TELTONIKA | Networks

CONNECTIVITY BROUGHT TO LIFE

USE CASE CATALOG 2022

WE LIVE IN A CONNECTED WORLD

IoT and M2M communication have reshaped the landscape of communication and technology. Our partners' creativity never fails to inspire us as we take part in this revolution! Seeing how the seeds of our partnerships bloom and bear fruit of IoT ingenuity throughout the years gives us the energy to keep pushing forward at the vanguard of innovation. With this catalog, we invite you to explore the connectivity potential Teltonika Networks has to offer across six different industry sectors.
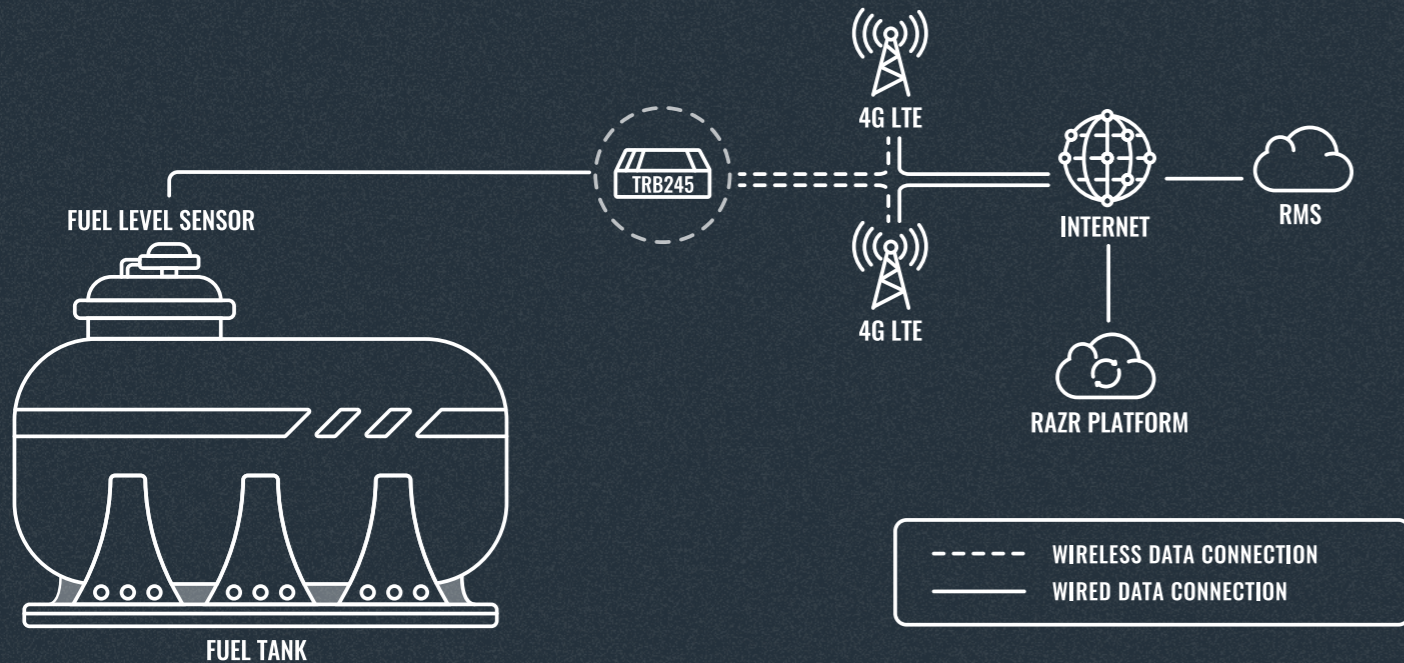
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INDUSTRIAL & AUTOMATION

Global adoption of automation, AI, and robotics to increase productivity is inseparable from monitoring and managing equipment remotely. Teltonika Networks has long-standing experience in this field, enabling manufacturers, integrators, and machine builders to stay in control of their equipment anytime, anywhere.

ENSURING THE SAFE STORAGE OF FUEL WITH SMART MONITORING

// INDUSTRIAL & AUTOMATION

FUEL LEVEL SENSOR

TRB245

4G LTE

4G LTE

INTERNET

RMS

RAZR PLATFORM

FUEL TANK

----- WIRELESS DATA CONNECTION
——— WIRED DATA CONNECTION

// CHALLENGE

The biggest risk of handling fossil fuels is that they are liquid. Toxic, flammable, volatile liquid, but liquid nonetheless. And if you ever arrived at your favorite picnic spot only to discover that sauce has leaked all over the insides of your bag, you know that storing liquids is trickier than it sounds. Fuel leaking from its storage tank is significantly more dangerous than your surplus salad sauce, and serious safety measures must always be in place to prevent it. But if all fails and a leak does occur, immediate detection and appropriate response are necessary to avoid a disaster.

The problem is that fuel isn't stored in small, individual storage tanks that an employee can comfortably keep a watchful eye on at all times. It is stored in a great multitude of tanks, often underground. To that end, detection requires more than mere vigilance. It requires automation.

// SOLUTION

The solution RAZRLAB came up with was to place a sensor over the fuel tank to accurately and continuously monitor fuel levels via guided wave radar technology. Any deviation from the normal amount, dictated by routine fuel usage and tank refills, will immediately be registered and reported for analysis and inspection. This also includes sudden drops in fuel levels, which indicate theft.

This data is then relayed to a custom RAZR cloud platform with the help of our TRB245 industrial cellular gateway, connected to the sensor via a via RS485 interface. This sturdy and compact model was specially designed for industrial applications and helps facilitate connectivity in challenging environments without the need for cumbersome cables and additional hardware, thereby keeping infrastructure complexity to a minimum.

This was especially useful in this case, as fuel tanks are often located underground and away from the city, where a wired connection would be inefficient. Boasting its dual SIM and auto-failover capabilities, TRB245 was the perfect fit – able to provide an uninterrupted, high-speed internet connection.

// BENEFITS

TRB245 is sturdy and durable – perfect for remote and rugged industrial environments where wired internet is not a good fit.

A high-speed and stable internet connection is guaranteed, even if TRB245 is installed deep underground in a hazardous environment.

Equipped with dual SIM and auto-failover features, TRB245 keeps your connection uninterrupted.

Being compact, simple, and easy to set up, TRB245 helps reduce infrastructure complexity and improve resource management. An ethernet port and multiple serial interfaces and I/Os also make it fit a variety of different needs.
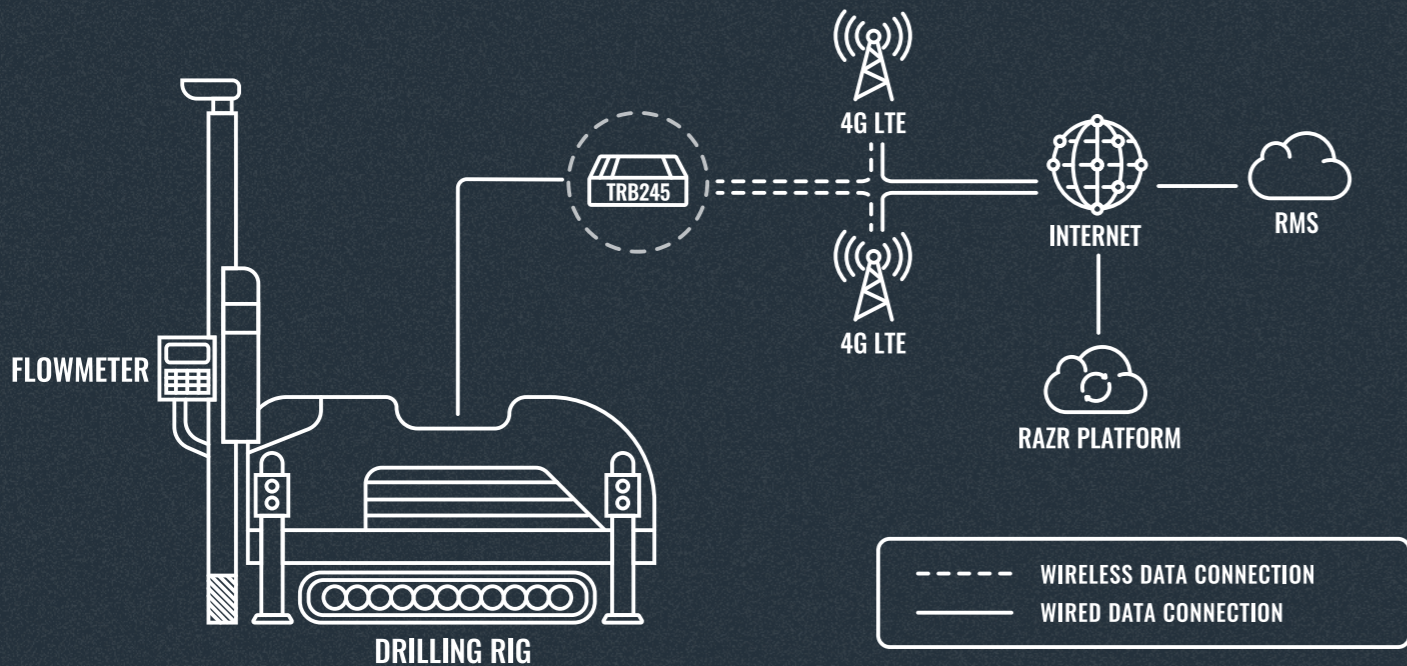

RAZRLAB

PRECISELY MONITORING THE FLOW AND PRESSURE OF DRILLING MUD

// INDUSTRIAL & AUTOMATION

FLOWMETER

TRB245

4G LTE

4G LTE

INTERNET

RMS

RAZR PLATFORM

DRILLING RIG

- - - - WIRELESS DATA CONNECTION
──── WIRED DATA CONNECTION

// CHALLENGE

Drilling mud is under constant hydrostatic pressure, and the amount of pressure determines whether it is an integral part of the drilling process or a serious work hazard. As such, the right amount of pressure needs to be maintained. Too much pressure results in overbalance. Not enough results in underbalance. Both can potentially damage the drilling gear, so the continuous pumping of drilling mud, known as mud flow, must be monitored at all times. Drilling gear is very expensive, so leaving the question of pressure balance to human judgment is just asking for trouble.

This calls for the precise, automated monitoring and control of the mud flow, performed by a solution capable of withstanding the vibrations of such an adverse work environment.

// SOLUTION

The solution they came up with is a flowmeter installed inside the drilling rig, measuring the mud flow and immediately alerting when any deviations in hydrostatic pressure occur. The flowmeter then sends this data to a custom RAZR IoT cloud platform accessible remotely by a centralized control dashboard showing real-time drill rig parameters.

The communication between the flowmeter and the cloud platform is facilitated by our reliable heavy-duty workhorse: the TRB245 industrial gateway and its RS485 port. It provides a steady internet connection and ensures the connection will remain uninterrupted thanks to its dual SIM functionality and auto-failover feature.

Designed with sturdy aluminum housing for vibration resistance as well as compact size, the TRB245 was made for this exact type of rugged work environment. It can easily be installed inside the drill and withstand the constant vibrations of the drilling, as well as extreme temperatures. It is quite literally perfect for the job.

// BENEFITS

TRB245's small and compact design makes it easy to fit into machinery with very little wiggle room, allowing for a wider range of applications.

Encased with aluminum and designed to withstand the vibrations and extreme temperatures of an industrial work environment, the TRB245 is reliable even in adverse conditions.

Modbus RTU and MQTT capabilities mean TRB245's internet connectivity is perfect for telemetry and sensory data conversion, and a built-in GNSS also makes it easily trackable.
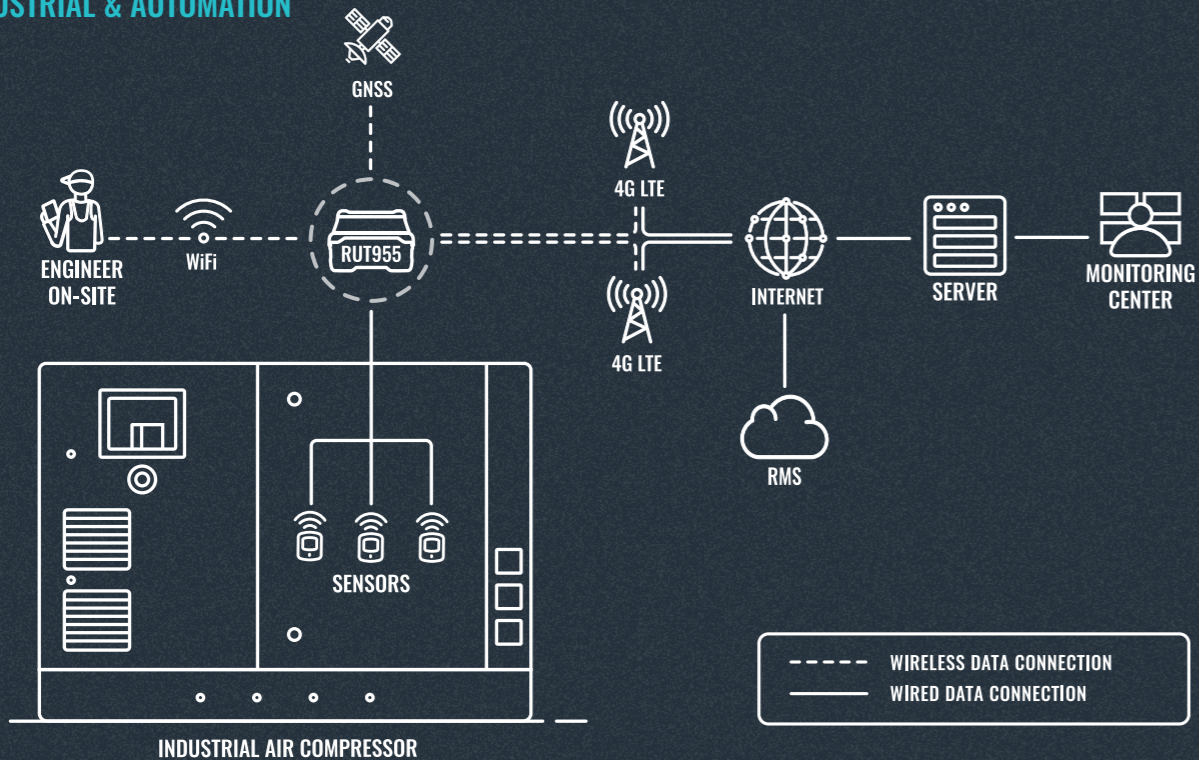

RAZRLAB

DATA COLLECTION FOR AIR COMPRESSOR OPTIMIZATION

// INDUSTRIAL & AUTOMATION

GNSS

WiFi

ENGINEER ON-SITE

RUT955

4G LTE

4G LTE

INTERNET

RMS

SERVER

MONITORING CENTER

SENSORS

INDUSTRIAL AIR COMPRESSOR

- - - - - WIRELESS DATA CONNECTION
_____ WIRED DATA CONNECTION

// CHALLENGE

Due to the technological limits of air compressors, they are not the most efficient for transforming electrical energy into work results. However, all the costs of production, transportation and consumption add up. This makes compressed air very expensive. Yet, it is still widely used in modern industry and production.

To lower the cost of compressed air, efficiency needs to be increased across the board. Metrics like pressure dew point, electricity used, solid particles and oil in the compressed air have to be closely monitored at all times.

So, the system needs multiple sensors to gather data and then send it all to the monitoring station. This solution requires a device that would gather all the data from numerous different sensors placed within the setup. Then the collected data needs to be forwarded to a monitoring center for processing. All of these parts need reliable and fast internet connectivity, as any unexpected changes within the system might be a sign of a malfunction and present inaccurate data.

// SOLUTION

In this case, Kompresory PEMA installed two 110kW compressors in a biomass power plant. The two air dryers keep a stable pressure dew point in two lines, one at -40°C and the other at +3°C. Each line has separate monitoring. The system also has drying units and the airflow for each line has individual monitoring. Several sensors track all of the minute changes in this setup. Based on the collected data, the air compression can be optimized. Machinery running at maximum efficiency prevents wasting electricity and materials.

Kompresory PEMA used Teltonika Networks RUT955 industrial cellular router to provide 4G connectivity for this monitoring solution. RUT955 connects to the sensors through an RS485 serial communication interface and LAN ports. After gathering diagnostic data via Modbus from the sensors, RUT955 relays it further to the monitoring center using the MQTT protocol. The data is analyzed and used to optimize the system and achieve the best result.

Multiple digital I/O connections allow for remote sensor control connected to the RUT955. Users can also safely connect to the router via a web interface using a VPN. Furthermore, the engineer can use Wi-Fi to access the system, perform checks, and change settings when on-site service is needed.

// BENEFITS

RUT955 provides stable dual SIM 4G LTE connectivity for industrial setups.

RUT955 has a wide variety of digital and analog interfaces, perfect for industrial applications with many different components.

Modbus (RTU and TCP/IP) and MQTT protocols allow efficient data collection and transfer to the analytical server.
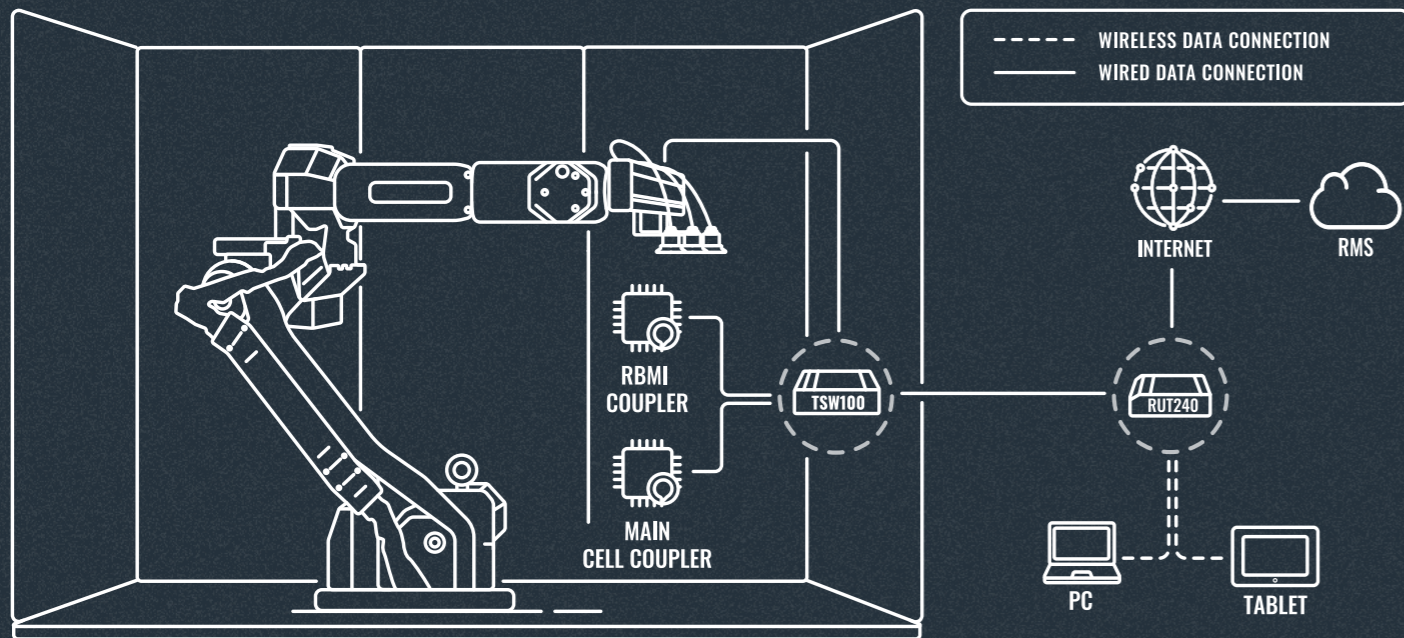
RUT955 has multiple VPN services to choose from for encrypted data transfer.

// PARTNER

SECURE INTERNET CONNECTIVITY FOR METAL BENDING MACHINERY

// INDUSTRIAL & AUTOMATION

- - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION

INTERNET   RMS

RBMI COUPLER

MAIN CELL COUPLER

TSW100   RUT240

PC   TABLET

// CHALLENGE

Bent-metal parts are needed everywhere, but the current manufacturing processes make it really expensive to produce them. The machinery is mainly single-purpose and cannot be adapted to change the parameters. As the demand increases for different bent metal parts and constructions, the factories cannot meet their supply. Usually, it is not a sound financial solution to order custom new machines as the return on investment gets comparatively low and takes a lot of time.

Frequently in assembly lines and factories, many different types of machinery need to be interconnected. This means that old and new hardware need an all-encompassing solution, which can be expensive for custom mechanical interfaces. Moreover, the setup requires safe and reliable internet connectivity for gathering diagnostic data and enabling remote control of the apparatus.

// SOLUTION

The essentials that Robobend was looking for in their IoT solution were reliable connectivity and security. They found all that covered by Teltonika Networks products — RUT240 industrial cellular router and TSW100 industrial PoE+ switch. RUT240 provides internet connectivity for the entire solution. Robobend uses remote connection through VPN to safely reach the main robot cell. It also lets the company connect to factory setups and gather diagnostic data from the devices.

In this solution, the main robot, RBMI coupler and main cell coupler are connected via the TSW100 industrial PoE+ switch. As stated by the client, the TSW100 switch is a perfect fit because it is a breeze to set up and use, which is essential for Factobotics. It has five LAN ports that can accommodate multiple connected devices and then power them thanks to PoE+ functionality.

// BENEFITS

TSW100 can accommodate multiple connected devices, making it a perfect choice for an IoT solution with numerous devices.

TSW100 has an easy and fast setup and PoE+ functionality, eliminating the need for additional powered connections.
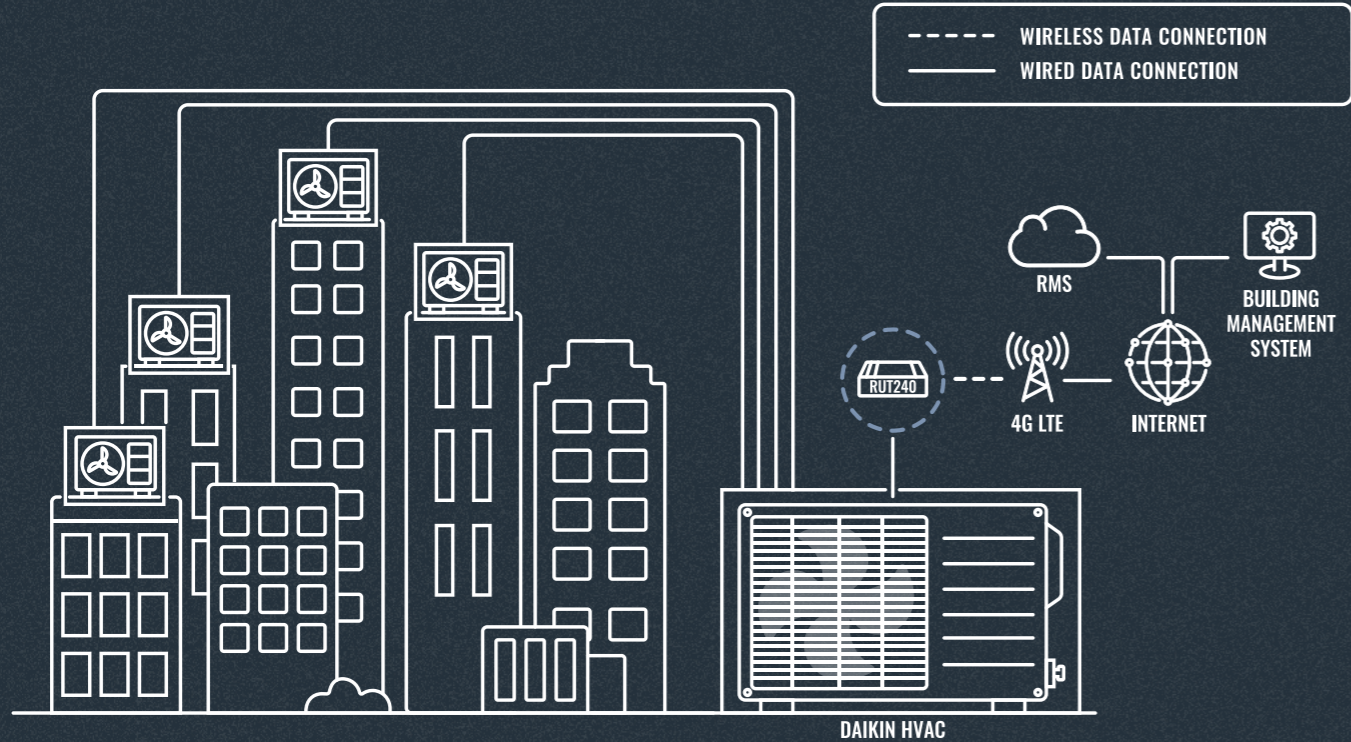
RUT240 devices come with Wi-Fi and wired connections that accommodate local devices used for monitoring and on-site control.

RutOS offers several different VPN protocols, ensuring that your connection will be safe.

ROBOBEND

OPTIMIZED USE OF RESOURCES IN DAIKIN HVAC SYSTEMS WITH 4G CONNECTIVITY

// INDUSTRIAL & AUTOMATION

- - - - - WIRELESS DATA CONNECTION
——— WIRED DATA CONNECTION

RMS

BUILDING MANAGEMENT SYSTEM

RUT240

4G LTE

INTERNET

DAIKIN HVAC

// CHALLENGE

HVAC systems are pretty complicated because they have many different components that are all interrelated. If one of them stops functioning as it should, the whole system might be affected and discontinue working. While the system itself does not require internet connectivity, deploying a router enables managing it remotely and, as such, early detection or even prevention of any issues in the system.

Another challenge is related to efficiency and resource optimization. As you may imagine, such systems consume a lot of energy, and therefore making data-driven changes and automation could result in significant financial and environmental benefits.

While internet connectivity is often limited in remote industrial locations, choosing a cellular router ensures a reliable connection without depending on one internet provider and its network capabilities.

// SOLUTION

The Teltonika Networks RUT240 industrial cellular router connects to the HVAC system via Ethernet cable. Internet connectivity enables easy integration with the Building Management System and remote management of the HVAC infrastructure. RUT240 cellular connectivity options make it perfect for industrial application scenarios, where the connectivity options are limited.

The Building Management System collects data using the MQTT protocol and analyses it for predictions and optimization. The reports provide valuable insights into where energy exploitation could be reduced and automating processes. Remote management comes in handy for scheduling the operation of various devices and amending these schedules as per changing needs.

// BENEFITS

Increased efficiency – data-driven decisions help cutting energy consumption and more streamlined automated operation of the HVAC system.

Wide temperature range – RUT240 is a professional device in a sturdy aluminum housing, which can operate in environments from -40C to 75C.
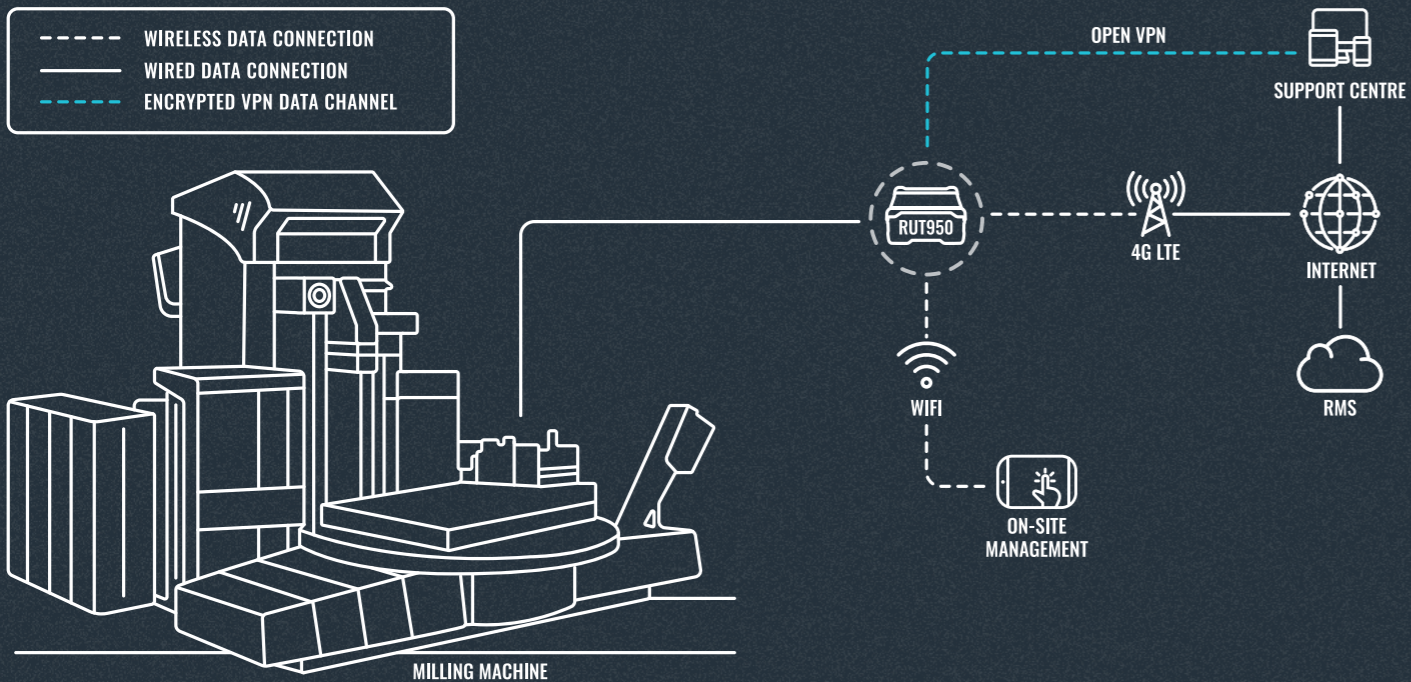
Reliable connectivity – LTE Cat 4 with WAN failover ensures a stable and reliable connection.

Remote support and warranty service – remote access to their devices saves manufacturers travel time and finances as they may troubleshoot and resolve the issue from the headquarters.

REMOTE MANAGEMENT OF BORING AND MILLING EQUIPMENT

// INDUSTRIAL & AUTOMATION

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION
- - - - - ENCRYPTED VPN DATA CHANNEL

OPEN VPN

SUPPORT CENTRE

RUT950

4G LTE

INTERNET

WIFI

RMS

ON-SITE MANAGEMENT

MILLING MACHINE

// CHALLENGE

Our partner, FERMAT, a manufacturer of precision sophisticated equipment for industrial use, has long understood that support is paramount for successful business continuity. They have clients in most countries of the world, hence, having a support office in each of them would not be feasible or at least financially-viable. The only way to provide efficient and timely support was by obtaining remote access to the equipment. However, various locations come with different connectivity challenges. Therefore, there was a need to ensure that solution comes with reliable networking equipment for primary and backup connections. Without question, the industrial sector requires secure data transmission, so this requirement was one of the prerequisites too. Combining their boring or milling machines with Teltonika Networks router RUT950 made it possible to offer an all-in-one solution to their clients that is secure, offers reliable connectivity, and can be reached remotely without any problems.

// SOLUTION

The boring and milling machines are sold with Teltonika Networks preinstalled and set-up RUT950 router to ensure reliable connectivity. RUT950 is a high-performance industrial 4G LTE wi-fi router designed as a main or backup internet source, which guarantees a reliable internet connection with high data throughput and data redundancy. Locally, the wi-fi connection allows controlling the machine using a phone, tablet, or computer. But the main thing in this solution is the possibility to connect remotely, using a VPN connection established by our router and the FERMAT's server. All data is encrypted and travels via Sophos SSL VPN Client, although there are many other options to choose from. The solution can be connected to the internet via cable or SIM for backup (or for best results - both). Remote accessibility could also very well be achieved using Teltonika Networks Remote Management System (RMS) and be integrated into the existing company's interface using RMS API functionality.

// BENEFITS

Multiple connectivity options – ensure main and backup connection continuity in different locations around the world.

Remote management – saves time and expenses as there is no need to physically travel to resolve issues and troubleshoot. This can be achieved by connecting to in-house servers or by using Teltonika Networks Remote Management System (RMS).

Multiple VPN options – allows to flexibly choose whichever one a client is comfortable with.

Quick deployment and unified support – using the same router in every solution makes it significantly easier to provide support to the clients. Besides, RMS Connect allows reaching the product behind the router.

FERMAT

ENERGY & UTILITIES

Efficiently -connected energy infrastructure reduces power consumption and lowers production and distribution maintenance costs. Teltonika Networks helps energy companies build wired and wireless IoT connectivity solutions for the most demanding environments.

REMOTE TOWER SITE MANAGEMENT

// INDUSTRIAL & AUTOMATION

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION

BASE STATION CONTROLLER

RUTX11

4G LTE   4G LTE

SITE MANAGER   INTERNET   SCADA

UPS   DIESEL GENERATOR   CCTV   RMS
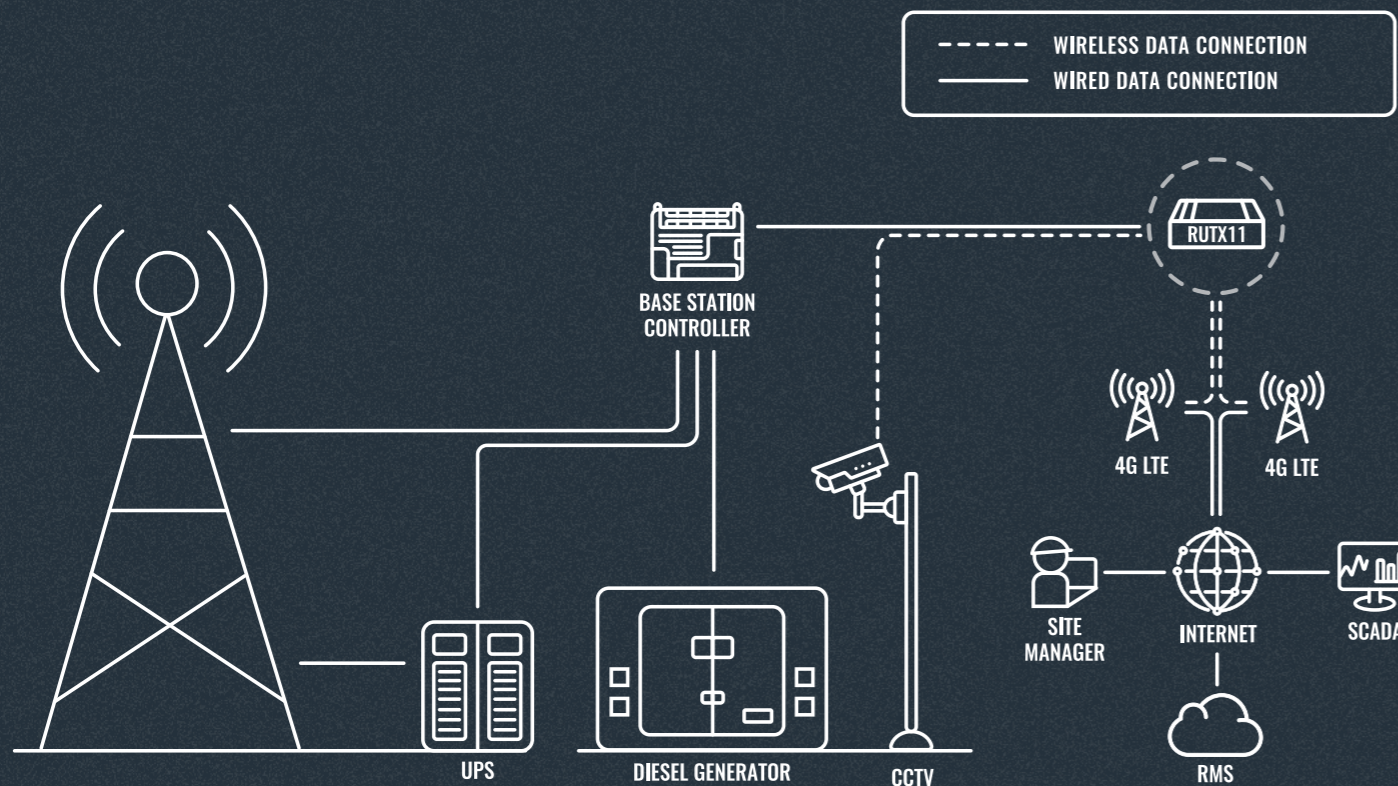
// CHALLENGE

Since the market is expanding, more and more base stations are installed in remote areas. It is extremely expensive to run electricity cables for hundreds of miles to power up the tower infrastructure. Due to this fact, the base stations and other site components are usually powered by the combination of diesel generators and UPS – uninterruptable power supply systems. Furthermore, these tower systems are self-sufficient, expensive, and controlled remotely; they include CCTV cameras for security, access control barriers, and separate site manager controller systems. All of these solution components must be controlled and monitored. Due to the remote nature of such sites, in very rare cases, they have cable Internet connectivity available. Since it is estimated that there are more than 6.5 million base stations worldwide, the only sensible way to monitor and control all of their infrastructure sites is to do so - remotely. The challenge here is clear – to provide secure and reliable access to the internet without any cable infrastructure available.

// SOLUTION

The cellular base station tower site is a complex infrastructure solution since it includes various elements, as mentioned above. However, most of those parts are connected directly to the tower site controller (also called site manager), which jointly monitors and allows to control everything using a single platform. These tower site controllers need to be connected to the Internet. Our partners are using the RUTX11 to ensure a secure and reliable connection, which grants the tower site controller connected to the Internet using 4G LTE.

Besides, RUTX11 has Dual-SIM functionality with auto-failover, which increases solution reliability. Using RUTX11 gives grants the possibility to access the controller remotely and manage a large number of sites from a central management center. Also, this professional cellular router is equipped with Gigabit Ethernet and Wi-Fi, which allows connecting additional components like CCTV cameras or access control barriers. Furthermore, every maintenance company must have alerts and notifications if something happens to the system. In this case, the whole system is controlled remotely via site management software, and our router – RUTX11 - is managed and controlled via RMS – Remote Management System. The RMS ensures that RUTX11 gets all the latest firmware updates and can provide valuable alerts and usage reports.

// BENEFITS

Reliability – our RUTX11 has two SIM card slots, meaning that you can use two different operators for the best internet connection reliability.

Wireless interfaces – RUTX11 has 2.4 & 5 GHz Wi-Fi included, which enables integrators to provide internet to various devices without additional cabling.
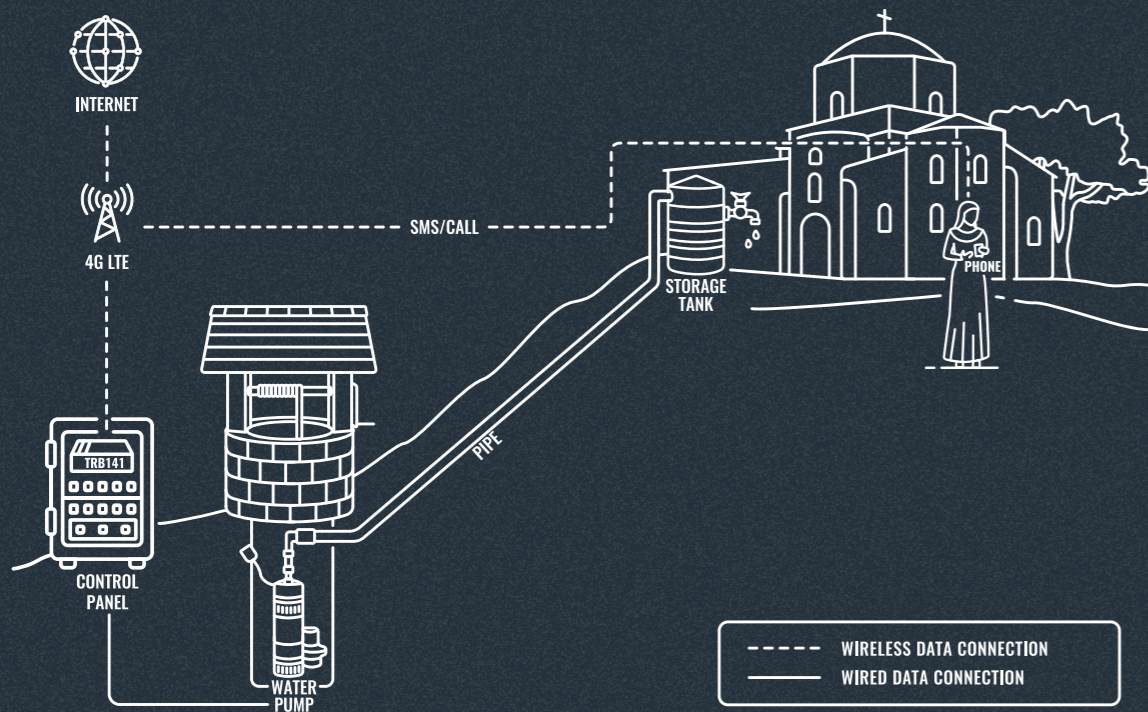
Remote control – our product can act as a gateway between the controller and software system for control and management.

Remote configuration – having thousands of sites can be a nightmare; however, with RMS, it is possible to configure all Teltonika routers remotely at once!

REMOTE WATER PUMP AUTOMATION USING SMS AND CALLS

// ENERGY & UTILITIES

INTERNET

4G LTE

SMS/CALL

STORAGE TANK

PHONE

PIPE

TRB141

CONTROL PANEL

WATER PUMP

- - - - WIRELESS DATA CONNECTION
───── WIRED DATA CONNECTION

// CHALLENGE

Although nowadays modern technologies make remote control a fairly simple challenge, however, simplicity and cost efficiency were key points to this solution. Due to the remoteness of the place related to significantly higher costs, broadband connection over cable was ruled out. The only viable solution was utilizing the cellular network. Using an omnipresent cellphone, the pump would be controlled by calls or SMS messages. This simple control solution was superior to a much more expensive approach such as control over the internet using a smartphone app.

// SOLUTION

In this solution, the well, water pump, and control panel are located in a remote plain field, while the monastery, where the water should be transported, is located on a mountain 1,5 km away. The water pump allows to fill up the water storage tank located on the mountain via the water pipe.

The water pipe is not pumping the water continuously due to efficiency reasons. It can be remotely activated by using the control panel with a mobile Teltonika Networks TRB141 gateway, allowing to turn on the water pump whenever the water is needed. The pumping can be initiated either by calling or by sending an SMS to the TRB 141 gateway SIM card from a cell phone. After the tank is filled up, the pump can be remotely deactivated by using the same method (call or SMS).

// BENEFITS

Cost-effective and simple remotely controlled solution.

Remote control by SMS – the pump can be managed by a simple SMS message sent by a specified list of users at any time.

Remote control by call – the user can turn on the pump for a specified time frame simply by making a call.
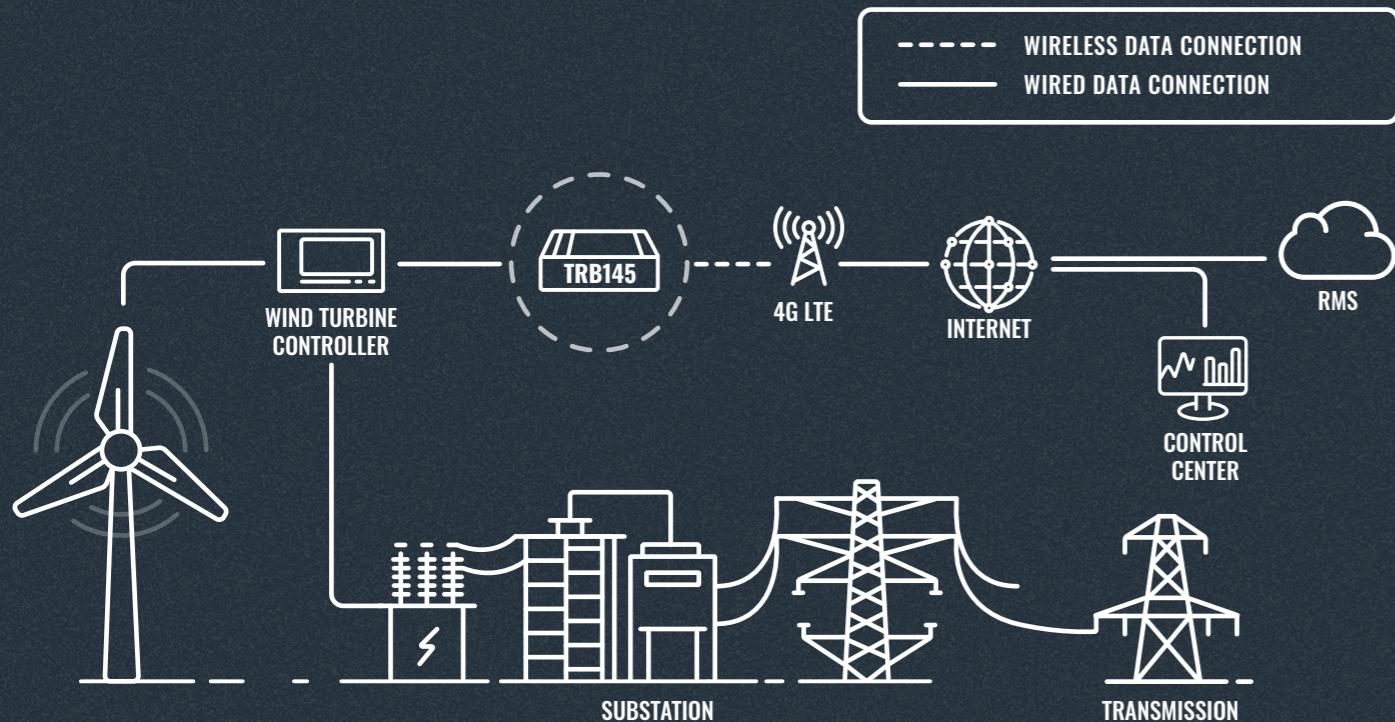
Easy to set up – documentation provided with the product is simple to understand and sufficient to utilize the entire capabilities of the device.

Simplified support enabled by the Remote Management System.

REMOTE CONTROL AND MONITORING OF WIND TURBINES

// ENERGY & UTILITIES

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION

TRB145

4G LTE

INTERNET

RMS

WIND TURBINE CONTROLLER

CONTROL CENTER

SUBSTATION

TRANSMISSION

// CHALLENGE

Energy generated from wind is one of the most prominent green energy solutions. Wind farm locations are usually remote, far away from civilization, in the hills or the seaside. Such places are used because for the wind farm to be profitable, there must be conditions that would generate as much wind as possible throughout the year. However, harsher environments require more complex wind turbines, which usually consists of towers, blades, hubs, and nacelles. To control all the parts, companies are mounting wind turbine controllers near the tower. Wind turbine controllers, like PLCs, are the brains for every wind turbine, since it is used for controlling the whole system, generating reports and monitoring. Without it, the turbine would not be working correctly, since it must be controlled and programmed. For this reason, the controllers must be connected to a unified system for remote monitoring, energy generation reporting, parameter control, and predictive maintenance. The main challenge here is obtaining reliable and secure connectivity to the Internet because of the remote location of wind farms.

// SOLUTION

The topology above shows the whole solution: wind turbine generates energy which is passed to a substation and further transmission. On the other side, everything is controlled and remotely monitored via the wind turbine controller, which is connected to TRB145 – a small but powerful 4G LTE Serial gateway by Teltonika Networks. This device provides a reliable and stable Internet connection and acts as a Modbus gateway between controller and control center where all monitoring and management takes place. TRB145 industrial gateway is an ideal choice here not only because it features Serial RS485 interface with Modbus RTU but also because it is powered by RutOS that is equipped with advanced features such as OpenVPN, Firewall, IPsec. Besides, this gateway can be managed and monitored via the RMS – Remote Management System, which, amongst other benefits, has the ability to send status reports and generate notifications by SMS or email.

// BENEFITS

Easy to manage – you can configure and remotely control an infinite number of TRB145 connected to wind turbines using RMS.

Energy consumption – since wind turbines are generating energy, they require that all devices would be low power consuming, TRB145 consumes only 2W of power while transferring data.
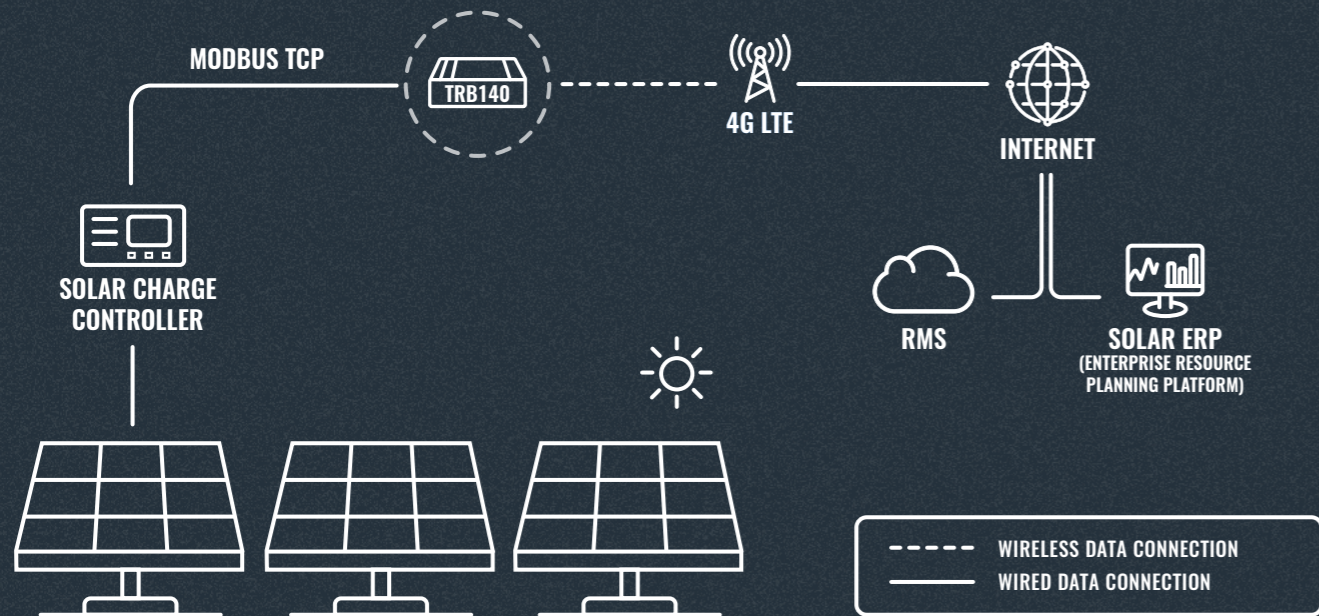
Rugged design – TRB145, the same, as all Teltonika's routers and gateways have a wide operating temperature range from -40°C to 75°C, which is a must when the solution is outside.

Size – TRB145 is extremely small and convenient to install into small cabinets.

REMOTE MONITORING OF SOLAR POWER PLANTS

// ENERGY & UTILITIES

MODBUS TCP

TRB140

4G LTE

INTERNET

SOLAR CHARGE CONTROLLER

RMS

SOLAR ERP
(ENTERPRISE RESOURCE PLANNING PLATFORM)

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION

// CHALLENGE

The solar power plant consists of a sophisticated infrastructure working in perfect sync to maximize the potential electricity production. Primary components are solar panels, inverters, solar controllers and transmission or energy storage systems. The performance of solar power plants must be closely monitored to ensure the maximum productivity and availability to make sure that everything is running smoothly and the electricity generation rate is within acceptable values to satisfy project ROI* schedule. Besides, remote monitoring is essential to scheduled maintenance, such as part replacement or solar panel cleaning, required for the power plant to maximize long term performance. Solar power plants are mostly located in remote areas because of the large amount of land area they occupy. Remote location poses a challenge for remote monitoring connectivity because wired Internet sources are rarely available at solar power production plant locations.

// SOLUTION

The topology above outlines a simplified classic remote monitoring solution with a cellular connectivity device at its core. The Solar controller is a brain of solar power plant operation and is generally capable of outputting system data via industrial protocols, such as Modbus TCP. Depending on the size of the solar power plant, numerous solar charge controllers are set-up to track electricity generation data from a set of solar panels. The best way to interpret this data is to use a cloud IoT platform where the data is aggregated and presented to the operator with performance metrics and suggested maintenance insights. TRB140 is a popular choice for this use case because of its secure and reliable cellular connectivity via 4G LTE and easy to use user interface, which requires no specialized training. Moreover, TRB140 includes advanced RutOS features, such as multiple VPN services, industrial, networking, & remote management protocols (Modbus TCP, MQTT and more.).

// BENEFITS

Easy to scale – you can configure infinite number of TRB140 in minutes using Teltonika Remote Management System (RMS).

Low-power – TRB140 uses only 2W of power when transferring data at maximum speeds and only 0.4 W when idle with an active data connection.
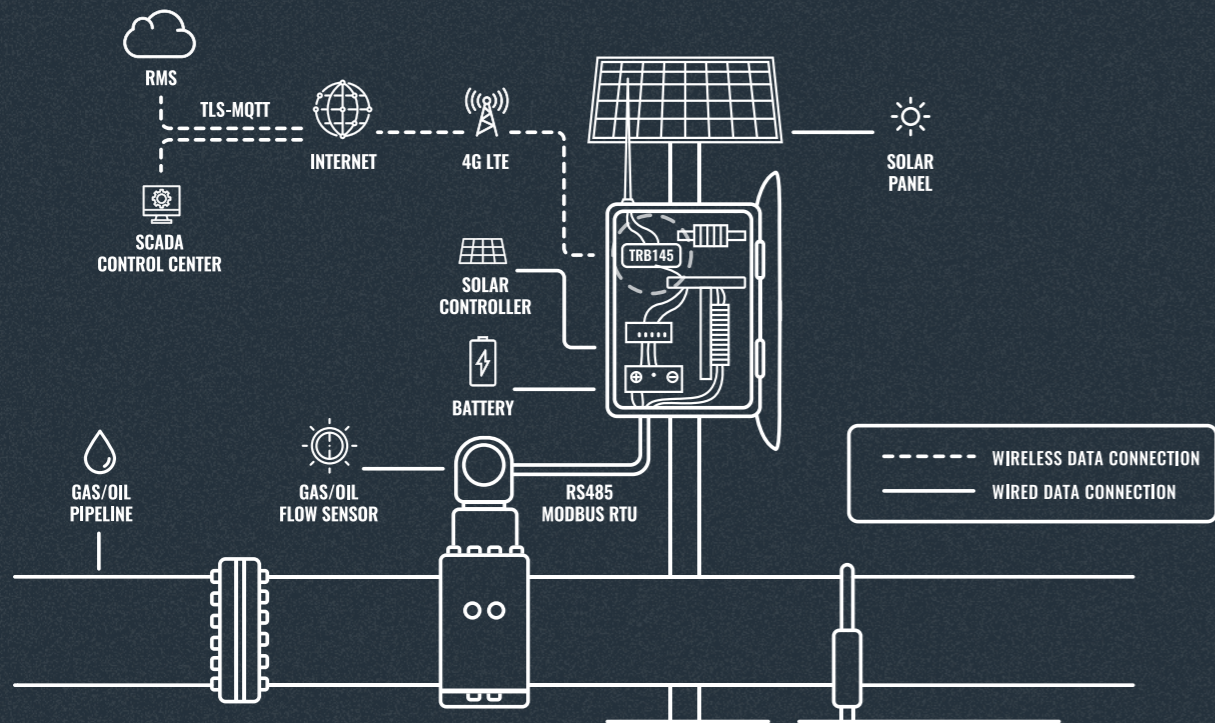
Easy management – with Teltonika RMS you can keep all TRBs up to date with the newest firmware and conveniently monitor and control the gateways from anywhere – even without Public IP!

Industrial design – TRB140 has a strong aluminium casing, wide range of supported power supply voltage and a wide operating temperature range.

REMOTE MONITORING OF OIL & GAS PIPELINES

// ENERGY & UTILITIES

RMS
TLS-MQTT
INTERNET
4G LTE
SCADA CONTROL CENTER
SOLAR PANEL
TRB145
SOLAR CONTROLLER
BATTERY
GAS/OIL PIPELINE
GAS/OIL FLOW SENSOR
RS485 MODBUS RTU

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION

// CHALLENGE

Extraction of energy from oil and gas sources is a complex process which requires a lot of infrastructure. One part of such infrastructure are the pipelines which are the key transport mechanism for Oil & Gas industries. They provide a safe, efficient, and cost-effective way to transport processed and unprocessed materials and operate continuously outside of scheduled maintenance windows. To preemptively diagnose possible safety and/or productivity issues the rate of the flow of materials must be closely monitored. However, pipeline infrastructure is usually placed in remote areas where wired Internet connectivity is not available.

// SOLUTION

Satellite communications are still highly expensive, however global expansion of 4G LTE coverage enables Oil & Gas companies to implement a wide pipeline flow monitoring network by using dedicated flow meters which output data using industrial protocols. In many cases – serial communication with RS-485 and Modbus industrial protocol is used. The data generated by the flow meter must be obtained and forwarded to control centers, SCADA systems to aggregate and interpret centrally. TRB145 Serial IoT Gateway by Teltonika Networks is perfect for such applications - with RS-485 interface, Modbus RTU Master functionality and 4G LTE Cat1 it is able to periodically read flow meter information and send gathered data to remote HTTP/HTTPS servers or various IoT platforms using MQTT. Finally, wide power supply range and low energy consumption allows TRB145 to be powered up by combining solar power and batteries.

// BENEFITS

Low-cost and quick to deploy – multiple TRBs can be simultaneously configured immediately using Teltonika Remote Management System (RMS).

High availability and low data cost – 4G LTE is highly available globally and cost efficient due to low amounts of data needed for this application.
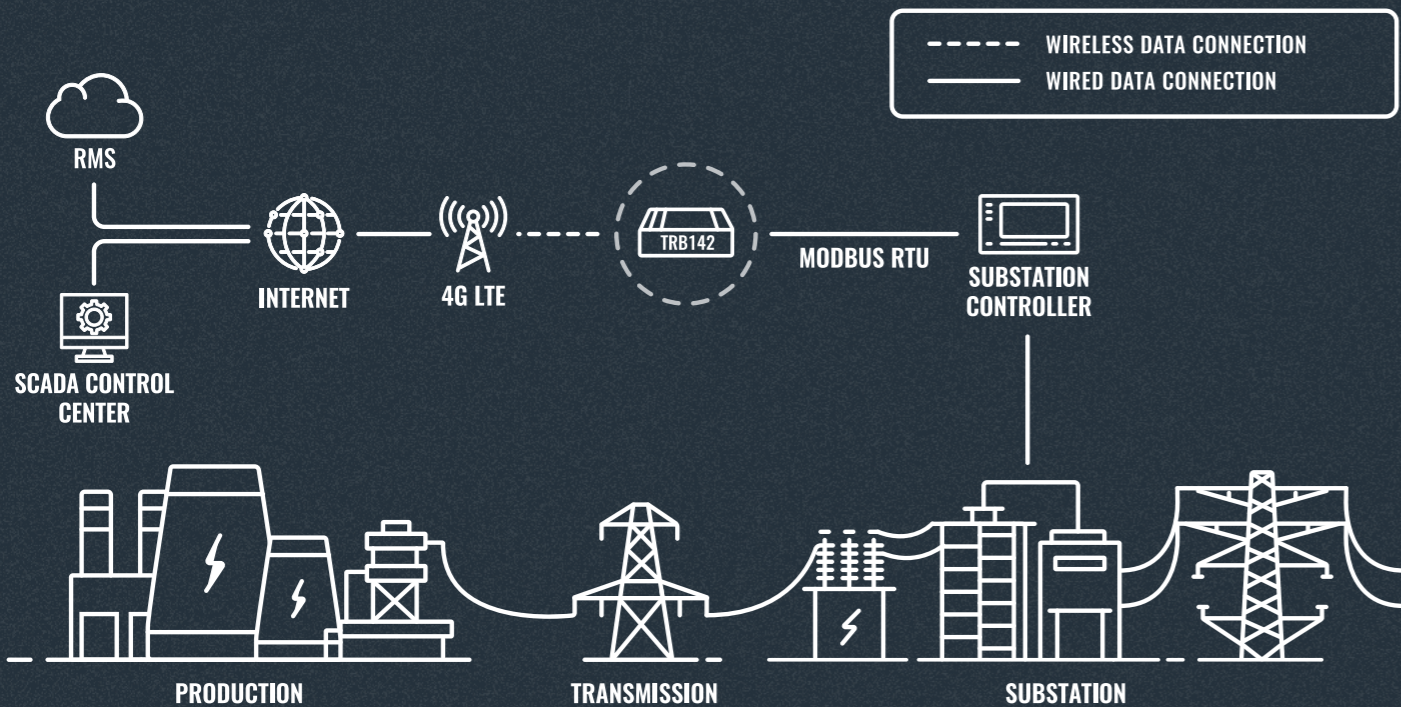
Data security – TRB145 supports advanced data protection with embedded Firewall and encryption with multiple VPN services available, such as OpenVPN, IPsec, PPTP, L2TP and others.

Immediate notifications – if preset flow values fall out of defined criteria, system operators can setup TRB145 to receive immediate alarms.

SMART GRID & SUBSTATION COMMUNICATION

// ENERGY & UTILITIES

- - - - - WIRELESS DATA CONNECTION
——— WIRED DATA CONNECTION

RMS

INTERNET   4G LTE   TRB142   MODBUS RTU   SUBSTATION CONTROLLER

SCADA CONTROL CENTER

PRODUCTION   TRANSMISSION   SUBSTATION

// CHALLENGE

Fundamentally, energy infrastructure consists of production & transmission. Nuclear, coal, gas energy plants and renewable energy installations together generate electricity and transmit it to the grid using series of high, medium and low voltage stations and substations eventually bringing power to homes and businesses around the world. All steps of production and transmission must be closely monitored and controlled to make sure the infrastructure is producing enough power that is distributed efficiently throughout the energy network. All of this would not be possible if all components of the grid would not be connected and controlled centrally by professional engineers and advanced SCADA systems. Substations have complex automation network that is managed by a substation controller. To enable smart grid, these must be connected to the central SCADA system via the Internet. Even when wired Internet connectivity is available, it is impossible to ensure 100% uptime which is required to be in control of the whole power generation and transmission infrastructure.

// SOLUTION

Integrators and energy operators around the world have recognized that cellular solutions, such as 4G LTE enabled gateways and routers, offer the most reliable connectivity and best availability for their complex substation systems. In many cases, substation controllers aren't new, meaning that they feature serial interfaces for communication, such as RS232. TRB142 is a 4G LTE Cat1 enabled cellular gateway by Teltonika Networks able to connect legacy equipment via serial RS232 and manage connectivity with numerous industrial and networking protocols, such as Modbus RTU & MQTT. It also has advanced firmware security functions, such as firewall and multiple supported VPN services. Moreover, TRB142 can diagnose any connectivity and functionality issues and reboot separate modules of the gateway to restore service automatically without any interference from the operators. Finally, all TRB142 devices can be easily monitored and controlled from thousands of miles away with Teltonika Remote Management System, which can generate not only customizable alerts, reports, but also allows direct access to the substation controllers connected using TRB142 even without Public IP.

// BENEFITS

TRB142 is easy to set up, easy to install and even easier to maintain with full support for Teltonika Remote Management System. It is also simple to scale as multiple devices can be configured at once using RMS.

This gateway is very reasonably priced and features robust 4G LTE Cat1 – designed for serial interface communication where low data speeds are required.

Advanced firmware functionality includes support for industrial, networking and remote management protocols, such as Modbus RTU, MQTT, DHCP, SNMP and features firewall and multiple supported VPN services.

SMART CITY

Our growing cities get smarter every day. Connected sensors, vehicles, and devices make lives more convenient while increasing energy efficiency and reducing maintenance costs. This infrastructure requires secure IoT connectivity products that are the specialty of Teltonika Networks.

DATA-DRIVEN OUTDOOR ADVERTISING WITH JCDECAUX LITHUANIA

// SMART CITY

70 m
70 m

JcDecaux DIGITAL SCREEN

70 m
70 m

RMS

ALLUNITE SYSTEM

RUT240

4G LTE
INTERNET

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION
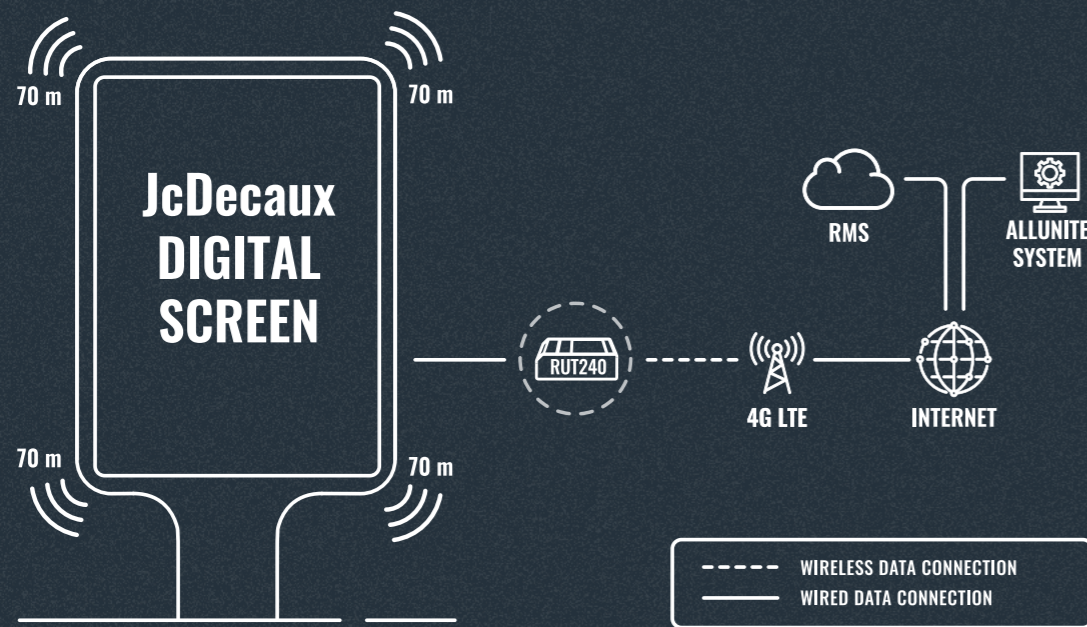
// CHALLENGE

To accurately measure how many people pass through an outdoor advertisement, you need a sensor to track the flow of people passing it every day. Such a solution requires internet connectivity, so the sensors can collect data and send it back to a monitoring center in real-time. There the data can be further processed by analytical software and displayed in an easy-to-understand fashion.

Another challenge that such a solution can face is the outdoor conditions. Hardware must withstand both low and high temperatures, especially in geographical zones where climate changes throughout the year. Furthermore, upgrading outdoor advertisements to their smart variant becomes a vast scalability challenge. The whole operation must bring real value and return on investment.

// SOLUTION

JCDecaux Lithuania was looking for a way to know how many people their outdoor advertising campaigns reach. With some help from their partner AllUnite, they arrived at a solution — Wi-Fi routers. When installed within outdoor advertising stands, they can scan the environment for nearby smart devices.

JCDecaux Lithuania found the perfect solution for their connectivity with the Teltonika Networks product — the RUT240 industrial cellular router. It acts as a scanner, detecting mobile devices in a 70-meter radius without breaching people's privacy. As the name implies, the scanner functionality only sends out a signal to check the number of nearby devices and does not gather any other user information. The collected data is sent back to AllUnite analytical system via a cellular connection. The information is then further extrapolated to determine how active the location is during each hour of every day. The ad campaign's effectiveness in that area can then be analyzed to learn how many people passed the advertisement and stopped to look at it.

Furthermore, RUT240 has a sturdy aluminum housing designed to provide protection even in unwelcome environments. So, this industrial cellular router can be used in an outdoor IoT solution where it might encounter extreme temperatures and moisture. Thanks to simple device mounting and connection, you can install it in many locations with minimal time investment for setup. The installation process is straightforward and fast, allowing for efficient integration into your project.

// BENEFITS

RUT240 works with RutOS open-source operating system, which allows integration with software like AllUnite analytical system.

RUT240 delivers high performance in rigorous environments and can withstand extreme temperatures in outdoor IoT solutions.

The router features a small design that fits within the limited space of an outdoor advertisement.

RUT240 allows for easy and fast installation, so your solution can get cellular connectivity anywhere when needed.
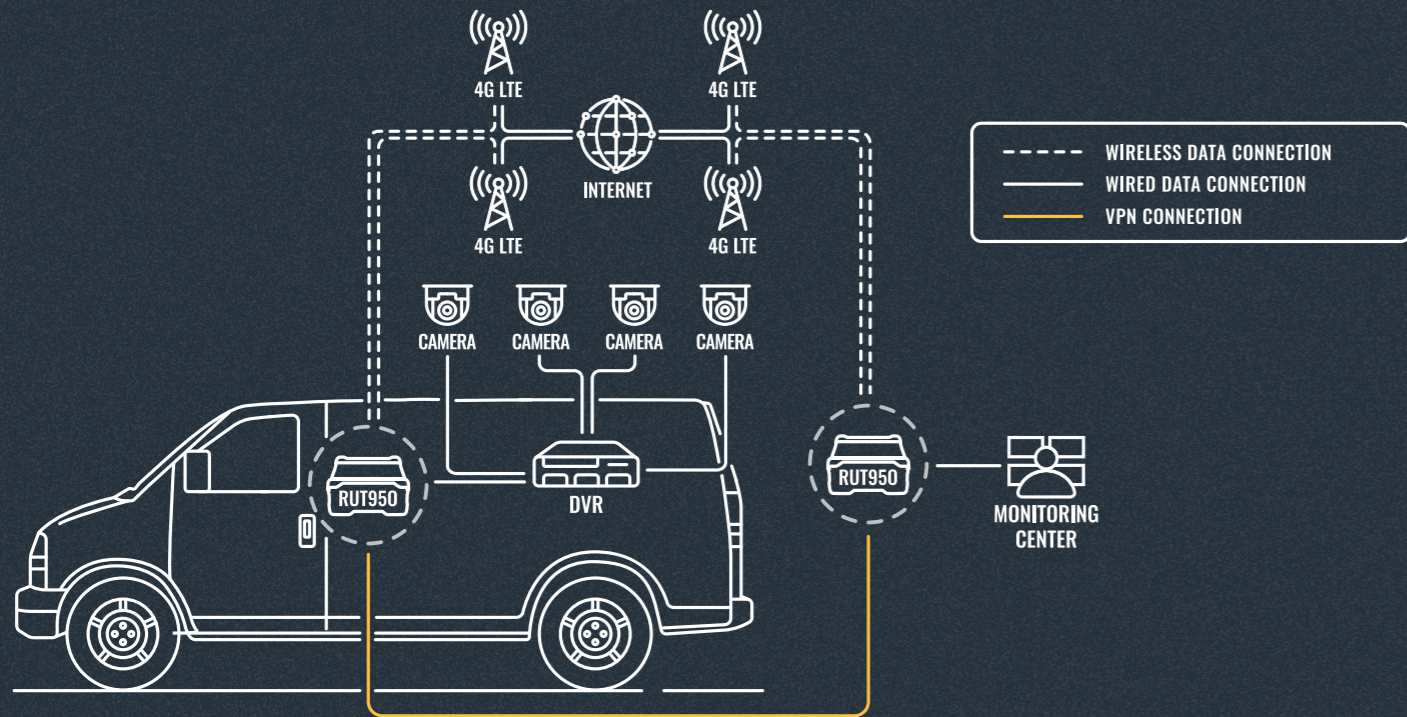

JCDecaux

REMOTE IMAGE CONTROL SOLUTION FOR ARMORED TRUCKS

// SMART CITY

// CHALLENGE

Remote image control significantly increases the security of armored fleets with a critical mission to bring all the valuables to the set destination. However, the solution requires a certain level of automation because the cameras and DVR need to start working before the vehicle leaves the parking area. So, the connectivity device should first be able to integrate the hardware and offer enough firmware flexibility to set up automation rules. Besides, having a stable, reliable connection is crucial for real-time remote monitoring in such missions. Even minutes of lost access could be game-changing in the sense of safety of staff and consignment. And network security is just as vital because a breached connection could result in real-life peril too.

// SOLUTION

In this solution, multiple cameras are placed outside and inside the vehicle. Using a wired connection, they connect to a DVR (Digital Video Recorder), which in turn connects to a RUT950 cellular router, providing connectivity for all these devices. A dual-SIM 4G router offers stable and reliable internet access in a moving vehicle with automatic failover, ensuring network continuity even if the primary connection is lost. Having a backup connectivity option with a different operator is essential for the security of this solution, as any minute of lost communication poses an increased threat level.

One of the essential features available in RUT950 for this solution was the scheduling feature that automatically activates the DVR power supply using a digital output. It enables turning on the cameras before the staff arrives at the area and ensures the camera system is active without any human interaction. As a result, the control center in the HQ can have visibility of the vehicle and its' surroundings.

The HQ connects to the router using a secure VPN connection. The RutOS offers a variety of VPN services to choose from to fit the requirements of different solutions. An encrypted connection protects the data from viewing or altering by third parties for malicious purposes, so the live camera footage and the recordings can safely reach the remote monitoring center and servers.

// BENEFITS

RUT950 offers a 4G connectivity with automatic dual-SIM failover that is perfect for providing connectivity with a backup in a moving vehicle.

The rugged and durable design of RUT950 can sustain the truck's vibration and wide temperature ranges.

The scheduling feature available in RUT950 allows to turn on the solution without any human interaction before the staff arrives at the parking area.

Using one of the multiple available VPN services in RutOS afford encrypted secure remote access from the HQ to the solution.

AdvanTech

REMOTELY CONTROLLED URBAN IRRIGATION SYSTEM

// SMART CITY

WIRELESS DATA CONNECTION
WIRED DATA CONNECTION

MONITORING CENTER

INTERNET

PHONE APP TO MONITOR AND MANAGE SOIL MOISTURE

4G LTE

IMC BOX   RUT240

SENSORS

WATER & FERTILIZERS

// CHALLENGE

A garden or a nice lawn set atop your apartment rooftop, a wall covered in green vines, or trees planted all along the sidewalks not only decrease the heat absorbed throughout the day but also help to clean the air. However, as many of you may know, plants need constant care and sufficient moisture to grow and flourish.

Since the greenery growing within the city will experience the drastic changes of the local microclimate, it needs the moisture to be just right. Having staff physically go around the city to check and take care of all the green spaces is highly inefficient. An irrigation system can eliminate such needs, making the watering process much faster. The irrigation system can be automated to increase such a solution's efficiency further. However, such a solution needs connectivity for all of its sensors and control options for the irrigation system.

// SOLUTION

Three companies have combined their expertise to provide remote irrigation system control for green city spaces. HB Water Technology has developed an IMC (Irrigation Moisture Control) box to track changes in weather conditions and active the irrigation system remotely when needed. The box monitors moisture in the soil, temperature, water pressure and flow. Based on this data, the irrigation can be set up to water the plants automatically, once all the requirements are met, or be remotely activated with an APP or via an internet browser.

Connectivity for this solution comes from Teltonika Networks RUT240 industrial cellular router housed within the IMC Box and featuring an eSIM data bundle provided by Comgate. Teltonika Networks router is a perfect fit for this scenario as it can withstand extreme environments, like heat, cold and moisture. The sensor can then relay the data to a monitoring center where the system can be adjusted accordingly and the information analyzed. This lets you take care of the city greenery without having trained staff on site.

// BENEFITS

RUT240 can work in extreme environmental conditions, like heat and moisture, which the irrigation system encounters regularly.

Multiple I/O connections allow for remote monitoring and control of connected elements.
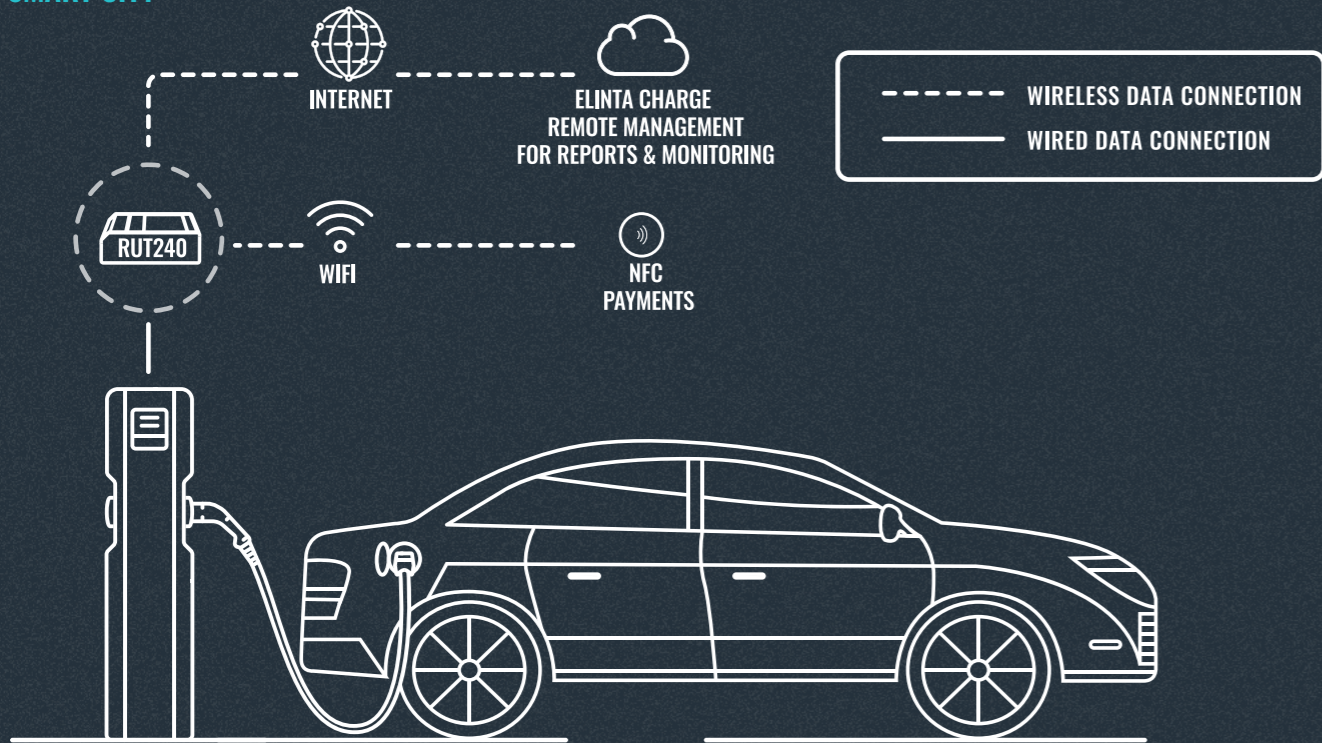
The industrial cellular router provides 4G LTE connectivity which allows transferring the gathered data from the sensors to the monitoring center.

Remote management of connected elements via an APP or browser.

PLUG AND PLAY CONNECTIVITY FOR EV CHARGING STATIONS

INTERNET

ELINTA CHARGE REMOTE MANAGEMENT FOR REPORTS & MONITORING

RUT240

WIFI

NFC PAYMENTS

------ WIRELESS DATA CONNECTION

———— WIRED DATA CONNECTION

// CHALLENGE

In 2021 Elinta Charge started working on their next-generation EV charging station to help with the rapidly growing electric vehicle infrastructure. They needed something that would solve the connectivity problem in the new design. Teltonika Networks provided just the right connectivity solution that could meet all the requirements to put the smart engineering solution into a sleek urban design.

Another problem that urban engineering faces is implementing new additions to the infrastructure. New charging stations need a power supply, payment systems and connectivity. All of this usually requires access to the internet. If the internet infrastructure is unavailable in an area, it would be highly inefficient to lay down new groundwork only for implementing a charging station. Hence, wired connectivity is not always an option.

// SOLUTION

Elinta Charge employs Teltonika Networks RUT240 industrial cellular router for their EV charging station IoT solution. The router enables internet access through cellular 4G connectivity without the need for any wired connection. Thanks to this connectivity, Elinta Charge is able to collect data from their charging stations and remotely manage them with their cloud-based management system. Remote management helps to change settings, perform firmware and payment system updates without visiting each charging station. Furthermore, it can also enable users to check the availability of charging stations and reserve them in advance.

Furthermore, RUT240 has a wireless access point functionality required for NFC (Near Field Communication) wireless payments. Clients can then pay using smart wallets or credit cards for their EV charging services. RUT240 can be easily integrated into an EV charger thanks to its compact design and plug-and-play functionality enabled by its wireless setup.

// BENEFITS

Teltonika Networks router offers high-level security that any payment solution needs with the help of Firewall, Auto Cipher modes and client separation.

RUT240 is compact which allows it to be integrated into a smart IoT solution without compromising the aesthetic.
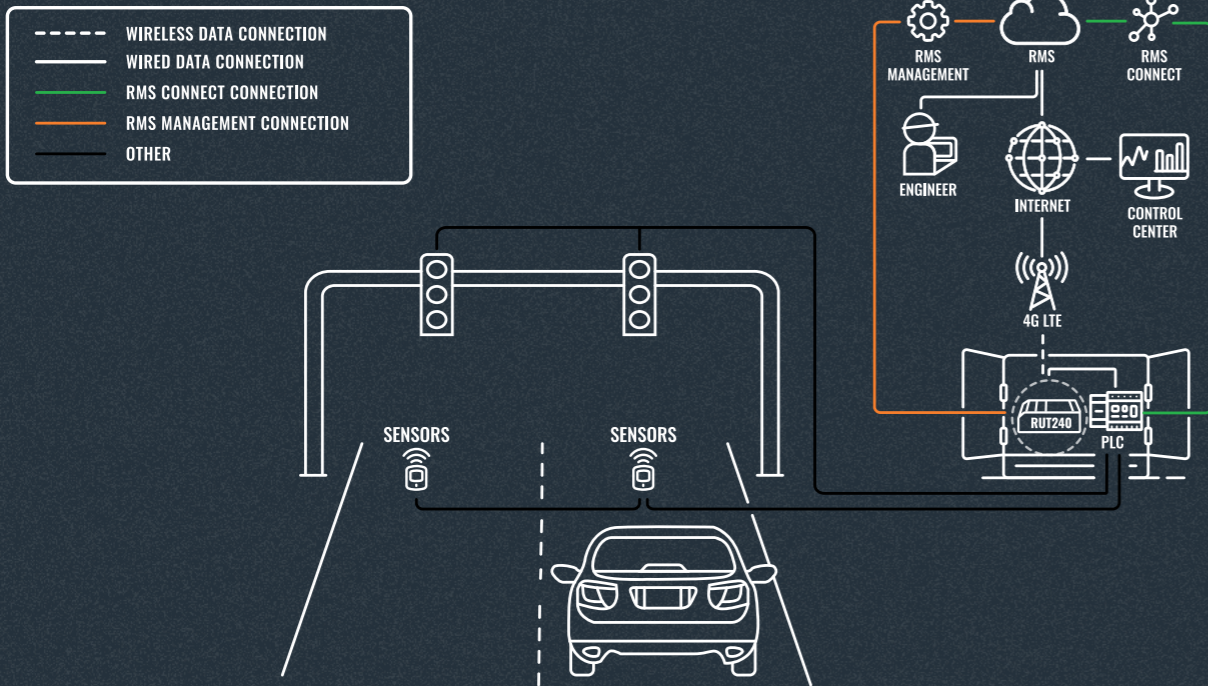
Routers' compatibility with remote management platforms enables 24/7 real-time analytics and surveillance, which provides information if there are any issues with the charging station.

The cellular router offers high scalability with fast and easy installation, thanks to its plug-and-play approach.

REMOTE CALIBRATION AND CONTROL OF SMART TRAFFIC LIGHTS

// SMART CITY

WIRELESS DATA CONNECTION
WIRED DATA CONNECTION
RMS CONNECT CONNECTION
RMS MANAGEMENT CONNECTION
OTHER

RMS MANAGEMENT
RMS
RMS CONNECT
ENGINEER
INTERNET
CONTROL CENTER
4G LTE
RUT240
PLC
SENSORS
SENSORS

// CHALLENGE

One of the essential elements to combat heavy traffic is city planning. With ever-growing cities and sprouting business centers, the conventional road and traffic infrastructure falls behind. Regular traffic signals are not always sufficient to handle large numbers of vehicles as they do not actively react to the situation, or inaccurately programmed timers can even add to the problem and create traffic jams.

With no way to actively gather data, accurate traffic signal calibration is nigh impossible. The workforce needed to calibrate each light would be huge and the overall logistics can get quite complicated.

M.K. Traffic Technical Solutions Ltd received a project to install the first Microprocessor Optimized Vehicle Actuation (MOVA) in Cyprus. The plan was to place this new addition in one of the busiest roundabouts on the island. Yet, the system had to be calibrated by an expert from the manufacturer. Thus, due to Covid-19 travel restrictions prohibiting the engineer from travelling, meeting project delivery dates was a massive challenge.

// SOLUTION

To meet the deadlines, M.K. Traffic Technical Solutions Ltd decided to redesign their solution by adding Teltonika Networks connectivity product. They decided to establish remote communication by using the RUT240 industrial cellular router so that the engineer could calibrate the system while staying abroad.

First, the RUT240 router provides an internet connection to this IoT solution. A Traffic Signal Controller connects with the router via an Ethernet cable. Then the PLC can accommodate all of the traffic signals and sensor connections. With the data from induction loops installed on the tarmac, the PLC can regulate traffic green light time.

Another part of this solution is the Teltonika Networks RMS. Teltonika RMS Management allows access to the RUT240 to monitor its temperature, install firmware updates, or set up alerts. RMS Management can accommodate more compatible Teltonika Networks devices in the future without the need for public IPs.

On the other hand, the RMS Connect can provide access to any other third-party equipment. With its help, you can then remotely manage any settings of the connected devices as if you were there physically. This is how the engineer was able to remotely calibrate the PLC.

// BENEFITS

The RUT240 offers easy integration due to its 4G connectivity and small size to fit into small cabinets without any problems.

RUT240 delivers high performance in rigorous environments, a perfect choice for solutions in extreme conditions, for example, near high traffic where you need resistance to vibrations. During the summer, the temperature of the router had reached 78°C and istill worked fine.
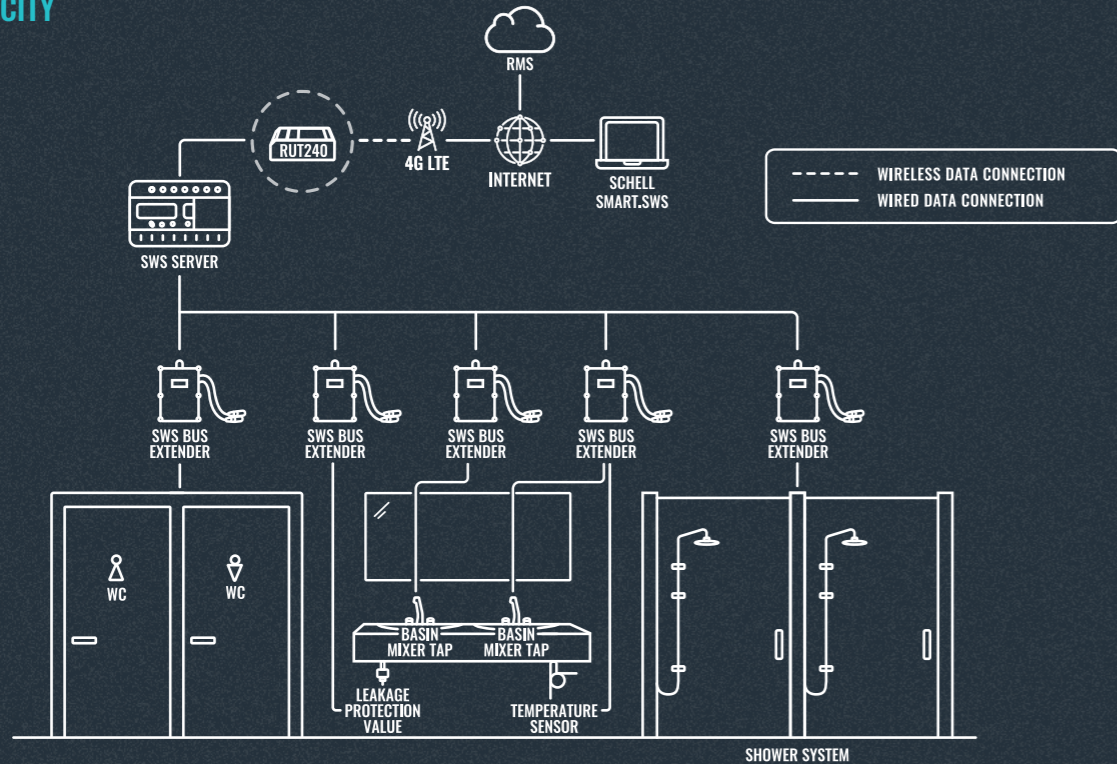
Teltonika RMS Connect allows access to any of the connected smart devices to configure them and extract data.

RMS Management allows access and control for all compatible Teltonika Networks devices without the need for a public IP.

REMOTELY MONITORED WATER MANAGEMENT SYSTEM

// SMART CITY

- RMS
- RUT240
- 4G LTE
- INTERNET
- SCHELL SMART.SWS
- SWS SERVER

- - - - WIRELESS DATA CONNECTION
——— WIRED DATA CONNECTION

- SWS BUS EXTENDER
- SWS BUS EXTENDER
- SWS BUS EXTENDER
- SWS BUS EXTENDER
- SWS BUS EXTENDER

- WC
- WC
- BASIN MIXER TAP
- BASIN MIXER TAP
- LEAKAGE PROTECTION VALUE
- TEMPERATURE SENSOR
- SHOWER SYSTEM

// CHALLENGE

Ensuring the hygiene of water and optimizing its use is not an easy task, especially in large properties with multiple sanitary units. The question is, how is it possible to warrant that the water systems are operating hygienically? And what is the best way of detecting any problems and required maintenance work productively and economically? Large structures require automation and remote management system to be monitored efficiently.

// SOLUTION

SCHELL SWS is the first water management system offering intelligent networking and control for fittings using Teltonika Networks RUT240 cellular router. The system can control SCHELL electronic washbasin, shower, WC, and urinal fittings. Installations connect into a network with the corresponding bus extenders, allowing up to 64 subscribers. Gateways integrate this system into the existing building automation system, where RUT240 provides unbreakable network connectivity with auto-failover for backup. This device is perfect for the solution because of connection reliability, compact size, simple integration, and support of various industrial networking protocols for secure data transfer. The centrally controlled system maintains water quality in large buildings via fittings and sensors. Operating parameters, like temperatures, or the start and end of a stagnation flush, can be read and evaluated using a data protocol.

SMART.SWS ensures that users across buildings always have an eye on the systems. Via remote access, it is possible to learn about the water consumption or the status of the intended operation at any time. Besides, with the help of a unified control system, it is possible to remotely set up the antibacterial high-temperature flush at a preferable time, or turn-off the water supply outside specific hours altogether. In summary, the online service enables uncomplicated, fast, and location-independent management and resource optimization.

// BENEFITS

Efficiency - data-driven automation ensures the highest possible water hygiene, automated optimal flushing, and centrally controlled thermal disinfection.

Reduced costs - come as a result of energetic and economic optimization through targeted control of water volumes.

Remote management - central control of multiple objects and parameters from any location.

Plug-n-play - the system comes with all the necessary components enabling quick integration and preventing incorrect orders.
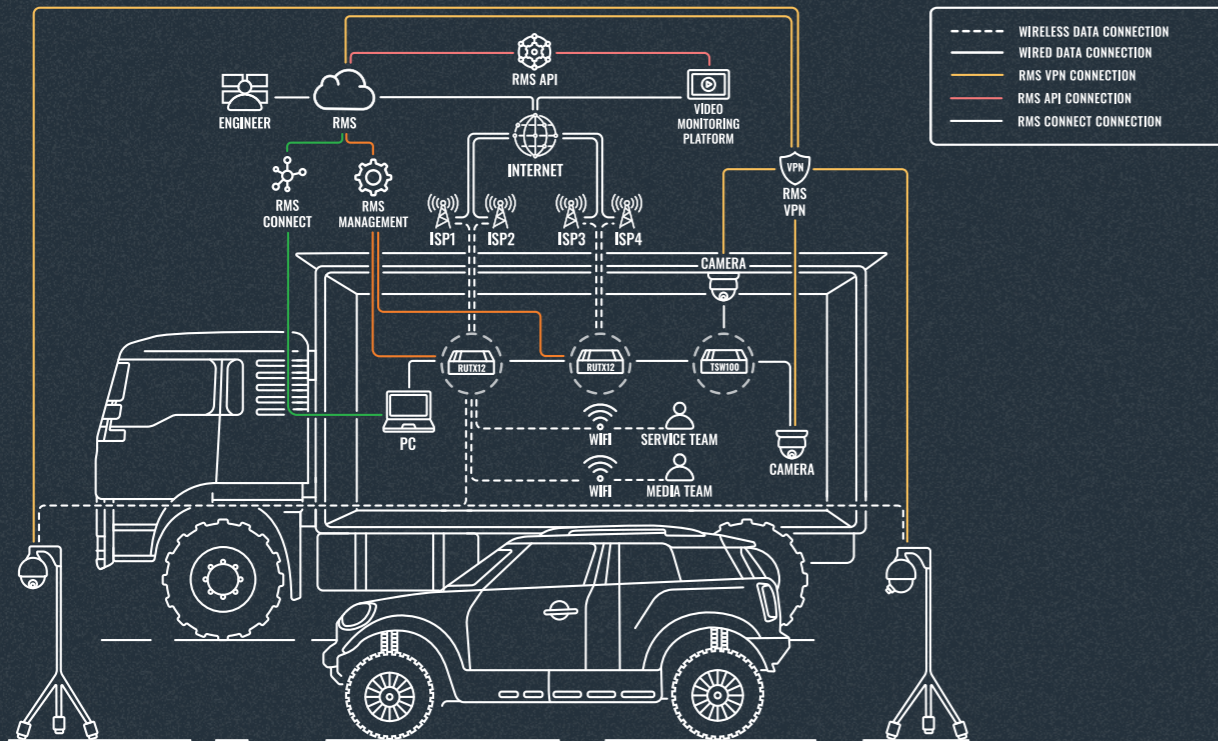

SCHELL

TRANSPORTATION

Public transportation companies, first responders, and automotive organizations rapidly evolve their services to accommodate IoT. Teltonika Networks devices provide users and transportation operators with more data to optimize their businesses and create new revenue streams with better-connected vehicles.

TELTONIKA RACING TEAM CONNECTIVITY IN DAKAR 2022

// TRANSPORTATION

Legend:
- ----- WIRELESS DATA CONNECTION
- ——— WIRED DATA CONNECTION
- ——— RMS VPN CONNECTION
- ——— RMS API CONNECTION
- ——— RMS CONNECT CONNECTION

// CHALLENGE

Naturally, Dakar rules do not allow any connectivity devices in race cars besides their official navigation and safety equipment. However, three of Teltonika Networks products were installed to provide connectivity in the rally assistance truck that follows the race team from one service area to another to assist the race team.

Due to their design, support trucks follow different routes than race cars and usually do not travel off-road. Yet the race still results as an ultimate two-week test of our devices traveling hundreds of kilometers each day, tested by vibration, dust, heat, and constant network changes among numerous mobile operators to provide stable internet connectivity for the team.

// SOLUTION

Dakar organizers take security very seriously. However, full of expensive equipment and mainly using different routes than the race cars, support trucks require additional security measures. Besides, the racers usually rest away from the bivouac, and remote monitoring options help them keep track of the work progress on the ground and maintain contact with the team.

For these reasons, four IP cameras have been installed on the support truck of the Teltonika racing team. They connect to two RUTX12 cellular routers via the TSW100 switch to receive reliable and uninterrupted internet connectivity over 4G. TSW100 features four PoE ports to easily connect the cameras and power them up simultaneously, making the arrangement super quick and straightforward. With this setup, cameras can be reached remotely via a secure RMS VPN connection for monitoring and support. And most importantly, data from the cameras can be securely transferred to a remote device, like a laptop, tablet, or phone, to access on demand by the team members.

The two simultaneously operating Dual-LTE Cat 6 RUTX12 routers ensure stable connectivity with instant failover among four different operators, while load-balancing helps to increase throughput. Both routers are remotely reachable by an engineer through the RMS Management service for any troubleshooting, updates, and monitoring should the need arise. Using RMS Connect also allows accessing third-party devices. So, even an engineer from another country may access and configure them just like they were physically there.

// BENEFITS

Uninterrupted connectivity and high throughput ensured by four simultaneously active SIM cards and load balancing.

Easy and quick setup of IP cameras due to PoE technology available in TSW100 switch.

Secure remote access of routers and third-party devices via RMS Management, RMS Connect, and RMS VPN.
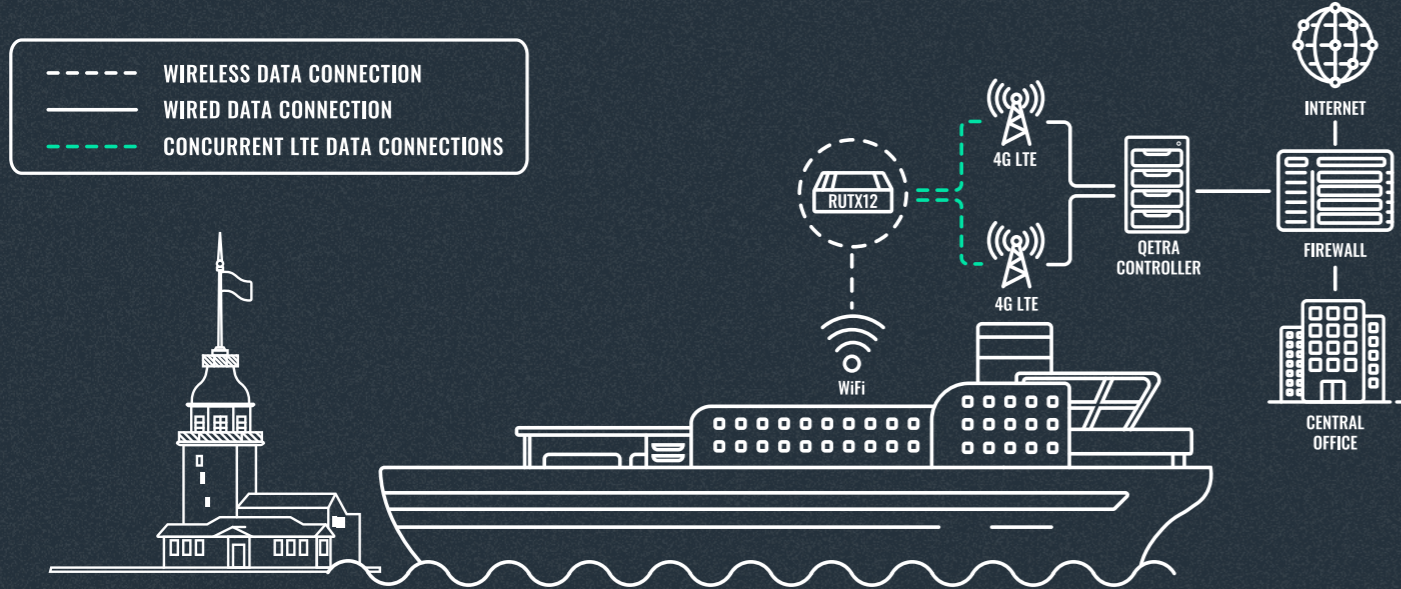
Simple to set up Access Point with Hotspot functionality available in Teltonika Networks routers.

The industrial design allows Teltonika Networks products to sustain harsh conditions, like extreme temperatures (the average in January is between 12 and 17 °C and sometimes can reach freezing 0°C at night), dust in the desert, and the vibration of a moving vehicle.

RELIABLE WIRELESS INTERNET CONNECTIVITY FOR FERRY PASSENGERS

// SMART CITY

- – – – – WIRELESS DATA CONNECTION
- ———— WIRED DATA CONNECTION
- – – – – CONCURRENT LTE DATA CONNECTIONS

RUTX12 · 4G LTE · 4G LTE · WiFi · QETRA CONTROLLER · FIREWALL · INTERNET · CENTRAL OFFICE

// CHALLENGE

Many passengers on the ferry want to share their scenic route on social media, read up on the news while commuting, or facetime their friends and family. For every one of those activities, an internet connection is a must, however the challenge lies in securing that connectivity on the water and between two continents separated by the Bosporus strait.

As the ferry sails across the water, the router might connect to different internet providers due to changing geographical location. Also, using the roaming function might cost quite a lot. Not to mention, many users are going to be connecting to one network at the same time.

// SOLUTION

ISTTELKOM and Stratus Bilisim have teamed up with Teltonika Networks to find an IoT solution that would help to provide a stable wireless internet connection to passengers on board the ferries. For this, our partners used the RUTX12 industrial cellular router due to its efficient load balancing and customizable RutOS firmware. In such a scenario features like load balancing, band-locking and the durability of the router are a must.

Using our SDK in combination with their own software Qetra SDWAN Suite, Stratus Bilisim added SD-WAN capabilities with Layer 2 communication to the RUTX12 router. With RUTX12 the load balancing feature can provide Wi-Fi users with a fast and stable internet connection. This IoT solution can automatically detect when one of the cellular internet provider connections weakens or fails and then switch to the other, more stable one. This functionality is essential as the cellular coverage on a ship is spotty at best.

RUTX12 router in this setup can offer Wi-Fi hotspot functionality. This function increases the security of the network with custom accessibility settings where certain permissions can be set. Moreover, it can be used for marketing and research purposes as it can collect data from connected devices or display targeted ads as they access the web.

// BENEFITS

Internet connection can be more stable and reach much higher speed because RUTX12 has two LTE Cat6 modems that can operate simultaneously.

A wide range of operating humidity and temperature allows RUTX12 to be installed in harsh environments, such as a ferry.
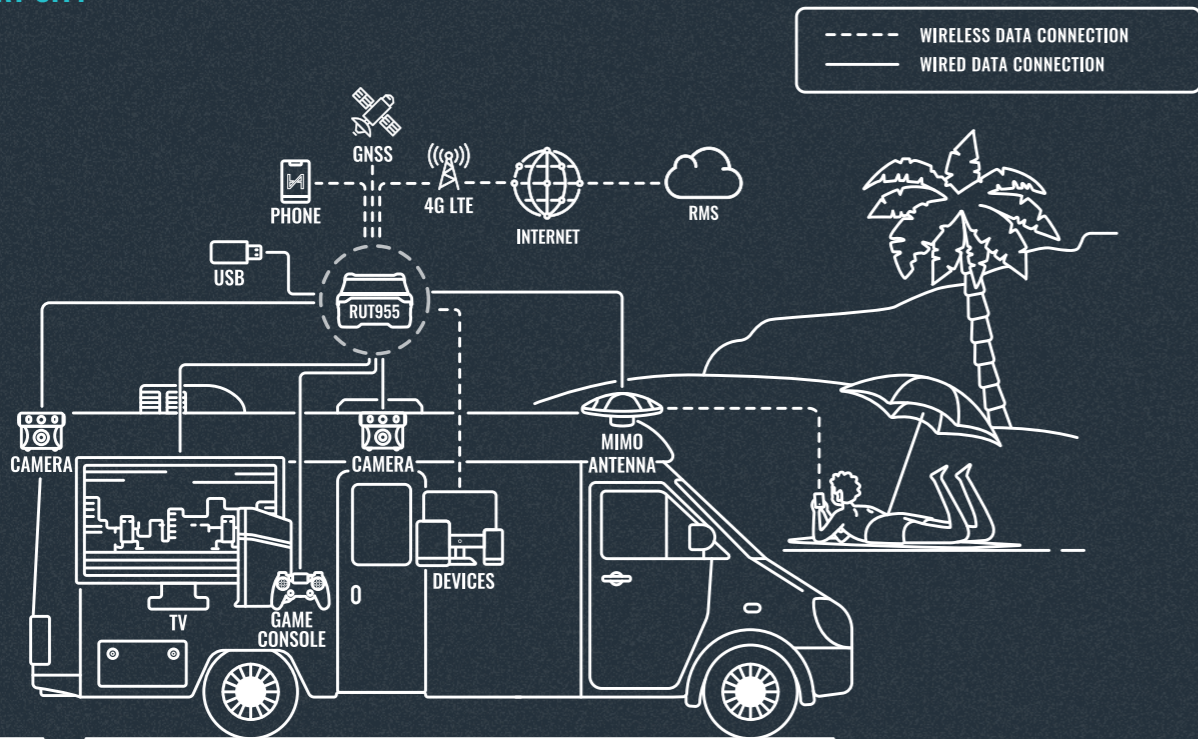
This router has a collection of advanced security features like VPN and Firewall which ensures that overall connection is safe.

RUTX12 offers load balancing and band locking, both of these features provide greater control over data usage.

PLUG-N-PLAY SOLUTION FOR THE WHOLE CAMPERVAN ECOSYSTEM

// SMART CITY

WIRELESS DATA CONNECTION
WIRED DATA CONNECTION

GNSS
PHONE
4G LTE
USB
INTERNET
RMS
RUT955
CAMERA
CAMERA
MIMO ANTENNA
TV
GAME CONSOLE
DEVICES

// CHALLENGE

The challenge of implementing connectivity in a campervan is multifold. The device must be sturdy enough to work smoothly in a moving vehicle. It also needs to have suitable mounting options and should be easy to install. As the campervans often cross borders of multiple countries, it needs to offer reliable connectivity in each of them, and especially - close to the borders, where the signal of different operators overlaps. Another big issue to consider is the security of the solution, where various devices are using the same WLAN.

// SOLUTION

CamperNET is a complete solution, offering reliable campervan connectivity without a complicated setup. A combination of patented antenna technology by Antretter & Huber and Teltonika Networks dual SIM 4G RUT955 router ensures reliable connectivity even where a cell phone would be failing. Using two SIM cards provides not only better network reception in different areas but also helps to save on the operator charges. For example, if a vehicle is crossing the border, the router will immediately switch to another SIM to avoid high roaming tariff.

This plug-n-play solution does not require downloading and installing any apps to work with any smartphone, laptop, tablet, or PC. A USB port available in the RUT955 allows connecting SmartTV, streaming sticks, or WIFI sound systems straight to the internet. Multiple Ethernet ports enable easily connecting IP cameras and other IP devices.

Robust RUT955 router can operate temperatures between -40 °C to 75 °C, so it will survive traveling in summer and winter conditions. The broad power voltage range makes the RUT955 compatible with any type of camper battery and the whole solution takes less energy than a LED lamp.

// BENEFITS

A complete solution meeting the WIFI needs of any type of traveler – from data consuming entertainment purposes to smooth uninterrupted remote work experience.

Dual SIM functionality allows choosing any two cellular operators helping to achieve better network reception and save on expenses.

The ability to put the whole equipment under one campervan WLAN allows connecting the whole ecosystem to a free external WIFI while on the camper site within a few clicks of a button.
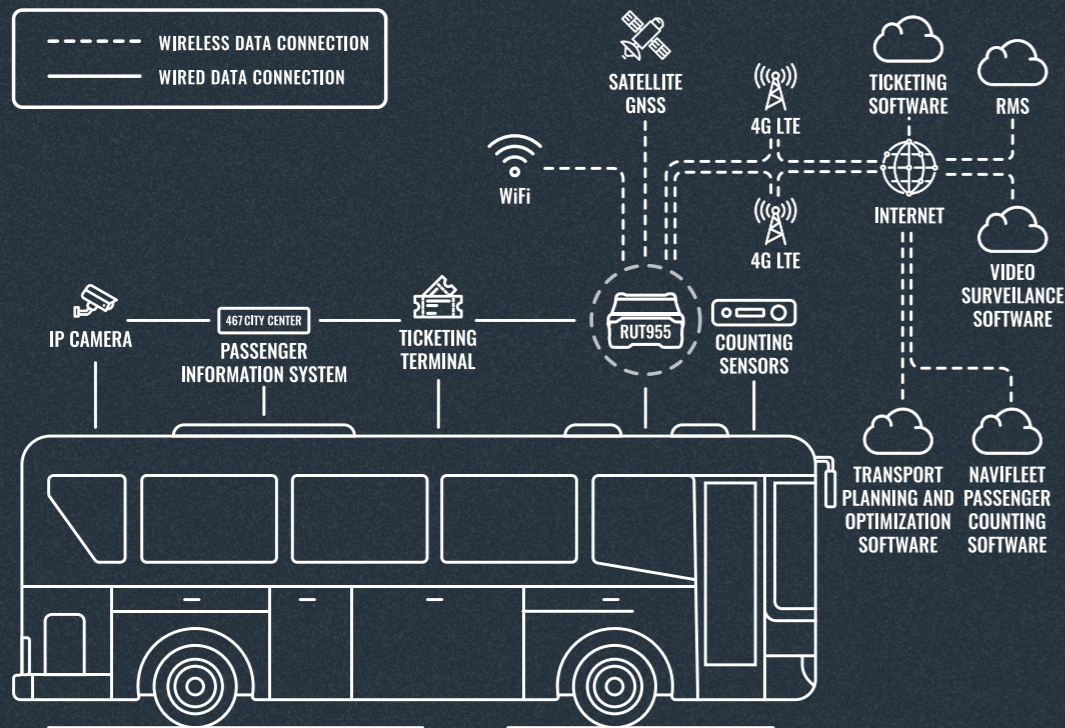
Hotspot enables sharing the internet with others while setting up data limits saves from too much data getting used.

Pre-installed Firewall ensures safe browsing for all the devices under the router.

REAL-TIME PASSENGER COUNTING IN PUBLIC TRANSPORT

// SMART CITY

WIRELESS DATA CONNECTION

WIRED DATA CONNECTION

WiFi

SATELLITE GNSS

4G LTE

4G LTE

TICKETING SOFTWARE

RMS

INTERNET

VIDEO SURVEILANCE SOFTWARE

IP CAMERA

467 CITY CENTER

PASSENGER INFORMATION SYSTEM

TICKETING TERMINAL

RUT955

COUNTING SENSORS

TRANSPORT PLANNING AND OPTIMIZATION SOFTWARE

NAVIFLEET PASSENGER COUNTING SOFTWARE

// CHALLENGE

So, we established that real-time data is vital in making timely decisions to optimize the operation of public transport. However, the question is what kind of data is important, and how to collect it and share it in real-time to increase effectiveness?

The most important factor in optimizing transport frequency is the number of passengers. Having real-time data as opposed to data from a short window is superior as it allows knowing what is exactly happening at a given time and make adjustments immediately, like adding an additional bus to the schedule to avoid overcrowding, hence improving customer experience. But how does this happen in real life?

Implementing a system that is capable of collecting and sending data in real-time in a constantly moving vehicle requires not just sophisticated counting equipment and cloud-based application, but also - a reliable connectivity solution.

// SOLUTION

The NaviFleet APC solution uses of Teltonika RUT955 router for the network. Passenger Counting Sensors are connected over the Ethernet interface and use NaviFleet APC firmware for real-time data collection. NaviFleet APC firmware is compatible with the most well-known passenger counting sensors.

NaviFleet APC Firmware integrated with RutOS OpenWrt transmits passenger counting information to NaviFleet Could Server Software over Wi-Fi or 4G for network continuity. Transmitted data includes accurate GPS tracking information, geofencing data, driving mileage, driving and stop time, and passenger flow data.

Advanced NaviFleet APC Firmware can connect additional devices, such as video IP cameras, breath analyser, Passenger Information System, and ticketing terminals.

// BENEFITS

Cost-efficient - combining NaviFleet APC with RUT955 allows offering a solution at a very competitive price point among others.

Easy management of the whole solution - cloud-based management platform offers easy captive portal management, connections to counting sensors, and location tracking.
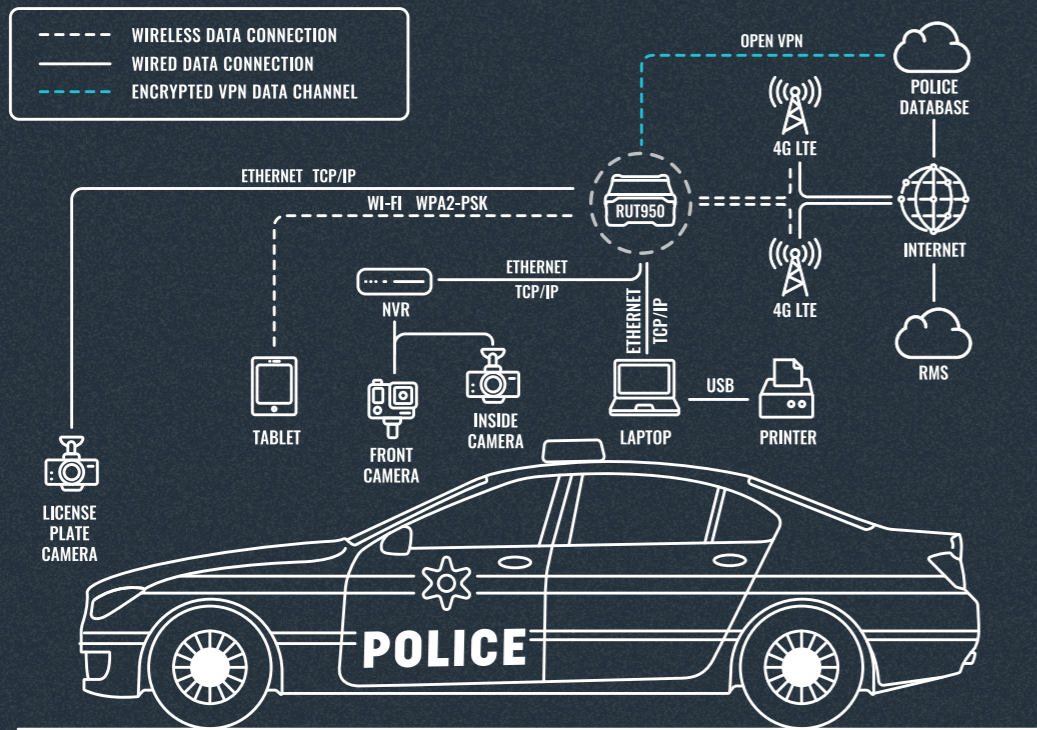
Multiple connectivity options - RUT955 combines reliable and secure LTE Cat 4, Wi-Fi, Ethernet, and GPS.

OpenWRT based RutOS - allows to conveniently create different useful applications and comply with the increasing market requirements.

RUT955

EcoTelematics Group

CELLULAR CONNECTIVITY FOR POLICE VEHICLES

// SMART CITY

WIRELESS DATA CONNECTION
WIRED DATA CONNECTION
ENCRYPTED VPN DATA CHANNEL

OPEN VPN
POLICE DATABASE
4G LTE
INTERNET
ETHERNET TCP/IP
WI-FI WPA2-PSK
RUT950
ETHERNET TCP/IP
NVR
ETHERNET TCP/IP
4G LTE
RMS
USB
TABLET
FRONT CAMERA
INSIDE CAMERA
LAPTOP
PRINTER
LICENSE PLATE CAMERA
POLICE

// CHALLENGE

The current police vehicles are far from being just a conventional car. They are packed with various devices and technology that all need to be connected via Wi-Fi, Ethernet, and mobile network. License plate reader, inside and outside cameras, tablets, laptops, and a printer - all need to be connected to the internet and to the police database to securely transfer sensitive data. The police car is constantly moving around, sometimes in locations where the connectivity is limited, so depending on one network operator is not an option. Backup connectivity is a must. A moving vehicle also creates vibration so the device needs to be quite sturdy and also function well in cold and hot temperatures.

// SOLUTION

RUT950 provides 4G LTE connectivity to the police vehicle systems. This router has dual SIM functionality, allowing to use SIM cards of two different operators and automatically switch to the secondary one in case of low signal. Multi PDN feature on primary SIM separates the traffic into the usual and private LTE and allows accessing the police database and special applications through private LTE. The license plate camera is connected to the router via a direct Ethernet link and communicates using TCP/IP. It keeps constant interaction with Police Database and monitors all traffic. If the system finds that the vehicle has broken the law, the officers can either stop it or leave it for the system to issue a fine automatically.

The tablets are using the internet from a pre-configured wireless network provided, again, by the same RUT950. With a range of up to 100 meters in an open area, it allows the officers to fill in reports, take and upload pictures, and reduce the time for paperwork. The front and inside cameras connect to the Network Video Recorder via Ethernet, which holds a week's worth of footage. The front camera is for evidence collection, and the inside camera proves to be an efficient tool for bribery prevention.

The laptop is connected to the router using an Ethernet interface communicating TCP/IP. It enables checking information on the database and plays an integral part in automatic monitoring and reporting solution empowered by the license plate camera. The system is secured with Open VPN end-to-end encryption, and the password for Wi-Fi and the router is changed periodically. The Remote Management System is used for data consumption reports, remote configuration, automated firmware updates, and alerts.

// BENEFITS

One router for the whole solution – RUT950 provides 4G LTE, Wi-Fi and wired connectivity options for all kinds of devices used in this case.

Secure – VPN end-to-end encryption ensures system security; periodical password change keeps the Wi-Fi network free from unwanted guests.

Reliable – 4G LTE connectivity with dual SIM for backup ensures the devices are always connected to the internet.
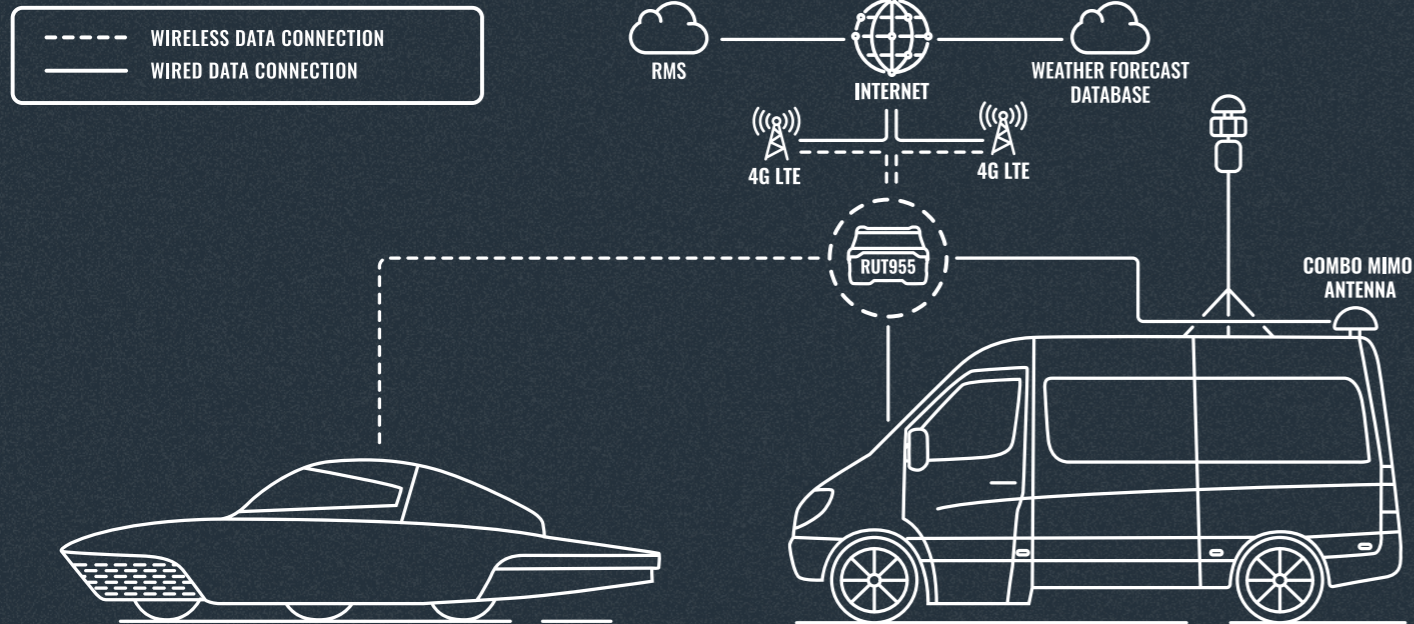
Rigid – the RUT950 comes in an aluminium housing and operates in temperature range of -40 °C to 75 °C.

Automated processes – the data is uploaded to police servers automatically once the RUT950 router senses that the Police Vehicle is back to the Police Station, saving time and ensuring privacy, as no human involvement is required.

UNINTERRUPTED INTERNET CONNECTIVITY IN DESERT RACE

// SMART CITY

WIRELESS DATA CONNECTION
WIRED DATA CONNECTION

RMS

INTERNET

WEATHER FORECAST DATABASE

4G LTE

4G LTE

RUT955

COMBO MIMO ANTENNA

// CHALLENGE

Team Sonnenwagen entered their latest electric, solar-powered car, Covestro Photon, into the Solar Challenge Morocco 2021 race. Although, the race car was not the only one on the road as a supporting convoy always followed suit. One of the supporting cars is dedicated to the driving strategy team. Their role in the race is to relay important information to the solar car driver to proceed without any problems.

The racecourse stretches throughout mountains, deserts and unpopulated areas. This race layout makes having a good internet connection quite challenging. Without it, the team cannot access weather and location data and other important information. The team needed to ensure somehow that the convoy had uninterrupted access to the internet. And to top it all off, the car was constantly moving.

// SOLUTION

The Sonnenwagen team used Teltonika Networks RUT955 industrial cellular router with the COMBO MIMO Mobile/GNSS/Wi-Fi Roof SMA antenna. This IoT solution ensured that the support team had an interrupted internet connection, which they used to acquire accurate weather data. Then the information was relayed to the solar car driver, and the route adjusted accordingly, as solar panels can't charge without sunlight.

The dual SIM with a failover allowed RUT955 to provide constant and stable internet access even in remote areas. A GNSS receiver was also connected to the router and a Sonnenwagen server. These features enabled continuous geographical tracking of the team and processing all the received data. The Sonnenwagen team first tested the router extensively and only after passing with flying colors was it installed in the Strategy Car.

Moreover, RUT955 runs on RutOS, an open-source operating system that lets anyone to adapt it with their specific requirements. The team could easily integrate their API and have complete access to the router system. Thanks to this compatibility, they could constantly monitor temperature, connection status and retrieve warnings if something didn't look right.

// BENEFITS

RutOS allows integrating a custom API that can gather critical diagnostic data.

RUT955 provides reliable cellular connectivity thanks to dual SIM and failover functionality.

RUT955 router can easily integrate with other products like antennas to further increase the strength of the internet connection signal.

The router can easily withstand high temperatures, vital for working in desert conditions.

RUT955 has an E-mark certificate, that allows it to be used in vehicles.


TEAM SONNENWAGEN AACHEN

ENTERPRISE

Enterprise applications require connectivity hardware that's secure, reliable, and easy to use. Teltonika Networks provides scalable networking infrastructure for primary and backup connectivity.

SECURE CONNECTIVITY FOR BANK BRANCHES

// ENTERPRISE

VPN CONNECTION
RMS CONNECTION

RMS   INTERNET   HQ

RUT300   RUT300   RUT300

BANK   BANK   BANK
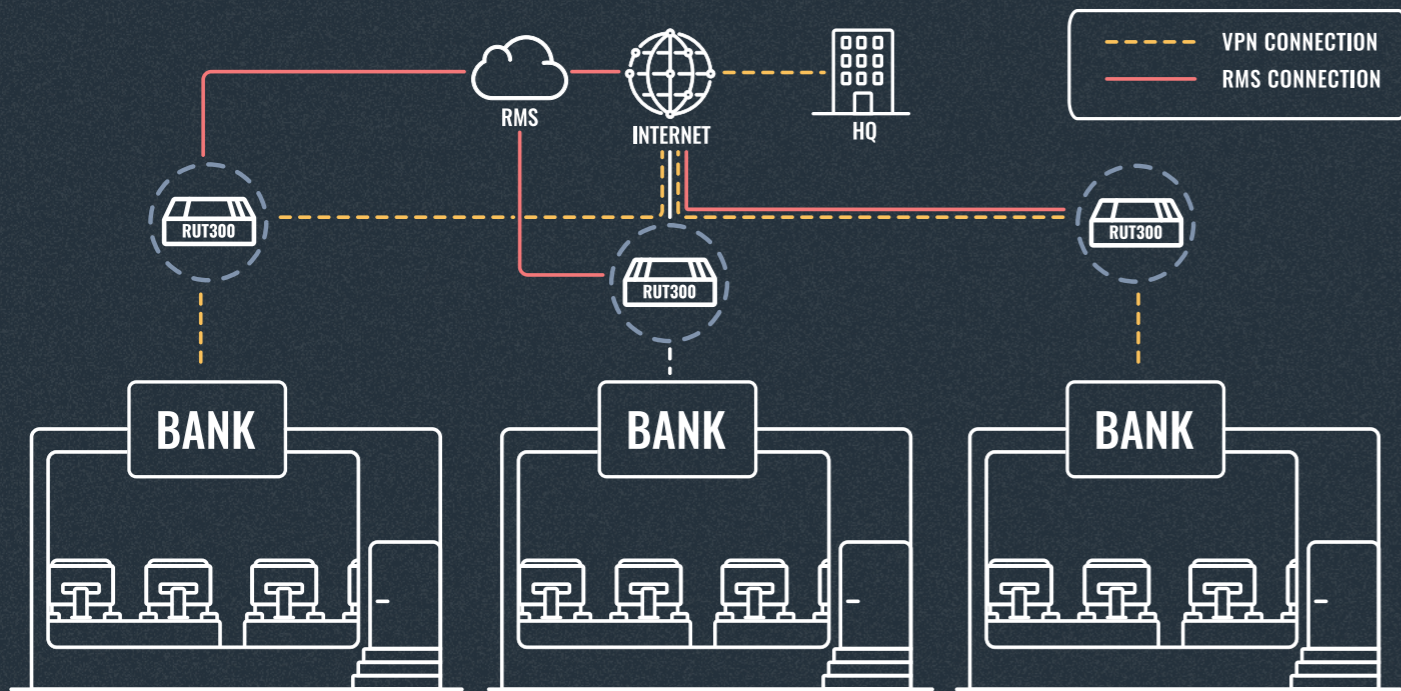
// CHALLENGE

The bank branch connectivity has to overcome multiple challenges. Connection reliability is a must. Being a customer-oriented institution, a bank cannot risk to be offline even for short periods of time, as it may cause not just dissatisfaction of the clients but also system disturbances. There is no question regarding the required top-level security of the data and transactions of any kind. However, besides these more obvious requirements, there is also a demand for flexibility and ease of setting-up. The rapidly changing situation in demographics and economy, strikes a challenge to predict of where and for how long a specific branch would be needed. As such, the installation should be quick and easily applicable in another location.

// SOLUTION

The bank branches in the US and across the world are getting smaller in size and the staff. The number of full-time employees has declined and varies on average from 3 to 8 per branch. As seen in topology, such branches do not require a complicated network infrastructure and Ethernet connectivity fully suffices the day-to-day operations.

RUT300 Ethernet router has five fast Ethernet ports to easily plug in the computers and gives immediate access to the internet. It is a small device that will easily fit into any cabinet or on a desk and the Passive PoE feature makes it very simple to deploy avoiding additional wires and messy setups. A USB port can be used to easily connect a printer or other office equipment to the network.

This device enjoys an abundance of RutOS benefits. It comes with a preconfigured Firewall, meaning that it is immediately safe to use. It also offers a selection of 10 different VPN services to establish a secure and private connection between the branches and the headquarters. RUT300 is compatible with Remote Management System (RMS), so the routers can be easily configured, updated, and troubleshot from a distanced location. Additionally, RMS Connect allows you to reach the equipment connected to the routers and manage it remotely as well (e.g., computers, printers, IP phones, etc.).

// BENEFITS

Simple setting-up process – such solution takes minutes to connect and can be easily transferred to a new setting.

Security – pre-configured Firewall makes the device safe to use from the very first seconds without complicated configurations.

Multiple VPNs – 10 various VPN services to choose from to establish a private connection between the remote branches and the headquarters.
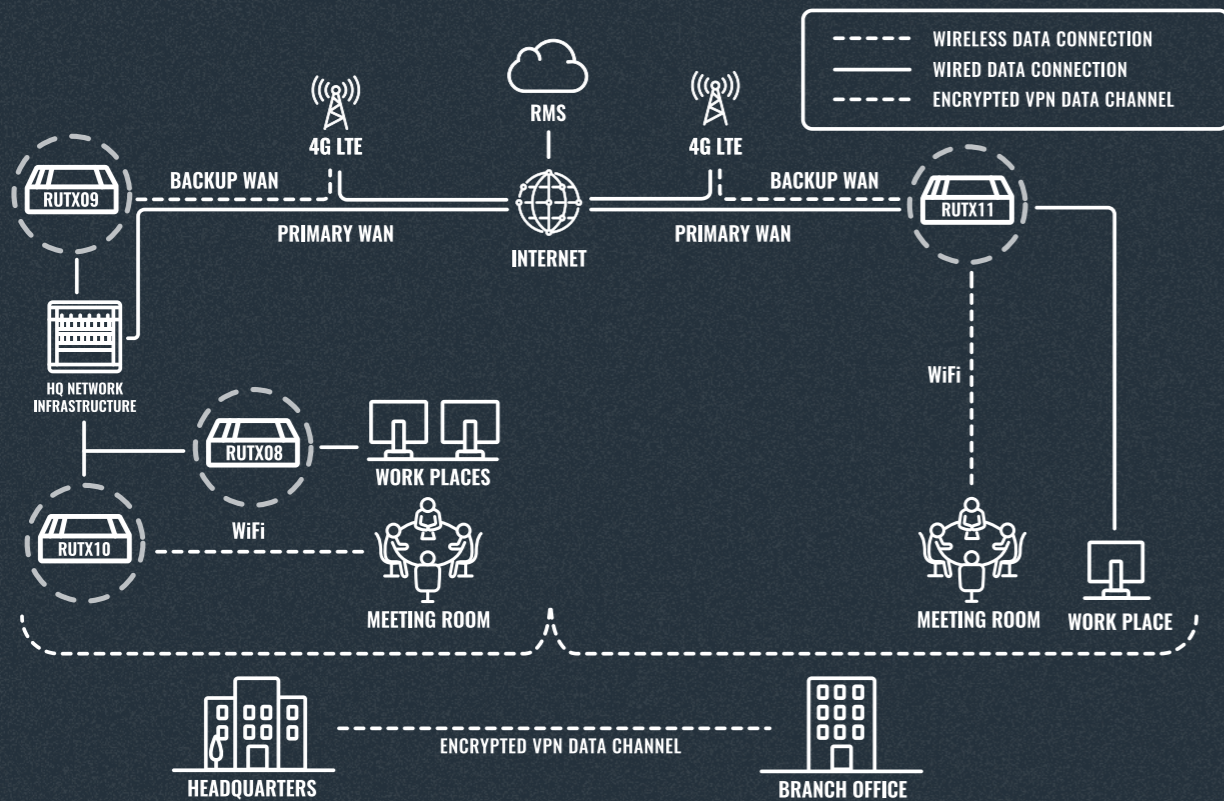
Small sized device – will fit into any server cabinet, drawer, or simply anywhere when using a DIN rail mounting option.

Remote management of the whole solution – via RMS Connect.

SECURE BRANCH CONNECTIVITY

// ENTERPRISE

WIRELESS DATA CONNECTION
WIRED DATA CONNECTION
ENCRYPTED VPN DATA CHANNEL

4G LTE — RMS — 4G LTE

RUTX09 — BACKUP WAN — PRIMARY WAN — INTERNET — PRIMARY WAN — BACKUP WAN — RUTX11

HQ NETWORK INFRASTRUCTURE

RUTX08 — WORK PLACES

RUTX10 — WiFi — MEETING ROOM

WiFi — MEETING ROOM — WORK PLACE

HEADQUARTERS — ENCRYPTED VPN DATA CHANNEL — BRANCH OFFICE

// CHALLENGE

The world of enterprise networking has been experiencing a change in perception lately due to newly available technologies to access the Internet. Traditionally, wired internet options, such as DSL or fiber, are the most popular, but they cannot ensure 100% Internet availability, due to unavoidable causes such as equipment failure or power outages. It is essential to highlight that even 99% of uptime results in 3.65 days/year during which Internet services are not available. If we take this into account and calculate potential losses for widespread enterprise business it is evident that even 99% of uptime provided by traditional enterprise Internet access options is not good enough. Because of this, businesses around the world are turning to 4G LTE to provide secure and dependable backup or even primary branch connectivity.

// SOLUTION

The topology presented in this use case focuses on a challenge when the headquarters of an enterprise needs to be reliably connected to a branch using encrypted VPN data channels. The headquarters has a wired WAN link with cellular backup provided by RUTX09 – an enterprise router with LTE-A connectivity and advanced RutOS features for security and remote management, such as support for DMVPN, MQTT & SNMP, and others. Then, workplaces are connected using another device from Teltonika Networks X series – the RUTX08, which is a professional Ethernet-to-Ethernet router offering excellent VPN performance and same remote management capabilities as the RUTX09. Finally, RUTX10 brings AC Wi-Fi (2.4 GHz + 5GHz) wireless connectivity service to areas such as meeting rooms, where it is essential to quickly connect to internal systems and offer separate public hotspots for visitors with different access and security settings applied in comparison to internal enterprise user network.

On the branch side, RUTX11 offers all needed connectivity through LTE-A with a maximum throughput of 300Mbps and shares it using Gigabit Ethernet and AC Wi-Fi interfaces. Using RUTX11 as the primary Internet source enables business to scale quickly, enabling 1-day connectivity with no delays for obtaining wired Internet source, which in practice can take weeks, if not months.

// BENEFITS

Teltonika X series cellular routers (X11 & X09) offer LTE – Advanced connectivity with speeds up to 300 Mbps and Carrier Aggregation – sufficient to replace aging and unreliable wired WAN options.
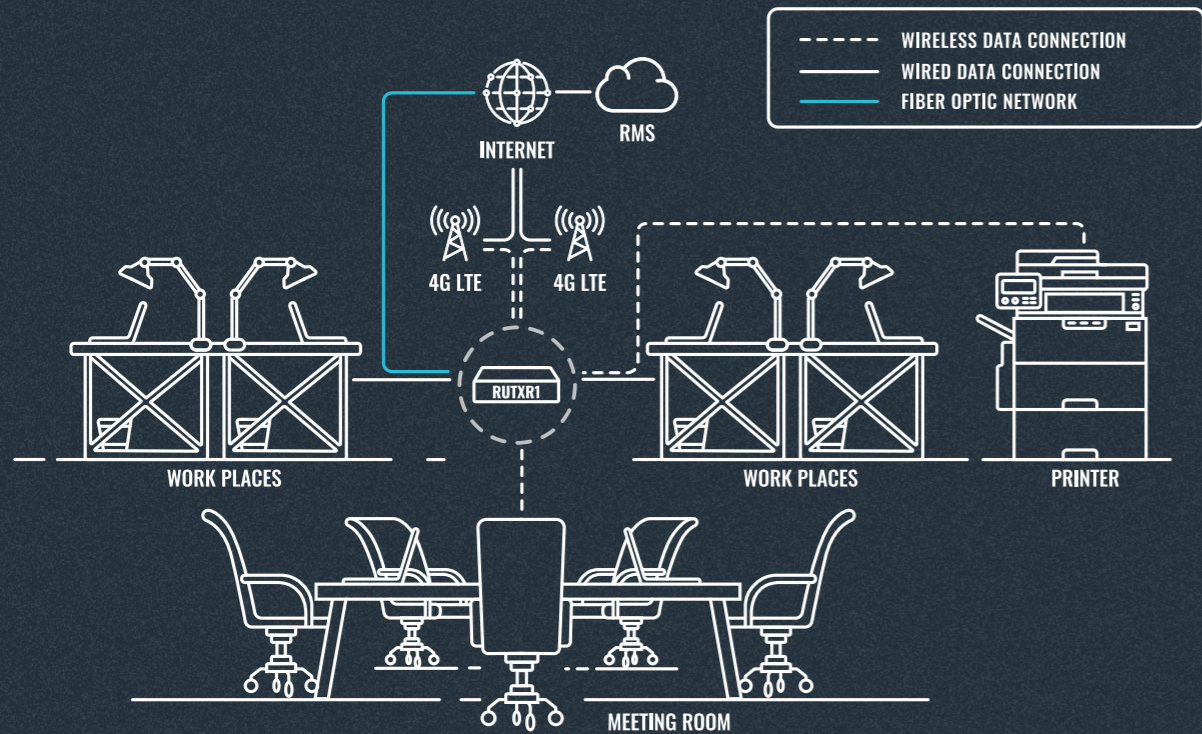
Also, X11 & X10 offers AC Wi-Fi able to offer wireless service using 2.4 GHz & 5 GHz frequency channels, which allows for faster service and separation of private/public hotspots.

All RUT X series routers are compatible with RMS, which allows to monitor performance with customizable reports & alerts, manage configurations of devices, and much more – remotely, even without Public IP!

SEAMLESS AND EASY TO SET-UP ENTERPRISE CONNECTIVITY

// ENTERPRISE

WIRELESS DATA CONNECTION
WIRED DATA CONNECTION
FIBER OPTIC NETWORK

INTERNET
RMS
4G LTE   4G LTE
RUTXR1
WORK PLACES   WORK PLACES   PRINTER
MEETING ROOM

// CHALLENGE

Each Internet Service Provider focuses on different connectivity options. Some of them are offering only wired connectivity, like Ethernet or fiber, others - only mobile internet connectivity, and some of them have a combination of options to choose from. There is no one right answer to which option is the best one. All of them have their pluses and minuses, so the best choice depends on an individual case. The goal is to reduce internet downtime as much as possible, and we strongly believe that implementing a backup connectivity source is the best way to achieve this.

Whenever starting a new business, there are plenty of challenges involved. Moving into a new building, one cannot know what to expect, which makes it hard to get ready and be up and running smoothly. Connectivity issues are common, and choosing a router with so many options as RUTXR1 offers can help save a lot of headaches and expenses.

// SOLUTION

With RUTXR1, it is possible to use wired connection, such as Ethernet or fiber, along with the mobile internet for a backup. This model has five Gigabit Ethernet ports and an SFP module, as well as 4G connectivity with dual SIM. Combining these options allows using three different internet providers and minimize the risk of downtime significantly.

Besides, RUTXR1 is rack-mountable, and it will fit in perfectly into a 19" cabinet or simply anywhere due to its compact size. Additionally to internet backup, RUTXR1 also has dual redundant power supplies, which makes it almost impossible to experience any network-related problems even in case one of the power sources fails. As shown in the topology below, RUTXR1 can be used to connect various devices in the office environment: from laptops and desktop computers to printers and meeting room equipment (like video call tools and tablets). Having multiple Gigabit Ethernet ports, it can offer cable internet to at least five different products. Moreover, it supports more than 100 concurrent Wi-Fi connections at a time, so it can fully serve a small to medium-sized office.

// BENEFITS

Dual Redundant Power Supply – RUTXR1 offers an option to use two different power supplies to allow you to set it up so you stay immune from network downtime even in event of main power loss.

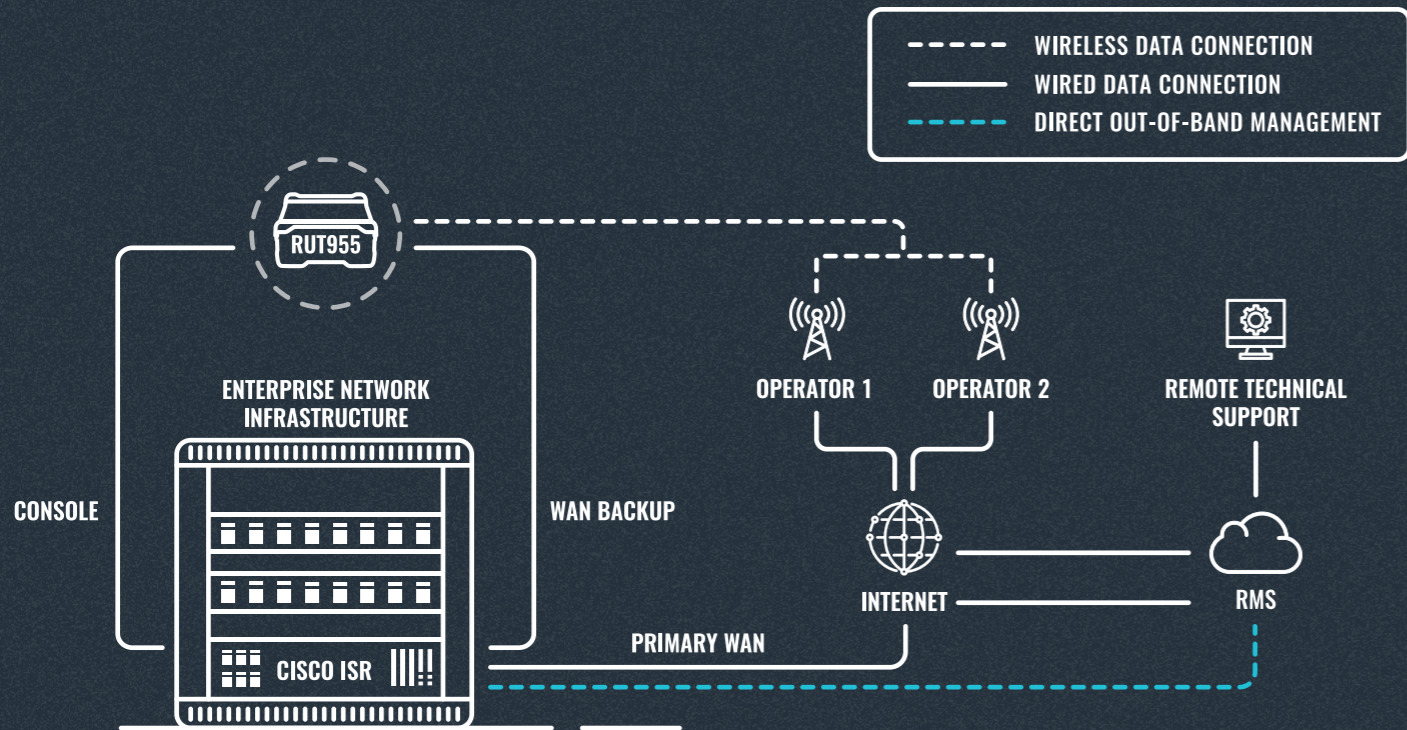SFP Port – RUTXR1 is the first Teltonika Networks router offering fiber connectivity option.

Two SIM cards – RUTXR1 has two SIM card slots for different carrier usage for mobile backup and ultra-high speeds.

Speedy deployment – choose from multiple primary and secondary connectivity options; make adjustments as your situation changes without any delays and extra costs.

OUT-OF-BAND MANAGEMENT FOR CISCO ISR

// ENTERPRISE

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION
- - - - - DIRECT OUT-OF-BAND MANAGEMENT

RUT955

ENTERPRISE NETWORK INFRASTRUCTURE

CONSOLE

WAN BACKUP

OPERATOR 1   OPERATOR 2

REMOTE TECHNICAL SUPPORT

CISCO ISR

PRIMARY WAN

INTERNET

RMS

// CHALLENGE

Legacy connection methods for out-of-band management are subject to slow connection speeds, high monthly recurring charges. Moreover, aging modems are vulnerable & unreliable making the whole remote access solution undependable. As a result, Network managers need a better option for infrastructure out-of-band management.

// SOLUTION

The most reliable option for remote site monitoring is having a certified network technician on-site at all times, though in most cases costs of doing so are too large to justify. Most commonly such engineers are hired by dedicated businesses offering technical support services which delegate their technical engineers on-demand to the location of client's infrastructure in case the main router is unreachable over its wired Internet connection. In the majority of cases, a simple reboot or configuration change is needed. However, the costs of hiring a certified professional engineer to travel to a remote site, debug and solve a problem are significantly higher than upgrading existing PSTN infrastructure to reliable and secure remote access solution for out-of-band management.

Multi-megabit speeds, improved response times, wide coverage and flexibly priced LTE plans make 4G LTE a great option for upgrade - not only for out-of-band management but also for WAN backup.

// BENEFITS

Fast deployment – multiple RUT955s can be quickly preconfigured for out-of-band management using Teltonika RMS.
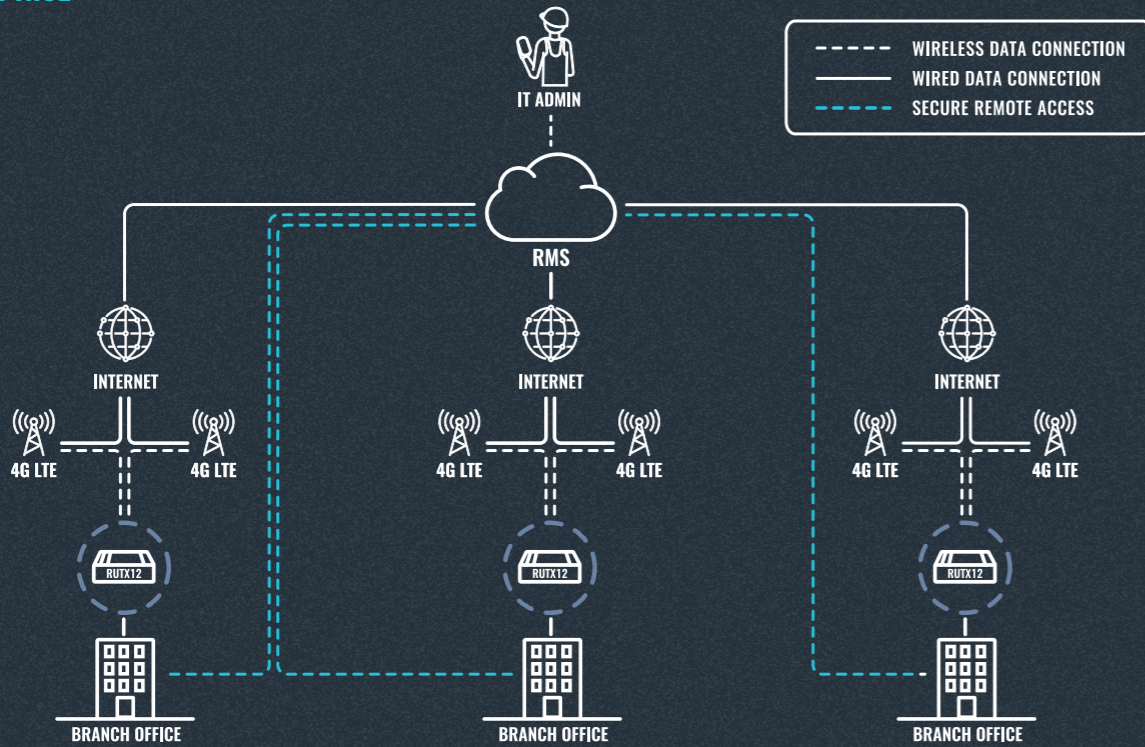
Reduced network maintenance costs – even one on-site visit by a certified technical support engineer can be more expensive than installing a single RUT955 for out-of-band management.

Support speed – a professional engineer can access the console interface of an ISR remotely immediately and resolve any arising issues avoiding time zone differences and traveling time to site.

RMS CONNECT FOR REMOTE MANAGE-MENT OF ENTERPRISE EQUIPMENT

// ENTERPRISE

IT ADMIN

----- WIRELESS DATA CONNECTION
——— WIRED DATA CONNECTION
----- SECURE REMOTE ACCESS

RMS

INTERNET
4G LTE   4G LTE
RUTX12
BRANCH OFFICE

INTERNET
4G LTE   4G LTE
RUTX12
BRANCH OFFICE

INTERNET
4G LTE   4G LTE
RUTX12
BRANCH OFFICE

// CHALLENGE

Every enterprise facility, regardless of its' size, requires IT administration services. In some cases, the solution may be relatively simple: a company sets up a dedicated IT department in-house, which then overlooks the entire infrastructure. However, this scenario is not always perfect for smaller businesses, and a lot of them choose to outsource these tasks to external organizations.

In other cases, companies have offices spread over different locations, and having separate IT departments does not always make sense. And, with the recent COVID-19 outbreak, remote work has become a necessity for a lot of companies to be able to continue their business. The demand for remote management solutions is growing and the organizations are looking for optimal solutions to ensure their business continuity at affordable costs.

// SOLUTION

In this topology, RUTX12 routers were chosen to provide connectivity in each branch office. It provides the primary and backup connection with dual modem LTE Cat 6 and load balancing, offering speeds up to 600 Mbps, when using cellular networks. Teltonika Networks Remote Management System (RMS) is used for convenient and secure monitoring and management of the routers. It provides a possibility to detect errors, prevent downtime, and update the firmware to multiple network devices quickly and comfortably from anywhere in the world.

However, the most value in this solution is brought by RMS Connect functionality. It enables accessing every computer of each branch network remotely, just as if sitting in front of it. It is a very similar way to reach devices to using solutions like Teamviewer or Anydesk. However, besides offering a possibility to reach computers through RDP/VNC, RMS Connect may be used to access a variety of other devices within the same network via SSH or HTTP(S) protocols. This is a great asset, as there is no need for IT staff to be present at the office to resolve technical problems, and it allows for more dynamic resource allocation.

// BENEFITS

Remote – access and configure your routers from anywhere with RMS Management.

Security – all clients access the RMS via HTTPS. All communication is encrypted, ensuring no one will be able to intercept any login details or gain unauthorized access to your account.

Multiconfiguration – easily update and configure multiple devices at once and remotely.

Lower costs – compared to similar solutions, RMS Connect has a very competitive and scalable pricing regardless of the size of the infrastructure you wish to reach within the same network.

RUTX12

VLAN TAGGING FOR EFFICIENT TRAFFIC MANAGEMENT

// ENTERPRISE

Legend:
- VLAN11 CONNECTION
- VLAN22 CONNECTION
- VLAN33 CONNECTION
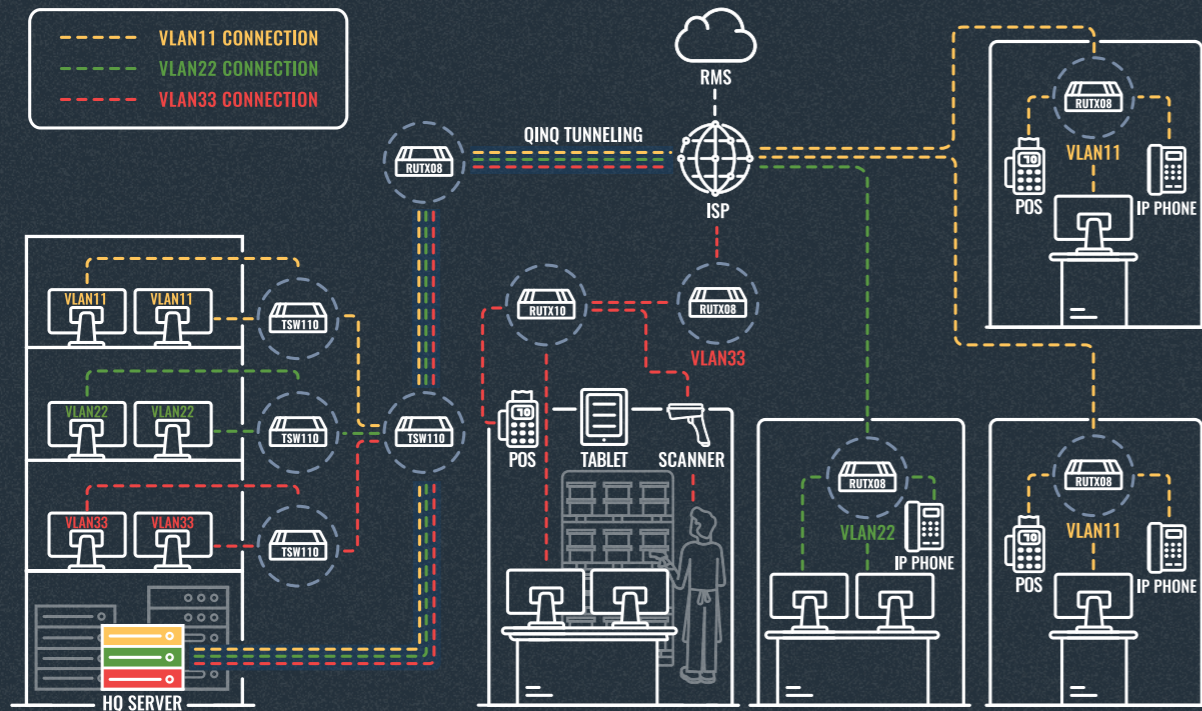
// CHALLENGE

Today, society and business operations are highly reliant on electronic access to information and continuous optimization. The main challenges lie in data availability, security, easy access, and costs. When the concept of networking was starting, all the components had to be physically connected. As big of a change that it was, over time, it appeared that in large buildings, it has become too expensive to get the employees connected into one local-area network (LAN), not to mention remote offices. That gave the start to a virtual local-area network (VLAN).

VLANs allow the creation of the same network rules and environment for the employees in different sites quickly and easily. However, sometimes the staff of various departments needs to have different access rights or addressing schemes in the same VLAN, and this is where the VLAN tagging becomes very handy.

// SOLUTION

Imagine a company selling electronic goods. Usually, such companies are complex structures, comprising of multiple units that communicate with the headquarters. Each department belongs to the same network, including the HQ. However, VLAN tagging (VLAN11, VLAN22, VLAN33) allows handling the traffic from each unit as if they belong to different networks. As per topology, traffic from the warehouse tagged as VLAN33 travels to an appropriate part of the HQ server. The traffic of the stores (VLAN11) and IT support (VLAN22) also travel separately. VLAN tagging allows for much easier network management without requiring multiple sets of cabling and networking devices. It also removes geographical boundaries. Besides, VLAN tagging also provides a possibility to prioritize specific sorts of traffic. So overall, there are multiple reasons for VLAN tagging, including simplicity, security, traffic management, and economy.

Our RUTX08 router is used in each unit to connect the equipment to the network since the solution does not require Wi-Fi connectivity. RUTX08 has four Gigabit Ethernet ports for easy set-up and high data throughput. But that's not even the most critical part - this model can support up to 128 port/tag-based VLANs, sufficient even for the most complicated network infrastructures. The TSW110 switch helps to speed up the deployment process even more with five additional Gigabit Ethernet ports and a plug-n-play design.

// BENEFITS

Simple management – VLANs allow network administrators to group together or separate traffic within the business network, prioritize traffic, etc.

Security – the traffic is delivered only within the frames of destined VLANs and to specific recipients within the VLAN.

Budget-friendly – network switched with VLANs is much cheaper than creating a routed network.

Easy deployment - VLAN membership is configured completely through software.

Flexibility - a VLAN can be easily configured and managed regardless of geographical location.
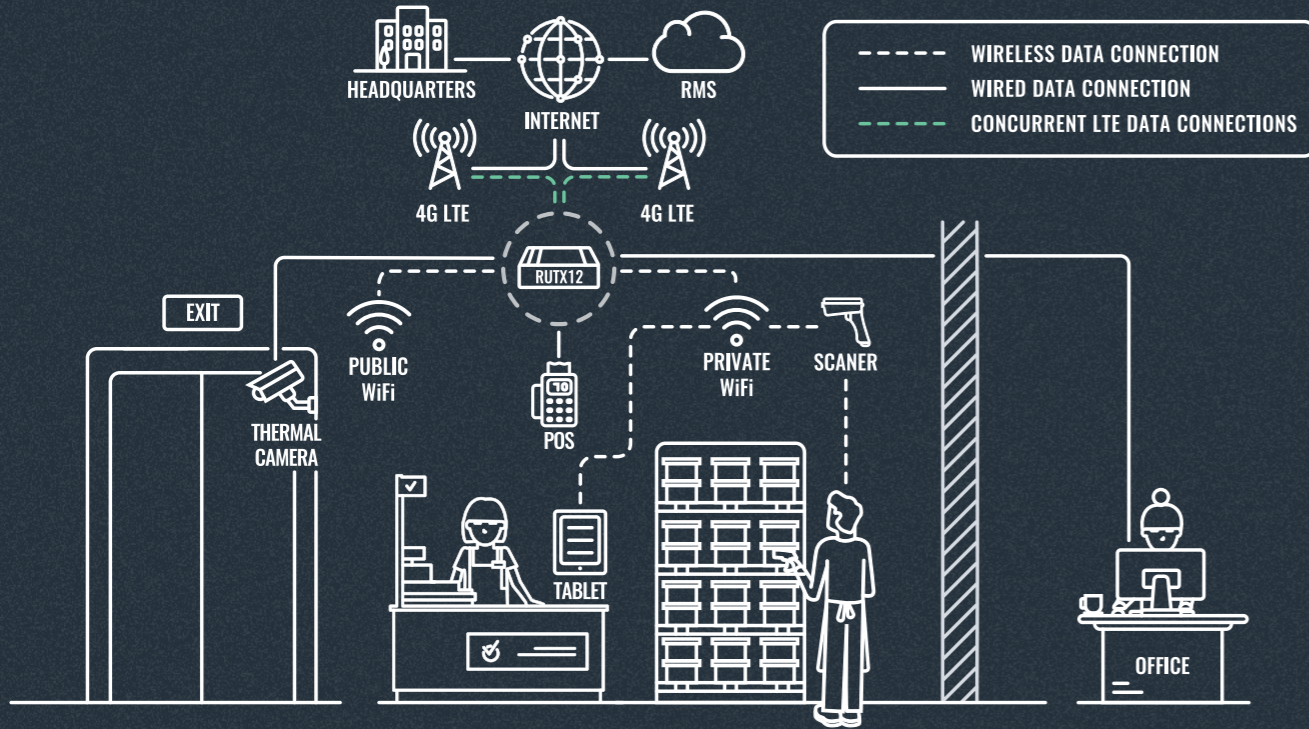
RETAIL

The retail market is experiencing rapid adoption of connectivity technology that helps companies offer new and advanced ways of interacting with their clients and collect valuable data for strategic decisions. Teltonika Networks provides a range of IoT connectivity products to accommodate the quickly changing needs of retail.

FAST AND UNINTERRUPTED RETAIL CONNECTIVITY

HEADQUARTERS
RMS
INTERNET
4G LTE
4G LTE
RUTX12
EXIT
PUBLIC WiFi
PRIVATE WiFi
SCANER
THERMAL CAMERA
POS
TABLET
OFFICE

- - - - WIRELESS DATA CONNECTION
——— WIRED DATA CONNECTION
- - - - CONCURRENT LTE DATA CONNECTIONS

// CHALLENGE

In essence, the retail environment is highly competitive. With digital services advancing rapidly, it takes less and less time to turn an idea into a business, and many entrepreneurs and enterprises seek to reduce the time-to-market as much as possible. Advancements in digital marketing drive customer demand, but regardless of the growing popularity of e-commerce, physical retail is still the primary consumer market driver. The retail market is highly dependent on reliable, fast, and secure internet connectivity both for customer services and internal operations, including stock management. Even though wired Internet connectivity is widely available in the hearts of urban environments, such options cannot offer 100% availability. Besides, there is a need for alternatives to obtain fast and reliable connectivity in areas where internet connectivity is unstable or slow. Finally – speed and availability are not the only challenges, with the increasing threats of cybersecurity.

// SOLUTION

4G is becoming a favorable option when it comes to fast and reliable connectivity options. With multiple cellular modules, higher LTE categories, mobile Internet services can match and surpass the speeds of wired connections in congested areas. However, cellular solutions can be deployed instantly without the need for cabling and arranging long-term contracts. Choosing a professional cellular router with two simultaneously working Cat 6 modules can resolve retail connectivity security, downtime, and availability challenges. With our RUTX12, the two SIM cards working together can provide speeds up to 600 Mbps and ensure that all retail solution components are connected. Two modules increase security by splitting traffic, for example, for corporate communication and customer services.

As shown in the topology, the POS system, computer, and thermal camera connect to the router via Ethernet. In contrast, barcode scanners and tablets connect to a secure, private Wi-Fi network. As RUTX12 can support IPsec, OpenVPN, and other VPN services, companies can configure their networks accordingly to their needs and requirements. Finally, the RUTX12 is compatible with the Remote Management System, allowing system operators to monitor and manage the whole network remotely, including remote configuration, firmware updates, notifications, reports, and much more.

// BENEFITS

Performance - RUTX12 with two LTE CAT 6 cellular modules working simultaneously can provide speeds up to 600 Mbps.

Functionality – RUTX12 is able to split traffic between two mobile connections with load balancing.
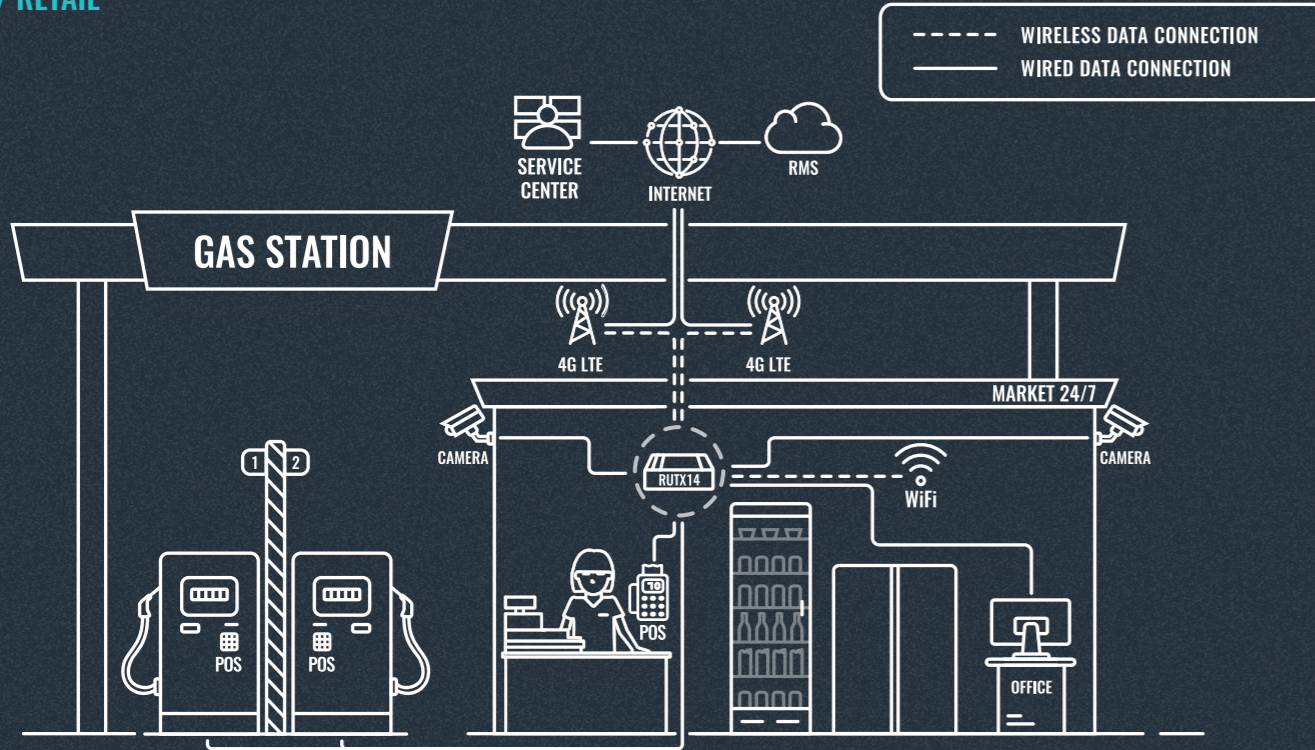
Remote monitoring – with RMS, you can conveniently monitor all network and make configurations remotely.

Security – with advanced RutOS features, RUTX12 offers multiple VPN options, embedded firewall, and other security features to comply with high-security standards.

WIRELESS BROADBAND CONNECTIVITY FOR GAS STATIONS

// RETAIL

WIRELESS DATA CONNECTION
WIRED DATA CONNECTION

SERVICE CENTER
INTERNET
RMS

GAS STATION

4G LTE
4G LTE

MARKET 24/7

CAMERA
CAMERA

1 2

RUTX14
WiFi

POS
POS
POS
OFFICE

// CHALLENGE

When it comes to gas stations, the connectivity challenges are many. To begin with, they usually belong to a chain, so the connectivity model needs to be universal to fit various locations and environments. Besides, the support of such chains is usually centralized. Hence having a unified connectivity solution eases up the support procedures and reduces the resources required for IT support. Also, it makes the time to set up a new station much shorter, simpler, and more cost-efficient.

// SOLUTION

RUTX14 router is the central piece of this solution. This first-ever LTE Cat 12 cellular router in our portfolio enables quick and easy deployment in any situation, even in remote areas. Opting for wireless cellular connectivity reduces the complexity of the solution, so it takes significantly less time and installation resources. Cat 12 router can reach speeds up to 600 Mbps, which is enough to serve the varied needs of devices used in similar environments.

Surveillance cameras inside and outside the petrol station, Points of Sale (POS), digital signage screens require speedy connection, network stability, and broad data bandwidth. These devices connect to the router via Ethernet cables through five available Gigabit ports available on RUTX14. Product scanners, tablets, and other wireless devices used for work purposes connect to a private WIFI network for security reasons. There is a separate public Guest WIFI created for the visitors. A wide selection of VPN services ensures that the most varied security requirements and preferences are met.

For an even more simplified solution, our TSW100 switch can power up the cameras via PoE. Compatibility with RMS and various other IoT platforms enables remote accessibility for IT support teams and various integrators to prevent any downtime and solve issues immediately and cost-efficiently.

// BENEFITS

Speedy connection with download speeds up to 600 Mbps and upload speeds up to 150 Mbps.

Quick and straightforward setup for an all-in-one solution to connect an ecosystem of multiple devices.
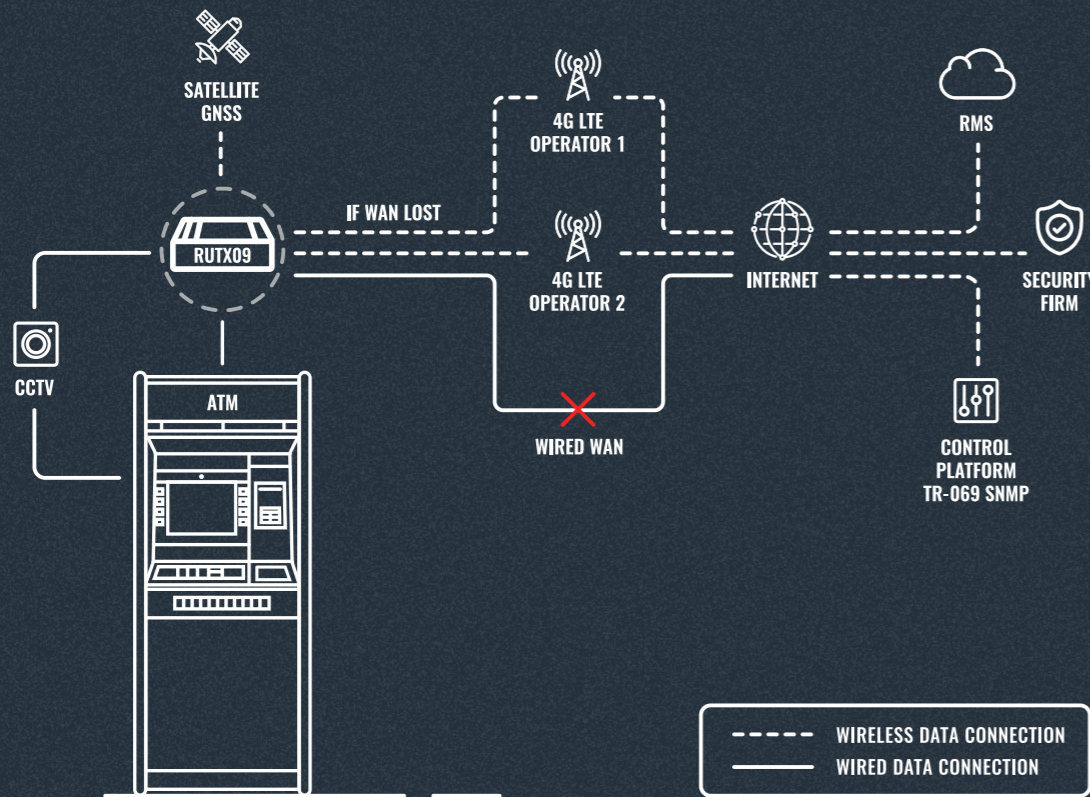
Multiple WANs and various VPNs to secure your network.

Remote management and monitoring via RMS or a variety of third-party IoT platforms.

RUTX14

EMPOWERING ATM CONNECTIVITY

// RETAIL

SATELLITE GNSS

4G LTE OPERATOR 1

RMS

RUTX09

IF WAN LOST

4G LTE OPERATOR 2

INTERNET

SECURITY FIRM

CCTV

ATM

WIRED WAN

CONTROL PLATFORM TR-069 SNMP

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION

// CHALLENGE

Nowadays, more and more people gain access to banking services and electronic payments around the world. ATMs are being deployed in new and remote areas, moreover, legacy equipment is being updated with state-of-the art cash machines. These ATMs are usually placed in shopping malls, gas stations, convenience stores. However, not all countries or locations have sufficient and reliable wired Internet access options such as DSL or fiber. Considering that VSAT communication is still highly expensive, this poses a challenge for ATM connectivity to be secure, affordable and reliable.

// SOLUTION

Technology integrators around the globe have already learned valuable lessons of relying on a single wired connection for ATM deployment. Even a few minutes of connection downtime can cost more than adding an additional layer of connectivity. Nowadays majority of ATMs are using industrial cellular routers with 4G LTE connectivity as a main or a backup source of connectivity between ATM and central system of the bank. Such routers must be highly secure, reliable and be able to establish VPN connections with advanced firewall functionality as well as support for multiple remote management protocols.

// BENEFITS

Quick and easy to deploy – Teltonika RUTX09 can be configured in minutes and the configuration can be multiplied across the fleet of routers using Remote Management System (RMS).

Failover between wired WAN and cellular connections allow to have much better link resiliency and service continuity even in an event when the service of primary operator goes down.
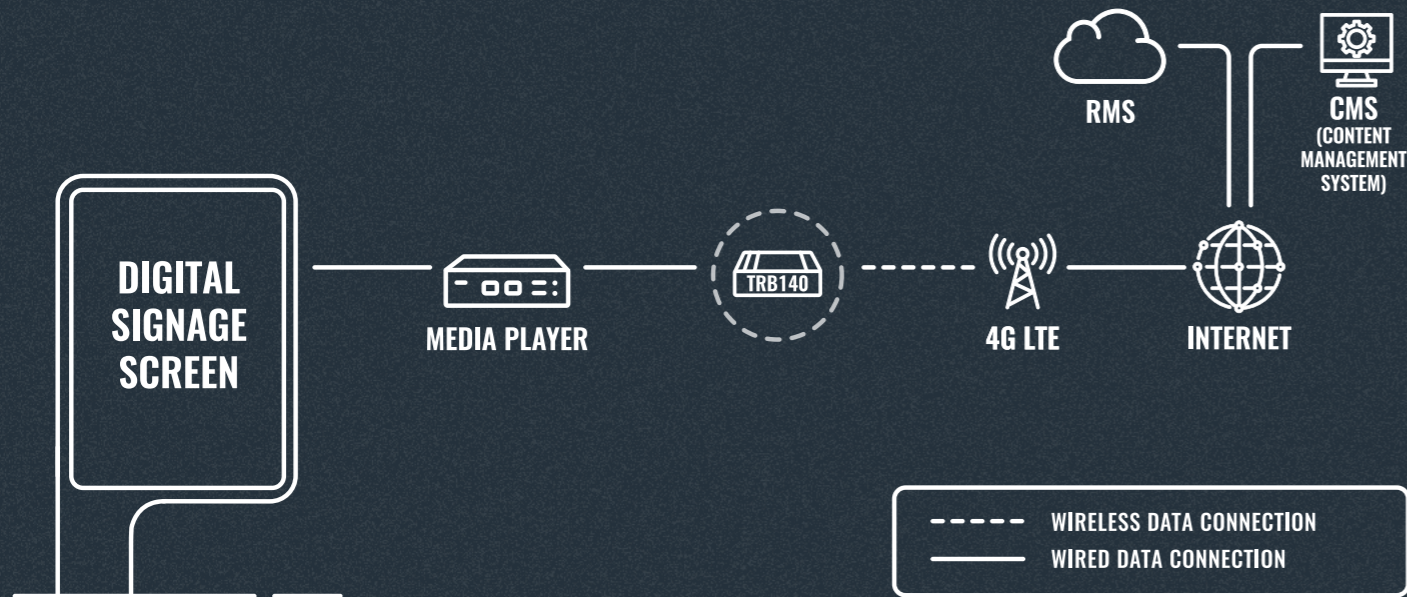
Advanced alert system can notify operators in case wired WAN fails and LTE is activated via SMS, Email or other methods.

With a wide power supply range of 9 – 50 VDC and GNSS functionality, you can power RUTX09 using a UPS and monitor the location of the whole ATM with programmable alerts.

80

DIGITAL SIGNAGE & CELLULAR CONNECTIVITY

// RETAIL

DIGITAL SIGNAGE SCREEN — MEDIA PLAYER — TRB140 — 4G LTE — INTERNET — RMS — CMS (CONTENT MANAGEMENT SYSTEM)

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION

// CHALLENGE

The Digital Signage solution is not very difficult to understand; usually, it consists of a screen panel and a media player with storage. However, the main challenge is to be able to control what content, in which intervals, and when will be displayed. When we consider that a single operator might be responsible for thousands of screens placed around the significant area, we see that manual uploading is not an option. In order to have an efficient business, the operator of Digital Signage infrastructure must be able to upload and control content real time without downtime.

// SOLUTION

As identified, reliable and convenient connectivity is essential for efficient content management across extensive Digital Signage infrastructure. Cellular solutions based on 4G LTE are prevalent in this use case because they eliminate multiple challenges, such as pace of solution deployment, different connectivity provider management, and dependency on 3rd party wired network infrastructure, which cannot guarantee 100% uptime. As defined in the topology above, the media player is responsible for playback of marketing content, such as pictures or video, while TRB140 is the device which enables the remote upload and management of such content.TRB140 is a 4G LTE enabled gateway, which is perfect for Digital Signage solutions because it is easy to deploy and scale due to compatibility with Teltonika Networks Remote Management System. With a single TRB140, the user can manage content on the media player and change the parameters and the playing order of the content.

// BENEFITS

Easy to manage – with Teltonika Remote Management System, system administrators can be in control of thousands of different sites with a single user interface.

Quick to deploy – no need to wait for wired Internet access contracts and installations.

Easy to scale – Teltonika TRB140 compatible with RMS which allows configuring an infinite amount of devices in minutes.
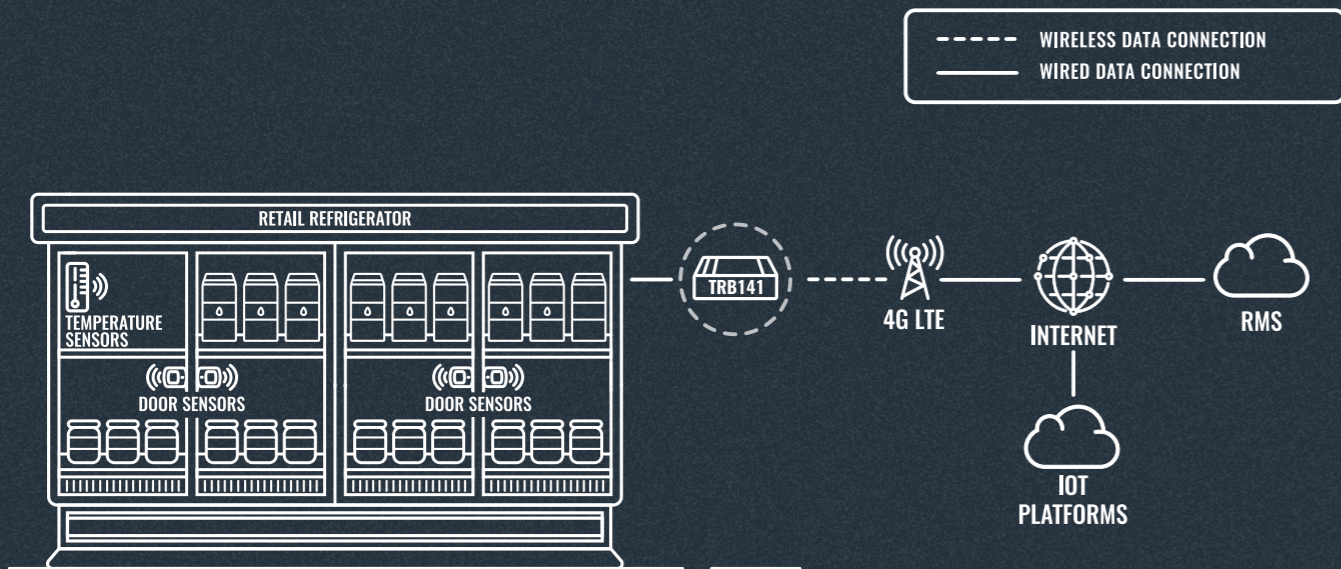
Secure - infrastructure will be safe due to advanced security features of the TRB140, such as VPN, IPsec, Firewall and Access Control.

Small size - TRB140 has impressively small footprint allowing it to be installed even in the most compact and design conscious Digital Signage enclosures.

REMOTE RETAIL REFRIGERATOR MONITORING

// RETAIL

RETAIL REFRIGERATOR

TEMPERATURE SENSORS

DOOR SENSORS

DOOR SENSORS

TRB141

4G LTE

INTERNET

RMS

IOT PLATFORMS

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION

// CHALLENGE

In retail and logistics, responsibility related to food waste in case of technical failures often falls on the manufacturer or integrator of the system. The biggest challenge is that without remote 24/7 monitoring, it is difficult to notice minor problems before they cause real damage. Early detection could usually prevent high losses, but that is difficult to achieve if the refrigerator is stored in a third-party establishment, and is only managed by the employees. It also usually means that the systems are left unsupervised outside of the working hours, so such a simple issue like a door left open could cost thousands of euros in spoilage and lost sales. Any discrepancies from the storage requirements could also catch the attention of Food and Veterinary Services and have long-term effects on the business.

// SOLUTION

To create one seamless autonomous solution, we chose TRB141 gateway due to its small size, convenient installation, and multiple Inputs/Outputs, allowing to connect the sensors. The gateway collects data from the temperature and door sensors and sends all information to an internal monitoring system.

In case of any temperature fluctuations outside the pre-set norms, an SMS is sent out for the system to trigger a response. A similar alert notifies when the door is left open for a particular amount of time. If any technical glitches occur, the system can be restarted remotely, which saves plenty of time for the technical staff and resolves most of the issues without human involvement.

When used together with Teltonika Networks Remote Management System (RMS), even more functionality and monitoring options are available. The system administrator may check history and audit logs of various devices deployed in multiple locations, easily customize and set-up new automation rules, and update all of the gateways remotely via FOTA.

// BENEFITS

24/7 remote autonomous management – no human involvement required to resolve minor issues saves time and finances.

Immediate response – systems are triggered right away in case of any abnormalities and reacts before any serious damage is caused.
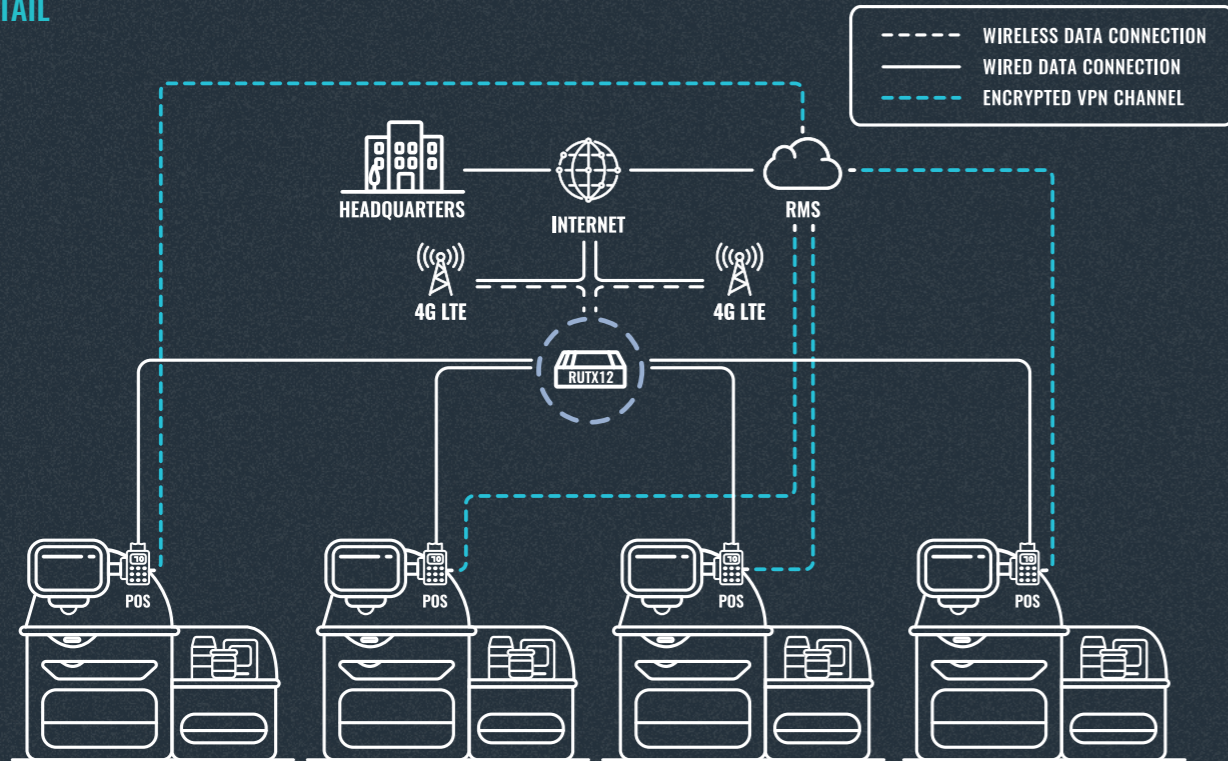
Scalability – one solution may be conveniently employed and monitored in various retail locations.

Audit logs – convenient access to reports history.

RMS CONNECT TO EMPOWER REMOTE POS SOLUTIONS

// RETAIL

- - - - - WIRELESS DATA CONNECTION
———— WIRED DATA CONNECTION
- - - - - ENCRYPTED VPN CHANNEL

HEADQUARTERS   INTERNET   RMS

4G LTE   4G LTE

RUTX12

POS   POS   POS   POS

// CHALLENGE

Point of Sale (POS) terminals usually require to integrate the technologies previously installed in the retail facilities and third-party CRMs to connect them into one fully-functioning system and provide the maximum value. Only when set-up correctly, these systems can grant business intelligence and drive informed decisions and developments, resulting in competitive advantage and pleasant user experience. Any disruptions in such systems cause significant financial losses in the short term and damaged business image in the long run. The integrators of such POS systems and terminals are usually third-party vendors, and as such, are not present in retail locations. Therefore, the ability to remote monitor and manage these structures is more of a must rather than a commodity.

// SOLUTION

POS terminals require uninterrupted connectivity at all times, which is provided by our newest and most advanced LTE Cat 6 dual-SIM RUTX12 cellular router. As this solution demands reaching non-Teltonika Networks devices, RMS Connect functionality is used to accomplish this task. The effect it has on this system is immense because of multiple reasons.

Firstly, it allows the system integrator to remotely monitor each device from the comfort of their desktop. The interface allows accessing the third-party devices just as viewing them in front of you. So, whenever any issue occurs, the device can not only be remotely rebooted but also troubleshot, just like when being on-site. This significantly reduces the travel time and costs associated with it.

Another great advantage of RMS Connect is the possibility to conveniently update firmware and carry out multiple configurations on hundreds of devices at the same time from anywhere in the world. The owner of the solution usually implements it in various locations for several different facilities, so executing such a simple task would be incredibly time- consuming, inefficient, and costly.

The retail sector is extremely susceptible to safety violations. RMS has a proven record of successful application scenarios in mission-critical network infrastructures, especially due to the multiple certificates and attestations related to its' security. Whenever financial operations are involved, the safety measures must always be ensured to the maximum level.

// BENEFITS

Security – top-level standard safety ensured by MQTT, TLS 1.2 and 1.3 protocols, and acknowledged with OWASP 2 certificate.

Contactless – reduces cost of the solution and increase safety related to health-related concerns in the recent COVID-19 outbreak context.

Wireless – convenient implementation, monitoring and management in multiple facilities.

Access to third party devices – RMS Connect allows to reach third-party devices.

Data collection – get information regarding technical status of your devices and marketing data into one platform.

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