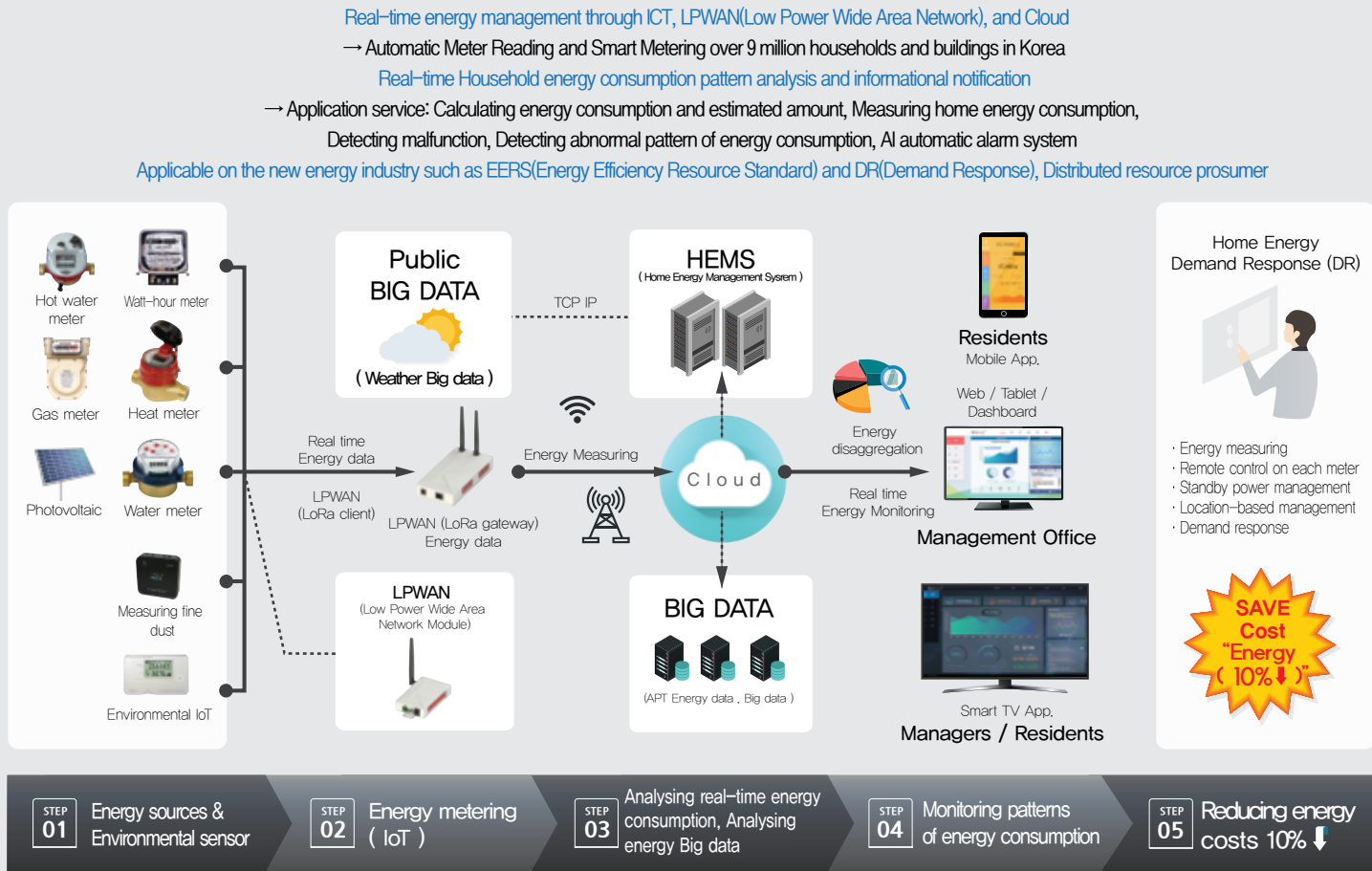




LPWAN H/W (LoRa)

Intellegent HEMS platform that shows real time data and insight on energy consumption

– with Big Data / Smart Grid / Smart Metering / HEMS (Home Energy Management System) / LoRa based IoT –



Energy consumers

User mobile App. Key Features

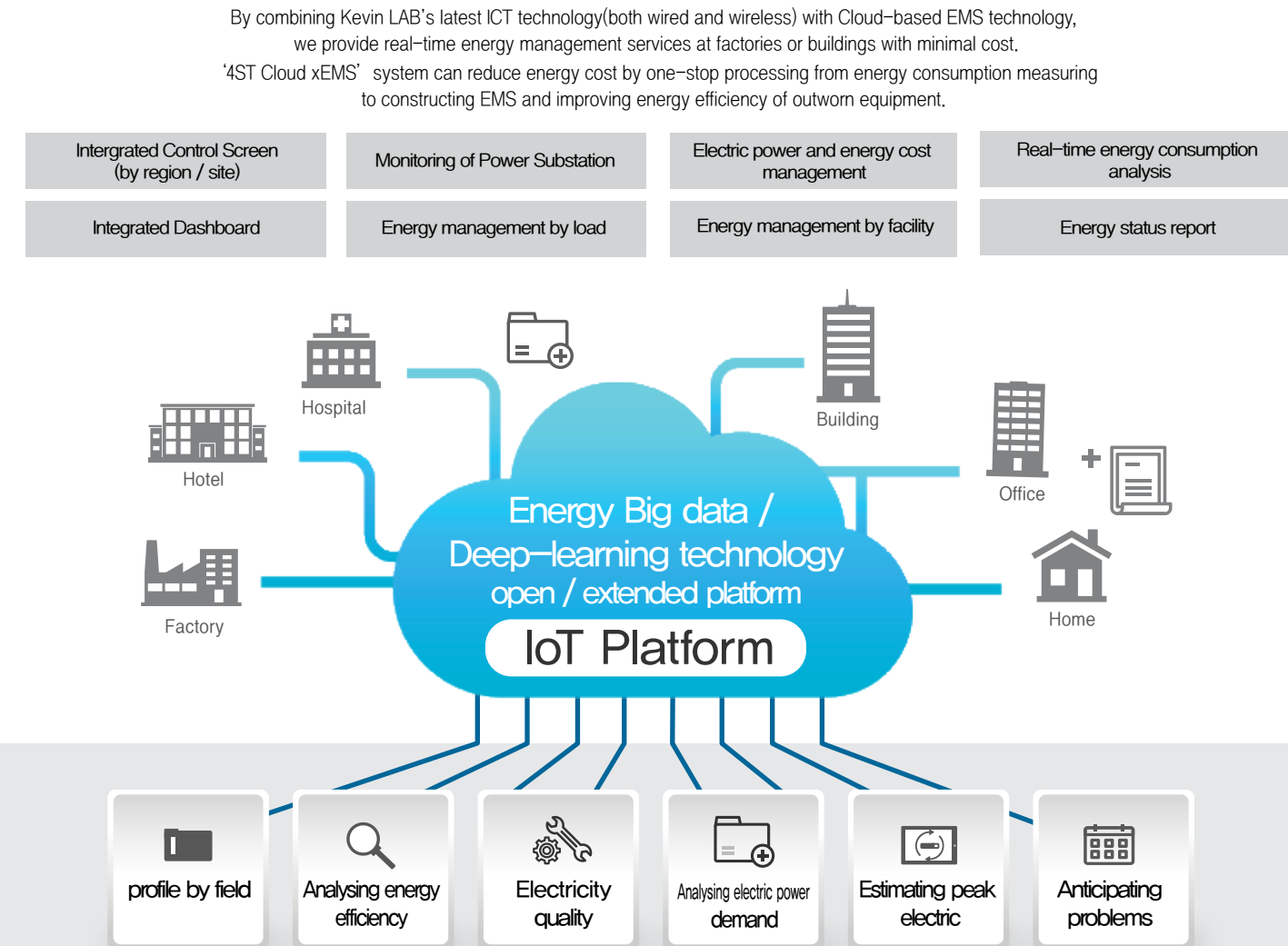
1. Real-time energy consumption information(estimated costs)
2. Detecting, analysing, and warning short circuit, water leak, or gas leak through AI
3. Detecting malfunction of meters (Watt-hour meter, Water meter, Gas meter, and Heat meter)
4. Warning in case progressive electricity billing system becomes applied
5. Comparing the amount of the energy consumption used in a house to the average level
6. Detecting abnormal energy consumption pattern through AI
7. Designing optimal energy consumption(costs)
8. Analysing energy consumption pattern through AI – designing energy consumption pattern inducing energy saving(for each user)
9. Giving information and statistics on energy consumption of the neighborhood through AI
10. Giving related information using various devices(fine dust sensor, thermometer, hygrometer, and fire alarm) by sharing API
11. Giving the app users opportunities to participate in Demand Response biz.

Managers

Manager EMS Key Features

1. Real-time energy consumption information(estimated costs)
2. Providing AMR(Automatic Meter Reading) solution
3. Information on malfunction of measuring equipment
4. Information on malfunction of meters
5. Sending messages to app users
6. Comparing the amount of the energy consumption by complex, building, or area
7. Detecting abnormal energy consumption pattern of app users through AI
8. Warning of short circuit, water leak, or gas leak and detecting the spots through AI
9. Information on energy saving through AI
10. Added IoT platform services(measuring fine dust level, fire alarm, door sensing, or emergency exit sensing)

Cloud-based factory and building EMS(Energy Management System) platform (FEMS / BEMS)



Cloud xEMS

IoT sensor wired/wireless device interworking

The latest wired/wireless communication method
Electric power IoT sensor interworking
Measuring electric power quality (separated measurement)
Gateway function
Local DB storage / Communication recovery function

Cloud xEMS

EMS using Cloud platform

- Minimizing initial development costs using Cloud platform
- Minimizing maintenance / management costs
- Providing stable services for 24-hours

Cloud xEMS

Real-time energy analysis using Big data

Analysing real-time energy consumption patterns and warning using a large amount of collected energy data (peak electric of main facilities and fee management)

Cloud xEMS

Supporting various Multi-device

- Real-time monitoring on multi-device such as smart phone, tablets, and PC (Anytime & Anywhere)

Cloud xEMS

Cloud xEMS Energy Platform

– xEMS focusing on energy consumers with rational price –

Kevin LAB, IoT integrated LPWAN (Client / Gateway / Repeater)

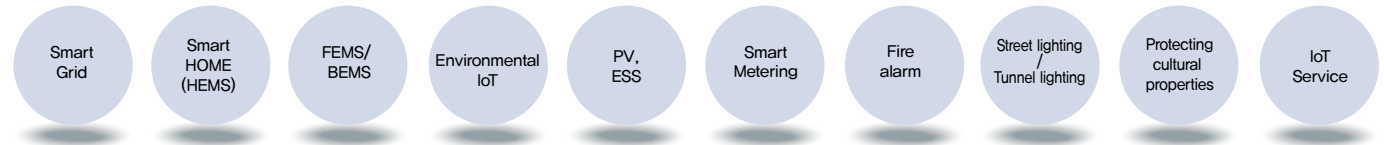
Features

- Configure as Client / Gateway (DCU) / Repeater IoT Device
- Private Network based , Minimum communication maintenance cost
- Real-time (within 10 minutes) 5 kinds of energy support (electric/water/gas/heat/hot water) AMI (Smart-Meter) link.
- Implementation of broadband wireless at least 1Km to up to 15km
- Gateway - 500 Client Device (Node) Accepted
- DC-PLC , RS-485 , and Ethernet interfaces (G/W)
- Support for interworking of distributed resources (Photovoltaic inverter) and IoT devices
- Temperature and humidity sensor interlock (external connection)
- LED status indicator (power, RF state, operating state)
- G/W mesh network support

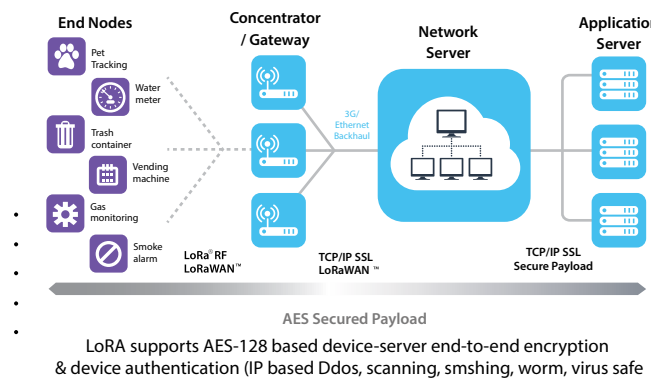
What is LORA LPWAN? (Low-Power Wide-Area Network)

LPWAN is low-power wide-area network connecting AMR and IoT End Device without complicated process that connects internet network and gateway used for smart-home system or AP.

Application



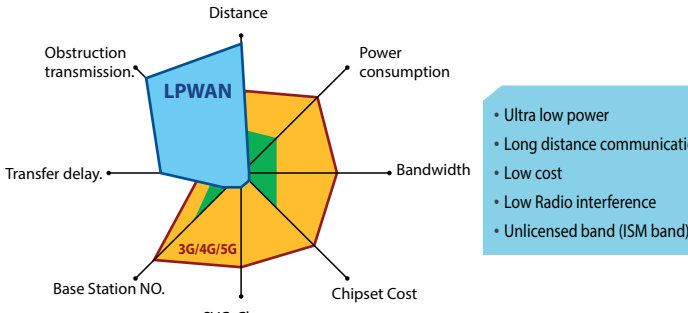
Network Architecture (Security)



LoRa WAN Architecture (Feature)

Application					• Network architecture • Communication range • Battery lifetime or low power • Robustness to interference • Network capacity (maximum number of nodes in a network) • Network security • One-way vs two-way communication • Variety of applications served
LoRa® MAC					
MAC option					
Class A (Baseline)	Class B (Baseline)	Class C (Baseline)			
LoRa® Modulation					
Regional ISM band					
EU 868	EU 433	US 915	AS 430	-	

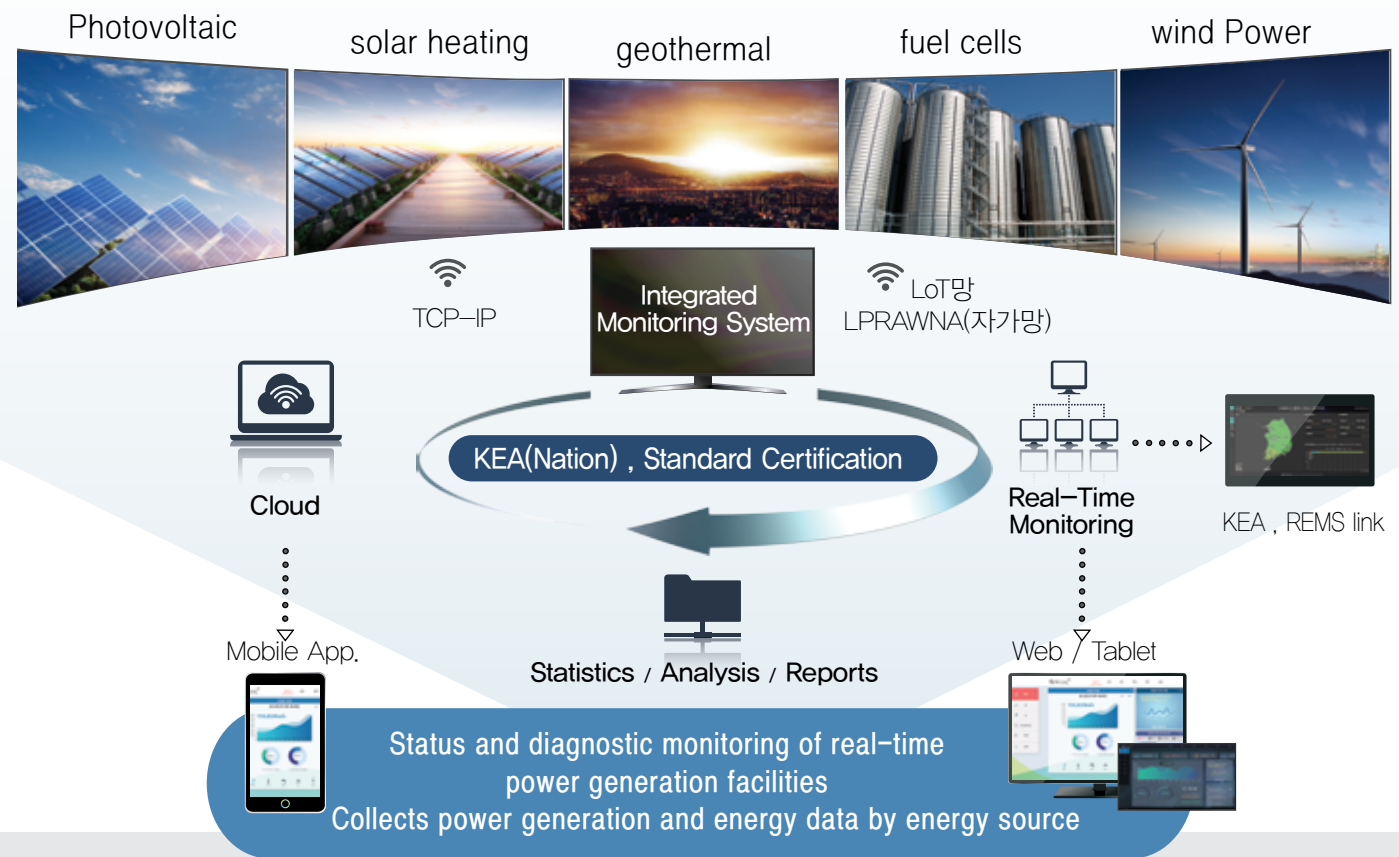
Feature



Comparing LPWAN Technology Options

Feature	LoRaWAN	Narrow-Band	LTE Cat-M	NB-LTE
Modulation	SS Chirp	QPSK / GFSK / BPSK	OFDMA	OFDMA
Rx bandwidth	500-125 KHz	100 Hz	20 Hz	20 KHz
Data Rate	100 bit/sec	100 bit/sec	10 Mbit/sec	200 kbps ~ 1 Mbps
Max. # Msgs/day	Unlimited	12/ 8 bytes Max	Unlimited	Unlimited
Max. # Output Power	20 dBm	UL: 140 mW/day	23-24 dBm	23 dBm
Link Budget	154 dB	151 dB	130 dB+	146 dB
Battery Lifetime	105 months	90 months	18 months	18 months
Power Efficiency	Very High	Very High	Low	Medium
Interference immunity	Very High	No	Medium	Low
Coexistence	Yes	No	Yes	No
Security	Yes	No	Yes	No
Mobility / Localization	Yes	Limited mobility	Mobility	Limited Mobility

Cloud-based New and Renewable Energy Integrated Monitoring System



"Real-time, anytime, anywhere monitoring with your smart phone"

Photovoltaic Monitoring Service for Users

1. Real-time monitoring of power generation and facility conditions
2. Power generation statistics and development / history check of disability
3. Real-time facility status check and simple A/S application
4. Power generation inquiry by energy source

"Integrated monitoring service for customer management maintenance"

Integrated monitoring service for administrators

1. Integrated management of customer information and installation information
2. Receiving applications, installing, and operating processes at once
3. Real-time monitoring of power generation status and facility conditions
4. Real-time facility status check and integrated customer A/S management
5. Convenient, Web-based interface

Remote Terminal Unit

Renewable Energy / Electricity measurement Monitoring RTU

Standard Certification of Korea Energy Agency (Nation)

Real-time monitoring of renewable energy generation

→ Standard Certification of Korea Energy Agency(Nation)

Simple and convenient maintenance

→ Remote diagnosis and monitoring / real-time maintenance

Store up to 2 years of power generation data

→ Supports external SD memory card 32G

Electricity and various external sensors multi-linkage

→ CT , Electricity Quality , Temperature , Sunlight etc Sensor

KVRTU-IPS10K