

MDS™ ORBIT TD SERIES

Robust Communication for Positive Train Control Solution

GE Vernova has a strong history of collaborating with rail operators and partners to overcome the industry's unique challenges. Whether it be novel applications using the MDS Orbit Platform or creating entirely new designs to meet rail-specific operational requirements, GE Vernova strives to be the solution provider that the industry can rely on.

Positive Train Control (PTC) is an application designed to enhance the safety of rail operations. PTC systems intelligently generate dynamic speed limits for trains to increase efficiency while maintaining safety. A PTC system can automatically slow or even stop a train when it detects a work crew, another train, a blocked crossing, or a signal ahead on the track. GE Vernova has worked with several PTC vendors for many years to refine a radio communications system ideally suited for PTC: MDS Orbit series.

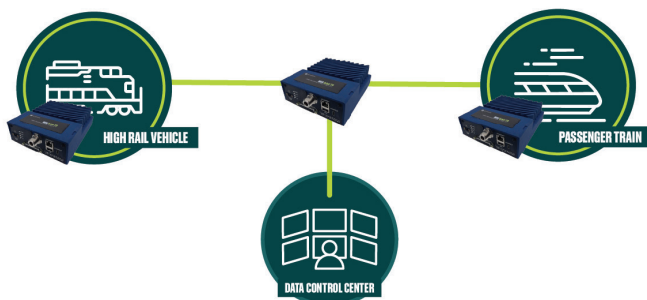
The new MDS Orbit TD series provides direct wireless connectivity between locomotives and wayside infrastructure connected to the Data Control Center.

The MDS Orbit TD series supports the 220, 256, and 450 MHz frequency bands, as well as various protocols and media access control (MAC) mechanisms.

Key Benefits

- 25 Watt transmit power for long-haul coverage.
- Backwards-compatibility with legacy MDS TD series
- Cost-effective without software licenses or maintenance fees
- Patented Forward Error Correction scheme for robustness in high-speed rail applications
- Ethernet and Serial Ports via a single rugged DB-25 connector.
- Standalone ethernet interface to use with local or remote controllers and devices.
- Optimized TDMA MAC supporting single-frequency operation, reducing spectrum license requirements

Positive Train Control Architecture



Backwards Compatibility and Forward Migration

- Compatible with legacy MDS TD Radio-based systems
- Works seamlessly with newer MDS Orbit TD series products over-the-air.
- Supports IP Ethernet and future network upgrades.

Improved Safety and Efficiency

- Error control mechanisms reduce downtime and operational failures.
- High reliability standards support both freight and passenger rail.
- Enhances safety by maintaining reliable control, logistics, and monitoring systems.
- Effective in freight, mining, commuter rail.

Industrial Strength Equipment

- Built to withstand harsh environmental conditions, with an operational temperature range from -40°C to 70°C. (-40 F to 158°F)
- Designed and tested to meet ETSI, FCC ANATEL and AREMA industry standards.
- Ideal for rugged deployments in challenging rail environments.



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Technical Specification

RADIO SPECS	
Technology	TDMA
Frequency Band	TD220: 216.0-221.9875 MHz TD256: 242-247/256-261 MHz TD450: 450-520 MHz
Data Rate	TD220/TD256: 9.6 kbps TD450: 16 kbps
Channel Bandwidth	TD220/TD256: 12.5 kHz TD450: 25kHz
Timing Mode	- Base: - GPS - NMEA 0183 1PPS 0-5 VDC - PTP: IEEE 1588-2008 PTPv2 - Mobile: Over-the-Air
Over-the-Air frame structure	TD220/TD256: 8 slots/sec (133 Bytes/Slot) TD450 12 slots/sec (149 Bytes/Slot)
TX Power	2-25 Watts (33-44 dBm)
Output Impedance	50 Ohms
Duty Cycle	25W / 30% Duty* 10W / 50% Duty* 2w / 100% Duty* * TD220/TD256 only. For TD450, Max Duty, at any power is Base 16.7%, Mobile 5.6%.
Epoch	TD220/TD256: 1 to 30 sec TD450: 3 sec
Modulation	GMSK

AGENCY APPROVALS	
ETSI, FCC, AREMA, ANATEL	Yes

SECURITY	
IPSec VPN Server (responder) and Client (initiator)	
Authentication Public Key, EAPTLS, Pre-Shared, Ike 1-2	
Encryption : 3DES, CBC, CTR, GCM, SHA 256/384/512 HMAC	
Firewalling: Stateful Layer 3-4 Firewall with MAC Filtering, NAT, Source NAT (Masquerading), Static NAT, Port Forwarding, rule violation notifications	
Device Security: Secure Boot, Secure Firmware, Digitally Signed Hardware and Software	
Certificate Management: X.509, SCEP, PEM, DER, RSA	
Automatic certificate renewal/re-enrollment	
User Authentication: Local RBAC, AAA/RADIUS, 802.1x	

INTERFACES	
DB-25	1x 10/100 Ethernet 1x RS-232C Serial Ports (1.2 to 115.2 kbps) 1x GPS PPS input (TTL) 1x External Alarm Pin - Configurable for Active Hi or Low
Ethernet	1x 10/100 Ethernet (RJ-45) 2x LEDs
USB	1x USB 1.1 (Type-A)
USB-C	1x USB-C (Console)
Power	2-pin DC power connector
Antenna	1x Type N Connector (Female)
LEDs	PWR, ETH, TX, RX

MECHANICAL	
Dimensions	6.7" L x 5.6" W x 2.0" H 17.0 L x 14.3 W x 5.0 H (cm)
Weight	3.1 lbs /1.4kgs
Material	Aluminum

PROTOCOLS	
Temperature	-40 °C to +70 °C (-40 °F to +158 °F)
Humidity	95% at 40 °C (104° F) non-condensing
Input Power	10.0 to 16 VDC (Negative ground only), 13.8 VDC Nominal

PROTOCOLS	
Management	WebUI (HTTP/HTTPS), Serial console, NETCONF, SSH, SNMP (Gets and Traps).
Payload	- TD220/TD256: STFP - TD450: ITCS-over-UDP

NETWORKING	
IPv4 Routing, OSPF, EGBP, RIPv2 with performance-based route failover	
Full managed switch capability, IEEE 802.3,802.1Q/VLANs, 64 VLANs, STP	
Current Bridging & Routing	
GRE Tunneling with Layer 2 (Ethernet) and Layer 3 support	
Route/path failover between any two Ethernet interfaces based on link loss, latency degradation, or packet loss thresholds	
Quality of service: 16 egress queues, priority queuing, fair queuing,traffic shaping, classification based on DSCP, 802.1p and layer 2-4 classifiers	
IP Protocols, TCS, UDP, ARP, DHCP, ICMP, NTP, FTP, SFTP, TFTP, DNS, configurable HTTP and HTTPS, SSH	
Serial TPC server,Modbus/TCP, Modbus RTU, TCP client, UDP	
Unicast and Multicast, BSAP, and DNP3	
VRF, Open VPN, FlexVPN, and VPN DPD*	

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