

# RailBox/DUA0\_V2

5G vehicle communication gateway for railway applications



## APPLICATIONS

Public transportation : trains, metros, tramways and buses

- 5G router + GNSS + WiFi 6 (fast roaming)
- 1 modem with 2 SIM cards
- 2 Ethernet ports 2.5 Gbps
- Multi-functions router, AP, client
- Smart Traffic routing (WiFi / 5G)
- Built-in Cybersecurity (EN 18031) with File system integrity monitor, secured access, VPN, firewall...
- Remote administration and monitoring with WaveManager
- EN50155, EN45545 certified router
- Ultra-wide 24 to 110 VDC with dual insulated redundant power supply input
- Extended operating temperature range from -40°C to +70°C
- Shock and vibration proof, IP66



5G



## Introduction

RailBox/DUA0 V2 is a rugged device designed for railway applications. It can be mounted on trains, subways, trams or in any vehicle that requires robustness and high bandwidth for innovative services on the move (such as buses):

- Uninterrupted train-to-trackside communications (CCTV, VoIP, preventive maintenance, PIS, remote monitoring...)
- High Speed data offload at the station or depot

RailBox/DUA0\_V2 is equipped with high-speed wireless technologies for transmitting data to and from vehicles. For public transport applications (trains, metros & trams), RailBox/DUA0\_V2 makes it possible to pool all data streams (SAE, ticketing, PIS, CCTV...) on a single router. Its WiFi fast roaming capabilities ensure continuous data transmission when the train arrives at the depot/ station. Its automatic switching capabilities between WiFi and 5G ensure service continuity when they go into operation.

Smart policy routing (5G / WiFi), along with segmentation and prioritization capabilities, allow seamless transmission of onboard applications (TCMS, maintenance...) including high-demanding real time applications such as CCTV and VoIP with no failure.

The onboard network being an extension of the operator IT network, it is now mandatory to secure the vehicle network according to CRA regulations. ACKSYS RailBox/DUA0\_V2 integrates the latest cyber-security standard EN18031, including firmware control, robust encryption and authentication, along with network isolation, prioritization and firewall to secure network integrity. Targeting IEC 62443-4-2 SL2: Powered by ACKSYS WaveOS, the Railbox is engineered to meet Security Level 2 (SL2) requirements, with full compliance scheduled for Q1 2027.

Remote administration and monitoring of the routers' fleet is performed with cloud or 'on-premise' ACKSYS WaveManager. The MQTT broker and bridge facilitate data transmission, system maintenance and monitoring of all onboard equipment.

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# Technical Characteristics overview (1/2)

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|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ethernet interfaces               | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                   | <b>High-Speed WiFi</b> <ul style="list-style-type: none"> <li>Standards: WiFi 6 (802.11ax) with Adaptive Noise Immunity (ANI), DFS (Dynamic Frequency Selection), and TPC (Transmit Power Control)</li> <li>Bands: dual band 2.4 &amp; 5GHz (support for HT20, HT40, HT80, HT160 channel widths)</li> <li>Radio data rate: up to 4.8 Gbps</li> <li>Max output power: up to 24 dBm (aggregate EIRP, per regional regulations)</li> <li>Antenna: 4x4 MIMO (4x QMA female connectors)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Radio interfaces                  | <b>5G/ LTE Connectivity</b> <ul style="list-style-type: none"> <li>5G SA and NSA modes, Sub-6 GHz,</li> <li>3GPP Rel-16</li> <li>DATA rate <ul style="list-style-type: none"> <li><b>5G SA Sub-6</b> : DL 2.4 Gbps; UL 900 Mbps</li> <li><b>5G NSA Sub-6</b> : DL 3.3 Gbps; UL 600 Mbps</li> <li><b>LTE</b> : DL 1.6 Gbps; UL 200 Mbps</li> <li><b>WCDMA</b> : DL 42 Mbps; UL 5.76 Mbps</li> </ul> </li> <li>Region: global (except for China),</li> <li>Private 5G/4G: supports n38 (3.5 GHz), n77 (3.7–4.2 GHz), and n78 (3.3–3.8 GHz) for private networks</li> <li>Antenna: 4 x QMA for Cellular (or 3 x QMA for Cellular and 1 x QMA for GNSS)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                   | <b>Mode Frequency Bands</b> <ul style="list-style-type: none"> <li>5G NR SA <ul style="list-style-type: none"> <li>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</li> <li><b>DL 4 x 4 MIMO</b>: n1/n2/n3/n7/n25/n30/n38/n40/n41/n48/n66/n70/n77/n78/n79</li> <li><b>UL 2 x 2 MIMO</b>: n38/n41/n48/n77/n78/n79</li> </ul> </li> <li>5G NR NSA <ul style="list-style-type: none"> <li>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</li> <li><b>DL 4 x 4 MIMO</b>: n1/n2/n3/n7/n25/n30/n66/n38/n40/n41/n48/n70/n77/n78/n79</li> </ul> </li> <li>LTE <ul style="list-style-type: none"> <li><b>FDD</b>: B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B17/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66/B71</li> <li><b>TDD</b>: B34/B38/B39/B40/B41/B42/B43/B46(LAA)/B48</li> <li><b>DL 4 x 4 MIMO</b>: B1/B2/B3/B4/B7/B25/B30/B38/B40/B41/B42/B43/B48/B66</li> </ul> </li> <li>WCDMA B1/B2/B4/B5/B8/B19</li> <li>GNSS GPS/GLONASS/BDS/Galileo/QZSS</li> <li>Antenna : passive GNSS mandatory</li> </ul> |
| SIM                               | 2x micro SIM (dual SIM redundancy for high availability)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Cellular services                 | Dynamic DNS, Auto APN, Switch SIM, Multi APN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| WiFi Modes                        | Client or router with fast roaming capabilities (less than 30 ms), Access point, Rogue AP detector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| WiFi Services                     | Hot Spot 2.0 with Wireless Load Balancing (load balancing, band steering, client roaming control, association control per SSID)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Security                          | EN18031 certified with firmware integrity check, firewall, DoS, https, MAC filtering, 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, ports and services management.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Ethernet networking               | IPv4/IPv6 compliance, frames filtering, bridging, repeater, STP/RSTP, VLAN and QoS, DHCP (server & client), DNS relay, LLDP, MQTT (bridge & broker)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Ethernet routing                  | Multicast (PIM), IP redundancy (VRRP), static routes, NAT 1:1, NAT router, router                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| ITxPT                             | Services: Inventory, Time, GNSS location, MQTT (bridge & broker)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Administration & easy maintenance | https, MQTT, SNMP agent (V1, V2C, V3), CLI<br>WaveManager administration software (cloud and on-premise versions)<br>Save / restore configuration key (C-Key) - MTTR < 2 minutes<br>Fanless, no battery                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 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: <ul style="list-style-type: none"> <li>one solid state relay output warning (with configurable action), 1 Form A, 60VDC 80mA max</li> <li>one input for external device control 24VDC max</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Power supply                      | Dual insulated redundant input (1500V insulation, M12 connectors 4-pole A-coded) 24 to 110 VDC (EN50155 nominal), with ground lug.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Consumption                       | 27W typical power consumption (dual radio), 30W max                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

## Technical Characteristics overview (2/2)

|                     |                                                                                                                                                                                  |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions & weight | Compact shockproof rugged aluminum enclosure, (L: 80 x l: 175 x h: 57 mm), 900g<br>Removable fixing plate: 4-point fixing plate with ground lug (L: 80 x l: 225 x h: 4 mm), 200g |
| Environment         | Operating: -40°C to +70°C (HR 0-99%)<br>Storage: -40°C to +80°C<br>IP66 seal rating, GORE ® protective vent (dehumidifying membrane)                                             |

|                              |               |                                                                                                                                                                                                                              |
|------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Standards and certifications | CE (RED)      | Cybersecurity: EN 18031<br>Safety: EN 62368-1:2014+A11, EN62311 EMC: EN 301 489 [-1], [-17]<br>Radio (WiFi) : EN 300 328 (2.4 GHz), EN 301 893 (5 GHz, DFS)<br>Radio (5G) : EN 301 908 [-1, -2, -13], EN 301 511, EN 303 413 |
|                              | RAILWAY       | EMC: EN 50155, EN 50121-4, EN 50121-3-2<br>Fire/smoke: EN45545-2 (HL3), NF F16-101 (M1F1), NFPA 130                                                                                                                          |
|                              | ROAD          | EMC: ECE R10 (E2)<br>Fire/smoke: UNR118                                                                                                                                                                                      |
|                              | ITxPT         | Certified according to Linden version                                                                                                                                                                                        |
|                              | Environmental | Shocks and vibration: EN 61373 [CAT 1 CLASS B]<br>Climatic: EN60068-2 [-1, -2, -30]                                                                                                                                          |

## Ordering references

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|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| RailBox/DUA0_V2 | 5G router, 1 modem with 2 SIMs, passive GNSS, and WiFi 6, for train-to-ground applications, shipped with a fixing plate (already mounted). |
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