



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

Receiver			
IF Selectivity	> 40 dB		
System Gain	135 dB		
Sensitivity	RF Data Rates	Without FEC	With FEC
	115.2 kbps	-105 dBm	-108 dBm
	250 kbps	-102 dBm	-105 dBm
	500 kbps	-99 dBm	-102 dBm
	1 Mbps	-95 dBm	-98 dBm
	1.5 Mbps (Beta)	-90 dBm	-93 dBm
	4 Mbps	-83 dBm	-86 dBm

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

Computing Resources (OPTIONAL UPGRADE)**	
CPU	ARM Cortex-A8 1 GHz
CPU	512 MB
Storage	1 GB
OS	Debian-based Linux

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



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

Interfaces	
Data Connectors	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)

Power Requirements				
Operating Voltage	+6 to +30 VDC			
Current Consumption	Voltage	Transmit	Receive	Idle
	12 VDC	358 mA	146 mA	118 mA

General Information	
Operating Temperature	Z9-P: -40°C to +85°C (-40°F to +185°F) Z9-PE: -40°C to +75°C (-40°F to +167°F)
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: 191.00 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: 172.37 g (0.38 lbs) Z9-PE: 750 g (1.7 lbs)
Reliability	MTBF 206,186
Safety	Class I, Division 2, Groups A-D
UL	Z9-P:  Z9-PE:

Information to Order	
Model Number	
Z9-P	Board Level Unit, 902 to 928 MHz
Z9-PE	Enclosed Unit, 902 to 928 MHz
Z9-PE-GREY	Grey Enclosed Unit, 902 to 928 MHz
Z9-PE-DEVKIT	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.