

Manhole Monitoring Service

over LoRa Network

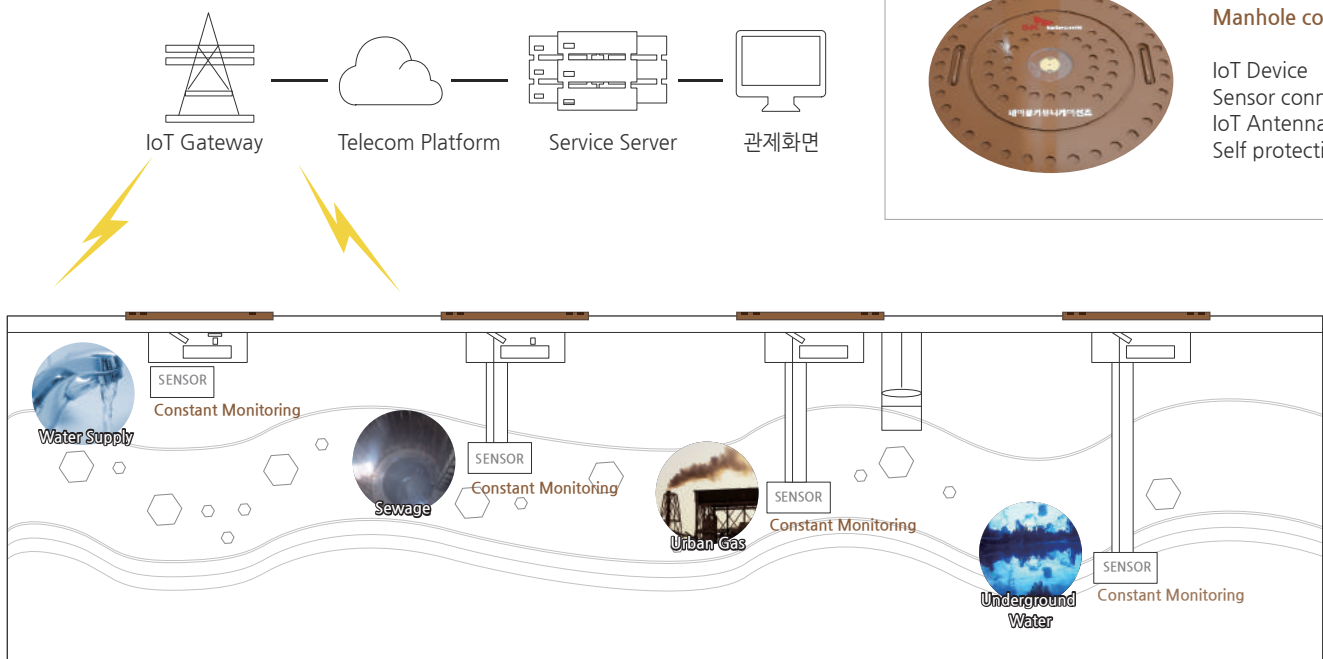
Service Overview

Service through Manhole cover connected to various sensors underground that reports the status of the underground facilities over IoT network to enable efficient monitoring and management

Requirements

- There are many kinds of underground facilities that need maintenance by huge human efforts.
- Workers for such maintenance are exposed to various dangerous factors and environments.
- Remote and automated monitoring system is required to reduce the cost and danger of the human powered maintenance.
- Manhole covers connected to various sensors underground can establish the safe and efficient monitoring system of underground facilities.
- No change in the current manhole structure to avoid unnecessary investment

Service Architecture



Service Advantages

Low Maintenance Cost



- Cheaper cost compared to human monitoring and inspection
- Prevention of potential damage by advance monitoring

Improved Maintenance Efficiency



- Easy planning of countermeasure by understanding the situation before maintenance
- Convenient adjustment of priority of several levels of maintenance and restoration

Improved Management Efficiency



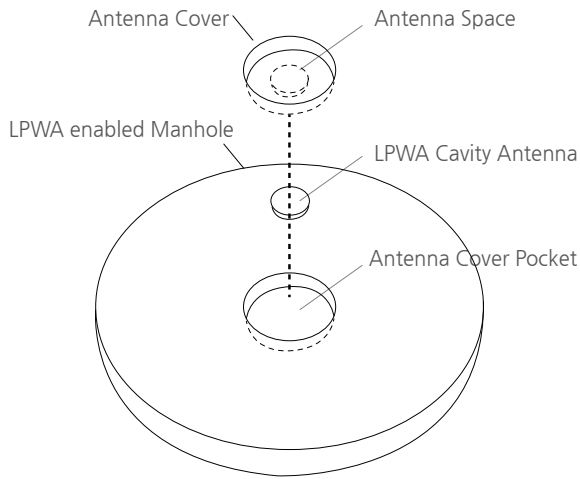
- 24x7 remote monitoring
- Real-time monitoring for organized countermeasure

Applicable to various industry

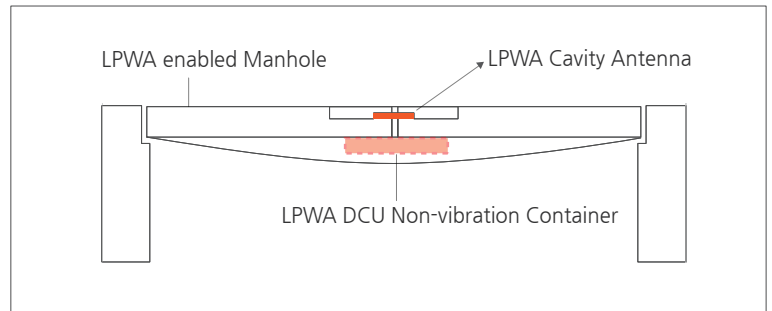


- Underground facility monitoring without changes in the existing manhole structure
- Numerous use cases (Example: water supply, sewage, gas pipe, telecom cable, environment management, etc.)

Manhole Cover Structure (example)



LPWA enabled Manhole with buried type Antenna



※ DCU : Data Concentrator Unit

Monitoring System (example)

The screenshot shows the 'LoRa Manhole' monitoring system interface. It includes a map view of a city area with manhole locations marked. A data table is visible with columns for 'No.', 'Name', 'Status', 'Temperature', 'Humidity', 'Gas', 'Pressure', 'pH', 'DO', 'TSS', 'NH4-N', 'NO3-N', 'COD', 'BOD', 'SS', 'Turbidity', 'Conductivity', 'Resistivity', 'Salinity', 'Total Hardness', 'Calcium Hardness', 'Magnesium Hardness', 'Total Solids', 'Dissolved Solids', 'Total Suspended Solids', 'Total Dissolved Solids', 'Total Soluble Solids', 'Total Insoluble Solids', 'Total Volatile Solids', 'Total Fixed Solids', 'Total Organic Solids', 'Total Inorganic Solids', 'Total Acid Soluble Solids', 'Total Alkaline Solids', 'Total Acid Insoluble Solids', 'Total Alkaline Insoluble Solids', 'Total Acid Soluble Solids', 'Total Alkaline Solids', 'Total Acid Insoluble Solids', 'Total Alkaline Insoluble Solids'. A temperature graph shows a reading of 26.6°C and a historical trend from Sep '15 to Nov '15.