RailBox V2 series

High performance railway router, with WiFi 6 / WiFi 6E and LTE 4G / 5G connectivity for Onboard and Trackside communications

- Single or dual radio WiFi and cellular :
  > WiFi 802.11ax MIMO 4T4R dual band 2.4 GHz and 5GHz
  > New WiFi 6E (6 GHz) version now available
  > 4G LTE or 5G cellular radio with dual sim
- 2 Ethernet ports 2.5Gbps
- Multi-functions router, AP, client, mesh
- Inter-Carriage Link (ICL):
  > SRCC automatic coupling
  > Ethernet Bypass relay (optional)
- Access Point:
  > Load balancing, band steering, Hotspot 2.0
  > Cybersecurity : Rogue AP Detection, WPA3 personnal & enterprise
- Fast Roaming:
  > CBB roaming with less than 0.1% packet loss
- NMS WaveManager
- EN50155, EN45545 certified router :
  > Ultra-wide 24 to 110 VDC or PoE++ 802.3bt type 3
  > Dual insulated redundant power supply input

FAST ROAMING

Introduction

RailBox V2 is a rugged device designed for railway and light rail applications. It can be mounted on trains, subways, trams or in any equipment that requires robustness and high bandwidth for innovative services on the move.

RailBox V2 can be implemented by system integrators and rail vehicle manufacturers who are seeking to establish reliable, efficient and agile network for:
- Uninterrupted train-to-trackside communications (CBTC, CCTV, VoIP, preventive maintenance, PIS...)
- Train and carriage coupling to establish an end-to-end Ethernet and IP backbone
- Passenger services like onboard WiFi, videostreaming, entertainment, infotainment...
- High Speed data offload at the station or depot

The device relies on the multi-streams MU-MIMO and beamforming technology that contributes to an expanded coverage, higher data throughput and increased radio link reliability.

It fulfills the most severe requirements in terms of operating environment: from -25°C to +70°C (extended : -40°C to +70°C), shock and vibration proof, protection against dust and water projections (IP66).

RailBox V2 is an evolution of Railbox, with exactly the same footprint (same dimensions and same connectors). This allows a smooth and cost-efficient upgrade of customers already equipped with Railbox products.

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Technical characteristics overview

Ethernet interface	2-port Gigabit Ethernet 100/1000/2500 auto-sensing, up to 5 Gbps link aggregation, water and vibration proof rapid connect 8-point M12 X-coded connectors (CAT-6A) plug & play mode & auto MDI/MDIX cross-over, optional Ethernet bypass that redirects the network traffic in case of device or power supply failure (for daisy chain topologies)
Radio interfaces	Radio 1: none or WiFi Radio 2: none or WiFi or cellular
Security	Firewall, DoS, https, MAC filtering, WPA/WPA2/WPA3-Personal & Enterprise (IEEE 802.1X/RADIUS), tunnels L2 (GRE), VPN (OpenVPN, IPsec), SNMP V3, Rogue AP detector, File system integrity monitor, Strong password policy, Management of opened ports and services
WiFi Modes	AP, client, MESH (IEEE 802.11s), infrastructure, fast roaming (less than 30 ms), WMM QoS
WiFi Services	Hot Spot 2.0, Wireless Load Balancing (load balancing, band steering, client roaming control, association control per SSID)
Cellular Services	Dynamic DNS, Auto APN, Switch SIM, Multi APN
ACKSYS enhanced features	Connect Before Break, Smart Redundant Carriage Coupling
Ethernet networking	Frames filtering, bridging, repeater, STP/RSTP, VLAN, DHCP (server & client), DNS relay, IPv6 compliant
Ethernet routing	Multicast (PIM), IP redundancy (VRRP), static routes, NAT router, router, carriage coupling system (SRCC)
Administration	http, https, SNMP agent (V1, V2C, V3), WaveManager administration software, save / restore configuration key (C-Key)
LEDs Signaling	Radio: quality, activity and status | Ethernet: link 100/1000/2500, activity | Power: on-off
Alarms & Inputs	A 3-pin Waterproof M8 connector with: - one solid state relay output warning (with configurable action), 1 Form A, 60VDC 80mA max - one input for external device control 24VDC max
Power supply	Dual insulated redundant input (1500V insulation, M12 connectors 4-pole A-coded) 24 to 110 VDC (EN50155 nominal), with ground lug. PoE++ 802.3bt type 3 model with ground lug also available.
Consumption	26W typical power consumption (dual radio), 30W max
Dimensions & weight	Compact shockproof rugged aluminium enclosure, (L: 80 x l: 175 x h: 57 mm), 900g Removable fixing plate: 4-point fixing plate with ground lug (L: 80 x l: 225 x h: 4 mm), 200g
Standards and certifications	CE (RED) Safety: EN 62368-1:2014+A11, EN62311 EMC: EN 301 489 [-1], [-17] Radio: EN 300 328 (2.4 GHz), EN 301 893 (5 GHz, DFS) EMC: EN 50155, EN 50121-3-2 Environmental: • Shocks and vibration: EN 61373 (CAT 1 CLASS B) • Climatic: EN60068-2 [-1, -2, -30] • Fire/smoke: EN45545-2 (HL3), NF F16-101 (M1F1), NFPA 130
Environment	Operating : -25°C to +70°C (HR 0-99%) Extended : -40°C to +70°C / +85°C for 10 mn, EN 50155 class TX Storage: -40°C to +80°C IP66 seal rating, GORE ® protective vent (dehumidifying membrane)

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Technical characteristics overview

WiFi				
WiFi radio cards	802.11n: 802.11ac: 802.11ac wave 2: 802.11ax (WiFi 6):	MCS0-7 MCS0-9 MCS0-9 MCS0-11	3 streams (up to 450 Mbps) 3 streams (up to 1.3 Gbps) 4 streams (up to 1.73 Gbps) 4 streams (up to 4.8 Gbps)	3 QMA connectors 3 QMA connectors 4 QMA connectors Up to 4 QMA connectors
Operating frequencies	Supports all ISM and UNII bands, 2.4 and 5GHz Supports HT20, HT40, HT80, HT160, depending on the WiFi radio card Supports DFS and TPC Supports 5.925 to 7.125 Ghz, only on WiFi 6E model			
Radio max transmit power	Up to 24dBm (aggregate)			
CELLULAR LTE 4G cat.12 : Worldwide coverage + GNSS (active antenna) - RailBox/xS model				
Operating frequencies	**LTE-FDD** (with Rx-diversity) B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66 **LTE-TDD** (with Rx-diversity) B38/B39/B40/B41/B42/B43/B46/B48 **WCDMA** (with Rx-diversity) B1/B2/B3/B4/B5/B6/B8/B19			
Cellular radio data rate	Max. downlink 600Mbps / Max. uplink 150 Mbps			
SIM	2 x micro SIM			
Navigation	GNSS Multi-constellation (GPS, GLONASS, BEiDou, Galileo). Requires an active antenna.			
Connectors	2 x QMA for Cellular and 1 x QMA for GNSS			
CELLULAR 5G WITH PASSIVE ANTENNA : Worldwide coverage + GNSS (passive antenna) - RailBox/xU model				
Operating frequencies	**5G NR SA** : n1/n2/n3/n5/n7/n8/n12/n13/n14/n18/n20/n25/n26/n28/n29/n30/n38/n40/n41/n48/n66/n70/n71/n75/n76/n77/n78/n79 **DL 4x 4 MIMO** : n1/n2/n3/n7/n25/n30/n38/n40/n41/n48/n66/n70/n77/n78/n79 **UL 2x 2 MIMO** : n38/n41/n48/n77/n78/n79 **5G NR NSA** : n1/n2/n3/n5/n7/n8/n12/n13/n14/n18/n20/n25/n26/n28/n29/n30/n38/n40/n41/n48/n66/n70/n71/n75/n76/n77/n78/n79 **DL 4x 4 MIMO** : n1/n2/n3/n7/n25/n30/n38/n40/n41/n48/n66/n70/n77/n78/n79 **LTE-FDD** **FDD** : B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66/B71 **TDD :** B34/B38/B39/B40/B41/B42/B43/B46(LAA)/B48 **DL 4 x 4 MIMO** : B1/B2/B3/B4/B7/B25/B30/B38/B40/B41/B42/B43/B48/B66 **WCDMA** : B1/B2/B4/B5/B8/B19			
Cellular radio data rate	**5G SA Sub-6** **5G NSA Sub-6** **LTE** **DC-HSDPA** **HSUPA** **WCDMA**		DL 2.4 Gbps; UL 900 Mbps DL 3.2 Gbps; UL 550 Mbps DL 1.6 Gbps; UL 200 Mbps DL 42 Mbps UL 5.76 Mbps DL 384 kbps; UL 384 kbps	
SIM	2 x micro SIM			
Navigation	GNSS Multi-constellation (GPS, GLONASS, BEiDou, Galileo). Requires a passive antenna.			
Connectors	4 x QMA for Cellular (or 3 x QMA for Cellular and 1 x QMA for GNSS)			
CELLULAR 5G WITH ACTIVE ANTENNA Worldwide coverage + GNSS (active antenna) - RailBox/xV model				
Operating frequencies	**5G NR SA** : n1/n2/n3/n5/n7/n8/n12/n20/n25/n28/n38/n40/n41/n48/n66/n71/n77/n78/n79 **DL 4x 4 MIMO** : n1/n2/n3/n7/n25/n38/n40/n41/n48/n66/n77/n78/n79 **UL 2x 2 MIMO** : n41 **5G NR NSA** : n1/n2/n3/n5/n7/n8/n12/n20/n25/n28/n38/n40/n41/n48/n66/n71/n77/n78/n79 **DL 4x 4 MIMO** : n1/n2/n3/n7/n25/n38/n40/n41/n48/n66/n77/n78/n79 **LTE-FDD** **FDD** : B1/B2/B3/B4/B5/B7/B8/B12(B17)/B13/B14/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66/B71 **TDD :** B34/B38/B39/B40/B41/B42/B43/B46(LAA)/B48 **DL 4 x 4 MIMO** : B1/B2/B3/B4/B7/B25/B30/B32/B34/B38/B39/B40/B41/B42/B43/B48/B66 **WCDMA** : B1/B2/B3/B4/B5/B6/B8/B19			
Cellular radio data rate	**5G SA Sub-6** **5G NSA Sub-6** **LTE** **DC-HSDPA** **HSUPA** **WCDMA**		DL 2.1 Gbps; UL 450 Mbps DL 2.5 Gbps; UL 600/650 Mbps DL 1 Gbps; UL 200 Mbps DL 42 Mbps UL 5.76 Mbps DL 384 kbps; UL 384 kbps	
SIM	2 x micro SIM			
Navigation	GNSS Multi-constellation (GPS, GLONASS, BEiDou, Galileo). Requires an active antenna.			
Connectors	4 x QMA for Cellular and 1 x QMA for GNSS			

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Ordering references

RailBox/RRXB_V2 Single or dual WiFi Access Point or LTE-A or 5G gateway for railway and mobile applications, shipped with a fixing plate (already mounted).

RailBox/RRXB_V2

Radio 1 (R) coding	Radio 2 (R) coding	Power supply (X) coding	Bypass (B) coding
0 = No radio **WiFi** **1 =** WiFi 802.11n (fast roaming, Mesh), -25°C to +70°C **2 =** WiFi 802.11ac, -40°C to +75°C (+85°C for 10 mn, EN 50155 class TX) **5 =** WiFi 802.11n (fast roaming, Mesh), -40°C to +75°C (+85°C for 10 mn, EN 50155 class TX) **D =** WiFi 802.11ax 2.4GHz and 5GHz, -40°C to +70°C (+85°C for 10 mn, EN 50155 class TX) **E =** WiFi 6E (6 GHz band)	**0 =** No radio **WiFi** **1 =** WiFi 802.11n (fast roaming, Mesh), -25°C to 70°C **2 =** WiFi 802.11ac, -40°C to +75°C (+85°C for 10 mn, EN 50155 class TX) **5 =** WiFi 802.11n (fast roaming, Mesh), -40°C to +75°C (+85°C for 10 mn, EN 50155 class TX) **D =** WiFi 802.11ax 2.4GHz and 5GHz, -40°C to +70°C (+85°C for 10 mn, EN 50155 class TX) **Cellular + GNSS** **S =** 4G LTE cat 12 (Worldwide) + GNSS (active antenna) **U =** 5G (Worldwide) + GNSS (passive antenna) **V =** 5G (Worldwide) + GNSS (active antenna)	**A** = +24VDC to +110VDC (EN 50155 nominal) **P** = PoE++ 802.3bt type 3	**0** = No Bypass **Y** = Bypass *The Ethernet bypass redirects the network traffic in case of device or power supply failure (useful for daisy chain network topologies)* **Note: Bypass is not compatible with PoE model.**

Combination examples (non-exhaustive list)

RailBox model	Radio 1	Radio 2	Number of radio connectors		Type	Power supply	Bypass
			Radio 1	Radio 2			
RailBox/D0P0	802.11ax	none	4	0	WiFi	PoE	NO
RailBox/DDAY	802.11ax	802.11ax	4	4	WiFi	24-110 VDC	YES
RailBox/DSA0	802.11ax	LTE cat 12 + GNSS	4	2 +1	WiFi + cellular + GNSS (WW)	24-110 VDC	NO
RailBox/DUA0	802.11ax	5G + GNSS	4	4 or 3 +1	WiFi + cellular + GNSS (WW)	24-110 VDC	NO
RailBox/DVA0	802.11ax	5G + GNSS	3	4 +1	WiFi + cellular + GNSS (WW)	24-110 VDC	NO
RailBox/E0P0	WiFi 6E	none	4	0	WiFi	PoE	NO
RailBox/EDAY	WiFi 6E	WiFi 6	4	4	WiFi	24-110 VDC	YES

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