GE
Grid Solutions

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

Water & Wastewater
- Level, pressure and flow monitoring
- Pipeline monitoring and control

Utility
- DA & AMI convergence
- Renewables protection and control with IEC® 61850
- Substation device monitoring and video surveillance

Heavy Industrial
- Heavy machinery monitoring
- Excavation machine control
- Facility-wide network extension to offsite areas

What's New

- New SFP fiber interface
- New alarm input with optional alarm sensor kit
- Configurable automatic over-the-air radio firmware upgrades
- VRF and Open VPN
- EMP hardened per MIL-STD-461G, RS105

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

Rural Area Self-Healing Network — **Store and Forward Network Range Extension**
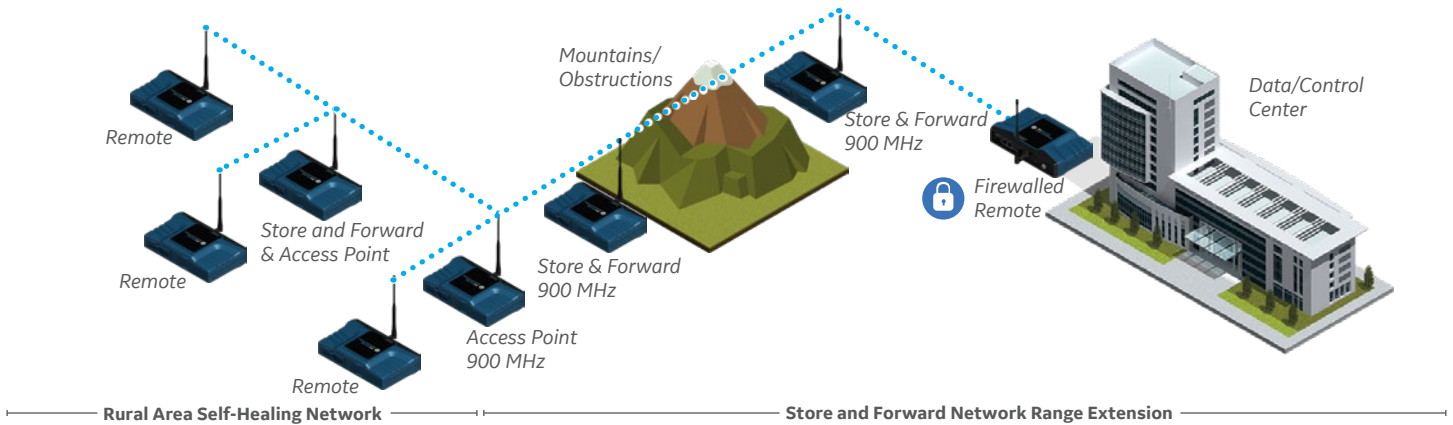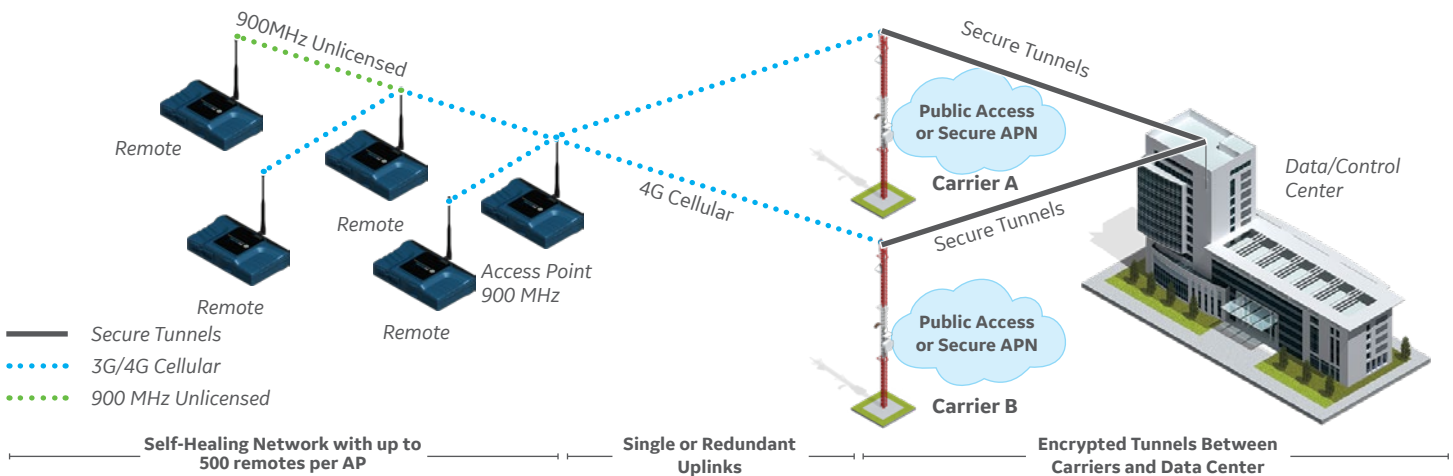
Features

- 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

Self-Healing Network with up to 500 remotes per AP — **Single or Redundant Uplinks** — **Encrypted Tunnels Between Carriers and Data Center**
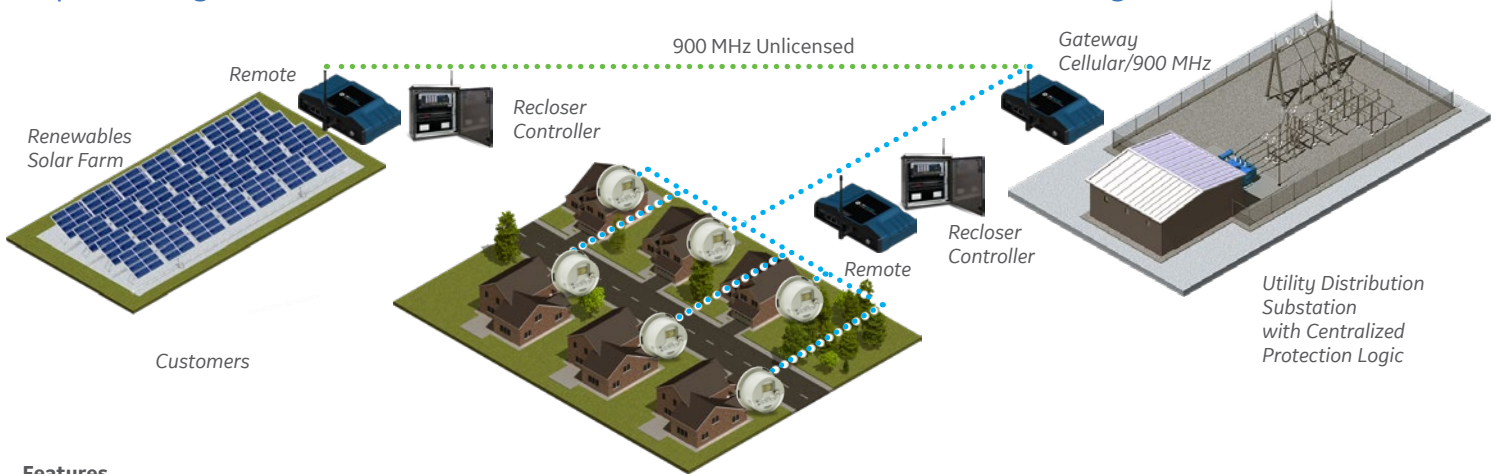
Features

- MDS Orbit MCR-900 supports a second wireless card which could be 4G LTE with 3G fallback.
- 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
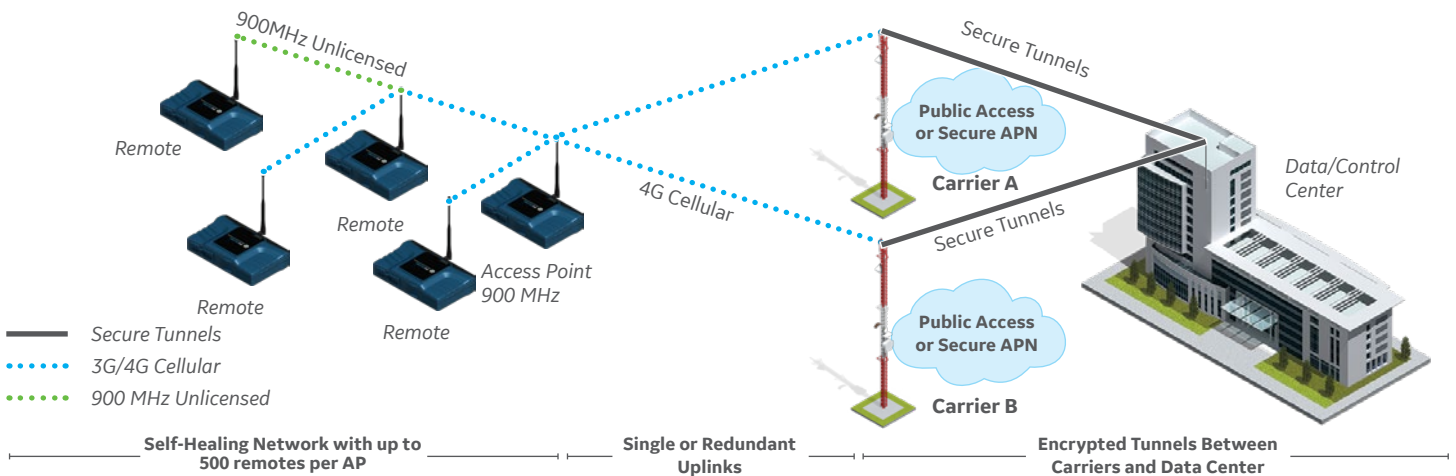

Features

- 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

900 MHZ 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
- Input Voltage 10 to 60 VDC
- Typical Power Consumption:

	AP	REMOTE
Idle	4.0W	3.2W
50% Duty Cycle	5.3W	5.0W

WI-FI OPTIONS

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 OPTIONS

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

MANAGEMENT

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

ENVIRONMENTAL & AGENCY APPROVALS

- EMP: MIL-STD-461G, RS105 Electro Magnetic Pulse
- Operating Temperature: -40° to 70° C (-40° to 158° F) 900 MHz 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, CSA C22.2 No. 142-M1987 & 213-M1987
- IEEE 1613**, IEC 61850-3
- UL as it is in process and will be complete by time of publication also required for GE2GE opportunities

* Check with local sales representative for availability.

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