

# Mercury

## High Speed Industrial WiMAX Networking



### LAN Extension | Mobile and Fixed Long-Range

MDS Mercury is a highly secure, industrial-grade WiMAX platform for mission critical, industrial and public safety applications, including AMI, SCADA, Distributed Automation devices, video, VoIP, mobile data, and Intranet applications. With aggregate Ethernet throughput up to 9 Mbps (or 800 kbps for nomadic mobile deployments), and a choice of frequencies, MDS Mercury has the capacity, service prioritization, and deployment flexibility to facilitate your immediate and long-term requirements.

#### Key Benefits

- WiMAX technology for high-speed, long range point-to-multipoint communications
- Prevents unauthorized network access and secures data as it's transmitted over the air
- Rugged solution for operation in extreme temperature ranges and hazardous locations
- Reduces required infrastructure and simplifies deployment and maintenance
- Supports existing PLCs and RTUs with comprehensive serial protocol support

#### Application specific wireless solution



##### Energy

- High capacity wireless network for AMI collectors, aggregation locations, RTUs, voltage regulators, reclosures, cap banks, and switches.



##### Oil & Gas

- High capacity wireless network for SCADA & aggregation locations
- Monitor well-heads, video surveillance, and transmit Voice Over IP (VoIP)



##### Water & Wastewater

- Monitor vital water flow
- Transmit fast scan rate video surveillance feeds



##### Public Safety

- Mobile data access to dispatch system, agency Intranet for Amber Alerts, shift logs, and policies.

### WiMAX Technology

- Up to 9 Mbps, (800 kbps for mobile parked)
- Time-Division Duplexing (TDD) synchronization for deterministic deployments
- Seamless, automatic adaptive modulation for optimized throughput

### Industrially Hardened

- Operation in extreme temperatures from -40C to +70C
- Class I, Div 2 hazardous location approved
- IEEE-1613 approval for operation in electric substation environments
- Rugged aluminum chassis tested to military shock and vibration standards

### Application Flexibility

- Multi-Megabit speed accommodates multiple services on one infrastructure
- Long Range wireless communication, up to 15 miles (Fixed) and 4 miles (Mobile)
- IP/Ethernet and serial operate simultaneously on the same network
- Handles multiple industry protocols including DNP3, Modbus, Modbus-TCP, and Multicast/Unicast Ethernet

### Secure

- Built-in AES-128 encryption
- VLAN traffic data segregation
- Radius authentication and MAC address filtering for robust authentication



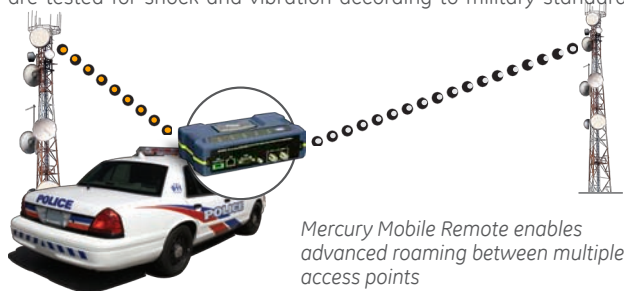
## Multi-use, Industrial Infrastructure

With high, WiMAX throughput, an organization may deploy an MDS Mercury solution to provide communications to mission-critical polling and monitoring devices with enough capacity remaining to provide additional services such as video surveillance, Voice over IP (VoIP), and with Mercury 900, mobile data.

VLAN tagging facilitates segregating sensitive operational data from administrative and overhead communications.

Advanced roaming algorithms make Mercury 900 the perfect choice for mobile applications. The Mercury remote can switch from one access point to another based on several criteria, such as signal strength, distance, and a combination of signal strength, distance, and bearing.

All MDS Mercury radios provide extreme operational temperature ranges, -40C to +70C, are housed in a rugged, aluminum chassis, and are tested for shock and vibration according to military standards.



These radios are built for mission-critical, industrial deployments.

## More Deterministic Deployments

The MDS Mercury platform provides channel selection options to permit using the clearest channels in a giving area, which facilitates optimized and more consistent throughput and latencies. Single channels may be selected, or for Mercury 900, multiple channels may be selected in the frequency hopping pattern.

Additionally, Time-Division Duplexing synchronizes access points (APs) to facilitate co-location of APs and overlap of coverage without introducing self-inflicted interference.

## Networking Flexibility

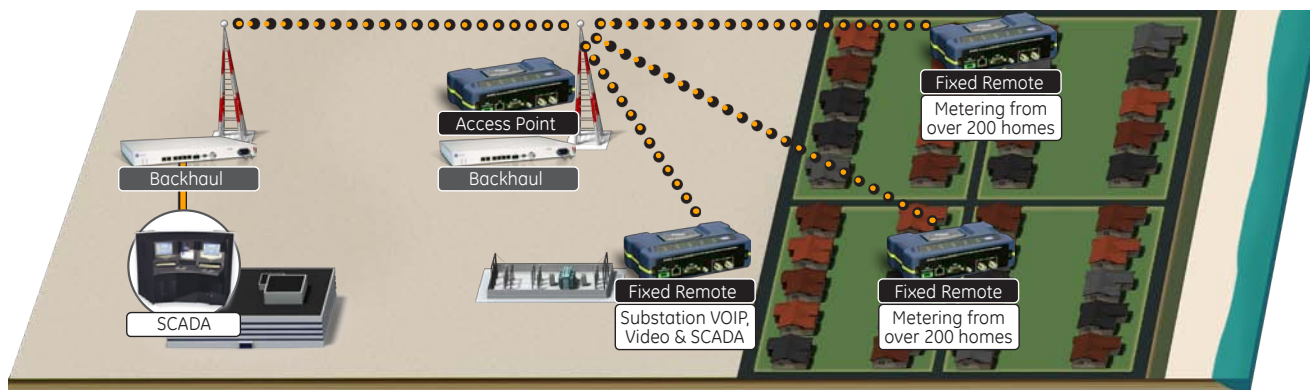
Serial protocol support, both active and transparent, provides communications to legacy and proprietary solutions as easily as Ethernet communications. Whether active Modbus TCP or transparently passing through TCP server, TCP client, Modbus TCP, Modbus RTU, and more, the MDS Mercury platform seamlessly provides a wide array of protocol support.

Additionally, frequency options available with the Mercury platform provide an organizations the ability to select the most appropriate frequency for their applications.

## Secure Communications

Sensitive communications must be protected from over-the-air capture and deciphering, and networks must be protected from unauthorized access. The MDS Mercury platform provides AES 128-bit encryption to protect data as it travels the air waves. Secure network authentication is provided by Radius authentication and MAC address filtering. Finally, sensitive data may be segregated using VLAN tagging.

## Mercury application advantages



### Multi-use, Secure Infrastructure

- High throughput to support multiple applications
- Transmission security, network authentication security, and segregation of sensitive data

### Flexible and More Deterministic

- Frequency options for best-band performance selection
- Full serial and Ethernet protocol support—in this same chassis
- Ability to block “noisy” channels

### Single-box Solution

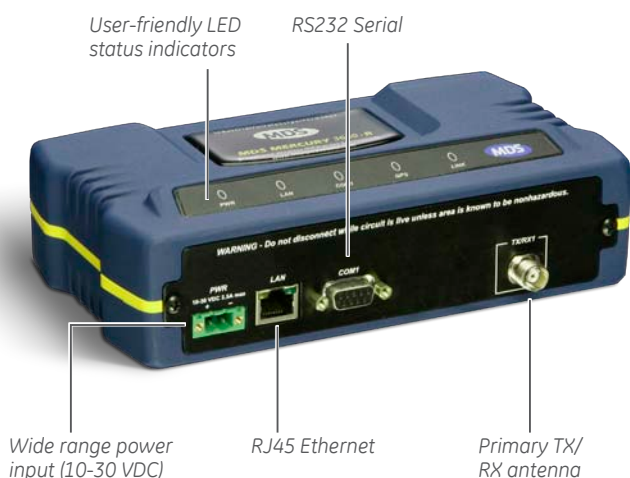
- Reduces points-of-failure
- Reduces infrastructure up to 67%
- Eases maintenance, support, and sparring

## Mercury 3650

### Superior throughput and protection

Mercury 3650 provides up to 9 mbps aggregate Ethernet throughput for fixed, point-to-point or point-to-multipoint deployments.

Mercury 3650 is highly secure with AES 128-bit encryption, Radius and MAC address filtering authentication, and VLAN tagging included as standard features. This industrial-grade, single-box solution delivers extreme temperature specs for all equipment, Class 1, Div 2 approval, and IEEE-1613-compliance, this solution is built to be deployed in harsh environments. As a single-box solution, infrastructure costs are reduced and significantly fewer points of failure exist.

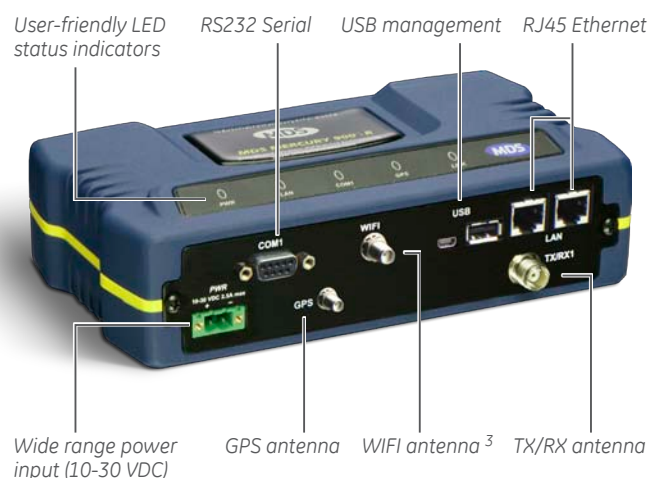


## Mercury 900

### High-speed, secure mobility

Mercury 900 is a premier mobile data solution for public safety and field force automation deployments where security, channel availability, and high throughput are required. While Mercury 900 may be deployed as fixed infrastructure, its feature set is optimized for mobility, to include advanced roaming capabilities and seamless adaptation to specific access point configuration settings.

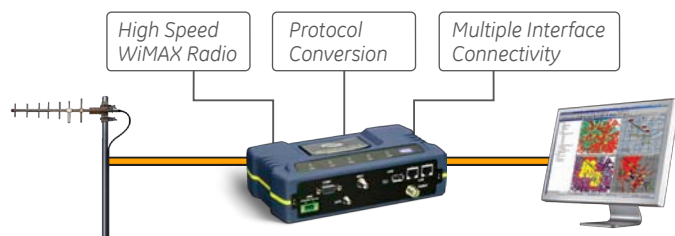
Officers or field workers benefit from up to 800 kbps aggregate Ethernet throughput while parked—throughput required for today’s feature-rich dispatch applications and accessing agency Intranet and e-mail systems.



## Single-box Solution

All required components, except an external antenna, are housed within a single MDS Mercury chassis. The radio, modem, interface connections, and TDD synchronization features are all part of one box. When deploying access points (i.e., base stations), no additional equipment is required for synchronizing co-located access points. For remote radios (i.e., subscriber units), no additional equipment is required for supporting serial and Ethernet connections simultaneously.

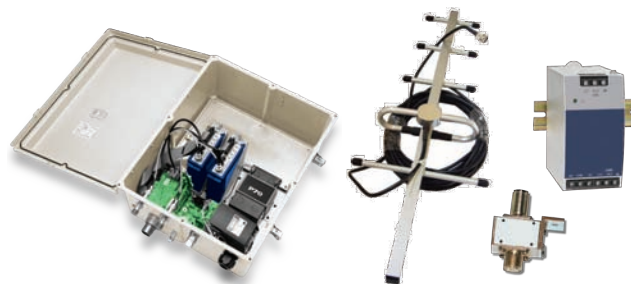
Additionally, there are no hidden fees for the full security suite and prioritization services—they’re all included as standard features.



All required components are included in the Mercury single-box solution

## Accessories & Custom Enclosures

GE MDS provides a complete line of reliable industrial-strength and cost-effective accessories that are tested to perform at optimal levels and maintain product warranties. GE MDS offers both standard and custom packages for wireless applications in harsh industrial environments. We simplify your wireless systems design by providing a convenient single-source ordering process. From antennas for the Mercury to field-rated power supplies for your mission-critical application, GE MDS can help ensure your system is robust and future-proof.



## Specifications

GENERAL	
Technology	802.16d-2004, WiMAX
Modulation	OFDM with FEC and configurable ARQ
Frame Duration	5 ms, 8 ms, 10 ms, 20 ms
Duplex Method	TDD with GPS synchronization, fixed or dynamic duty cycle
Output Impedance	50 Ohms
Available Configurations	Single box Access Point, single box Remote
MERCURY 900	
Frequency	902-928 MHz
Channel Size	1.75, 3.5 MHz
Carrier Power	100 mW – 1 W
Range	3 miles mobile, 1 - 2 typical
MERCURY 3650	
Frequency	3.65 – 3.70 GHz
Channel Size	1.75, 3.5, 5, 7MHz
Carrier Power	100 mW – 200 mW
Range	14 miles, 8 - 10 typical
Ethernet	10/100BaseT, RJ-45
PHYSICAL INTERFACES	
Ethernet	10/100BaseT, RJ-45
Serial	1,200 – 115,200 bps, COM1 RS-232, DB-9F

Antennas	TX/RX - TNC connectors, GPS - Female SMA connector
LEDs	PWR, LAN, COM1, GPS, LINK
OPTIONAL FEATURE SET	
Built-in 2.4GHz 802.11 b/g WiFi	
Second 10/100BaseT, RJ-45 Ethernet port with integrated switch	
USB 2.0 management port.	
PROTOCOLS	
Ethernet	IEEE 802.3, Spanning Tree (Bridging), VLAN, IGMP
TCP/IP	DHCP, ICMP, UDP, TCP, ARP, Multicast, SNMP, TFTP
Serial	Active Modbus TCP and transparent TCP server, TCP client, Modbus TCP, Modbus RTU, UDP Unicast, UDP Multicast, BSAP and DNP3
MDS CYBER SECURITY SUITE, LEVEL 1	
Encryption	AES-128 w. auto key rotation
Authentication	802.1x, RADIUS, EAP/TLS, PKI, PAP, CHAP
Management	SSL, SSH, HTTPS
MANAGEMENT	
HTTP, HTTPS, TELNET, SSH, SSL, local console	
SNMPv1/v2/v3, MIB-II, Enterprise MIB	
MDS NETview MS™ compatible	

ENVIRONMENTAL				
Temperature	-40°C to 70°C (-40°F to 158°F)			
Humidity	95% at 40°C (104°F) non-condensing			
MECHANICAL				
Case	Die Cast Aluminum			
Dimensions	5.715 H x 20 W x 12.382 D cm. (2.25 H x 7.875 W x 4.875 D in.)			
Weight	1kg (2.2 lb.)			
Mounting options	Flat surface mount brackets, DIN rail, 19" rack tray			
AGENCY APPROVALS				
FCC Part 15.247 (Mercury 900)				
FCC Part 90 (Mercury 3650)				
CSA Class 1 Div. 2 (UL 508, UL 1604)				
IC pending				
ELECTRICAL				
Input Voltage	10-30 Vdc			
Current Consumption (nominal)				
	<b>Mode</b>	<b>Power</b>	<b>13.8 Vdc</b>	<b>24 Vdc</b>
AP	Operational (50% TX)	12W	.87A	.5A
RM	Operational & Associated	8W	.58A	.33A

### Radio Sensitivity in dBm

Channel BW	1.75 MHz	3.5 MHz	5 MHz	7 MHz
MERCURY 3650				
BPSK	-99	-96	-95	-94
QPSK FEC 1/2	-96	-93	-91	-90
QPSK FEC 3/4	-93	-90	-88	-87
16QAM FEC 1/2	-90	-87	-85	-84
16QAM FEC 3/4	-87	-84	-82	-81
64QAM FEC 2/3	-84	-81	-79	-78
MERCURY 900				
BPSK FEC 1/2	-98	-95	N/A	N/A
QPSK FEC 1/2	-95	-92	N/A	N/A
QPSK FEC 3/4	-92	-89	N/A	N/A
16QAM FEC 1/2	-89	-86	N/A	N/A
16-QAM FEC 3/4	-86	-83	N/A	N/A
64-QAM FEC 2/3	-83	-80	N/A	N/A

### Signal Rate (SR) & Aggregate Ethernet Throughput (AET) in Mbps

Channel BW	1.75 MHz		3.5 MHz		5 MHz		7 MHz	
	SR	AET	SR	AET	SR	AET	SR	AET
MERCURY 3650								
BPSK	0.71	0.30	1.41	0.97	2.02	1.30	2.82	1.78
QPSK FEC 1/2	1.41	0.95	2.82	2.09	4.03	2.76	5.65	3.58
QPSK FEC 3/4	2.12	1.51	4.24	3.19	6.05	4.10	8.47	6.01
16QAM FEC 1/2	2.82	2.01	5.65	3.61	8.06	5.72	11.29	7.52
16QAM FEC 3/4	4.24	2.99	8.47	5.52	12.10	7.46	16.94	8.11
64QAM FEC 2/3	5.60	3.84	11.18	6.36	15.97	8.67	22.36	8.86
MERCURY 900*								
BPSK FEC 1/2	0.71	0.30	1.41	0.96	N/A	N/A	N/A	N/A
QPSK FEC 1/2	1.41	0.96	2.82	2.09	N/A	N/A	N/A	N/A
QPSK FEC 3/4	2.12	1.51	4.24	3.20	N/A	N/A	N/A	N/A
16QAM FEC 1/2	2.82	2.01	5.85	3.60	N/A	N/A	N/A	N/A
16-QAM FEC 3/4	4.24	2.99	8.47	5.52	N/A	N/A	N/A	N/A
64-QAM FEC 2/3	5.60	3.84	11.18	6.36	N/A	N/A	N/A	N/A

## Ordering

Mercury HG	X	X	N	X	0101FS0BMNNNN	X
A						Access Point
R						Remote radio
	9					902-928 MHz FCC
	3					3.65 GHz FCC
			1			900 MHz only - 17.5 MHz channel
			3			900 MHz only - 3.5 MHz channel
			N			for 3650
				S		SNMP only
				B		SNMP with NetView

### Order Code Example

HG-R3-N-3-0101FS0BMNNNN-B

- 3.65 GHz FCC Remote Radio
- 3.5 MHz channel size
- SNMP with NetView

### Accessories for the Mercury

Kit	900 MHz	3.65 GHz
AP kit with Omni	KAP-N09-F1	KAP-N36-F1
RM kit with Panel (fixed)	KFR-N09-F1	KFR-N36-F1
RM kit for Opt Set 1 with panel and WiFi antenna (fixed)	KFR-N09-F2	KFR-N36-F2

View Accessories catalog at [www.gemds.com](http://www.gemds.com)

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