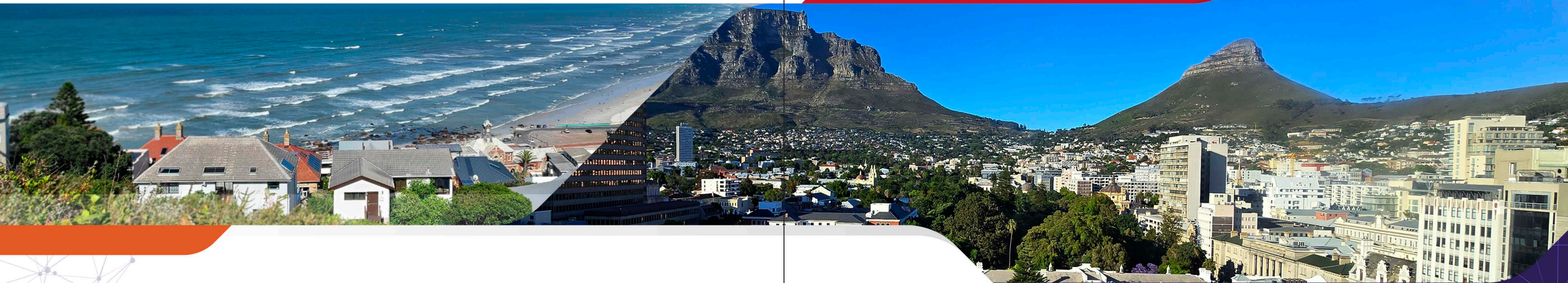


Pioneer TVWS Wireless Local
Network Market with Innovative
Devices, Charge-free Services,
Simple Installation and Operation

INNONENT

Innovative public IT
services for the world

Leads public IT services for a society for all



www.innonet.net



C-417, 11-gil, Beobwon-ro 7, Songpa-gu, Seoul, South Korea
TEL 02-406-8849 / FAX 02-3012-8101
E-mail sales@innonet.net
www.innonet.net





**Innovation That Only Dreaming INNUNET Can Achieve!
Dynamic and Fast-changing INNUNET Based on
Coexistence and Cooperation**

World where everyone is happy and enjoys life,
Only possible in a society where we live together

Innovation that overcomes limitations and breaks through,
Privilege that only people and companies with dreams can achieve

New world with innovative IT technology,
Possible with only team that we walks together as one family, holding
hands

Enriching the lives, increasing customer business value,
and changing the world !
These are true solution that Innonet pursues

INNUNET CO.,Ltd

Contents

ABOUT INNUNET 4

- 1. Company Overview
- 2. Competencies
- 3. History

Story 6

- 1. Vision
- 2. Mission
- 3. Performance
- 4. Interllectual Property
- 5. Unlicensed-band Technology

Main Product 10

- 1. Fixed TWWS Gateway
- 2. TWWS Backpack Wi-Fi
- 3. Smart Safety Devices
- 4. Backpack Relay Base station
- 5. Vehicle Base station
- 6. Broadcasting & Two-way Call
- 7. Renewable Energy
- 8. Gas Detector
- 9. BLE Bridge & Registration Device
- 10. IoT Services
- 11. Server

Service Network & Construct 19

- 1. Smart village Services
- 2. Telemedicine Services
- 3. Public Safety Services
- 4. Smart Construction/Mine Services
- 5. Youtube Live Streaming Services
- 6. Smart Delivery Services

Global Cooperation 24

1. Company Overview

Global Solution Supplier & Service Provider for TVWS Local Network

INNUNET, continuously conducting R&D based on TVWS, is leading provider in IT convergence service market, offering wireless charge-free networks for rural internet access in mountainous areas, public Wi-Fi, construction sites, emergency network for wildfires and urban areas, as well as underground and marine environments.



CEO	YOO HO SANG
Established	2011
Address	C-417, 11-gil, Beobwon-ro 7, Songpa-gu, Seoul, South Korea
TEL	(+82) 2-406-8849
FAX	(+82) 2-3012-8101
E-MAIL	sales@innonet.net
Homepage	www.innonet.net

2. Competencies

Charge-free, unlicensed-band TVWS technology

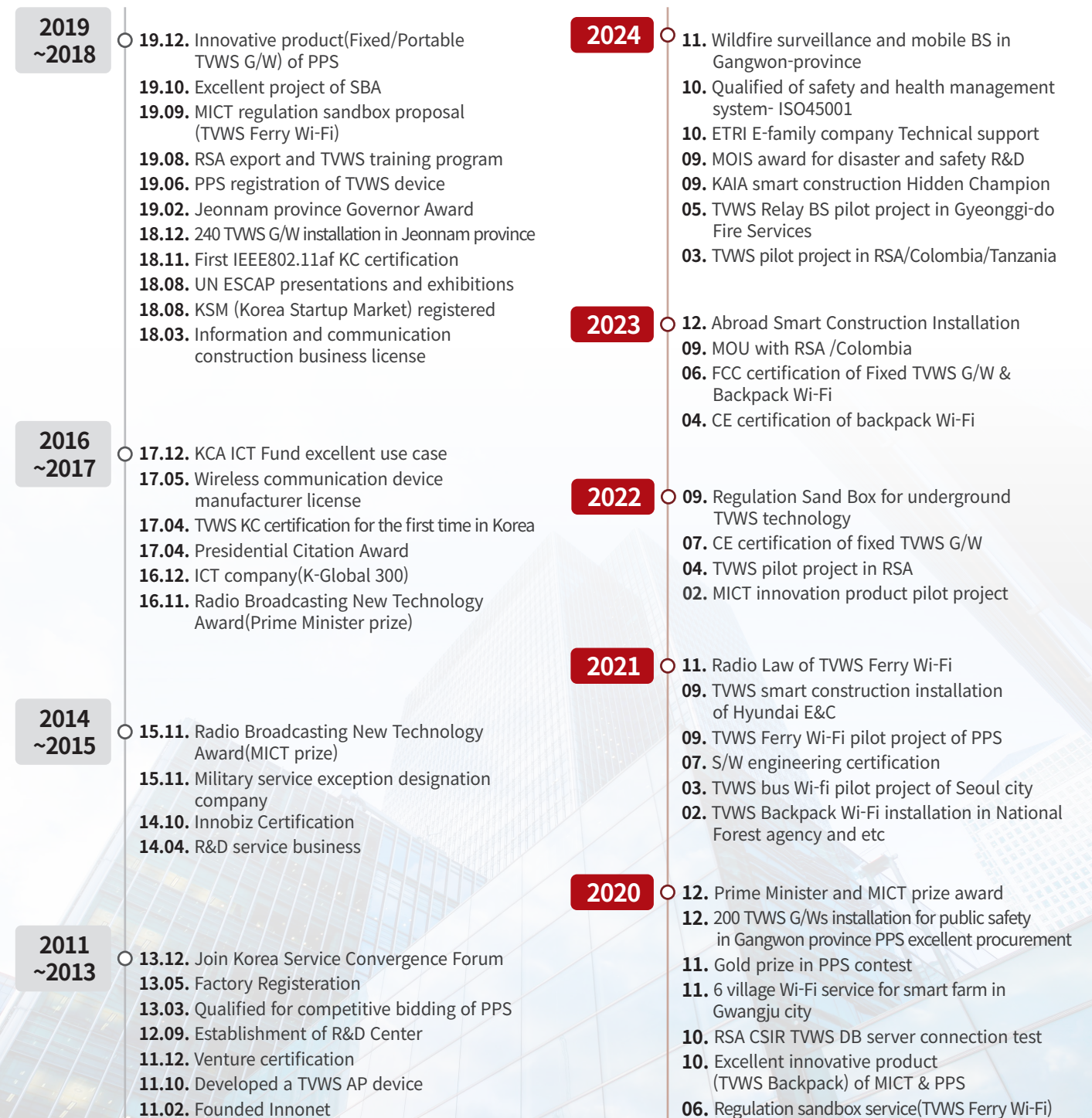
over 30 patents, the company provides diverse telecommunication and IoT service platforms. Its products and technology are verified by government agencies, municipalities, large corporations, and public institutions, supporting growth and expansion through partnerships and adaptation across various environments.



3. History

INNUNET Providing New Value & Chance

Established in 2011, Innonet prioritizes customer satisfaction through the development of patent-based "First No. 1" products, reasonable prices, and thorough quality management.



1. Vision



Convergence through Innovation Networks

Bridging the IT Gap between Urban and Rural Areas and Across Economic Levels,
Realizing a Society of Coexistence through IT Welfare and Public Safety Services



Providing R&D and Services that Transform Human Lives by Bridging the Information Gap and Realizing a Safe Society

Actively Engaging in Global Problem-Solving through Innovative Collaboration and R&D, Striving to Build a Sustainable Society

2. Management Ideology

Customs Satisfaction Management

- Prioritizing trust with customers by ensuring on-time product delivery
- Delivering customized products with no customer complaints

Creative Talent Management

- Employees are the company's most valuable asset
- Fostering talented individuals capable of self-questioning and overcoming their own limits

Limitless Challenge Management

- Challenging and innovative research and development
- Thorough quality management through standardized ERP-based processes

Innovative Technology for the Future

- Innovative Technology Development for a World of Coexistence
- Valuable Technology Development and Investment
- Differentiated Technology Development Based on Patents

Technology for Happiness and Safety

- Technology Development for People's Safety and Happiness
- A Company that Protects and Realizes People's Dreams

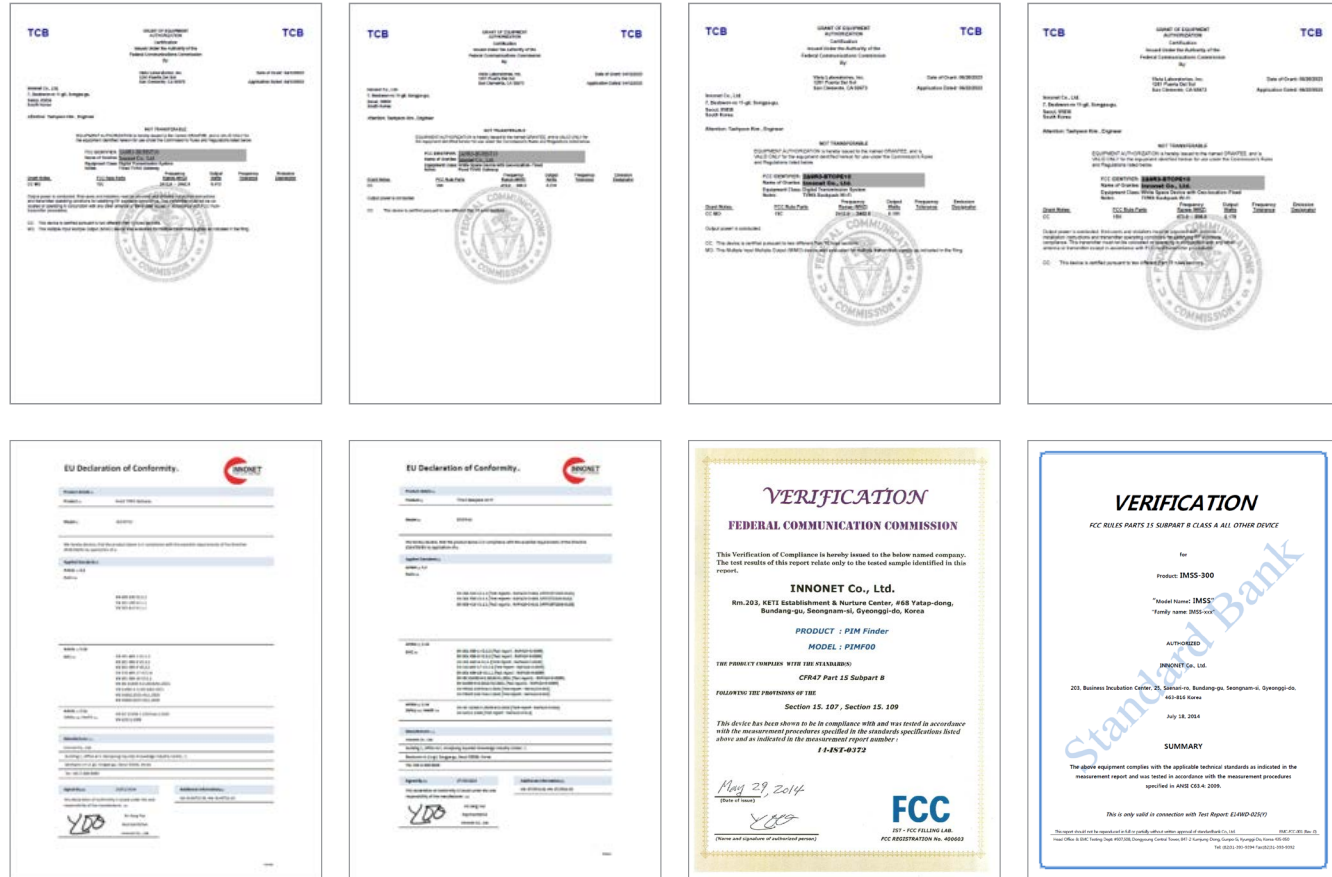
Human-Centered Technology that Unites the world

- Human-Centered Technology Development that Bridges the IT Gap between Urban and Rural Areas, and Between Rich and Poor, Enabling All People to Connect and Communicate as One

3. Performance



3. Performance



4. Patent



Domestic Patent

[10-1136994-00-00]

[10-1265779-00-00]

[10-1343066-00-00]

[10-1558306-00-00]

[10-1565599-00-00]

[10-1577630-00-00]

[10-1587766-00-00]

[10-1690239-00-00]

[10-1751786-00-00]

[10-1839968-00-00]

[10-1861522-00-00]

[10-1949709-00-00]

[10-2131338-00-00]

[10-2105693-00-00]

[10-1823293-00-00]

[10-1920486-00-00]

[10-1937251-00-00]

[10-2631820-00-00]

[10-2598037-00-00]

- SYSTEM AND METHOD FOR DETECTING THE LOCATION AND AMPLITUDE OF PASSIVE INTER-MODULATION DISTORTION SIGNAL IN PASSIVE COMPONENT
- DEVICE AND METHOD FOR REDUCING ELECTRIC POWER CONSUMPTION OF RF COMMUNICATION SYSTEM IN MULTI-BAND MOBILE COMMUNICATION SERVICE ENVIRONMENT
- SYSTEM FOR TRANSMITTING MULTIPLE MULTI-INPUT MULTI-OUTPUT SIGNAL BY REMOVING PASSIVE INTERMODULATION SIGNAL OF MOBILE COMMUNICATION FEED CABLE
- Apparatus and method for power efficient multi-hop multi-carrier TWWS backhaul system
- TV system to eliminate interference signals
- TV system to eliminate interference signals and the operation method
- TERMINAL TEMPERATURE MONITORING SYSTEM and TERMINAL TEMPERATURE DETECTING DEVICE OF POWER FACILITY
- Device and method for TV white space wireless transceiver
- TERMINAL TEMPERATURE MONITORING SYSTEM and TERMINAL TEMPERATURE DETECTING DEVICE OF POWER FACILITY
- Mobile TWWS Apparatus and Operation Method thereof
- Wireless Backhaul Apparatus using Mobile TWWS for Bus Communication Network and Operation Method thereof
- Missing person searching system using VHF and UHF wireless backhaul based Drone with camera and mobile communication base station
- High-speed wireless network system using TWWS
- COMMUNICATION SYSTEM PROVIDING RECEIVING AND TRANSMITTING SIGNALS BY USING TV WHITE SPACE FREQUENCY BAND
- Backpack Type VHF/UHF TWWS Backhaul-based LTE Mobile Base Station capable of Self-Operation Wireless Network and Group/Private Communication
- DUAL WIRELESS BACKHAUL SYSTEM
- Video Monitoring System using TWWS
- CONTROL METHOD OF COMMUNICATION SYSTEM USING TWWS DIRECTIONAL ANTENNA
- WIRELESS BACKHAUL SYSTEM USING TWWS FOR INDOOR AND UNDERGROUND TUNNELS WHERE GPS RECEPTION IS NOT AVAILABLE

Abroad Patent

[US 9,998,900 B1]

[3324554]

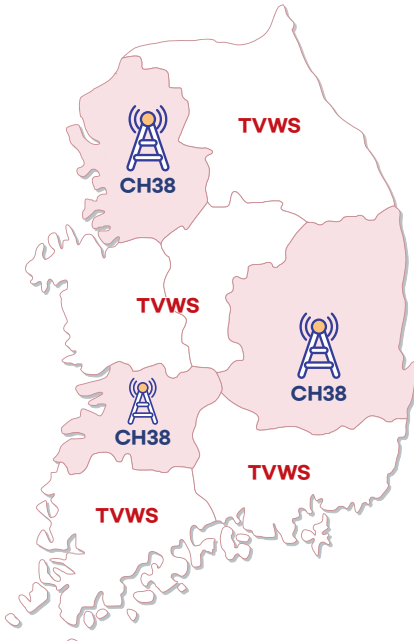
[201680041722.9]

[2020-03328]

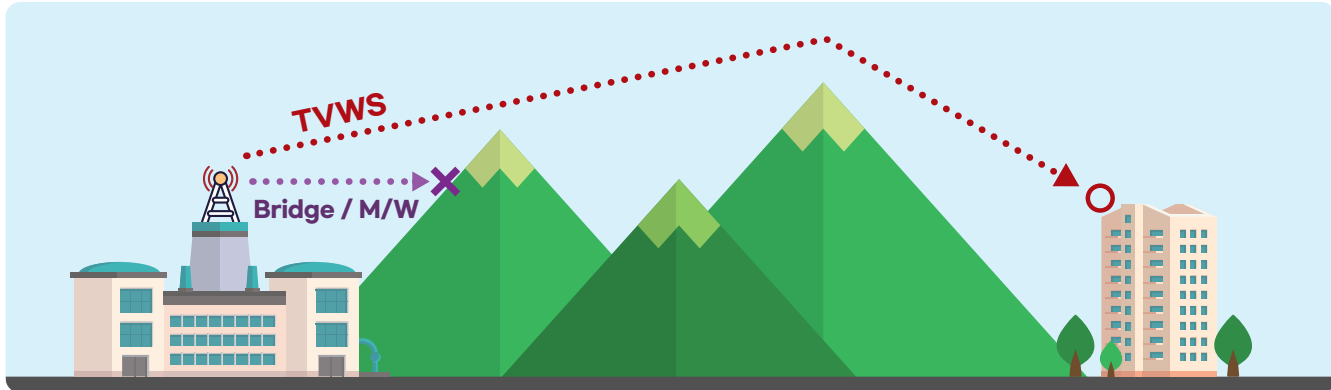
- USA : BACKPACK-TYPE MOBILE BASE STATION SYSTEM AND METHOD BASED ON TWWS AND SATELLITE BACKHAUL
- EUROPE : BACKPACK-TYPE MOBILE BASE STATION SYSTEM AND METHOD BASED ON TWWS AND SATELLITE BACKHAUL
- CHINA : BACKPACK-TYPE MOBILE BASE STATION SYSTEM AND METHOD BASED ON TWWS AND SATELLITE BACKHAUL
- REPUBLIC OF SOUTH AFRICA : BUS COMMUNICATION NETWORK WIRELESS BACKHAUL SYSTEM USING MOBILE TWWS AND OPERATING METHOD THEREOF

5. Unlicensed band technology

TVWS(TV White Space) : Temporally/spatially empty channel in the broadcast band



- Unlicensed area
- Frequency : 470~698MHz(UHF)
- Standard : IEEE802.11af & 22
- Technology : Fixed & Portable TVWS
- Available channels : TVWS DB Server Access



Item	Wi-Fi Bridge	Microwave	TV White Space
Frequency	2.4 GHz or 5 GHz	> 6 GHz	470 ~ 698 MHz
maximum service range	> 5 km	> 20 ~ 30 km	> 13 km
Beemwidth	About 5~7 degree	About 1~3degree	About 40~50degree
point-to-point NLOS	X	X	O
Guard Interval	0.8us (250m)	-	6us (1,800m)
Throughput	50~100 Mbps	50~1000 Mbps	26Mbps
Wi-Fi interference	O	X	X
Weather influence	O	O	X
Application	LOS(line-of-sight), Fxed object	LOS(line-of-sight), Fixed object	LOS/NLOS, Fixed/Portable object

1. Fixed TVWS Gateway



Item	Content
Model	BUHST10(UHF), BVHST10(VHF), BUPST10(Portable)
Frequency	174 ~ 154MHz(VHF), 470 ~ 698MHz(UHF)
Output(dBm)	27dBm ~ 17dBm(Fixed), 20dBm ~ 17dBm(Portable)
Antenna	Sector, Yagi, Patch, Omni
Standard	IEEE802.11af
TVWS Receiver	-98dBm/CH, LNA Bypass, 8-band Filter
Mode	AP or Client
OS	Open-WRT
Management	Web-UI, NMS server
Network link	WAN @ AP Mode
Service	Wi-Fi, Ethernet, BLE, LoRa, USB, RS-485
Encryption	N.I.S CC Certified or Military KCMVP
Installation	Fixed pole or Wall-mounted
Power Supply	AC220V or 110V(AC to DC Adaptor)
IP rating	IP65
Operating temperature	-30°C ~ 60°C

2. TVWS Backpack Wi-Fi



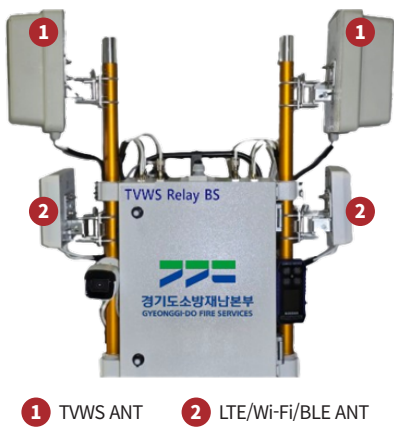
Item	Content
Model	BTCPE10
Frequency	470 ~ 698MHz
Output(dBm)	27dBm
Antenna	Sector, Yagi1 Patch, Omni
Standard	IEEE802.11af
TVWS Receiver	-98dBm/CH, LNA Bypass, 8-band Filter
Mode	AP or Client
OS	Open-WRT
Management	Web-UI, NMS server
Network link	5GHz Bridge or WAN @ AP Mode
Service	Wi-Fi, Ethernet, RS-485
Encryption	N.I.S CC Certified or Military KCMVP
Battery	More than 24 hours, Li-ion
Installation type	Backpack or Carrier
Power Supply	AC220V or AC110V, Remote Monitoring
IP rating	IP65
Operating temperature	-20°C ~ 50°C

3. Smart Safety Device



Item	Content
Model	BFEGD10 / BMEGD10
Camera	4M pixel, PTZ, 150m IR
Broadcast	Broadcast, Two-way Communication
Wi-Fi/BLE	2.4 GHz, BLE(Indoor location and access)
Gas Detector	Fixed type (O2, CO, H2S, LEL -etc)
TVWS	27dBm, -98dBm/CH, LNA Bypass
TVWS Mode	AP or Client
Network link	WAN @ AP Mode
Service	Wi-Fi, UTP, BLE, LoRa, USB, RS-485
Management	Web-UI, NMS server
Alarm	Warning lamp
Encryption	N.I.S CC Certified or Military KCMVP
Battery	More than 8 hours, Li-ion
Installation type	Wall-mounted or Carrier
Power Supply	AC220V or AC110V, Remote Monitoring
IP rating	IP65
Operating temperature	-20°C ~ 50°C

4. TVWS Backpack Relay BS



Item	Content
Model	BTRBS10
TVWS Frequency	470 ~ 698MHz @ Link & Service
TVWS Output	27dBm @ Link & Service
TVWS Antenna	Patch @ Link & Service
TVWS Standard	IEEE802.11af @ Link & Service
TVWS Receiver	-98dBm/CH, LNA Bypass, 8-band Filter
TVWS Mode	AP @ Service & Client @ Link
LTE	1.8GHz, 2x2 MIMO, 64Channel concurrent call
Wi-Fi/BLE	2.4GHz, BLE(Indoor location and access)
Antenna	TVWS(Patch), LTE/Wi-Fi/BLE(Patch)
Service	Camera, GAS
Battery	More than 8 hours, Li-ion
Installation type	Backpack or Carrier
Power Supply	AC220V or AC110V
IP rating	IP65
Operating temperature	-20°C ~ 50°C

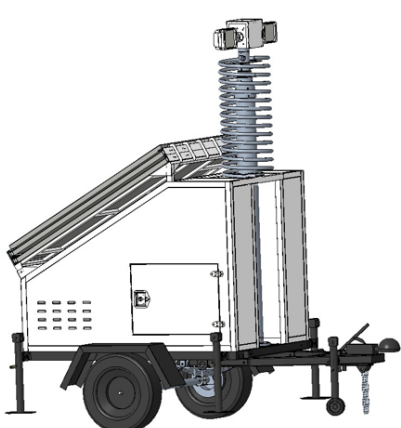
5. Vehicle Mobile Base Station



Firetruck Mobile Base Station



Portable Mobile Base Station



Trailer Mobile Base Station

Item	Content
Model	BVTBS10
Light	120W*2pcs, 25200lm
Rotator Range	Horizontal : 380°, Vertical : 330°
Height Range	228mm ~ 1200mm / Truck Rooftop
TVWS Standard	27dBm, -98dBm/CH, LNA Bypass
TVWS Mode	AP or Client
Wi-Fi Standard	802.11n
LTE	1.8GHz, 2x2 MIMO, 64Channel concurrent call
Power	AC 220V
Installation	Internal and External
IP Rating	IP65
Operating temperature	-20°C ~ 50°C

Item	Content
Model	BVTBS20
Rotator Range	Horizontal : 0 ~ 350°, Vertical : ±35°
Height Range	580mm ~ 1600mm
TVWS Standard	27dBm, -98dBm/CH, LNA Bypass
LTE	1.8GHz, 2x2 MIMO, 64Channel concurrent call
Power	AC 220V, Solar, Battery
Installation	Modular
Operating temperature	-20°C ~ 50°C

Item	Content
Model	BVTBS30
Light	120W*2pcs, 25200lm
Rotator Range	Horizontal : 380°, Vertical : 180°
Height Range	2.6m ~ 7.5m
TVWS Standard	27dBm, -98dBm/CH, LNA Bypass
TVWS Mode	AP or Client
Wi-Fi Standard	802.11n
LTE	1.8GHz, 2x2 MIMO, 64Channel concurrent call
Power	AC 220V, Solar, Battery
Installation	EU 7pin, 2 inch Coupler ball
IP Rating	IP65
Operating temperature	-20°C ~ 50°C

6. Broadcast & Two-way Talk



Item	Content
IP Speaker	(Bi-Directional) Speaker, Two-way Talk Alert&Broadcast switch
Intercom	Broadcast & Two-way Talk
APP	Android, Broadcast & Two-way Talk
Voice server	Centos 7.9(PBX In Cloud)
Protocol	SIP 2.0, TCP/IP, UDP, DHCP
Rerated Power	50W
Max Power	100W
Power Supply	DC 12V
Frequency response	120Hz-16KHz
Size	680*330*330 mm
Weight	5.4 kg
IP rating	IP65
Operating temperature	-20°C ~ 50°C

7. Renewable Energy



Item	Content
Solar Panel	310W(1.65*1m), 480W(2.2*1m) etc
Wind Turbine	300Wh etc
Battery	Lithium-ion(24V, 880Wh) LiFePo4(24V, 1280Wh)
Hybrid Inverter	Input: AC220V, Solar PV Battery Charging Output: 24Vdc Load Output: 220Vac Remote real-time monitoring Operating Temp: -25°C ~ 55°C
Wind-Solar Controller	Input: Solar PV, Wind Turbine Battery Charging Output: 24Vdc Load Output: 24Vdc Remote real-time monitoring Operating Temp: -20°C ~ 50°C
Solar Controller	Input: Solar PV Battery Charging Output: 24Vdc Load Output: 24Vdc Remote real-time monitoring Operating Temp: -30°C ~ 60°C

8. Gas Detector



Item	Content
Model	MFMGD10
Maximum Gases	1 ~ 4
Gas Sampling	Flow-Through
Gas Type	CO, CO2, NO, NO2, CH4, H2S, O2 etc
Resolution	0.01ppm / 1ppm / 1% vol / 1%LEL
Communicate	RS-485
IP Rating	IP65
Operating temperature	-20°C ~ 50°C
Power	DC 24V

Item	Content	
Model	MPMGD10	MPSGS10
Maximum Gases	6	4
Gas Sampling	Pump Suction	Natural Diffusion
Gas Type	CO, CO2, NO, NO2, CH4, H2S, O2 etc	
Resolution	0.01ppm / 1ppm / 1% vol / 1%LEL	
Communicate	USB 2.0	
IP Rating	IP65	
Operating temperature	-10°C ~ 50°C	
Power	USB Type-C DC 5V	USB Type-B Micro DC 5V

9. BLE Bridge & BLE Registration Device



Item	Content	
Model	IBBRG10	IBBRD10
Wi-Fi Standard	802.11b/g/n 2.4GHz	None
BLE Standard	Bluetooth 5.0	Bluetooth 5.0
Power Consumption	1W	1W
Power	AC 220V	USB Type-C / DC 5V
Installation	Wall-mounted	Stand Alone
IP Rating	IP65	IP65
Operating temperature	-20°C ~ 60°C	-20°C ~ 50°C

10. IoT



BLE Beacon Tag



BLE Smart Watch



Smart Farm Tag



Livestock Tracking Tag



Solar GPS Tracking & Temp-Humidity Logging Tag

BLE Beacon Tag

Item	Content
Product	BLE Beacon Tag
Function	Periodic Beacon Transmission Emergency Button
Battery Life	3.7 Year

BLE Smart Watch

Item	Content
Product	BLE Smart Watch
Function	Heart Rate, Blood Pressure, Body Temp Emergency Button etc
Battery Life	Charging

Smart Farm Tag

Item	Content
Product	Smart Farm Tag
Function	PH, Temp-Humidity, Air Quality etc
Battery Life	Charging

Livestock Tracking Tag

Item	Content
Product	Smart Livestock Tag
Function	Periodic Beacon Transmission
Battery Life	2 Year

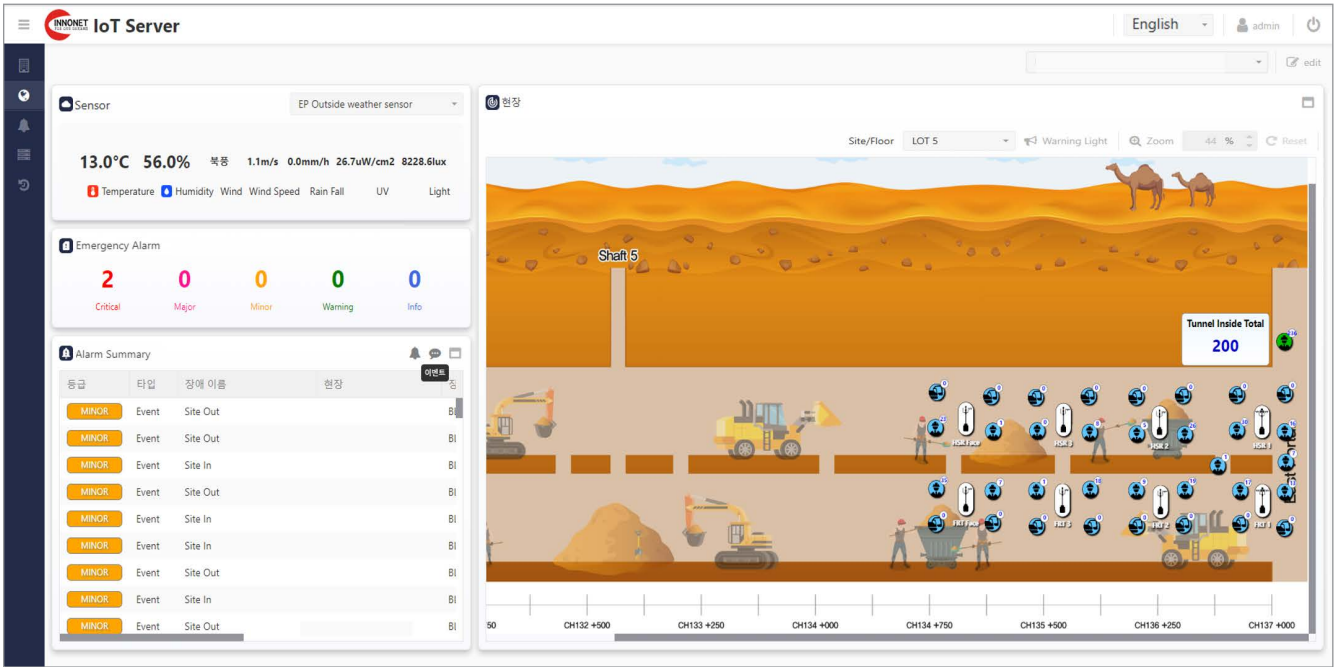
Solar GPS Tracking & Temp-Humidity Logging Tag

Item	Content
Product	Smart Delivery Tag
Function	GPS, Temp-Humidity Logging
Battery Life	Solar and Battery

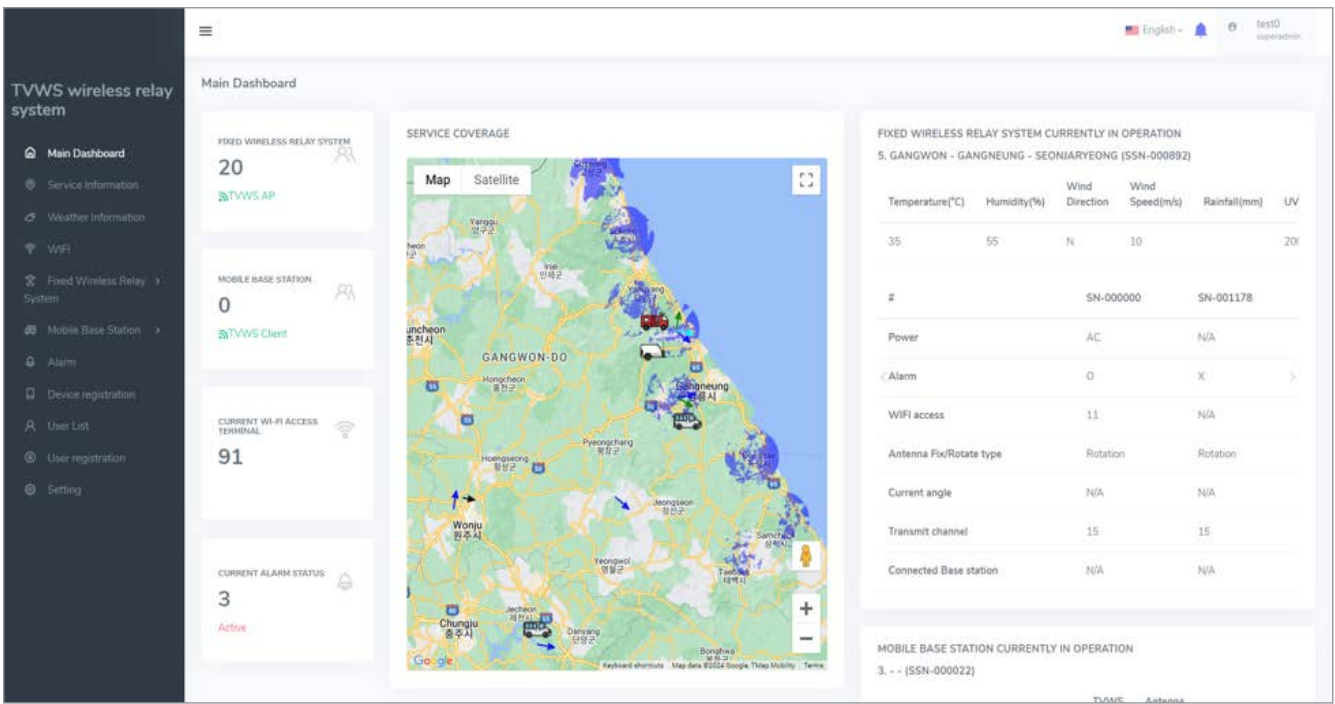
11. Server



- Smart Safety Construction Server(OS: Ubuntu24.04 , Entrant location tracking and logging, Gas & Weather IoT sensor data monitoring, Active Warning light and Automatically ringing by IoT server alarm, Checking Extrusion Rate)



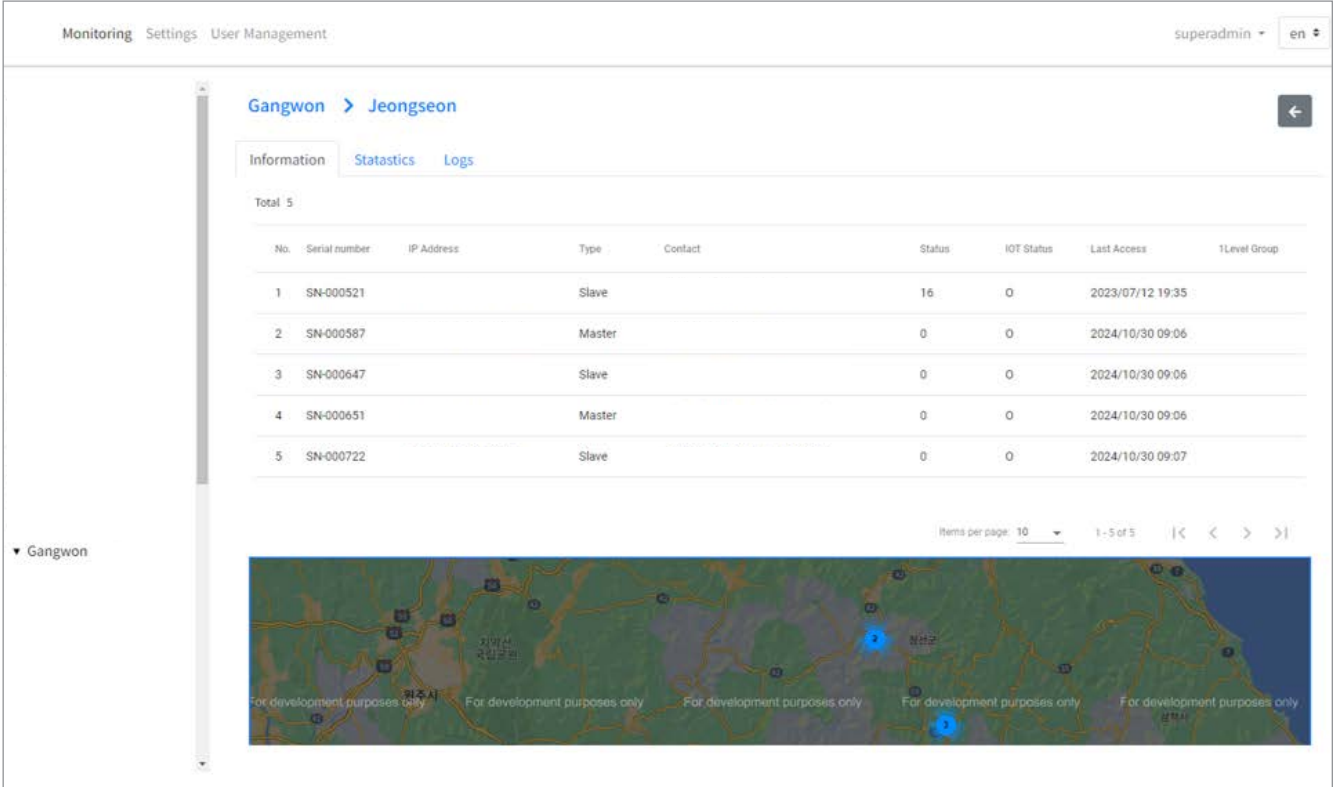
- Optimization Server (OS: CentOS7.9, AP & Client device location tracking , Monitoring service Area, Wi-Fi access count monitoring, Optimal channel allocation according to interference table, IoT Sensor data Monitoring, Alarm)



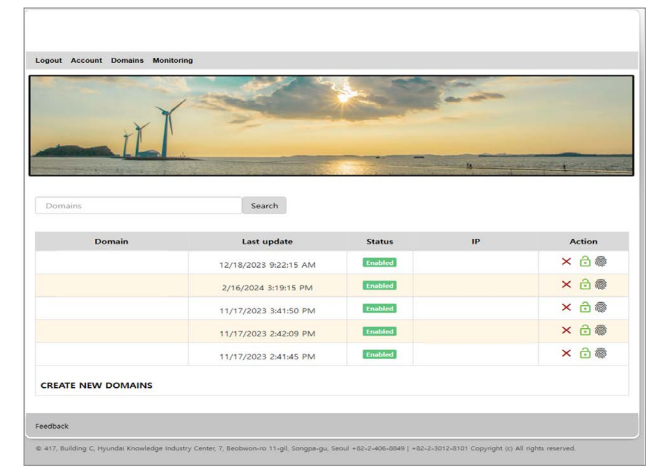
11. Server



- NMS server (OS: CentOS7.9, Gateway device status monitoring, Gateway device repair history upload and checking, Alarm occurrence statistics monitoring)



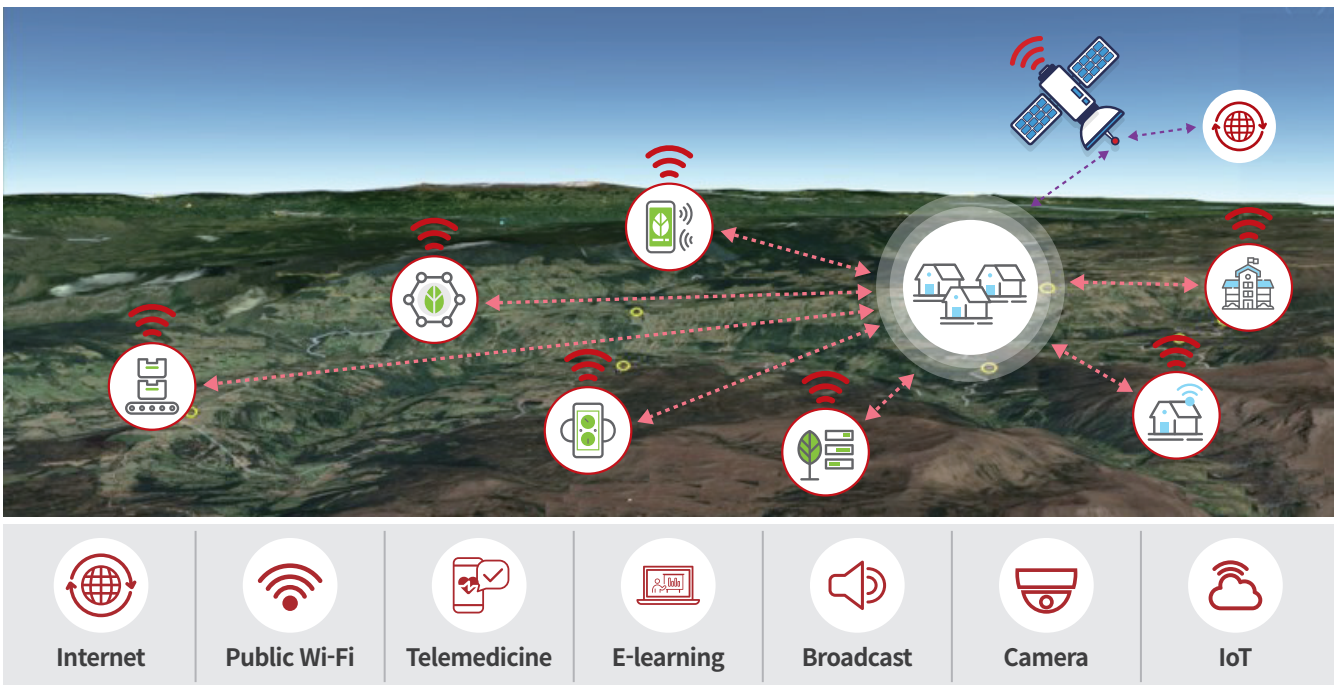
- DDNS Server (OS: Window Server 2019 Essentials, DDNS, Monitoring whether the domain's TCP port can be connected using PING and HTTP methods)



- NVR server(Camera video monitoring, Automatic recording of camera video at specified time)



1. Smart Village Service



UN SDGs

Reduced Inequality

Provide public Wi-Fi without communication charges to villages/schools/farms/livestock farms in mountainous areas based on wireless local networks without communication charges, thereby eliminating the information gap between urban and rural areas and between the rich and poor

Good Health and Well-being

Ensuring a healthy life through non-face-to-face medical services using digital healthcare technology, pharmaceutical & refrigerated/frozen food delivery management service in mountainous and rural areas

No Poverty

A vibrant and challenging society with high productivity based on the Internet of Things, security cameras, and activation of the village broadcasting community

Quality Education

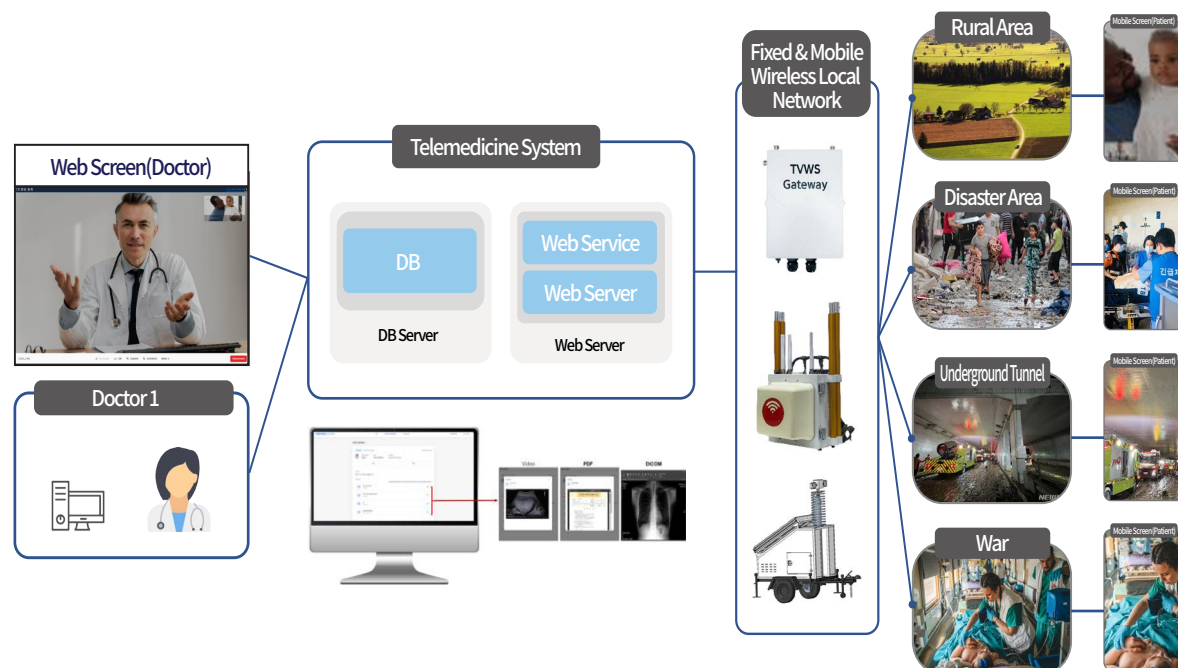
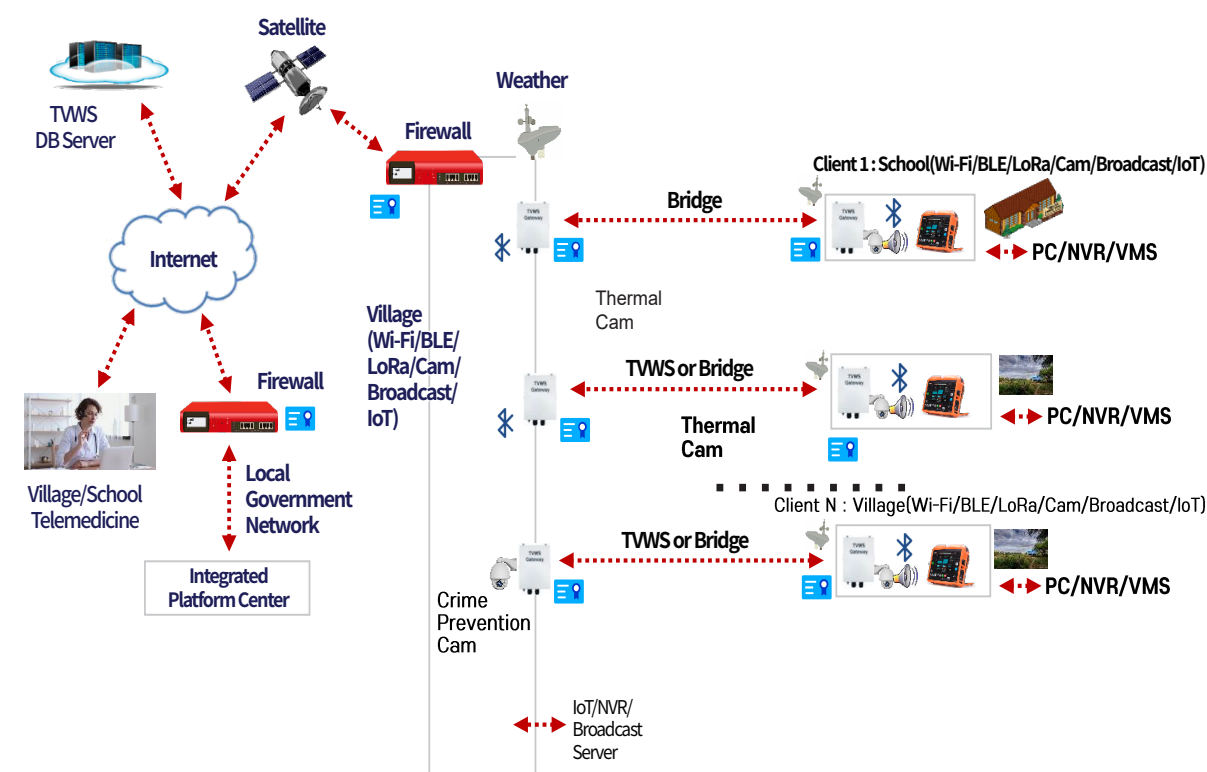
Providing fair opportunities for students to challenge themselves by providing Internet services, and providing lifelong learning for residents, change and innovation that will enable them to survive in the 21st century

Low-Orbit Satellite	• Downlink : approx. 100Mbps, Uplink: approx. 10Mbps • Affected by weather, not support port forwarding, fixed location
Wireless local Network	• 5GHz Wireless Bridge: approx. 100Mbps, UHF TVWS: approx. 26Mbps • Point-to-Point Communication: 1:1 ~ 1:3 • Wi-Fi AP & Repeater: 2.4GHz • Service Interface: Wi-Fi, LAN, USB, BLE, LoRa, RS-485
Telemedicine	• Remote telemedicine via PC/Smartphone, Target: Residents, Women, Students, Children, etc. • Regular/Emergency medical consultations in remote mountain regions
E-Learning	• Providing infrastructure for school e-learning, using after-school e-learning services
Broadcasting	• Village/School outdoor broadcasting, two-way communication, unified emergency response
Camera	• Real-time monitoring for security, wildfire monitoring, disaster safety, farms, schools, etc.
IoT	• Weather, BLE (pharmaceutical/food delivery, farm animals, etc.), LoRa (remote inspection, etc.)

2. Telemedicine



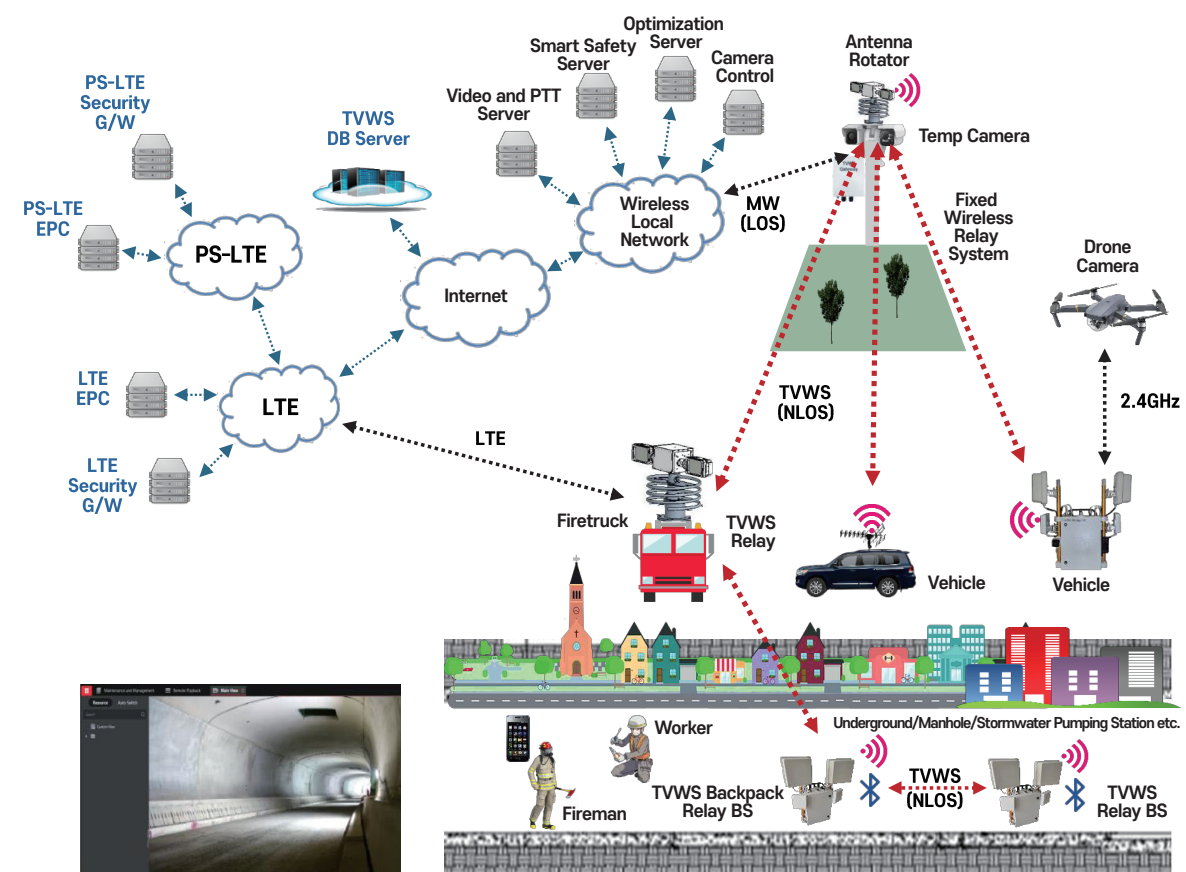
- Web and Mobile Video Consultation Interface for Smart Village
- Remote medical consultation service for village residents and school students.



3. Public Safety Service



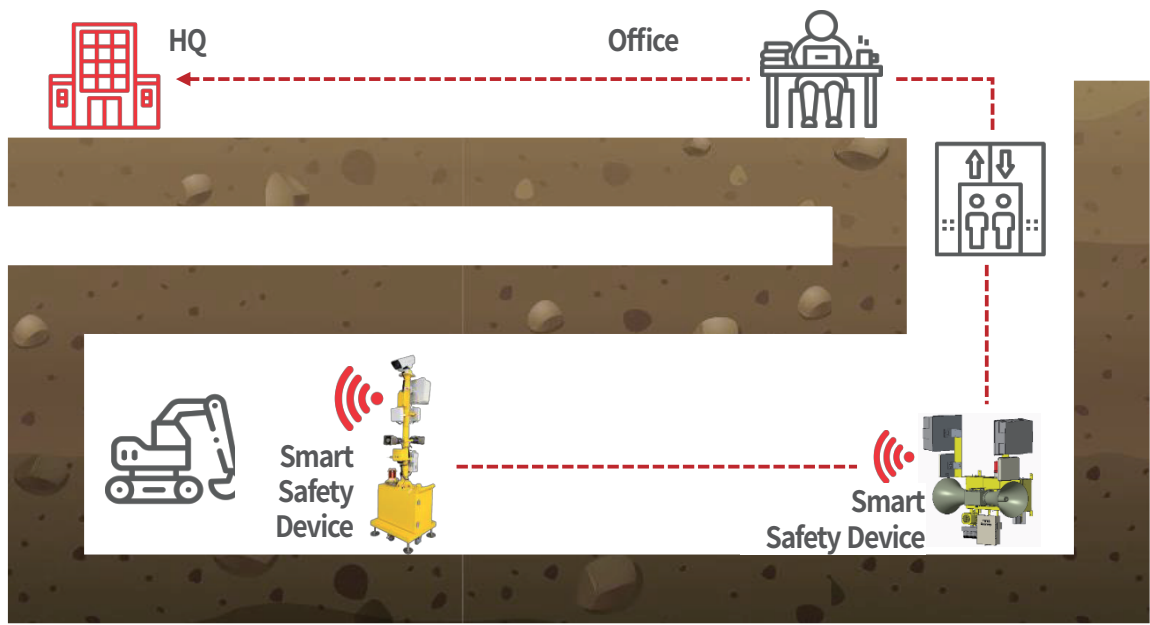
- Install a fixed wireless relay system on mountains near urban (rural) areas to monitor wildfires, fires, and disasters in real-time using thermal imaging cameras.
- Provide emergency communication (LTE/PS-LTE/Wi-Fi) for above-ground and underground spaces (e.g., mines), and real-time monitoring of firefighters' location, cameras, and gas levels underground.
- Operate a wireless local network and transmit drone camera footage in case of major disasters (e.g., earthquakes) that disrupt fiber optic internet networks.



4. Smart Construction/Mining Services



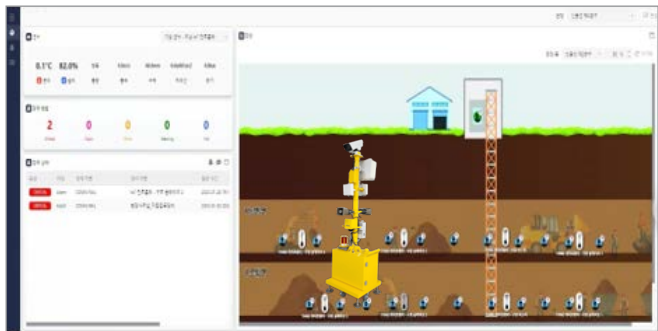
- Wi-Fi/Camera/Broadcasting/Two-Way Communication/Wi-Fi Walkie-Talkie services based on TVWS backhaul in underground tunnel construction sites and mines.
- Internet of Things (IoT) services for monitoring gas, air quality, power, location and access of workers/vehicles within the tunnel, and smart devices such as smartwatches.



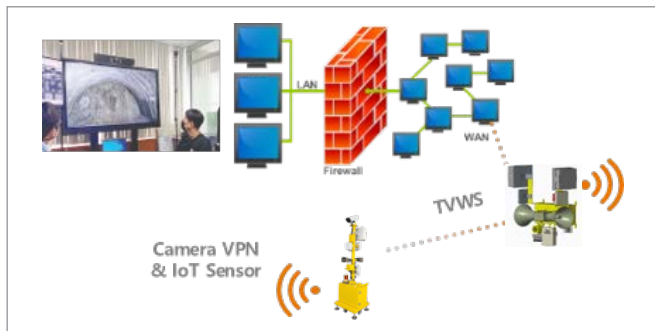
Integrated Platform



Camera & IoT & Robot

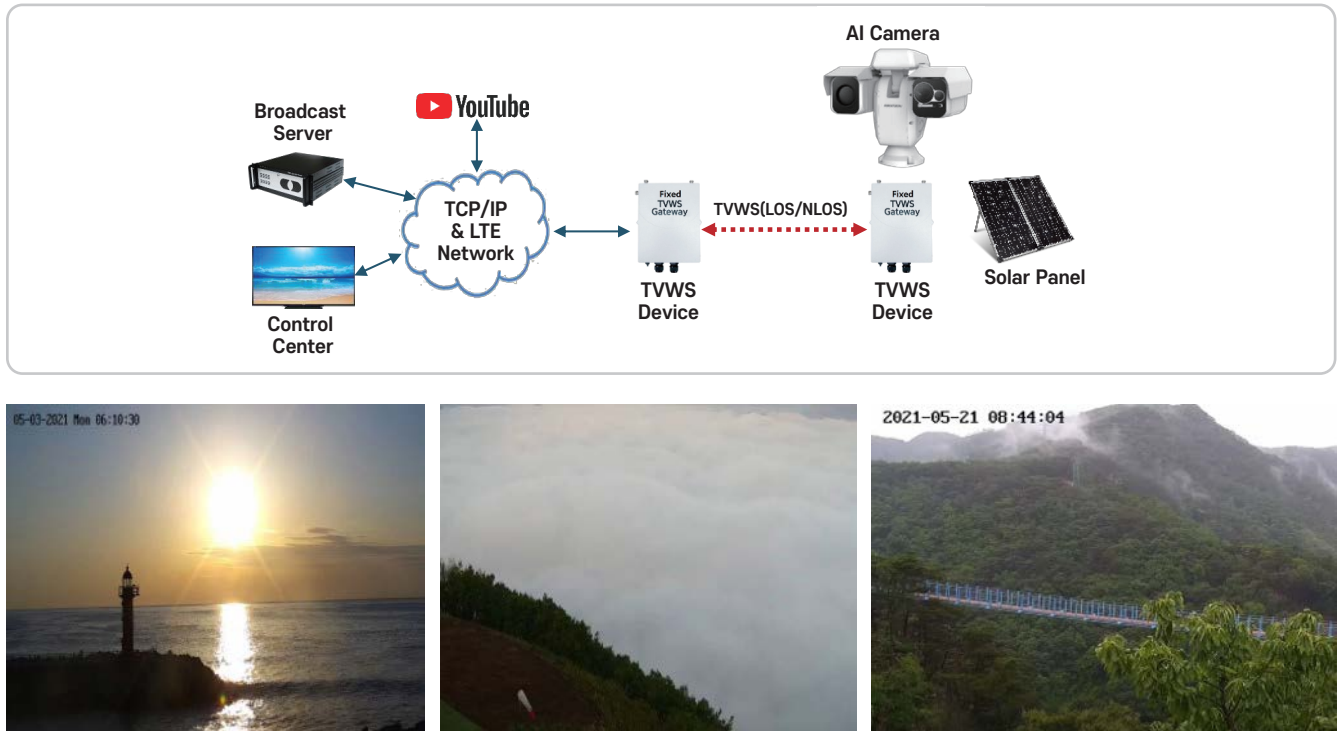


Worker Management



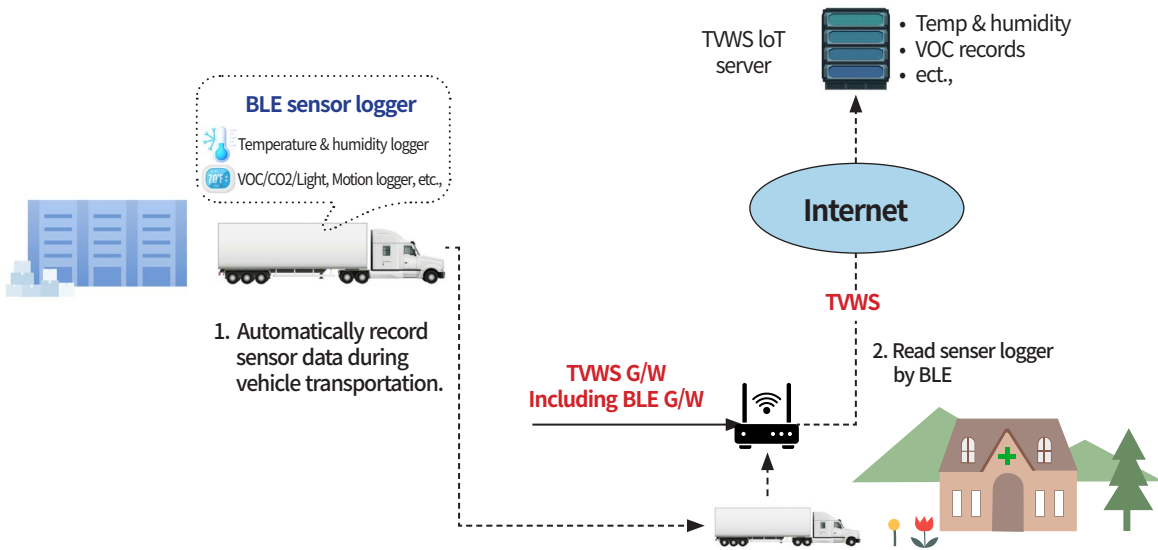
Security & Emergency Call

5. YouTube Live Streaming Service

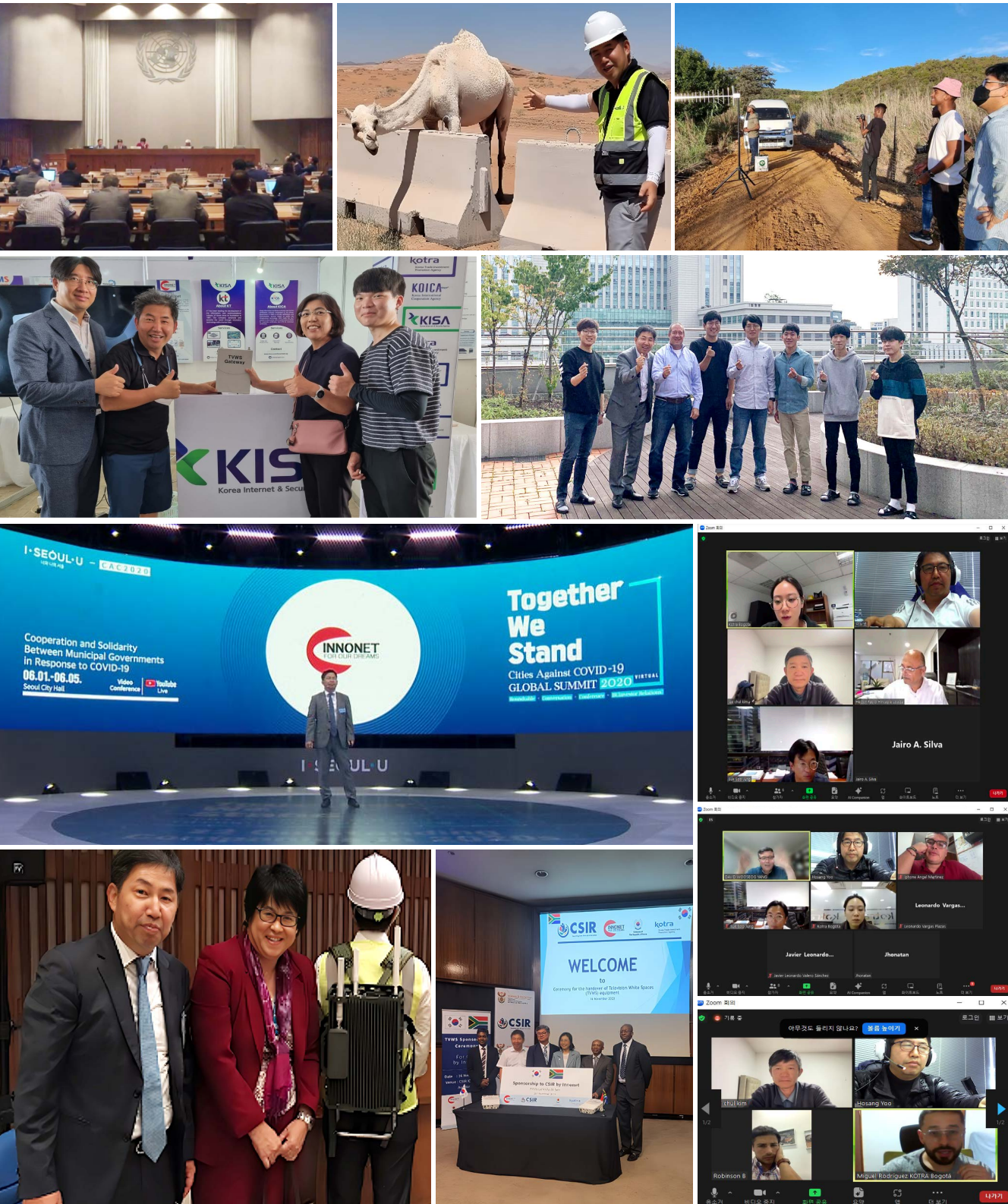


6. Smart Delivery Service

- Install a BLE sensor logger (GPS, temperature, and humidity) in the vehicle to record GPS coordinates and temperature/humidity data while the vehicle is in motion.
- Store logger data on the TVWS IoT server from regions where the TVWS gateway is installed.
- Use the data stored on the TVWS IoT server to verify proper management.



Global Cooperation



Knowing limits with new challenges and changes,
Developing new market convergence services of TWWS

“First”
“No. 1” Company



INNONENT Co., Ltd.

GLOBAL NETWORKING

HUMAN TECHNOLOGY

