# Milesight IoT Success Stories

Better Inside, More in Sight

# CONTENTS

Better Inside, More in Sight

Milesight

▸ **Smart Building**

- Indoor Air Quality Monitoring
- Trash & Water Leak Management

# Smart Healthcare Project for Aged Care Facilities in Australia

**Milesight**

## Background

To fulfill compliance requirements, retirement villages need a solution to monitor the temperature in their medicine fridges smartly other than sending someone on-site.

### Where it happened?

New South Wales, Queensland, Victoria, and Canberra in Australia;

Project Timeline:

① Stage1: Mar.-2021 - Oct. 2021

② Stage2: Oct. 2021 - Apr. 2022

③ Stage3: Apr. 2022 - Oct. 2022

### What was the challenge?

Recording Interval

- Customers can only manually monitor the fridges every 8 hours due to short of staff;

Real-Time Alerts

- The existing paper-based recording solution neither produces remote reporting nor generates real-time alerts;

New South Wales, Queensland,Victoria, and Canberra in Australia;

# Smart Healthcare Project for Aged Care Facilities in Australia

- UG67 Outdoor Gateway
- UG65 Indoor Gateway
- EM300-TH
- AM319

**UG67**

**UG65**

**EM300-TH**

**AM319**

## Highlights

- **Precision Temperature Control**: The temperature of all fridges is within the ideal range of 2℃ – 8℃;
- **Intensive Report Interval**: To get data every 5 minutes for long-term monitoring;
- **Flexibility at Scale**: More sensors can be added anytime anywhere, from a small facility to the retirement village;

# Smart Healthcare Project for Aged Care Facilities in Australia

## Deployment

- EM300-TH sensors deployed in more than 100 medication fridges;
- UG67 gateway to cover a wide area in aged care facilities – one of them serves sensors across 3 buildings;
- More than 25 outdoor gateways have been deployed alongside more than 150 EM300-TH temperature monitoring sensors.
- Different gateway serves different size facilities;
- AM319 ambiance monitoring sensors deployed in the office environment for extending applications;

# IAQ Projects in British Schools, Reported by BBC News

**Milesight**
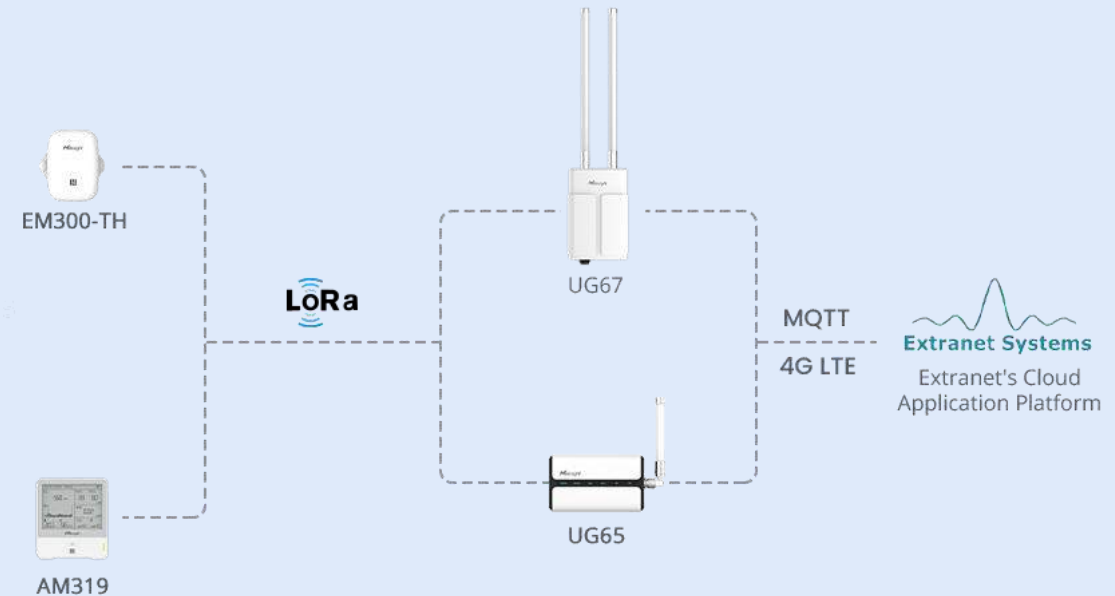
## Location

Isle of Man Schools, UK

Tynwald buildings in Douglas, UK



## Background

Poor air quality can have a significant impact on a pupils' ability to study and their health, as high levels of $CO_2$ in the classroom can significantly impair decision-making and cognitive performance. Thus, a new air quality monitoring system is installed in classrooms to make sure students can concentrate properly.

## Challenge

**Visible Data**
No data can be used to make sure classrooms are well ventilated to stop the spread of COVID-19;

**Separate Monitors**
Monitors levels of $CO_2$, heat, humidity and light by separate devices, which means high investment;

# IAQ Projects in British Schools, Reported by BBC News

## Highlights

- **Long-term Monitoring**: The vital data from sensors enable the local government to review existing environments within schools and inform the planning stages of any education infrastructure in the future;

- **Wireless Deployment**: Sensors are attached to the wall using screws or adhesive pads.

- **Unrivaled Accuracy**:  Sensors use NDIR technology to provide unrivaled accuracy of $CO_2$;

AM107

AM107 Sensor

# IAQ Projects in British Schools, Reported by BBC News



## Deployment

- The AM107 features $CO_2$, Temperature, Humidity, Occupancy, TVOC and Light sensors – with support for LoRaWAN;
- Sensors are deployed in every classroom to measure whether the fresh air passing through the filtration system is comfortable for people;
- The collected data from sensors are forwarded to the existing public LoRaWAN network that covers the whole of the island;
- MTG Cloud Platform is built in Microsoft Azure and provides a highly scalable environment for dashboards, data collection, storage and visualisation.

# 47,000 IAQ Sensors Create Safer Classrooms in Canada

**Mi**lesight

## Location

Public schools in Quebec, Canada

## Background

To curb the spread of COVID-19 and protect students and faculties' safety, the **Ministère de l'Éducation du Québec** in Canada decides to adopt an IoT solution that is able to monitor temperature, humidity and the level of $CO_2$ in over **90,000** classrooms.

Installation Sequence:

① Priority 1: $CO_2$ level exceeding 2000 ppm

② Priority 2: $CO_2$ level exceeding 1500 ppm

③ Priority 3: Naturally ventilated buildings or $CO_2$ level between 1000 and 1500 ppm

④ Priority 4: Mechanically ventilated buildings

### What was the challenge?

- Reduce maintenance and installation difficulties
- Monitor CO2, humidity and temperature level at 5 minutes intervals during school hours
- Create an information system without the use of Wi-Fi or Cellular Internet

# 47,000 IAQ Sensors Create Safer Classrooms in Canada

**Milesight**

- EM500-CO$_2$
- AM107
- UG65 Indoor Gateway
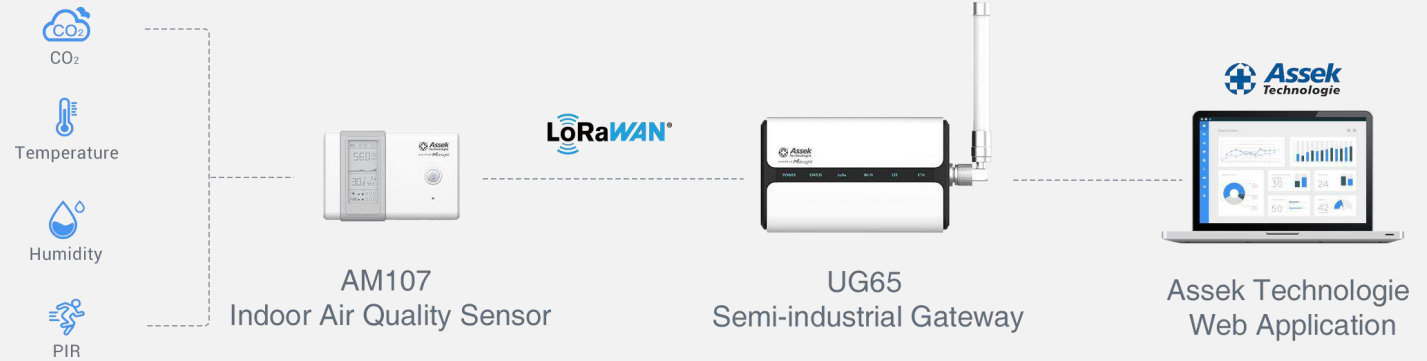
UG65

AM107

EM500-CO$_2$

## Highlights

- **Safeguard of Back-to-School Plan**: Deploy CO$_2$ sensors in 47,000 classrooms to automatically detect, collect data and indicate indoor air quality;
- **Competitive Solution**:  Total 5 lots in the public tender, in which Milesight has become the winner of the two lots, i.e. more than half of the sensors are supplied by Milesight;

# 47,000 IAQ Sensors Create Safer Classrooms in Canada

**Milesight**

## Deployment

- 47,000 units of IAQ sensors deployed.
- 2,600 units of gateways deployed.
- 7,331,376/day (156/day/device) of message handled/period
- ROI data: There was no monitoring at all before. This IAQ project made the environment data under monitoring and control.

CO₂

Temperature

Humidity

PIR

LoRaWAN

**AM107**
Indoor Air Quality Sensor

**UG65**
Semi-industrial Gateway

**Assek Technologie**
Web Application

# Optimize IAQ and Energy Efficiency in Commercial Buildings

**Milesight**

## Location

Canada

Commercial buildings /estates

## Background

For commercial buildings, there's a large desire for the efficient operation and management.

## What was the challenge?

**Wired Solution with Failure**
- A complicated deployment environment extended the project timeline and doubled the workload;

**Wireless Zigbee Solution with Failure**
- High power consumption of batteries;
- More gateways for better signal coverage;
- Unstable performance with more mainte;

# Optimize IAQ and Energy Efficiency in Commercial Buildings

**Milesight**

## Highlights

- **Wider Area Coverage**: Just 5 units of gateways are enough to support a high building with 19 floors;
- **Lower Power Consumption**: Battery health dropped 3% only within one year, no maintenance cost rose;
- **Wireless Deployment**: Installation is simple and does not require access to existing infrastructure making it ideal for both new and retrofit buildings;

- EM500-CO$_2$
- EM300-TH
- UG67 Outdoor Gateway
- WS52x
- AM319 & AM107
- VS121 AI Workplace

# Optimize IAQ and Energy Efficiency in Commercial Buildings
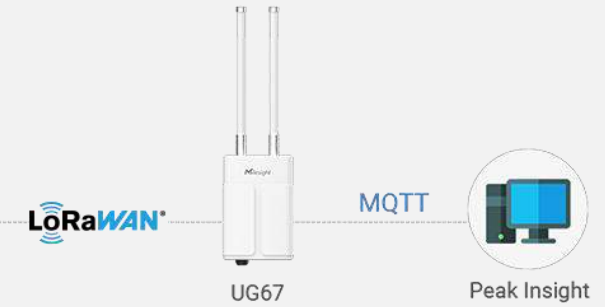


## Deployment

- Around 4,400 sensors and 440 gateways are deployed in the project, including IAQ sensors, people counting sensors and many more;
- The Peak Insight™ platform works with sensors that monitor occupant comfort, energy usage, and air quality all over the building, provides building owners, operators and managers with energy-saving advice;
- The data is transmitted through UG67 outdoor gateways on a dedicated network for stability and security;

# Trash & Water Leak Management for Residential Buildings

**Milesight**

## Background

Smart buildings are the future! And many advanced technologies such as trash can empty efficiency and water damage prevention are in great need.

### Location

- Legacy residential building "Artisan Garden" in Hong Kong
- "Artisan Garden" is the latest completed high-quality residential project that was jointly developed by the HK New World Development Company Limited(NWD) and HK Urban Renewal Authority in the Ma Tau Kok area, offering 294 units on 31 floors.

### Challenge

**Bin Management**
Collects waste on predetermined time and route regardless of the fill rate or level;

**Water Leak Detection**
Water leaks from a broken faucet or a leaky pipe will be a big deal when water seeps into an elevator pit;

**Network Deployment**
The prevailing wired system is neither optimized nor efficient;

# Trash & Water Leak Management for Residential Buildings

Milesight

- EM300-SLD
- EM310-UDL
- UG65 Indoor Gateway
- Milesight IoT Cloud
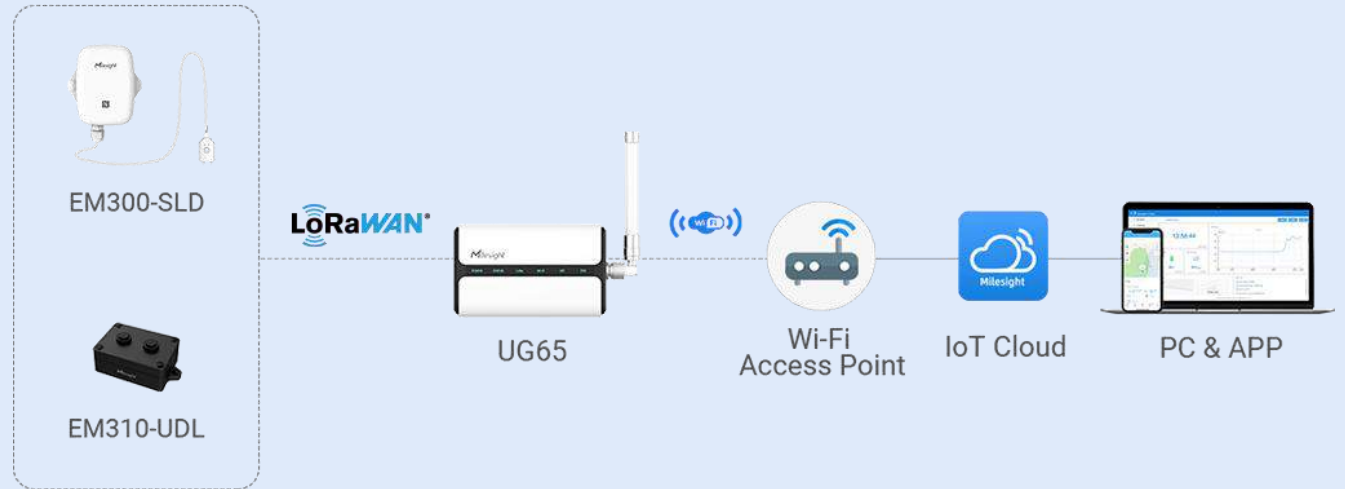
EM300-SLD

EM310-UDL

UG65

Milesight IoT Cloud

# Highlights

- **Incredibly Efficiency**: No need for additional cabling and simple to implement to existing buildings and setups;
- **Smart Monitoring**: Customise data feeds to receive information at your pre-defined intervals;
- **Server-based Strategy**: Strategy in the Cloud simplifies daily operations and maintenance;
- **Timely Alerting System**: Action can be taken quickly when an incident occurs because of the Web and Mobile App monitoring

# Trash & Water Leak Management for Residential Buildings

**Milesight**

## Deployment

- The smart bin sensor makes use of ultrasonic distance measurement technology to monitor the available room of every bin in real-time.
- The spot leakage detection sensor is vertically screwed on the bottom of the door to make sure its two probes are close to the floor, only when both of them touch the water simultaneously the alert can be triggered.
- The LoRaWAN gateway is lying on a shelf at a higher position to provide signal coverage widely.
- The collected data was via the gateway to Milesight IoT Cloud.

EM300-SLD

EM310-UDL

LoRaWAN®

UG65

Wi-Fi Access Point

IoT Cloud

PC & APP

# Real-Time Flood Monitoring System in Austria

**Milesight**

### Location

Weißenbach Valley, Austria

Chorinsky-Klause Dam

### Background

A real-time flood monitoring system keeps watch on water and precipitation levels that helps to monitor flood conditions in Austria.

### What was the challenge?

Limited network coverage in the project area

- There is meagrer network coverage and a shortage of electricity supply in the project area.
- It is pricey to set up a thorough wired network solution in remote places and often requires a long period time to complete.

Time & Labor Consuming

- Chorinsky-Klause is located in a remote valley with only a small dilapidated road leading to it.
- It was a relatively tough job for staff to check frequently.

# Real-Time Flood Monitoring System in Austria

## Highlights

- **Time-saving & Cost-efficient Solution:** Saving lots of time wasted by heading back and forth. On top of that, it reduces labor costs, as staff do not need to make a trip there as often as before for inspection ;

- **Real-Time data collection & Warning alerts:**Staff could gather detailed data without too much hassle, and the settlement could be warned of an upcoming flood;

- **Data-based Insights & Managements**: It'll be better to plan for further measures since data acquisition is available and highly efficient to retrieve data. Staff will be able to archive records for documentation and analyze past events for better management.
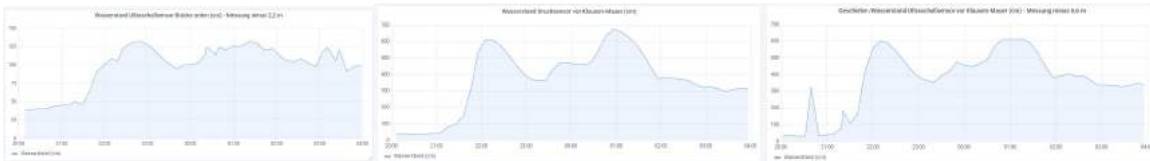
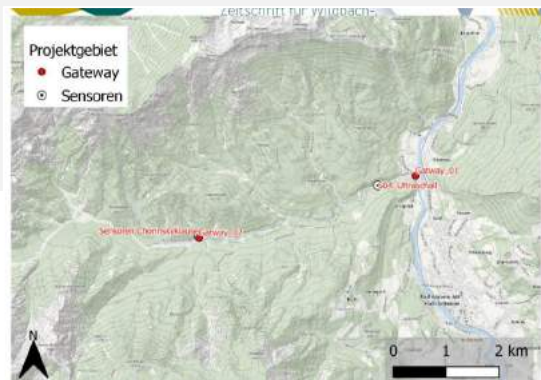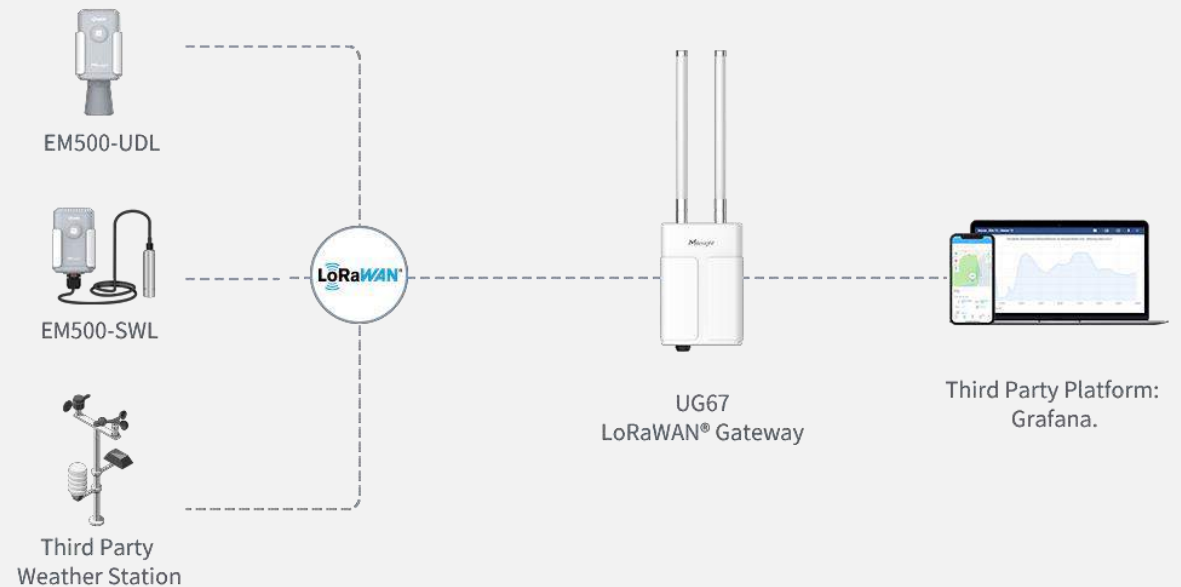

*Water level  measured with EM500-UDL & EM500-SWL

- EM500-UDL
- UG67 Outdoor Gateway
- Third-party Weather Station

- EM500-SWL
- UG85 Outdoor Gateway
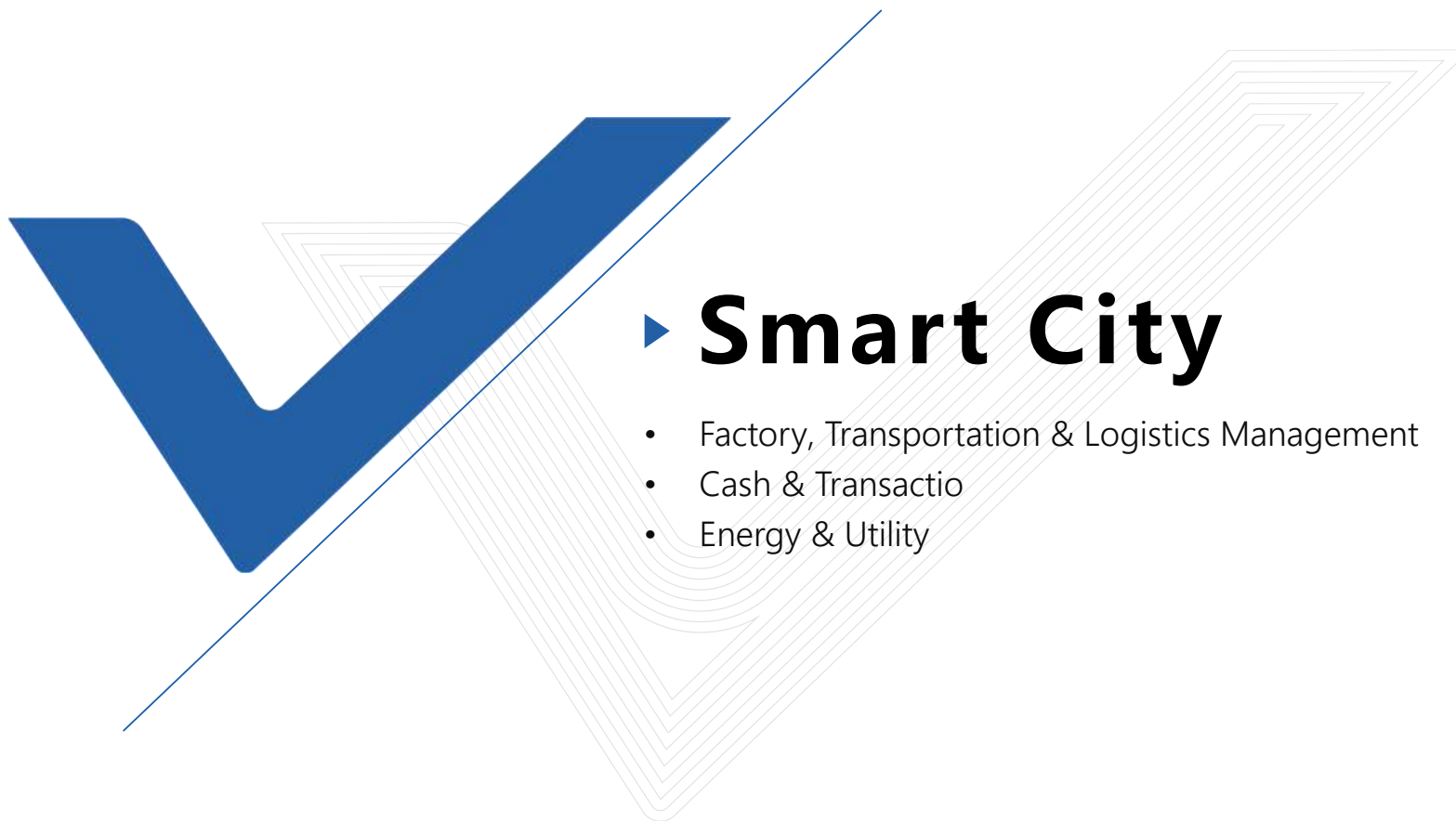
# Real-Time Flood Monitoring System in Austria

## Deployment

- Around the dam, there were several sensors installed to measure the water level and to collect data on the weather conditions around the dam.
- An EM500-UDL Ultrasonic Distance/Level Sensor plus an EM500-SWL Submersible Water Level Sensor were installed next upstream to measure water level every 10 minutes interval.
- Further down near the downstream, locates another EM500-UDL Ultrasonic Distance/Level Sensor to measure data at the same time interval.



EM500-UDL

EM500-SWL

Third Party Weather Station

LoRaWAN

UG67 LoRaWAN® Gateway

Third Party Platform: Grafana.

Better Inside, More in Sight

▶ **Smart City**

- Factory, Transportation & Logistics Management
- Cash & Transactio
- Energy & Utility

# Remote Monitoring of Rail Freight Transport in Italy

**Milesight**

## Background

The rail freight transport company wants to keep track of the locomotives wherever they are and to access the machinery status and operations online.

### Where it happened?

- Udine, Italy

- Rail freight transport industry

### What was the challenge?

Stability System

- Optimize the flow of data without overloading the system and convey only strategic information.

Not An All-in-One Solution

- Different vendors have their own advantages, it's hard to work them together for a solution.

# Remote Monitoring of Rail Freight Transport in Italy

## Highlights

- **Multiple Vendors to Unified**: The eWon remote management solution and Milesight UR32 router make online access to the machinery status and operations;
- **Enhanced Efficiency**: System integrators can reduce service trips and maintenance costs while giving their customers an even more reliable vehicle;
- **Location Accuracy**: UR32 Router provides a very high accuracy data of the location and is well displayed within a complex context;
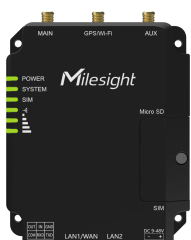
UR32

Milesight UR32 Cellular Router

# Remote Monitoring of Rail Freight Transport in Italy



**Deployment**

- Communication between the different devices inside the locomotive is carried out via Ethernet port;
- Information is gathered inside the Ewon gateway that stores all data coming from PLC and GPS;
- The machinery data, for example running hours, temperatures, pressures, alarms, oil level, etc., are displayed inside the locomotive using an HMI
- Ewon gateway gets the GPS location from Milesight UR32 router by using NEMA protocol and stores machinery data by using Modbus protocol from PLC;
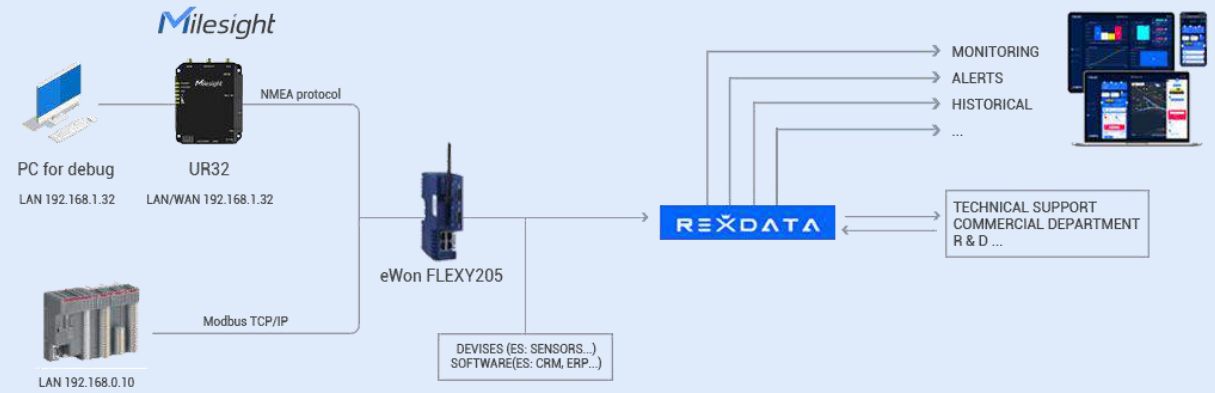
# COVID-19 Vaccine Storage Monitoring in Governmental Health Care Facilities

**Milesight**

## Location

Indonesia

## Background

COVID-19 vaccines require deep freeze conditions to be maintained in the supply chain in order to ensure their efficacy.

## What was the challenge?

### Monitoring Vaccine Safety

Ensure a proper vaccine storage environment during the whole distributing process.

### Data Integrity & Traceability

Eliminate manual operations for regular reporting and real-time alerts in the supply chain.

# COVID-19 Vaccine Storage Monitoring in Governmental Health Care Facilities



## Highlights

- **Consistent Monitoring:** Critical aspects of the vaccine supply chain can be monitored at all times;
- **Cost-efficient  Solution**: The best option to avoid expensive front-end investments related to infrastructure buildup and maintenance;
- **Secure Network**: LoRaWAN connectivity maintains the highest security levels and quality of connection for data transmission.
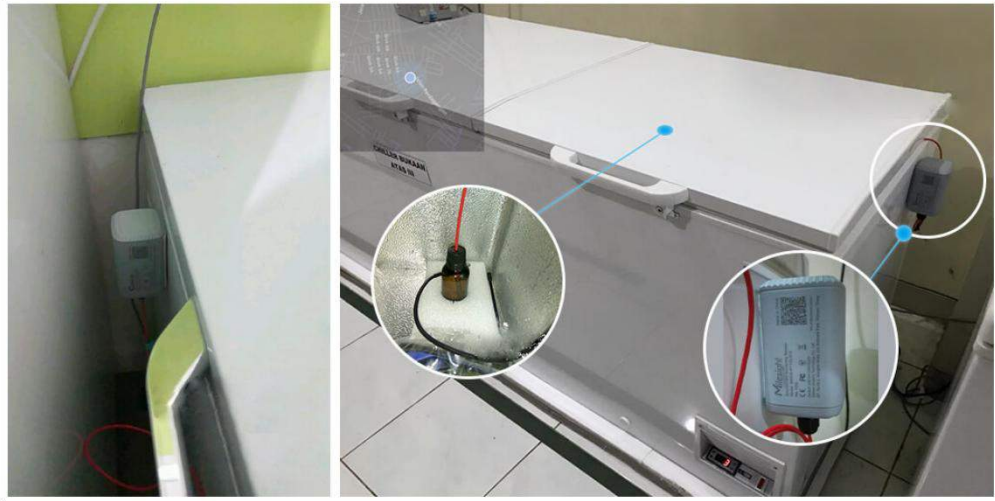
EM500-PT100

# COVID-19 Vaccine Storage Monitoring in Governmental Health Care Facilities



## Deployment

- Everynet has been laying the groundwork along with Telkom Indonesia to deploy a public LoRaWAN network in Indonesia;

- The Milesight sensors are carefully inserted into the freezers for real-time monitoring;

- Totally 150 sensors are deployed in the field;

**Milesight**

## Background

Not all ATM machines are in one place, operators need a solution to collect their data back securely and efficiently.

### Where it happened?

- The United States;
- For the ATM operators,

### What was the challenge?

**Expensive Fixed-Line Connection**
Expensive investment for network deployment in the unattended area with limited space

**Unstable Connectivity**
Lack of reliability and security network for data transactions

**Speedy Deployment**
Deploy it faster, result from it faster.

# AT&T Certified Cellular Router Ensures Connectivity for ATMs

**Milesight**

Milesight UR32 Cellular Router

## Highlights

- **Always-on Connectivity:** Failover between wired WAN and cellular connections and dual SIM failover functionality;

- **Highly Secure Connectivity:** Sends SMS to power off the device when receiving the GPS location alarm.

- **Wide Cellular Coverage:** Inexpensive construction in comparison to fiber or DSL, quick return on investment;

- **Central Management:** Operator configures in bulk on Milesight DeviceHub platform for all deployed routers

# AT&T Certified Cellular Router Ensures Connectivity for ATMs

**Milesight**

## Deployment

- The connection between the ATM machine and router relies on the Ethernet service of RJ45;
- The Digital Output is customized in the control of the power supply through SMS.
- The built-in firewall monitors and controls incoming and outgoing network traffic based on predetermined rules.

**Milesight**
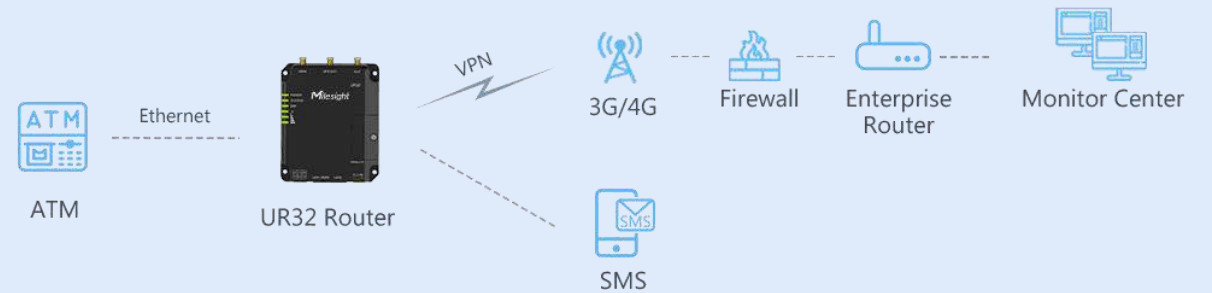
# ▸ **Smart Agriculture**

- Animal Husbandry & Fish Farming
- Crops and Plants & Forest Farming
- Climate & Environmen

# Quantifying the Value of IoT Technology for Poultry Farming

**Milesight**

### Location

- Africa

- Inmaa Farm : The farm contains 8 sites and 56 small animal housings and covers an area of 6,000 m$^2$.

### Background

It is important to note that the environment is the key fundamental that determines the condition of animal farming.

### What was the challenge?

**Monitoring and Assessing Key Welfare Indicators**
Indicators like temperature, humidity, $CO_2$ levels and security within poultry houses in large poultry farms is no easy undertaking.

**Cost-sensitive Envrionmental Attributes & Unctrollable Variables**
Maintaining the ROI of animal agriculture is a key challenge for all farmers and animal farming practitioners.

# Quantifying the Value of IoT Technology for Poultry Farming

## Highlights

- **Happy and Healthier Chickens:** This solution allows the customer to detect harmful conditions earlier and take preventative measures to ensure birds' welfare.
- **End-to-End IoT Solution**: It combines data collection technology with the knowledge of specialist vets and data analysts to bring together real-time data, which facilitates improvements in poultry performance and economics.
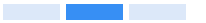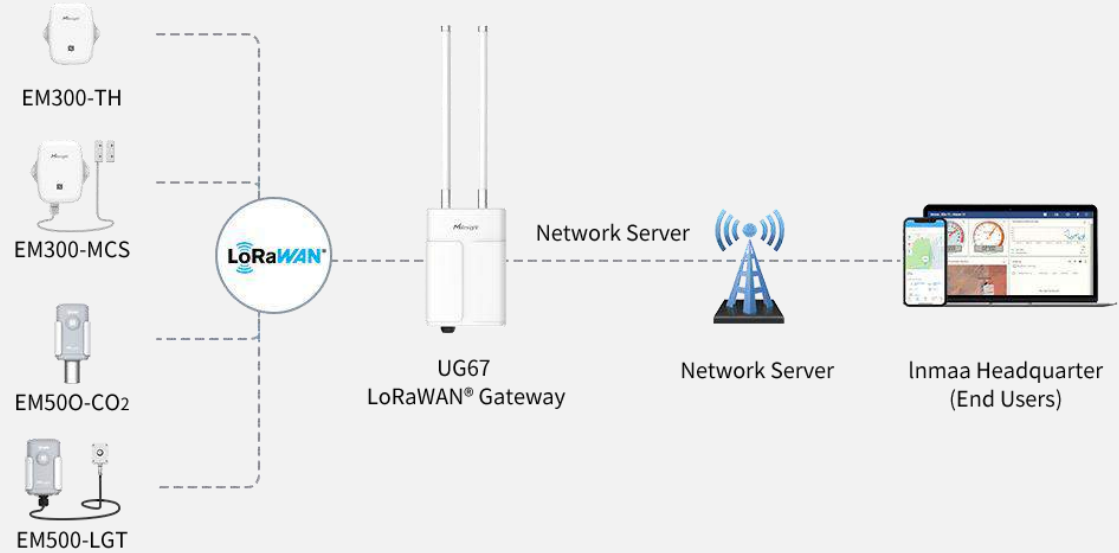


- EM500-CO$_2$
- EM500-LGT
- UG67 Outdoor Gateway
- EM300-TH
- EM300-MCS

# Quantifying the Value of IoT Technology for Poultry Farming

## Deployment

- The Milesight sensors provide effective oversight of environmental conditions such as temperature, humidity and CO2, as well as a safeguard the accessing points in each monitored zone;
- One LoRaWAN gateway in the roof of the control room can be connected with hundreds of sensors deployed in multiple zones;
- All the sensors and gateway are around 2km away from the headquarters;

EM300-TH

EM300-MCS

EM50O-CO2

EM500-LGT

LoRaWAN

UG67 LoRaWAN® Gateway

Network Server

Network Server

Inmaa Headquarter (End Users)

# Tea Processing Monitoring to Guarantee Product Quality

**Milesight**

## Background

In the tea-making process, the temperature/humidity in the tea-making environment as well as the oxygen content in the air are very important for the fermentation and drying of tea leaves.

### What was the challenge?

**Internal and External Monitoring**
Simultaneously measure the components of machinery and the oxygen content of the air by one system;

**Limited IoT Knowledge**
The devices are small enough to be placed inside of a machine and the system is installable by end users;

**Location**

Wuyishan,
Fujian Province, China

# Tea Processing Monitoring to Guarantee Product Quality

**Milesight**

- UC500 Controller
- UG65 Indoor Gateway
- Milesight IoT Cloud platform
- EM300-TH
- EM500-PT100

UC500

UG65

Milesight
IoT Cloud

EM300-TH

EM500-PT100

## Highlights

- **The Controlled Environment**: Optimum temperature and humidity ensure the tea is evenly heated at the best quality;

- **Data Visualization and Alert System:** Users can monitor and view the data in real-time through Milesight IoT Cloud and mobile APP, and also set alarm values on the cloud platform.

# Tea Processing Monitoring to Guarantee Product Quality
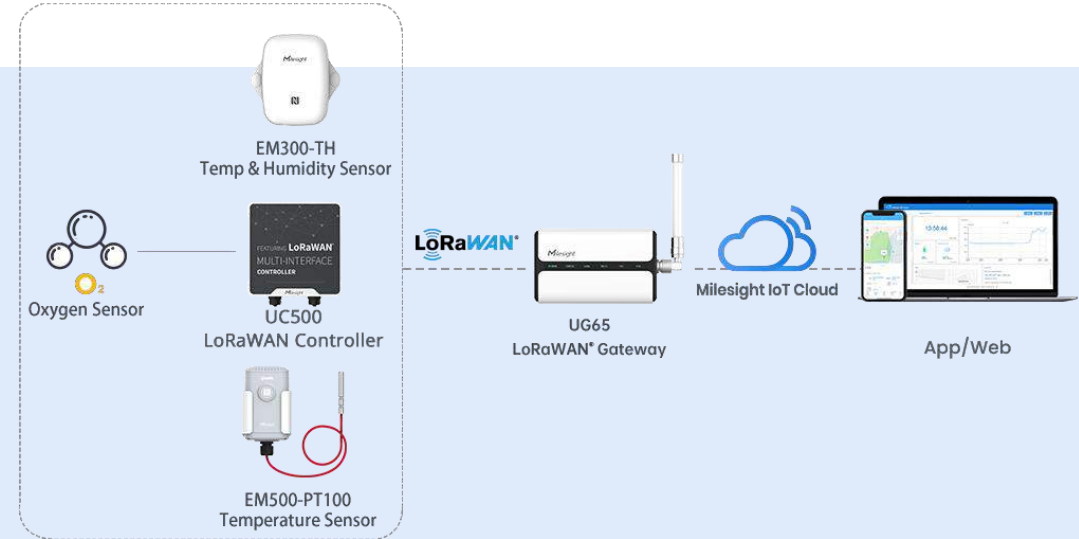


## Deployment

- Sensors are installed at different positions inside the roasting machine to monitor the temperature and humidity values in real-time during the tea roasting;
- The traditional oxygen sensor is connected via a multifunctional controller through RS485 to collect the data about oxygen content in the tea factory;
- PT100 temperature sensor is used to monitor the temperature values of central parts of the tea roasting machine, so as to avoid overheating or even damage of parts arising from the long working hours;
- The collected data is sent to the Cloud via a gateway for analysis, judging whether the current ambiance and oxygen content is appropriate and whether the machine is functioning properly;

# Automation of Smart Greenhouses through LoRaWAN®

**Milesight**

### Where it happened?

- Mauritius, Africa
- Greenhouse

### Background

Utilizing agriculture sensors based on Milesight's leading and proven LoRa devices enables the simple and accurate monitoring of temperature and humidity flow inside the greenhouse and allows farmers to respond quickly to improve yield.

### What was the challenge?

**Automating Mechanism**

- As the climate monitoring and the ventilation system are working independently, realize the automatic control of the motors and fans according to the measurements;

**Risk of Contamination**

- The new solution must be non-invasive i.e. wireless so as to maintain the ongoing greenhouse in production.

# Automation of Smart Greenhouses through LoRaWAN®

## Highlights

- **Non-invasive Solution:** The battery-powered sensors can be added or moved anytime anywhere with no worries about cable and electricity;

- **Minimum Human Interference:** The plants are kept at optimum temperature, humidity, light, and soil moisture levels with little or no input from the user.
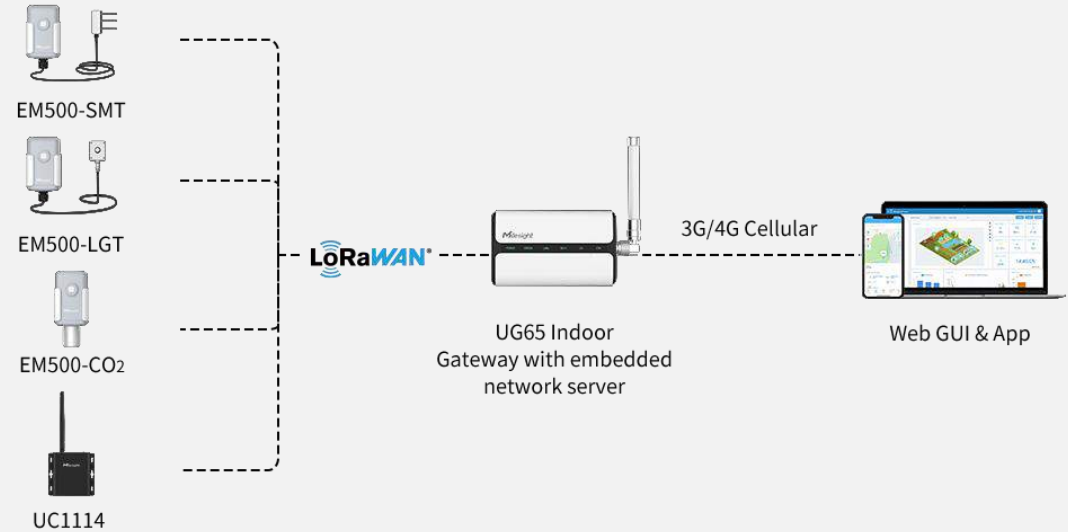
- EM500-SMTC
- EM500-CO$_2$
- EM500-LGT
- UC1114
- UG65 Indoor Gateway
- Milesight IoT Cloud platform

# Automation of Smart Greenhouses through LoRaWAN®

## Deployment

- Soil moisture sensors are installed at a pole, and their probes are inserted into the soil via a 5-meter cable;
- A carbon dioxide sensor is installed on the same pole to monitor the air quality, temperature, and humidity;
- Every 10 minutes, these sensors send data to the indoor gateway to analyze the results;
- The gateway will forward the command to the UC1114 controllers where motors and fans are remotely connected via digital input and replay output ports;
- If the temperature and humidity values are above threshold levels, sidewalls plastics will be opened and fans will be switched on.

EM500-SMT

EM500-LGT

EM500-CO2

UC1114

LoRaWAN®

UG65 Indoor Gateway with embedded network server

3G/4G Cellular

Web GUI & App

# Digitizing and Visualizing Forest Change and Growth

**Milesight**

## Background

Forests are typically located in remote, rural environments which can make regular access for surveyors challenging and logistically difficult.

### What was the challenge?

Traditional Unified Monitoring Method
- Managing forests as large blocks with uniform treatments simplify management but misses shifts in forest dynamics over time;

Warning System
- A system helps to improve early detection and prompt a rapid response;

### Where it happened?

Latvia

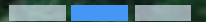# Digitizing and Visualizing Forest Change and Growth

**Milesight**

## Highlights

- **Get Forest Insights Widely and Regularly:** By providing accurate, automated, and structured data, researchers and forest-based companies can take meaningful actions that improve both productivity and sustainability;
- **End-to-End Solution:** The values are displayed on PC and generate report and analytics timely for far away surveyors.
- **Long-term Continuous Monitoring:** The new solution can serve as an early warning system by providing evidence of changes to biological processes.

UG67

UG67 Outdoor Gateway

# Digitizing and Visualizing Forest Change and Growth

**Milesight**

## Deployment

- Gateway is installed at a higher place with a kind of pole-mounted to provide around 11km LoRaWAN® network coverage and connect up to 2000 sensor nodes;
- Simultaneously receives LoRa and FSK messages on 8/16 channels with a 4dBi high gain glass fiber antenna;
- Different LoRaWAN sensors are attached to the trees and in the soil to measure the changes in the environment;

# Improvement of Watering Systems for Sustainable Agriculture

**Milesight**

## Background

Farmers always want to improve water-use efficiency and minimize water losses.

## Where it happened?

- A big farmland in Australia
- Irrigated agriculture field size: 540 hectares – divided into 15 x 36 hectare bays.

## What was the challenge?

High Expenses
Water, time, money and resources are wasted with manually operated irrigation systems;

Unreachable Connectivity
M2M connectivity has always been an issue for regional and rural areas.

# Improvement of Watering Systems for Sustainable Agriculture

## Highlights

- **Smart Irrigation**: The real-time monitoring and analysis of the environmental conditions of crops allow for informed and intelligent decision-making on behalf of the user to increase the yield of crops.
- **Typical Application**: Te Keytah Station project is also part of the Australian Government's "Smarter Irrigation for Profit Phase 2" Initiative.
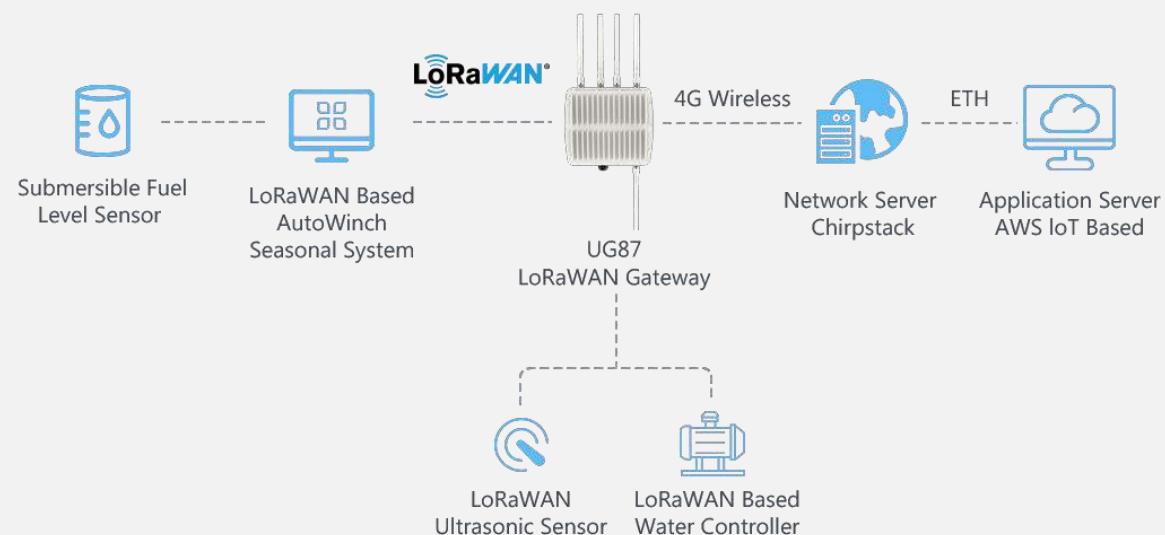
UG67

UG67 Outdoor Gateway

## Deployment



- An installed multifunctional data collector detecting light, carbon dioxide, soil temperature, humidity, electrical conductivity, and input liquid levels on the farmland;
- UG87 gateway is installed approximately 9 meters above ground level with a solar panel power input (200w panel and 100AH deep cycle battery);
- Gateway covers at least 9.5km away, line of sight;
- The 4G module in the gateway provides an easy internet connection for data transmission;
- Once the gateway receives data, it's passed on to the Chirpstack network server via the cellular network and is then forwarded by MQTT to the AWS IoT platform where the monitoring software is hosted for farmer access via the web app, Android, and IOS apps.

# LoRaWAN® Gateway Energizes Weather Balloon Flying

**Milesight**

## Background

To receive crucial climate data and explore the upper atmosphere using hot air balloons is also an essential way to see the environment change smartly.
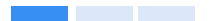
### What was the challenge?

Most of the world's weather phenomena occur at an altitude of 6 to 11 kilometers from the earth's surface.

**Long-Distance Data Transmission**

Data is difficult to transmit in the receiver ground system through the cellular signal reception or the Wi-Fi LAN network;

**Lower Power Efficiency**

Due to the frequent usage of weather balloons, one to two times a day, the system must be sustained with enough power consumption.

### Where it happened?

US and African countries like Nigeria, Ghana, and Cameroon

# LoRaWAN® Gateway Energizes Weather Balloon Flying

UG65

UG67

- UG65 Indoor Gateway
- UG67 Outdoor Gateway
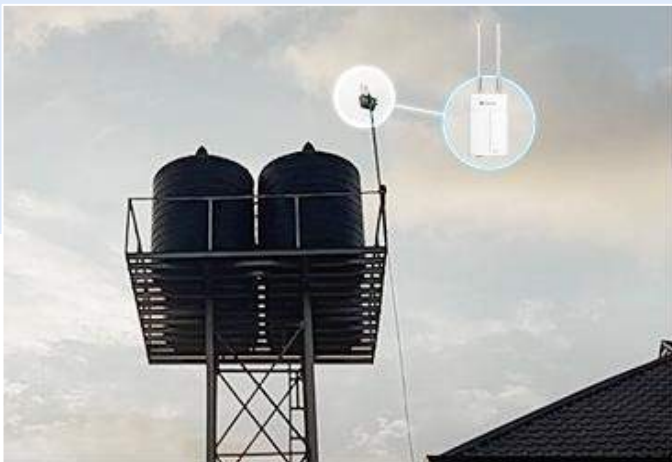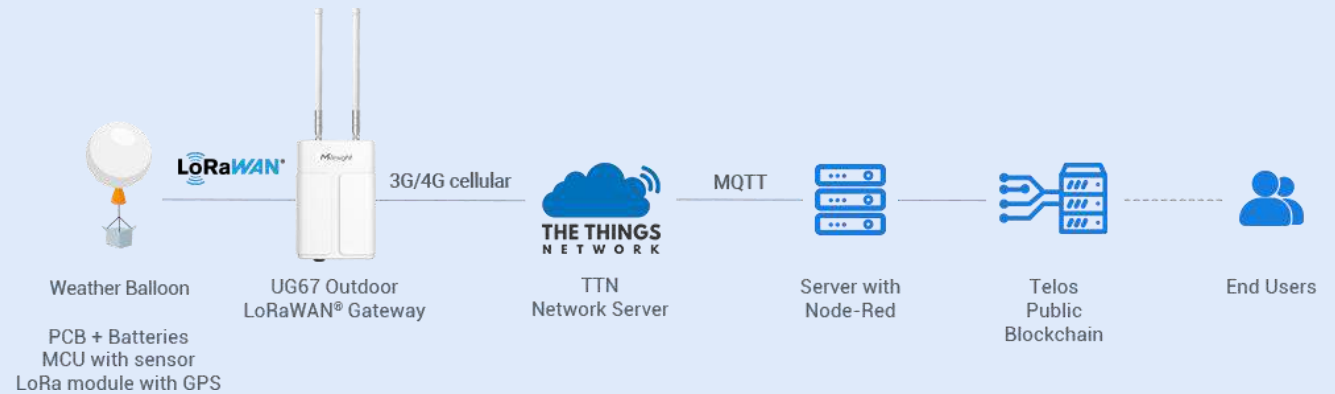- UG87 Outdoor Gateway

## Highlights

- **Accurate and Comprehensive Meteorological Monitoring:** Data analysis and forecasting is performed to provide useful weather information
- **Line of Sight Communication**: No solid object between the node and gateway so good signal is available;
- **Stable Network**: Gateways provide a transmission network to receive crucial climate data from the balloon;

# LoRaWAN® Gateway Energizes Weather Balloon Flying

## Deployment

- The gateways successfully received and decoded the message are installed on a tower at an altitude of 100 meters;
- The node on the balloon was flying at an altitude of 8 to 10 km;
- Six units of gateways operating in US915 or EU868 frequency are installed in different countries;
- The data is sent over the cellular network via MQTT protocol to the customer's server, and finally to a public blockchain.



Weather Balloon — UG67 Outdoor LoRaWAN® Gateway — TTN Network Server — Server with Node-Red — Telos Public Blockchain — End Users

PCB + Batteries
MCU with sensor
LoRa module with GPS

3G/4G cellular — MQTT