



MOBILE ROUTER FOR MEDICAL SUPPLY INVENTORY MANAGEMENT

HIGHLIGHTS

- ✔ One of our partners developed a solution to monitor methane and carbon dioxide emissions from ruminants, providing valuable data for environmental research and sustainable farming.
- ✔ Teltonika [RUT241](#) industrial cellular router was selected for its reliable 4G LTE Cat 4 connectivity, Wi-Fi capabilities, WAN failover, and OpenVPN support, ensuring consistent data transmission from remote agricultural locations.
- ✔ The MQTT protocol enables efficient communication between the data logger and analytics systems, allowing farmers and researchers to access real-time emissions data.

THE CHALLENGE – TRACKING ENVIRONMENTAL IMPACT

Livestock farming, particularly cattle operations, faces growing environmental scrutiny due to methane emissions contributing to greenhouse gases. According to the [Food and Agriculture Organization \(FAO\)](#), livestock supply chains account for approximately 14.5% of all human-induced greenhouse gas, with cattle being responsible for about 65% of the livestock sector's emissions. Accurately measuring them is crucial for developing effective mitigation strategies and supporting sustainable agricultural practices.

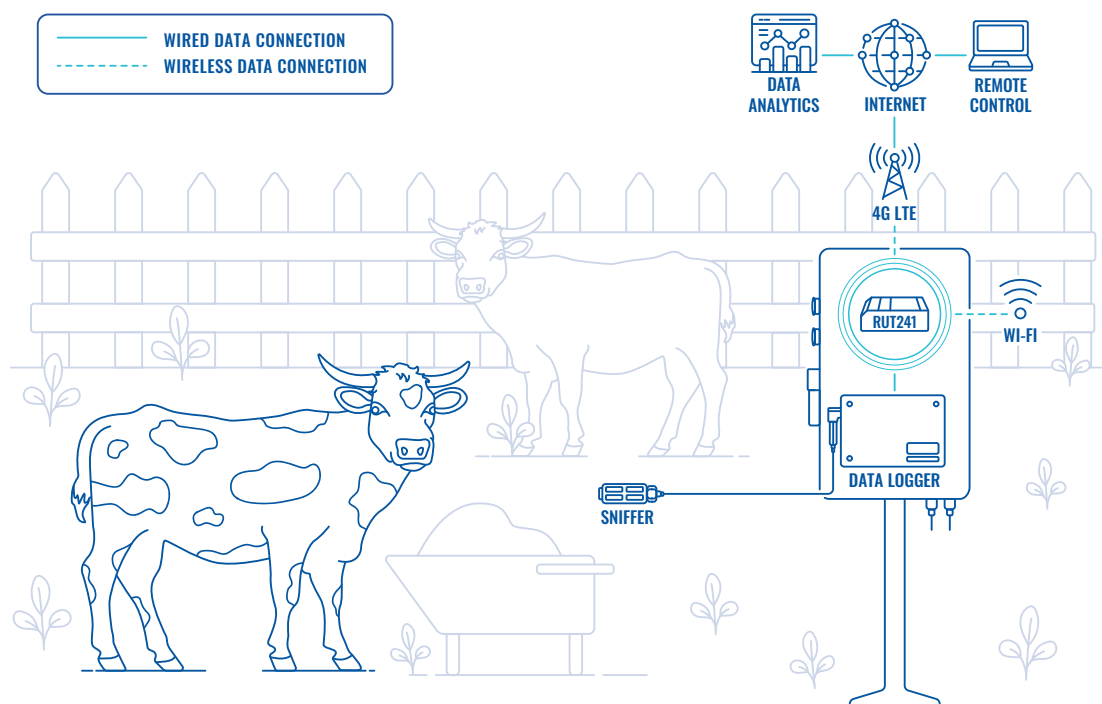
Traditional monitoring methods often lack precision or require laboratory conditions, making real-time field measurements challenging. Research published in the [Journal of Dairy Science](#) highlights the need for continuous emission monitoring during normal operations without disrupting animal routines or farm productivity.

Additionally, most dairy farms are located in rural areas where connectivity can be unreliable, yet timely access to emission data is essential for research and improving farm management practices. According to [European Network for Rural Development](#), connectivity remains a significant challenge in many agricultural regions, limiting the adoption of precision farming technologies.

Any monitoring solution must overcome these connectivity challenges while providing consistent, accurate measurements with remote access to researchers and farm managers.

Agricultural settings also present challenging conditions for electronic equipment. Networking hardware must withstand temperature fluctuations, humidity, and dust. These demanding conditions require industrial-grade connectivity solutions that can operate reliably with minimal maintenance while ensuring continuous data flow from monitoring systems to IoT cloud platforms.

TOPOLOGY



THE SOLUTION – MOBILE ROUTER FOR ACCURATE MONITORING

This solution effectively monitors ruminant breath emissions. The system focuses on measuring methane in ranges of 0-1% and carbon dioxide in ranges of 0-5%, with optional oxygen monitoring capabilities.

The solution architecture consists of several key components working together seamlessly. The sniffer tube is strategically placed near milking robots, where it captures breath samples from animals during their regular milking routine. This positioning ensures consistent data collection without disrupting the animals' normal behavior.

The sniffer connects to the data logger device housed in a 24V control panel via an Ethernet cable, where gas concentration data is processed with a response time of less than 15 seconds.

The Teltonika [RUT241](#) mobile router serves as the critical connectivity component within the control panel. Its rugged [aluminum housing](#) and industrial-grade design make it ideal for withstanding the harsh conditions of agricultural environments, including exposure to dust, humidity, and temperature fluctuations common in livestock facilities. The 4G router's wide operating temperature range ensures reliable performance across seasonal changes.

The RUT241's 4G LTE Cat 4 capabilities ensure reliable internet connectivity in rural farm locations where internet is often unavailable or unreliable. The cellular router's WAN failover feature maintains uninterrupted data transmission even when primary connectivity experiences issues – a common occurrence in rural areas with variable cellular coverage. This resilience is crucial for maintaining continuous remote monitoring without data loss.

The [MQTT](#) protocol facilitated by the RUT241 enables efficient IoT data transmission from the data logger to cloud-based analytics systems. This lightweight messaging protocol is ideal for limited bandwidth situations often encountered in agricultural settings.

Through the secure connection established, users can access the system via mobile router's IP address. The webserver interface provides access to real-time sensor data, allows downloading historical measurements, and supports development of mathematical models for estimating future methane production.

The OpenVPN capability of the RUT241 4G mobile router provides secure remote access to the system, allowing technicians and researchers to troubleshoot, update configurations, or retrieve data without physically visiting the farm. This remote management feature significantly reduces operational costs and allows for timely system maintenance, particularly valuable for farms in remote locations.

This implementation demonstrates how Teltonika's industrial networking devices meet the connectivity requirements of challenging agricultural environments. By providing reliable connectivity in rural settings, Teltonika enables innovative sustainability technologies to operate where they're needed most.

Ready to discuss your specific connectivity needs? Contact our team of experts today to explore how Teltonika can support your IoT projects, even in the most challenging environments.

