MOBILE ROUTERS POWERING SCALABLE GRAIN SILO CONNECTIVITY

HIGHLIGHTS

- Tois, s.r.o., a Slovakian IoT solutions provider, in cooperation with Slovak Telekom, a.s., integrates over 200 Teltonika mobile routers in agricultural, pharmaceutical, and energy management projects.

- The RUT956 and RUT200 mobile routers and TRB140 industrial gateway were selected for their reliable cellular data transmission and Modbus protocol support via RS485 and LAN interfaces.

- Teltonika's Data to Server feature ensures seamless data transfer via REST API to a centralised IoT platform, enabling real-time monitoring and predictive maintenance of grain silos.
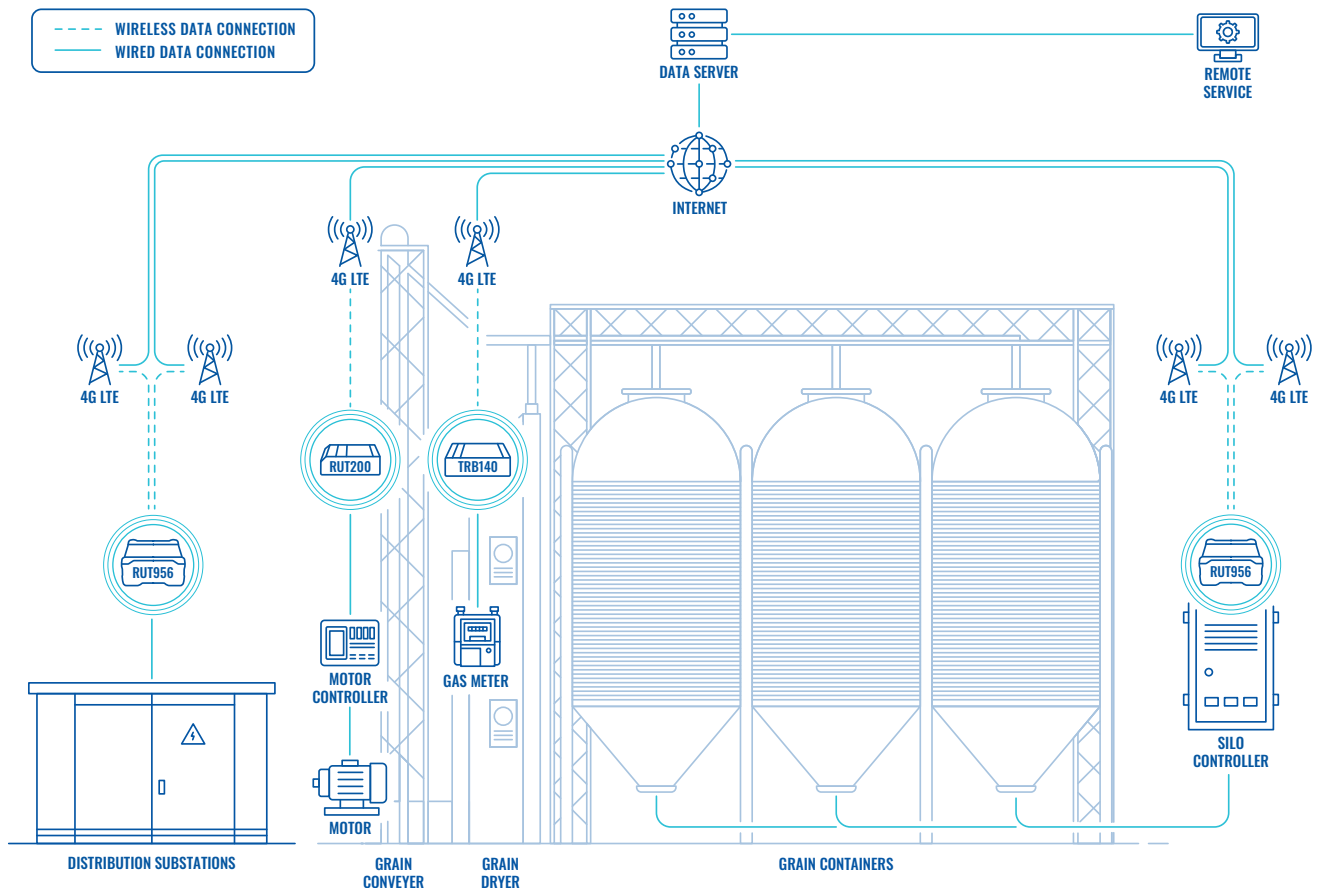
THE CHALLENGE – MANAGING COMPLEX GRAIN SILO OPERATIONS

Grain silos are a cornerstone of modern agriculture, storing and protecting valuable commodities such as grains and seeds. Proper management is critical to maintaining quality and ensuring operational efficiency. However, as noted in a 2024 report on grain handling and storage challenges, these systems often face issues such as spoilage, inefficiencies, and economic losses due to improper handling or monitoring.

Managing these intricate systems presents significant connectivity challenges. Gas consumption must be meticulously tracked for cost efficiency, motors require constant monitoring to prevent failures, and silo flap movements must be coordinated to ensure smooth commodity flow. These operations rely on distributed hardware like gas meters, motor controllers, and silo control units, often deployed across expansive industrial sites.

Traditional local networks often lack the reliability and scalability needed for such complex setups, leaving operations prone to inefficiencies and downtime. Our partner, Tois, s.r.o. in cooperation with Slovak Telekom, a.s. sought an advanced IoT solution capable of connecting diverse devices, ensuring uninterrupted data transmission, and delivering real-time insights to support predictive maintenance.

TOPOLOGY

THE SOLUTION – BUILDING A SCALABLE IOT ECOSYSTEM

Tois, s.r.o. in cooperation with Slovak Telekom, a.s., addressed these challenges by deploying a versatile IoT solution using different Teltonika mobile routers and an industrial gateway. Multiple RUT956 cellular routers formed the backbone of the system, connecting electrical distribution stations and industrial devices for managing high-demand tasks such as monitoring energy consumption and controlling silo flaps.

These mobile routers integrate seamlessly with industrial controllers via Modbus over RS485 and Modbus over LAN, ensuring precise communication with silo controllers and distribution substations. Their 4G LTE Cat 4 connectivity enables uninterrupted data transmission to a centralized IoT platform, providing real-time insights and supporting predictive maintenance

For gas meter monitoring, the TRB140 industrial gateway was chosen, leveraging its compact design and a single Ethernet interface that is sufficient for sending the data via Modbus over LAN. Meanwhile, the RUT200 mobile router provided cost-effective connectivity for motor controllers needing more than one LAN port for seamless integration.

At the heart of this system is Teltonika's Data to Server functionality. It enables the setup of data senders to collect information from various sources and periodically transmit it to a custom IoT platform via REST API for analytics. This feature leverages the cellular connectivity of Teltonika's mobile routers and gateways, eliminating reliance on local networks and ensuring uninterrupted data flow. By facilitating seamless data collection and analysis, it empowers better decision-making and enhances overall system efficiency.

Built for industrial environments, Teltonika's networking devices are designed to withstand harsh conditions such as extreme temperatures, dust, and vibrations. These robust devices ensure reliable performance even in challenging settings, making them ideal for agricultural and industrial operations. Moreover, advanced security features, such as VPN support and firewall, safeguard sensitive data from unauthorised access and cyber threats, ensuring compliance with stringent security standards.

By integrating over 200 Teltonika mobile routers and gateways across multiple locations, Tois, s.r.o., in cooperation with Slovak Telekom a.s., has created a robust and scalable IoT ecosystem that not only optimises silo operations but also sets a new standard for industrial IoT in agriculture.

The partnership with Teltonika has enabled real-time monitoring, streamlined operations, and significantly reduced costly downtime through predictive maintenance, demonstrating the transformative potential of IoT connectivity.