GE
Grid Solutions

MDS Orbit Platform

The Next Generation Industrial Wireless Networks

As industrial SCADA and automation applications have evolved, corresponding requirements for security, reliability and performance of communication networks have become more demanding. Furthermore, the diversity of topography and wireless spectrum conditions across regions is often difficult to address with any single wireless technology.

The MDS™ Orbit industrial wireless platform offers the security, reliability, performance, and wireless flexibility required for next-generation industrial networks. Orbit enables customers to deploy advanced communications using diverse options of wireless technologies and frequencies.

Orbit allows for communication over licensed spectrum, unlicensed spectrum, cellular and Wi-Fi in various form factors with single or dual radio options. Its advanced cyber security capabilities enable customers to secure and protect their networks and assets.

Key Benefits

- Protect network and assets against attacks with powerful cyber security capabilities and electromagnetic 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 redundancy features
- IP Header and Payload compression improves efficiency by up to 30%
- Bi-directional per-packet, per-remote adaptive modulation maximizes network throughput in uplink and downlink directions

Applications

Oil & Gas
- Well Head and Production Pad Controllers & Metering Automation
- Remote Field Office Connectivity

Water & Wastewater
- Monitoring and Control
- Maintenance Workforce Mobility

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

Heavy Industrial
- Train Control and Machinery Monitoring
- Excavation Machine Control

Platform Flexibility

- A single platform enables networks with various radio technologies including dual radios with auto failover in a single device
- Public or Private LTE with Dual SIM multi-carrier auto switching and GSMA eSIM compatible, supporting FirstNet, CBRS, Anterix 900MHz, and more
- Licensed technology with QAM, Bi-directional adaptive modulation, FEC and advanced compression maximizes efficiency on narrowband spectrum
- High-performance 900 MHz FHSS enables low latency and high-throughput unlicensed networks with multipoint and store-and-forward
- Configurable automatic over-the-air radio firmware upgrades
- Flexible interfacing options including serial, ethernet, USB, Wi-Fi, alarm input, and SFP*

Advanced Networking & Security

- Enterprise-class cyber security including VPNs, key rotation, firewalling and centralized authentication for advanced protection
- EMP hardened per MIL-STD-461G, RS105
- FIPS 140-2 (Level 2) certification*
- Dual APN, Open VPN*, and VRF*

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 Platform Key Capabilities

Flexible Networking

MDS Orbit's support for dynamic and static routing as well as managed switch capabilities facilitate the deployment in a multitude of network architectures. To achieve maximum uplink and application uptime, Orbit supports a variety of High Availability mechanisms such as interface bonding, Spanning Tree, Layer 3 failover, VRRP as well as latency and packetloss based failover. GRE tunneling coupled with IPSec VPNs and DMVPN further enable the establishment of secure Virtual Private Networks (VPN) across any wireless technology.

Enterprise-Class Security

The MDS Orbit platform is built on a comprehensive cyber security framework to enable the deployment of highly secure environments. It offers standards-based IPSec VPN and DMVPN capabilities with X.509 certificate management to allow the encryption of network paths and interop with non-GE devices. As an added layer of security, Orbit supports the encryption of private radio links at the RF layer. RBAC and RADIUS enable local and centralized user authentication into the network. MDS Orbit's stateful firewall as well as MAC-filtering capabilities ensure that only valid traffic is permitted through the network. Its secure boot and secure firmware protect against meddling with the hardware and software, and its magnetometer provides tamper-detection to secure against theft.

Advanced QoS (Quality of Service)

Orbit supports advanced QoS functionality with fair and priority queuing to enable deterministic latency and throughput performance with up to 16 application priority queues. Orbit's Traffic Shaping allows applications such as SCADA to have a dedicated throughput on the uplink for predictable performance. Orbit further supports classification based on DSCP, 802.1p, and other Layer 2-4 header information.

Network Management and User Interface

The MDS Orbit platform supports standards-based SNMP and Netconf network and device management protocols for easy integration into MDS PulseNet as well as 3rd party network management software. It supports Command-Line Interface (CLI), an intuitive web-based Graphical User Interface (GUI) as well as wizards to simplify and speed the configuration of complex tasks. Orbit's user experience is identical regardless of radio technology or form factor.

Diverse Radio Technology Options

Licensed Spectrum

MDS Orbit's Licensed radio technology offers multiple narrowband spectrum options with QAM modulation that maximizes available throughput for modern IP-based applications. Performance is enhanced with raw data rates of up to 240 Kbps in a 50 kHz channel or up to 120 Kbps in a 25 kHz channel. IP header and payload compression as well as per-packet, per-remote, bi-directional adaptive modulation further optimize throughput on a perremote basis to ensure the network isn't penalized for its lowest common denominator remote.

Backwards Compatibility

For customers looking to upgrade legacy licensed networks, the Orbit Licensed radio technology supports 3-FSK modulation mode, which provides backwards compatibility with legacy x710 as well as SD base stations on the A Modem. Furthermore, for those customers who desire an at-your-own-pace migration, a GE MDS Master Station equipped with Orbit radio modules and an embedded Evolution Module allows coexistence of both new and legacy networks by routing the traffic over the appropriate network.

Unlicensed Spectrum

MDS Orbit's unlicensed radio offers cutting edge performance in the 900MHz ISM spectrum with its advanced Media Access Control (MAC) technology. Orbit's patented MAC prevents ingress collision at the access point by synchronizing the network and allocating time slots for one remote to transmit at a time. It enables communication at 1.25Mbps with a latency as low as 5msec for latency-sensitive automation and protection applications. Orbit's unlicensed 900Mhz radio can be deployed in various topologies including point to point, point to multipoint, and a self-healing store-and-forward network.

Cellular

A variety of cellular technologies are supported on Orbit covering 4G LTE Dual SIM with roaming and profile switching based on signal quality. Furthermore, Orbit supports communication over private LTE bands including CBRS and Anterix™ 900 MHz. Orbit's cellular modem can be used as a primary uplink, as backup for a primary licensed or unlicensed radio, or in tandem with the primary radio. GPS is supported on select cellular modem options.

Wi-Fi

A Wi-Fi radio option can be selected as a standalone, or as a secondary radio for licensed, unlicensed or cellular radios. Orbit offers two versions of Wi-Fi to meet performance and cost requirements. A 802.11 b/g/n 2.4 GHz Wi-Fi option supports up to 7 clients/hosts per AP. A 802.11 a/b/g/n 2.4/5 GHz option provides enhanced dual antenna (MIMO) performance and up to 32+ clients per AP.

MDS Orbit OCR
with Cellular

MDS Orbit MCR
with Cellular and 900 MHz

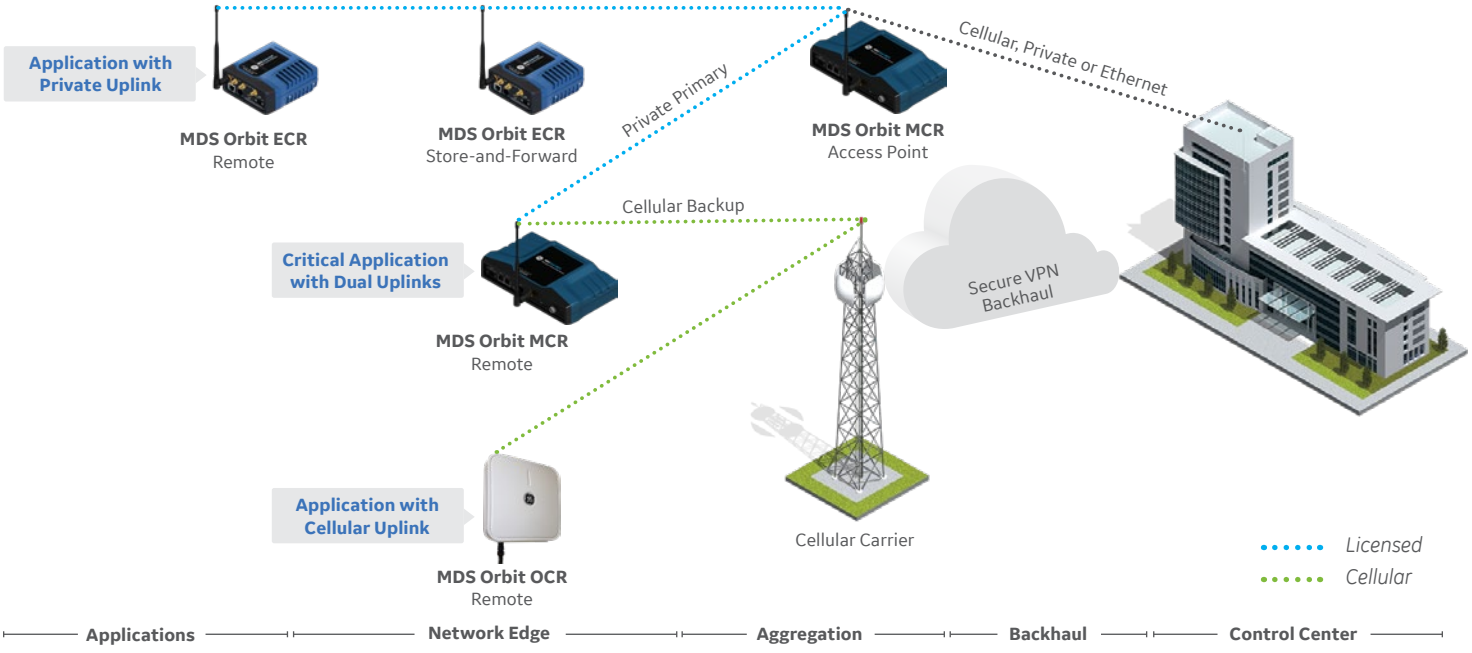
MDS Orbit ECR
with Cellular and WiFi

The MDS Orbit Platform Models & Radio Support

MDS Orbit Models	MCR (Multiservice-Connect Router) Standard 	MCR (Multiservice-Connect Router) High Port Density 	ECR (Edge-Connect Router) 	OCR* (Outdoor-Connect Router) 
PORT DENSITY				
Port Combination & Density Options (Factory-configured)	2 Ethernet, 1 Serial, 1 USB 1 Ethernet, 2 Serial, 1 USB	1 SFP, 2 Ethernet, 2 Serial, USB 4 Ethernet, 2 Serial, 1 USB	1 Ethernet, 1 Serial, 1 USB	1 PoE Ethernet 1 PoE Ethernet, 2 N-type Antenna Connectors
RADIO COMBINATIONS				
	1 WAN-Radio 1 WAN-Radio + 2.4 GHz Wi-Fi 1 WAN-Radio + 2.4/5 GHz MIMO Wi-Fi			
	2 WAN-Radios (limited options)			
WAN-RADIO Technologies				
Cellular Radio Options	3G/4G Dual SIM LTE North America 3G/4G Dual SIM EMEA Private LTE Bands			
Unlicensed Radio Options	902-928 MHz FHSS			
Licensed Radio Band Options	135-155 MHz 150-174 MHz 216-235 MHz 330-406 MHz 406.1-470 MHz 450-520 MHz 757-758, 787-788 MHz 896-960 MHz			
Wi-Fi RADIOS				
Wi-Fi	2.4 GHz 802.11b/g/n 2.4/5 GHz MIMO 802.11a/b/g/n			

MDS Orbit Hybrid Network Example

Industrial customers depend on more than one wireless technology to extend connectivity to their field assets. The Orbit platform offers a rich portfolio of wireless technologies in various form factors, as well as single or dual radio options to facilitate the deployment in various applications and scenarios. The common platform offers a seamless and unified user experience regardless of the wireless technology used. It simplifies radio operation and management, and helps reduce learning curves and operational costs.



GE MDS™ Orbit Platform Data Sheet

Unless otherwise noted, specifications listed apply to all Orbit models

NETWORKING

- IPv4 Routing OSPF, EBGP, RIPv2 with performance-based route failover
- IPv6 Routing*
- Full managed switch capability, IEEE 802.3, 802.1Q/VLANs, 64 VLANs, 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
- Dual APN, VRF, and Open VPN*

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
- 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) certified*

LICENSED RADIO SUMMARY

- 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: 800 - 870 MHz
  - L9C: 896 - 960 MHz
- Channel Size: 5, 6.25, 12.5, 25, and 50 kHz**
- Operation Modes: Access Point, Remote, Store & Forward
- Duplex Mode: Simplex, Half-Duplex
- Modulation: CPFSK, QPSK, 16QAM, 64QAM, Bi-Directional Adaptive Modulation
- Backward compatibility with MDS SD Series and x710 Master Stations using QPFSK
- Raw Data Rate: Up to 240 Kbps in 50kHz and 120 Kbps in 25kHz
- Compression: IP Header and Payload
- FEC: Dynamic, per packet
- Peak TX Power: up to +40 dBm

UNLICENSED RADIO SUMMARY

- Frequency Bands: 902-928 MHz FHSS
- Occupied Bandwidth 152 to 1320 kHz, up to 80 channels
- Modulation: 2, 4-level GFSK, Adaptive
- Raw Data Rates: 125Kbps, 250Kbps, 500 Kbps, 1000 Kbps, 1250 Kbps
- Latency of < 5 msec
- Operation Modes: Access Point, Remote, Store & Forward
- Duplex Mode: Half-Duplex
- Compression: IP Header and Payload
- TX Power: 1 watt, configurable

CELLULAR RADIO SUMMARY

Cellular Options (with Dual SIM and GPS):

- 4GY: 4G LTE-A NAM/EMEA/LATAM - Anterix™ 900MHz, AT&T, Verizon, US Cellular*, Bell, Telus, Rogers*, Vodafone, FCC, CE, PTCRB, GCF
- 4GB: 4G LTE-A Pro FirstNet Ready™, CBRS, US - AT&T, Verizon, FCC, IC, PTCRB
- 4GA: 4G LTE-A Pro Brazil/Australia - Telstra, GCF, Anatel, RCM/ACMA
- 4GD: 4G with 2G/3G fallback EMEA/LATAM - CE, GCF, Anatel

WI-FI RADIO SUMMARY

IEEE 802.11 b/g/n 2.4 GHz option:

- 1x1 SISO (single antenna/radio chain)
- Scalability up to 2 SSIDs, up to 7 clients/stations
- Max transmit power (adjustable): up to 20dBm
- Operating modes: Access Point (AP), Station, Station bridging
- Security: WPA/WPA2 PSK, Enterprise
- Applications:
  - Local configuration and management using Wi-Fi devices
  - Station/client connecting to a 2.4GHz AP in outdoor LOS environment
  - Small-scale 2.4GHz AP operating in outdoor LOS environment

IEEE 802.11 a/b/g/n Dual-Band 2.4/5 GHz option:

- 2x2 MIMO (dual antenna/radio chain)
- Scalability up to 2 SSIDs, up to 32+ clients/stations
- Max transmit power (adjustable): up to 26dBm (23dBm per antenna/chain) for 2.4GHz and 23dBm (20dBm per antenna/chain) for 5GHz
- 5GHz (U-NII-1 and U-NII-3 bands supported)
- Operating modes: Access Point, Station, Station bridging, Access-Point-Station (simultaneous AP and Station operation)
- Security: WPA/WPA2 PSK, Enterprise
- Applications:
  - Local configuration and management using Wi-Fi devices
  - Station/client connecting to a 2.4Ghz/5Ghz AP in indoor/
  - outdoor LOS/NLOS environment
  - Large-scale AP

MANAGEMENT

- Support for MDS LaunchNET with 'Zero-touch' or 'One-touch' for easy field provisioning
- MDS PulseNET NMS Support
- Secure device management via HTTP/HTTPS, (GUI) and Juniper-style CLI via SSH or local console
- Event logging, Syslog over TLS
- Iperf throughput diagnostic
- NETCONF
- SNMPv1/v2c/v3, MIB-II, Enterprise MIB

ORBIT MODEL INTERFACES

- MCR Standard Option A
  (2) 10/100 Ethernet, RJ45
  (1) RS232/485 Serial, RJ45
  (1) mini USB 2.0
- MCR Standard Option B
  (1) 10/100 Ethernet, RJ45
  (2) RS232/485 Serial, RJ45
  (1) mini USB 2.0
- MCR SFP Option*
  (2) 10/100/1000 Ethernet, RJ45
  (2) RS232/485 Serial, RJ45
  (1) mini USB 2.0
  (1) 1000BASE-X SFP
- MCR High Density Option
  (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
- MCR/ECR Antenna Connectors
  Licensed NB:TNC
  900Mhz Unlic: TNC
  Wi-Fi: RP-SMA
  Cellular: SMA
  GPS: SMA female
- OCR*
  (1) 10/100 PoE Ethernet, RJ45
  (2) N-Type Antenna Connectors
  (Optional)

MECHANICAL

- Case – Rugged die-cast aluminum
- Dimensions MCR – 1.75 H x 8.0 W x 4.8 D in., 4.45 x 20.32 x 12.19 cm
- Weight MCR – 2 lbs, 0.91 kg
- Dimensions ECR – 2.1 H x 4.3 W x 4.6 D in., 5.33 x 10.92 x 11.68 cm
- Weight ECR – 1.45 lbs, 0.65 kg
- Dimensions OCR: 15.59 H x 15.43 W x 3.9 D in.; 39.6 x 39.2 x 9.9 cm"
- Mounting Options Integrated DIN Rail mount and Standard Mounting bracket
- No Fans, No Moving Parts
- HALT & HASS Testing
- Case Die Cast Aluminum

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

ELECTRICAL & POWER CONSUMPTION

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

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

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
- IP67 environmental rating (OCR only)

† Requires an external DC to DC converter having floating DC inputs (neither side grounded)

WARRANTY

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

* Check with local sales representative for availability

** 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.

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