

# IIoT with LoRaWAN Use Cases

Craig Watson  
Head of IIoT Solutions and Development



Your Network's Edge®

Delivering  
**INNOVATION**



# About RAD



Your Network's Edge®

Telecommunications access solutions  
provider and Industrial IoT technology leader

Founded in 1981, privately owned

Global presence, part of the \$1.46 billion RAD  
Group



# Presenter's Bio



## Craig Watson

Head of IIoT Solutions and CI Sales Engineering

### *Speaker Bio:*

Craig Watson has over 20 years of IT networking and security experience working with utilities, cities, and government entities on improving the reliability and availability of all phases of critical infrastructure data, video, and voice networks. He has a strong understanding and working knowledge of the importance of security as it relates to the regulations and standards that utilities must adhere to, as well as providing network design architecture expertise and on-site field project support and engineering guidance for the operations and optimization of IT communication infrastructures.

Craig has coordinated, led, and managed teams for IT project consultations and assessments on large-scale network architectures, communication network design and gap analysis reporting efforts on several utility networks across North America. He currently serves as the Head of IIoT Solutions and CI Sales Engineering for RAD Data Communications and is responsible for the design, implementation, and roll out of large utility, smart city, and transportation communication programs.















Your Network's Edge®

# IIoT – Areas of Focus



## 10 IoT technology trends to watch in 2022

- 1  IoT is developing into a crucial technology for sustainability
- 2  The platform hype is moving from cloud to the edge
- 3  IIoT initiatives are transforming manufacturing
- 4  Cloud-Native applications are on the rise
- 5  Hyperautomation is transforming operations
- 6  AI is increasingly found at the (Thin) Edge
- 7  "Invisible AI" adoption is happening right under our noses
- 8  Immersive realities (VR/AR) are entering the enterprise environment
- 9  5G is becoming "IoT ready"
- 10  Secure remote access of assets is growing in importance

Source: IoT Analytics Research 2022. We welcome republishing but require source citation with link to the original post and company website.



# IIoT Market Verticals



Your Network's Edge®



## Power Utilities

- Smart Grid
- Re-closers
- Load breakers
- RTUs/SCADA
- Secondary substations
- Smart Meters



## Oil and Gas Utilities

- Flow meters
- Volume/pressure/level sensors
- Safety sensors
- Vibration, temperature, and moisture sensors



## Water Utilities

- Temperature, pressure, quality, and consumption
- Pump/valve control
- Smart Water sensors
- Water leak detectors
- Smart Meters



## Connected Industry

- Non-factory
- Asset monitoring
- Remote control (cranes, forklifts,...)
- Mines, oilfields
- Factory
- Production floor monitoring
- Wearables on the shop-floor
- Remote PLC control
- Automated quality control systems



## Safe City/Smart City

- Smart Parking; electric car charging
- Traffic management and control
- Fleet Management
- Smart bus lanes
- Info boards/Digital Signage
- Air quality monitoring
- Video Surveillance
- Smart Lighting
- Waste management



## Smart Agriculture

- Soil Irrigation and Moisture Monitoring
- Autonomous Irrigation
- Smart Soil Sensors
- Connected Farms



## Mobile Service Providers

- Cell Tower asset monitoring



## Connected Building/Remote Monitoring

- Building Automation/Generators
- Building security/Surveillance
- HVAC/Heating/Cooling
- Sensors and Informational Status
- Alarms and Alerts

# IIoT Solutions Development and Innovation



Your Network's Edge®

## Smart Street light



Manage city lights , saving costs,  
increase efficiency

## Security & Surveillance



Enabling Smart Security monitoring in  
any office, facility, or site

## Smart Energy



Smart grid / DC management

## Asset Tracking Management



Real-time tracking, status monitoring  
of heavy and light assets, vehicles  
and equipment, outdoors or in  
indoor industrial facilities

## Smart parking



Parking space at your fingertips –  
anytime anywhere

## Smart Environment



Monitoring for a healthy  
and risk-free environment

## Connected building



Make living in the building an  
enjoyable experience efficient  
management of resources (power,  
water, etc.)

## Waste management



Ultrasonic measurement of waste  
levels, autonomous, providing  
continuous monitoring of any type  
of container



**Solutions available today**



**Solutions in progress**



# IIoT Backhaul: Awarded Excellence

- **Main trends**

- More cloud adoption for higher efficiency and scalability
- Big Data and analytics for preventive maintenance, performance improvement and anomaly detection
- As the network expands into more and more locations – rising need for cyber secure solutions

- **SecFlow is a flexible “Swiss Army knife”**

- PoE, LTE, LPWAN (LoRa), serial, fiber, PLC, Stateful firewall and edge computing



**Building the Next Generation of Smart Grid Edge connectivity!**



# I/IOT Gateway Options



Your Network's Edge®

## SecFlow-1v

E1  
chassis

E2  
chassis



|                       |                       |
|-----------------------|-----------------------|
| 4 Ethernet LAN        | 4 PoE Ethernet LAN    |
| 1 Fiber WAN           | 1 Fiber WAN           |
| 2 Serial (RS-232/485) | 2 Serial (RS-232/485) |
| 2 In/Out Dry Contacts | 2 In/Out Dry Contacts |

## SecFlow-1v LoRa

E2  
chassis



|                       |
|-----------------------|
| 4 PoE Ethernet LAN    |
| 1 Fiber WAN           |
| 2 Serial (RS-232/485) |
| 2 In/Out Dry Contacts |

## SecFlow-1v IP66

E5  
chassis



2H 2022

|                       |
|-----------------------|
| 4 PoE Ethernet LAN    |
| 1 Fiber WAN           |
| 2 Serial (RS-232/485) |
| 2 In/Out Dry Contacts |

## SecFlow-1v PLC

E3  
chassis



|                       |
|-----------------------|
| 4 PoE Ethernet LAN    |
| 1 Fiber WAN           |
| 2 Serial (RS-232/485) |
| 2 In/Out Dry Contacts |

|               |
|---------------|
| 6 Analog IN*  |
| 6 Digital IN  |
| 6 Digital OUT |

## SecFlow-1p

E1  
chassis



LoRa mid 2022

|                       |
|-----------------------|
| 4 Ethernet LAN        |
| 2 Fiber WAN           |
| 2 Serial (RS-232/485) |
| 2 In/Out Dry Contacts |

Option: 3 AI ports can work as 4-20mA

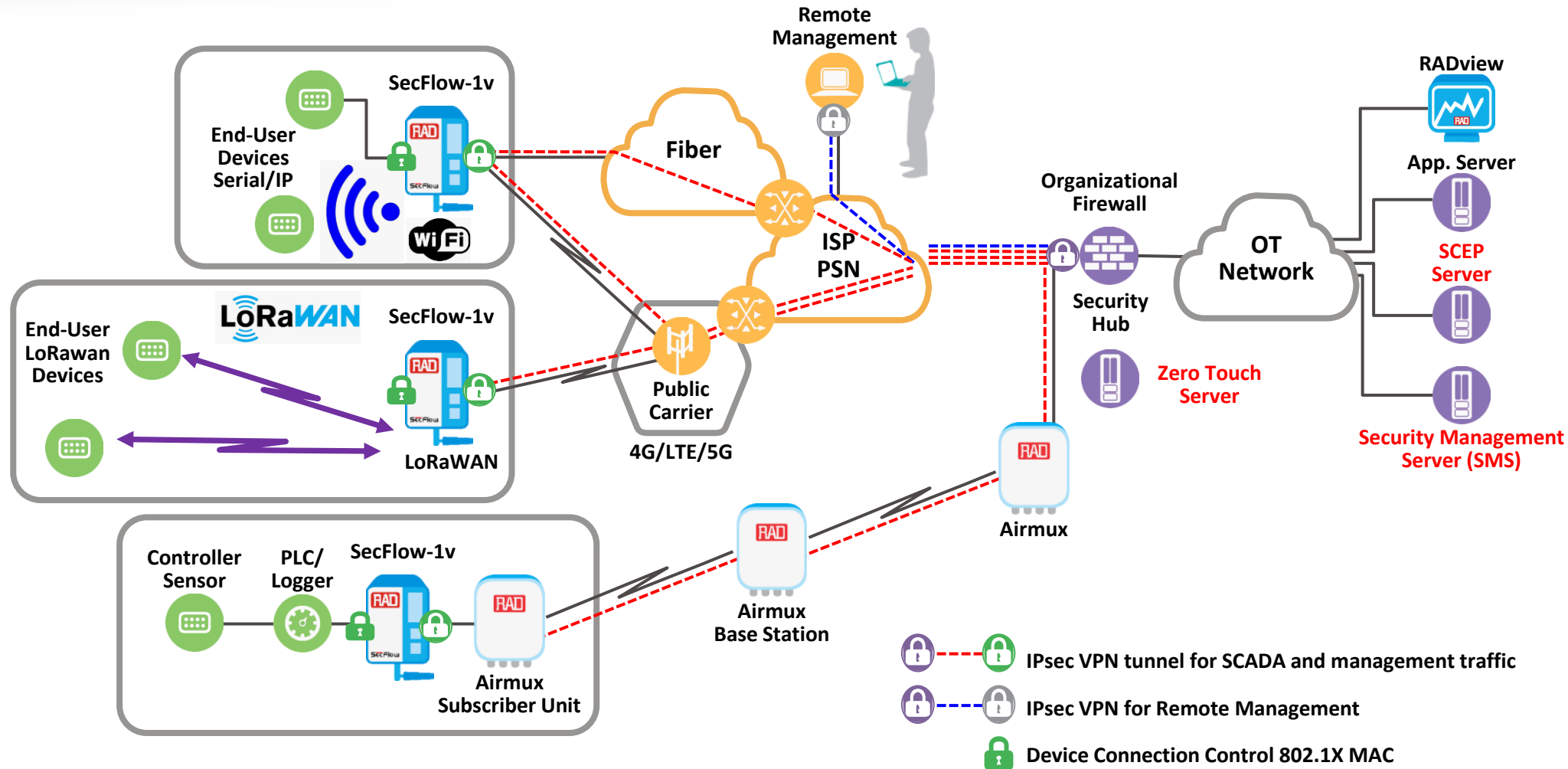


Common ordering options for all chassis

# RAD's Comprehensive, End-to-end Solution



Your Network's Edge®







Your Network's Edge®

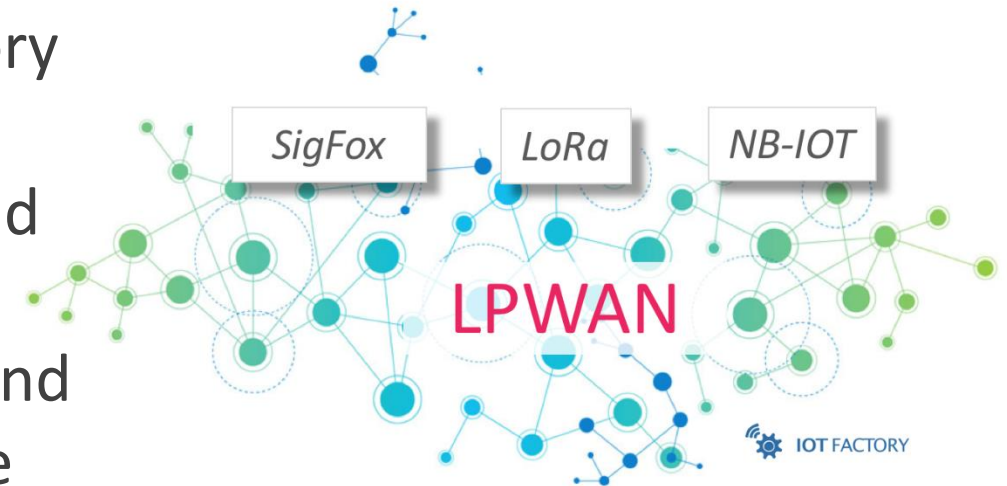
# The Case for LoRaWAN



Delivering  
**INNOVATION**

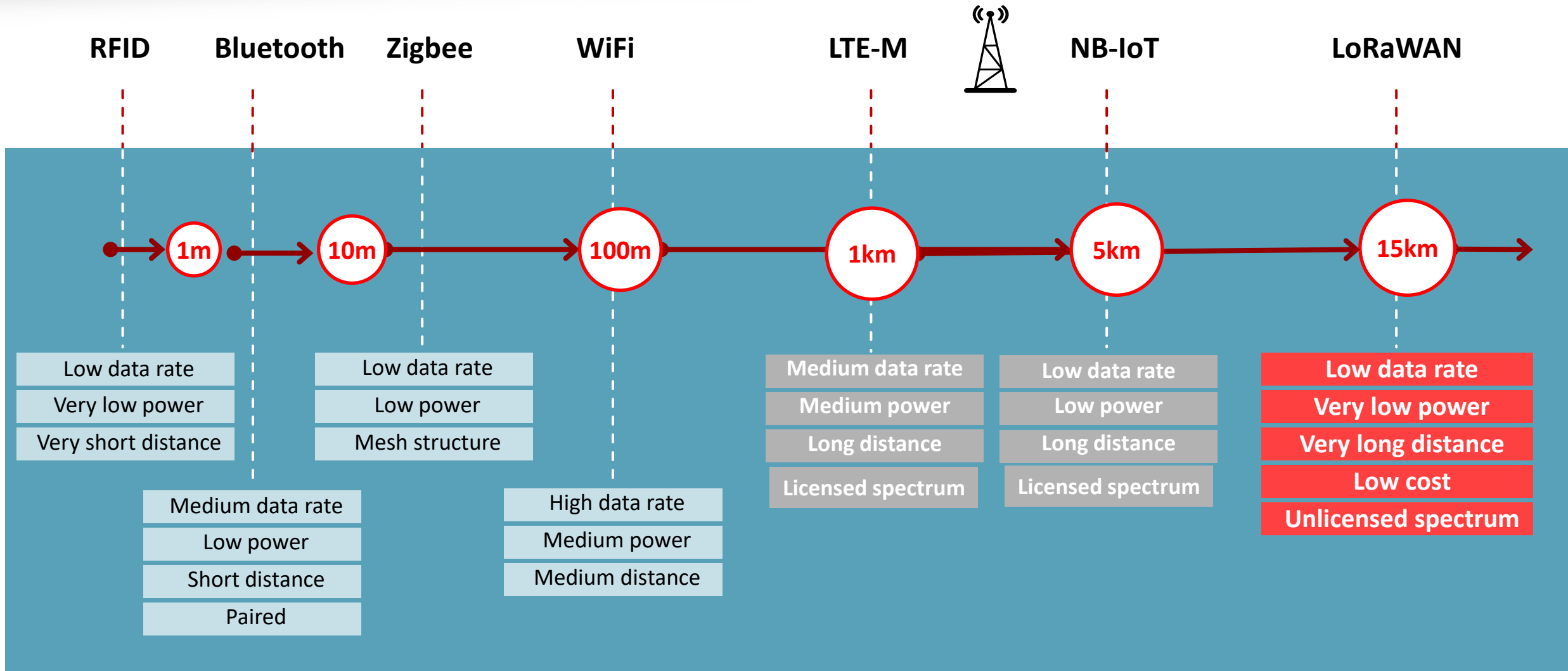
# Definition LPWAN — What is it?

- Low-power wide-area networks (LPWANs or LPWA networks) are a relatively new category of wireless communication technologies designed for power-efficient, long-range, and low-cost communication from simple IoT devices. LPWAN technologies address low-end IoT applications that are often cost-sensitive and characterized by 1) infrequent transmissions of small bursts of data, 2) a large number of devices, often spread over wide areas, and 3) the need for devices to operate autonomously for many years.





# LP-WAN Technologies



# LoRaWAN ITU Announcement

The LoRaWAN® standard has been officially approved as a standard for low power wide area networking (LPWAN) by the International Telecommunication Union (ITU), the United Nations specialized agency for information and communication technologies.



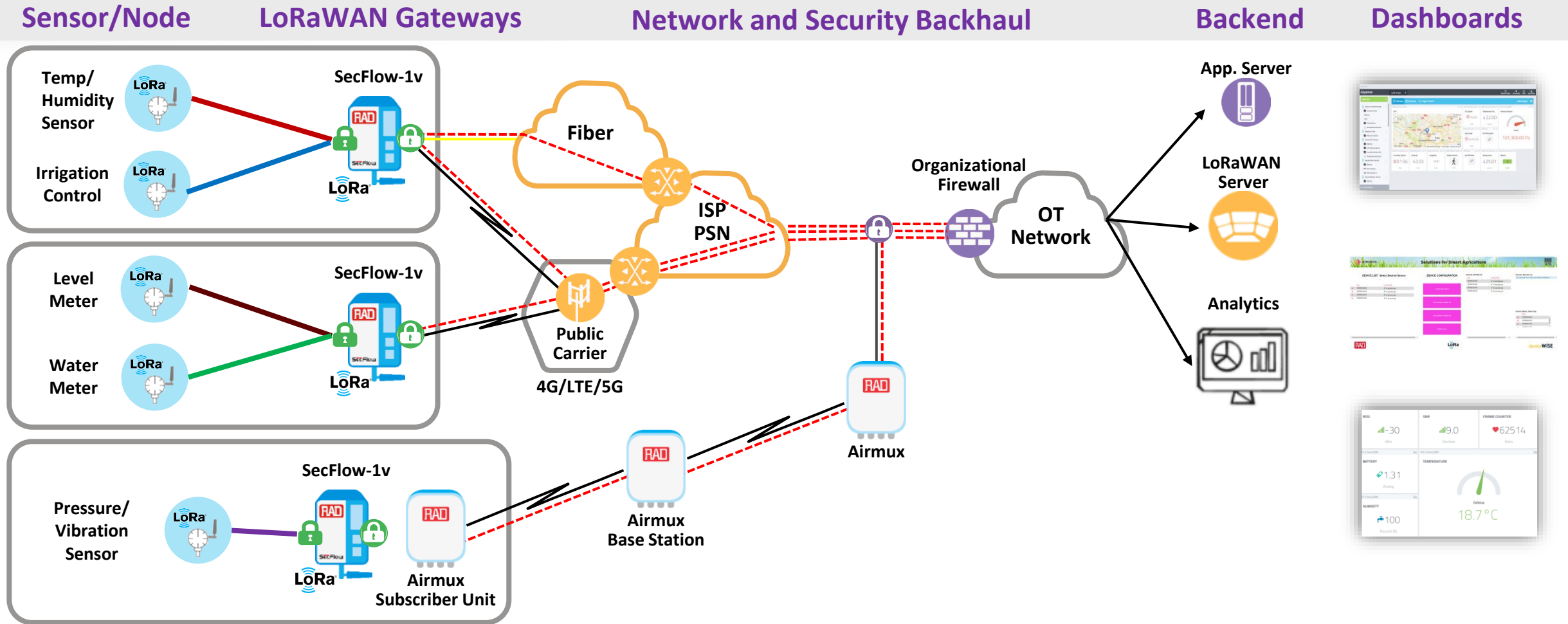
Recommendation ITU-T Y.4480 “Low power protocol for wide area wireless networks”



# LoRaWAN Network Architecture – Smart Sensor Networks



Your Network's Edge®



Gives users real-time data on a variety of conditions such as temperature, moisture, level conditions, and metering through a network of low-cost wireless sensors, all concentrated and visualized in a headend dashboard



Your Network's Edge®

# IIoT Use Cases



# Monitoring Remote Assets

Agriculture, Campus, Warehouse,...



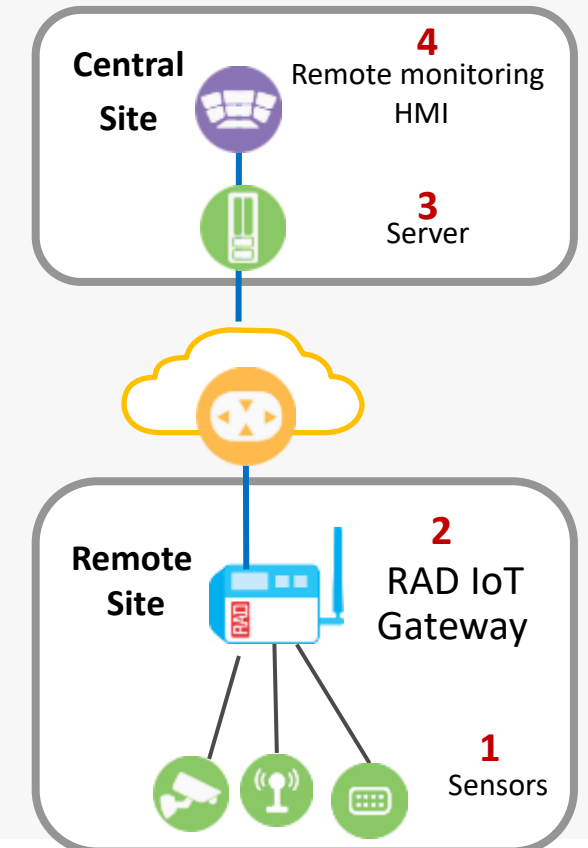
Your Network's Edge®

## Motivation:

- Save money by getting timely alerts before problems become critical, thus avoiding catastrophic damage, unanticipated shutdowns, security violations,...

## Main elements to an IIoT based remote monitoring solution.

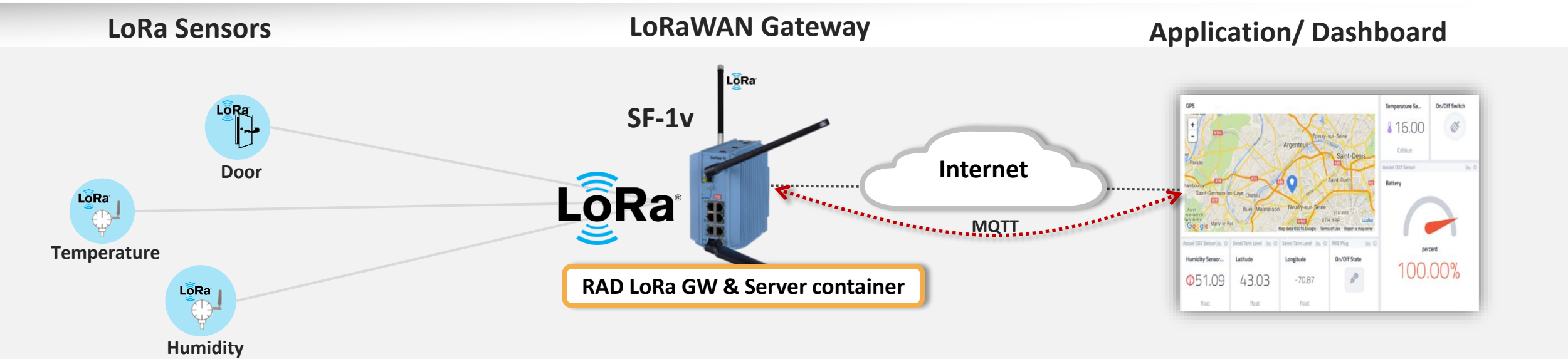
1. Surveillance cameras to detect activity and sensors to monitor environment and assets HVAC (Heating, Ventilation and AC), generators, doors/windows, etc.
2. RAD SecFlow Gateway that connects to the equipment, acquires and processes the data and communicates it to a remote server.
3. Remote server that collects and stores the data
4. Central HMI dashboard, VMS, control and analytics Software



**SecFlow provides 24/7 visibility and control**



# Condition Reporting with RAD LoRa Container



## Motivation and Value

- SecFlow container technology facilitates both GW function and Lora Network Server (LNS)
- Easy integration to 3<sup>rd</sup> party Applications / Dashboards

## Solution Blueprint Components

- LoRa sensors located in the RAD vLAB is connected to SecFlow-1v
- SecFlow-1v with RAD LoRa Gateway / Server container transform LoRa messages to MQTT
- SF-1v will receive messages from LoRa sensors, transmit MQTT messages over secure tunnel to Dashboard application
- Dashboard from Thingspark located in the Cloud receives MQTT messages from RAD LoRa GW server (LSN)

# Asset Tracking (LoRa + 5G)



Your Network's Edge®

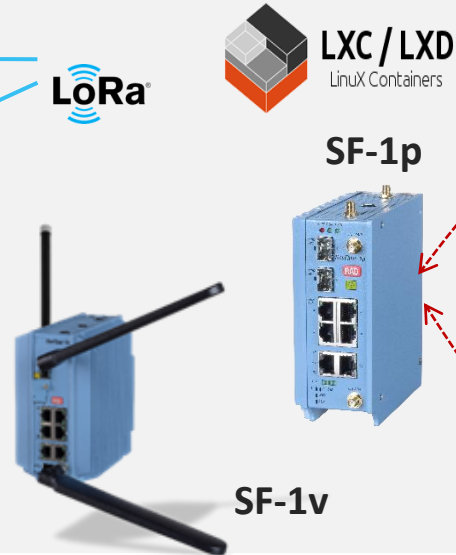
## 1 Sensors/devices



LoRa<sup>®</sup>

LoRa<sup>®</sup>

## 2 Multi-function Gateways

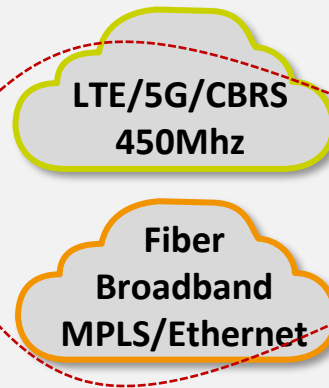


LXC / LXD  
Linux Containers

SF-1p

SF-1v

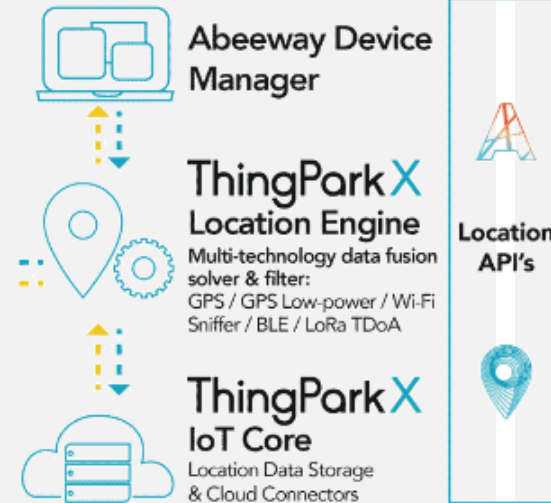
## 3 Connectivity



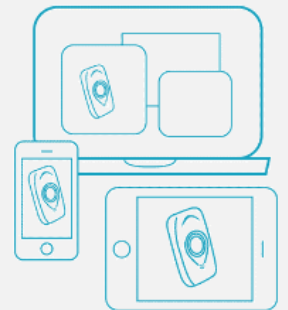
LTE/5G/CBRS  
450Mhz

Fiber  
Broadband  
MPLS/Ethernet

## 4 Backend



## 5 Dashboards



- Airports, Ports, Harbors
- Construction sites
- Transportation & Logistics
- Mines, Oil and Gas
- Warehouses and facilities
- Livestock and Farming



1. Sensors/Devices: Abeeway Trackers

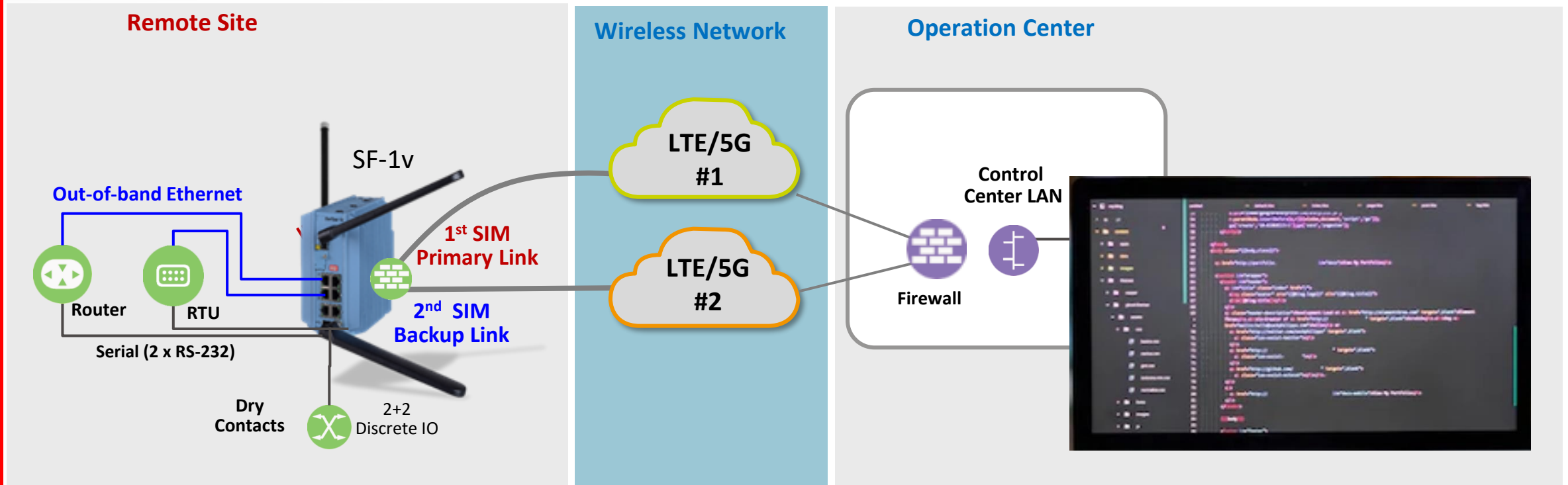
2. SF-1v with containers: hosting Activity LoRaWAN Gateway and Network Server

3. Connectivity: Fiber, LTE or 5G with 1 / 2 SIMs or 1 / 2 modems

4. Backend Servers: Abeeway Device manager, Location engine and data storage

5. Dashboards: Visual display of data, Business Applications

# Out-of-Band Management with Redundant Cellular Connectivity



## Requirement

- Secure out-of-band management of equipment over cellular
- Reduce OpEx by minimizing truck rolls for operations and maintenance

## Solution Benefits

- Secure mgt. (IPsec and stateful Firewall)
- Terminal server access to console ports
- Seamless access to out of band Ethernet interfaces
- Redundant connectivity (supports 2 SIMs or 2 modems for resilience)



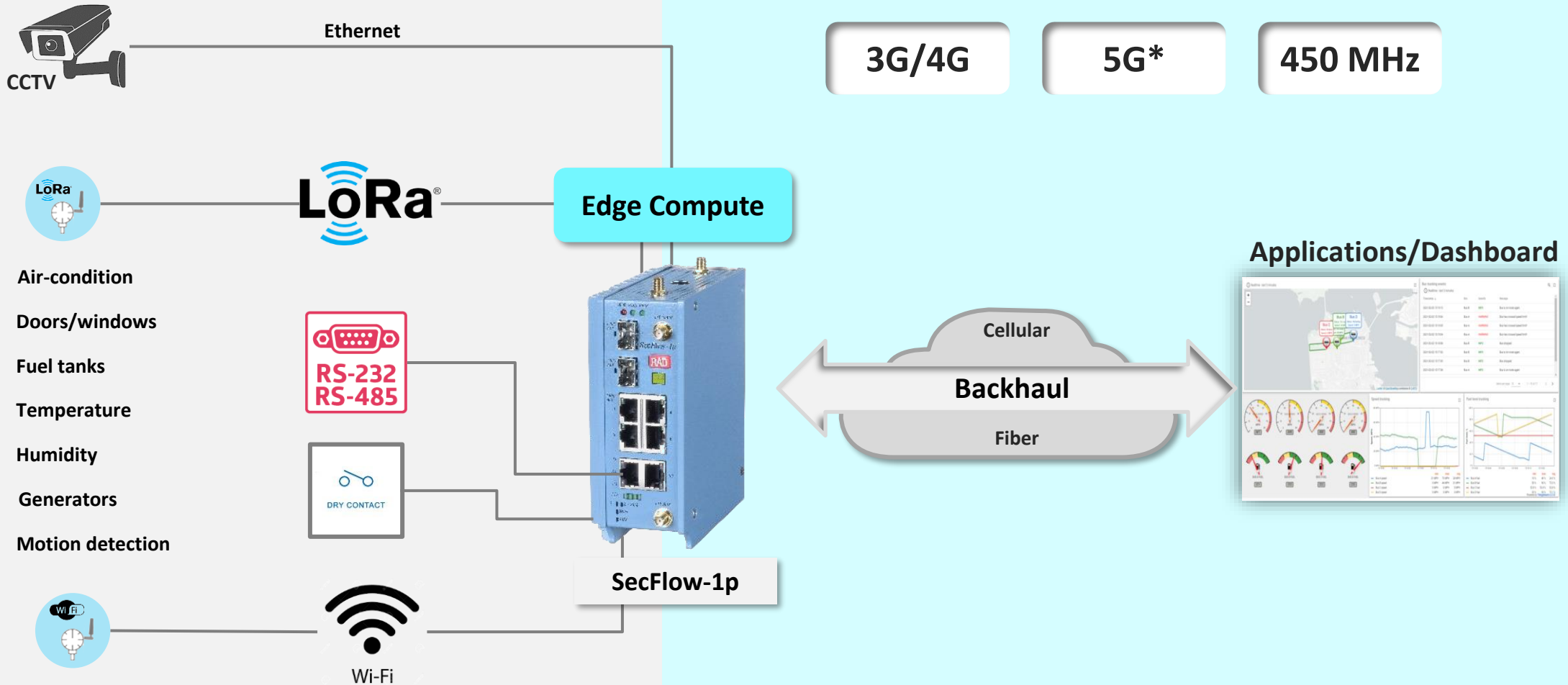
# Remote Site and Asset Monitoring Functionality



Your Network's Edge®

Remote Monitor & Control

Backhaul Technologies



# LoRaWAN Sensor Vendor Partners



## Smart Tank Monitoring

General, Water, and LPG/propane monitoring solutions



## Humidity and Temp

Temperature Probe sensor for monitoring environmental data



## LoRaWAN Customized Sensors

Support Temperature, Proximity, Liquid, Movement, and Air



## Open Source IoT solution

Outdoor/Indoor Humidity, Temperature, Soil sensor



## PlacePod

IoT-enabled smart parking sensor for both in-ground and surface



## End Node Manufacturer

CO2, Window/Door, Temp, Motion, Leak Detection sensors



## Industrial IoT Market

Industrial products and IIoT software solutions



## Battery-powered GPS trackers

Track anything, anywhere



## Smart Building sensors

Temp, Light, Occupancy, and Door/Window sensors



## Smart Agriculture sensors

Smart and Precision Agriculture, Environmental Monitoring

YOKOGAWA



## "Sushi Sensor"

Pressure, Vibration, and Temperature sensors

**R**<sup>IoT</sup> Wireless

The **REAL** Internet of Things at work



## C1D1 Tank Level Monitor

Level, temperature, measurement quality, battery status, etc



## IoT tracking solutions

Reliable, cost-and energy-efficient tracking solutions.



## Submetering Energy Management

Gain a better sense of your Building electricity usage

Plus, any certified LoRaWAN sensor from the following marketplaces:

- <https://www.thethingsnetwork.org/marketplace/products/devices>
- <https://www.semtech.com/lora/ecosystem/sensor-features>
- [https://lora-alliance.org/showcase/search?is\\_certified=1](https://lora-alliance.org/showcase/search?is_certified=1)

# Time for a Poll



Your Network's Edge®

Poll Question  
of the Day



# Live Demo



Your Network's Edge®



# Takeaways



Your Network's Edge®

- RAD has extensive IIoT hardware and software product capabilities across many different verticals
- LoRaWAN serves as a cornerstone wireless technology to be able to connect thousands of sensors together
- SecFlow accommodates flexibility with virtual containers that provides the perfect fit for Asset Monitoring and Automation

Delivering  
**INNOVATION**





Your Network's Edge®

# Thank you

For your attention

---

Craig Watson  
Head of IIoT Solutions  
[Craig\\_w@rad.com](mailto:Craig_w@rad.com)

Delivering  
**INNOVATION**