mmWave Onboard Rail Node

Oryx-7321

- **Compact, multi-gigabit train-top and train node**
  - Data rates up to 3 Gbps per radio
  - Optimized wireless connectivity using integrated phased array antennas
  - Compact IP66 rated train-top
- **Designed for on-board deployment**
  - Easy installation of self-cleaning train-top mounting
  - Single cable connecting train top unit with CPU
  - EN 50155 compliant
- **mmWave connectivity with unlicensed bands**
  - Uses 57-71 GHz mmWave unlicensed bands
  - Supports train speeds up to 500 kmph
  - Typical range of 1 Gbps at 1 km

CE EN 45545-2 Fire Safety EN 50155 On-board Rail

Westermo's mmWave solution for high-speed transport provides continuous, on-the-move multi-gigabit connectivity between trackside and train for on-board services including Passenger Internet Access, CCTV upload and data exchange.

The Oryx-7321 node is qualified for onboard deployment with extended service life and low maintenance. This node comes with three units. A train top unit, a cable and an in-train CPU. The compact Oryx-7321 is EN 50155 compliant for onboard installation.

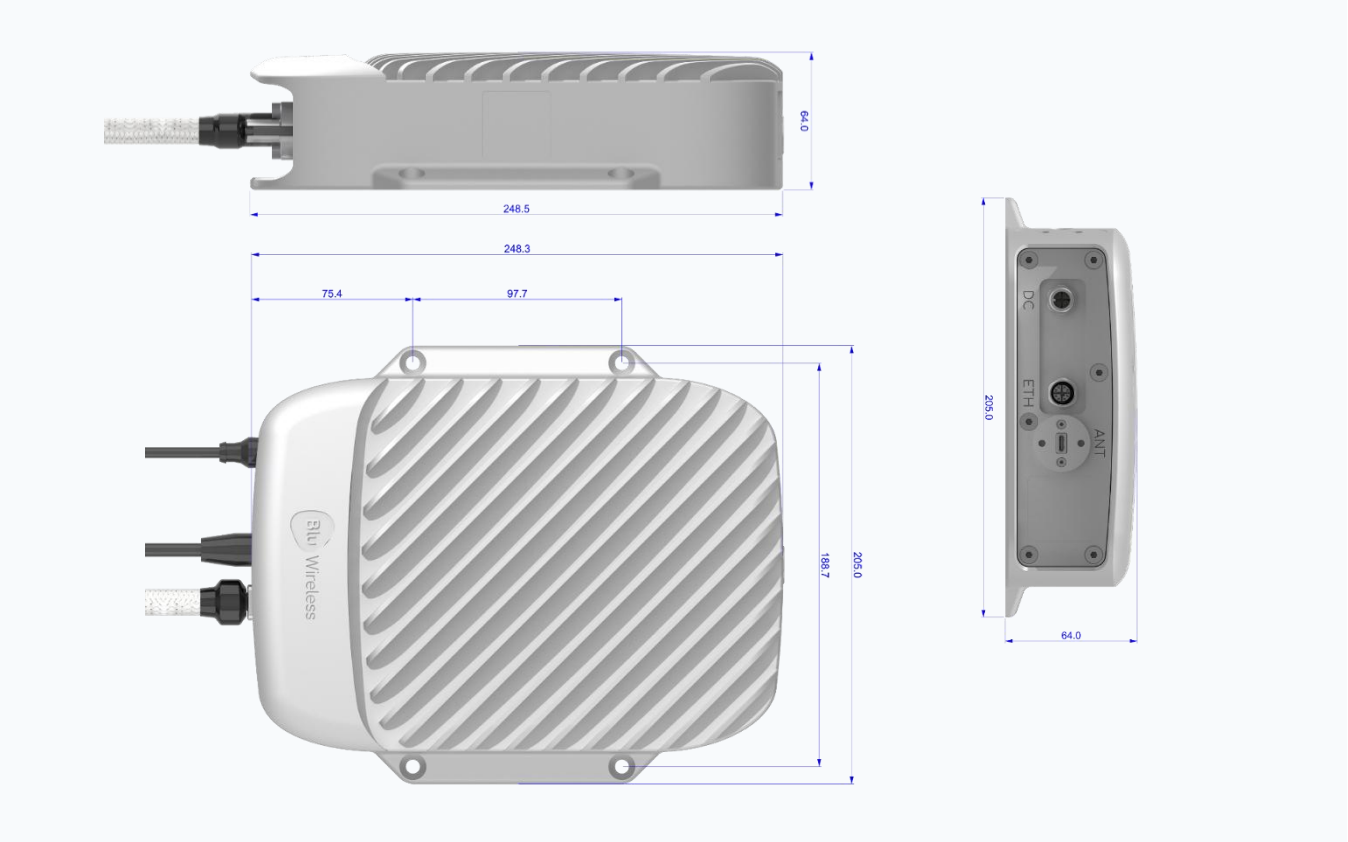
The Oryx-7321 onboard unit works together with Oryx-7322 trackside unit to form a multi-gigabit link between train and trackside. Both feature two radios which work together to maintain an aggregated data throughput of between 2-4 Gbps per train, continuously and at speed.

Trackside and train units include the RWM6050 dual modem IC with HYDRA technology developed by Blu Wireless, two-sector electronic phased array antennas operating in 60 GHz unlicensed spectrum, and a quad-core ARM Network Processor. The units support flexible network and edge application configuration in a standard and secure Linux environment.

The Oryx-7321 is equipped with the latest cybersecurity features and updates. The links have AES128 encryption in the nominal configuration and AES256 in the extended range configuration.

Specifications - Oryx-7321

Dimensional drawing



Technical data	
Dimensions (W x H x D)	NPU (in-train): 28 x 250 x 205 mm (1.10 x 9.84 x 8.07 inches) Radio head (train-top): 200 x 155 x 75 mm (7.87 x 6.10 x 2.95 inches) Cable: 2 m (78.72 inches)
Housing	Full metal (type)
Weight	NPU (in-train): 3.0 kg Radio head (train-top): 2.3 kg
Ambient temperature	-25 to +45°C up to +55°C with reduced performance (-13.0 to +131.0 °F)
Ingress protection	TN001XC: IP54 TN201SP: IP66
MTBF	TN201SC: 100k hours (15.2 years, according to 75 % duty cycle in mission profile) Note that MTBF varies with the assumed ambient temperature. We reference EN50125-1:2014, which indicates 25 °C should be used for all temperature classes for MTBF (section 4.3).
Rated voltage	20 to 48 VDC
Nominal voltage	36 VDC
Rated power	40 W nominal (70 W max.)

Interface	
Antenna	2x phased array antennas for 57-71 GHz with data rates up to 3 Gbps
Ethernet	10 GBASE-T

Wireless	
Standard supported	IEEE 802.11ad
Link Management	Mobile Connection Manager for wireless link management
Frequency range	57 to 71 GHz
Channel bandwidth	Nominal: 1760 MHz Extended range: 880 MHz
Channel support	Supports all six IEEE 802.11ad channels
Beamforming	Beam alignment and tracking using electronic phased-array antennas to accommodate installation, track gradient and bends
Phased array azimuth steerability	+/-45 degrees for each radio
Azimuth beamwidth	7 degrees
Elevation beamwidth	20 degrees
Data throughput	Nominal configuration: 3 Gbps per radio Extended range: 1.5 Gbps Typical throughput for a train equipped with 2 Oryx-7321 units: 2.0 Gbps journey average (dependent on deployment parameters)
Modulation scheme	BPSK, QPSK, 16QAM
Transmit power EIRP	+40 dBm
Range	Typical range (nominal configuration): 1 Gbps at 1 km (dry) and 1 Gbps at 650 m (wet Zone F rain fade) Extended range adds +40 % range for 50 % of data rate

Features	
Link encryption	Nominal: unencrypted or AES 128 Extended range: unencrypted or AES 256
Network coordination	High-speed transport optimised link selection and management
Network operations	Support for NMS, configuration, telemetry and software update services
Networking	Multi-queue QoS Support for Link Aggregation SON support via API OA&M capability
Applications processor	Quad-core 1.8 GHz ARM v8 CPU Linux OS with user-space networking Remote diagnostics and software upgrade Network and security acceleration

Approvals and Standards	
Conformity	CE, FCC, EN 50155
Radio regulatory approvals	US FCC Part 15.255 and EU Radio Equipment Directive (RED)

Ordering information			
Art. no.	**Model**	**Blu Wireless Part Number**	**Description**
3623-73210	Oryx-7321-T1G10-OB-3P	TN201SC	mmWave in-train, train top node and connecting cable. Total 3 components - TN001XC – in-train control unit - TN201SP – train top radio unit - TNCAB2B – cable