GE
Grid Solutions

MDS Orbit Licensed Solutions

High Speed, Long Range, Exceptional Performance for Licensed Wireless Networks

The constant evolution of industrial SCADA applications coupled with the ever increasing scale of asset deployment cause significant challenges on underlying licensed narrowband networks. Such networks need to offer an always-on connectivity to maximize application availability. They must provide a comprehensive framework of security in order to guard against the intensified waves of cyber attacks. Finally, the wireless networks must enable advanced performance in order to scale and support modern TCP/IP applications.

The GE MDS Orbit is an industrial-strength wireless router platform that helps overcome the challenges of deploying modern industrial automation applications. In addition to enabling high performance communication over the licensed narrowband spectrum, the Orbit platform offers a diverse range of integrated secondary radio options including cellular, unlicensed 900 MHz ISM as well as Wi-Fi.

Key Benefits

- Protect network and assets against attacks with powerful cyber security capabilities and electrocmagnetic pulse (EMP) compliance
- Whether operating a small network or 100s of remotes per access point, the latest release of MDS Orbit provides the best real world performance in a licensed narrwoband network
- Provide backward compatibility with GE MDS SD Series or legacy GE MDS x710 radios to seamlessly expand or migrate networks
- Minimize network downtime with dual radio uplinks with smart auto failover and other redudancy features
- Simplify operations, reduce learning curves and reduce cost by unifying the deployment of multiple wireless technologies on a single platform

Applications

Oil & Gas
- Well head and production pad controllers & metering automation
- Remote field office connectivity

Water & Wastewater
- Monitoring and control
- Maintenance workforce

Emergency & Utility Vehicles
- Law enforcement connectivity
- Utility workforce mobility

Electric Utilities
- Field area network
- AMI backhaul
- Workforce mobility

Smart Cities & Municipalities
- Traffic signals control
- Video security
- Weather monitoring stations

Mobility
- Train control and machinery monitoring
- Excavation machine control

Imagination at work

What's New

- EMP hardened per MIL-STD-461G, RS105
- Advanced MAC Mode provides the best real-world narrowband performance
- Advanced Polling Mode (250 remotes per AP)
- Added 32QAM for improved performance
- Efficient pass-through native serial
- Auto failover between Access Points
- 50 kHz in 130-155 MHz and 800-880 MHz bands
- TACACS+

Exceptional Performance

- Up to 64 QAM modulation and 50kHz bandwidth enables newer applications in narrowband networks
- Bi-directional per-packet, per-remote adaptive modulation maximizes network throughput in uplink and downlink directions
- IP Header and Payload compression improve efficiency by up to 30%

Networking & Security

- Enterprise-class cyber security including VPNs, key rotation, firewalling and centralized authentication for advanced protection
- FIPS 140-2 (Level 2) certification*
- Rich Quality of Service allows for various modes of traffic prioritization in addition to per application bandwidth allocation

Platform Flexibility

- Single or dual radios with auto failover

Industry Leading Reliability

- A patented Media Access Control guarantees message delivery and eliminates collision at the access point
- 3rd party Certified for IEEE1613, and Class 1 Div 2 for deployment in harsh environments

MDS Orbit Licensed Solutions

Orbit Licensed Narrowband Technology

- Duplex Modes – Half duplex
- Modulation – CPFSK, QPSK, 16QAM, 32QAM, 64QAM
- Adaptive Modulation – Per-packet, per-remote, bi-directional
- Dynamic FEC – Convolutional, Reed Solomon
- Compression – IP Header and Payload, up to +30% efficiency
- Media Access Control – High performance
- Topologies: Point to Multipoint (PTMP), PTP, Daisy Chain
- Collision avoidance over Serial traffic, proprietary MAC - no retransmissions required

Orbit Licensed Narrowband Frequency Bands

- L1B: 150 - 174 MHz
- L1C: 135 - 156 MHz
- L2B: 220 - 222 MHz
- L2X: 216 - 237 MHz
- L4A: 330 - 406 MHz
- L4C: 450 - 520 MH
- L4E: 406.1 - 470 MHz
- L7A: 757 - 758 and 787 - 788 MHz
- L9A: 880 - 870 MHz
- L9C: 896 - 960 MHz

Gross Data Rates (all frequencies)

CHANNEL	QPSK	16QAM	64QAM
6.25 kHz†	9.6 kbps	19.2 kbps	28.8 kbps
12.5 kHz	20 kbps	40 kbps	60 kbps
25 kHz	40 kbps	80 kbps	120 kbps
50 kHz	80 kbps	160 kbps	240 kbps

Transmitter Characteristics

- Frequency Stability – +/- 0.5 ppm
- Peak Carrier Power – +40 dBm 330-470 MHz, +39.5 dBm 896-960 MHz
- Average Power – QPSK: +36 dBm
- (Programmable) – 16QAM: +33 dBm, 64QAM: +33 dbm
- Power Range – +20 dBm to +40 dBm
- Carrier Power Accuracy – (+/- 1.5 dB typical)
- Adjacent Channel Power – < -60 dB
- Output Impedance – 50 Ohms

Receiver Characteristics

- Type – Direct Conversion
- Adjacent Channel Rejection – > -48 dBm
- Sensitivity (Actual) @ 1x10-6 BER, low FEC (ETSI 80% PSR eqv.)

CHANNEL	QPSK	16QAM	64QAM
12.5 kHz	-115 dBm	-110 dBm	-103 dBm
25 kHz	-114 dBm	-108 dBm	-101 dBm
50 kHz	-111 dBm	-105 dBm	-98 dBm

Networking

- IPv4 Routing OSPF, EBGP, RIPv2 with performance-based route failover
- IPv6 Routing*
- Full managed switch capability, IEEE 802.3, 802.1Q/VLANs, 64 LANs, STP
- Concurrent Bridging & Routing
- GRE Tunneling with Layer 2 (Ethernet) and Layer 3 support
- Route/path failover between any two wireless/Ethernet interfaces based on link loss, latency degradation or packet loss thresholds
- Quality of Service 16 egress queues, Priority Queuing, Fair Queuing, Traffic Shaping, Classification based on DSCP, 802.1p and Layer 2-4 classifiers
- IP Protocols TCP, UDP, ARP, DHCP, ICMP, NTP, FTP, SFTP, TFTP, DNS, configurable HTTP and HTTPS, SSH
- Serial TCP server, Modbus/TCP, Modbus RTU, TCP client, UDP Unicast and Multicast, BSAP, and DNP3

Security

- IPSec VPN Server (responder) and Client (initiator) with DMVPN
- Authentication Public Key, EAPTLS, Pre-Shared, Ike 1-2
- Encryption : 3DES, AES 128/192/256, CBC, CTR, CCM, GCM, SHA 256/384/512 HMAC. Wi-Fi: WPA WPA/WPA2 PSK, Enterprise
- Firewalling: Stateful Layer 3-4 Firewall with MAC Filtering, NAT, Source NAT (Masquerading), Static NAT, Port Forwarding
- Device Security : Secure Boot, Secure Firmware, Digitally Signed Hardware and Software, Magnetometer Tamper Detection
- Certificate Management: X.509, SCEP, PEM, DER, RSA
- User Authentication: Local RBAC, AAA/RADIUS, 802.1x
- FIPS 140-2 (Level 2) certification in progress

Management

- GE MDS PulseNET NMS Support with device management and auto-provisioning
- GUI configuration Wizards to simplify operation
- Secure device management via an intuitive web-based GUI and/or CLI
- Event logging, Syslog-over-TSL, SSH, Console
- Iperf throughput diagnostic, NETCONF
- SNMP v1/2c/3, MIB-II, Enterprise MIB

Mechanical

- Case – Rugged die-cast aluminum
- Dimensions MCR – 1.75 H x 8.0 W x 4.8 D in., 4.45 H x 20.32 W x 12.19 D cm
- Weight MCR – 2 lbs., 0.91 kg
- Dimensions ECR – 2.1 H x 4.3 W x 4.6 D in., 5.33 H x 10.92 W x 11.68 D cm
- Weight ECR – 1.45 lbs., 0.65 kg

Environmental

- Operating Temp -40° to +70°C (-40° 158°F)
- Storage Temp -40° to +85°C (-40° 185°F)
- Humidity 95% at 60°C (140°F) non-condensing

Warranty

- 5-year standard manufacturer warranty on all Orbit MCR/ECR models

Secondary Radio Options

Unlicensed 900 MHz ISM

- Frequency Bands: 902-928 MHz FHSS
- Bandwidth 152 to 1320 kHz, up to 80 channels
- Gross Data Rates: 125 kbps, 250 kbps, 500 kbps, 1000 kbps, 1250 kbps
- Latency of < 5 msec
- TX Power: 1 watt, configurable

Cellular (dual SIM, 3G Fallback)

- 4GY: 4G LTE-A NAM/EMEA/LATAM - Verizon, AT&T, Bell, Telus, Vodafone, FCC, CE, PTCRB, GCF
- 4GB: 4G LTE-A Pro - US - Band 14, CBRS,, Band 8 Private LTE, AT&T, Verizon, FCC, IC, PTCRB
- 4GA: 4G LTE-A Pro Brazil/Australia - Telstra, GCF, Anatel, AUSTEST

2.4 GHz Wi-Fi

- 1x1 SISO (single antenna/radio chain); 802.11 b/g/n
- Scalability up to 2 SSIDs, up to 7 clients/stations
- Max transmit power (adjustable): up to 20 dBm

Dual-Band 2.4/5 GHz Wi-Fi

- 2x2 MIMO (dual antenna/radio chain); 802.11 a/b/g/n
- Scalability up to 2 SSIDs, up to 32+ clients/stations
- Max transmit power (adjustable): up to 26 dBm

Orbit Model Interfaces

MCR Option A	(2) 10/100 Ethernet, RJ45 (1) RS232/485 Serial, RJ45 (1) mini USB 2.0
MCR Option B	(1) 10/100 Ethernet, RJ45 (2) RS232/485 Serial, RJ45 (1) mini USB 2.0
MCR Option C	(4) 10/100 Ethernet, RJ45 (2) RS232/485 Serial, RJ45 (1) mini USB 2.0
ECR	(1) 10/100 Ethernet, RJ45 (1) RS232/485 Serial, RJ45 (1) mini USB 2.0
Antenna Connectors	Licensed NB:TNC 900 MHz Unlic: TNC Wi-Fi: RP-SMA Cellular: SMA GPS: SMA female

Electrical and Power Consumption

- Input Voltage 10 to 60 VDC
- Power Consumption Calculations with nominal 25°C at 13.8 V

WITH 4G LTE	POWER	13.8 V
• Connected (Idle)	4.0 W	292 mA
• Typical download	4.3 W	310 mA
WITH 4G LTE + WI-FI	POWER	13.8 V
• Connected (Idle)	4.8 W	250 mA
• Typical download	5.5 W	400 mA
WITH 900MHZ ISM	POWER	13.8 V
• Typical	3.2 W	232 mA
• Maximum	5.3 W	385 mA
WITH LICENSED NB	AP	REMOTE
• Idle	910 mA	350 mA
• 50% Duty Cycle	950 mA	780 mA

Agency Approvals / Standards

- FCC Part 15, 90, 80, 101, 27, 95 and IC
- ETSI / CE, EN 300.113, EN302.561
- IEEE 1613**, IEC 61850-3
- CSA Class 1, Div. 2, CSA C22.2 No. 142-M1987 & 213-M1987
- ANSI/ISA – 12.12.01 – 2015, UL 916, 5th Ed., EN60950
- EMS EN 301 489-5, EN 301 489-1
- EMP: MIL-STD-461G, RS105 Electro Magnetic Pulse
- Shock: MIL-STD-810F Method 516.5
- Vibration: MIL-STD-810F Method 514.5
- Shock and Vibration: EIA RS374A
- Storage Temp: Mil-Std 810F Section 501.4 with 1 week soak test
- IP 40/41 per IEC 60529 for Vertical Falling Water and Pollution 3 for Dust
- IEC 60068-2-1 Cold; IEC62262 & IEC60068-2-75 Shock; IEC 60068-2-2 Dry Heat; IEC 60068-2-2-38 Composite temperature/humidity cyclic

† *L1C, L2X, L4A, L4C, L7A, L9A, L9C Orbit band options support 12.5, 25, and 50 kHz. L2B supports 5 kHz only. Other band options support 6.25, 12.5, and 25 kHz.*

* *Check with local sales representative for availability*

** *Requires an external DC to DC converter having floating DC inputs (neitherside grounded)*

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Imagination at work