

MDS Intrepid Series



Intrepid & Intrepid Ultra Maximized capacity and reliability Backhaul | Licensed & Unlicensed

The proliferation of IP devices and applications have resulted in a backhaul bottleneck, where the channel size required to carry data efficiently exceeds the network's capacity. The MDS™ Intrepid Series combats this challenge by providing higher capacity, reduced interference, Quality of Service (QoS) and simple deployment options.

The Intrepid Series is a cost effective, scalable, reliable and hardened backhaul solution that operates in the 2.3-2.4 and 4.8-6.0 GHz bands. In addition, Intrepid shares bandwidth between TDM and IP traffic, allowing for a smooth TDM to IP migration.

Key Benefits

- Offers economic solutions by providing several throughput options
- Smooth TDM to IP migration
- Full duplex or asymmetric throughput for application flexibility
- MIMO and OFDM technology for optimum performance
- Simple installation and maintenance with intuitive tools

Application Specific Wireless Solution



Energy & Utilities

- Backhaul AMI collectors and distribution automation networks
- Interconnect transmission and distribution substations



Public Safety & Government

- Interconnect multiple federal, state and local private networks
- Private emergency backhaul for disaster recovery



Oil & Gas

- SCADA control, disaster recovery, video surveillance
- WAN networks, interconnect control centers and campuses



Water & Wastewater

- SCADA monitoring and LAN/WAN networks
- Video surveillance, interconnect control centers

Protection and Control

- Phase segregated line current differential with adaptive restraint, ground differential, in-zone transformer and stub bus protection
- Phase & ground distance (5 zones) with independent compensation settings
- Thermal overload, phase, neutral & negative sequence directional overcurrent, broken conductor and reverse power

Advanced Communications

- 3 independent Ethernet ports for simultaneous & dedicated network connections with IEEE 1588 support
- Advanced IEC 61850 Edition 2 implementation with complete settings via SCL files and IEC 61850-9-2 process bus support
- Wide range of supported protocols: IEC 61850 Ed. 2, SFTP, MMS File Transfer Service, DNP 3.0, Modbus Serial/TCP, IEEE 1588, IEC 60870-5-104 and 103, PRP, SNTP, HTTP, TFTP
- Increased network availability by reducing failover time to zero through IEC 62439-3 PRP Support

Cyber Security

- CyberSentry™ provides high-end cyber security aligned to industry standards and services (NERC® CIP, AAA, Radius, RBAC, Syslog)

Monitoring & Metering

- Multi-ended fault location consistently providing 2% accuracy
- Advanced recording with high capacity event recorder, waveform capture, and data logger



Robust, Optimized Backhaul

The MDS Intrepid Series is comprised of the Intrepid and Intrepid Ultra. Both operate on the same frequency bands, share many advanced features and utilize the latest microwave technologies for high-speed data communication and spectral efficiency. Selecting one model over the other largely depends on the required data rate and coverage range.

Both Intrepid and Intrepid Ultra can be configured as (1+0), (1+1), hot standby, space diversity and ring protection functionality. Intrepid is built using multiple-input and multiple-output (MIMO) smart antenna technology which offers significant increases in data throughput and link range without additional channel size or transmit power.

Intrepid

25 Mbps Full Duplex/50 Mbps Aggregate Throughput

The Intrepid backhaul solution provides up to 25 Mbps full duplex/50 Mbps aggregate throughput. Featuring a wide range of options, the Intrepid is available as a compact IDU unit with two Ethernet ports and two T1/E1 ports, or as a 19" rack mountable IDU unit with two Ethernet ports and up to 8 T1/E1 ports.

Intrepid Ultra

100 Mbps Full Duplex/200 Mbps Aggregate Throughput

The Intrepid Ultra is the latest addition to the MDS backhaul portfolio. Providing 100 Mbps full duplex/200 Mbps aggregate throughput, the Intrepid Ultra solution is available as a compact IDU unit with two Ethernet ports and two T1/E1 ports, or as a 19" rack mountable IDU unit with two Ethernet ports and up to 16 T1/E1 ports.

Reduced Interference

The Intrepid Series has built-in interference combating technology to keep the over-the-air signal clear and strong despite the interference common in unlicensed bands.

Adaptive Coding and Modulation (ACM) is an interference reducing mechanism that optimizes the transmission rate while maintaining Quality of Service (QoS) by dynamically changing both the signal coding and modulation according to the interference levels.

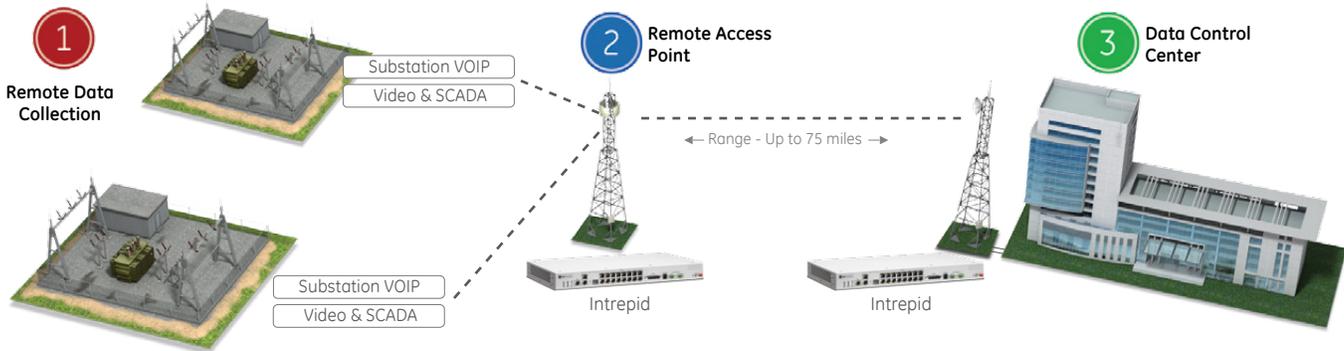
The Automatic Repeat Request (ARQ) feature provides fast retransmission of errant data. This, along with advanced Forward Error Correction (FEC) designed for low overhead, minimizes the latency and the error rate, and is especially important for delay-sensitive applications like Voice over IP (VoIP).

Application Flexibility

Both Intrepid and Intrepid Ultra can be used as a single point-to-point link from a central site using Hub Site Synchronization (HSS). The unique burst synchronization technique synchronizes the transmission of collocated radios, reducing mutual interference commonly experienced with collocated radios if one transmits while another simultaneously receives.

The Intrepid Series supports multiple frequency bands with the same hardware, making it easy to change frequency in the field without any new hardware. Frequency bands can easily be changed using the Link Manager, an easy, intuitive management and diagnostic tool.

Intrepid Series Application Advantages



Reliable Communications

- BER of $1.0E^{-11}$ with fast ARQ algorithm
- Native, low latency IP/Ethernet and TDM interfaces
- ACM and Automatic Channel Selection (ACS) facilitate easy changes for RF optimization
- Robust MIMO & OFDM technology for operation in frequency dense and non-line of sight environments

Flexible Deployment

- Multiple unlicensed frequencies
- Collocation of radios to optimize tower use via hub site synchronization
- Various channel size options facilitate best combination of range and speed
- Asymmetric throughput capacity feature allocates bandwidth to optimize payloads

Prioritized and Secure

- AES 128-bit encryption for secure data transmission
- QoS ensures most critical communications receive the highest priority

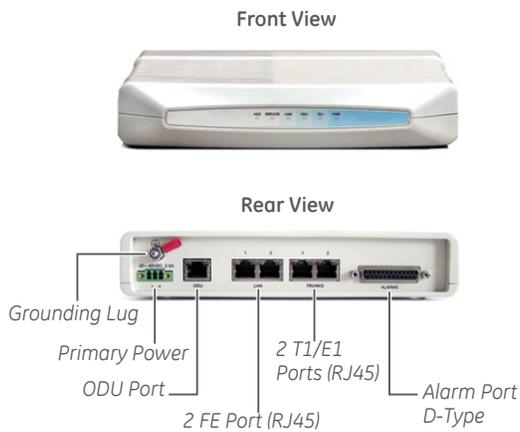
Secure & Reliable Communications

To ensure link security, the Intrepid Series encrypts data transmitted over-the-air using Advanced Encryption Standards (AES) with a 128-bit key.

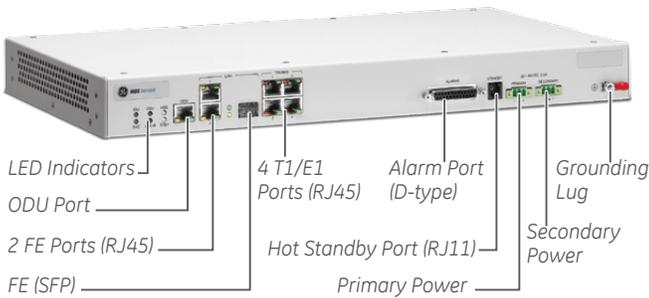
The MDS Intrepid Series is not only secure, but also reliable. In a (1+1) hot standby configuration, the automatic switchover from primary link to secondary link occurs within 50 milliseconds, with no impact on TDM services.

Like the other GE MDS products, the Intrepid Series is hardened to survive in rugged, harsh, or remote environments. Even in heavy rain or other extreme weather conditions, the Intrepid Series will continue to provide a wide, reliable, and robust backhaul channel.

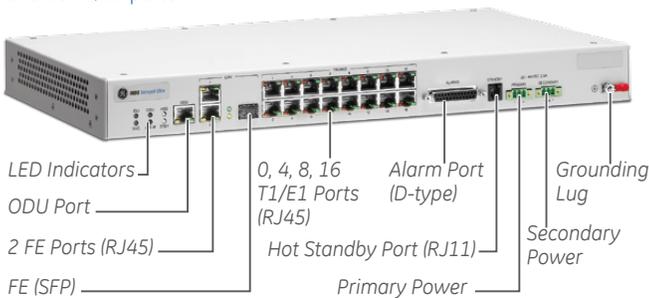
The compact IDU is available for both Intrepid and Intrepid Ultra and provides 2 T1/E1 ports and 2 Fast Ethernet (FE) ports.



The 19" rack mountable IDU for Intrepid and Intrepid Ultra provides 2 FE ports and up to 8 T1/E1 ports (4 T1/E1 shown).



The 19" rack mountable IDU for Intrepid Ultra provides 2 FE ports and 16 T1/E1 ports.

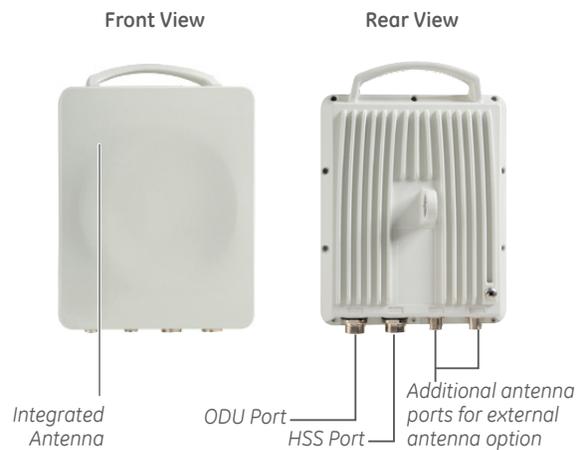


Indoor Unit / Outdoor Unit Configuration

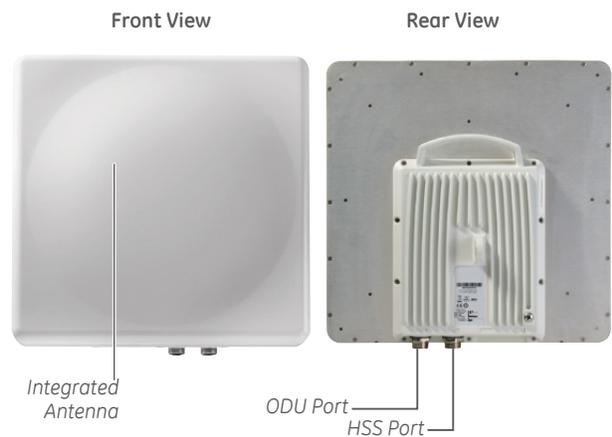
The Intrepid is offered as a split mount system consisting of an Indoor Unit (IDU) which contains interfaces and protocol firmware support, and an Outdoor Unit (ODU) which contains the RF and frequency-specific firmware. The ODU may be purchased with an integrated antenna or with external antenna connections.

The IDU is offered in an industrial-grade enclosure or a more cost effective standard enclosure. Alternatively, a Power over Ethernet (PoE) IEEE 802.3AF option is available.

MDS Intrepid ODU provides for both integrated and external antenna options in one package.



MDS Intrepid Ultra is available with integrated and external antenna options (integrated antenna option shown).



Specifications

	Intrepid Ultra	Intrepid
Operating Frequency	2.4, 4.9, 5.3-5.8 GHz	
Capacity Throughput	200 Mbps Asymmetric / 100 Mbps Full Duplex	50 Mbps Asymmetric / 25 Mbps Full Duplex
Max Range	120 km (75 miles)	
Channel Bandwidth	5, 10, 20, 40 MHz	5,10,20MHz
Max Transmitter Power	+25dBm	
Modulation	2x2MIMO-OFDM(BPSK,QPSK,16QAM,64QAM)	
Adaptive Modulation Code	Supported	
Automatic Channel Selection	Supported	
Bandwith Allocation	Symmetric or Asymmetric	
Diversity	Polarization and Space Diversity Supported	
Spectrum View	Built-in spectrum Analyzer	
Duplex Technology	TDD	
Radio Modes	MIMO/Diversity/Single	
Encryption	AES-128	
Interfaces	Ethernet Ports: 2 Fast Ethernet ports	
	TDM Ports: 0, 2,4, 8, or 16T1/E1 ports	TDM Ports: 0, 2, 4, or 8 T1/E1 ports
Configuration	(1+1), (1+0) , Monitored Hot Standby	
	Split mount (seperated IDU & ODU)	
Dimensions	IDU (19" Rack Mount Carrier Class): 43.6cm (W) x 4.5cm (H) x 21cm (D) : 1.5kg/3.3lb	
	IDU (Compact): 22cm (W) x 4.4cm (H) x 17cm (D); 0.5kg/1.1lb	
	ODU (Integrated Antenna): 37.1cm (W) x 37.1cm(H)x 11cm (D); 3.5kg/7lb	ODU (Integrated Antenna & Connectorized for External Antenna): 19.5cm (W) x 27.0cm(H) x 8cm (D); 1.8kg/3.6lb
	ODU (External Antenna): 19.5 cm (W) x 27.0cm(H) x 8cm (D); 1.8kg/3.6lb	
Operating Temperature	IDU: 0°C to +50°C	
	ODU:-35°C to +60°C	
Relative Humidity	IDU: up to 90% non-condensing	
	ODU: IP67; up to 100% condensing	
IDU Power - Feed - 19" Rack	Dual Redundent Feed: -20 to -60 VDC (DC power supply optional)	
IDU Power - Consumption 19" Rack	IDU + ODU: 20-35 Watts	
IDU Power - Feed - Compact	Single Feed: -20 to -60 VDC (DC power supply optional)	
IDU Power - Consumption Compact	IDU + ODU: 20-35 Watts	
POE Power	100-240 VAC	
POE Power - Consumption	POE + ODU: 5-15 Watts	
Antenna Connector	Type N-Female, Qty 2	
Antenna Gain - Internal /Dual Polarized @5.7GHz	23 dBi	15.5 dBi

Intrepid Antenna Options

Frequency (GHz)	Antenna Type	Gain (dBi)	Dimensions		Weight		Connector
			(mm)	(in)	(kg)	(lb)	
5.3-5.8	External - Dish	28	600 dia.	23.6 dia.	20.5	45	N-type Female
5.3-5.8	External - Flat panel	23	365 x 365 x 58	14.4 x 14.4 x 2.3	2.5	2.5	N-type Female
4.9	External - Flat panel	23	365 x 365 x 58	14.4 x 14.4 x 2.3	2.5	2.5	N-type Female
2.4	External - Flat panel	19	365 x 365 x 58	14.4 x 14.4 x 2.3	2.5	5.5	N-type Female

Radio Parameters at 20 MHz Channel Bandwidth

Modulation	2x2 MIMO - OFDM								
	BPSK	QPSK			16QAM		64QAM		
Forward Error Correction (FEC) Rate	1/2	1/2	3/4	1/2	3/4	2/3	3/4	5/6	
Air Rate (Mbps)	13	26	39	52	78	104	117	130	
Sensitivity (dBm) @ BER <10E-11, 20 MHz ChBw	-88	-86	-83	-81	-80	-72	-70	-67	



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English
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