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

Application Flexibility
- Native Ethernet and TDM traffic allowing for TDM to IP migration
- Multiple combinations of Ethernet and TDM ports
- Multiple point-to-point configuration and capacity options

Reliable & Scalable
- Built-in sophisticated interference combating mechanisms
- Ensured Quality of Service (QoS)
- Hot standby configuration with hitless, automatic switchover
- Dual power feeding

Secure
- Built-in AES 128-bit encryption
- Password protected access and lockdown

Easy to Use
- Link manager with Set-up Wizards for simple installation and configuration
- Easily change frequencies in the field
- Useful planning tools such as Spectrum View and Link Budget Calculator
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 1E-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

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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).

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### Intrepid Series

#### Specifications

<table>
<thead>
<tr>
<th>Operating Frequency</th>
<th>Intrepid Ultra</th>
<th>Intrepid</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4, 4.9, 5.3-5.8 GHz</td>
<td>2.4, 4.9, 5.3-5.8 GHz</td>
<td>5.3-5.8 GHz</td>
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</table>

#### Antenna Options

<table>
<thead>
<tr>
<th>Frequency [GHz]</th>
<th>Antenna Type</th>
<th>Gain (dBi)</th>
<th>Dimensions (mm)</th>
<th>Weight (kg)</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3-5.8</td>
<td>External - Dish</td>
<td>28</td>
<td>600 dia.</td>
<td>23.6 dia.</td>
<td>N-type Female</td>
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<tr>
<td>5.3-5.8</td>
<td>External - Flat panel</td>
<td>22</td>
<td>365 x 365 x 58</td>
<td>14.4 x 14.4 x 2.3</td>
<td>2.5</td>
</tr>
<tr>
<td>4.9</td>
<td>External - Flat panel</td>
<td>21</td>
<td>365 x 365 x 58</td>
<td>14.4 x 14.4 x 2.3</td>
<td>2.5</td>
</tr>
<tr>
<td>2.4</td>
<td>External - Flat panel</td>
<td>19</td>
<td>365 x 365 x 58</td>
<td>14.4 x 14.4 x 2.3</td>
<td>2.5</td>
</tr>
</tbody>
</table>

#### Radio Parameters at 20 MHz Channel Bandwidth

<table>
<thead>
<tr>
<th>Modulation</th>
<th>2x2 MIMO - OFDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPSK</td>
<td>1/2</td>
</tr>
<tr>
<td>QPSK</td>
<td>3/4</td>
</tr>
<tr>
<td>16QAM</td>
<td>3/4</td>
</tr>
<tr>
<td>64QAM</td>
<td>5/6</td>
</tr>
<tr>
<td>Forward Error Correction (FEC) Rate</td>
<td>1/2</td>
</tr>
<tr>
<td>Air Rate [Mbps]</td>
<td>13</td>
</tr>
<tr>
<td>Sensitivity [dBm] @ BER &lt;10E-11, 20 MHz ChBw</td>
<td>-88</td>
</tr>
</tbody>
</table>

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Intrepid Ultra: 200 Mbps Asymmetric / 100 Mbps Full Duplex
Intrepid: 50 Mbps Asymmetric / 25 Mbps Full Duplex

Max Range: 120 km (75 miles)

Channel Bandwidth: 5, 10, 20, 40 MHz

Max Transmitter Power: +25dBm

Modulation: 2x2MIMO-OFDM(BPSK,QPSK,16QAM,64QAM)

Adaptive Modulation Code: Supported

Automatic Channel Selection: Supported

Bandwidth 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

Configuration: TDM Ports: 0, 2, 4, 8, or 16T1/E1 ports

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 11cm (H) x 11cm (D): 1.5kg/3.3lb

ODU (External Antenna): 19.5 cm (W) x 27.0cm(H)x 8cm (D): 1.8kg/3.6lb

Operating: IDU: -35°C to +60°C

Temperature: ODU: -5°C to +60°C

Relative Humidity: ODU: up to 90% non-condensing

IDU Power - Feed - 19" Rack: Dual Redundant Feed - to -60 VDC (DC power supply optional)

IDU Power - Consumption 19" Rack: IDU + ODU: 20-35 Watts

IDU Power - Feed - Compact: Single Feed - to -60 VDC (DC power supply optional)

IDU Power - Consumption Compact: IDU + ODU: 20-35 Watts

POE Power: 100-240V AC

POE Power - Consumption: POE + ODU: 5-15 Watts

Antenna Connector: Type N-Female, Qty 2

Antenna Gain - Internal/Dual Polarized @5.7GHz: 23 dBi

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