



MDS Orbit Unlicensed Solutions

900MHz and 2.4/5 GHz Routers for Cost-Effective Industrial Deployments



Orbit's industry-leading networking and security capability as well as its support for a variety of wireless technologies and topologies position it as a single box, OPEX-saving platform for industrial networks.

GE's unlicensed wireless solutions provide exceptional performance with 900MHz or Wi-Fi to extend secure connectivity across industrial networks.

Key Benefits

- Extend industrial networks into rural and Field Area Networks using Orbit's 900MHz Unlicensed, Wi-Fi, and cellular connectivity
- High performance interference avoidance and very low latency 900MHz technologies along with advanced Quality of Service enable determinism for critical and industrial applications
- Orbit's integrated routing, switching, Quality of Service (QoS) and comprehensive security provide for flexible integration into modern networks
- A holistic cyber security framework protects the users, the network and assets and allows operators to meet stringent government and corporate cyber security requirements
- Rugged durable design, wide temperature range and low power consumption provide deployment life extension in the harshest of environments while protecting CAPEX investment

Applications



Oil & Gas

- Well Head and Production Pad Automation
- Pipeline Monitoring and Control
- WiFi for Field Operations



Utility

- DA & AMI convergence
- Renewables Protection & Control with IEC® 61850
- Substation Device Monitoring and Video Surveillance



Water & Wastewater

- Monitoring and Control
- Maintenance Workforce Mobility



Heavy Industrial

- Heavy Machinery Monitoring
- Excavation Machine Control
- Facility Wide Network Extension to Offsite Areas

Optimum Flexibility

- Point to Point, Multipoint, Store & Forward and self-healing topologies allow for flexible deployment
- Integrated routing and switching enable support for a variety of design scenarios
- Scalable 900MHz data rates from 125Kbps to 1.25Mbps with varying sensitivity
- Multiple interface options include Ethernet, Serial, USB, Cellular and Wi-Fi

Comprehensive Security

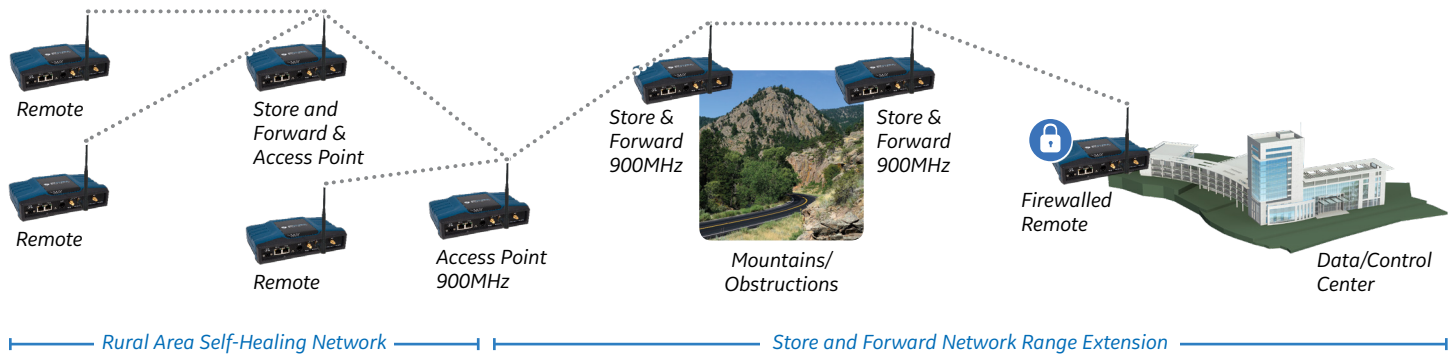
- Advanced firewall protects users and network assets against intrusion
- IPSec VPN enables secure enterprise-class encrypted communication
- Secure Boot protects integrity of firmware
- Extensive X.509 digital certificate management simplifies provisioning
- Integration with enterprise systems via RADIUS, AAA, SCEP, SNMPv3 and Syslog
- FIPS 140-2 (Level 2) certified*

Deterministic Performance

- High performing 900MHz unlicensed FHSS and dual-band Wi-Fi routers
- Low latency for critical and demanding protection applications
- Advanced Quality of Service ensures deterministic application performance
- Designed to endure harsh environments:
- Enhanced ESD protection
 - Extended temperature (-40 to +70 C)
 - Class 1/Div 2 & IEEE® 1613 compliance

The MDS Orbit Platform Models & Radio Support

MDS Orbit as Enabler for Classic Multipoint Communication with Coverage Extension Into Rural Areas



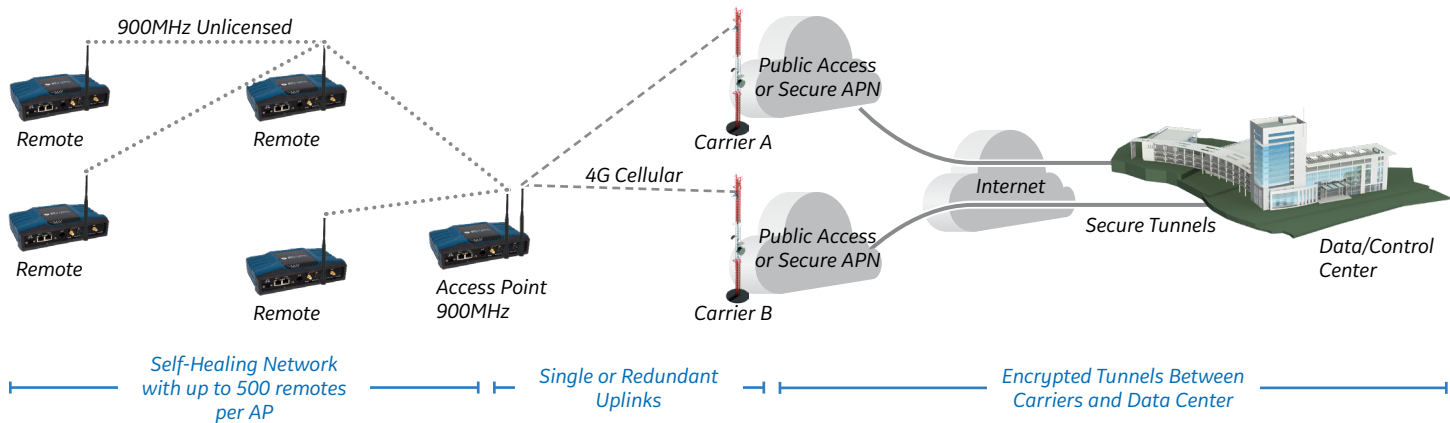
Features

- MDS Orbit's flexible 900MHz unlicensed deployment architectures as well as support of > 30 miles per segment with effective FHSS interference avoidance make it an ideal enabler for the expansion of network coverage into remote and rural areas
- A large scalability of remotes per Access Point expands network coverage into massive footprints
- High performance Store and Forward technology allows repeaters to be daisy chained for up to 8 hops in series to extend network range through mountainous or rugged terrain
- Stateful firewalling as well as RF and IPSec encryption ensure protection of data, users and network assets from intrusion

Application Examples

Oil & gas production fields, oil pipeline monitoring & control, Distribution Automation Field Area Networks, water & waste water, municipalities

MDS Orbit as 900MHz Unlicensed Gateway with Multiple Encrypted Uplinks Through Public Carriers



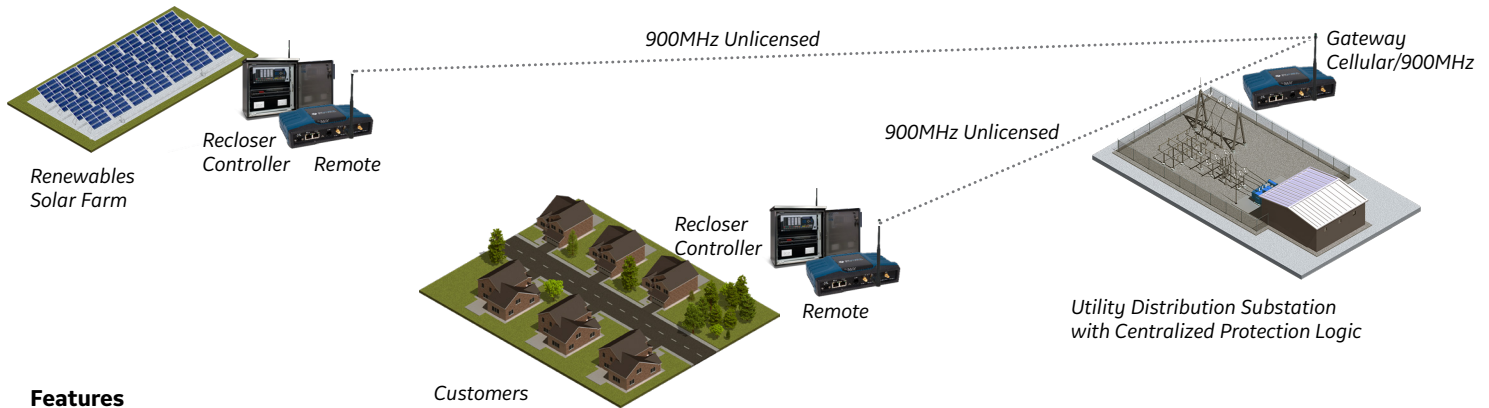
Features

- MDS Orbit MCR-900 supports a second wireless card which could be 4G LTE with fallback options on 2G/3G GSM and CDMA.
- The large scalability of MDS Orbit unlicensed 900MHz remotes allows for cost-effective expansion of network coverage to allows to cost-effectively expand network coverage to hundreds of sites with a single cellular uplink thus saving on OPEX by eliminating recurring per-site cellular subscription fees
- Stateful firewalling as well IPSec encryption can be applied on 900MHz or Cellular links to augment network security for critical applications and protect against intrusions

Application Examples

Advanced Metering Infrastructure (AMI) gateways, Distribution Automation Field Area Networks, water & waste water, municipalities, oil & gas production fields

Implementing Renewables Protection & Control with the IEC 61850 Protocol using MDS Orbit



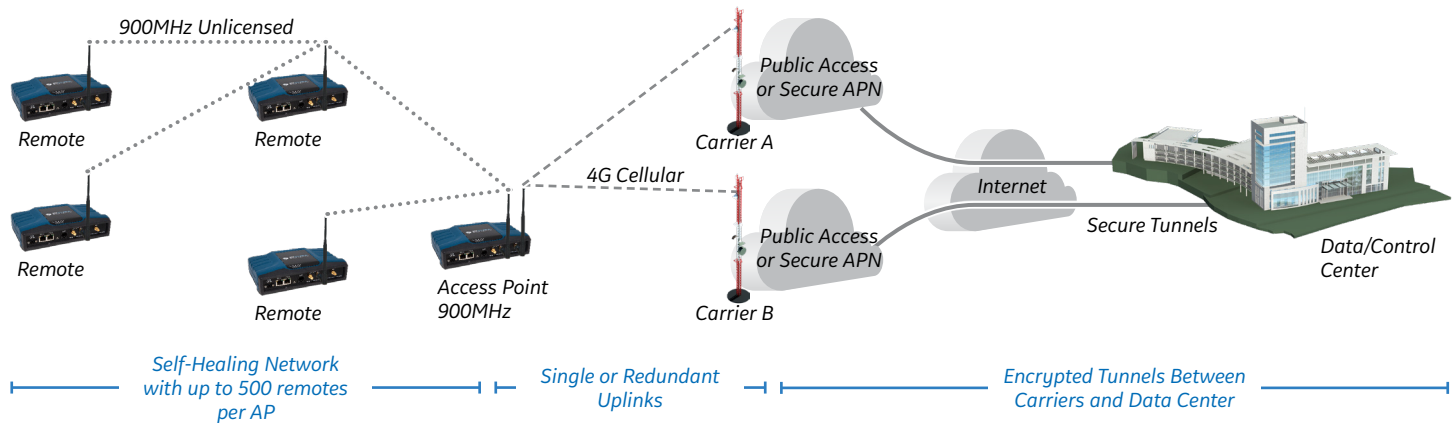
Features

- MDS Orbit's high performance 900MHz unlicensed technology can transport IEC 61850 GOOSE Ethernet frames natively. It allows for data rates of up to 1.25Mbps with a latency tunable to as low as 5msec. This along with advanced Quality of Service facilitate advanced Distribution Automation applications such as Renewables/Distributed generation Protection & Control which demand low latency and network determinism
- A large scalability of remote enables cost-effective coverage of large customer and asset footprints
- Stateful firewalling as well as RF and IPsec encryption enable network operators to meet NERC® CIP / EPCIP and other stringent cyber security requirements by encrypting communication links and protecting network assets and users against intrusion

Application Examples

Distributed Generation/Renewables Protection & Control, Distribution Automation, critical infrastructure control, other protection applications

MDS Orbit as a Network Convergence Enabler for Multiple Simultaneous Applications



Features

- MDS Orbit supports advanced QoS functionality which allow it to prioritize egress traffic based on Layer 2- Layer 4 classifications. In this fashion, critical applications are assigned to the priority queue and are switched first to meet application requirements.
- Orbit is capable of up to 5 site-to-site IPsec VPN tunnels per device which give it flexibility to secure critical application paths as needed. Furthermore,
- Orbit supports a stateful firewall to protect the network and assets against intrusion.
- Orbit's support of multiple wireless and networking technologies make it an ideal network convergence platform.

Application Examples

Converged Distribution Automation (Protection, Control, SCADA, Metering, AMI etc..), Oil & Gas production fields (SCADA, control, Workforce, Video Monitoring)

MDS Orbit Unlicensed Specifications

900MHz Unlicensed

- Operating Modes: Access Point, Remote, Store & Forward
- Technology: Point-to-Point, Point-to-multipoint,
- Data Rates/Sensitivity:
 - 125 Kbps/-105 dBm
 - 250 Kbps/-103 dBm
 - 500 Kbps/-99 dBm
 - 1.0 Mbps/-95 dBm
 - 1.25 Mbps/-95 dBm
- Latency: tunable to <5 msec one-way
- Output Impedance: 50 Ohms
- Frequency: 902-928 MHz
- Frequency Masks: 16 masks, up to 5 channels per mask
- Spreading method: FHSS, DTS
- Occupied Bandwidth 152 to 1320 kHz, up to 80 channels
- Modulation 2, 4-level GFSK, Dwell Time 10-300 msec
- Carrier Power 100 mW – 1W, Range > 30 miles
- Media Access: Patent pending proprietary design, advanced interference avoidance, error detection, retransmission, auto repeat guaranteed collision free data, and dynamic fragmentation

Wi-Fi Option

- 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 operating in indoor/outdoor LOS/NLOS environment

Cellular 4G Option

- Region/Carrier: U.S. /AT&T, Bell, Telus, Rogers, Verizon, US Cellular, FCC, PTCRB
- Max Throughput: 50 Mbps downlink/25 Mbps uplink
- Typical Throughput: 21 Mbps downlink/10 Mbps uplink
- See MDS Orbit Cellular brochure for more details

Cyber Security

- Tunneling: IPSec VPN compatible with Enterprise VPN concentrators
- Firewall: Stateful Packet Inspection Layer 2-4, Access Control Lists, NAT
- 900 unlicensed Encryption: AES-CCM 128/256 bit with auto key rotation
- Authentication: RADIUS, PSK, EAP/TLS, PKI
- Certificates: X.509, SCEP, PEM, DER
- Boot Security: Digitally signed firmware
- FIPS 140-2 (Level 2) certified*

Networking Technologies

- Full IEEE 802.3 Layer 2 switching with Spanning Tree, VLANs, IGMP
- Layer 3 static routing
- Routing and Bridging from/to any interface (as applicable)
- Advanced L2-L4 Quality of Service
- Protocols: NAT, DHCP, ICMP, UDP, TCP, ARP, NTP, FTP, SFTP, TFTP, DNS
- Serial: TCP server, Modbus/TCP, Modbus RTU, TCP client, UDP Unicast and Multicast, BSAP, and DNP3

Management

- HTTP, HTTPS, SSH, NETCONF, local console
- SNMPv1/v2/v3, MIB-II, Enterprise MIB
- Syslog and Syslog-over-TLS, MDS PulseNET compatible

Environmental and Agency Approvals

- Voltage: 10-60VDC
- Maximum Power Consumption: 4.3W (4G), ~5.3W (900MHz)
- Typical Power Consumption: 4.0W (4G), 3.2W (900MHz)
- Operating Temperature: -40° to 70° C (-40° to 158° F) 900MHz modem
- Humidity: 95% at 60° C (140° F) non-condensing
- Case: Die Cast Aluminum
- Dimensions: (1.75 H x 8.0 W x 4.8 D in.) | Weight: 2 lbs
- Mounting Options: Integrated DIN Rail mount, Standard bracket
- FCC Part 15, IC, ETSI / CE (WiFi models)
- CSA Class 1, Div. 2, IEEE 1613

* Check with local sales representative for availability.

For more information in North America, call **1-888-437-5739** or email **gemds.customersupport@ge.com**. For more information Worldwide, call **1-704-561-5751** or email **gemds.international@ge.com**.

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