iREX
Contents & Data Service Provider

oneM2M Industry Day

Industrial IoT use case / LoRaWAN Network Server – oneM2M Interworking

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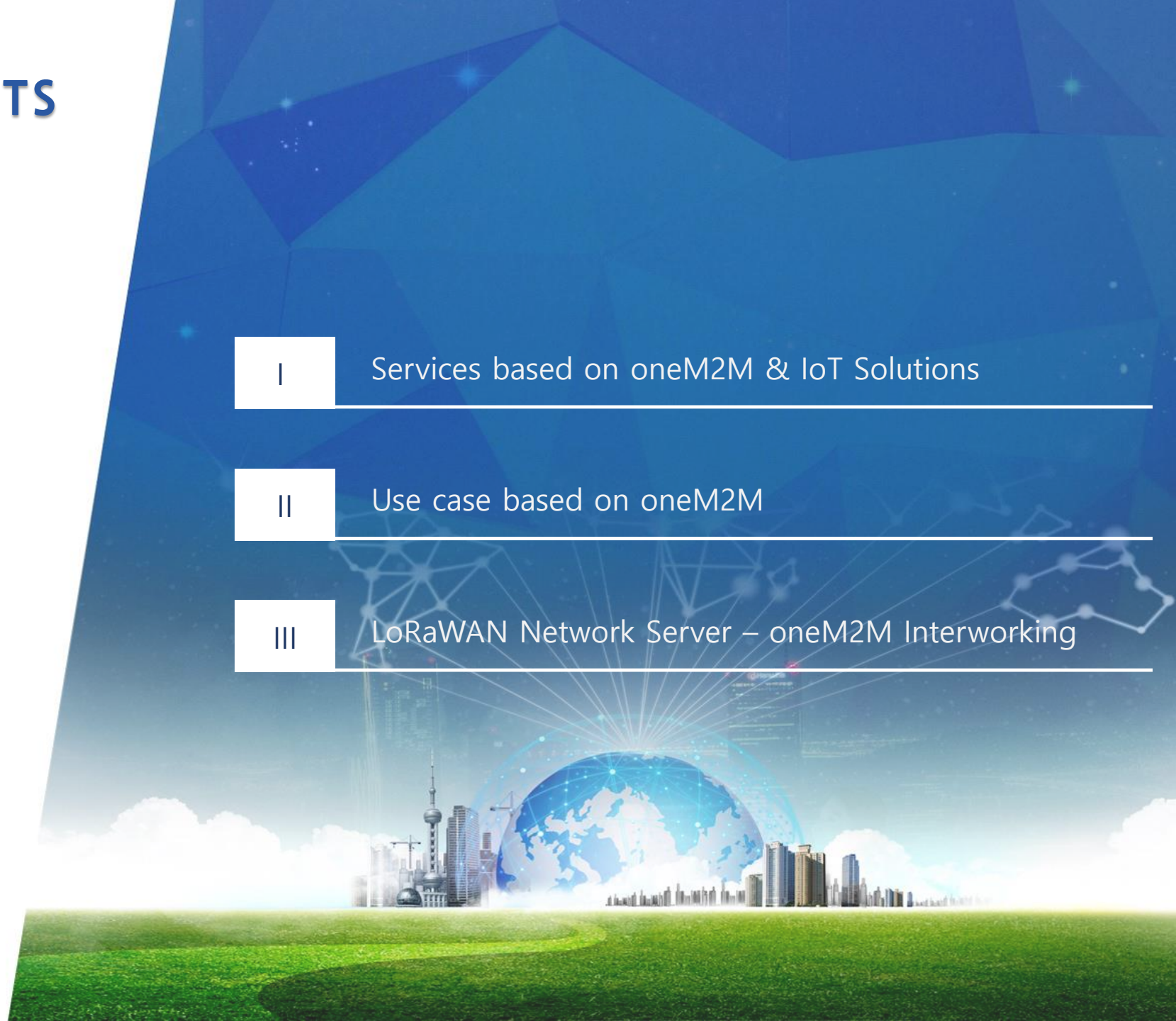


iREX
Contents & Data Service Provider

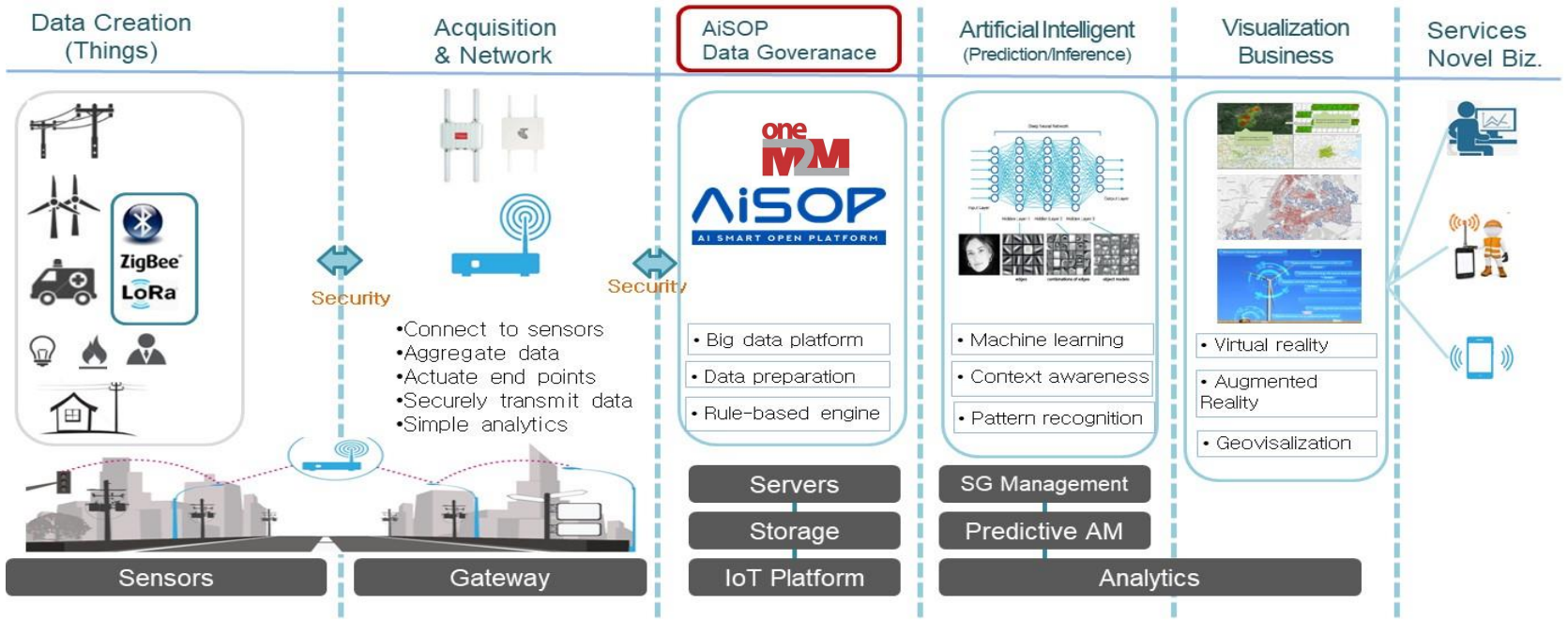
AISOP (Ai Standard Open Platform)

Supporting ecosystem for Bigdata and Ai Service

Service Use Case

- Bigdata governance, Support Common Ai Analysis Engine & OnDemand Algorithm

Representative Use Case



Purpose : Provide the data governance for Bigdata and Ai Analysis

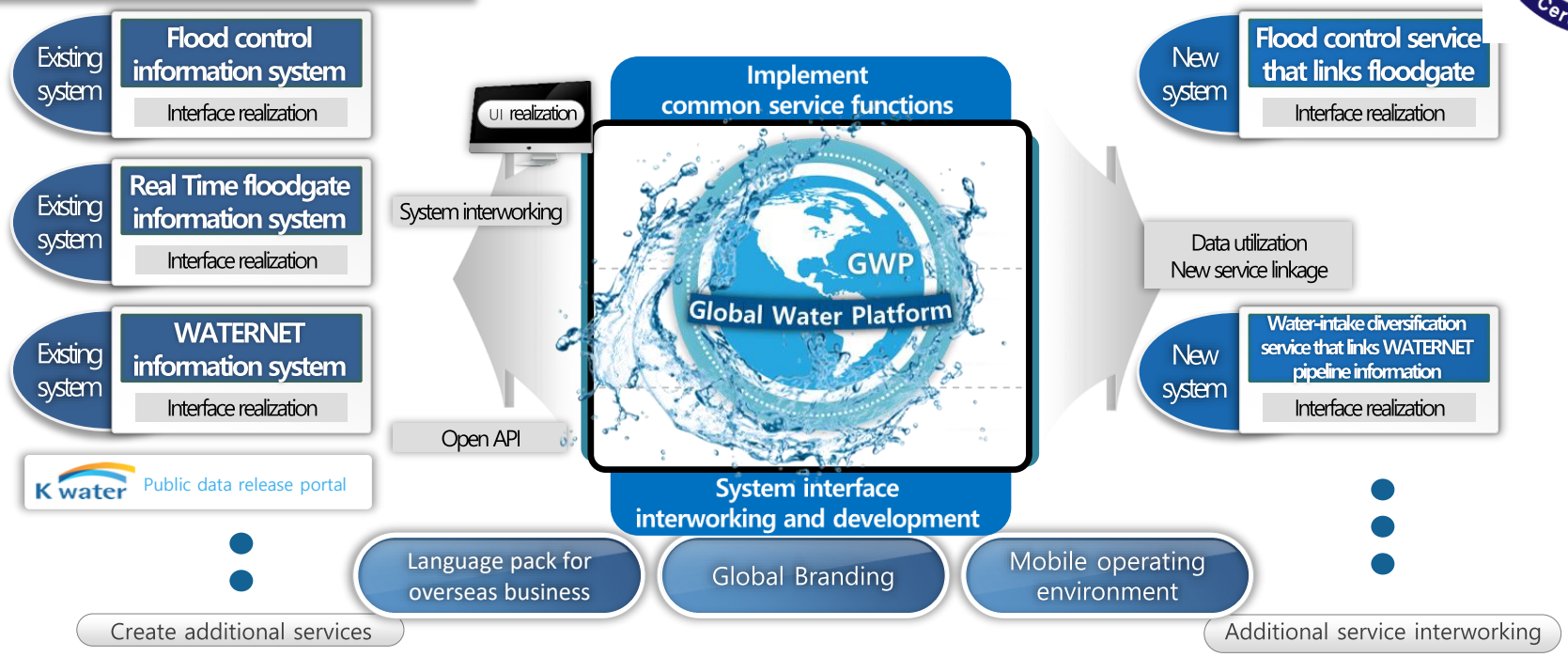
GWP (Global Water Platform)

Water-Industrial open IoT platform

Service Use Case

- **Individual water-system integration, Water-side development ecosystem etc.**

Representative Use Case



Purpose : Individual system integration for overseas business activation of K-Water

IoT Smart World by oneM2M

Our approaching for a "Smart World"

Irexnet currently provides the best business and solutions for various fields around social infrastructures.

It is a platform to integrate and manage data from the underlying devices of the Internet, and applications Platform to provide integrated IoT solutions and is making changes and innovations at this moment in order to be competitive in the Internet market and create new services.

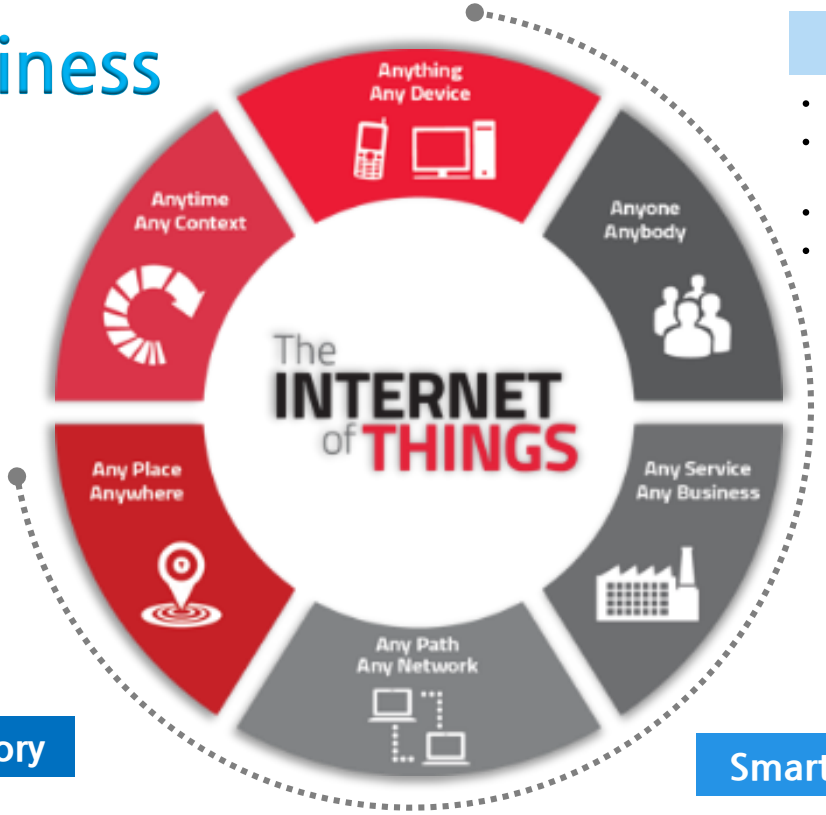
POWERED BY AiSOP
AI SMART OPEN PLATFORM

Service Resigns for IoT

"IoT Services"

✓ IoT Business

- IoT Solution
- IoT Platform
- IoT Device



Social Overhead Capital

- Korea Electric Power Corporation business project
- Korea Water Resources Development Corporation Service platform
- Korean Railway Device platform
- Big Data-based public services

Industrial Safety

- High-risk workplaces such as petrochemical, shipbuilding business
- Hazardous gas safety management in confined spaces
- Facility management

University, Laboratory

- Experimental equipment
- Prototype development, pilot project

Smart City

- Management pilot project for education, environment, and agriculture
- Air Quality Monitoring Service
- Urban infrastructure management services

Totally Service for IoT

"IREXNET IoT Solution"

Irexnet has developed its own platform to enable interoperability between different devices and platforms around the world.
Sensor devices that can be used professionally in the industry and differentiated services tailored to user requirements are connected via AiSOP with scalability and interconnectivity.

E-IoT, W-IoT, environmental field sensor
Approximately 100 sensors can be selected

Device

iThings 4G LTE Bluetooth SMART NB-IoT WiFi LoRaWAN MQTT http://

CoAP RFC 7252

oneM2M AiSOP AI SMART OPEN PLATFORM

International standard oneM2M
Certified
Data Governance Platform
GWP, AiSOP

Platform

i-Service

User requirements Customized service

oneThings_AMI

oneThings_City

oneThings_・・・

Service

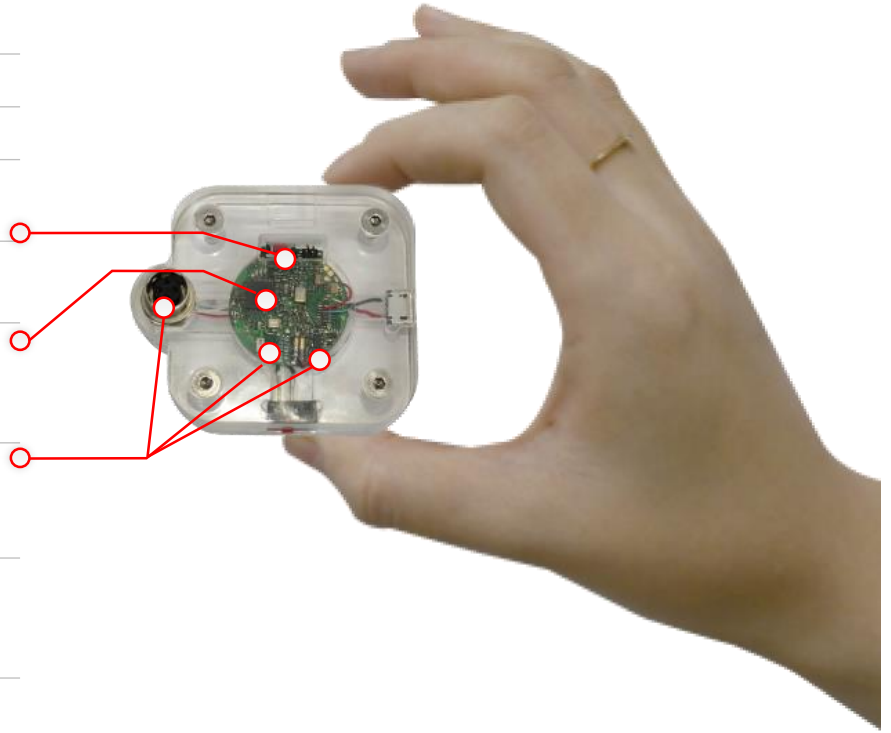
Device for IoT

iThings - Ultra-compact low-power complex sensor module

Device

iThings is a low-power-based sensor device.
It is supplied to the industrial field by customizing it to customer's requirement from communication, power to more than 100sensors to supply various demands of customers at optimum cost.

Classification	Contents
Module size(Diameter/Height)	50mm x 50mm
Max mount sensor	8ea per node
Main processor	ARM(M0)
Power supply	Customized to customer requirements (Always power, battery, solar panel, etc)
Communication type	Customized to customer requirements (LoRa WAN, NB-IoT, WiFi, BLE, etc)
Mounted sensor type	Custom made to customer requirements (E-IoT, W-IoT, environmental field, etc (more than 100kinds)
Sensor attachment type (Internal/External of case)	Internal mounting External connector connection
Data transmission interval security(Purpose)	KSVMP authentication key management & AES128

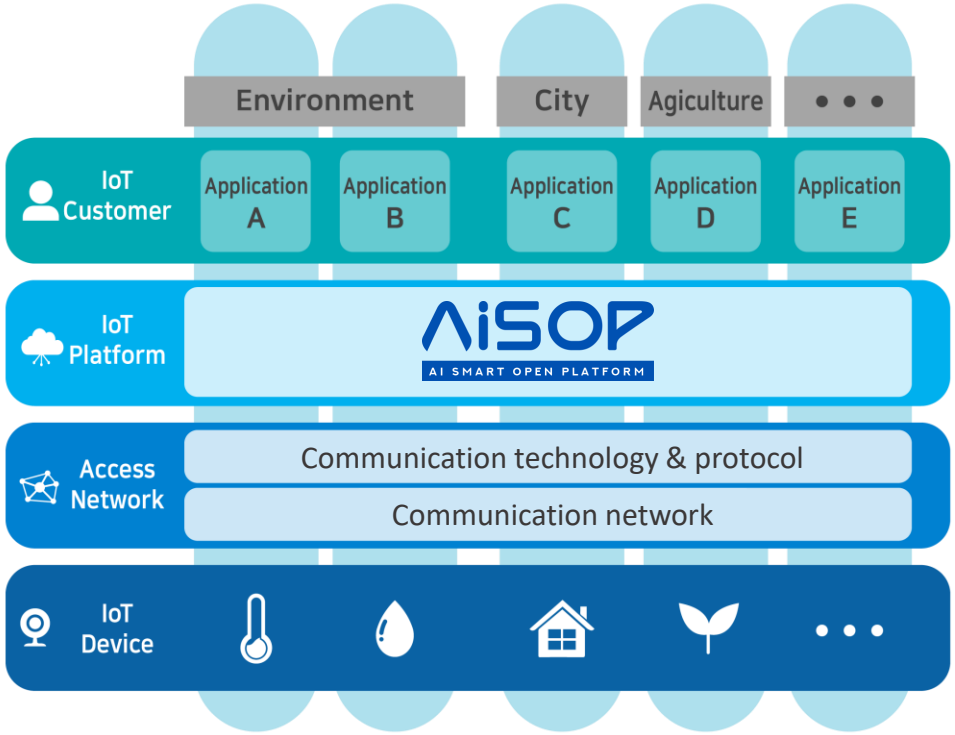


AiSOP - IoT Platform for Data Governance

AiSOP integrates and manages all of the devices connected to the Internet in a single system. Intelligent IoT Data Governance is also provided through user-customized object retrieval, connection and control functions.


CERTIFICATE

IREXNET



- User-customized search for things
- Object recommendation and connection
- Material care function
- Flexible link to new devices
- Flexible connection to new services

i-Service - International standards-based application service platform

Service

i-Service

Based on the theory of software engineering, we systematically analyze and design the customer's requirements to provide flexible services that reflect customers' requirements.

IREXNET

IREXNET

Company A

Company B

Energy IoT

City

AMI

Agriculture

Electric power field IoT service

KEPCO – Padmounted overall surveillance system

Pilot

Application Field

We have developed a sensor device to monitor the condition of transformer and switch that are underground power equipment.
It aims to provide the best power quality by promptly checking the problem of imbalance and quick response to increase of load.

Transformer sensor

Switch sensor

Smart sensor development and interlock

Development contents

- **Ground switch Smart Sensor**
  - Load surveillance : current(3phase), voltage(1phase) measure
  - Transformer internal pressure and insulating oil measure
  - Partial prevention of arc suppression using uv-c
  - External impact and slope : Acceleration Sensor Utilization
- **Ground switch Smart Sensor**
  - Leakage current monitoring : using a magnetic field sensor
  - External impact and slope : Acceleration Sensor Utilization
- **G/W & IoT Platform interlock**
  - NS & LPWA support using LoRa WAN
  - Current IoT interlock provision based on oneM2M

Precondition

- **Smart sensor**
  - LoRa technology based interlock protocol application
  - “IoT network interface profile” application
- **Gate way**
  - CoAP technology based interlock protocol application
  - “IoT network interface profile” application
- **eIoT Platform**
  - Sensor device data interlock function & Providing guidance for sensor figure outcome
  - “IoT info modeling & interlock regulation” application
- **IU-Guard Service**

Features of smart sensor

Ground Transformer Smart Sensor


Voltage/current sensor (3phase)


Pressure sensor


Insulating oil temperature sensor


UV-C Sensor


Vibration sensor

Ground switch smart sensor


Current sensor (2phase)


Vibration sensor

Ⅱ.2 Electric power field IoT service

KEPCO – Electric power IoT test-bed build

Pilot

Application Field

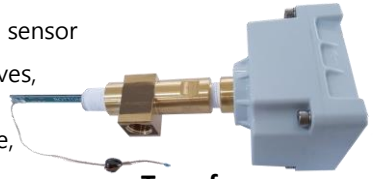
We have developed a complex sensor device that can be directly attached to the power equipment such as transformer, switch, and insulator. Based on the collected data, it provides information for asset management of electric power facilities to enable low maintenance.

Electric power facility monitoring sensor

Aerial line, pad mounted power facility

- Transformer monitoring sensor
  - Oil temperature, UV-C illuminance, vibration, slope
- Switch monitoring sensor - vibration, slope, external temperature, telluric current, ultrasonic waves
- Telephone monitoring sensor
  - shock, slope, external temperature
- Insulator monitoring sensor
  - UV-C, ultrasonic waves, slope, vibration, external temperature, telluric current

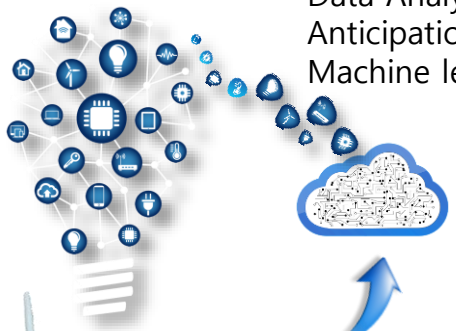
Switch, telephone pole, Insulator Monitoring sensor



Transformer monitoring sensor

Central monitoring system

IoT Platform
Data Analytics
Anticipation
Machine learning



Electric power IoT diagnosis monitoring gateway

Electric power field IoT service

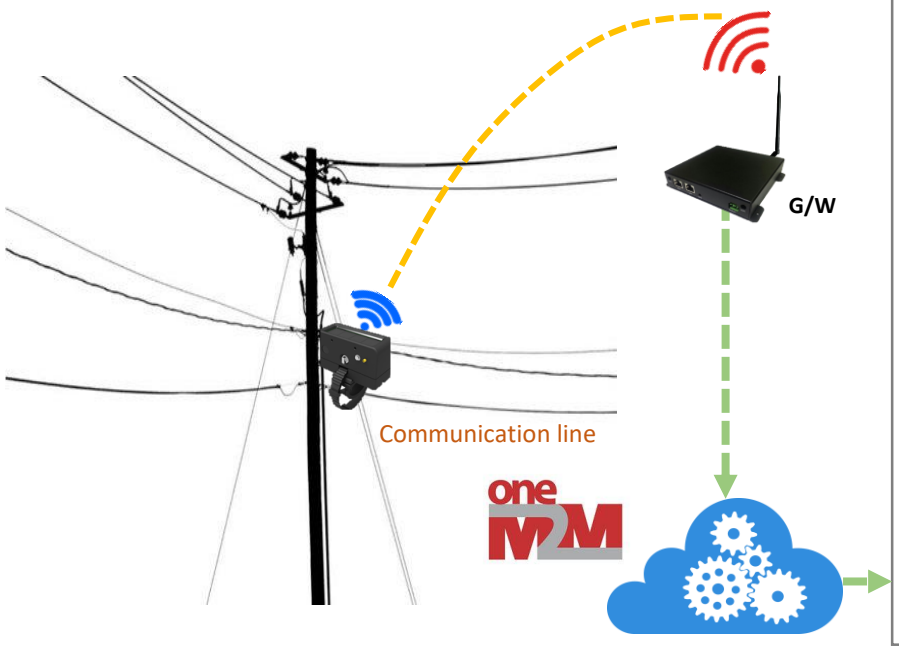
KEPCO - Communication line Sealing device

Pilot

Application Field

Carriers install fiber optic cables using existing telephone poles. In order to manage the optical cable installed, KEPCO only applies the communication lines allowed in the cable line. It's a system for monitoring and surveillance of these communication line.

Type of Sensor device



< Example: Consist of monitoring and locking device control platform >

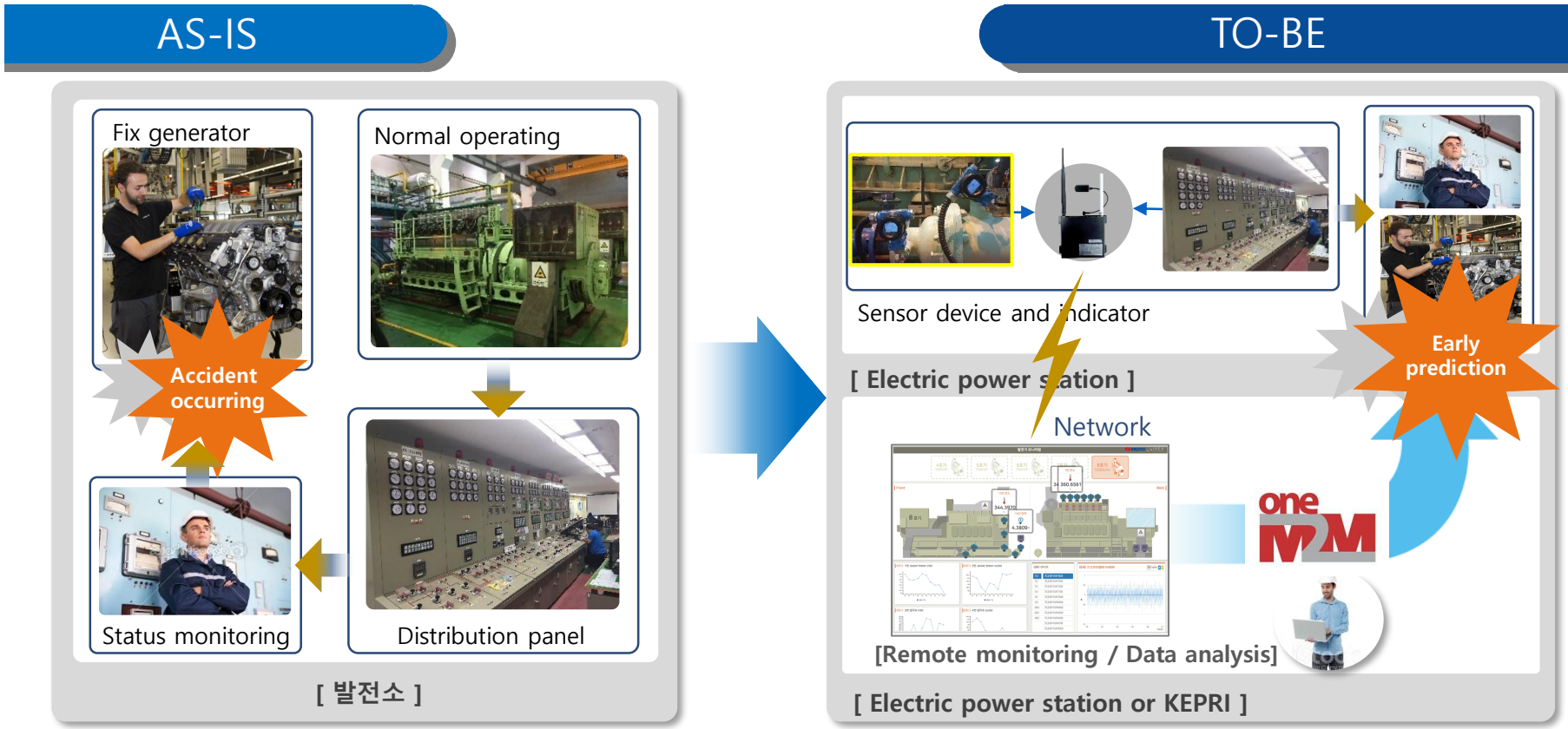
Ⅱ.4 Electric power field IoT service

KEPCO - Island area electric generator engine facility monitoring device

Pilot

Application Field

We have developed and delivered a complex sensor node for physical quantity and environmental monitoring of sensors in the island area, and sensor data collection. We provide the base materials necessary for stable power supply by remote transmission of various sensor data through iREXNET platform.



Electric power field IoT service

KEPCO - Electric transmission monitoring solution

Pilot

Application Field

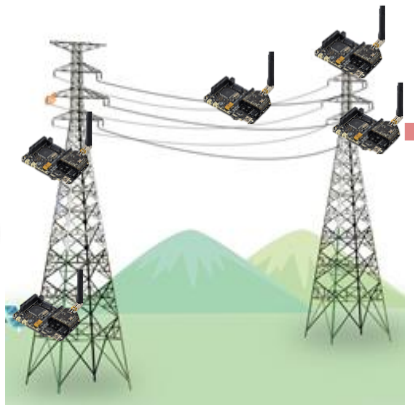
Prevention of disturbance occurrence is possible by capturing an anomalous signal of the transmission line in advance.

By standardizing the network functions of KEPCO, we are securing technologies that can guarantee the ease and scalability of power technology development.

Transmission line diagnosis status

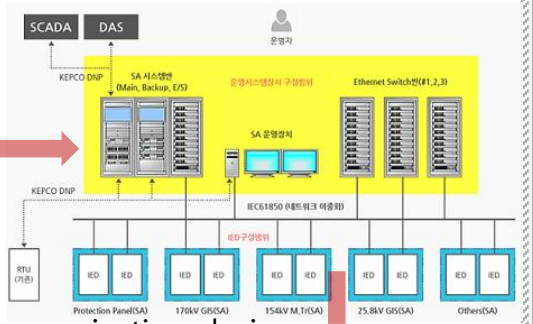
Insulator inspection work using electric field formula detector

Inspection using live insulator inspecting robot



Attach sensor device for always monitor

Gateway



Communication design

KEPCO IoT Platform

one M2M Global Standards for Machine to Machine & Internet of Things

Existing SCADA system

IoT based diagnosis system

IoT service for water resources

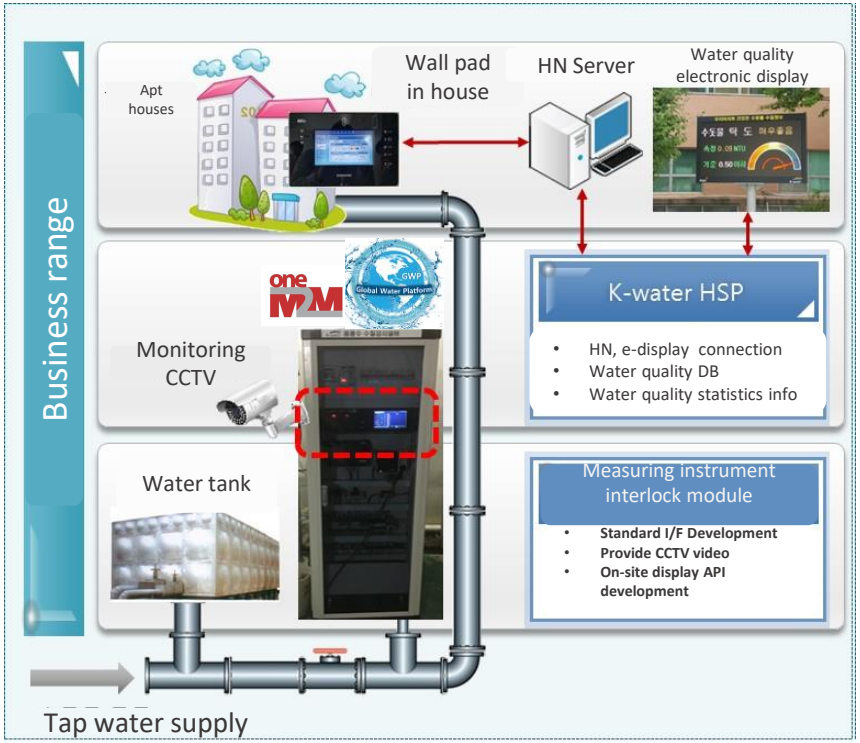
K-water - Multi-unit water quality information providing system

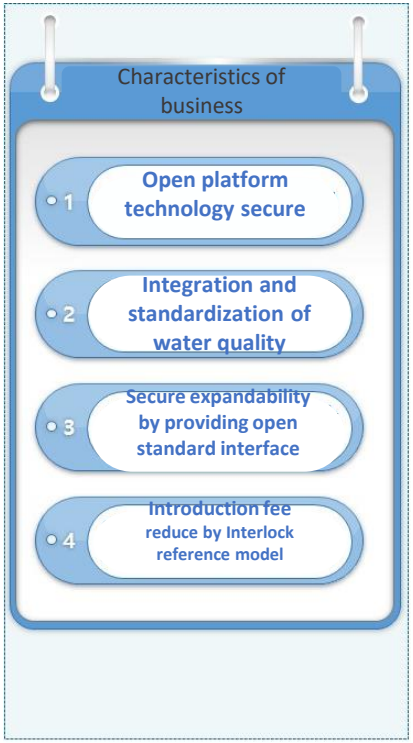
commercial

Application Field

It applies the home service platform (HSP) and server that can provide the water quality information of the drinking water to the tenant residing in the apartment house and accumulate the water quality information to provide big data service.
It is linked to the solution of existing apartment house home network company with oneM2M standard.

Overall system configuration diagram





IoT service for water resources

K-water - Water service AMI (Advanced Metering Infrastructure)

commercial

Application Field

It demonstrates an automatic meter reading system that wirelessly and automatically meters water usage.

Demand increases awareness of energy conservation by understanding and using energy information, and suppliers reduce deficit and increase work efficiency. In the future energy usage information can enable us to create new services.

Overall system configuration diagram

1	2	3	4
Digital meter	**Remote location department**	**The next generation IoT communication network**	**Data center(platform)**
Sends information of meter and sensing to the remote location department	Sends Information of meter and remote location department to mobile network base station	Collected information is transfered to the platform safely and quickly	Meter information management and analysis, usage reference & billing, check for meter fail and water leak

IoT service for water resources

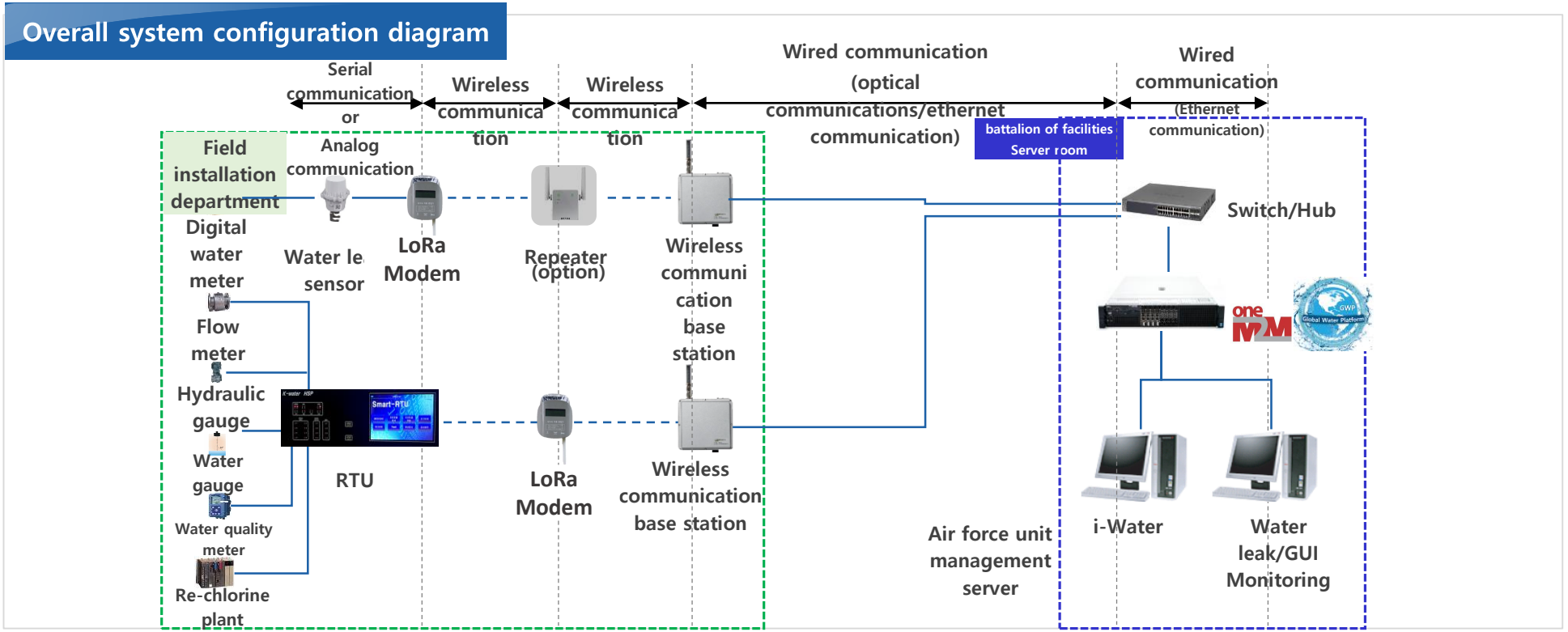
K-water - Smart water grid management

commercial

Application Field

K-water's platform for smart water management based on international standard oneM2M is a common platform for providing Internet common functions. K-water provides Common Data Governance for storing and managing data by integrating Well Define solutions operated by existing K-water. We have successfully completed the Smart Water Management Project of the Air Force Academy.

Overall system configuration diagram



Public Field IoT Service

KISTI- Build test-bed for atmospheric environment measurement

commercial

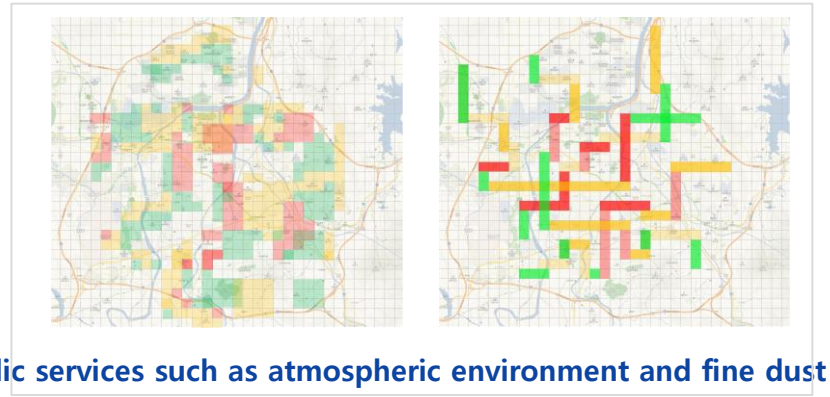
Application Field

It collects and accumulates real-time outdoor atmospheric environment status data by using mobile type atmosphere sensor and GPS.
Also it analyzes the atmospheric environment using collected data, and display real-time regional data by using monitoring system.

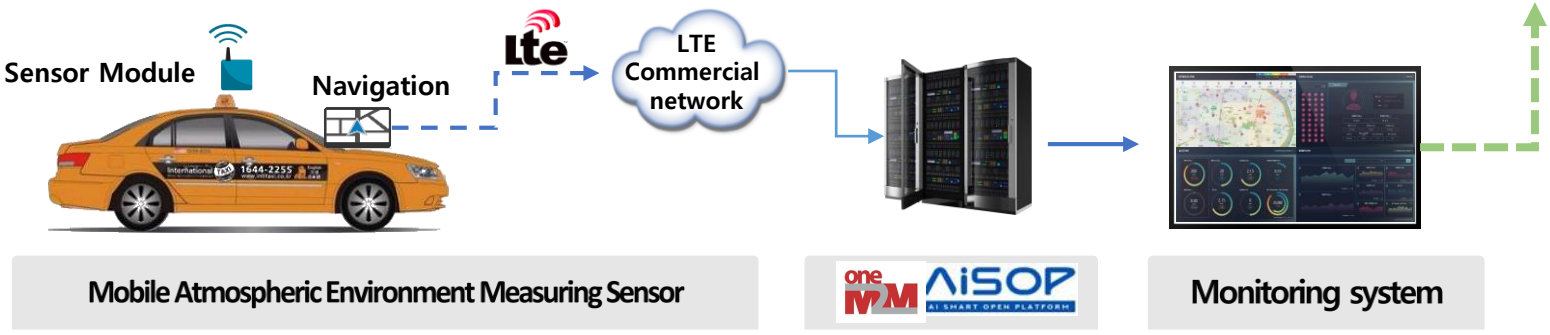
Whole system Composition

[Data collection]
6 atmospheric pollution sources & temperature and humidity

- PM2.5 (Ultrafine dust)
- CO (Carbon monoxide)
- PM10 (Fine dust)
- NO_2 (Nitrogen dioxide)
- O_3 (Ozone)
- SO_2 (Sulphur dioxide)
- Temperature & Humidity



Providing public services such as atmospheric environment and fine dust maps



Public Field IoT Service

Bus Station Air Quality Monitoring Service

Pilot

In order to minimize the public health damage caused by air pollution, measuring instrument is installed in the bus stop shelter to inform the surrounding air pollution information in real time.

Big Data Governance

- Fine dust data
- Air pollution policy
- Data-driven City policy
- To reduce CO2 gas emission

Improving Public Service

- Open information system
- Providing air pollution information

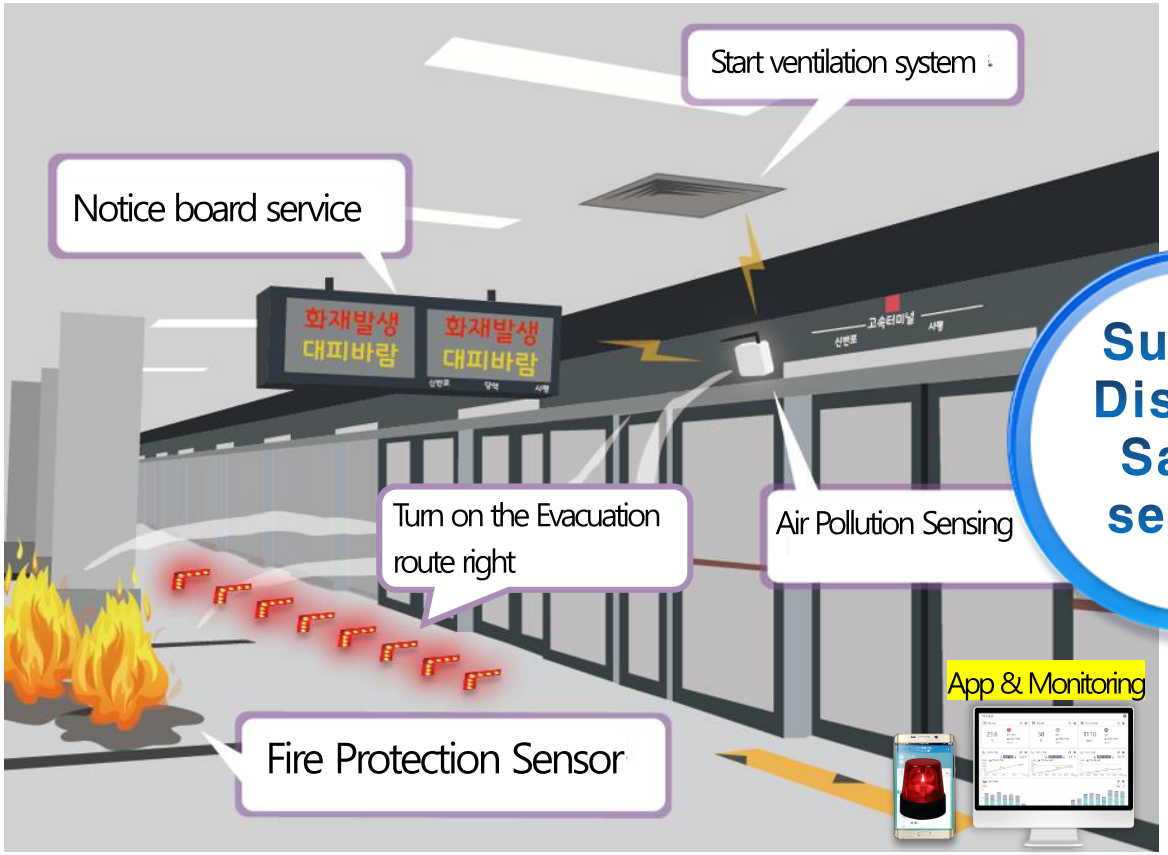
Public Field IoT Service

Subway fire prevention and alarm system

Pilot

Detecting fire signs and fires through changes in CO2 and temperature / humidity in the subway, changing the oxygen concentration, and sending information to the central control center, billboards, and disaster safety apps.

In case of emergency, fast evacuation can be secured to prevent human accidents in advance.



Subway Disaster Safety service

Improving subway atmosphere

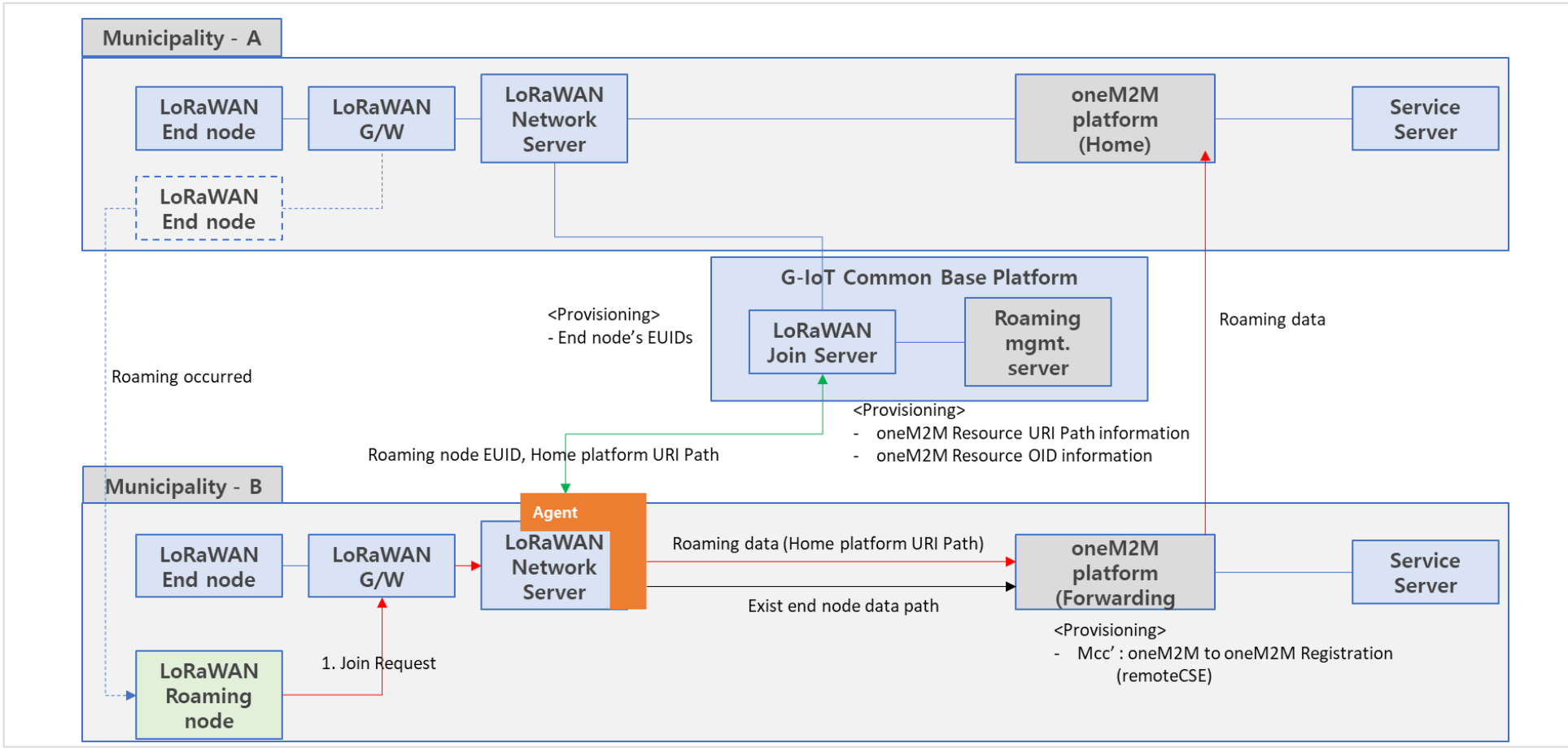
- Provide underground space air quality data by location, time, and date
- Intelligent Ventilation System for Air Quality Improvement

Fire Detection

- Induction of evacuation route by fire position by smart guidance
- Delivering real-time disaster safety information and prompting the agency to respond quickly

NIA- G-IoT Common Base Platform (oneM2M)

City-to-city data roaming must be possible. LoRaWAN's Join Server shall store the whole end node's EUID and Platform URI Path for Roaming in LoRaWAN Networks.



THANK YOU

If you have any questions, please contact me by email.
I will respond in detail.

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