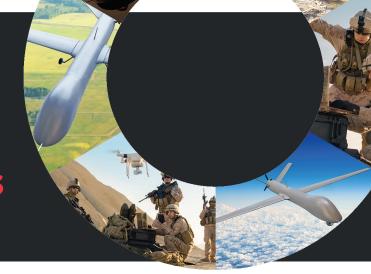


Government and Defense Applications

Use Cases at a Glance



FreeWave Vision

To enable a world where implementing the Internet of Things (IoT) is effortless through universal wireless access to data from any Machine to Machine (M2M) device from any location.

Application	Use Case Description	Generally-Used Frequencies	Specific Products
Unmanned Air Vehicles (UAV)	 Command & Control Intelligence Surveillance and Reconnaissance 	900 MHz, 2.4 GHz, 1.3 GHz	 GXM Series MM2-M13 Series ZumLink™ 900 Series MM2 Series
Unmanned Ground Vehicles (UGV)	 Robotics Weapon and IED Detection	900 MHz, 1.3 GHz	ZumLink 900 SeriesMM2-M13 Series
Unattended Ground Sensors (UGS)	 Real-Time Remote Monitoring Physical and Perimeter Security Border Security QumLink 900 Ser GXM Series 		ZumLink 900 SeriesGXM Series
Unmanned Underwater Vehicles (UUV)			MM2 SeriesGXM Series
Training	Soldier TrainingInfantrySmall Unit Tactics	900 MHz, 1.3 GHz	MM2-9X5WMM2-13X5W
Targeting / Range	• Small Arms Ranges	900 MHz, 1.3 GHz	MM2 SeriesMM2-M13 Series
Guided Parachutes	• Guided Cargo/Pallet Drops	900 MHz, 1.3 GHz	MM2 SeriesMM2-M13 Series
Navy Surface Targets	Aircraft GunneryShip to Shore	900 MHz	MM2-9X5WMM2 SeriesMM2-13X5WZumLink 900 Series
Base Infrastructure	 Electric Power Smart Grid Control Infrastructure Processes	900 MHz	 MM2 Series ZumLink 900 Series

Frequency	Serial Interface	Ethernet Interface	Security & Notes
900 MHz	Х	х	Small Form Factor, Wideband, Optional AES and TDMA, 5 Watt Amplified
1.3 GHz	Х	х	Small Form Factor, Wideband, FIPS 140-2, Optional AES and TDMA, 5 Watt Amplified
2.4 GHz	х		Various Form Factors, Wideband, Optional AES and TDMA, FIPS 140-2

Additional Benefits

- American-made in Boulder, CO
- 25 years of experience
- 1+ million radios shipped
- Line of sight up to 210 km
- ISO 9001:2015 certified
- 2+ million hours of combat flight time on UAS programs of record
- Cost, Size, Weight, and Power (CSWaP) advantages vs. traditional DoD radio suppliers



Commercial and Enterprise Applications

Use Cases at a Glance



Primary Application	How FreeWave Is Used	
Oil & Gas	 Supervisory Control and Data Acquisition (SCADA) Sensor communication (C1D1, C1D2) Plunger lift Tank levels and water meters Pumps, valves, and flow lines Auto Vehicle Location (AVL) 	 Flare stacks Dehydrator temperature Separator pressure Emergency Shut Down (ESD) Cathodic protection Network resiliency (mesh to re-route, cell for backup)
Water/Wastewater	 Storage tank levels Master meters – turbines, magnetic flow Pumping stations Sewer lift stations 	 Treatment plants Chemical injection sites Specialty process control devices
Smart Grid & Solar	 Distribution Management (DMS) Distribution Automation (DA) Substation Automation (SSA) Load Management (LM) 	 Demand Response (DR) Energy Management (EMS) Supervisory Control and Data Acquisition (SCADA)
Environmental Monitoring	 Seismic monitoring Geothermal monitoring Subsea monitoring Water level monitoring 	 River flow monitoring Leak detection Levee performance testing
Electric Power & Utilities	 Power generation stations Infrastructure Emissions control Fault Condition Indicator (FCI) Supervisory Control and Data Acquisition (SCADA) 	 Auto Meter Infrastructure (AMI) backhaul Capacitor bank monitoring Recloser communications Regulator monitoring
Location Tracking	Food & beverage communicationIrrigation control	• Golf, distance from pin
Precision Agriculture	Precision steering and guidanceIrrigation	Fertilizer and pesticide applicationFeedlot controls
Turf & Pivot Irrigation	Center pivot mobile water systemWater control above ground for canals	• Ground based water source

Other Applications	How FreeWave Is Used
Mine Safety & Rescue	Emergency communications, video monitoring
Wind Turbine	Gas content, radon, vibration monitoring
Asset Management	Stationary asset monitoring, predictive analytics
Fleet Management	Mobile asset monitoring, predictive analytics
Traffic Control	Traffic control, video monitoring
Education	School campus – last mile, remote research, video monitoring/surveillance
Healthcare	Virtual medicine, remote diagnostics and diagnosis, last mile connectivity
Public Safety	Police, EMS, 1st responders, video monitoring/surveillance



5395 Pearl Parkway Boulder, CO 80301 **TF:** 1.866.923.6168 **Tel:** 303.381.9200

www.freewave.com