



# 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

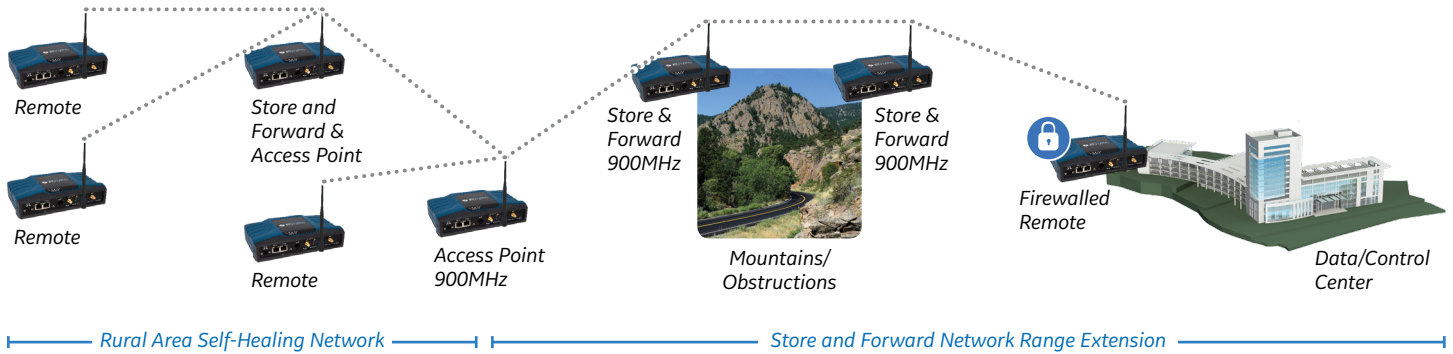
- Advanced firewall protects users and network assets against intrusion
- IPSec VPN enables secure enterprise-class encrypted communication
- Secure Boot protects integrity of firmware
- Extensive X.509 digital certificate management simplifies provisioning
- Integration with enterprise systems via RADIUS,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

### 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



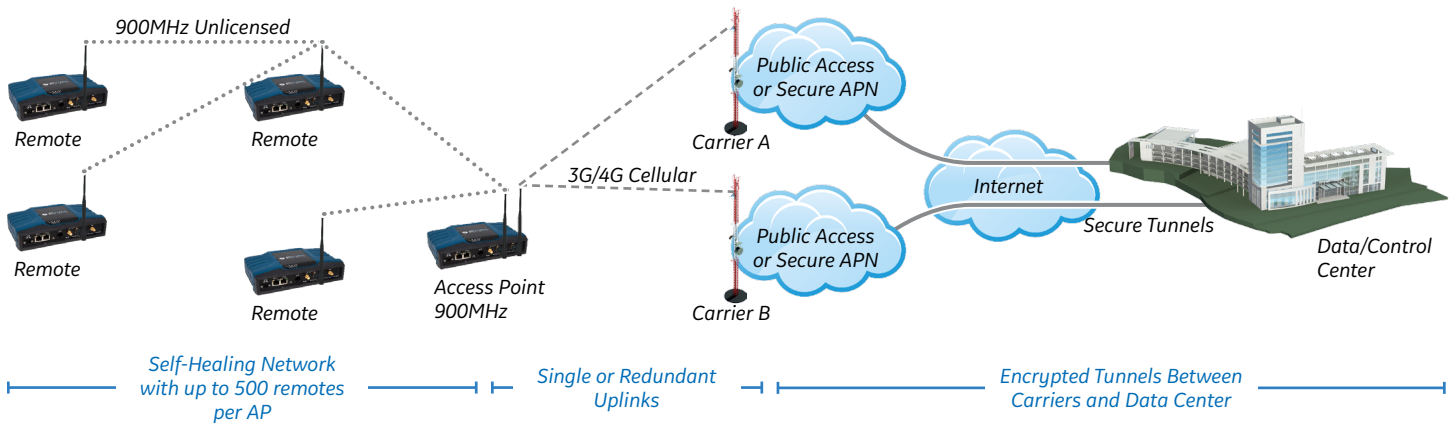
### Features

- 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



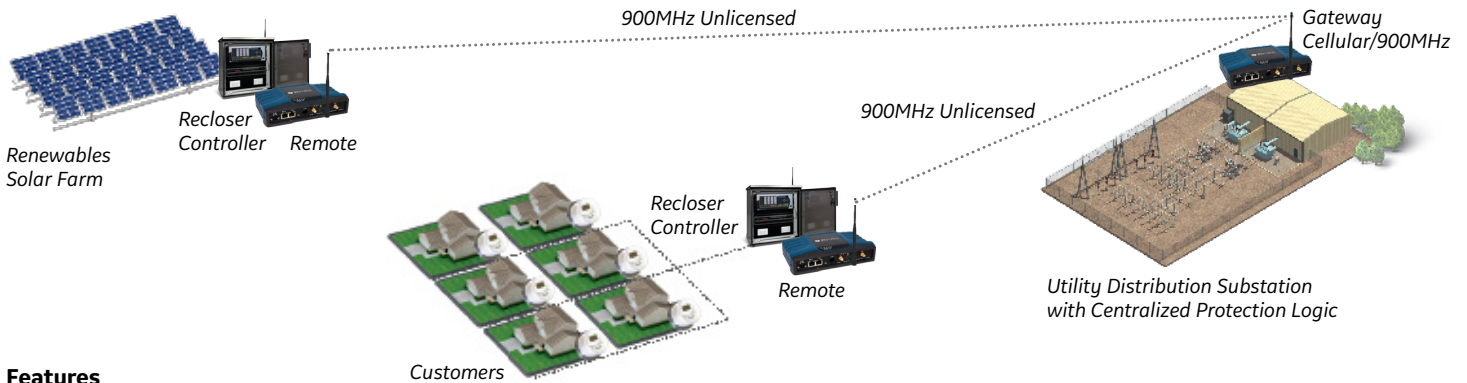
### Features

- MDS Orbit MCR-900 supports a second wireless card which could be 4G LTE or 3G Global, with the latter supporting dual SIMs
- 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



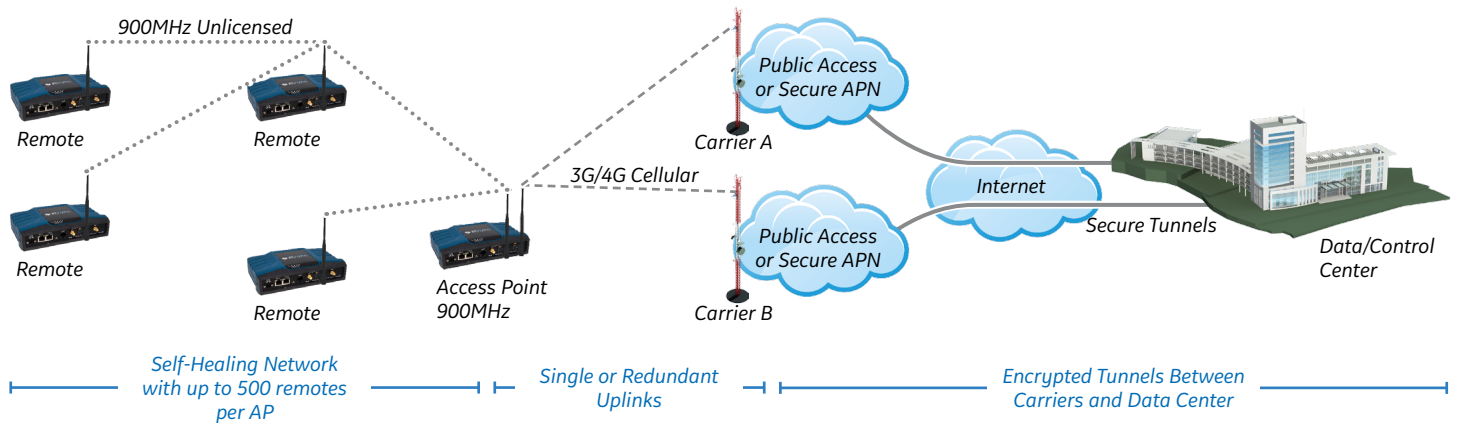
### Features

- 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 technologies, including 4G LTE, 3G Global, 900MHz unlicensed and Wi-Fi in addition to its simultaneous support for bridging and routing 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

Standard 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

Standard 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 3G Option

- GSM, GPRS, EDGE, HSPA+ 850/900/1800/1900 MHz
- UMTS, HSPA, HSPA+ 800/850/900/1700/1900/2100
- Region/Carrier: Global PTCRB, GCF certification, /AT&T, Rogers, Telus, Bell
- Max Throughput: 21 Mbps downlink/5 Mbps uplink
- Typical Throughput: 5.5 Mbps downlink/0.3 Mbps uplink
- See MDS Orbit Cellular brochure for more details

## 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

## 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), 3.2W (3G), ~5.3W (900MHz)
- Typical Power Consumption: 4.0W (4G), 2.5W (3G), 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 (3G and WiFi models)
- CSA Class 1, Div. 2, IEEE 1613