Managed Connected Router for 3G/4G LTE Networks

The MDS Orbit MCR is an advanced wireless router for industrial networking and machine-to-machine applications. The MDS Orbit leverages GE’s extensive experience delivering private wireless network solutions to empower the convergence of multiple applications utilizing the public cellular infrastructure. MDS Orbit’s advanced feature set and processing capabilities present new levels of flexibility and versatility, and provide options to seamlessly bridge cellular communications onto WiFi and unlicensed 900 MHz networks.

Key Benefits
- Integrated routing and switching combined with an extensive feature suite allow for easy integration into a variety of network designs
- Communicate with legacy serial devices utilizing MDS Orbit’s embedded terminal server and Modbus TCP protocol conversion
- Secure your network utilizing MDS Orbit’s exceptional cyber security suite addressing user, device and network security
- Rugged design and extended temperature range permit installation in harsh industrial environments

Applications
- **Oil & Gas**
  - Well Head and Production Pad Automation
  - WiFi Connectivity for Field Technician Operations
- **Water & Wastewater**
  - Level, Pressure and Flow Monitoring
  - Pipeline Monitoring and Control
- **Utility**
  - Distribution Automation for Legacy Line Devices
  - Substation Device Monitoring and Video Surveillance
- **Heavy Industrial**
  - Train Control and Machinery Monitoring
  - Excavation Machine Control
  - Facility Wide Network Extension to Offsite Areas

Comprehensive Security
- Security capabilities include firewall, IP sec, VPN and certificate management
- Secure boot cryptographic signature of firmware to prevent compromising the device
- SX.509 digital certificate management to simplify provisioning and lifecycle management
- Integrate with enterprise security systems (RADIUS, AAA, SCEP, and Syslog)

Advanced System Performance
- Hardware accelerated switching and high performance processors minimize latency
- Designed for harsh rugged environments
- Secure device management with NETCONF, HTTP, SNMPv3, and SSH
- Electrostatic discharge (ESD) protection
- Extended temperature range (-40°C to + 70°C)
- IEEE® 1613 and Class 1/Div 2 conformance

Ease of Use & Integration
- Industrial options for application flexibility including 10/100 Ethernet and RS232/485 serial ports
- Compact enclosure easily fits into existing cabinets
- Integrated DIN rail mount facilitates rapid deployment
MDS Orbit Series

GE MDS has been providing products to meet the specific and unique requirements for a broad range of industrial applications for over twenty-five years. The MDS Orbit Series extends the portfolio to support public infrastructure requirements. Built on a common platform, GE’s MDS Orbit Series provides integrated communications, enhanced security, consistent user interface configuration, common packaging, and the rugged construction inherent in all MDS products.

Flexible Communications

The MDS Orbit Series was designed to support Ethernet and legacy serial applications. Serial protocol support, both active and transparent, provides easy connectivity to common control and data acquisition equipment and protocols, such as Modbus and DNP3. The MDS Orbit MCR devices are equipped with two Ethernet ports, reducing the need for cabling when used in multiple Ethernet applications. Serial needs are covered by an RS232/RS485 port. A USB port provides access for a PC or laptop to connect and configure, troubleshoot, or maintain the device.

Provides a Secure Environment

Critical infrastructure communication must ensure availability, integrity, and confidentiality for data flows. The MDS Orbit platform provides a wealth of best-in-class cyber security capabilities. Cellular communication is protected with IPsec VPN, network address translation, and a stateful firewall. WiFi communication is protected with WPA/WPA2 security. Access to device management is protected through role-based access control with RADIUS integration and secure protocols including NETCONF, HTTPS, SNMPv3, and SSH. The MDS Orbit MCR is protected with boot security and digitally signed firmware.

Ease of Use

The combination of cellular and WiFi provides a method for extending communications across a well pad or substation. The MDS Orbit MCR with WiFi delivers 54 Mbps throughput making it ideal for video monitoring of remote sites with public access for backhaul. The compact enclosure easily fits into existing cabinets and its integrated DIN rail mount makes it a quick and easy product for deployment in all applications.

Network Management Ready

Once a network is operational, users are able to utilize the MDS PulseNET™ comprehensive network management system for end-to-end management. MDS PulseNET provides pre-built workflows, along with intuitive graphical representations of the communications network. It provides real-time availability, performance, and configuration management of all MDS radio products and select third party devices, allowing operations personnel to create customizable, pro-active support processes.
GE’s MDS Orbit Cellular Deployment Options

**Point to Point or Multipoint via Cellular APN**
- Support for modern cellular APN attachment
- Available security functionality includes firewalling and VPN

**Secure Communication via IPSec VPN Tunnels**
- IPSec VPN tunnels encrypt communication between MDS Orbits
- Stateful firewall protects against network intrusion
- Support for multiple VPN tunnels per device

**Redundant Cellular Uplinks**
- Flexible support for multiple cellular technologies within one device
- Dual SIM support enables multiple carrier option for redundancy at critical sites
- Failover to second carrier based on connection availability

**Extend Cellular Communication Using WiFi and 900 MHz**
- Seamlessly bridge cellular, WiFi and unlicensed 900 MHz networks
- Extend range up to 30 miles using unlicensed 900 MHz
- Store and forward extends range up to 8 hops
Application Example: Device Monitoring

Monitoring devices from a distance is achieved with the MDS Orbit MCR, which provides the bridge to tie your remote private networks to public access.

Application Example: Substation Communications

Utilities have distribution substations in remote areas of their franchise territory. Cellular coverage is often available at remote substations that may be outside of the utility’s established private network. These substations benefit from video surveillance to monitor for theft and equipment failure. Within the substation, the MDS Orbit MCR-WiFi stations communicate with the surveillance cameras and the MDS Orbit MCR-WiFi access point. The MDS Orbit MCR with WiFi provides the aggregated data back to the control center over the cellular network.
Application Example: Natural Gas Production

Use the Orbit WiFi for an unlicensed WiFi network across a gas production pad and provide wireless access to instrumentation, controllers, and flow meters for production and custody transfer. Backhaul site data to operations center by seamlessly bridging private local WiFi networks onto public 3G/4G infrastructure.

Multivariable pressure and level instruments connected via multidrop RS485 serial and polled using Modbus.

RTU via Serial and electronic valve control via Ethernet to a WiFi access point with 4G cellular backhaul.

MDS Orbit Platform – An Exterior View

- DC Power 10-60 VDC
- 2 - RJ45 10/100 Ethernet Ports
- USB 2.0
- RS 232/485 Serial Port
- Cellular Antenna
- SIM Ports
- 900 MHz Connector
# Technical Specifications

## CELLULAR 3G

| Protocol/Frequency | GSM, GPRS, EDGE, HSPA+  
|                    | 850/900/1800/1900 MHz  
|                    | UMTS, HSPA, HSPA+  
|                    | 800/850/900/1700/1900/2100 MHz  
| Region/CARRIER | Global  
|                  | PTCRB, GCF certification  
|                  | Regional carrier certifications  

| Max Throughput | 21 Mbps downlink  
|               | 5 Mbps uplink  

| Typical Throughput | 5.5 Mbps downlink  
|                   | 0.3 Mbps uplink  

## CELLULAR 4G

| Protocol/Frequency | LTE Release 8  
|                    | 700MHz  
|                    | CDMA  
|                    | Band class 0 (850 MHz)  
|                    | Band class 1 (1900 MHz)  
| Region/CARRIER | U.S. Verizon  

| Max Throughput | 50 Mbps downlink  
|               | 25 Mbps uplink  

| Typical Throughput | 21 Mbps downlink  
|                   | 10 Mbps uplink  

## WiFi

| Standard | IEEE 802.11 b/g/n  
|          | Operating Modes | Access Point, Station  
|          | AP Networking | Dual SSID with VLAN mapping  
|          | Security | WPA/WPA2 PSK, Enterprise  
|          | Carrier Power | 20dBm  

## PROTOCOL

| Networking | Layer 2 bridging  
|            | Layer 3 routing, QoS  

| Ethernet | IEEE 802.3, Spanning Tree (Bridging), VLAN, IGMP  
|          | TCP/IP, DHCP, ICMP, UDP, TCP  
|          | ARP, NTP, FTP, SFTP, TFTP, DNS  

| Serial | TCP server, TCP client  
|        | UDP Unicast and Multicast  
|        | Terminal Server for any asynchronous serial protocol  
|        | Modbus TCP to RTU conversion  

## PHYSICAL INTERFACES

| Ethernet | 10/100BaseT, RJ-45  
|          | Integrated Switch  

| Serial | RS-232/RS-485, RJ-45  
|        | USB 2.0 Management Port  

| Antenna Ports | 900 ISM: TNC  
|              | WiFi: RP-SMA  
|              | Cellular: SMA  

| LEDs | PWR, ETH, COM, NIC1, NIC2  

## ELECTRICAL

| Input Voltage | 10 – 60 Volt DC  
|              | Power Consumption | at 13.8 VDC  

<table>
<thead>
<tr>
<th>MCR 3G (NOMINAL, 25C)</th>
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</table>
| **MODE** | **POWER/CURRENT**  
| Connected (Idle) | 2.5W/182mA  
| Connected (Typical Download) | 3.2W/235mA  

<table>
<thead>
<tr>
<th>MCR 4G (NOMINAL, 25C)</th>
</tr>
</thead>
</table>
| **MODE** | **POWER/CURRENT**  
| Connected (Idle) | 4.0W/292mA  
| Connected (Typical Download) | 4.3W/310mA  

## MCR 4G (NOMINAL, 25C)
### Mechanical

<table>
<thead>
<tr>
<th>Case</th>
<th>Die Cast Aluminum</th>
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<tbody>
<tr>
<td>Dimensions</td>
<td>4.4 H x 20.3 W x 12.2 D cm. (1.75 H x 8.0 W x 4.8 D in.)</td>
</tr>
<tr>
<td>Weight</td>
<td>2 lbs</td>
</tr>
<tr>
<td>Mounting Options</td>
<td>Integrated DIN Rail mount, Standard Mounting bracket</td>
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</tbody>
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### Environmental

<table>
<thead>
<tr>
<th>Temperature</th>
<th>-40⁰ to 70⁰ C (-40⁰ to 158⁰ F)</th>
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<tbody>
<tr>
<td>Humidity</td>
<td>95% at 60⁰ C (140⁰ F) non-condensing</td>
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### Management

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

### Agency Approvals

- FCC Part 15
- IC
- ETSI / CE (3G and WiFi models)
- CSA Class 1, Div. 2, UL 508, UL 1604
- IEEE 1613

### Orbit Cyber Security Suite

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<thead>
<tr>
<th>Tunneling</th>
<th>IPSec VPN</th>
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<tbody>
<tr>
<td>900 ISM Encryption</td>
<td>AES-CCM 128/256 bit with auto key rotation</td>
</tr>
<tr>
<td>Authentication</td>
<td>RADIUS, PSK, EAP/TLS, PKI</td>
</tr>
<tr>
<td>Firewall</td>
<td>Stateful Packet Inspection, Access Control Lists, NAT</td>
</tr>
<tr>
<td>Certificates</td>
<td>X.509, SCEP, PEM, DER</td>
</tr>
<tr>
<td>Boot Security</td>
<td>Digitally signed firmware</td>
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### Accessories for the MDS Orbit MCR Series

- Antenna kit for WiFi cellular and cabling
- Antenna kit for WiFi only
- Stand-alone antennas
- Ground wire surge suppressors
For more information about GE Industrial Communications products visit GEDigitalEnergy.com/Communications