

MOBILE ROUTER FOR BUS MONITORING SYSTEM

HIGHLIGHTS

- ✓ [Malux](#) is a Nordic entrepreneurial company creating safe working environments in industries such as communication, lighting, and more.
- ✓ For its bus monitoring system, it needed a versatile mobile router to support a high number of end devices all while keeping the IoT solution simple and scalable.
- ✓ The device chosen is Teltonika's RUT956 dual-band router, featuring four RJ45 ports, an RS485 connector, an RS232 port, and six I/Os. Together with Teltonika's RMS for remote fleet management, the RUT956 is the perfect device for Malux's system.

THE CHALLENGE – NEXT STOP: INNOVATIVE GROWTH

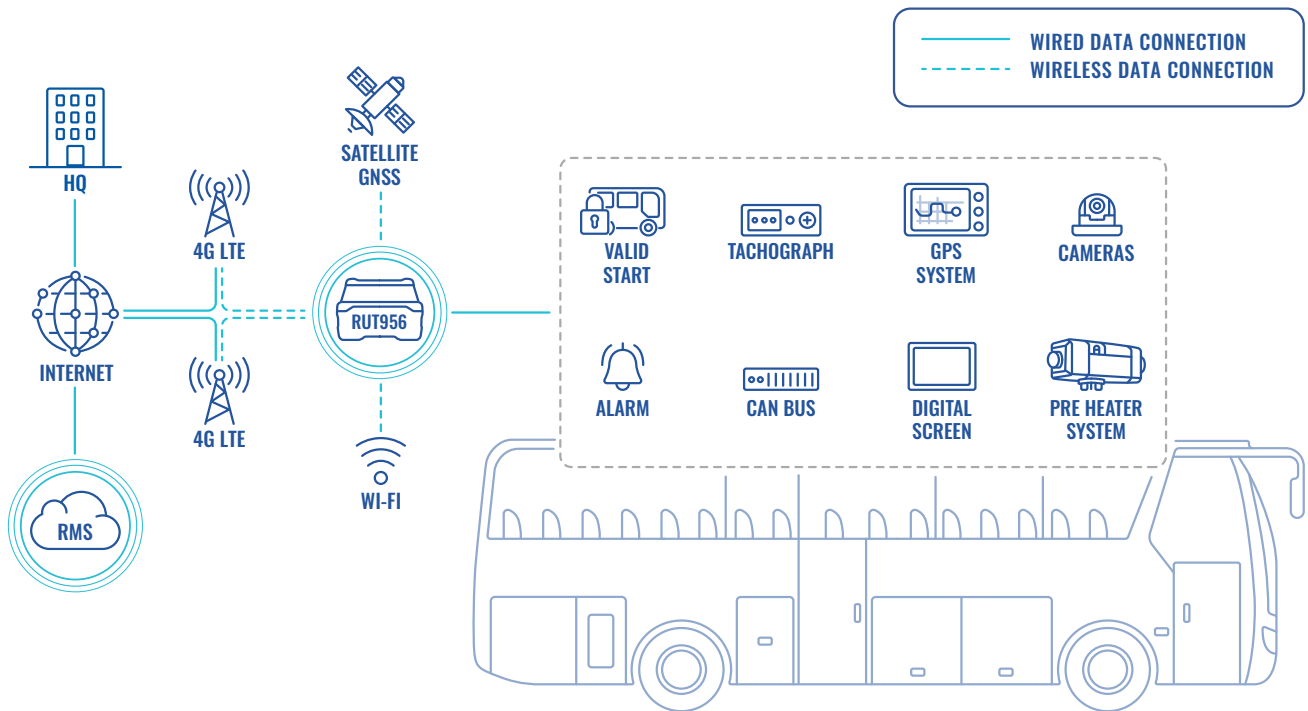
As our connected world becomes ever more advanced, tried and true markets thrive by incorporating IoT innovations. Take the bus market, for example. In 2024, its market size [was estimated to be](#) \$109 billion. It is expected to reach \$212.7 billion by 2030, growing at a CAGR of 11.79%.

What role does IoT play in this growth? Quite a few, but chief among them are smart bus monitoring systems. These rely on connectivity to both collect vital bus operation data in real time and enable operational optimisation—maximising efficiency and minimising costs.

An excellent case study for this is the bus monitoring system of our Nordic partner, Malux, which is presently implemented in over 800 buses across Sweden. Each of these buses is equipped with a mobile router, which springs to life a complex orchestra of smart end devices, M2M communication, and sophisticated data tracking and relay.

How does this IoT solution work? Just how many end devices can this mobile router support? Let's dive in.

TOPOLOGY



THE SOLUTION – MULTI-INTERFACE MOBILE ROUTER

The mobile router chosen by Malux for this IoT solution is Teltonika's RUT956 4G dual-band router. Its LTE Cat 4 connectivity facilitates communication between a host of end devices and Malux's dedicated server. While this router's suite of features is extensive, none are as vital to this solution as its wide range of interfaces.

Connected via the router's RS232 port is a Valid Start tachograph reader, which records the driving time, breaks, and rest periods of drivers. In addition, this device can detect the presence, or lack thereof, of a driver's card in the tachograph. A LED signal and a buzzer help prevent the driver from starting the vehicle if their card isn't present.

Next, connected via its RS485 connector is a [Controller Area Network](#) (CAN) bus reader, used primarily for tracking fuel usage data encoded via [ASCII](#). The RUT956 also has four 10/100 Mbps RJ45 ports, which are connected to on-board cameras and digital screens.

In addition to these interfaces, the dual-band router is also equipped with four inputs and two outputs. These six I/Os are connected to six end devices: an Alcolock alcohol ignition interlock device, an immobiliser, a panic button, and pre-heater for remotely starting the bus's heating system.

The aforementioned end devices rely on wired connections, but what about wireless? The RUT956 dual-band router enables on-board Wi-Fi via hotspot, which is configured to include a dedicated landing page with limits for both speed and data.

Despite the high number of connected devices supported by this mobile router, all communication is carried by a single SIM card, safeguarded by the router's auto-failover and backup WAN. However, the RUT956 has dual SIM slots, leaving room for adapting this solution to different needs in the future.

Connections are not the only facet in which the RUT956 is flexible—it also supports myriad communication protocols, including OPC UA, MQTT, [Modbus](#) TCP and RTU, and many others. Moreover, its support extends to key industrial VPN services, including WireGuard, [ZeroTier](#), and Stunnel.

As previously mentioned, this IoT solution is implemented in over 800 buses across Sweden. The continuous upkeep

of all these mobile routers necessitates remote fleet management, and Malux chose Teltonika's [Remote Management System](#) to accomplish that. This remote monitoring and management tool makes troubleshooting, firmware updating, password changing, and other routine tasks quick and simple.

If your bus remote monitoring and management system is looking for a heart to pump connectivity at its core, look no further than the RUT956—the perfect mobile router for the job.

