

## Future-Ready Industrial Ethernet Radio

FreeWave's ZumLink™ 900 Series is made for secure collection, transport, and control of data in rugged industrial environments, providing a long-range, low-power solution for remote wireless communications—with capabilities that can be seamlessly added as IIoT requirements evolve.

The ZumLink Z9-PE and Z9-P operate in the unlicensed 900 MHz spectrum and utilize Frequency Hopping Spread Spectrum (FHSS) technology for cybersecure data transfer with RF link rates up to 4 Mbps. Performance is further enhanced by FreeWave's Network Accelerators, which utilize techniques such as packet compression, packet aggregation, forward error correction, and Adaptive Spectrum Learning to maximize network throughput, efficiency, and reliability.

ZumLink radios are ideal in field area networks, systems, and devices such as those used by oil and gas, precision agriculture, water / wastewater, smart cities, and utilities, and deliver advanced features to maximize performance of virtually any M2M, SCADA, or IIoT application used today or in future operations.

**In fact, the ZumLink 900 Series is software upgradable to include FreeWave's IQ Application Environment, a Linux-based operating system for developing and deploying third-party applications.**

### Key Features

**Operates in the Unlicensed 900 MHz Spectrum:**  
Cost-effective, easy to deploy

**High Speed Data Rates:** Five RF link rates supporting from 80 kbps to 4 Mbps

**Long Range:** Up to 97 km (60 miles) with clear line of sight

**Safe for Hazardous Locations:** Class I, Division 2 certified to board level

**Leverages FreeWave's Network Accelerators:**  
to maximize network efficiency

- **Packet Compression:** Minimizes packet transmission
- **Packet Aggregation:** Increases throughput
- **Forward Error Correction:** Improves network reliability
- **Adaptive Spectrum Learning:** Reduces the impact of interferences

**Low Current Consumptions:** 358 mA @ 12 V in transmit; 146 mA @ 12 V in receive

**Secure:** SSH, SNMP, 128- and 256-bit AES counter mode encryption

**Reliable Communication:** CRC, ARQ, FEC

**Upgradable with the IQ Application Environment:**  
Linux-based operating system and storage for applications built in any Linux-compatible language

## Transmitter

<b>Frequency Range*</b>	902 to 928 MHz
<b>Output Power*</b>	10 mW to 1 W; user selectable
<b>Range</b>	97 km (60 miles) with clear line of sight
<b>Channel Spacing</b>	230.4, 345.6, 691.2, 1382.4, 1612.8 (Beta) and 3225.6 kHz
<b>RF Data Rate</b>	115.2, 250, 500 kbps, 1, 1.5 (Beta), & 4 Mbps; user selectable

## Receiver

<b>IF Selectivity</b>	> 40 dB		
<b>System Gain</b>	135 dB		
<b>Sensitivity</b>	<b>RF Data Rates</b>	<b>Without FEC</b>	<b>With FEC</b>
	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

<b>Type</b>	Frequency Hopping Spread Spectrum
<b>Modulation</b>	2 level GFSK 4- and 8-ary FSK
<b>Link Throughput</b>	Up to 1.6 Mbps; 4 Mbps with Compression
<b>Error Detection</b>	ARQ and CRC, retransmit on error, FEC
<b>Hopping Rates</b>	400, 200, 100, 50, 25 ms
<b>Hopping Channels*</b>	Up to 110; RF Data Rate Dependent
<b>Hopping Patterns</b>	Up to 16; RF Data Rate Dependent
<b>Protocol</b>	Adaptive Spectrum Learning (ASL)
<b>User Interface Rates</b>	Ethernet Rate: 10/100 Mbps Serial Rate: up to 250 kbps
<b>Data Encryption</b>	128-bit and 256-bit AES CCM
<b>Advanced Features</b>	Packet Compression and Aggregation

## Computing Resources (OPTIONAL UPGRADE)\*\*

<b>CPU</b>	ARM Cortex-A8 1 GHz
<b>CPU</b>	512 MB
<b>Storage</b>	1 GB
<b>OS</b>	Debian-based Linux

## Management

<b>Management</b>	HTTP, SSH SNMPv1/v2c/v3, MIB-II, Enterprise MIB, Modbus
-------------------	--

## Networking

<b>VLAN</b>	802.1Q
<b>Serial</b>	TCP server, Modbus/TCP, Modbus RTU, TCP client
<b>Traffic Filtering</b>	Netmask filter, ARP filter



## Interfaces

<b>Data Connectors</b>	Three RJ-45 (1 Ethernet, 2 Serial)
<b>USB Connector</b>	Micro USB
<b>RF Connector</b>	<b>Z9-P:</b> SMA <b>Z9-PE:</b> TNC
<b>Power Connectors</b>	<b>Z9-P:</b> Phoenix Contact (#1776692) <b>Z9-PE:</b> Switchcraft (#17282-2PG-300)

## Power Requirements

<b>Operating Voltage</b>	+6 to +30 VDC			
<b>Current Consumption</b>	<b>Voltage</b>	<b>Transmit</b>	<b>Receive</b>	<b>Idle</b>
	12 VDC	358 mA	146 mA	118 mA

## General Information

<b>Operating Temperature</b>	<b>Z9-P:</b> -40°C to +85°C (-40°F to +185°F) <b>Z9-PE:</b> -40°C to +75°C (-40°F to +167°F)
<b>Humidity</b>	0 to 95% non-condensing
<b>Dimensions</b>	<b>Z9-P:</b> 177.29 L x 83.06 W x 40.89 H (mm) 7.0 L x 3.3 W x 1.6 H (in) <b>Z9-PE:</b> 191.00 L x 109.47 W x 41.91 H (mm) 7.52 L x 4.31 W x 1.65 H (in)
<b>Weight</b>	<b>Z9-P:</b> 172.37 g (0.38 lbs) <b>Z9-PE:</b> 750 g (1.7 lbs)
<b>Reliability</b>	MTBF 206,186
<b>Safety</b>	Class I, Division 2, Groups A-D
<b>UL</b>	<b>Z9-P:</b>  <b>Z9-PE:</b> 

## Information to Order

<b>Model Number</b>	
<b>Z9-P</b>	Board Level Unit, 902 to 928 MHz
<b>Z9-PE</b>	Enclosed Unit, 902 to 928 MHz
<b>Z9-PE-GREY</b>	Grey Enclosed Unit, 902 to 928 MHz
<b>Z9-PE-DEVKIT</b>	Includes 2 Z9-PE units and accessories

\*Country-specific models and information are available. Contact FreeWave Sales for information.

\*\*Requires licensing. Contact FreeWave Sales for information.