Microwave
NETWORKS

Proteus MX

MADE IN
U.S.A

Intelligent Bandwidth for Evolving Networks

The Proteus MX is Microwave Networks' fourth generation TDM/ Ethernet hybrid backhaul radio. Microwave Networks designed the Proteus MX specifically for mission critical applications. It is available in two basic configurations.

- **The Proteus MX features** a robust design with total redundancy of all traffic and overhead channels with automatic switchover for the highest possible path reliability.
- **The Proteus MXD** is configured in a back-to-back repeater configuration for use in loop or route diversity networks where redundancy is provided through the use of multiple paths.

Together, there is an appropriate Proteus MX radio to fit almost any mission critical backhaul application.

Proteus MX offers mission critical carrier-class Ethernet along with native TDM in a single, feature rich, and flexible platform, allowing easy and cost effective migration from legacy TDM to Ethernet/IP networks.

Proteus MX features set it apart from other radios. Its flexible functionality offers high speed native Ethernet with Rapid Ring Protection, native TDM with native DS1 loop protection, and Adaptive Code and Modulation that optimizes throughput while protecting critical traffic. When configured for hot standby, the Proteus MX point-to-point radios incorporate active circuit redundancy of all data and overhead channels. An optional feature is AES encryption and FIPS 140-2 Level 2 module protection. Whether you're keeping pace with growing traffic demands, reconfiguring radio-link payload for new services, or adding cyber security and networking features, the Proteus MX is designed to adapt to your needs.

The convergence of voice, data, and video networks is transforming telecommuni -cations systems. Microwave Networks is ready to help you with mission critical microwave and integrated cyber security and networking solutions.

- **True 1+1 Mission Critical redundancy in a Licensed Band backhaul radio**
- **Native TDM and Native Ethernet**
- **Easy Network Migration**
- **MPLS Compatible Native Ethernet**

Effortless Migration from TDM to Ethernet/IP Networks

Available in a range of frequencies from 6 - 38 GHz, the Proteus MX radio supports mission critical reliability requirements in public safety, government, critical infrastructure, utilities, and mobile operator networks, including P25, DMR, and LTE networks.

Featuring native TDM and native Ethernet, the Proteus MX simplifies network migration, delivering new Ethernet/IP services while supporting TDM legacy equipment. Using the Proteus MX, native TDM has lower latency than encapsulated TDM over Ethernet, given the same path conditions. Low latency is essential for time sensitive applications.

In spur topologies using hot standby mode, the Proteus MX active circuit redundancy ensures mission critical network reliability. In ring network topologies the Proteus MXD back-to-back repeater configuration simplifies installation and reduces rack space requirements while providing self healing DS1 loop protection and Ethernet Rapid Ethernet Ring Protection for best network reliability and availability. The Proteus MX and Proteus MXD are available for indoor or split mount installation.

Supporting Mission Critical Legacy, P25, DMR, and LTE Networks

Features

- Native Ethernet and Native TDM
- 6,7,8,11,13,15,18,23,26, 38 GHz
- 6 to 350 Mbps throughput
- 10/100/1000 BaseT Ethernet
- 4 to 128 DS1; 1 to 4 DS3; OC-4/STM-1
- 1+0, 1+1, 1+0 Repeater, Space Diversity
- Hot Standby with redundancy of all active components
- Back-to-back Repeater Configuration
- SHARP loop protected DS1
- RRP+ loop protected Ethernet
- All Indoor or Split Mount configurations
- VLAN, IEEE 802.1p & 802.1Q
- Hitless Adaptive Code Modulation (ACM)
- Software selected bandwidth, modulation, capacity, frequency, and output power
- Chart recorder, spectrum analyzer, and constellation viewer for link monitoring and diagnostics
- AES 128, 196, and 256 bit Encryption
- FIPS 140-2 Level 2 validation
- CyberShield cyber security integration
- Native TDM and MPLS compatible Native Ethernet

Signal Processing Unit (SPU)

Data Line Interface	32xDS1 (2 x 64-pin Telco) ; 4xDS3 (8 x 75-ohm BNC) ; 155 Mbps (optical LC; SM or MM)
Gigabit Ethernet	4 x 10/100/1000 BaseT Gigabit Ethernet ports or 3 x 10/100/1000BaseT + 1 x 1000BaseT Optical (SFP)
FEC & Coding	Low Density Parity Check (LDPC)
Digital Engineering Orderwire	Integrated Digital or External RS-422 Digital O/W; 2 x RJ-45 jacks for daisy chain/external connection
Auxiliary Data Channels	2 x RS-232 up to 19.2 kbps async; 1 x RS-422 at 64 kbps async (not available if EOW configured)
Relay Alarm Outputs	4 x Form-C relays, NO & NC contacts (software mapped)
External Inputs	6 x TTL floating inputs
Configuration Memory	Removable SD FLASH memory card (store link/terminal data & performance history)
Dimensions (h x w x d)	Dimensions (h x w x d) 3.5 in. x 19 in. x 11.2 in. (2RU)
Weight	18 lbs.
Temperature	+23° F to +122° F (-5° C to +50° C)
Humidity	Up to 95% non-condensing
Input Power	+/- 19 to +/- 60 volts DC

Management

Protocol	SNMPv3 (also supports SNMP v1 and v2)
Authentication	RADIUS (client)
Element Manager (EM)	Java based management software; access radio through any local/remote management
NMS Interface	2 x RJ-45; 10/100/1000 BaseT; for access and bridging, configurable for in-band or out-of-band operation
Command Line Interface	RS-232 serial DB-9; for local VT-100 type interface or TELNET access
Modem (PPP)	RS-232 serial DB9; for dial-up access
Management IP Routing	RIP2 dynamic routing or static route maps
NMS Compatibility	OpenViewTM, NetViewTM, SNMPcTM or other SNMP-based NMS; Motorola MOSCAD; Motorola UEM

Standards Compliance

Safety	EN 60950
EMI/EMC	EN 301 489; EN 300 385
RF	EN 302 217-2
MAC QoS	IEEE P802.1p
VLAN	IEEE 802.1Q
Power Supply	EN 300 132-2
Storage	ETS 300 019-1-1 (Class 1.1E)
Transport	ETS 300 019-1-2 (Class 2.1E)
Environmental - SPU	ETS 300 019-1-3 (Class 3.1E)

System Specification

Operating Frequencies (GHz)	T/R Spacing (MHz)	
5.925 - 7.125	All FCC, ETSI and ITU spacings	
7.125 - 7.900	154, 160, 161, 168, 196, 245, 300	
7.900 – 8.500	119, 126, 151.614, 208, 266, 311.32	
10.70 – 11.70	490, 500, 530	
12.75 – 13.25	200, 225, 266	
14.40 - 15.35	315, 322, 420, 475, 490, 640, 644, 728	
17.70 - 19.70	1008, 1010, 1092.5, 1120, 1560	
21.20 - 23.60	1008, 1200, 1232	
24.20 - 26.50	800, 1008	
37.00 - 40.00	700, 812, 1260	
Frequency Stability	+/- 10 ppm (.001 %)	
RX overload	- 20 dBm for < 10^{-6} BER	
Residual BER	Better than 10^{-12}	
Altitude	15,000 ft.	
Power Consumption (max.)	Split-mount: 80 W non-protected, 166 W protected	All-indoor: 120 W non-protected, 250 W protected

RF Unit and Antenna

	Split Mount Outdoor Unit (ODU)	All Indoor RF Unit
Frequencies	6, 7, 8, 11, 13, 15, 18, 23, 26 and 38 GHz	6, 7, 8, and 11 GHz
Configuration	Split-mount; SPU inside / ODU outside	All indoor rack mounted
Dimensions	10.2 in. diameter; 5.9 in. deep	7.0 in. x 19 in. x 11.5 in. (4RU)
Weight	11 lbs.	27 lbs.
Temperature		
Full Performance	-27°F to 131°F (-33° C to +55° C)	+23° F to +122° F (-5° C to +50°
Operational	-67°F to 131°F (-55° C to +55° C)	
Humidity	Up to 100%	95 % (no condensation)
Output Power Control	-4 dBm to Max	+8 dBm to Max
SPU to ODU Interface	TNC female (SPU); N-type female (ODU)	
Recommended Cable	RG-8A/U equivalent; 50 Ohms	Elliptical Waveguide
Max. SPU to ODU distance	850 feet using RG-8A/U	
Intermediate Frequencies	SPU to ODU - 350 MHz; ODU to SPU - 140 MHz	
Antenna Diameter (ft.)	Category A - 1,2,3,4,6,8,10, 12	
Antenna Connection Options	Integrated push-fit or remote mounting	6 GHz: CMR-137F, CPR-137F; 7/8 GHz: UG-51/U; 11 GHz: CPR-90, UG-39/U

Specifications are subject to change without notice.