates the number of seconds before an inactive entry in the MAC Table ages out and expires.		
	 The radio network learns the MAC address of devices connected to particular radio Endpoints and stores them in a MAC table. 		
	 As traffic passes between the Endpoints, the entries in the MAC table are updated. 		
	 If packets have NOT been sent or received to a MAC address within the designated dataPath.MacTableEntryAgeTimeout period, the entry in the table is marked as expired. 		
	 Expired entries must be re-learned and generate some extra traffic on the network until the radio Endpoint associated with the MAC address is learned. 		
	 The timeout does impact the time it takes to learn the new path. 		
	This value can be optimized with parallel Repeaters to allow for fail over.		
	 Setting this value too small so normal traffic does not keep the MAC table entry from expiring may generate excess network traffic. 		
	FREEWAVE Recommends : Set this timeout longer than the polling rate on the network.		
	Entries do not use the new timeout value until they are updated when a packet transfer.		
	Note : See MacTableShow (on page 231) to view the MAC to nodeld mapping table.		

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17.5. otaMaxFragmentSize

otaMaxFragmentSize	
Setting	Description
CLI / Web Page	[Page=dataPath]
CLI Command	dataPath.otaMaxFragmentSize=nnnn
	Note: Where nnnn is the maximum fragment size.
Web Interface	OTA Max Fragment Size
window	 In the OTA Max Fragment Size text box, enter the maximum fragment size, in bytes, sent over the air.
	2. Click the Update button to save the change.
	Note: See the Data Path window (on page 341) for the parameter location.
Default Setting	1000
Options	The minimum value is 64.
	The maximum value is 1000.
Description	The dataPath.otaMaxFragmentSize 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.
	 A larger Max Fragment Size may reduce RF link reliability in noisy environments.

17.6. routeMinSignalMarginThresh

routeMinSignalMarginThresh		
Setting	Description	
CLI / Web Page	[Page=dataPath]	
CLI Command	dataPath.routeMinSignalMarginThresh=nnnn	
	Note: Where nnnn is the minimum signal margin in dB.	

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routeMinSignalMarginThresh		
Setting	Description	
Web Interface window	 Route Min Signal Margin Thresh 1. In the Route Min Signal Margin Thresh text box, enter the minimum threshold signal margin in dB. 2. Click the Update button to save the change. Note: See the Data Path window (on page 341) for the parameter location. 	
Default Setting	• 10	
Options	The minimum value is -5.The maximum value is 60.	
Description	 The dataPath.routeMinSignalMarginThresh setting designates the minimum (threshold) signal margin, in dB, the next hop must be considered part of the packet route. Notes When Repeaters are enabled, the packets take the path through the radio network with the minimum number of hops. By increasing the threshold value, the possible routes can be reduced to allow a particular routing path to be preferred. FREEWAVE Recommends: This value should be at least 4 dB lower than the reported link margin to the next hop. Example: If the best-reported link margin for the next hop is 20 dB, this number should be set to 16 or less. This prevents the traffic from choosing an alternative route with lower margin. 	

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18. date Parameters

Note: See the Date window (on page 343).

- dcAppStartTime (on page 218)
- dcAppUptime (on page 218)
- time (on page 219)
- timeString (on page 219)
- upTime (on page 220)
- upTimeString (on page 220)

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. dcAppStartTime

Important!: Time zones do not apply to the Z9-P / Z9-PE / Z9-PE-GREY.

dcAppStartTime	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	• date.dcAppStartTime
	• dcAppStartTime
Web Interface	DC App Start Time
window	Note : This parameter is read-only in the Web Interface. See the Date window (on page 343) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The date.dcAppStartTime command reports the time stamp of when the main app started.
	Note: This is a Read-only parameter.

18.2. dcAppUptime

Important!: Time zones do not apply to the Z9-P / Z9-PE / Z9-PE-GREY.

dcAppUptime	
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 343) for the parameter location.
Default Setting	N/A
Options	N/A

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dcAppUptime	
Setting	Description
Description	The date.dcAppUptime command reports the number of seconds since the main app started.
	Note: This is a Read-only parameter.

18.3. time

Important!: Time zones do not apply to the Z9-P / Z9-PE / Z9-PE-GREY.

time	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	• date.time
	• time
Web Interface window	Time Note: This parameter is read-only in the Web Interface. See the Date window (on page 343) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The date.time command reports the current time in Unix time stamp format. Note: This is a Read-only parameter.

18.4. timeString

Important!: Time zones do not apply to the Z9-P / Z9-PE / Z9-PE-GREY.

timeString	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	date.timeString=MM/DD/YYYY HH.MM.SS

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timeString	timeString	
Setting	Description	
Web Interface window	Time String Note: This parameter is read-only in the Web Interface. See the Date window (on page 343) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The date.timeString setting changes the time ONLY if the ntpReference (on page 260) is set to REFCLK_LOCALCLOCK .	
	Important!: If the Z9-P / Z9-PE / Z9-PE-GREY loses power, the time must be manually reset.	

18.5. upTime

Important!: Time zones do not apply to the Z9-P / Z9-PE / Z9-PE-GREY.

upTime	
Setting	Description
CLI / Web Page	[Page=date]
CLI Command	• date.upTime
	• upTime
Web Interface	Up Time
window	Note : This parameter is read-only in the Web Interface. See the Date window (on page 343) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The date.upTime command reports the number of seconds since the ZumLink restarted.
	Note: This is a Read-only parameter.

18.6. upTimeString

Important!: Time zones do not apply to the Z9-P / Z9-PE / Z9-PE-GREY.

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upTimeString	upTimeString	
Setting	Description	
CLI / Web Page	[Page=date]	
CLI Command	• date.upTimeString	
	• upTimeString	
	Example : A return of Uptime 5 Days 01:36:41 means the unit has been up for 5 days, 1 hour, 36 minutes, and 41 seconds.	
Web Interface	Up Time String	
window	Note : This parameter is read-only in the Web Interface. See the Date window (on page 343) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The date.upTimeString command reports the amount of time in Days, Hours, Minutes, and Seconds the Z9-P / Z9-PE / Z9-PE-GREY has been powered on without a reboot.	
	Note: This is a Read-only parameter.	

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19. encryption Parameters

Note: See the Encryption window (on page 345).

- activeKey (on page 223)
- encryptionMode (on page 223)
- getKey (on page 224)
- remoteRestore (on page 225)
- remoteSave (on page 225)
- setKey (on page 225)

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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19.1. activeKey

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.

activeKey	
Setting	Description
CLI / Web Page	[Page=encryption]
CLI Command	 encryption.activeKey=Off
	 encryption.activeKey=Key1 to Key16
	Example: encryption.activeKey=Key10.
Web Interface	Active Key
window	Note : This parameter is read-only in the Web Interface. See the Encryption window (on page 345) for the parameter location.
Default Setting	Off
Options	• Off
	Key1 to Key16
Description	The encryption.activeKey setting designates the active key.
	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.

19.2. encryptionMode

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.

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encryptionMode	
Setting	Description
CLI / Web Page	[Page=encryption]
CLI Command	AES Counter Mode:
	 encryption.encryptionMode=AES_CTR
	AES Counter Mode with MIC (Message Integrity Check):
	 encryption.encryptionMode=AES_CCM
Web Interface window	 Encryption Mode 1. Click the Encryption Mode list box arrow and select the designated encryption mode. 2. Click the Update button to save the change. Note: See the Encryption window (on page 345) for the parameter location.
Default Setting	AES_CTR
Options	AES_CCM
	• AES_CTR
Description	The encryption.encryptionMode setting designates the encryption mode.
	Important!: Use of encryption may affect latency and user throughput.

19.3. getKey

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.

getKey	
Setting	Description
CLI / Web Page	[Page=encryption]
CLI Command	encryption.getKey=Key1 to Key16
	Example: encryption.getKey=key8.

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getKey	getKey	
Setting	Description	
Web Interface window	Get Key Note: This parameter is read-only in the Web Interface. See the Encryption window (on page 345) for the parameter location.	
Default Setting	Off	
Options	OffKey1 to Key16	
Description	 The encryption.getKey command reports this information about the key: Whether the key is 128- or 256-bit key. If the key is empty. Note: This is a Read-only parameter.	

19.4. remoteRestore

Important!: FreeWave internal use only.

19.5. remoteSave

Important!: FreeWave internal use only.

19.6. setKey

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.

setKey	
Setting	Description
CLI / Web Page	[Page=encryption]

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setKey	
Setting	Description
CLI Command	The format of this setting is: setKey [key] [128 or 256 key in hex] Example: 128 bit key: encryption.setKey=key1 1234567890abcdef1234567890abcdef Example: 256 bit key: encryption.setKey=key2 1234567890abcdef1234567890abcdef1234567890abcdef1234567890abc def
Web Interface window	Set Key Note: This parameter is read-only in the Web Interface. See the Encryption window (on page 345) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The encryption.setKey setting loads the key. Enter encryption.setKey= WITHOUT an actual key to erase or clear the existing key.

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20. localDiagnostics Parameters

Note: See the Local Diagnostics window (on page 352).

- signalLevel (on page 228)
- signalMargin (on page 228)
- cntBadBCC (on page 229)
- cntBadSync (on page 229)
- cntETX (on page 229)
- cntSTX (on page 229)
- getStats (on page 229)
- interfaceBytesRx (on page 230)
- interfaceBytesTx (on page 230)
- interfaceDataRx (on page 230)
- interfaceDataTx (on page 230)
- MacTableClear (on page 231)
- MacTableShow (on page 231)
- monitoredNode (on page 232)
- noiseLevel (on page 232)
- RadioAckTx (on page 233)
- RadioBadAckRx (on page 233)
- RadioBadCRC (on page 234)
- RadioBadSync (on page 234)
- RadioContentionDrop (on page 235)
- RadioLLRx (on page 235)

- RadioLLTx (on page 236)
- RadioNoAckTx (on page 237)
- RadioReliableRx (on page 237)
- RadioReliableTx (on page 237)
- RadioRexmit (on page 237)
- RadioRx (on page 237)
- RadioSendingDrop (on page 238)
- RadioTimedOut (on page 238)
- RadioTooLong (on page 238)
- RadioTooShort (on page 238)
- RadioTx (on page 238)
- resetsDetected (on page 239)
- resetSent (on page 239)
- resetStats (on page 239)
- RxSuccess (on page 240)
- showChannelDiags (on page 240)
- showNodeDiags (on page 241)
- timestamp (on page 241)
- TxAvailability (on page 242)
- TxSuccess (on page 243)
- VSWR (on page 243)

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20.1. signalLevel

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

signalLevel	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.signalLevel
	• signalLevel
Web Interface	Signal Level
window	Note : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.
Default Setting	-128.00
Options	N/A
Description	The localDiagnostics.signalLevel command reports the Signal Level of the radio in dBm of the last received packet.
	Note : This setting shows -128.00 if no packet has been received since the stats were cleared.

20.2. signalMargin

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

signalMargin	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.signalMargin
	• signalMargin

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signalMargin	
Setting	Description
Web Interface window	Signal Margin Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.signalMargin command reports the amount of signal margin in dB the last received packet experienced. Note: The signal margin is the difference between the signal level and either the receive sensitivity or the noise level, whichever is higher, for the configured RF data rate.

20.3. cntBadBCC

Important!: FreeWave internal use only.

20.4. cntBadSync

Important!: FreeWave internal use only.

20.5. cntETX

Important!: FreeWave internal use only.

20.6. cntSTX

Important!: FreeWave internal use only.

20.7. getStats

getStats	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]

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getStats	getStats	
Setting	Description	
CLI Command	 localDiagnostics.getStats 	
	• getStats	
Web Interface	Get Stats	
window	Note : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The localDiagnostics.getStats command reports the localDiagnostics from the radio immediately.	
	Important!: A refresh of the localDiagnostics page is required to see the updates.	

20.8. interfaceBytesRx

Important!: FreeWave internal use only.

20.9. interfaceBytesTx

Important!: FreeWave internal use only.

20.10. interfaceDataRx

Important!: FreeWave internal use only.

20.11. interfaceDataTx

Important!: FreeWave internal use only.

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20.12. MacTableClear

MacTableClear	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	 localDiagnostics.MacTableClear=Now
	 localDiagnostics.MacTableClear=
	• MacTableClear=Now
	• MacTableClear=
Web Interface	Mac Table Clear
window	Note : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.
Default Setting	N/A
Options	Now
Description	The localDiagnostics.MacTableClear command clears the MAC to the nodelD mapping table and forces routes to be relearned.

20.13. MacTableShow

MacTableShow	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	 localDiagnostics.MacTableShow
	• MacTableShow
Web Interface	Mac Table Show
window	Note : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.MacTableShow command reports the MAC addresses of the devices connected to the Z9-P / Z9-PE / Z9-PE-GREY in a nodelD table format.

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20.14. monitoredNode

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

monitoredNode	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	 localDiagnostics.monitoredNode=<node here="" id=""></node>
	 monitoredNode=<node here="" id=""></node>
Web Interface window	 Monitored Node 1. In the Monitored Node text box, enter the nodeld (on page 272) to monitor. 2. Click the Update button to save the change. Note: See the Local Diagnostics window (on page 352) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.monitoredNode setting designates the nodeld (on page 272) to be monitored and reported back by the localDiagnostics.showNodeDiags command.
	Use the showNodeDiags to view the received signal level (RSSI) of this node.

20.15. noiseLevel

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

noiseLevel	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.noiseLevel
	• noiseLevel

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noiseLevel	
Setting	Description
Web Interface window	Noise Level
	Note : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.
Default Setting	0.00000
Options	N/A
Description	The localDiagnostics.noiseLevel command reports the amount of link noise measured in dB before the last packet was transmitted.

20.16. RadioAckTx

Important!: FreeWave internal use only.

20.17. RadioBadAckRx

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

RadioBadAckRx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.RadioBadAckRx
	• RadioBadAckRx
Web Interface window	Radio Bad Ack RX Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.RadioBadAckRx command reports the number of received ACKs missed in unicast transmissions.

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20.18. RadioBadCRC

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

RadioBadCRC	RadioBadCRC	
Setting	Description	
CLI / Web Page	[Page=localDiagnostics]	
CLI Command	• localDiagnostics.RadioBadCRC	
	• RadioBadCRC	
Web Interface window	Radio Bad CRC	
WINGOW	Note : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The localDiagnostics.RadioBadCRC command reports the number of radio packets received with data corruption.	
	FREEWAVE Recommends : When viewing local diagnostics, if the RadioBadCRC (on page 234) count is more than 15% of the total transmitted packets (the RadioLLTx (on page 236) count), enabling the fecRate (on page 212) setting is beneficial.	

20.19. RadioBadSync

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

RadioBadSync	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.RadioBadSync
	• RadioBadSync

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RadioBadSync	RadioBadSync	
Setting	Description	
Web Interface window	Radio Bad Sync Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The localDiagnostics.RadioBadSync command reports the number of times beacons were lost and the Endpoint needed to re-synchronize with the Gateway when radiosettings.radioHoppingMode=Hopping_On .	

20.20. RadioContentionDrop

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

RadioContentior	RadioContentionDrop	
Setting	Description	
CLI / Web Page	[Page=localDiagnostics]	
CLI Command	 localDiagnostics.RadioContentionDrop 	
	• RadioContentionDrop	
Web Interface window	Radio Contention Drop Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The localDiagnostics.RadioContentionDrop command reports the number of times a transmission was backed-off due to contention on the RF channel.	

20.21. RadioLLRx

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

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RadioLLRx	
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 352) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.RadioLLRx command reports the number of packets received over the air without data corruption.

20.22. RadioLLTx

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

RadioLLTx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.RadioLLTx
	• RadioLLTx
Web Interface window	Radio LL TX Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.
Default Setting	N/A
Options	N/A

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RadioLLTx	
Setting	Description
Description	The localDiagnostics.RadioLLTx command reports the number of packets transmitted over the air. FREEWAVE Recommends: When viewing local diagnostics, if the RadioBadCRC (on page 234) count is more than 15% of the total transmitted packets (the RadioLLTx (on page 236) count), enabling the fecRate (on page 212) setting is beneficial.

20.23. RadioNoAckTx

Important!: FreeWave internal use only.

20.24. RadioReliableRx

Important!: FreeWave internal use only.

20.25. RadioReliableTx

Important!: FreeWave internal use only.

20.26. RadioRexmit

Important!: FreeWave internal use only.

20.27. RadioRx

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

RadioRx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.RadioRx
	• RadioRx

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RadioRx	RadioRx	
Setting	Description	
Web Interface window	Radio RX	
	Note : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The localDiagnostics.RadioRx command reports the number of data packets correctly received over the wireless RF link for this node.	

20.28. RadioSendingDrop

Important!: FreeWave internal use only.

20.29. RadioTimedOut

Important!: FreeWave internal use only.

20.30. RadioTooLong

Important!: FreeWave internal use only.

20.31. RadioTooShort

Important!: FreeWave internal use only.

20.32. RadioTx

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

RadioTx	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]

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RadioTx	RadioTx	
Setting	Description	
CLI Command	 localDiagnostics.RadioTx 	
	• RadioTx	
Web Interface window	Radio TX	
WINCOW	Note : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The localDiagnostics.RadioTx command reports the number of data packets scheduled to be transmitted.	

20.33. resetsDetected

Important!: FreeWave internal use only.

20.34. resetSent

Important!: FreeWave internal use only.

20.35. resetStats

resetStats	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	 localDiagnostics.resetStats=Now
	 localDiagnostics.resetStats=
	• resetStats=Now
	<pre>• resetStats=</pre>
Web Interface window	Reset Stats
	Note : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.

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resetStats	
Setting	Description
Default Setting	N/A
Options	Now
Description	The localDiagnostics.resetStats command resets the local diagnostics.

20.36. RxSuccess

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

RxSuccess	
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 352) for the parameter location.
Default Setting	100
Options	N/A
Description	The localDiagnostics.RxSuccess command reports the percentage of packets correctly received for this node.

20.37. showChannelDiags

showChannelDiags	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	 localDiagnostics.showChannelDiags
	• showChannelDiags

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showChannelDiags	
Setting	Description
Web Interface window	Show Channel Diags Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.showChannelDiags command reports the received signal level (RSSI) and node ID of the last packet received on the displayed frequencies.

20.38. showNodeDiags

showNodeDiags	showNodeDiags	
Setting	Description	
CLI / Web Page	[Page=localDiagnostics]	
CLI Command	 localDiagnostics.showNodeDiags 	
	• showNodeDiags	
Web Interface window	Show Node Diags Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The localDiagnostics.showNodeDiags command reports the channel frequency and signal level for the node selected by the localDiagnostics.monitoredNode parameter.	

20.39. timestamp

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

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timestamp	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	• localDiagnostics.timestamp
	• timestamp
Web Interface window	Timestamp Note: This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The localDiagnostics.timestamp command reports the time the Diagnostics Information was collected by the device.

20.40. TxAvailability

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

TxAvailability	
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 352) for the parameter location.
Default Setting	100
Options	N/A
Description	The localDiagnostics.TxAvailability command reports the percentage of packets that were transmitted without back-off.

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20.41. TxSuccess

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

TxSuccess	
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 352) for the parameter location.
Default Setting	100
Options	N/A
Description	The localDiagnostics.TxSuccess command reports the percentage of packets that were transmitted with a successful ACK received.

20.42. VSWR

Important!: Most of the **localDiagnostics** parameters are read-only. The information reported is dependent upon the connected Z9-P / Z9-PE / Z9-PE-GREY device.

VSWR	
Setting	Description
CLI / Web Page	[Page=localDiagnostics]
CLI Command	 localDiagnostics.VSWR=
	 VSWR= Example:

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VSWR	VSWR	
Setting	Description	
Web Interface window	Signal Level	
	Note : This parameter is read-only in the Web Interface. See the Local Diagnostics window (on page 352) for the parameter location.	
Default Setting	0 (zero)	
Options	N/A	
Description	The localDiagnostics.VSWR 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, or	
	 > 100 for a poor match. 	
	Notes	
	 VSWR is less accurate at higher power levels (>20dBm). 	
	 The reported VSWR is a value proportional to the VSWR. It is closer to VSWR at lower powers, but at higher power levels, it still increases with reflected power. 	
	 VSWR may not function on Z9-P / Z9-PE / Z9-PE-GREY models manufactured prior to September, 2018. If the Z9-P / Z9-PE / Z9-PE-GREY reports a VSWR value of 0 (zero), VSWR is not supported. 	

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21. network Parameters

Note: See the Network window (on page 355).

- gateway (on page 246)
- ip_address (on page 246)
- mac_address (on page 247)
- MTU (on page 247)
- nameserver_address1 (on page 248)
- nameserver_address2 (on page 249)
- netmask (on page 249)
- netmaskFilterEnabled (on page 250)
- stpEnabled (on page 251)
- txqueuelen (on page 252)

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. gateway

gateway	gateway	
Setting	Description	
CLI / Web Page	[Page=network]	
CLI Command	network.gateway=nnn.nnn.nnn	
Web Interface window	 Gateway 1. In the Gateway text box, enter the Gateway IP address for the network. 2. Click the Update button to save the change. Note: See the Network window (on page 355) for the parameter location. 	
Default Setting	192.168.111.1	
Options	N/A	
Description	The network.gateway setting designates the Gateway IP address for the network when DHCP is disabled. Important!: The use of a Gateway here is NOT related to the radioSettings.radioMode=Gateway or radioSettings.radioMode=Endpoint.	

21.2. ip_address

ip_address	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	network.ip_address=nnn.nnn.nnn Important!: Where nnn.nnn.nnn is the IP address assigned by the IT department for the Z9-P / Z9-PE / Z9-PE-GREY network.
Web Interface window	 IP Address In the IP Address text box, enter the IP address of the Z9-P / Z9-PE / Z9-PE-GREY assigned by the IT department for the network. Click the Update button to save the change.
	Note: See the Network window (on page 355) for the parameter location.
Default Setting	192.168.111.100
Options	N/A

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ip_address	
Setting	Description
Description	The network.ip_address setting designates the IP address of the Z9-P / Z9-PE / Z9-PE-GREY when DHCP is disabled.

21.3. mac_address

mac_address	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	 network.mac_address
	• mac_address
Web Interface window	MAC Address Note: This parameter is read-only in the Web Interface. See the Network window (on page 355) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The network.mac_address command reports the MAC Address of the Z9-P / Z9-PE / Z9-PE-GREY.
	Important!: This parameter is read-only and is unique for each radio.

21.4. MTU

mtu	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	network.mtu=nnnnmtu=nnnn
	Note: Where nnnn is the maximum transmission unit.

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mtu	mtu	
Setting	Description	
Web Interface window	 MTU 1. In the MTU text box, enter the maximum transmission unit. 2. Click the Update button to save the change. Note: See the Network window (on page 355) for the parameter location. 	
Default Setting	1500	
Options	The minimum value is 100.The maximum value is 65521.	
Description	The network.mtu setting designates the maximum transmission unit (MTU) frame size for the Z9-P / Z9-PE / Z9-PE-GREY.	
	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.	

21.5. nameserver_address1

nameserver_address1	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	network.nameserver_address1=nnn.nnn.nnn
	Note : Where nnn, nnn, nnn is a user-defined DNS IP address.
Web Interface window	 Nameserver Address 1 1. Optional: In the Nameserver Address 1 text box, enter a user-defined DNS IP address. 2. Click the Update button to save the change. Note: See the Network window (on page 355) for the parameter location.
Default Setting	8.8.8.8 Note: This is a Google Public DNS.

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nameserver_address1	
Setting	Description
Options	User-defined DNS IP address.
Description	The network.nameserver_address1 setting designates the DNS for name-to- address resolution.

21.6. nameserver_address2

nameserver_address2	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	network.nameserver_address2=nnn.nnn.nnn.
	Note: Where nnn, nnn, nnn is a user-defined DNS IP address.
Web Interface	Nameserver Address 2
window	 Optional: In the Nameserver Address 2 text box, enter a user-defined DNS IP address
	2. Click the Update button to save the change.
	Note: See the Network window (on page 355) for the parameter location.
Default Setting	8.8.4.4
	Note: This is a Google Public DNS.
Options	User-defined DNS IP address.
Description	The network.nameserver_address2 setting designates the DNS for name-to- address resolution.

21.7. netmask

netmask	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	 network.netmask=nnn.nnn.nnn.nnn
	 netmask=nnn.nnn.nnn

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netmask	netmask	
Setting	Description	
Web Interface window	 Netmask 1. In the Netmask text box, enter the Netmask of the Z9-P / Z9-PE / Z9-PE-GREY. 2. Click the Update button to save the change. Note: See the Network window (on page 355) for the parameter location. 	
Default Setting	255.255.255.0	
Options	N/A	
Description	The network.netmask setting designates the Netmask of the Z9-P / Z9-PE / Z9-PE-GREY when DHCP is disabled.	

21.8. netmaskFilterEnabled

netmaskFilterEnabled	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	Enable:
	 network.netmaskFilterEnabled=true
	Disable:
	 network.netmaskFilterEnabled=false
Web Interface	Netmask Filter Enabled
window	 Click the Netmask Filter Enabled list box arrow and select True to enable the bridge firewall and restrict network communication to current IPv4 subnet.
	2. Click the Update button to save the change.
	Note : By default, the Netmask Filter Enabled is enabled (set to False). See the Network window (on page 355) for the parameter location.
Default Setting	False
Options	• True
	• False

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netmaskFilterE	netmaskFilterEnabled	
Setting	Description	
Description	The network.netmaskFilterEnabled enables a bridge firewall to restrict network communication to current IPv4 subnet.	
	Notes	
	 Allows ONLY IPv4, TCP, UDP, ICMP (ping), and ARP communication that is in the network.netmask parameter subnet to enter into the radio network. 	
	• VLAN tagged packets are filtered out because the radio is not considered on the VLAN and therefore VLAN packets cannot be on the same subnet.	
	Enabling Netmask Filter can prevent non-radio Ethernet traffic from adversely affecting the performance and capacity of the radio network.	
	ImportantI: ZumLink acts as a layer 2 switch. ALL Ethernet and Multicast packets are passed when IP Netmask Filter is NOT enabled.	

21.9. stpEnabled

stpEnabled	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	Enable:
	 network.stpEnabled=true
	Disable:
	 network.stpEnabled=false
Web Interface window	STP Enabled
	 Click the STP Enabled list box arrow and select True to enable the Spanning Tree Protocol.
	2. Click the Update button to save the change.
	Note : By default, the STP Enabled is NOT enabled (set to False). See the Network window (on page 355) for the parameter location.
Default Setting	False
Options	• True
	• False
Description	The network.stpEnabled setting enables the Spanning Tree Protocol.

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21.10. txqueuelen

txqueuelen	
Setting	Description
CLI / Web Page	[Page=network]
CLI Command	network.txqueuelen=nnnn
	Note : Where nnnn is the maximum number of packets to hold in the transmit queue.
Web Interface window	Txqueuelen
	 In the Txqueuelen text box, enter the maximum number of packets to hold in the transmit queue.
	2. Click the Update button to save the change.
	Note: See the Network window (on page 355) for the parameter location.
Default Setting	25
Options	The minimum value is 1.
	The maximum value is 1000.
Description	The network.txqueuelen setting designates the maximum number of packets that can be buffered before they are rejected by the radio.
	Notes
	 The radio is still trying to send packets as soon as it receives them.
	 If the queue size is too small in an Ethernet network with a high rate of small packets, then packets could be lost.
	 Increasing TX Queue Length may increase throughput if there is a lot of network chatter that causes packets to be lost at the network layer.
	• Increasing TX Queue Length can increase latency if the packets are arriving at the Ethernet interface at an average rate that is above the capacity of the radio link.
	Example : network.txqueuelen=750 allows 750 Ethernet packets buffered in the transmit queue.

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22. networkStats Parameters

Note: See the Network Stats window (on page 359).

- rx_bytes (on page 254)
- rx_dropped (on page 254)
- rx_errors (on page 255)
- rx_packets (on page 255)
- tx_bytes (on page 256)
- tx_dropped (on page 256)
- tx_errors (on page 257)
- tx_packets (on page 257)

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. rx_bytes

rx_bytes	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	 networkStats.rx_bytes
	• rx_bytes
Web Interface	RX Bytes
window	Note : This parameter is read-only in the Web Interface. See the Network Stats window (on page 359) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The networkStats.rx_bytes command reports the number of bytes received from the radio network.
	Note: This is a Read-only parameter.

22.2. rx_dropped

rx_dropped	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	 networkStats.rx_dropped
	• rx_dropped
Web Interface	RX Dropped
window	Note : This parameter is read-only in the Web Interface. See the Network Stats window (on page 359) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The networkStats.rx_dropped command reports the number of Ethernet packets received from the radio network that were dropped at the Ethernet interface.
	Note: This is a Read-only parameter.

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22.3. rx_errors

rx_errors	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	 networkStats.rx_errors
	• rx_errors
Web Interface window	RX Errors
	Note : This parameter is read-only in the Web Interface. See the Network Stats window (on page 359) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The networkStats.rx_errors command reports the number of Ethernet packets received from the radio network that had Ethernet errors.
	Note: This is a Read-only parameter.

22.4. rx_packets

rx_packets	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	 networkStats.rx_packets
	• rx_packets
Web Interface	RX Packets
window	Note : This parameter is read-only in the Web Interface. See the Network Stats window (on page 359) for the 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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22.5. tx_bytes

tx_bytes	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	 networkStats.tx_bytes
	• tx_bytes
Web Interface window	TX Bytes
WINDOW	Note : This parameter is read-only in the Web Interface. See the Network Stats window (on page 359) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The networkStats.tx_bytes command reports the number of bytes of Ethernet packets received from the Ethernet port and sent over the radio network.
	Note: This is a Read-only parameter.

22.6. tx_dropped

tx_dropped	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	 networkStats.tx_dropped
	 tx_dropped
Web Interface	TX Dropped
window	Note : This parameter is read-only in the Web Interface. See the Network Stats window (on page 359) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The networkStats.tx_dropped command reports the number of Ethernet packets received from the Ethernet port but dropped because the transmit queue is full.
	Note : An increase of this counter may indicate that increasing the txqueuelen parameter may improve overall network performance.
	Note: This is a Read-only parameter.

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22.7. tx_errors

tx_errors	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	 networkStats.tx_errors
	• tx_errors
Web Interface	TX Errors
window	Note : This parameter is read-only in the Web Interface. See the Network Stats window (on page 359) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The networkStats.tx_errors command reports the number of Ethernet packets received from the Ethernet port that were in error.
	Note: This is a Read-only parameter.

22.8. tx_packets

tx_packets	
Setting	Description
CLI / Web Page	[Page=networkStats]
CLI Command	 networkStats.tx_packets
	• tx_packets
Web Interface	TX Packets
window	Note : This parameter is read-only in the Web Interface. See the Network Stats window (on page 359) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The networkStats.tx_packets command reports the number of Ethernet packets received from the Ethernet port and sent over the radio network.
	Note: This is a Read-only parameter.

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23. NTP Parameters

Note: See the NTP window (on page 361).

- ntp_address (on page 259)
- ntpDate (on page 260)
- ntpReference (on page 260)
- ntpRestart (on page 261)

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. ntp_address

ntp_address	
Setting	Description
CLI / Web Page	[Page=ntp]
CLI Command	 ntp.ntp_address1=nnn.nnn.nnn
	• ntp.ntp_address2=nnn.nnn.nnn
	 ntp.ntp_address3=nnn.nnn.nnn
	 ntp.ntp_address4=nnn.nnn.nnn.nnn
	 ntp.ntp_address5=nnn.nnn.nnn
	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
	1. In the NTP Address 2 to 5 text boxes, enter the IP address of the servers
	used for synchronizing time. 2. Click the Update button to save the change.
	2. Click the Optiale button to save the change.
	Note: By default, the NTP Address 1 is time.nist.gov.
	See the NTP window (on page 361) for the parameter location.
Default Setting	ntp_address1: time.nist.gov
	 ntp_address2-5: 0.0.0.0
Options	N/A
Description	The ntp.ntp_address1-5 setting designates the IP address of the servers used for synchronizing time.
	Notes
	A maximum of five NTP servers are allowed.
	 Use 0.0.0 to skip a specific server.
	Example : Enter ntp.ntp_address2=0.0.0.0 to skip a second server, if it's available.

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23.2. ntpDate

ntpDate	ntpDate	
Setting	Description	
CLI / Web Page	[Page=ntp]	
CLI Command	• ntp.ntpDate=now	
	• ntpDate=now	
Web Interface	NTP Date	
window	 In the NTP Date text box, enter Now to synchronize the local clock with the time from the NTP servers specified in the ntp_address (on page 259) settings. 	
	2. Click the Update button to save the change.	
	Note: See the NTP window (on page 361) for the parameter location.	
Default Setting	N/A	
Options	Now	
Description	The ntp.ntpDate setting synchronizes the local clock with the time from the NTP servers specified in the ntp.ntp_address1 to 5 settings.	
	Note : The server with the best clock, as defined by the NTP protocol, is used.	

23.3. ntpReference

ntpReference	
Setting	Description
CLI / Web Page	[Page=ntp]
CLI Command	 ntp.ntpReference=NETWORK_TIME_SERVER
	The reference is from other systems on the network.
	 ntp.ntpReference=REFCLK_LOCALCLOCK
	The reference is generated by the local clock.
Web Interface	NTP Reference
window	 Click the NTP Reference list box arrow and select either NETWORK_ TIME_SERVER or REFCLK_LOCALCLOCK. Click the Update button to save the change. Note: See the NTP window (on page 361) for the parameter location.

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ntpReference	
Setting	Description
Default Setting	NETWORK_TIME_SERVER
Options	NETWORK_TIME_SERVER
	REFCLK_LOCALCLOCK
Description	The ntp.ntpReference setting designates the clock reference for NTP.

23.4. ntpRestart

ntpRestart	
Setting	Description
CLI / Web Page	[Page=ntp]
CLI Command	ntp.ntpRestart=now
Web Interface window	NTP Restart Note: This parameter is read-only in the Web Interface. See the NTP window (on page 361) for the parameter location.
Default Setting	N/A
Options	Now
Description	The ntp.ntpRestart setting restarts the NTP system.

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24. radioSettings Parameters

Note: See the Radio Settings window (on page 363).

- beaconBurstCount (on page 263)
- beaconInterval (on page 264)
- frequencyKey (on page 265)
- frequencyMasks (on page 267)
- InaBypass (on page 269)
- maxLinkDistanceinMiles (on page 270)
- networkId (on page 271)
- nodeld (on page 272)

- radioFrequency (on page 273)
- radioHoppingMode (on page 275)
- radioMaxRepeaters (on page 277)
- radioMode (on page 280)
- radioRepeaterSlot (on page 281)
- rfDataRate (on page 282)
- txPower (on page 285)

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. beaconBurstCount

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

beaconBurstCou	beaconBurstCount	
Setting	Description	
CLI / Web Page	[Page=radioSettings]	
CLI Command	 radioSettings.beaconBurstCount=n 	
	 beaconBurstCount=n 	
	Note: Where n is any number between 1 and 7.	
Web Interface	Beacon Burst Count	
window	 In the Beacon Burst Count text box, enter the number of consecutive beacons to send per beaconInterval time. 	
	2. Click the Update button to save the change.	
	Note : See the Radio Settings window (on page 363) for the parameter location.	
Default Setting	3	
Options	Any number between 1 and 7.	
Description	The radioSettings.beaconBurstCount setting designates the number of consecutive beacons to send per beaconInterval time.	
	Notes	
	 The radioSettings.beaconBurstCount is set on the Gateway device. 	
	 The Endpoint radios obtain this value from a Gateway with the same networkId via the beacon frame. 	
	This setting is only used when	
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>	
	 Increasing the number of beacons may improve RF link reliability in noisy environments. 	
	• Decreasing the number of beacons may improve throughput in environments where interference is minimal.	
	FREEWAVE Recommends : Set the beaconBurstCount (on page 263) 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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24.2. beaconInterval

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

beaconInterval	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	 radioSettings.beaconInterval=TWENTY_FIVE_MS
	 radioSettings.beaconInterval=FIFTY_MS
	 radioSettings.beaconInterval=ONE_HUNDRED_MS
	 radioSettings.beaconInterval=TWO_HUNDRED_MS
	 radioSettings.beaconInterval=FOUR_HUNDRED_MS
Web Interface	Beacon Interval
window	 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. Click the Update button to save the change.
	Note : See the Radio Settings window (on page 363) for the parameter location.
Default Setting	ONE_HUNDRED_MS
Options	TWENTY_FIVE_MS
	FIFTY_MS
	ONE_HUNDRED_MS
	TWO_HUNDRED_MS
	FOUR_HUNDRED_MS

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beaconInterval	
Setting	Description
Description	The radioSettings.beaconInterval controls how often a Gateway radio sends out a beacon packet and changes to the next radio frequency in the hopping pattern.
	Notes
	 The radioSettings.beaconInterval is set on the Gateway device.
	 The Endpoint radios obtain this value from a Gateway with the same networkId via the beacon frame.
	This setting is only used when
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>
	 A shorter Beacon Interval may improve the RF link reliability in noisy environments.
	A longer Beacon Interval may improve throughput in environments where interference is minimal.

24.3. frequencyKey

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

frequencyKey	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	 radioSettings.frequencyKey=Key0
	 radioSettings.frequencyKey=Key1 to Key16
Web Interface window	 Frequency Key 1. Click the Frequency Key list box arrow and select the Key number used as an index to select a hopping table. 2. Click the Update button to save the change. Note: See the Radio Settings window (on page 363) for the parameter location.
Default Setting	Key0 (zero)

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frequencyKey	1	
Setting	Description	
Options	Key0 (zero)	
	 Key1 to Key16 	
	Valid frequencyKey V	/alues
	Data Rate of 115.2	κ
	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 Rate	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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frequencyKey	
Setting	Description
Description	The radioSettings.frequencyKey setting designates the Key number used as an index to select a hopping table.
	Notes
	 Use a unique Frequency Key setting to use different hop patterns for each ZumLink network.
	This setting is only used when
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>
	 The number of available frequency keys is based on the number of hopping sequences in the hop table.
	An invalid frequency key setting is determined by:
	Being outside of the specified range.
	 If an invalid frequency key setting is found, the radioSettings.frequencyKey is NOT changed.
	 The frequency key setting being larger than the number of hopping tables configured for a specific rfDataRate.
	• In this instance, the radioSettings.frequencyKey is set to Key0 (zero).
	Important!: The Endpoint radios obtain this value from a Gateway with the same networkId via the beacon frame.
	After communications are established, any change of this value are picked up by the Endpoints.
	When using different hop patterns on each network, interference caused by neighboring ZumLink networks can be minimized.

24.4. frequencyMasks

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

frequencyMasks	
Setting	Description
CLI / Web Page	[Page=radioSettings]

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frequencyMasks	3
Setting	Description
CLI Command	radioSettings.frequencyMasks=nnnn
	Note : Where nnnn is the specified format of the frequency range to mask shown in:
	A. Single Channel Format, B. Banga of Channels Format, er
	B. Range of Channels Format, or C. Combination of Channels Format.
	Important! : 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	Frequency Masks
window	 In the Frequency Masks text box, enter the exact specified format of the frequency range to mask.
	2. Click the Update button to save the change.
	Note : See the Radio Settings window (on page 363) for the parameter location.
Default Setting	Blank
Options	Caution : 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
	• A single entry masks the specified frequency plus the bandwidth on each side of the center frequency as a function of the rfDataRate.
	• frequencyMasks=xxx.yyyy,xxx.yyyy,xxx.yyyy
	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
	 frequencyMasks=xxx.yyyy-xxx.yyyy,xxx.yyyy

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frequencyMasks	
Setting	Description
Description	The radioSettings.frequencyMasks setting designates specific frequencies or a set of frequencies in the hopping pattern to remove from usage.
	Caution: radioSettings.frequencyMasks entries MUST BE less than 128 bytes. ONLY A comma MUST separate the values - NOT a comma with a space.
	Notes
	This setting is only used when
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>
	 All radios in the network MUST use the same value for this setting.
	• When Frequency Masks is enabled, interference fixed at certain frequencies within the spectrum can be avoided by the transmitter.
	Least significant zeros are NOT required.
	• .9, .09, .009 are valid entries as well as .9000, .0900, .0090.
	Type frequencyMasks and press <enter> to clear all Frequency Mask entries.</enter>

24.5. InaBypass

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

InaBypass	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	Enable LNA:
	 radioSettings.lnaBypass=0
	• lnaBypass=0
	Bypass LNA:
	 radioSettings.lnaBypass=1
	• lnaBypass=1

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InaBypass	
Setting	Description
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 (on page 363) for the parameter location.
Default Setting	0 (zero)
Options	• 0 • 1
Description	The radioSettings.InaBypass setting enables the Low Noise Amplifier (LNA) used to boost the radio module receive signal by 10dB.

24.6. maxLinkDistanceinMiles

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

maxLinkDistanceinMiles	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	radioSettings.maxLinkDistanceinMiles=nnnmaxLinkDistanceinMiles=nnn
	Note : Where nnn is the maximum one-way distance (in miles) between any nodes in the network.

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maxLinkDistanceinMiles	
Setting	Description
Web Interface	Max Link Distance in Miles
window	 In the Max Link Distance in Miles text box, enter the maximum one-way distance (in miles) between any nodes in the network.
	2. Click the Update button to save the change.
	Note : See the Radio Settings window (on page 363) for the parameter location.
Default Setting	20 miles
Options	The minimum value is 5 miles.
	The maximum value is 120 miles.
Description	The radioSettings.maxLinkDistanceinMiles setting designates the maximum one-way distance (in miles) between any nodes in the network.
	FREEWAVE Recommends : All nodes in the network that communicate with each other should use the same distance value.

24.7. networkld

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

networkId	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	 radioSettings.networkId=nnnn
	• networkId=nnnn
	Note : Where nnnn is the network identifier which subdivides traffic on radio units.

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networkId		
Setting	Description	
Web Interface window	 Network ID 1. In the Network ID text box, enter the network identifier that subdivides traffic on radio units. 2. Click the Update button to save the change. Note: See the Radio Settings window (on page 363) for the parameter location. 	
Default Setting	51966	
Options	The minimum value is 2.The maximum value is 65535.	
Description	The radioSettings.networkId setting designates the network identifier which subdivides traffic on radio units. Notes Radio units can only communicate with other units that have the same radioSettings.networkId setting. Important!: If radios are on the same frequency, they still receive data from radios of a different networkId, but the data is dropped.	

24.8. nodeld

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

nodeld	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	radioSettings.nodeId=nnnnnodeId=nnnn
	Note : Where nnnn is a user-designated nodeld instead of the auto- generated nodeld.

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nodeld		
Setting	Description	
Web Interface window	 Node ID 1. In the Node ID text box, enter a user-designated nodeld instead of the auto-generated nodeld. 2. Click the Update button to save the change. Note: See the Radio Settings window (on page 363) for the parameter location. 	
Default Setting	Predetermined by the Z9-P / Z9-PE / Z9-PE-GREY, this is an auto-generated, unique number from 2 through 65533.	
Options	N/A	
Description	 The radioSettings.nodeld setting designates the unique ID of the device. Notes Each radio with the same networkId must have a UNIQUE nodeld. Otherwise, two or more nodes will unicast an acknowledgment that may collide. The Gateway or Gateway-Repeater device ALWAYS has a nodeld of value 1. It cannot be changed. 	

24.9. radioFrequency

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

radioFrequency	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	 radioSettings.radioFrequency=nnn.nnnn
	 radioFrequency=nnn.nnnn
	Note: Where nnn.nnnn is the operating center frequency.

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radioFrequency		
Setting	Description	
Web Interface window	Radio Frequency 1. In the Radio Frequen 2. Click the Update butto	cy text box, enter the operating center frequency. on to save the change.
	location.	ings window (on page 363) for the parameter
Default Setting	915.0000 for the Standard Hop Set - ZumLink 900MHz Channels (on page 399)	
Options	Valid Ranges	
	Data Rate	MHz Range
	4 Mbps	904.5504 - 925.7472
	1 Mbps	903.0528 - 927.0144
	500 kbps	902.7072 - 927.3600
	250 kbps	902.5344 - 927.4176
	115.2 kbps	902.4768 - 927.5904

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radioFrequency	
Setting	Description
Description	The radioSettings.radioFrequency setting designates the operating center frequency in MHz.
	Notes
	• All radios in the network MUST use the same value for this setting.
	This setting is only used when
	<pre>radiosettings.radioHoppingMode=Hopping_Off.</pre>
	• The range of this setting is dependent on the rfDataRate (on page 282) setting.
	The frequency interval is 100 Hz.
	 The minimum value increases and the maximum value decreases as the radioSettings.rfDataRate increases.
	The increase in channel bandwidth affects these ranges.
	• If the radioSettings.radioFrequency setting is set too close to the band edge for the current radioSettings.rfDataRate , the radio module rejects the setting.
	 A minimum of 3 hopping channels are supported when radioSettings.rfDataRate = RATE_4M, RATE_1M, and RATE_500K.
	FREEWAVE Recommends: Use a single radioSettings.radioFrequency if
	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-P / Z9-PE / Z9-PE-GREY.

24.10. radioHoppingMode

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

radioHoppingMode	
Setting	Description
CLI / Web Page	[Page=radioSettings]

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radioHoppingMode	
Setting	Description
CLI Command	Enable:
	 radiosettings.radioHoppingMode=Hopping_On
	Disable:
	 radiosettings.radioHoppingMode=Hopping_Off
Web Interface	Radio Hopping Mode
window	 Click the Radio Hopping Mode list box arrow and select Off to disable frequency hopping.
	2. Click the Update button to save the change.
	Note : See the Radio Settings window (on page 363) for the parameter location.
Default Setting	Hopping_On
Options	Hopping_Off
	Hopping_On

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radioHoppingM	radioHoppingMode		
Setting	Description		
Description	The radioSettings.radioHoppingMode setting enables frequency hopping. Notes		
	 All radios in the network MUST use the same value for this setting. For rfDataRate values of 115.2 and 250 kbps, the radioSettings.radioHoppingMode is forced On and CANNOT be set to radiosettings.radioHoppingMode=Hopping_Off. 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. A Gateway is required when the radiosettings.radioHoppingMode=Hopping_On. A Gateway is NOT required when the radiosettings.radioHoppingMode=Hopping_Off. 		
	 If the radioSettings.rfDataRate=RATE_250K: If the number of hopping channels in the hop table is: >=50, the maximum txPower is 30dBm and the txPower is NOT automatically changed. >=25 and <=49, the maximum txPower is 24dBm and the txPower is automatically reduced to 24dBm. <25, all masking is removed. All channels contained in the hop table are re-enabled. txPower is NOT automatically changed. If the radioSettings.rfDataRate=RATE_115.2K: If the number of hopping channels in the hop table is: >=50, the maximum txPower is 30dBm and the txPower is NOT automatically changed. stilling.rfDataRate=RATE_115.2K: If the number of hopping channels in the hop table is: >=50, the maximum txPower is 30dBm and the txPower is NOT automatically changed. <50, all masking is removed. All channels are re-enabled. txPower is NOT automatically changed. 		

24.11. radioMaxRepeaters

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

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radioMaxRepeaters	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	 radioSettings.radioMaxRepeaters=n
	Note : Where n is the number of Repeater slots in the network.
Web Interface	Radio Max Repeaters
window	 In the Radio Max Repeaters text box, enter the number of Repeater slots in the network. Click the Update button to save the change.
	Note : See the Radio Settings window (on page 363) for the parameter location.
Default Setting	0 (zero)
Options	• 0 (zero)
	• 1
	• 2
	• 3

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radioMaxRep	eaters
Setting	Description
Description	The radioSettings.radioMaxRepeaters setting designates the maximum Repeater slots in the network when the
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>
	Note : The Endpoint radios obtain this value from a Gateway with the same networkId via the beacon frame.
	• The radioSettings.radioMaxRepeaters is set on the network Gateway device and the Gateway beacon carries this information.
	 If radioSettings.radioMaxRepeaters=0
	• Set the value to 0 (zero) when there are no Endpoint-Repeaters or when
	radiosettings.radioHoppingMode=Hopping_Off.
	• If radioSettings.radioMaxRepeaters=n:
	 If the network has one Repeater, set this to 1. If the network has two Repeaters, set this to 2.
	 If the network has three or more Repeaters, set this to 2.
	 Set the value to match the number of overlapping Repeaters, with a maximum of 3.
	 Set the value to the maximum number of repeater slots used in the network when Endpoint-Repeaters are present in the network and when the radiosettings.radioHoppingMode=Hopping_On.
	Note : Setting this value too high adds unnecessary latency to the network.
	Communication Method
	ZumLink uses Listen Before Talk (LBT) and Carrier Sense Multiple Access (CSMA) where there are no assigned slots. The radios transmit when the channel is clear.
	The Gateway broadcasts packets to all Endpoints within range.
	The Endpoints unicast packets back to the Gateway.
	The Gateway acknowledges the Endpoint packets.
	FreeWave's traditional protocol has a Gateway Time Slot and an Endpoint Time Slot within a frame.
	The Gateway transmits in its slot and listens in the Endpoint slot.
	The Endpoint transmits its slot and listens in the Gateway slot.

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24.12. radioMode

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

radioMode	radioMode	
Setting	Description	
CLI / Web Page	[Page=radioSettings]	
CLI Command	 radioSettings.radioMode=Gateway 	
	 radioSettings.radioMode=Endpoint 	
	 radioSettings.radioMode=Gateway_Repeater 	
	 radioSettings.radioMode=Endpoint_Repeater 	
Web Interface	Radio Mode	
window	 Click the Radio Mode list box arrow and select the device type to designate the Z9-P / Z9-PE / Z9-PE-GREY as. Click the Update button to save the change. 	
	Note : See the Radio Settings window (on page 363) for the parameter location.	
Default Setting	Endpoint	
Options	Endpoint	
	Endpoint-Repeater	
	Gateway	
	Gateway-Repeater	

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radioMode	
Setting	Description
Description	The radioSettings.radioMode setting designates the device type.
	Notes
	• Each network can have only ONE Gateway or Gateway-Repeater device.
	See Repeaters (on page 164) for additional information.
	 The remaining devices MUST BE configured as Endpoints or Endpoint- Repeaters.
	 The Gateway or Gateway-Repeater device ALWAYS has a nodeld of value 1. It cannot be changed.
	• The Endpoint or Endpoint-Repeater nodeld values are 2 through 65535.
	A Gateway is required when the
	<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 nodeld and repeats packets and master beacons.
	See Repeaters (on page 164) for additional information.

24.13. radioRepeaterSlot

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

radioRepeaterSlot	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	radioSettings.radioRepeaterSlot=n
	Note: Where n is the Repeater slot.

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radioRepeaterSI	radioRepeaterSlot	
Setting	Description	
Web Interface	Radio Repeater Slot	
window	 In the Radio Repeater Slot text box, enter which repeater slot the Endpoint-Repeater uses. Click the Update button to save the change. 	
	Note : The Radio Repeater Slot parameter is only visible when the Z9-P / Z9-PE / Z9-PE-GREY is designated as an Endpoint-Repeater. See the Radio Settings window (on page 363) for the parameter location.	
Default Setting	1	
Options	• 1 • 2 • 3	
Description	The radioSettings.radioRepeaterSlot setting designates which repeater slot, up to the radioMaxRepeaters setting, the Endpoint-Repeater uses.	
	Important!: This setting is only available when radioSettings.radioMode=Endpoint_Repeater.	
	Notes	
	 The radioSettings.radioRepeaterSlot is set on the Endpoint-Repeater device when radiosettings.radioHoppingMode=Hopping_On. This setting does NOT apply when 	
	radiosettings.radioHoppingMode=Hopping_Off.	
	 Repeater slots must be unique for Repeaters that are in communication range so the beacons do not collide. 	
	 Endpoint-Repeaters can share a slot number when they do not overlap and form longer repeater chains. 	
	• The number of entered Repeater slots cannot be larger than the numbered entered in the radioMaxRepeaters (on page 277) setting.	

24.14. rfDataRate

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

rfDataRate	
Setting	Description
CLI / Web Page	[Page=radioSettings]

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rfDataRate	
Setting	Description
CLI Command	• radioSettings.rfDataRate=RATE_4M
	 radioSettings.rfDataRate=RATE_1M
	 radioSettings.rfDataRate=RATE_1.5M_BETA_FEATURE
	 radioSettings.rfDataRate=RATE_500K
	 radioSettings.rfDataRate=RATE_250K
	 radioSettings.rfDataRate=RATE_115.2K
Web Interface	RF Data Rate
window	 Click the RF Data Rate list box arrow and select the RF link data rate in bits per second. Click the Update button to save the change. Note: See the Radio Settings window (on page 363) for the parameter location.
Default Setting	RATE_500K
Options	RATE_4M (4Mbps mode)
	RATE_1M (1Mbps mode)
	 RATE_1.5M_BETA_FEATURE (1.5Mbps mode)
	• RATE_500K (500 kbps mode)
	RATE_250K (250 kbps mode)
	• RATE_115.2K (115.2 kbps mode)

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rfDataRate	
Setting	Description
Description	The radioSettings.rfDataRate setting designates the RF link data rate in bits per second.
	Notes
	• All radios in the network MUST use the same value for this setting.
	A higher RF link data rate provides more throughput but at the expense of link distance or fade margin.
	When changing from lower data rates to higher ones
	(e.g., rfDataRate=RATE_115.2K to rfDataRate=RATE_1M), the radioFrequency (on page 273) may be set back to the default if the frequency would have been out of band.
	 When selecting data rates of either <pre>rfDataRate=RATE_115.2K</pre> or <pre>rfDataRate=RATE_250K</pre>, radioSettings.radioHoppingMode is
	automatically forced to <pre>radiosettings.radioHoppingMode=Hopping_ On</pre> and <pre>cannot</pre> be turned off.
	 For all other data rates, the radioSettings.radioHoppingMode remains at its current setting.
	Important!: Special rules must be applied for the 115.2 and 250 kbps data rates to enforce regulatory rules.
	 If the radioSettings.rfDataRate=RATE_250K
	 If the number of hopping channels in the hop table is:
	 >=50, the maximum txPower is 30dBm and the txPower is NOT automatically changed.
	 >=25 and <=49, the maximum txPower is 24dBm and the txPower is automatically reduced to 24dBm.
	 <25, all masking is removed. All channels contained in the hop table are re-enabled. txPower is NOT automatically changed.
	 If the radioSettings.rfDataRate=RATE_115.2K
	If the number of hopping channels in the hop table is:
	 >=50, the maximum txPower is 30dBm and the txPower is NOT automatically changed.
	 <50, all masking is removed. All channels are re-enabled. txPower is NOT automatically changed.
	 A minimum of 3 hopping channels are supported when radioSettings.rfDataRate = RATE_4M, RATE_1M, and RATE_500K.

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rfDataRate	
Setting	Description
	FREEWAVE Recommends: Use a single radioSettings.radioFrequency if radiosettings.radioHoppingMode=Hopping_Off.
	Caution : The RATE_1.5M_BETA_FEATURE data rate is a Beta feature NOT recommended for production deployment.

24.15. txPower

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

txPower	
Setting	Description
CLI / Web Page	[Page=radioSettings]
CLI Command	• radioSettings.txPower=nn
	• txPower=nn
	Note: Where nn is the RF output transmit power.
	Important!: Entering a decimal value changes the txpower to 0 (zero).
	FREEWAVE Recommends: Use whole numbers only.
Web Interface	TX Power
window	 Click the Tx Power list box arrow and select the dB RF output transmit power level for the Z9-P / Z9-PE / Z9-PE-GREY.
	2. Click the Update button to save the change.
	Note : See the Radio Settings window (on page 363) for the parameter location.
Default Setting	• 30
Options	The minimum value is 10.
	The maximum value is 30.

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txPower	txPower	
Setting	Description	
Description	The radioSettings.txPower setting designates the dB RF output transmit power for the Z9-P / Z9-PE / Z9-PE-GREY.	
	Notes	
	Output power is limited to maximum of 30dBm or 1 Watt.	
	Use a higher power to increase link margin.	
	Use a lower transmit power to reduce interference when multiple radio links are in close proximity.	
	The maximum radioSettings.txPower can be limited if the	
	<pre>radiosettings.radioHoppingMode=Hopping_On.</pre>	
	See frequencyMasks (on page 267) for additional details.	
	Entering txpower=0 or radiosettings.txpower=0 changes the output power to the minimum or 10 dB.	

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25. radioSettingsHelpers Parameters

Note: See the Radio Settings Helpers window (on page 366).

- frequencyMasksErrors (on page 288)
- rCli (on page 288)
- resetRadio (on page 288)
- setAllRadioSettings (on page 288)
- syncSettingsFromRadio (on page 288)

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. frequencyMasksErrors

frequencyMasksErrors	
Setting	Description
CLI / Web Page	[Page=radioSettingsHelpers]
CLI Command	 radioSettingsHelpers.frequencyMasksErrors
	• frequencyMasksErrors
Web Interface window	Frequency Masks Errors Note: This parameter is read-only in the Web Interface. See the Radio Settings Helpers window (on page 366) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The radioSettingsHelpers.frequencyMasksErrors command reports the results of any errors in the frequency mask.
	Note: This is a Read-only parameter.

25.2. rCli

Important!: FreeWave internal use only.

25.3. resetRadio

Important!: FreeWave internal use only.

25.4. setAllRadioSettings

Important!: FreeWave internal use only.

25.5. syncSettingsFromRadio

Important!: FreeWave internal use only.

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26. runtimeEnvironment Parameters

Note: See the Runtime Environment window (on page 368).

- rteInstalledByAppsVersion (on page 290)
- rteReset (on page 290)
- rteTemplateVersion (on page 291)
- rteVersion (on page 292)

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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26.1. rteInstalledByAppsVersion

rteInstalledByAp	rteInstalledByAppsVersion	
Setting	Description	
CLI / Web Page	[Page=runtimeEnvironment]	
CLI Command	 runtimeEnvironment.rteInstalledByAppsVersion 	
	 rteInstalledByAppsVersion 	
Web Interface	Rte Installed by Apps Version	
window	Note : This parameter is read-only in the Web Interface. See the Runtime Environment window (on page 368) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The runtimeEnvironment.rteInstalledByAppsVersion command reports the version number of the firmware used to install the ZumIQ runtime application environment.	
	Important!: The firmware that installed the ZumIQ runtime application environment may have a different version than the application environment itself.	
	Note: This is a Read-only parameter.	

26.2. rteReset

rteReset	
Setting	Description
CLI / Web Page	[Page=runtimeEnvironment]
CLI Command	 runtimeEnvironment.rteReset=Cancel
	• rteReset=Cancel
	 runtimeEnvironment.rteReset=Hard
	• rteReset=Hard
	 runtimeEnvironment.rteReset=Now
	• rteReset=Now

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rteReset	
Setting	Description
Web Interface window	Rte Reset Note: This parameter is read-only in the Web Interface. See the Runtime Environment window (on page 368) for the parameter location.
Default Setting	N/A
Options	CancelHardNow
Description	 The runtimeEnvironment.rteReset setting designates the upgrade or reset of the ZumIQ runtime application environment. runtimeEnvironment.rteReset=Cancel is used to REMOVE the rteReset=Hard command BEFORE the next boot of the Z9-P / Z9-PE / Z9-PE-GREY. runtimeEnvironment.rteReset=Hard is used to completely reset the file system of the runtime application environment to match the latest installed developer user package. This will stage the development runtimeEnvironment to be applied on the next reboot. The runtime application environment reset takes place at the time of next boot. Warning! ALL User-generated content and settings in ZumIQ ARE DELETED after the next reboot! runtimeEnvironment.rteReset=Now This reboots the Z9-P / Z9-PE / Z9-PE-GREY and copies the Linux application environment into the runtime location. This will take ~3-4 minutes to complete.

26.3. rteTemplateVersion

rteTemplateVersion	
Setting	Description
CLI / Web Page	[Page=runtimeEnvironment]
CLI Command	 runtimeEnvironment.rteTemplateVersion
	 rteTemplateVersion

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rteTemplateVersion	
Setting	Description
Web Interface window	Rte Template Version Note: This parameter is read-only in the Web Interface. See the Runtime Environment window (on page 368) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The runtimeEnvironment.rteTemplateVersion command reports the version number for the template ZumIQ application environment.
	This is the application environment applied when executing the rteReset=hard command.
	Note: See rteReset (on page 290) for additional information.
	Note: This is a Read-only parameter.

26.4. rteVersion

rteVersion	
Setting	Description
CLI / Web Page	[Page=runtimeEnvironment]
CLI Command	• runtimeEnvironment.rteVersion
	• rteVersion
Web Interface	Rte Version
window	Note : This parameter is read-only in the Web Interface. See the Runtime Environment window (on page 368) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The runtimeEnvironment.rteVersion command reports the version number for the active ZumIQ application environment
	Note : If this setting is blank, the application environment has not yet been initialized.
	Note: This is a Read-only parameter.

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27. security Parameters

Note: See the Security window (on page 370).

- enableEthernetLogin (on page 294)
- enablePtpInterface (on page 294)

Note: In the CLI, if the "=" sign is appended to the parameter, it is an implied change to that parameter.

If a value is NOT included after the "=", the value becomes a null, space, or 0 (zero) **depending on the parameter**.

Example: Entering **frequencyKey** returns the current value of **frequencyKey**. Entering **frequencyKey=** is an implied change to **frequencyKey**. If a value is NOT included, it changes **frequencyKey** to 0 (zero).

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27.1. enableEthernetLogin

enableEthernetLogin	
Setting	Description
CLI / Web Page	[Page=security]
CLI Command	Enable:
	 security.enableEthernetLogin=true
	Disable:
	 security.enableEthernetLogin=false
Web Interface	Enable Ethernet Login
window	 Click the Enable Ethernet Login list box arrow and select False to disable SSH logins.
	2. Click the Update button to save the change.
	Note : By default, the Enable Ethernet Login is enabled (set to True). See the Security window (on page 370) for the parameter location.
Default Setting	True
Options	• True
	• False
Description	The security.enableEthernetLogin setting enables SSH logins.
	• When Disabled , the device no longer responds to SSH connection requests.
	 This setting also disables any SSH-based services, such as SCP.
	Important!: This parameter does NOT affect website logins.
	This setting requires a reboot to apply the changes, either by executing the config.reset=now CLI command or power cycling the Z9-P / Z9-PE / Z9-PE-GREY. See reset (on page 206) for additional information.

27.2. enablePtpInterface

enablePtpInterface	
Setting	Description
CLI / Web Page	[Page=security]

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enablePtpInterface	
Setting	Description
CLI Command	Enable:
	 security.enablePtpInterface=true
	Disable:
	 security.enablePtpInterface=false
Web Interface	Ethernet PTP Interface
window	 Click the Ethernet PTP Interface list box arrow and select False to disable the PTP (drag-and-drop) interface.
	2. Click the Update button to save the change.
	Note : By default, the Ethernet PTP Interface is enabled (set to True). See the Security window (on page 370) for the parameter location.
Default Setting	True
Options	True
	• False
Description	The security.enablePtpInterface setting enables the PTP (drag-and-drop) interface.
	When Disabled , the Z9-P / Z9-PE / Z9-PE-GREY no longer appears in Windows® Explorer as ZumLink <serialnumber></serialnumber> when connected to a computer using the Micro-USB cable.
	Important!: The security.enablePtpInterface setting does NOT disable serial connections through the Micro-USB cable.
	This setting requires a reboot to apply the changes, either by executing the config.reset=now CLI command or power cycling the Z9-P / Z9-PE / Z9-PE-GREY.
	See reset (on page 206) for additional information.

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28. services Parameters

Note: See the Services window (on page 372).

• timeOutCli (on page 297)

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. timeOutCli

timeOutCli	
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	 In the Time Out CLI text box, enter the number of seconds of idle time before the CLI connection is closed.
	2. Click the Update button to save the change.
	Note: See the Services window (on page 372) for the parameter location.
Default Setting	900
Options	FREEWAVE Recommends : Enter any number between 60 and 3600.
Description	The services.timeOutCli setting designates the number of seconds of idle time before the CLI connection is closed.
	Warning! DO NOT enter 0 (zero). 0 disables the timeout.

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29. SNMP Parameters

Note: See the SNMP window (on page 374).

- roCommunityName (on page 299)
- rwCommunityName (on page 299)
- snmpUser (on page 300)
- v1Enabled (on page 301)
- v2cEnabled (on page 302)
- v3Enabled (on page 302)

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. roCommunityName

roCommunityName	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	snmp.roCommunityName=enter_unique_name_hereroCommunityName=enter_unique_name_here
	Note : Where enter_unique_name_here is a user-designated name.
Web Interface window	RO Community Name
	 In the RO Community Name text box, enter the user-designated name for SNMP V1/V2C Read-only access.
	2. Click the Update button to save the change.
	Note : See the SNMP window (on page 374) for the parameter location.
Default Setting	public
Options	Maximum of 31 characters.
Description	The snmp.roCommunityName setting designates the user-designated 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.

29.2. rwCommunityName

rwCommunityName	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	snmp.rwCommunityName=enter_unique_name_hererwCommunityName=enter_unique_name_here
	Note : Where enter_unique_name_here is a user-designated name.

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rwCommunityName	
Setting	Description
Web Interface window	 RW Community Name 1. In the RW Community Name text box, enter the user-designated name for SNMP V1/V2C Read-Write access. 2. Click the Update button to save the change. Note : See the SNMP window (on page 374) for the parameter location.
Default Setting	private
Options	Maximum of 31 characters.
Description	The snmp.rwCommunityName setting designates the user-designated 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.

29.3. snmpUser

snmpUser	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	View All Users:
	• snmpUser=show
	Remove User:
	<pre>• snmpUser=remove <username></username></pre>
	Add User**:
	 snmpUser=add <username></username>
	Modify User**:
	 snmpUser=modify <username></username>
Web Interface	SNMP User
window	Note : This parameter is read-only in the Web Interface. See the SNMP window (on page 374) for the parameter location.
Default Setting	Blank

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snmpUser	snmpUser	
Setting	Description	
Options	**Add or Modify access authorization options are:	
	 <aes> <encryption passphrase=""></encryption></aes> 	
	 <des> <encryption passphrase=""></encryption></des> 	
	 <md5> <authentication passphrase=""></authentication></md5> 	
	 <readonly></readonly> 	
	 <readwrite></readwrite> 	
	 <sha> <authentication passphrase=""></authentication></sha> 	
Description	The snmp.snmpUser setting manages the SNMP V3 users.	
	Example: <pre>snmpUser=add <username> <aes> <encryption passphrase="">. snmpUser=modify <username> <readwrite></readwrite></username></encryption></aes></username></pre>	
	Important!: The Passphrase requires a minimum of 8 characters.	

29.4. v1Enabled

v1Enabled	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	Enable SNMP V1:
	 snmp.vlEnabled=true
	Disable SNMP V1:
	 snmp.vlEnabled=false
Web Interface	V1 Enabled
window	 Click the V1 Enabled list box arrow and select True to enable SNMP V1.
	2. Click the Update button to save the change.
	Note : By default, the v1 Enabled is NOT enabled (set to False). See the SNMP window (on page 374) for the parameter location.
Default Setting	False
Options	• True
	• False
Description	The snmp.v1Enabled setting enables SNMP V1.

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29.5. v2cEnabled

v2cEnabled	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	Enable SNMP V2C:
	 snmp.v2cEnabled=true
	Disable SNMP V2C:
	 snmp.v2cEnabled=false
Web Interface	V2C Enabled
window	 Click the V2C Enabled list box arrow and select True to enable SNMP V2C.
	2. Click the Update button to save the change.
	Note : By default, the v2c Enabled is NOT enabled (set to False). See the SNMP window (on page 374) for the parameter location.
Default Setting	False
Options	True
	• False
Description	The snmp.v2cEnabled setting enables SNMP V2C.

29.6. v3Enabled

v3Enabled	
Setting	Description
CLI / Web Page	[Page=SNMP]
CLI Command	Enable SNMP V3:
	• snmp.v3Enabled=true
	Disable SNMP V3:
	 snmp.v3Enabled=false
Web Interface	V3 Enabled
window	 Click the V3 Enabled list box arrow and select True to enable SNMP V3. Click the Update button to save the change.
	Note : By default, the v3 Enabled is NOT enabled (set to False). See the SNMP window (on page 374) for the parameter location.

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v3Enabled	
Setting	Description
Default Setting	False
Options	True
	• False
Description	The snmp.v3Enabled setting enables SNMP V3.

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30. system Parameters

Important!: The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.

Note: See the System Info window (on page 376).

- dump (on page 305)
- dumpConfig
- dumpFormat (on page 305)
- dumpPage (on page 306)
- dumpTag (on page 307)
- filter (on page 307)
- help (on page 308)
- login (on page 308)

- logout (on page 308)
- modbusLayout (on page 309)
- pages (on page 309)
- password (on page 309)
- passwordRestoreDefaults (on page 310)
- showLayout (on page 311)
- tags (on page 311)
- whoami (on page 311)

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. 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 Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The system.dump command reports all of the device configuration and status values using the format specified in dumpFormat (on page 305). Note: This is a Read-only parameter.

30.2. dumpFormat

dumpFormat	dumpFormat	
Setting	Description	
CLI / Web Page	[Page=system]	
CLI Command	• system.dumpFormat=Full	
	• dumpFormat=Full	
	 system.dumpFormat=Json 	
	• dumpFormat=Json	
	 system.dumpFormat=Result 	
	• dumpFormat=Result	
	 system.dumpFormat=Short 	
	• dumpFormat=Short	
	 system.dumpFormat=Verbose 	
	• dumpFormat=Verbose	

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dumpFormat	
Setting	Description
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The system.dumpFormat setting designates the format of the output of commands and setting changes.
	dumpFormat Short
	• The Short setting shows the page name in a header row, then each setting indented with its value.
	This is the default format.
	dumpFormat Full
	 The Long setting shows each setting with its fully-qualified name and value (page.setting=value).
	dumpFormat Verbose
	 The Verbose setting shows: the fully-quailifed name and value (the same as the dumpFormat Long) and the header row (the same as the dumpFormat Short).
	dumpFormat Result
	 The Result setting is identical to "dumpFormat Full".
	dumpFormat Json
	 The Json setting shows the output results in JavaScript Object Notation (Json).
	Example : Enter dumpPage=SNMP to show the SNMP settings.

30.3. dumpPage

dumpPage	
Setting	Description
CLI / Web Page	[Page=system]

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dumpPage	
Setting	Description
CLI Command	 system.dumpPage=enter_page_name_here dumpPage=enter_page_name_here 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 Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The system.dumpPage command reports all device configuration and status values for the specified page, using the format specified in dumpFormat (on page 305).
	Example: Enter dumpPage=SNMP to show the SNMP settings. Note: This is a Read-only parameter.

30.4. dumpTag

Important!: FreeWave internal use only.

30.5. dumpTopic

Important!: FreeWave internal use only.

30.6. filter

Important!: FreeWave internal use only.

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30.7. help

help	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	• system.help
	• help
	• help <parameter></parameter>
	to see help for a specific parameter
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The system.help command lists the help.txt file.
	Important!: Help information is only available for active parameters.
	Example : If the ZumLink is designated as a gateway, the Help information for radioSettings.nodeld is not provided since the nodeld parameter cannot be changed.

30.8. login

Important!: FreeWave internal use only.

30.9. logout

logout	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	logout
	Note: Where enter_page_name_here is a CLI page.

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logout	
Setting	Description
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The logout command logs out of the CLI session.

30.10. modbusLayout

Important!: FreeWave internal use only.

30.11. pages

pages	pages	
Setting	Description	
CLI / Web Page	[Page=system]	
CLI Command	• system.pages	
	• pages	
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.	
Default Setting	N/A	
Options	N/A	
Description	The system.pages command lists all of the pages of settings and commands in the Z9-P / Z9-PE / Z9-PE-GREY.	

30.12. password

password	
Setting	Description
CLI / Web Page	[Page=system]

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password	
Setting	Description
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 Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	N/A
Description	The system.password setting designates the password.
	Important!: Must be logged in to the Z9-P / Z9-PE / Z9-PE-GREY.
	Example: The default password is admin. The CLI to change this is: system.password=admin,NewPasswrd123,NewPasswrd123. Note: An error message appears when there is an error in typing the new password command.

30.13. passwordRestoreDefaults

passwordRestoreDefaults	
Setting	Description
CLI / Web Page	[Page=system]
CLI Command	 system.passwordRestoreDefaults=now
	 passwordRestoreDefaults=now
Web Interface window	Important!: The [Page=system] parameters are only available in the CLI window. See the Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access.
Default Setting	N/A
Options	Now

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passwordRestoreDefaults	
Setting	Description
Description	The system.passwordRestoreDefaults command restores all passwords back the factory default of admin.
	• The system.passwordRestoreDefaults resets both the admin and devuser account passwords to factory defaults.
	 After executing this command, the Z9-P / Z9-PE / Z9-PE-GREY must be rebooted by either:
	 executing the reset now command (see reset (on page 206)) or
	 power-cycling the Z9-P / Z9-PE / Z9-PE-GREY.

30.14. showLayout

Important!: FreeWave internal use only.

30.15. tags

Important!: FreeWave internal use only.

30.16. 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 Tera Term Activation and ZumLink Setup (on page 66) 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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31. systemInfo Parameters

Note: See the System Info window (on page 376).

- deviceConfiguration (on page 313)
- deviceFirmwareVersion (on page 313)
- deviceId (on page 314)
- deviceModel (on page 314)
- deviceName (on page 315)
- hopTableVersion (on page 315)
- layoutHash (on page 316)
- licenses (on page 316)
- modelCode (on page 317)

- radioFirmwareVersion (on page 318)
- radioModel (on page 318)
- radioModelCode (on page 319)
- radioSerialNumber (on page 319)
- resetInfo (on page 320)
- rteTemplateVersion (on page 320)
- rteVersion (on page 320)
- serialNumber (on page 321)

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. deviceConfiguration

deviceConfiguration	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	 systemInfo.deviceConfiguration
	 deviceConfiguration
Web Interface	Device Configuration
window	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.deviceConfiguration command reports the device configuration of the Z9-P / Z9-PE / Z9-PE-GREY.
	Note: This is a Read-only parameter.

31.2. deviceFirmwareVersion

deviceFirmware	deviceFirmwareVersion	
Setting	Description	
CLI / Web Page	[Page=systemInfo]	
CLI Command	 systemInfo.deviceFirmwareVersion 	
	 deviceFirmwareVersion 	
Web Interface	Device Firmware Version	
window	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The systemInfo.deviceFirmwareVersion command reports the device firmware version of the Z9-P / Z9-PE / Z9-PE-GREY.	
	Note: This is a Read-only parameter.	

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31.3. deviceld

deviceId	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.deviceId=nnnn
	• deviceId
	Note: Where nnnn is a user-designated device ID.
Web Interface	Device ID
window	 In the Device ID text box, enter the user-defined Device ID identifier for the Z9-P / Z9-PE / Z9-PE-GREY.
	2. Click the Update button to save the change.
	Note : See the System Info window (on page 376) for the parameter location.
Default Setting	1
Options	N/A
Description	 The systemInfo.deviceId setting designates the Device Identifier selected for the Z9-P / Z9-PE / Z9-PE-GREY.
	 The systemInfo.deviceId=nnnn setting designates the device ID.
	 Where nnnn is a user-designated device ID.

31.4. deviceModel

deviceModel	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.deviceModel
	• deviceModel
Web Interface window	Device Model Note: This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.
Default Setting	N/A
Options	N/A

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deviceModel	
Setting	Description
Description	The systemInfo.deviceModel command reports the device model.
	Note: This is a Read-only parameter.

31.5. deviceName

deviceName	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	 systemInfo.deviceName=nnnn deviceName
	• deviceName Note: Where nnnn is the user-defined name for the Z9-P / Z9-PE / Z9-PE- GREY.
Web Interface window	 Device Name 1. In the Device Name text box, enter the user-defined name for the Z9-P / Z9-PE / Z9-PE-GREY. 2. Click the Update button to save the change. Note: See the System Info window (on page 376) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.deviceName setting designates the user-defined name for the Z9-P / Z9-PE / Z9-PE-GREY.

31.6. hopTableVersion

hopTableVersion	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	 systemInfo.hopTableVersion
	• hopTableVersion

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hopTableVersion	
Setting	Description
Web Interface window	Hop Table Version Note: This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.hopTableVersion command reports the radio Hop Table Version of the Z9-P / Z9-PE / Z9-PE-GREY. Note: This is a Read-only parameter.

31.7. layoutHash

layoutHash	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.layoutHash
	• layoutHash
Web Interface window	Layout Hash Note: This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.layoutHash command reports the Unique Layout Identifier. Note: This is a Read-only parameter.

31.8. licenses

licenses	
Setting	Description
CLI / Web Page	[Page=systemInfo]

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licenses	
Setting	Description
CLI Command	• systemInfo.licenses
	• licenses
Web Interface	Licenses
window	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.
Default Setting	None
Options	N/A
Description	The systemInfo.licenses command reports all of the license information.
	Note: This is a Read-only parameter.

31.9. modelCode

modelCode	modelCode	
Setting	Description	
CLI / Web Page	[Page=systemInfo]	
CLI Command	• systemInfo.modelCode	
	• modelCode	
Web Interface	Model Code	
window	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The systemInfo.modelCode command reports the model code of the Z9-P / Z9-PE / Z9-PE-GREY.	
	Note: This is a Read-only parameter.	

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31.10. radioFirmwareVersion

radioFirmwareVe	radioFirmwareVersion	
Setting	Description	
CLI / Web Page	[Page=systemInfo]	
CLI Command	 systemInfo.radioFirmwareVersion 	
	• radioFirmwareVersion	
Web Interface	Radio Firmware Version	
window	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.	
Default Setting	N/A	
Options	N/A	
Description	The systemInfo.radioFirmwareVersion command reports the radio firmware version of the Z9-P / Z9-PE / Z9-PE-GREY.	
	Note: This is a Read-only parameter.	

31.11. radioModel

radioModel	radioModel	
Setting	Description	
CLI / Web Page	[Page=systemInfo]	
CLI Command	• systemInfo.radioModel	
	• radioModel	
Web Interface	Radio Model	
window	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.	
Default Setting	AMT0100AA	
Options	N/A	
Description	The systemInfo.radioModel command reports the radio model of the Z9-P / Z9-PE / Z9-PE-GREY.	
	Note: This is a Read-only parameter.	

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31.12. radioModelCode

radioModelCode	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	 systemInfo.radioModelCode
	• radioModelCode
Web Interface	Radio Model Code
window	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.radioModelCode command reports the radio model code of the Z9-P / Z9-PE / Z9-PE-GREY.
	Note: This is a Read-only parameter.

31.13. radioSerialNumber

radioSerialNumber	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.radioSerialNumber
	• radioSerialNumber
Web Interface	Radio Serial Number
window	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.radioSerialNumber command reports the radio serial number of the Z9-P / Z9-PE / Z9-PE-GREY.
	Note: This is a Read-only parameter.

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31.14. resetInfo

Important!: FreeWave internal use only.

31.15. rteTemplateVersion

rteTemplateVersion	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systeminfo.rteTemplateVersion
	• rteTemplateVersion
Web Interface	N/A
window	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The systeminfo.rteTemplateVersion command reports the version number for the template ZumIQ application environment.
	This is the application environment applied when executing the <pre>rteReset=hard</pre> command.
	Notes
	See rteReset (on page 290) for additional information.
	This is a Read-only parameter.

31.16. rteVersion

rteVersion	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systeminfo.rteVersion
	• rteVersion
Web Interface window	N/A
	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.
Default Setting	N/A

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rteVersion	
Setting	Description
Options	N/A
Description	The systeminfo.rteVersion command reports the version number for the active ZumIQ application environment. Note: If this setting is blank, the application environment has not yet been initialized.
	Note: This is a Read-only parameter.

31.17. serialNumber

serialNumber	
Setting	Description
CLI / Web Page	[Page=systemInfo]
CLI Command	• systemInfo.serialNumber
	• serialNumber
Web Interface	Serial Number
window	Note : This parameter is read-only in the Web Interface. See the System Info window (on page 376) for the parameter location.
Default Setting	N/A
Options	N/A
Description	The systemInfo.serialNumber command reports the serial number of the Z9-P / Z9-PE / Z9-PE-GREY.
	Note: This is a Read-only parameter.

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32. TerminalServerRelay Parameters

Note: See the Terminal Server Relay window (on page 378).

- remote_termserv_ip_address (on page 323)
- termserv_relay_mapping (on page 323)

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. remote	_termserv_	_ip_address	
	the second stress second		

remote_termserv_ip_address	
Setting	Description
CLI / Web Page	[Page=TerminalServerRelay]
CLI Command	TerminalServerRelay.remote_termserv_ip_ address=nnn.nnn.nnn
	Note: Where nnn.nnn.nnn is the IP address for the remote terminal server.
Web Interface	Remote Termserv IP Address
window	 In the Remote Termserv IP Address text box, enter the IP address for the remote terminal server. Click the Update button to save the change.
	Note : See the Terminal Server Relay window (on page 378) for the parameter location.
Default Setting	0.0.0.0
Options	N/A
Description	 The TerminalServerRelay.remote_termserv_ip_address= command reports the IP address of the remote terminal server.
	 The TerminalServerRelay.remote_termserv_ip_ address=nnn.nnn.nnn changes the IP address of the remote terminal server.

32.2. termserv_relay_mapping

termserv_relay_mapping	
Setting	Description
CLI / Web Page	[Page=TerminalServerRelay]

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termserv_relay_	termserv_relay_mapping	
Setting	Description	
CLI Command	 TerminalServerRelay.termserv_relay_ mapping=TERMSERV_RELAY_DISABLED 	
	 TerminalServerRelay.termserv_relay_mapping=LOCAL_ BOTH_COM_TO_REMOTE_BOTH_COM 	
	 TerminalServerRelay.termserv_relay_mapping=LOCAL_ COM1_TO_REMOTE_COM1 	
	 TerminalServerRelay.termserv_relay_mapping=LOCAL_ COM2_TO_REMOTE_COM2 	
	 TerminalServerRelay.termserv_relay_mapping=LOCAL_ BOTH_COM_TO_REMOTE_COM1 	
	 TerminalServerRelay.termserv_relay_mapping=LOCAL_ BOTH_COM_TO_REMOTE_COM2 	
	 TerminalServerRelay.termserv_relay_mapping=LOCAL_ COM1_TO_REMOTE_BOTH_COM 	
	 TerminalServerRelay.termserv_relay_mapping=LOCAL_ COM2_TO_REMOTE_BOTH_COM 	
Web Interface	Termserv Relay Mapping	
window	 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. 	
	2. Click the Update button to save the change.	
	Note : See the Terminal Server Relay window (on page 378) for the parameter location.	
Default Setting	TERMSERV_RELAY_DISABLED	

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termserv_relay_	mapping
Setting	Description
Options	TERMSERV_RELAY_DISABLED
	 Data forwarding between local and remote COM ports is disabled.
	LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM (on page 328).
	 Data is forwarded between the local COM1 and remote COM1 or local COM2 and remote COM2 ports.
	LOCAL_COM1_TO_REMOTE_COM1 (on page 329).
	 Data is forwarded between the local COM1 and remote COM1 ports.
	LOCAL_COM2_TO_REMOTE_COM2 (on page 330).
	Data is forwarded between the local COM2 and remote COM2 ports.
	LOCAL_BOTH_COM_TO_REMOTE_COM1 (on page 331).
	 Data is forwarded between the local COM1 and COM2 and remote COM1 ports.
	LOCAL_BOTH_COM_TO_REMOTE_COM2 (on page 332).
	 Data is forwarded between the local COM1 and COM2 and remote COM2 ports.
	LOCAL_COM1_TO_REMOTE_BOTH_COM (on page 333).
	 Data is forwarded between the local COM1, remote COM1, and COM2 ports.
	LOCAL_COM2_TO_REMOTE_BOTH_COM (on page 334).
	 Data is forwarded between the local COM2, remote COM1, and COM2 ports.
Description	The TerminalServerRelay.termserv_relay_mapping setting is used for the transfer of a bi-directional byte stream between two serial device servers.
	Notes
	 If using Terminal Server Relay, the TCP port numbers must be consistent across all involved radios.
	 The data relay is only supported between the terminal server on this Z9-P / Z9-PE / Z9-PE-GREY radio and the terminal server on a separate Z9-P / Z9-PE / Z9-PE-GREY radio in the same IP network. See Examples - Terminal Server Relay (on page 326).
	Important!: The TerminalServerRelay.termserv_relay_mapping should only be enabled on one side of the connection.
	FREEWAVE Recommends : If using the Terminal Server Relay setting, keep the TCP port numbers as their defaults.

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33. Examples - Terminal Server Relay

- Connected Terminal Servers and Terminal Server Relay (on page 327)
- LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM (on page 328)
- LOCAL_COM1_TO_REMOTE_COM1 (on page 329)
- LOCAL_COM2_TO_REMOTE_COM2 (on page 330)
- LOCAL_BOTH_COM_TO_REMOTE_COM1 (on page 331)
- LOCAL_BOTH_COM_TO_REMOTE_COM2 (on page 332)
- LOCAL_COM1_TO_REMOTE_BOTH_COM (on page 333)
- LOCAL_COM2_TO_REMOTE_BOTH_COM (on page 334)
- Example: Multicast (on page 335)

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33.1. Connected Terminal Servers and Terminal Server Relay

Figure 219 shows the Terminal Servers and the Terminal Server Relay (client) connected together through the Bridge.

- The Bridge connects the Ethernet interface with the radio interface.
- The Terminal Servers are connected to the COM ports.
- From any network interface you can get to the Terminal Servers.

The Terminal Server Relay is designed to connect the local Terminal Servers (hence the COM ports) to any remote Terminal Server.

- This connection could be over the Ethernet or radio interface.
- It does not matter since it is a TCP connection.
- Each terminal server can have 20 concurrent TCP connections.
- Expects COM1 to be on port 5041 for both local and remote units.
- Expects COM2 to be on port 5042 for both local and remote units.

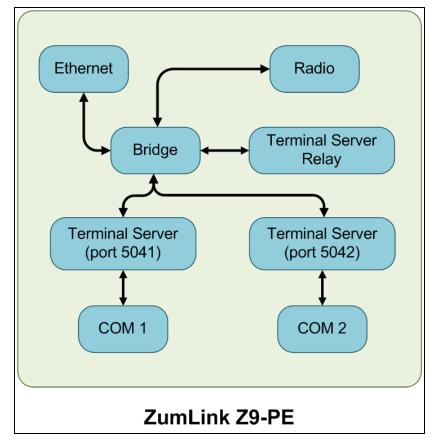


Figure 219: Terminal Servers and Terminal Server Relay (Client) Connected Together through the Bridge

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33.2. LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM

Figure 220 illustrates the Terminal Server Relay command: LOCAL BOTH COM TO REMOTE BOTH COM.

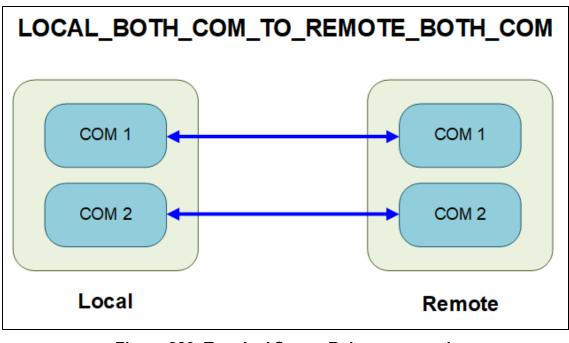


Figure 220: Terminal Server Relay command: LOCAL_BOTH_COM_TO_REMOTE_BOTH_COM

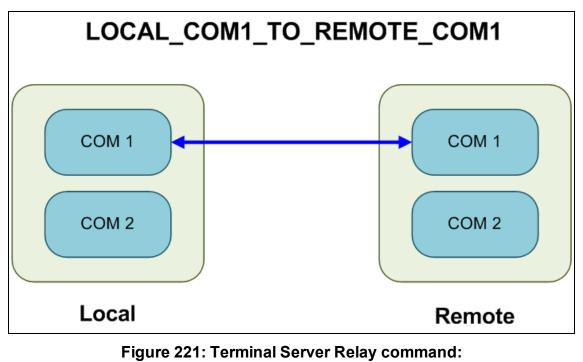
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33.3. LOCAL_COM1_TO_REMOTE_COM1

Figure 220 illustrates the Terminal Server Relay command: LOCAL COM1 TO REMOTE COM1.



LOCAL COM1 TO REMOTE COM1

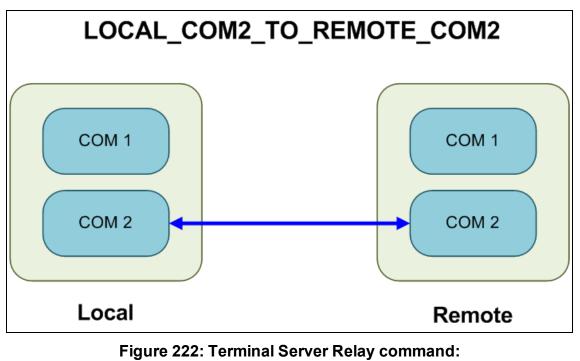
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33.4. LOCAL_COM2_TO_REMOTE_COM2

Figure 220 illustrates the Terminal Server Relay command: LOCAL COM2 TO REMOTE COM2.



LOCAL COM2 TO REMOTE COM2

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33.5. LOCAL_BOTH_COM_TO_REMOTE_COM1

Figure 220 illustrates the Terminal Server Relay command: **LOCAL BOTH COM TO REMOTE COM1**.

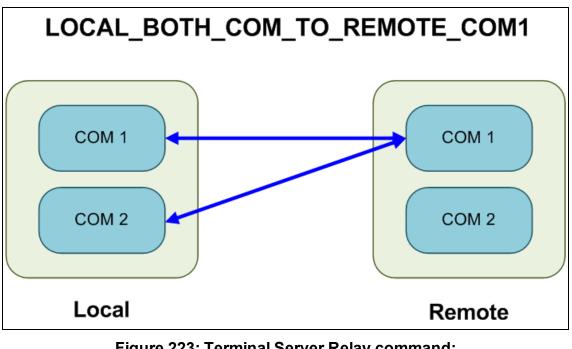


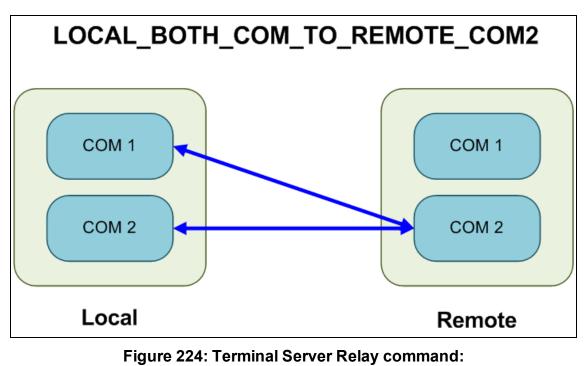
Figure 223: Terminal Server Relay command: LOCAL BOTH COM TO REMOTE COM1

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33.6. LOCAL_BOTH_COM_TO_REMOTE_COM2

Figure 220 illustrates the Terminal Server Relay command: LOCAL BOTH COM TO REMOTE COM2.



LOCAL BOTH COM TO REMOTE COM2

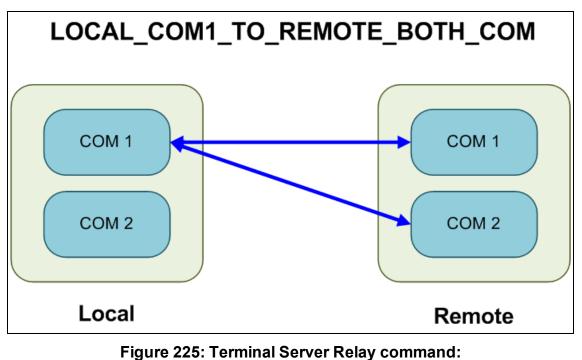
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33.7. LOCAL_COM1_TO_REMOTE_BOTH_COM

Figure 220 illustrates the Terminal Server Relay command: LOCAL COM1 TO REMOTE BOTH COM.



LOCAL COM1 TO REMOTE BOTH COM

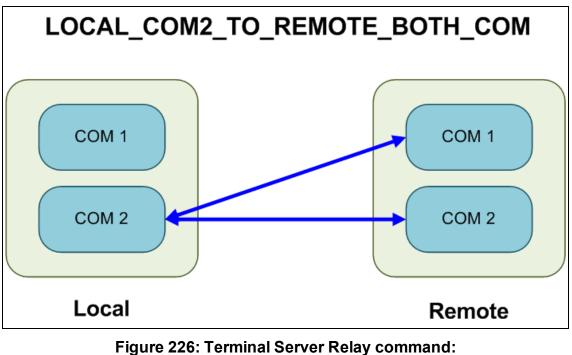
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33.8. LOCAL_COM2_TO_REMOTE_BOTH_COM

Figure 220 illustrates the Terminal Server Relay command: LOCAL COM2 TO REMOTE BOTH COM.



LOCAL COM2 TO REMOTE BOTH COM

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33.9. Example: Multicast

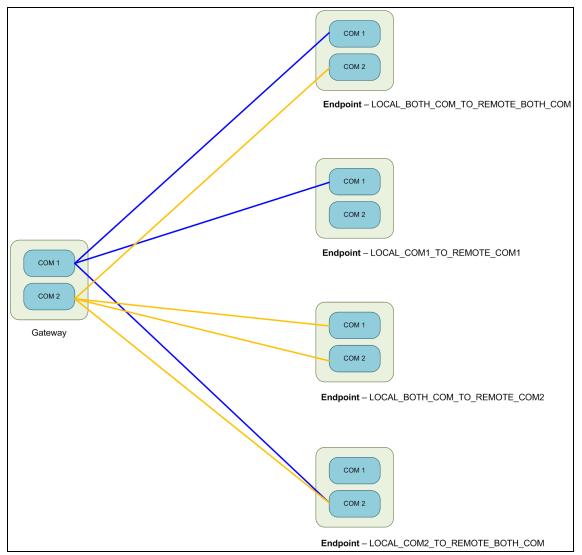


Figure 227: Example: Multicast

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34. Web Interface

The available windows are:

- COM window (on page 337)
- Config window (on page 339)
- Data Path window (on page 341)
- Date window (on page 343)
- Encryption window (on page 345)
- File Upload window (on page 347)
- Help window (on page 349)
- Home window (on page 351)
- Local Diagnostics window (on page 352)
- Network window (on page 355)
- Network Diagnostics window (on page 357)

- Network Stats window (on page 359)
- NTP window (on page 361)
- Radio Settings window (on page 363)
- Radio Settings Helpers window (on page 366)
- Runtime Environment window (on page 368)
- Security window (on page 370)
- Services window (on page 372)
- SNMP window (on page 374)
- System Info window (on page 376)
- Terminal Server Relay window (on page 378)
- User Data Drag and Drop window (on page 380)

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34.1. COM window

The **COM** windows are used to read and change information about the communication settings of the Z9-P / Z9-PE / Z9-PE-GREY.

Note: See the COM Parameters (on page 191) for detailed information about the parameters.

Access and Window Description

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

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

Example: For the first time, enter **192.168.111.100/config**.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the System Info link. (Figure 228)



Figure 228: 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.

 Click either the COM1 or COM2 tab. The selected COM window opens. (Figure 229)

Note: The parameters for **COM1** and **COM2** are the same except for the **TerminalServerPort** parameter setting.

The information in this window is read-only.

See the COM Parameters (on page 191) for detailed information about the parameters.

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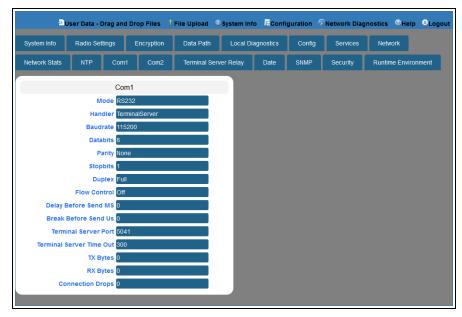


Figure 229: COM1 window

7. On the Menu bar, click the **Configuration** link to Change the COM Parameters (on page 107).

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34.2. Config window

Note: See the config Parameters (on page 204) for detailed information about the parameters.

Access and Window Description

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

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

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 230)

User Data - Drag and Drop Files	1 File Upload	O System Info	Configuration	Network Diagnostics	[⊙] Help	Cogout
		^① Sys	stem Info			

Figure 230: System Info link

The Authentication Required (Login) dialog box opens.

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

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

6. Click the **Config** tab.

The **Config** window opens. (Figure 231)

Important!: The information in this window is read-only.

The parameters in this window can only be changed in the CLI.

See the Tera Term Activation and ZumLink Setup (on page 66) procedure for CLI access. See the config Parameters (on page 204) for detailed information about the parameters.

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System Info	Radio Settings	Encryption	Data Path	Local Di	agnostics	Config	Services	Network	
Network Stats	NTP C	om1 Com2	Terminal Ser	ver Relay	Date	SNMP	Security	Runtime Enviro	onment
	(Config							
	Reset								
F	actory Defaults								
	Save								
	Restore								
	License State								

Figure 231: Config window

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34.3. Data Path window

Note: See the dataPath Parameters (on page 209) for detailed information about the parameters.

Access and Window Description

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

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

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 232)

≥User Data - Drag and Drop Files	1 File Upload	O System Info	Configuration	Network Diagnostics	en	⊜Logout
		() Sys	stem Info			

Figure 232: System Info link

The Authentication Required (Login) dialog box opens.

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

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

6. Click the **Data Path** tab. The **Data Path** window opens. (Figure 233)

> **Note**: The information in this window is read-only. See the dataPath Parameters (on page 209) for detailed information about the parameters.

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System Info	Radio Setting	is E	Incryption	Data Path	Local D	iagnostics	Config	Services	Network	
Network Stats	NTP	Com1	Com2	Terminal Serv	er Relay	Date	SNMP	Security	Runtime Env	ironment
	[Data Path	ı							
Compr	ession Enable	faise								
OTA Max	Fragment Siz	e 1000								
	FEC Rat	RATE_1	I_1							
Agg	regate Enable	false								
Route Mi	n Signal Margi Thres									
	try Age Timeou	+ 120								

Figure 233: Data Path window

7. On the Menu bar, click the **Configuration** link to Change the Data Path Parameters (on page 111).

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34.4. Date window

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

Access and Window Description

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

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

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 234)

User Data - Drag and Drop Files	Î File Upload	System Info	Configuration	Network Diagnostics	€ Help	⊜Logout
		⁽¹⁾ Sys	stem Info			

Figure 234: System Info link

The Authentication Required (Login) dialog box opens.

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

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

6. Click the **Date** tab.

The **Date** window opens. (Figure 235)

Note: The information in this window is read-only. See the date Parameters (on page 217) for detailed information about the parameters.

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Network Stats NTP Com1 Com2 Terminal Server Relay Date SNMP Security Runtime Environment Date Up Time 3596 Up Time String Uptime 0Days 00h 59m 56s DC App Uptime 0Days 00h 59m 29s DC App Start Time 01/01/2000 00:00:22 Time 946688391	System Info	Radio Setti	ngs	Encryption	Data Path	Local D	iagnostics	Config	Services	Network	
Up Time 3596 Up Time String Uptime 0Days 00h 59m:56s DC App Uptime Uptime 0Days 00h 59m:29s DC App Start Time 01/01/2000 00:00:22	Network Stats	NTP	Com1	Com2	Terminal Serv	er Relay	Date	SNMP	Security	Runtime Envi	ronment
Up Time String Uptime 0Days 00h:59m:56s DC App Uptime Uptime 0Days 00h:59m:29s DC App Start Time 01/01/2000 00:00:22			Date								
DC App Uptime Uptime 0Days 00h:59m:29s DC App Start Time 01/01/2000 00:00:22		Up Ti	<mark>me</mark> 3596								
DC App Start Time 01/01/2000 00:00:22		Up Time Stri	ing Uptime	0Days 00h:5	9m:56s						
		DC App Upti	me Uptime	0Days 00h:5	9m:29s						
Time 946688391	DC	App Start Ti	me 01/01/2	2000 00:00:22	2						

Figure 235: Date window

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34.5. Encryption window

Note: See the encryption Parameters (on page 222) for detailed information about the parameters.

Access and Window Description

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

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

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the System Info link. (Figure 236)

User Data - Drag and Drop Files	¹ File Upload	O System Info	Configuration	Network Diagnostics	[®] Help	⊜Logout
		() Sys	stem Info			

Figure 236: System Info link

The Authentication Required (Login) dialog box opens.

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

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

6. Click the **Encryption** tab. The **Encryption** window opens. (Figure 237)

> **Note**: The information in this window is read-only. See the encryption Parameters (on page 222) for detailed information about the parameters.

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System Info	Radio Settings	Encryption	Data Path	Local Di	agnostics	Config	Services	Network	
Network Stats	NTP Co	om1 Com2	Terminal Ser	ver Relay	Date	SNMP	Security	Runtime Envi	ronment
	E.	cryption							
E.	ncryption Mode								
	Active Key	-							
	Set Key								
	Get Key								

Figure 237: Encryption window

7. On the Menu bar, click the **Configuration** link to Change the Encryption Parameters (on page 114).

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34.6. File Upload window

The **File Upload** window is used to search for and upload these file types into the Z9-P / Z9-PE / Z9-PE-GREY:

Extension	File Type
.cfg; .cfg.txt	Configuration changes
.fcf; .fcf.txt	Radio module Firmware updates
.pkg; .pkg.txt	Interface board Firmware updates

Access and Window Description

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

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

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

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

Example: For the first time, enter **192.168.111.100/config**.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. On the Menu bar, click the File Upload link. (Figure 238)



Figure 238: File Upload link

The Authentication Required (Login) dialog box opens.

 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 239)

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

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User Data - Drag and Drop Files	🖞 File Upload	O System Info	Configuration	Retwork Diagnostics	() Help	Cogout
Jpload File						
Upload and Apply File						
Browse No file selected.						
Send Cancel						
		_				

Figure 239: File Upload window

File Upload window	W
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 upgrade process on the Z9-P / Z9-PE / Z9-PE-GREY.
Cancel button	Click to cancel the file transfer if already started or refresh the window and clear the selected file.

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34.7. Help window

The **Help** window is used to read information about the settings of the Z9-P / Z9-PE / Z9-PE-GREY.

Access and Window Description

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. On the Menu bar, click the Help link. (Figure 240)



Figure 240: 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 241)

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	^
Duser Data - Drag and Drop Files 🕴 File Upload 🔍 System Info 🗮 Configuration 🖓 Network Diagnostics 🔍 Help 🔍 Logov	ut
Help	
system	
system.help	
Help	
Displays help information on CLI commands and settings.	
"help" lists information for all settings and commands. Its response is identical to the contents of the "help.txt" file.	
"help " lists information for all settings and commands on the specifed page.	
"help " lists information for the specified setting or command.	
type:execute options:("OK", "GENERAL_ERBOR", "FAGE_NOT_FOUND", "FARAMETER_NOT_FOUND", "FARAMETER_NOT_VALID", "INDEX_NOT_FOUND", "DUFLICATE_FARAMETER", "NO RRITE_FEMIISSIONS", "NO READ_FEMIISSIONS", "FILE_NOT_FOUND", "TAG_NOT_FOUND", "TIMEOUT", "CONFIG_LOAD_ERBOR", "CALIEBRATION_ERBOR", "NODE_NOT_FOUND", "TIME_KISIS", "ITHE_NOT_FOUND", "REQUIRED_MISSING", "NOT_VALID_IN_MFG_MODE", "NOT_VALID_FCC_MODE")	
system.dump	
<	× *

Figure 241: Help window

Note: The information in this window is read-only.

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34.8. Home window

The Home window is the default window when the Web Interface is used.

It is used to:

- View basic System information of the connected Z9-P / Z9-PE / Z9-PE-GREY.
- Provide links to other windows of the Z9-P / Z9-PE / Z9-PE-GREY.

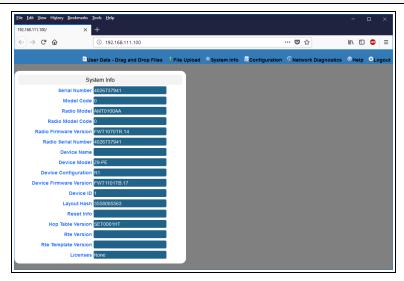
Access and Window Description

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

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

3. Refresh the browser window (press <Enter> or <F5>). The Z9-P / Z9-PE / Z9-PE-GREY **Home** window opens.

Note: See the systemInfo Parameters (on page 312) for detailed information about the parameters.





Note: The information in this window is read-only.

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34.9. Local Diagnostics window

Note: See the localDiagnostics Parameters (on page 227) for detailed information about the parameters.

- Upper Half (on page 353)
- Lower Half (on page 354)

Access and Window Description

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

Example: For the first time, enter **192.168.111.100/config**.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 243)

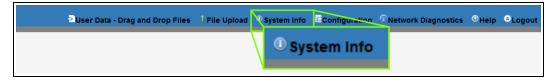


Figure 243: System Info link

The Authentication Required (Login) dialog box opens.

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

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

 Click the Local Diagnostics tab. The Local Diagnostics window opens. (Figure 244 and Figure 245)

Note: The information in this window is read-only. See the localDiagnostics Parameters (on page 227) for detailed information about the parameters.

See:

- Upper Half (on page 353)
- Lower Half (on page 354)

```
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```

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7. On the Menu bar, click the **Configuration** link to Change the Local Diagnostics (on page 117).

34.9.1. Upper Half

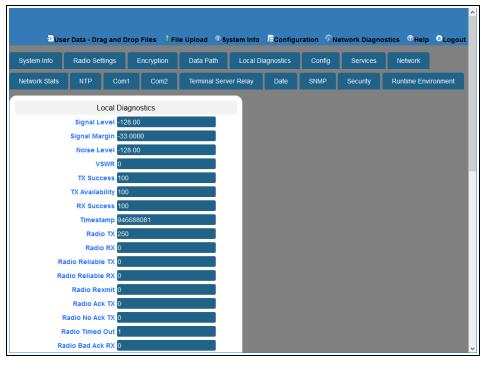
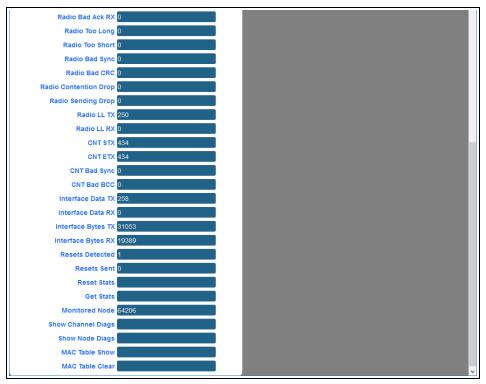


Figure 244: Local Diagnostics window - Upper Half

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34.9.2. Lower Half





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34.10. Network window

```
The Network window is used to provide network information for the Z9-P / Z9-PE / Z9-PE-GREY.
```

Note: See the network Parameters (on page 245) for detailed information about the parameters.

Access and Window Description

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

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

Example: For the first time, enter **192.168.111.100/config**.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the System Info link. (Figure 246)

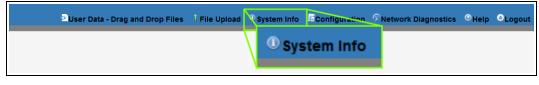


Figure 246: System Info link

The Authentication Required (Login) dialog box opens.

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

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

6. Click the **Network** tab. The **Network** window opens. (Figure 247)

> **Note**: The information in this window is read-only. See the network Parameters (on page 245) for detailed information about the parameters.

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System Info	Radio Sel	tings	Encryption	Data Path	Local D	iagnostics	Config	Services	Network	
Network Stats	NTP	Com1	Com2	Terminal Serv	er Relay	Date	SNMP	Security	Runtime Env	ironment
		Netwo	ork							
	MAC Add	ress 00:0	7:e7:00:06:9b							
	IP Add	ress 192.	168.111.100							
	Netn	nask 255.:	255.255.0							
	Gate	way 192.	168.111.1							
	STP Enal	oled faise								
	Txqueu	elen 25								
		MTU 1500)							
Netmas	k Filter Enal	oled faise								
Names	erver Addre	888	8							

Figure 247: Network window

7. On the Menu bar, click the **Configuration** link to Change the Network Parameters (on page 120).

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34.11. Network Diagnostics window

The Network Diagnostics window is used to:

- Discover other Endpoints in the network.
- Show hops and their paths from the Gateway.
- Show the link quality (RSSI and Margin).
- Show neighbors.

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

Access and Window Description

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

Example: For the first time, enter **192.168.111.100/config**.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. On the Menu bar, click the **Network Diagnostics** link. (Figure 248)



Figure 248: Network Diagnostics link

The **Network Diagnostics** window opens. (Figure 249)

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<u>File Edit View History Bookmarks</u>	<u>T</u> ools <u>H</u> elp						-		×
Network Diagnostics X									
(←) → ⊂ 🏠	i	/networkDiagnosti	cs			… ◙ ☆	111\	E 🐵	≡
									^
D.	Jser Data - Dra	g and Drop Files	🖁 File Upload	Osystem Info	Configuration	Retwork Diagnostics	© Help	⊖Logo	out
Download Support Bundle	Clear Stats	Refresh Network	Diagnostics	Save Network D	iagnostics				
	oldur oldus	Rencon neuron	Bildghostics	oure network b	lagnosies				
IP			_						
Node ID	1								
Node Type	Gateway Rep	eater							
Hops From Gateway	1								
Path From Gateway:									
Neighbors									
Node ID:2 RSSI:	-77								
Node ID:65511 RSSI:	-83								
Node ID:56119 RSSI:	-49								
	_	_							
	_								
IP Node ID									
	2 EndPoint Rep								
Hops From Gateway		beater							
Path From Gateway									
Hop 1:									
Source Node ID									
Dest Node ID									~

Figure 249: Network Diagnostics window

To update the Network Diagnostics window (on page 357), refresh the browser to clear the browser cache.

Network Diagnostics	window
Control Title	Control Description
Download Support Bundle button	Click the Download Support Bundle button to open the Opening support_bundle_xxx.xxx.xxx.xxx.zip dialog box.
	Use this dialog box to save the current network performance reading to send to FreeWave Technical Support for faster issue resolution.
Clear Status button	Click the Clear Status button to reset the network diagnostics.
Refresh Network Diagnostics button	Click the Refresh Network Diagnostics button to updated the current network performance reading.
Save Network Diagnostics button	Click the Save Network Diagnostics button to open the Opening network_diag.json dialog box.
	Use this dialog box to save the current network performance reading for later review and to monitor network performance over time.

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34.12. Network Stats window

Note: See the networkStats Parameters (on page 253) for detailed information about the parameters.

Access and Window Description

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

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

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 250)

User Data - Drag and Drop Files	¹ File Upload	O System Info	Configuration	Network Diagnostics	e Help	⊜Logout
		() Sys	stem Info			

Figure 250: System Info link

The Authentication Required (Login) dialog box opens.

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

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

 Click the Network Stats tab. The Network Stats window opens. (Figure 251)

Note: The information in this window is read-only. See the networkStats Parameters (on page 253) for detailed information about the parameters.

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					1	1	
System Info	Radio Settings	Encryption	Data Path Local	Diagnostics	Config	Services	Network
Network Stats	NTP Con	11 Com2	Terminal Server Relay	Date	SNMP	Security	Runtime Environmer
	Netwo	'k Stats					
	RX Bytes 0						
	RX Packets 0						
	RX Dropped 0						
	RX Errors 0						
	TX Bytes 12	895					
	TX Packets 12	9					
	TX Dropped 0						
	TX Errors 0						



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34.13. NTP window

The **NTP** window is used to designate the date and time used on the Z9-P / Z9-PE / Z9-PE-GREY.

Note: See the NTP Parameters (on page 258) for detailed information about the parameters.

Access and Window Description

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

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

Example: For the first time, enter **192.168.111.100/config**.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 252)

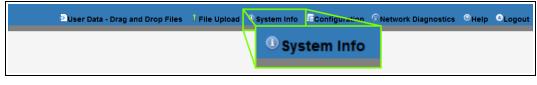


Figure 252: System Info link

The Authentication Required (Login) dialog box opens.

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

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

 Click the NTP tab. The NTP window opens. (Figure 253)

> **Note**: The information in this window is read-only. See the NTP Parameters (on page 258) for detailed information about the parameters.

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System Info	Radio Settings	Encryption	Data Path	Local Di	agnostics	Config	Services	Network	
Network Stats	NTP Col	m1 Com2	Terminal Serv	er Relay	Date	SNMP	Security	Runtime Enviro	nment
	N	ITP							
	NTP Reference R	EFCLK_LOCALCL	оск						
	NTP Restart								
	NTP Date								
	NTP Address1 0	0.0.0							
	NTP Address2 0	0.0.0							
	NTP Address3 0	0.0.0							
	NTP Address4 0.	0.0.0							
	NTP Address5 0	000							



7. On the Menu bar, click the **Configuration** link to Change the NTP Parameters (on page 123).

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34.14. Radio Settings window

Note: See the radioSettings Parameters (on page 262) for detailed information about the parameters.

- Gateway Radio Mode (on page 364)
- Endpoint Radio Mode (on page 365)

Access and Window Description

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

Example: For the first time, enter **192.168.111.100/config**.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 254)

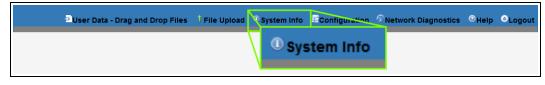


Figure 254: System Info link

The Authentication Required (Login) dialog box opens.

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

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

 Click the Radio Settings tab. The Radio Settings window opens. (Figure 255 or Figure 256)

Note: The information in this window is read-only. See the radioSettings Parameters (on page 262) for detailed information about the parameters.

See:

- Gateway Radio Mode (on page 364)
- Endpoint Radio Mode (on page 365)

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7. On the Menu bar, click the **Configuration** link to Change the Radio Settings Parameters -Endpoints (on page 126).

34.14.1. Gateway Radio Mode

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



Figure 255: Radio Settings window - Gateway Radio Mode

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34.14.2. Endpoint Radio Mode

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



Figure 256: Radio Settings window - Endpoint Radio Mode

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34.15. Radio Settings Helpers window

Note: This window is only available if the radioHoppingMode (on page 275) parameter is set to **Hopping_On**.

See the radioSettingsHelpers Parameters (on page 287) for detailed information about the parameters.

Access and Window Description

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

Example: For the first time, enter **192.168.111.100/config**.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 257)

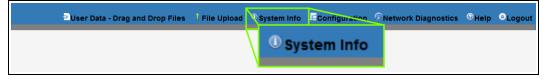


Figure 257: System Info link

The Authentication Required (Login) dialog box opens.

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

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

6. Click the **Radio Settings Helpers** tab.

Note: The information in this window is read-only. See the radioSettingsHelpers Parameters (on page 287) for detailed information about the parameters.

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		Duse	r Data - Dra	ag and Dro	o Files	1 File	Upload	• System Info	Configur	ation 🤇	Help OLogo
System Info	Radio Se	ettings	Radio S	Settings Help	pers	Encry	ption	Data Path	Local Dia	gnostics	Config
Services	Network	Netwo	ork Stats	NTP	Con	n1	Com2	Terminal Se	rver Relay	Date	SNMP
Radio Settings Helpers											
Freque	Frequency Masks Errors										

Figure 258: Radio Settings Helpers window

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34.16. Runtime Environment window

The **Runtime Environment** window is used to provide information specific to the Linux Runtime Environment.

Note: See the runtimeEnvironment Parameters (on page 289) for detailed information about the parameters.

Access and Window Description

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

Example: For the first time, enter **192.168.111.100/config**.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 259)

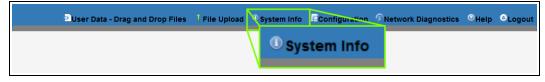


Figure 259: System Info link

The Authentication Required (Login) dialog box opens.

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

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

6. Click the **Runtime Environment** tab. The **Runtime Environment** window opens. (Figure 260)

Note: The information in this window is read-only. See the runtimeEnvironment Parameters (on page 289) for detailed information about the parameters.

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34. Web Interface





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34.17. Security window

Note: See the security Parameters (on page 293) for detailed information about the parameters.

Access and Window Description

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

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

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the System Info link. (Figure 261)

User Data - Drag and Drop Files	Î File Upload	System Info	Configuration	Network Diagnostics	€ Help	⊜Logout
		⁽¹⁾ Sys	stem Info			

Figure 261: System Info link

The Authentication Required (Login) dialog box opens.

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

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

6. Click the **Security** tab.

The **Security** window opens. (Figure 262)

Note: The information in this window is read-only. See the security Parameters (on page 293) for detailed information about the parameters.

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System Info Ra									-
	adio Settings	Encryption	Data Path	Local Dia	ignostics	Config	Services	Network	
Network Stats	NTP Com1	Com2	Terminal Serv	er Relay	Date	SNMP	Security	Runtime Env	ironment
	Secur	ity							
Enable PT	P Interface true								
Enable Ethe	ernet Login true								

Figure 262: Security window

7. On the Menu bar, click the **Configuration** link to Change the Security Parameters (on page 142).

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34.18. Services window

Note: See the services Parameters (on page 296) for detailed information about the parameters.

Access and Window Description

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 263)

User Data - Drag and Drop Files	¹ File Upload	O System Info	Configuration	Network Diagnostics	[®] Help	⊜Logout
		() Sys	stem Info			

Figure 263: System Info link

The Authentication Required (Login) dialog box opens.

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

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

6. Click the **Services** tab.

The **Services** window opens. (Figure 264)

Note: The information in this window is read-only. See the services Parameters (on page 296) for detailed information about the parameters.

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Ð	Jser Data - Drag and	d Drop Files	File Upload) System Info	Confi	iguration 🔗	Network Diag	nostics [©] He	elp [©] Logout
System info	Radio Settings	Encryption	Data Path	Local Dia	gnostics	Config	Services	Network	
Network Stats	NTP Com	1 Com2	Terminal Serv	ver Relay	Date	SNMP	Security	Runtime Env	vironment
	Serv	ices							
	Time Out CLI 900)							

Figure 264: Services window

7. On the Menu bar, click the **Configuration** link to Change the Services Parameters (on page 145).

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34.19. SNMP window

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

Access and Window Description

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

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

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the System Info link. (Figure 265)

≥User Data - Drag and Drop Files	¹ File Upload	O System Info	Configuration	Network Diagnostics	[⊙] Help	Cogout
		() Sys	stem Info			

Figure 265: System Info link

The Authentication Required (Login) dialog box opens.

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

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

6. Click the **SNMP** tab.

The **SNMP** window opens. (Figure 266)

Note: The information in this window is read-only. See the SNMP Parameters (on page 298) for detailed information about the parameters.

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System Info	Radio Setting	s E	ncryption	Data Path	Local D	agnostics	Config	Services	Network	
Network Stats	NTP	Com1	Com2	Terminal Serv	er Relay	Date	SNMP	Security	Runtime Env	ronment
		SNMP								
	V1 Enable									
	V2C Enable	false								
	V3 Enable	false								
RO Cor	nmunity Nam	public								
RW Cor	nmunity Nam	private								

Figure 266: SNMP window

7. On the Menu bar, click the **Configuration** link to Change the SNMP Parameters (on page 148).

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34.20. System Info window

The System Info window provides system level information for the Z9-P / Z9-PE / Z9-PE-GREY.

Note: See the systemInfo Parameters (on page 312) for detailed information about the parameters.

Access and Window Description

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 267)

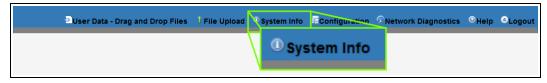


Figure 267: System Info link

The Authentication Required (Login) dialog box opens.

5. Enter **admin** in both the **User Name** and **Password** text boxes and click **OK**. The **Login** dialog box closes and the **System Info** window opens. (Figure 268)

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

The System Info window opens. (Figure 268)

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⊵User	Data - Drag and D	rop Files 🕴 Fil	e Upload 🕕 Sy	rstem Info	Configu	ration 🔊 Ne	etwork Diagno	ostics ©Help	Cogou
System Info	Radio Settings	Encryption	Data Path	Local Di	agnostics	Config	Services	Network	
Network Stats	NTP Com	1 Com2	Terminal Serv	er Relay	Date	SNMP	Security	Runtime Env	ironment
	Syster	n Info							
	Serial Number 402	26737941							
	Model Code 0								
	Radio Model AM	T0100AA							
Radio	o Model Code 0								
Radio Firm	nware Version FW	T1070TR.14							
Radio S	Serial Number 402	26737941							
	Device Name								
1	Device Model Z9-	PE							
Device	Configuration R1								
Device Firm	nware Version FW	T1101TB.17							
	Device ID 1								
	Layout Hash 355	8005563							
	Reset Info								
Нор	Table Version SE	T0001HT							
	Rte Version								
Rte Terr	plate Version								
	Licenses Nor	ne							

Figure 268: System Info window

6. On the Menu bar, click the **Configuration** link to Change the System Info Parameters (on page 151).

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34.21. Terminal Server Relay window

Note: See the TerminalServerRelay Parameters (on page 322) for detailed information about the parameters.

Access and Window Description

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. Click the **System Info** link. (Figure 269)

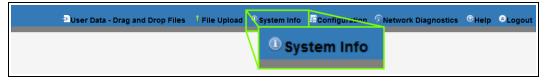


Figure 269: System Info link

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.

 Click the Terminal Server Relay tab. The Terminal Server Relay window opens. (Figure 270)

Note: The information in this window is read-only. See the TerminalServerRelay Parameters (on page 322) for detailed information about the parameters.

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Vetwork Stats					<u>.</u>	<u> </u>			
	TP Com1	Com2	Terminal Server Relay	Date	SNMP	Security	Runtime Environment		
Terminal Server Relay									
Termserv Relay	Mapping TER	MSERV_RELAY	_DISABLED						

Figure 270: Terminal Server Relay window

7. On the Menu bar, click the **Configuration** link to Change the Terminal Server Relay Parameters (on page 154).

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34.22. User Data - Drag and Drop window

The **User Data - Drag and Drop** window lists the default files of the Z9-P / Z9-PE / Z9-PE-GREY.

Access and Window Description

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

Note: If this is the first time the Z9-P / Z9-PE / Z9-PE-GREY is accessed, enter its default IP address of 192.168.111.100.

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

Example: For the first time, enter 192.168.111.100/config.

- 3. Refresh the browser window (press <Enter> or <F5>). The Home window (on page 351) opens.
- 4. On the Menu bar, click the User Data Drag and Drop link.



Figure 271: User Data - Drag and Drop Files link

The Authentication Required (Login) dialog box opens.

5. Enter admin in both the User Name and Password text boxes and click OK.

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

The Login dialog box closes and the User Data - Drag and Drop window opens. (Figure 272)

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	∑User Data - Drag and Drop Files	l File Upload	System Info	Configuration	Network Diagnostics	elp	⊖Logout
	_	Name *			Laf	st modified	Size
boot_result	s.txt					000-01-01 10:13.060000	438 Bytes
config.txt						000-01-01 10:21.621000	2.2 kB
help.txt						000-01-01 10:21.428000	66.5 kB
layout.txt						000-01-01 10:21.581000	67.7 kB
result.txt						000-01-01 2:54.065001	836 Bytes
sys_info.txt						000-01-01 10:30.079000	564 Bytes

Figure 272: User Data - Drag and Drop window

Note: See the Z9-P / Z9-PE / Z9-PE-GREY Files and Descriptions (on page 438) for additional information.

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35. Release Notes

These sections describe the additions, changes, known limitations, and workarounds in each software version. The most recent version is listed first.



The latest software versions and the most recent list of known limitations and workarounds are available on <u>www.freewave.com</u>.

35.1. Version 1.1.0.1

Release Date: September 2018 Additions and Changes

- Support has been added for:
 - Local Diagnostics:
 - noiseLevel (on page 232)
 - RxSuccess (on page 240)
 - TxAvailability (on page 242)
 - TxSuccess (on page 243)
 - VSWR (on page 243)

Important!: VSWR may not function on Z9-P / Z9-PE / Z9-PE-GREY models manufactured prior to September, 2018.

If the Z9-P / Z9-PE / Z9-PE-GREY reports a VSWR value of 0 (zero), VSWR is **not** supported.

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- MTU (on page 247) 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-P / Z9-PE / Z9-PE-GREY:
 - SNMP v2c and v3 write access.
 - Parameters have been added to the MIB and SNMP agent.
- Increase Terminal Server connections from 20 to 128 concurrent TCP connections.
- Default settings were changed to improve field performance:
 - compressionEnabled (on page 211) default is now **True**.
 - beaconBurstCount (on page 263) default is now 3.
 - radioHoppingMode (on page 275) default is now Hopping_On.
 - rfDataRate (on page 282) default is now **RATE_500K**.
 - txPower (on page 285) default is now **30**.

Important!: A Gateway MUST BE configured for the radios to communicate.

- Corrections have been implemented for:
 - Frequency Mask
 - COM ports temporarily stop functioning when passing traffic with certain termserv_relay_ mapping (on page 323) settings enabled.
 - When rfDataRate = **RATE** 4M and beaconBurstCount = 1:
 - Endpoint-Repeaters may lose synchronization with the Gateway and reset themselves.
 - Updated time out behavior for the COM1 and COM2 terminal servers:
 - The connection remains open if data is being sent or received.
- The TerminalServerTimeOut (on page 201) connection remains open if data is sent or received.
- A new LED pattern at startup after an upgrade to v1.1.0.1 indicates an active boot of the Z9-P / Z9-PE / Z9-PE-GREY.
- During boot, the COM LEDs will cycle indicating startup.
- For optimal throughput, when Repeaters are used and the RF environment is noisy, the beaconBurstCount (on page 263) is no longer required to be 2 or more.
- When an invalid Gateway is entered, the gateway (on page 246) is set to a null value.
 - When a Z9-P / Z9-PE / Z9-PE-GREY with a non-default **network.gateway** value (e.g., 194.2.2.2) is upgraded to v1.1.0.1, it is set to a null value after upgrade.
- ZumIQ Application Environment now available
 - This was previously only available as a standard option in the v1.0.6.0 release.

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Important!: If upgrading to v1.1.0.1 from any previous firmware version, a license key MUST BE requested to activate the ZumIQ Application Environment. Contact FreeWave Technical Support (on page 13) for the license key.

- The default value for ntpReference (on page 260) was changed to NETWORK_TIME_ SERVER.
 - This causes the Z9-P / Z9-PE / Z9-PE-GREY to attempt to contact the default external time.nist.gov IP address listed in ntp_address (on page 259).

Beta Features

Important!: Beta Features have not been fully tested by FreeWave. The intent is to expose the feature and receive early feedback from customers.

- Web Interface
 - Added a **Configuration** menu.
 - Added a Network Diagnostics menu

Important!: A Gateway is required to use the Network Diagnostics menu.

- Network Discovery
- Discover other Endpoints in the network.
- Show hops and their paths from the Gateway.
- Show the link quality (RSSI and Margin).
- Show neighbors.
- Available options are:
 - Download Support Bundle
 - Clear Status
 - Refresh Network Diagnostics
 - Save Network Diagnostics
- MacTableEntryAgeTimeout
 - The MacTableEntryAgeTimeout is the number of seconds before an inactive entry in the radio MAC Table ages out and expires.
 - This feature:
 - Allows the optimization of the time it takes a unit to learn a new path to allow for Repeater redundancy.
 - Is used to adjust fail-over times with parallel Repeaters.
 - User field sets MacTableEntryAgeTimeout period.
 - The default is 120 seconds, with a Minimum of 30 seconds and a Maximum of 86400 seconds.

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Known Limitations and Workarounds

• A downgrade from v1.1.0.1 to v1.0.4.x requires an intermediate downgrade to v1.0.7.0.

Example: Downgrade v1.1.0.1 to v1.0.7.0, then downgraded to v1.0.4.0.

- v1.0.6.0 / v1.1.0.1 Upgrade or Downgrade
 - When either upgrading or downgrading, the ZumIQ template is changed but NOT the active ZumIQ runtime application environment version.
 - Active applications will continue to run.

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

- Performing an rteReset (on page 290) to copy in the new FW template erases any existing applications in the original runtime application environment.
 - If the new runtime environment is needed, save all applications prior to performing an runtimeEnvironment.rteReset.
- Changing the ip_address (on page 246) 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-P / Z9-PE / Z9-PE-GREY.
- VSWR **may not** function on Z9-P / Z9-PE / Z9-PE-GREY models manufactured prior to September, 2018.

If the Z9-P / Z9-PE / Z9-PE-GREY reports a VSWR value of 0 (zero), VSWR is **not** supported.

• VSWR is less accurate at higher power levels (>20dBm).

Note: The reported VSWR is a value proportional to the VSWR. It is closer to VSWR at lower powers, but at higher power levels, it still increases with reflected power.

- After updating the systemInfo.rteTemplateVersion parameter, a reboot is necessary to update the sys_info.txt file with the ZumIQ version.
- Rebooting a pair of radios simultaneously when one of the Z9-P / Z9-PE / Z9-PE-GREY has termserv_relay_mapping (on page 323) enabled, the terminal server relay takes between 2 and 5 minutes to become active.
- To update the Network Diagnostics window (on page 357), refresh the browser to clear the browser cache.
- When upgrading to v1.1.0.1, the fw_upgrade_result.txt file does NOT appear after the upgrade is completed.
 - If the fw_upgrade_result.txt file does appear in the USB drive after an upgrade, it is now write-protected and cannot be deleted.
- Setting aggregateEnabled (on page 210) on all Endpoints in a network prevents the neighbor table from being populated.

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- The Network Diagnostics window (on page 357) does not appear correctly when dataPath.aggregateEnabled=true.
- TxAvailability (on page 242) is ONLY available via MIB, not via SNMP.
- RxSuccess (on page 240) is NOT available via SNMP.
- localDiagnostics.TxAvailability returns localDiagnostics.RxSuccess value via SNMP.
- Options are visible but not active in the handler (on page 197) parameter.
- The setKey (on page 225) cannot be entered using the Z9-P / Z9-PE / Z9-PE-GREY Web Interface.

Important!: The encryption.setKey MUST BE entered in CLI.

35.2. Version 1.0.7.0

Release Date: June 2018

Warning! DO NOT remove power from the Z9-P / Z9-PE / Z9-PE-GREY during or immediately after the firmware upgrade process!

Wait until the Home window (on page 351) Web Interface is accessible before removing power from the **ZumLink** device (approximately 6-8 minutes).



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

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

Upgrade Notes for Z9-P / Z9-PE / Z9-PE-GREY - v1.0.7.0

Important!: Inside the downloaded **Z9-P-and-Z9-PE-v1070-Firmware.zip** file, there are **TWO**.pkg files.

The **CORRECT** .pkg file to use depends on the **ZumLink** version you are upgrading from.

- When upgrading from v1.0.4.2 or LATER firmware, use the file named:
 - 1_Device_Firmware_v1_0_7_0____when_upgrading_from_v1042_or_later.pkg.
- When upgrading from a version EARLIER than v1.0.4.2, use the file named:
 - 1_Device_Firmware_v1_0_7_0____when_upgrading_from_a_version_earlier_ than_v10402.pkg.
- For all firmware versions, use 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:

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- Multiple Repeaters using a maximum of 3 Repeater slots.
 - The Endpoint-Repeater has a radio Repeater slot range from 1-3.
 - A maximum number of 3 Endpoint-Repeaters are supported in an overlapping communication space or RF coverage area.
 - The radio Repeater slot numbers can be reused where there is no RF connectivity or overlap between the reused radio Repeater slots.

FREEWAVE Recommends: Set the beaconBurstCount (on page 263) to 2 or more for optimal throughput when Repeaters are used and the RF environment is noisy. This increases the number of beacons sent in a beacon interval.

- The Terminal Server Relay Client provides radio-to-radio serial communication.
- Hopping data rates from the Gateway to Endpoint and the Endpoint to Gateway are now more symmetric.
- Improved sensitivity, noise filtering, and interference avoidance for 250 and 500 kbps rates. Throughput rates between the Gateway and Endpoint have been rebalanced.

Important!: Data rates 250K and 500K are NOT compatible with previous releases of the ZumLink radio firmware.

- When **network.netmaskFilterEnabled=true**, VLAN tagged packets are filtered out because the radio is not considered on the VLAN and therefore VLAN packets cannot be on the same subnet.
- Multiple FEC-related corrections have been implemented.
- A problem where the Ethernet interface does not work due to pings at boot time has been fixed.

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.

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• The default is 120 seconds, with a Minimum of 30 seconds and a Maximum of 86400 seconds.

Known Limitations and Workarounds



Caution: **config.restore** can give inconstant results if the radioMode (on page 280) was changed.

- Significant data is lost between radios when operating in close proximity (3-6 feet) when **radioSettings.rfDataRate=RATE** 4M. (See rfDataRate (on page 282)).
 - Workaround: Reduce power on radios when operating in close proximity.
- When using the USB, the CLI may lock up on units with termserv_relay_mapping (on page 323) enabled.
 - Workaround:
 - Re-seat the cable.
 - Reconfigure the termserv_relay_mapping using either of these procedures:
 - Drag and Drop Configuration ZumLink (on page 53) or
 - Web Interface Configuration (on page 75).
- COM ports temporarily stop functioning when passing traffic with certain Terminal Server Relay settings enabled.
- When the termserv_relay_mapping is in use, the connectionDrops (on page 193) count should be ignored.
- When operating at rfDataRate = RATE 4M and beaconBurstCount = 1:
 - Endpoint-Repeaters may lose synchronization with the Gateway and reset themselves.
 - TCP traffic can be intermittent when operating multiple Repeaters.
- When operating at rfDataRate = RATE_4M and with multiple Repeaters, if a short beaconInterval and a high beaconBurstCount are designated, throughput is very low.
 - Workaround: Use either a longer beaconInterval or a lower beaconBurstCount.
- As Repeaters are chained in the network, round trip delay will increase.
 - When issuing pings of large packet sizes at the lower data rates, such as 115.2K, and a beaconInterval = **TWENTY_FIVE_MS**, the latency can increase causing the pings to fail.
 - Workaround: Allowing appropriate delay between pings resolves this issue.

FREEWAVE Recommends: Set the **beaconBurstCount=2** or more and **beaconInterval=ONE_HUNDRED_MS** or more for optimal throughput when extended Repeater networks are used.

- Frequency Mask is not working properly.
- ZumIQ application environment is not available.

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35.3. Version 1.0.6.0

Release Date: September 2017

Additions and Changes

Important!: If a downgrade to v1.0.4.0 is needed, an upgrade to v1.0.7.0 is required first, then the user can install v1.0.4.0.

- ZumIQ Application Environment available
 - Provides the capability to develop and host 3rd party Apps for intelligent control and automation of remote sensors and devices.
 - Provides a Debian Linux environment and access to hardware resources for application development and deployment.
 - These official sample applications are available at https://github.com/FreeWaveTechnologies/ZumIQ:
 - Mosquitto
 - Node.js
 - Node-RED
 - Python 2.7
 - Python 3.x

Known Limitations and Workarounds

- The web page is not available for several minutes after the Z9-P / Z9-PE / Z9-PE-GREY reboots.
- A reboot of the Z9-P / Z9-PE / Z9-PE-GREY is required:
 - when Security page settings are changed.
 - after applying a license file.
- The Node-RED website times out on slow networks.
 - Workaround: Replace Node.js v8 with Node.js v7 using the install-node7.sh script available on GitHub.
- A downgrade from v1.0.6.0 to v1.0.4.0 requires an intermediate upgrade to v1.0.7.0.

Example: Upgrade from v1.0.6.0 to v1.0.7.0, then downgrade to v1.0.4.0.

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35.4. Version 1.0.4.2

Release Date: June 2017

Additions and Changes

- Allows for the passing of VLAN tagged traffic.
- Packet Aggregation is now working properly.
- Resolved the otaMaxFragementSize performance issues when set to 64.
- 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.

Known Limitations and Workarounds

- When changing the COM port to **Terminal Server**, the **ZumLink** must be power cycled after making the change.
- In Local Diagnostics, the RF data rate 1 Mbps reports a maximum signal level of -42 dBm.

Notes

- If the password was changed from the default, the password is changed back to **admin** after upgrading the radio firmware.
- Firmware v1.0.4.2 and v1.0.4.1 are over-the-air compatible but are NOT compatible with firmware v1.0.3.2 when the **radioSettings.radioHoppingMode** setting is set to **On** (enabled).

35.5. Version 1.0.4.1

Release Date: May 2017 Additions and Changes

Additions and Chang	jes
Feature	Description
IP Filtering	Prevents IP addresses NOT within the IP subnet from being transmitted over the air.
Repeater	Allows a single radio to repeat (store and forward) traffic from one radio to another.
Terminal Server Activity Timeout	Provides a settable time that closes the port when no data is received through the socket connection for longer than the timeout period.
Diagnostic Support Bundle	Generates a zip file containing all the configuration and diagnostics information when IP address followed by /support is typed in a web browser.

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Additions and Changes		
Feature	Description	
Radio Settings	Displays parameters that are required for radio mode, frequency hopping, and so forth.	
	Example : The radioSettings.beaconInterval is not available for radios configured as Endpoints.	
Throughput	Increases in user data throughput in most RF data rates for single channel and frequency hopping when operating unidirectional or bidirectional.	
RF Rate 250 kbps	Unexpected packet losses when radioSettings.beaconInterval set to 50 msec has been resolved.	
Help	Additional details included in the radios help function.	
COM port	COM port LEDs are now functional as described in this manual.	
USB COM Port	Changed so that each time a ZumLink device is plugged into a Windows based computer a unique port number is NOT enumerated.	

Notes

- If the password was changed from the default, the password is changed back to **admin** after upgrading the radio firmware.
- Firmware v1.0.4.1 is NOT over-the-air compatible with firmware v1.0.3.2 when the radioSettings.radioHoppingMode setting is set to On (enabled) or with FEC enabled.

Known Limitations and Workarounds

- Packet Aggregation is currently not working properly.
- When **otaMaxFragementSize** is set to 64, disruptions and failures occur in a ping test with payload size of 20.
- When changing the COM port to **Terminal Server**, the **ZumLink** must be power cycled after making the change.
- In Local Diagnostics, the RF data rate 1 Mbps reports a maximum signal level of -42 dBm.

35.6. Version 1.0.3.2 (Initial Release)

Release Date: October 2016

Known Limitations and Workarounds

- When changing the COM port to **Terminal Server**, the **ZumLink** must be power cycled after making the change.
- Unexpected packet losses when the radioSettings.beaconInterval is set to 50 msec.

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36. Available Accessories

These are the Z9-P / Z9-PE / Z9-PE-GREY accessories available from FreeWave.

- Z9-P, Z9-PE, and Z9-PE-GREY Accessories (on page 392)
- Z9-P Only Accessories (on page 393)
- Z9-PE Only Accessories (on page 393)

36.1. Z9-P, Z9-PE, and Z9-PE-GREY Accessories

Available Accessories - Z9-P / Z9-PE / Z9-PE-GREY		
Part Number	Description	
EAN0900SQ	 ¼ Wave Omni-directional 900 MHz Stub Antenna 	
	• 0 (zero) dBi gain	
	Straight, SMA Male RF connector	
EAN0900SR	 ½ Wave Omni-directional 900 MHz Stub Antenna 	
	• 2 dBi gain	
	Right-angle 360 degree swivel, SMA Male RF connector	
EAN0900WC	Open coil Omni-directional 896-940 MHz Antenna	
	• 5.15 dBi gain.	
	Important!: Does NOT include mounting hardware or cable.	
EAN0905WC	Closed coil Omni-directional 896-970 MHz Antenna	
	• 5 dBi gain	

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Available Accessories - Z9-P / Z9-PE / Z9-PE-GREY		
Part Number	Description	
EAN0906YC	• 3 Element 890-960 MHz Yagi antenna	
	• 8.65 dBi gain	
	24" feedline terminated with N female connector	
ECD0324ER	3 foot long RJ-45 to DB-9 cable adapter	
ECD0658EB	6½ foot long shielded Ethernet cable	
EMD1280UX	12 VDC @ 800mA AC-to-DC power supply with phoenix connector	
	This connector is used with either the:	
	 Z9-PE (FreeWave Part Number: ASC0003ZL) or the 	
	 Z9-PE-GREY (FreeWave Part Number: ASC0003TH) 	
	power cable included with the Z9-P / Z9-PE / Z9-PE-GREY. See Included Equipment (on page 18).	

36.2. Z9-P Only Accessories

Available Accessories - Z9-PE Only		
Part Number	Description	
AOH0001HT	Multi-position DIN rail bracket kit	

36.3. Z9-PE Only Accessories

Available Accessories - Z9-PE Only		
Part Number	Description	
EMD1280UW	12 VDC @ 800mA AC-to-DC power supply with DC plug	
ASC0002ZL	12 inch power adapter with jack	
	Note: For use with EMD1280UW Power Supply.	
AOH4003SP	Reversible DIN rail bracket kit	

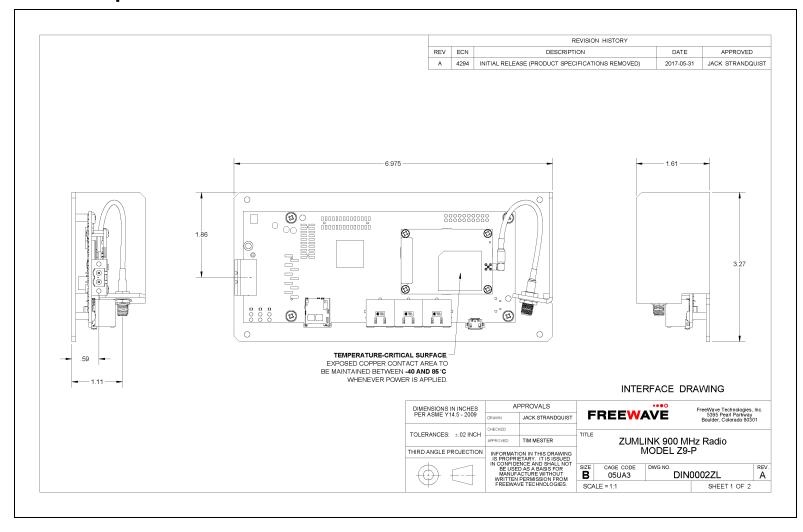
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37. Mechanical Drawing - Z9-P

37.1. Z9-P - Top and Sides

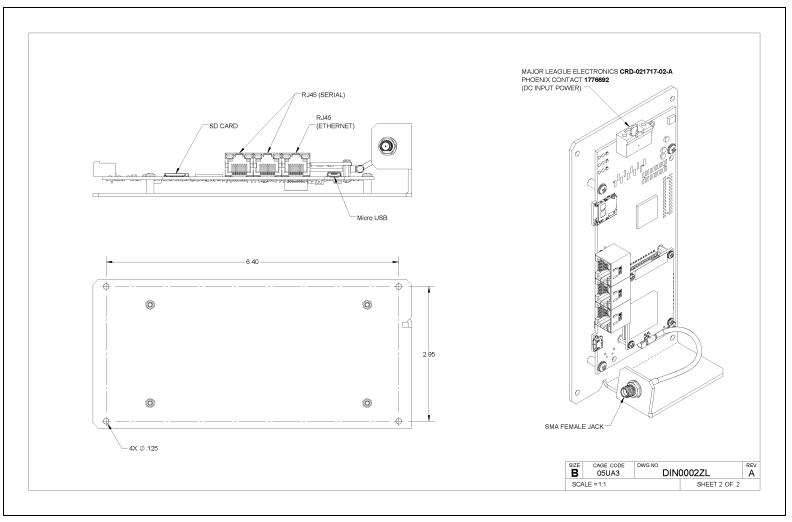


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37.2. Z9-P - Back and Sides



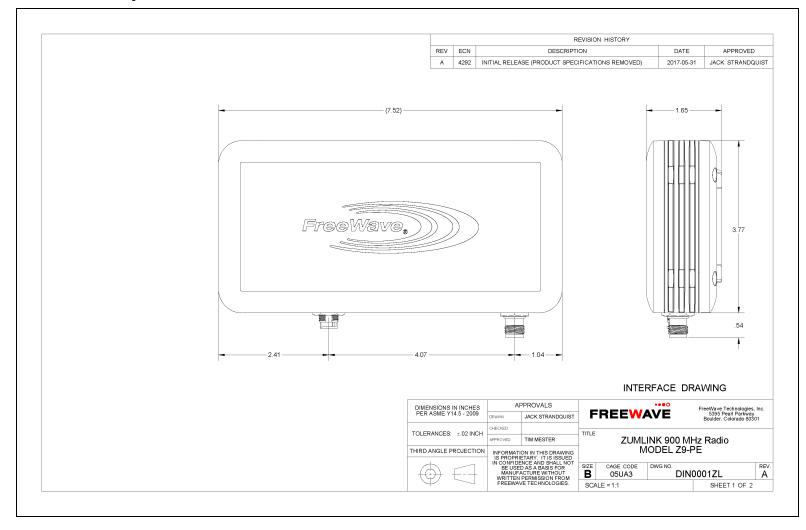
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38. Mechanical Drawing - Z9-PE

38.1. Z9-PE - Top and Sides

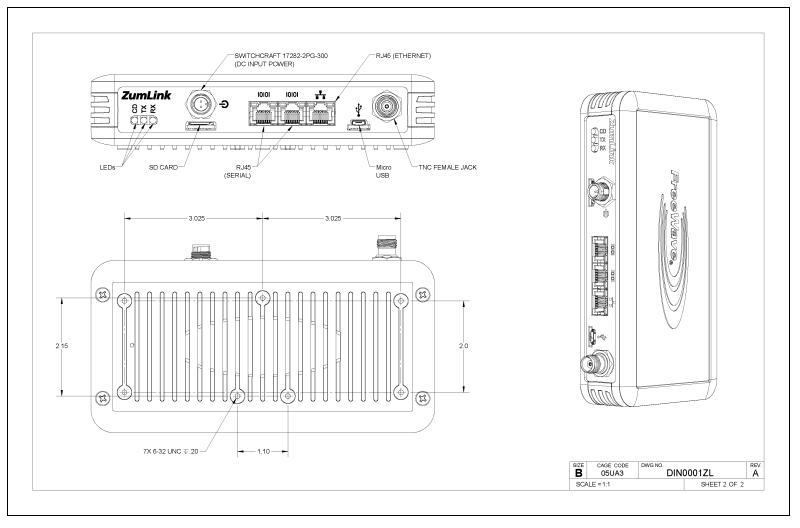


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38.2. Z9-PE - Back and Sides



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39. Hop Tables

- Standard Hop Set ZumLink 900MHz Channels (on page 399)
- Australia Hop Set ZumLink 900MHz Channels (on page 403)

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39.1. Standard Hop Set - ZumLink 900MHz Channels

These are the standard channels supported when the radioHoppingMode (on page 275) is **Enabled**.

Note: When the Radio Hopping Mode is Disabled, the frequency can be set manually.

- RF Data Rate: 115.2 kbps (on page 399)
- RF Data Rate: 250 kbps (on page 400)
- RF Data Rate: 500 kbps (on page 400)
- RF Data Rate: 1 Mbps (on page 401)
- RF Data Rate: 1.5 Mbps (on page 401)
- RF Data Rate: 4 Mbps (on page 402)

39.1.1. RF Data Rate: 115.2 kbps

Channel Size (MHz): 0.2304 Number of Channels: 110

Standard Ho	Standard Hop Set - ZumLink 900MHz Channels									
RF Data Rate	RF Data Rate: 115.2 kbps									
Frequency		Frequency Fre		Frequency	Frequency Frequency			Frequency		Frequency
MHz		MHz		MHz		MHz		MHz		MHz
902.4768		907.0848		911.6928		916.3008		920.9088		925.5168
902.7072		907.3152		911.9232		916.5312		921.1392		925.7472
902.9376		907.5456		912.1536		916.7616		921.3696		925.9776
903.1680		907.7760		912.3840		916.9920		921.6000		926.2080
903.3984		908.0064		912.6144		917.2224		921.8304		926.4384
903.6288		908.2368		912.8448		917.4528		922.0608		926.6688
903.8592		908.4672		913.0752		917.6832		922.2912		926.8992
904.0896		908.6976		913.3056		917.9136		922.5216		927.1296
904.3200		908.9280		913.5360		918.1440		922.7520		927.3600
904.5504		909.1584		913.7664		918.3744		922.9824		927.5904
904.7808		909.3888		913.9968		918.6048		923.2128		
905.0112		909.6192		914.2272		918.8352		923.4432		
905.2416		909.8496		914.4576		919.0656		923.6736		
905.4720		910.0800		914.6880		919.2960		923.9040		
905.7024		910.3104		914.9184		919.5264		924.1344		
905.9328		910.5408		915.1488		919.7568		924.3648		
906.1632		910.7712		915.3792		919.9872		924.5952		
906.3936		911.0016		915.6096		920.2176		924.8256		
906.6240		911.2320		915.8400		920.4480		925.0560		
906.8544		911.4624		916.0704		920.6784		925.2864		

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39.1.2. RF Data Rate: 250 kbps

Channel Size (MHz): 0.3456

Number of Channels: 73

Standard Hop	Standard Hop Set - ZumLink900MHz Channels								
RF Data Rate: 250 kbps									
Frequency	Frequency	Frequency	Frequency	Frequency	Frequency				
MHz	MHz	MHz	MHz	MHz	MHz				
902.5344	907.0272	911.5200	916.0128	920.5056	924.9984				
902.8800	907.3728	911.8656	916.3584	920.8512	925.3440				
903.2256	907.7184	912.2112	916.7040	921.1968	925.6896				
903.5712	908.0640	912.5568	917.0496	921.5424	926.0352				
903.9168	908.4096	912.9024	917.3952	921.8880	926.3808				
904.2624	908.7552	913.2480	917.7408	922.2336	926.7264				
904.6080	909.1008	913.5936	918.0864	922.5792	927.0720				
904.9536	909.4464	913.9392	918.4320	922.9248	927.4176				
905.2992	909.7920	914.2848	918.7776	923.2704					
905.6448	910.1376	914.6304	919.1232	923.6160					
905.9904	910.4832	914.9760	919.4688	923.9616					
906.3360	910.8288	915.3216	919.8144	924.3072					
906.6816	911.1744	915.6672	920.1600	924.6528					

39.1.3. RF Data Rate: 500 kbps

Channel Size (MHz): 0.6912

Number of Channels: 36

Standard Hop Set - ZumLink 900MHz Channels										
RF Data Rate: 500 kbps										
Frequency Frequency <t< th=""><th>Frequency</th></t<>								Frequency		
MHz		MHz		MHz		MHz		MHz		MHz
902.7072		906.8544		911.0016		915.1488		919.2960		923.4432
903.3984		907.5456		911.6928		915.8400		919.9872		924.1344
904.0896		908.2368		912.3840		916.5312		920.6784		924.8256
904.7808		908.9280		913.0752		917.2224		921.3696		925.5168
905.4720		909.6192		913.7664		917.9136		922.0608		926.2080
906.1632		910.3104		914.4576		918.6048		922.7520		926.8992

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39.1.4. RF Data Rate: 1 Mbps

Channel Size (MHz): 1.3824

Number of Channels: 18

Standard Hop Set - ZumLink 900MHz Channels						
RF Data Rate: 1 Mbps						
Frequency Frequency						
MHz	MHz					
903.0528	915.4944					
904.4352	916.8768					
905.8176	918.2592					
907.2000	919.6416					
908.5824	921.0240					
909.9648	922.4064					
911.3472	923.7888					
912.7296	925.1712					
914.1120	926.5536					

39.1.5. RF Data Rate: 1.5 Mbps

Channel Size (MHz): 1.3824 Number of Channels: 17

Standard Hop Set - ZumLink 900MHz Channels					
RF Data Rate: 1.5 Mbps					
MHz					
903.2562	916.1586				
904.8690	917.7714				
906.4818	919.3842				
908.0946	920.9970				
909.7074	922.6098				
911.3202	924.2226				
912.9330	925.8354				
914.5458					

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39.1.6. RF Data Rate: 4 Mbps

Channel Size (MHz): 3.2256

Number of Channels: 7

Standard Hop Set - ZumLink 900MHz Channels				
RF Data Rate: 4 Mbps				
Frequency				
MHz				
904.5504				
907.7760				
911.0016				
914.2272				
917.4528				
920.6784				
923.9040				

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39.2. Australia Hop Set - ZumLink 900MHz Channels

These are the standard channels supported when the radioHoppingMode (on page 275) is **Enabled**.

Note: When the Radio Hopping Mode is Disabled, the frequency can be set manually.

- RF Data Rate: 115.2 kbps (on page 403)
- RF Data Rate: 250 kbps (on page 404)
- RF Data Rate: 500 kbps (on page 404)
- RF Data Rate: 1 Mbps (on page 405)
- RF Data Rate: 4 Mbps (on page 405)

39.2.1. RF Data Rate: 115.2 kbps

Channel Size (MHz): 0.2304

Number of Channels: 54

Australia Hop	Australia Hop Set - ZumLink 900MHz Channels								
RF Data Rate: 115.2 kbps									
Frequency	Frequency	Frequency							
MHz	MHz	MHz	MHz	MHz	MHz				
915.3792	917.6832	919.9872	922.2912	924.5952	926.8992				
915.6096	917.9136	920.2176	922.5216	924.8256	927.1296				
915.8400	918.1440	920.4480	922.7520	925.0560	927.3600				
916.0704	918.3744	920.6784	922.9824	925.2864	927.5904				
916.3008	918.6048	920.9088	923.2128	925.5168					
916.5312	918.8352	921.1392	923.4432	925.7472					
916.7616	919.0656	921.3696	923.6736	925.9776					
916.9920	919.2960	921.6000	923.9040	926.2080					
917.2224	919.5264	921.8304	924.1344	926.4384					
917.4528	919.7568	922.0608	924.3648	926.6688					

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39.2.2. RF Data Rate: 250 kbps

Channel Size (MHz): 0.3456

Number of Channels: 35

Australia Hop Set - 2	Australia Hop Set - ZumLink 900MHz Channels							
RF Data Rate: 250 kbps								
Frequency	Frequency Frequency Frequency							
MHz	MHz	MHz	MHz					
915.6672	919.1232	922.5792	926.0352					
916.0128	919.4688	922.9248	926.3808					
916.3584	919.8144	923.2704	926.7264					
916.7040	920.1600	923.6160	927.0720					
917.0496	920.5056	923.9616	927.4176					
917.3952	920.8512	924.3072						
917.7408	921.1968	924.6528						
918.0864	921.5424	924.9984						
918.4320	921.8880	925.3440						
918.7776	922.2336	925.6896						

39.2.3. RF Data Rate: 500 kbps

Channel Size (MHz): 0.6912 Number of Channels: 17

Australia Hop Set - ZumLink 900MHz Channels							
RF Data Rate: 500 kbps							
Frequency	Frequency Frequency						
MHz		MHz					
915.8400		922.0608					
916.5312		922.7520					
917.2224		923.4432					
917.9136		924.1344					
918.6048		924.8256					
919.2960		925.5168					
919.9872		926.2080					
920.6784		926.8992					
921.3696							

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39.2.4. RF Data Rate: 1 Mbps

Channel Size (MHz): 1.3824

Number of Channels: 8

Australia Hop Set - ZumLink 900MHz Channels				
RF Data Rate: 1 Mbps				
Frequency				
MHz				
916.8768				
918.2592				
919.6416				
921.0240				
922.4064				
923.7888				
925.1712				
926.5536				

39.2.5. RF Data Rate: 4 Mbps

Channel Size (MHz): 3.2256 Number of Channels: 3

Australia Hop Set - ZumLink 900MHz Channels				
RF Data Rate: 4 Mbps				
Frequency				
MHz				
917.4528				
920.6784				
923.9040				

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40. ZumLink MIB

These are the supported item groups in the Z9-P / Z9-PE / Z9-PE-GREY MIB file:

- CPU Usage (on page 407)
- Disk Usage (on page 408)
- Memory Usage (on page 410)
- FreeWave Technologies-MIB (on page 412)
- SNMP Write Access (on page 428)

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40.1. CPU Usage

ZumLink MIB - CPU Usage								
Objective Type	Syntax	MAX Access	Status	Description	::=			
ssCpuUser	Integer32	Read-only	Deprecated	The percentage of CPU time spent processing user-level code, calculated over the last minute.	{systemStats 9}			
ssCpuSystem	Integer32	Read-only	Deprecated	The percentage of CPU time spent processing system-level code, calculated over the last minute.	{systemStats 10}			
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}			

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40.2. Disk Usage

ZumLink MIB - D)isk Usage				
Objective Type	Syntax	MAX Access	Status	Description	::=
dskTable	Sequence of	Not	Current	Disk watching information.	{ucdavis 9}
	DskEntry	Accessible		Partitions to be watched are configured by the snmpd.conf file of the agent.	
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	

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ZumLink MIB - D	ZumLink MIB - Disk Usage					
Objective Type	Syntax	MAX Access	Status	Description	::=	
dskAvail	Integer32	Read-only	Current	Available space on the disk.	{dskEntry 7 }	
dskUsed	Integer32	Read-only	Current	Used space on the disk.	{dskEntry 8}	
dskPercent	Integer32	Read-only	Current	Percentage of space used on disk.	{dskEntry 9}	
dskPercentNode	Integer32	Read-only	Current	Percentage of nodes used on disk.	{dskEntry 10}	

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40.3. Memory Usage

ZumLink MIB - M	emory Usage)				
Objective Type	Syntax	Units	MAX Access	Status	Description	::=
memTotalSwap	Integer32	kВ	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	kВ	Read-only	Current	The total amount of real / physical memory installed on the host.	{ memory 5 }
memAvailReal	Integer32	kВ	Read-only	Current	The amount of real / physical memory currently unused or available.	{ memory 7 }
memShared	Integer32	kВ	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	kВ	Read-only	Current	The total amount of real or virtual memory currently allocated for use as memory buffers.	{ memory 14 }
					This object will not be implemented on hosts where the underlying operating system does not explicitly identify memory as specifically reserved for this purpose.	

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ZumLink MIB - M	ZumLink MIB - Memory Usage						
Objective Type	Syntax	Units	MAX Access	Status	Description	::=	
memCached	Integer32	kB	Read-only	Current	The total amount of real or virtual memory currently allocated for use as cached memory.	{ memory 15 }	
					This object will not be implemented on hosts where the underlying operating system does not explicitly identify memory as specifically reserved for this purpose.		
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 }	

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40.4. FreeWave Technologies-MIB

FreeWave Technologies-MIB				
Object	Description	Access	Syntax	
fwtPlusModemStatusTable	This table gives basic status information for each radio modem in the system.	Not Accessible		
fwtPlusModemStatusTableEntry	A row containing status information for a specific radio modem.	Not Accessible		
fwtPlusModemSerial	The serial number for the radio the given status table entry line is for	Not Accessible	Gauge32	
fwtPlusModemSignal	The received signal level for this radio modem, in dBm.	Read-only	Integer32	
fwtPlusModemNoise	The detected noise for this radio modem, in dBm.	Read-only	Integer32	
fwtPlusModemSupplyVoltage	The supply voltage to this radio modem, in units of 1/100th of a volt.	Read-only	Integer32	
fwtPlusModemRxRate	The current receive rate as a percentage of the maximum, in units of one Hundredth of a percent.	Read-only	Gauge32	
fwtPlusModemReflectedPower	The current amount of reflected RF power.	Read-only	Gauge32	
fwtPlusModemTemperature	The current temperature of this radio modem in degrees Celsius.	Read-only	Integer32	
fwtPlusModemRange	The current approximate range of this radio modem from its peer, in meters.	Read-only	Gauge32	

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FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtPlusModemTxRate	The current transmit rate as a percentage of the maximum, in units of one Hundredth of a percent.	Read-only	Gauge32
fwtPlusModemSNDelta	The current margin (absolute) between the received signal and the noise at this radio.	Read-only	Integer32
fwtPlusModemVendorString	The name of the vendor of this radio modem.	Read-only	DisplayString
fwtPlusModemConnectedTo	The serial number of the radio that we currently have an RF link with.	Read-only	Gauge32
fwtPlusModemUpstreamSignal	The received signal level that the upstream radio receives from this radio, in dBm.	Read-only	Integer32
fwtPlusModemUpstreamNoise	The noise level that the upstream radio receives from this radio, in dBm.	Read-only	Integer32
fwtPlusModemDisconnectCount	The number of times this radio has lost its RF link.	Read-only	Gauge32
fwtPlusModemPacketRxCount	The number of Ethernet packets the radio has received over its RF link.	Read-only	Gauge32
fwtPlusModemPacketTxCount	The number of Ethernet packets the radio has sent over its RF link.	Read-only	Gauge32
fwtPlusModemPacketDroppedCount	The number of Ethernet packets the radio has dropped	Read-only	Gauge32
fwtPlusModemPacketBadCount	The number of BAD / corrupt Ethernet packets the radio has received over its RF link.	Read-only	Gauge32
fwtPlusModemControlTable	This table contains some parameters which may be adjusted for each radio modem in the system.	Not Accessible	
fwtPlusModemControlTableEntry	A row containing adjustable parameters for a specific radio modem.	Not Accessible	

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FreeWave Technologies-MIB					
Object	Description	Access	Syntax		
fwtPlusModemNetworkMode	The network mode to be used by a radio modem.	Read-Write	INTEGER		
fwtPlusModemMode	The modem mode to be used by a radio modem.	Read-Write	INTEGER		
fwtPlusModemFrequencyKey	The frequency key to be used by a radio modem.	Read-Write	Gauge32		
fwtPlusModemMinPacketSize	The minimum packet size to be used by a radio modem.	Read-Write	Gauge32		
fwtPlusModemMaxPacketSize	The maximum packet size to be used by a radio modem.	Read-Write	Gauge32		
fwtPlusModemTxPower	The transmit power to be used by a radio modem.	Read-Write	Gauge32		
fwtPlusModemRetryTimeout	How many times a radio modem should try to transmit a packet before timing out.	Read-Write	Gauge32		
fwtPlusModemRFDataRate	The RF data rate to be used by a radio modem. Permissible values are 1200,867,614, 154, or 115, depending on the series of radios.	Read-Write	Gauge32		
fwtPlusModemBroadcastRepeat	The number of times a Gateway will send out a packet of information before moving on to the next.	Read-Write	Gauge32		
fwtPlusModemNetworkID	A numerical ID that radios use to decide which network they are allowed to link to.	Read-Write	Gauge32		
fwtPlusModemRepeaters	Allows for repeaters in the network, or not.	Read-Write	INTEGER		
fwtPlusModemRxSubnetID	A numerical ID that radios use to decide which subnet they are allowed to link to.	Read-Write	Gauge32		
fwtPlusModemTxSubnetID	A numerical ID that radios use to decide which subnet they will transmit on.	Read-Write	Gauge32		

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FreeWave Technologies-MIB				
Object	Description	Access	Syntax	
fwtPlusModemReboot	Set to 1 to reboot radio.	Read-Write	INTEGER	
	This will force any changes to take effect.			
fwtPlusModemMaxSlaveRetry	The maximum number of times an Endpoint can attempt to deliver data to the Gateway before it discards the data.	Read-Write	Gauge32	
fwtPlusModemSystemName	A textual identifier for a given system.	Read-Write	DisplayString	
fwtPlusModemControlFreqZoneTable	This table describes the available frequency zones for a radio modem and allows them to be selectively enabled and disabled.	Not Accessible		
fwtPlusModemControlFreqZoneTableEntry	A row describing a specific frequency zone and whether it is enabled or disabled.	Not Accessible		
fwtPlusModemFreqZoneIndex	An index used to identify a specific frequency zone for a specific radio modem.	Not Accessible	Gauge32	
fwtPlusModemFreqZoneDescr	A textual description of a specific frequency zone for a specific radio modem.	Read-only	DisplayString	
fwtPlusModemFreqZoneEnabled	If the value of this object is true(1) then the referenced frequency zone is enabled for the relevant radio modem. If the value of this object is false(2), then the frequency zone is disabled.	Read-Write	TruthValue	
fwtZumLinkSerialNumber	Serial Number	Read-only	Unsigned32	
fwtZumLinkModelCode	Model Code	Read-only	Unsigned32	
fwtZumLinkRadioModel	Radio model	Read-only	DisplayString	
fwtZumLinkRadioModelCode	Radio Model Code	Read-only	Unsigned32	
fwtZumLinkRadioFirmwareVersion	Radio Firmware Version	Read-only	DisplayString	
fwtZumLinkRadioSerialNumber	Radio Serial Number	Read-only	DisplayString	

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FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkDeviceName	Device Name	Read-only	DisplayString
fwtZumLinkDeviceModel	Device Model	Read-only	DisplayString
fwtZumLinkDeviceConfiguration	Device Configuration	Read-only	DisplayString
fwtZumLinkDeviceFirmwareVersion	Device Firmware Version	Read-only	DisplayString
fwtZumLinkDeviceId	Device Identifier	Read-only	Unsigned32
fwtZumLinkLayoutHash	Unique Layout Identifier	Read-only	Unsigned32
fwtZumLinkResetInfo	Reset Information	Read-only	DisplayString
fwtZumLinkHopTableVersion	Radio Hop Table Version	Read-only	DisplayString
fwtZumLinkRteVersion	Runtime Environment Version	Read-only	DisplayString
fwtZumLinkRteTemplateVersion	Runtime Template Environment Version	Read-only	DisplayString
fwtZumLinkLicenses	License Information	Read-only	DisplayString
fwtZumLinkRadioMode	Radio Operational Mode	Read-Write	ZUMLINK_RADIO_ MODE_THOR
fwtZumLinkRfDataRate	RF Link Data Rate	Read-Write	ZUMLINK_RF_ DATA_RATES
fwtZumLinkRadioMaxRepeaters	Max Repeater slots in the Network	Read-Write	Unsigned32
fwtZumLinkRadioRepeaterSlot	Repeater Slot	Read-Write	Unsigned32
fwtZumLinkTxPower	Transmit Power	Read-Write	ZUMLINK_RADIO_ TX_POWER
fwtZumLinkNetworkId	Network Identifier	Read-Write	Unsigned32
fwtZumLinkNodeId	Node ID	Read-Write	Unsigned32
fwtZumLinkFrequencyKey	Frequency Key	Read-Write	ZUMLINK_ FREQUENCYKEYS
fwtZumLinkRadioFrequency	Operating Center Frequency in MHz	Read-Write	Float32TC

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FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkRadioHoppingMode	Radio Hopping Mode	Read-Write	ZUMLINK_RADIO_ HOPPING_MODE
fwtZumLinkBeaconInterval	Beacon Interval	Read-Write	ZUMLINK_ BEACON_ INTERVALS
fwtZumLinkBeaconBurstCount	The number of beacons to send per beacon time.	Read-Write	Unsigned32
fwtZumLinkLnaBypass	LNA Bypass	Read-Write	Unsigned32
fwtZumLinkMaxLinkDistanceInMiles	The max link distance in miles	Read-Write	Unsigned32
fwtZumLinkFrequencyMasks	Frequency Masks	Read-Write	DisplayString
fwtZumLinkFrequencyMasksErrors	Frequency Masks Error	Read-only	DisplayString
fwtZumLinkEncryptionMode	Encryption mode	Read-Write	ZUMLINK_ ENCRYPTION_ MODE
fwtZumLinkActiveKey	The active selected key.	Read-Write	ZUMLINK_ ENCRYPTION_ KEYS
fwtZumLinkSetKeySelect	Selection of the next encryption key to be modified.	Read-Write	ZUMLINK_ ENCRYPTION_ KEYS
fwtZumLinkSetKeyValue	Set the value of the selected key.	Read-Write	DisplayString
fwtZumLinkCompressionEnabled	If compression is enabled out going packets will be sent compressed if the compressed packet is smaller.	Read-Write	TruthValue
fwtZumLinkOtaMaxFragmentSize	OTA Max Fragment Size	Read-Write	Unsigned32
fwtZumLinkFecRate	Sets the FEC (Forward Error Correction) rate.	Read-Write	ZUMLINK_FEC_ RATES

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FreeWave Technologies-MIB				
Object	Description	Access	Syntax	
fwtZumLinkAggregateEnabled	Enables the aggregation of smaller packets to enhance throughput.	Read-Write	TruthValue	
fwtZumLinkRouteMinSignalMarginThresh	The radio route minimum signal level threshold in dB.	Read-Write	INTEGER	
fwtZumLinkMacTableEntryAgeTimeout	The number of seconds before an inactive entry in the MAC Table ages out and becomes expired.	Read-Write	INTEGER	
fwtZumLinkSignalLevel	Signal Level	Read-only	INTEGER	
fwtZumLinkSignalMargin	Signal Margin	Read-only	INTEGER	
fwtZumLinkTimestamp	Diagnostics Time Stamp	Read-only	Unsigned32	
fwtZumLinkRadioTx	Radio Tx Data Packets	Read-only	Unsigned32	
fwtZumLinkRadioRx	Radio Rx Data Packets	Read-only	Unsigned32	
fwtZumLinkRadioReliableTx		Read-only	Unsigned32	
fwtZumLinkRadioReliableRx		Read-only	Unsigned32	
fwtZumLinkRadioRexmit		Read-only	Unsigned32	
fwtZumLinkRadioAckTx		Read-only	Unsigned32	
fwtZumLinkRadioNoAckTx		Read-only	Unsigned32	
fwtZumLinkRadioTimedOut		Read-only	Unsigned32	
fwtZumLinkRadioBadAckRx	Radio Bad ACK Received	Read-only	Unsigned32	
fwtZumLinkRadioTooLong		Read-only	Unsigned32	
fwtZumLinkRadioTooShort		Read-only	Unsigned32	
fwtZumLinkRadioBadSync	Radio Bad Synchronization	Read-only	Unsigned32	
fwtZumLinkRadioBadCRC	Radio Bad CRC on RX packets.	Read-only	Unsigned32	
fwtZumLinkRadioContentionDrop	Radio Contention Drop	Read-only	Unsigned32	
fwtZumLinkRadioSendingDrop		Read-only	Unsigned32	

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FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkRadioLLTx	Radio Low Level Transmit	Read-only	Unsigned32
fwtZumLinkRadioLLRx	Radio Low Level Receive	Read-only	Unsigned32
fwtZumLinkCntSTX		Read-only	Unsigned32
fwtZumLinkCntETX		Read-only	Unsigned32
fwtZumLinkCntBadSync		Read-only	Unsigned32
fwtZumLinkCntBadBCC		Read-only	Unsigned32
fwtZumLinkInterfaceDataTx		Read-only	Unsigned32
fwtZumLinkInterfaceDataRx		Read-only	Unsigned32
fwtZumLinkInterfaceBytesTx		Read-only	Unsigned32
fwtZumLinkInterfaceBytesRx		Read-only	Unsigned32
fwtZumLinkResetsDetected		Read-only	Unsigned32
fwtZumLinkResetsSent		Read-only	Unsigned32
fwtZumLinkResetStats	Reset Statistics	Read-Write	ZUMLINK_NOW_ OPTION
fwtZumLinkMonitoredNode	Monitor Node	Read-Write	Unsigned32
fwtZumLinkChannelDiagsTable	Show Channel Diagnostics	Not Accessible	
fwtZumLinkChannelDiagsEntry	A row containing diagnostics for a channel.	Not Accessible	
fwtZumLinkChannelDiagsIdx	Index to a set of diagnostics for a channel	Not Accessible	Unsigned32
fwtZumLinkChannelDiagsFreq	Channel Diagnostics Frequency	Read-only	Float32TC
fwtZumLinkChannelDiagsRSSI	Channel Diagnostics RSSI	Read-only	INTEGER
fwtZumLinkChannelDiagsMargin	Channel Diagnostics Margin	Read-only	INTEGER
fwtZumLinkChannelDiagsNodeId	Channel Diagnostics Node ID	Read-only	Unsigned32
fwtZumLinkNodeDiagsTable	Show Monitored Node Diagnostics	Not Accessible	
fwtZumLinkNodeDiagsEntry	A row containg diagnostics for a node.	Not Accessible	

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FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkNodeDiagsNodeId	Node Diagnostics Node ID	Read-only	Unsigned32
fwtZumLinkNodeDiagsFreq	Node Diagnostics Frequency	Read-only	Float32TC
fwtZumLinkNodeDiagsRSSI	Node Diagnostics RSSI	Read-only	INTEGER
fwtZumLinkNodeDiagsMargin	Node Diagnostics Margin	Read-only	INTEGER
fwtZumLinkMacTableClear	Clear the MAC to 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
fwtZumLinkReset		Read-Write	ZUMLINK_RESET_ OPTIONS
fwtZumLinkFactoryDefaults		Read-Write	ZUMLINK_FDR_ OPTIONS
fwtZumLinkSave		Read-Write	ZUMLINK_NOW_ OPTION
fwtZumLinkTimeOutCli	The number of seconds of idle before CLI connection will be closed.	Read-Write	Unsigned32
fwtZumLinkMac_address		Read-only	MacAddress
fwtZumLinkIp_address	IP address of unit when DHCP is disabled.	Read-Write	IpAddress
fwtZumLinkNetmask	Netmask of unit when DHCP is disabled.	Read-Write	IpAddress
fwtZumLinkGateway	Gateway of unit when DHCP is disabled.	Read-Write	IpAddress
fwtZumLinkStpEnabled	Spanning tree protocol is enabled or disabled.	Read-Write	TruthValue

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FreeWave Technologies-MIB				
Object	Description		Syntax	
fwtZumLinkTxqueuelen	Sets the Ethernet transmit packet queue length.	Read-Write	Unsigned32	
fwtZumLinkMtu	Sets the MTU frame size for the unit.	Read-Write	Unsigned32	
fwtZumLinkNetmaskFilterEnabled	Enable or disable bridge firewall.	Read-Write	TruthValue	
fwtZumLinkNameserver_address1	DNS for name-to-address resolution.	Read-Write	IpAddress	
fwtZumLinkNameserver_address2	DNS for name-to-address resolution.	Read-Write	IpAddress	
fwtZumLinkRx_bytes	Number bytes of Ethernet packets received from the radio network.	Read-only	Unsigned32	
fwtZumLinkRx_packets	Number of Ethernet packets received from the radio network.	Read-only	Unsigned32	
fwtZumLinkRx_dropped	Number of Ethernet packets received from the radio network that were dropped at the Ethernet interface. Read-only		Unsigned32	
fwtZumLinkRx_errors	Number of Ethernet packets received from the radio network that were had Ethernet errors.Read-only		Unsigned32	
fwtZumLinkTx_bytes	Number bytes of Ethernet packets received Read-only from the Ethernet port and sent over the radio network.		Unsigned32	
fwtZumLinkTx_packets	Number Ethernet packets received from theRead-onlyEthernet port and sent over the radio network.		Unsigned32	
fwtZumLinkTx_dropped	Number Ethernet packets received from the Read-only Ethernet port but dropped because the txqueue was full.		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	

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FreeWave Technologies-MIB				
Object	Description	Access	Syntax	
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	
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 Read-Write to skip this server.		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	

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FreeWave Technologies-MIB			
Object	Description	Access	Syntax
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
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

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FreeWave Technologies-MIB			
Object	Description	Access	Syntax
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
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

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FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkDcAppStartTime	The timestamp of when the main app restarted.	Read-only	DisplayString
fwtZumLinkTimeString	The current time.	Read-Write	DisplayString
fwtZumLinkFileTransferStatus	File Transfer Status	Read-only	DisplayString
fwtZumLinkV1Enabled	SNMP V1 Enable / Disable	Read-Write	TruthValue
fwtZumLinkV2cEnabled	SNMP V2C Enable / Disable	Read-Write	TruthValue
fwtZumLinkV3Enabled	SNMP V3 Enable / Disable	Read-Write	TruthValue
fwtZumLinkRoCommunityName	Read-Only Community Name	Read-Write	DisplayString
fwtZumLinkRwCommunityName	Read-Write Community String	Read-Write	DisplayString
fwtZumLinkEnablePtpInterface	Enable PTP interface	Read-Write	TruthValue
fwtZumLinkEnableEthernetLogin	Enable SSH logins	Read-Write	TruthValue
fwtZumLinkNeighborTableNumNeighbors	Number of Neighbors	Read-only	Unsigned32
fwtZumLinkNeighborTableNodeId	Device Node ID	Read-only	Unsigned32
fwtZumLinkNeighborTableNodeType	Node Type	Read-only	Unsigned32
fwtZumLinkNeighborTableIpAddress	Neighbor IP Address	Read-only	IpAddress
fwtZumLinkNeighborTableMacAddress	Neighbor MAC Address	Read-only	MacAddress
fwtZumLinkNeighborTableDeviceName	Device Name	Read-only	DisplayString
fwtZumLinkNeighborTableFWVersion	Device Node ID	Read-only	DisplayString
fwtZumLinkNeighborTableCounter	Neighbor Table Counter	Read-only	Unsigned32
fwtZumLinkNeighborTable	This table gives detailed status information for each neighbor of this node.	Not Accessible	
fwtZumLinkNeighborEntry	A row containing status information for a specific neighbor.	Not Accessible	
fwtZumLinkNeighborNodeId	Neighbor Node ID	Read-only	Unsigned32
fwtZumLinkNeighborIpAddress	Neighbor IP Address	Read-only	IpAddress

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FreeWave Technologies-MIB			
Object	Description	Access	Syntax
fwtZumLinkNeighborMacAddress	Neighbor MAC Address	Read-only	MacAddress
fwtZumLinkNeighborNodeType	Neighbor Node Type	Read-only	Unsigned32
fwtZumLinkNeighborRSSI	Neighbor RSSI	Read-only	INTEGER
fwtZumLinkNeighborLinkMargin	Neighbor Link Margin	Read-only	INTEGER
fwtZumLinkNeighborCounter	Neighbor Table Counter	Read-only	Unsigned32
fwtZumLinkNeighborTimestamp	Time When Node Info Received	Read-only	Unsigned32
fwtZumLinkNetworkTableDiscoveryState	Start or Stop Network Discovery	read-write	INTEGER
fwtZumLinkNetworkTableDiscoveryStatus	Get Discover Network Status	Read-only	DisplayString
fwtZumLinkNetworkTableNumNodes	Number of nodes in network	Read-only	Unsigned32
fwtZumLinkNetworkTableTimeStamp	Timestamp for when network table was last updated	Read-only	Unsigned32
fwtZumLinkNetworkTable	This table gives detailed status information for each neighbor of this node.	Not Accessible	
fwtZumLinkNetworkEntry	A row containing status information for a specific node.	Not Accessible	
fwtZumLinkNetworkNodeId	Device ID	Read-only	Unsigned32
fwtZumLinkNetworkNodeType	Node Type / Role	Read-only	Unsigned32
fwtZumLinkNetworkIpAddress	IP Address	Read-only	IpAddress
fwtZumLinkNetworkMacAddress	MAC Address	Read-only	MacAddress
fwtZumLinkNetworkDeviceName	Device Name	Read-only	DisplayString
fwtZumLinkNetworkFwVersion	Firmware Version	Read-only	DisplayString
fwtZumLinkNetworkHopCount	number of hops from node id	Read-only	Unsigned32
fwtZumLinkNetworkNeighborTable	Neighbor Nodes	Not Accessible	
fwtZumLinkNetworkNeighborEntry	A row containing status information for a specific neighbor node.	Not Accessible	

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FreeWave Technologies-MIB				
Object	Description	Access	Syntax	
fwtZumLinkNetworkNeighborNodeId	Neighbor Node ID	Read-only	Unsigned32	
fwtZumLinkNetworkNeighborRSSI	RSSI From Neighbor Node	Read-only	INTEGER	
fwtZumLinkNetworkPathTable	List of nodes in path from current node where info is gathered to current node	Not Accessible		
fwtZumLinkNetworkPathEntry	A row containing status information for a node in the path.	Not Accessible		
fwtZumLinkNetworkPathIdx	Index to a node in the path	Not Accessible	Unsigned32	
fwtZumLinkNetworkPathNodeId	Node In Path From Current Node	Read-only	Unsigned32	
fwtZumLinkNetworkPathRSSITable	RSSI values between all the nodes along the path	Not Accessible		
fwtZumLinkNetworkPathRSSIEntry	A row containing RSSI for a node along the path.	Not Accessible		
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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40.5. SNMP Write Access

- 1. Verify v2cEnabled (on page 302) is enabled.
- 2. Make a note of the rwCommunityName (on page 299).

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)
```

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Tip

```
~$ snmpget -mFREEWAVE-TECHNOLOGIES-MIB -Pu -v2c -c private 192.168.2.10
fwtZumLinkRadioMode.0
FREEWAVE-TECHNOLOGIES-MIB::fwtZumLinkRadioMode.0 = INTEGER: gateway(0)
~$ snmpset -mFREEWAVE-TECHNOLOGIES-MIB -Pu -v2c -c private 192.168.2.10
fwtZumLinkRadioMode.0 i endpoint
FREEWAVE-TECHNOLOGIES-MIB::fwtZumLinkRadioMode.0 = INTEGER: endpoint(1)
~$ snmpget -mFREEWAVE-TECHNOLOGIES-MIB -Pu -v2c -c private 192.168.2.10
fwtZumLinkRadioMode.0
FREEWAVE-TECHNOLOGIES-MIB::fwtZumLinkRadioMode.0 = INTEGER: endpoint(1)
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 may change at any time without notice. For the most up-to-date specifications information, see the product's data sheet available at <u>www.freewave.com</u>.

Technical Specifications	Technical Specifications		
Specification	Description		
Transmitter			
Frequency Range	• 902 to 928MHz		
	Australia: 915-928 MHz		
Output Power	• 10mW to 1W		
	User selectable		
Range	97 km (60 miles), clear line of sight		
Channel Spacing	 230.4 kHz 345.6 kHz 	 1382.4 kHz 3225.6 kHz 	
RF Data Rate	 691.2 kHz User selectable 115.2 kbps 250 kbps 500 kbps 	• 1 Mbps • 4 Mbps	
Receiver			
IF Selectivity	> 40 dB		
System Gain	136 dB		

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Specification	Description		
Sensitivity	RF Data Rate	Without FEC	With FEC
	115.2 kbps	-105 dBm	-108 dBm
	250 kbps	-102 dBm	-105 dBm
	500 kbps	-99 dBm	-102 dBm
	1 Mbps	-95 dBm	-98 dBm
	1.5 Mbps (Beta)	-90 dBm	-93 dBm
	4 Mbps	-83 dBm	-86 dBm
Data Transmission			l
Туре	Frequency Hopping Sp	read Spectrum	
Modulation	2 level GFSK		
	• 4- and 8-ary FSK		
Link Throughput	Maximum of 1.6 Mb	ps	
	4 Mbps with Compression	ession	
Error Detection	• 16-bit CRC, FEC, a	nd ARQ	
	Retransmit on error		
Hopping Rates	User selectable	User selectable	
	• 25ms		
	• 50ms	• 200ms	
	• 100ms	• 400ms	
Hopping Channels	Maximum of 110 ch	annels	
	Dependent on the rf	DataRate (on page 282) s	etting
	User selectable		
	Note: See the Austra (on page 403) for add	alia Hop Set - ZumLink 90 litional information.	0MHz Channels
Hopping Patterns	Maximum of 16 patt	erns	
		DataRate (on page 282) s	etting
	User selectable		
Protocol	Adaptive Spectrum Lea		
User Interface Rate	Ethernet Rate: 10/1	•	
	Serial Rate: Maximu	•	
Data Encryption	128-bit and 256-bit AES		
VLAN	Layer 2, pass tagged ar	nd double-tagged packets	

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Technical Specifications		
Specification	Description	
Advanced Features	Forward Error Correction	
	Packet Aggregation	
	Packet Compression	
	User selectable	
Programmability		
CPU	ARM Coretex-A8 1 GHz	
RAM	512 MB	
Storage	1 GB	
OS	Debian (Linux Kernal 3.14.1)	
Power Requirements		
Operating Voltage	+6 to +30 VDC (+/- 10%)	
Idle Current	130 mA at 12 VDC	
Receive Current	145 mA at 12 VDC	
Transmit Current	355 mA at 12 VDC	
Interfaces		
Data Connector	Three RJ-45	
	1 Ethernet	
	• 2 Serial	
USB Connector	Micro USB	
RF Connector	• Z9-P : SMA	
	• Z9-PE : TNC	
Power Connectors	• Z9-P : Phoenix Contact (# 1776692)	
	• Z9-PE : Switchcraft (#17282-2PG-300)	

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Technical Specifications		
Specification	Description	
General Information		
Operating Temperature	 Z9-P -40°C to +85°C -40°F to +185°F Caution: This is the Z9-P temperature as defined for the exposed copper heat sink surface of the ZumLink radio PCB shown in the Z9-P: Exposed Copper Heat Sink (on page 434), Figure 273. See Mechanical Drawing - Z9-P (on page 394). Z9-PE -40°C to +75°C -40°F to +167°F Note: This is the Z9-PE temperature as defined for the local ambient air in contact with the product enclosure and assumes no solar radiation. 	
Humidity	0 to 95% non-condensing	
Dimensions	 Z9-P 177.29 L x 83.06 W x 40.89 H (mm) 7.0 L x 3.3 W x 1.6 H (in) Z9-PE 191.04 L x 109.47 W x 41.91 H (mm) 7.52 L x 4.31 W x 1.65 H (in) 	
Weight	Z9-P • 172g • 0.38 lbs Z9-PE • 750g • 1.7 lbs	
Reliability	91,328 hour MTBF	

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Z9-P: Exposed Copper Heat Sink

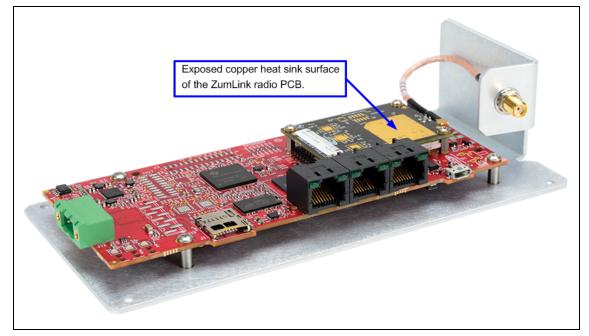


Figure 273: Exposed copper heat sink surface of the ZumLink Z9-P radio PCB.

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Appendix B: LEDs

These are the LEDs for the Z9-P / Z9-PE / Z9-PE-GREY.

Note: See Z9-P Port Connections (on page 21) and Z9-PE Port Connections (on page 21) for additional information.

Normal Operation

LEDs - Normal Operation				
CD	ТХ	RX	Condition	Notes
Solid Red			Not Linked	While operating with Frequency Hopping enabled, this LED indicates the radio has NOT received the beacon within the last 60 seconds.
Solid Green <			Radio linked	The radio is linked with a margin of 20dB or greater above sensitivity or noise level, whichever is highest.
Solid Green or Alternate Solid Green / Solid Red		Solid Green	Receiving Data	The radio is actively receiving data over the wireless RF link.
Solid Green or Alternate Solid Green / Solid Red	Solid Green		Transmitting Data	The radio is actively transmitting data over the wireless RF link.

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LEDs - Normal Operation				
CD	ТХ	RX	Condition	Notes
Alternate Solid Green / Solid Red 		Solid Green	Receiving Data	 There are 4 blink rates for levels 15dB, 10dB, 5dB, and 0dB above sensitivity or noise level, whichever is highest.
				 The blink rates are faster as the levels increase from the sensitivity / noise point.
				 The RSSI level is based on the last packet received.
				 The pattern continues for 60 seconds after the last received packet before turning back to Red if the link has dropped.
Solid Amber (Yellow)	Blinking Red	Blinking Red	Upgrading firmware or changing the configuration.	TX and RX blink in unison at a slow rate.
Blinking Green 🖯	Off	Off	Upgrade or update succeeded.	
5 Times				
Blinking Red ⊖ 5 Times	Off	Off	Upgrade or update failed.	

COM LEDs

Note: During boot, the COM LEDs will cycle indicating startup.

LEDs - COM			
LED	LED Color	Description	
COM1 Left	Blinking Green 🖯	Transmitting data on COM1.	
COM1 Right	Blinking Green 🖯	Receiving data on COM1.	
COM2 Left	Blinking Green 🖯	Transmitting data on COM2.	
COM2 Right	Blinking Green 😑	Receiving data on COM2.	

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Ethernet LEDs

LEDs - Ethernet			
LED	LED Color	Description	
Ethernet Left	Solid Green 💻	Shows Power.	
		LED is lit while power is applied to the Ethernet module.	
Ethernet Right	Solid Green 💻	Shows Ethernet link but no activity.	
Ethernet Right	Blinking Green 🖯	Shows Activity.	
	-	LED will blink / flicker while sending and receiving data on the Ethernet port.	

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Appendix C: Z9-P / Z9-PE / Z9-PE-GREY Files and Descriptions

When the Windows® Explorer window of the Z9-P / Z9-PE / Z9-PE-GREY is opened, there are default files that appear.

This is a list of those files and descriptions of their purpose.

Note: If the Z9-P / Z9-PE / Z9-PE-GREY has been upgraded or rebooted, other files may appear.

File Edit View Tools Help)					
Organize 🔻						· ·
4 📵 ZumLink	*	Name	Туре	Size	Date Picture Taken	Dimension
4026675399		boot results.txt	Text Document	1 KB	1/1/2000 1:00 AM	
		config.txt	Text Document	2 KB	1/1/2000 1:00 AM	
		fw_upgrade_result.txt	Text Document	1 KB	1/1/2000 5:34 AM	
		help.txt	Text Document	31 KB	1/1/2000 4:06 AM	
		layout.txt	Text Document	20 KB	1/1/2000 1:00 AM	
		result.txt	Text Document	1 KB	1/16/2000 3:25 AM	
	E	sys_info.txt	Text Document	1 KB	1/1/2000 1:00 AM	
		(п	1		

Figure 274: Z9-P / Z9-PE / Z9-PE-GREY Files shown in Windows® Explorer

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Appendix C: Z9-P / Z9-PE / Z9-PE-GREY Files and Descriptions

<u>User & Reference Manual</u>

Files and Descriptions - Z9-P / Z9-PE / Z9-PE-GREY			
File Name	Description		
boot_results.txt	The boot_results.txt file shows the firmware version the device is currently running.		
config.txt	The config.txt file contains all of the configuration parameters of the Z9-P / Z9-PE / Z9-PE-GREY.		
	These parameters determine how the device functions and connects to other devices in the network.		
fw_upgrade_ result.txt	The fw_upgrade_result.txt file shows the status of the upgrade procedure for the device firmware.		
	Note : This file appears after the ZumLink has been upgraded to a newer version of firmware.		
help.txt	The help.txt file contains online user assistance information using the CLI commands.		
	Example : In a CLI window, enter help=txPower or help txpower to see the help information for the radioSetting.txpower setting.		
layout.txt	The layout.txt file is used for management applications to provide the CLI and config.cfg with a format description of the commands.		
modbuslayout.txt	Note: The modbuslayout.txt file is not used.		
result.txt	The result.txt is used to verify the acceptance or rejection of each parameter change applied to the config.txt file.		
	Note : This file appears after the config.txt file of the ZumLink has been changed.		
sys_info.txt	The sys_info.txt file provides information about the radio including serial number, model number, firmware versions, and device name.		

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Appendix D: FreeWave Legal Information

Export Notification

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FreeWave products are designed and manufactured in the United States of America.

FCC Notifications

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1) This device may not cause harmful interference and 2) this device must accept any interference received, including interference that may cause undesired operation.

The content of this guide covers FreeWave Technologies, Inc. models sold under FCC ID: 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.

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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-P or Z9-PE or Z9-PE-GREY covered in this document has a maximum transmitted output power of +30dBm.

The antennas used MUST provide a separation distance of at least 52 cm from all persons and MUST NOT be co-located or operate in conjunction with any other antenna or transmitter.

IC Notifications

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Ce dispositif est conforme aux normes permis-exemptes du Canada RSS d'industrie. L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence, et (2) ce dispositif doit accepter n'importe quelle interférence, y compris l'interférence qui peut causer le fonctionnement peu désiré du dispositif.

The content of this documentation covers FreeWave Technologies, Inc. models sold under IC: 2329B-PMT0101AB.

IC Host Installation and Label

When any FreeWave Technologies, Inc. module is placed inside a Host, a label must be placed on the outside of the Host. The label must include the text "**Contains IC: 2329B-PMT0101AB**".

IC Radiation Exposure Statement

This system has been evaluated for RF Exposure per RSS-102 and is in compliance with the limits specified by Health Canada Safety Code 6. The system must be installed at a minimum separation distance from the antenna to a general bystander of 7.8 inches (20 cm) to maintain compliance with the General Population limits.

L'exposition aux radiofréquences de ce système a été évaluée selon la norme RSS-102 et est jugée conforme aux limites établies par le Code de sécurité 6 de Santé Canada. Le système doit être installé à une distance minimale de 7.8 pouces (20 cm) séparant l'antenne d'une personne présente en conformité avec les limites permises d'exposition du grand public.

Argentina CNC

Identificación CNC

• Z9-P / Z9-PE: Contiene CNC ID: C-21612

Brazil

ADENDO AO MANUAL

Z9-PE; Z9-P; Z9-PC; Z9-PC-SR001

Atendimento à Regulamentação Anatel

Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

Este produto está homologado pela ANATEL, de acordo com os procedimentos regulamentados pela Resolução 242/2000, e atende aos requisitos técnicos aplicados.

Para maiores informações, consulte o site da ANATEL www.anatel.gov.br



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Mexico IFETEL

Z9-P Número IFETEL: RCPFRZ917-1310-A4.

Z9-PE Número IFETEL: RCPFRZ917-1310.

La operación de este equipo está sujeta a las siguientes dos condiciones: (1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

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GNU License Notification

Some of the software in the firmware is licensed under the GNU General Public License and other Open Source and Free Software licenses. Contact FreeWave to obtain the corresponding source on CD.

UL Power Source

Input power shall be derived from a certified, Class 2:

- single power source or
- a limited power source (LPS) in accordance with:
 - IEC/EN 60950-1
 - CAN/CSA C22.2 No. 60950-1-07.
- Input voltage for the Z9-P / Z9-PE / Z9-PE-GREY is +6 to +30 VDC (+/- 10%).

Z9-P Only



Z9-PE Only

When installed in a Restricted Access Location, Max ambient of +75C operating temperature is declared.

When installed in a non-Restricted Access Location, Max ambient of +69C operating temperature is declared.

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Caution, Hot Surface

Note: This applies to equipment located in the Restricted Access Location where surface temperatures may reach +75C.



Standards and Editions

- HazLoc Standards
 - ANSI/ISA 12.12.01-2013
 - ANSI/ISA-12.12.01-2015
 - CAN/CSA C22.2 No. 213-15
 - Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Division 1 and 2
 Hazardous (Classified) Locations
- Ordinary Location Standards
 - UL 60950, 2nd Edition
 - CAN/CSA-C22.2 No. 60950, 2nd Edition
 - IEC 60950, 2nd Edition
 - EN 60950, 2nd Edition
- Essential Health and Safety Requirements related to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to Directive 2014/34/EU of the European Parliament and the Council. Compliance with:
 - EN 60079-0:2012 + A11:2013
 - EN 60079-15:2010
 - DEMKO 16 ATEX 1705X Rev 0
 - 😢 II3G Ex nA IIC T6 Gc

Schedule of Limitations

- Antenna connection is internal wiring only.
- The Ex Components shall only be used in an area of not more than pollution degree 2, as defined in IEC/EN60664-1.
- The Ex Components shall be installed in an enclosure with tool removable door or cover that provides a degree of protection not less than IP 54 in accordance with IEC/EN60679-15.
- Transient protection shall be provided that is set at a level not exceeding 140% of the peak rated voltage value at the supply terminals to the equipment.
- All connectors (J1 to J4) do not have mating connectors with the devices.
- The securement of these connectors must be evaluated during end-product investigation.

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• Z9-PE Only

- Temperature test was conducted at a rated supply voltage and the maximum surface temperature of +61°C was recorded at +60°C ambient temperature.
- All input power supply wires should be at least 20AWG wires.
- A dedicated and stable power supply line is preferred. The power supply used MUST provide more current than the amount of current drain listed in the specifications for the product and voltage.

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