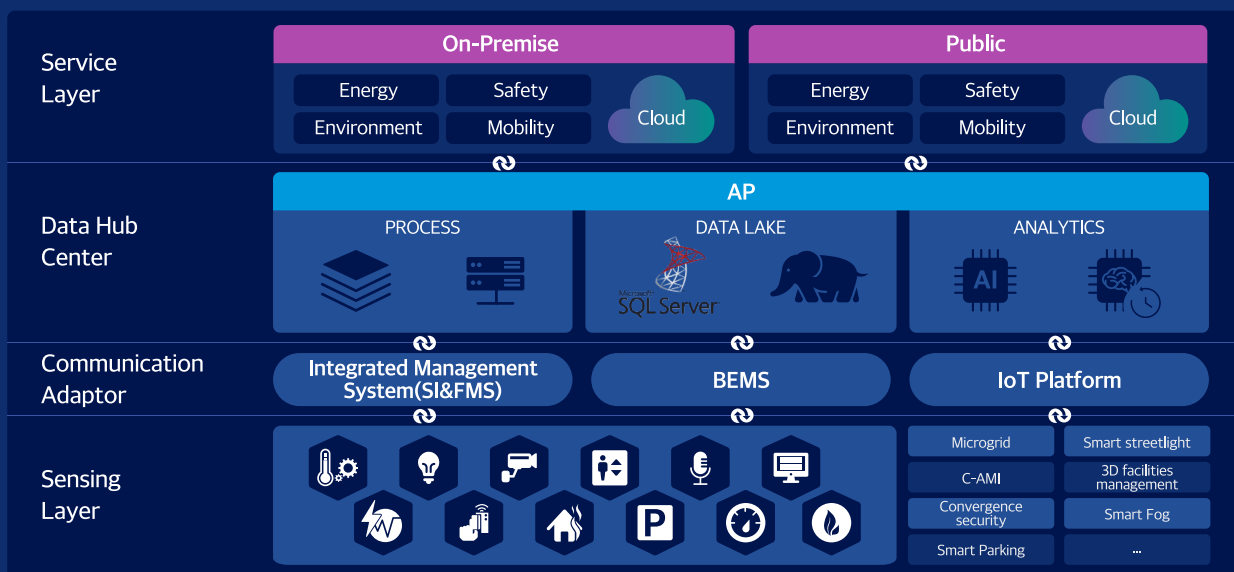


# SMART CITY

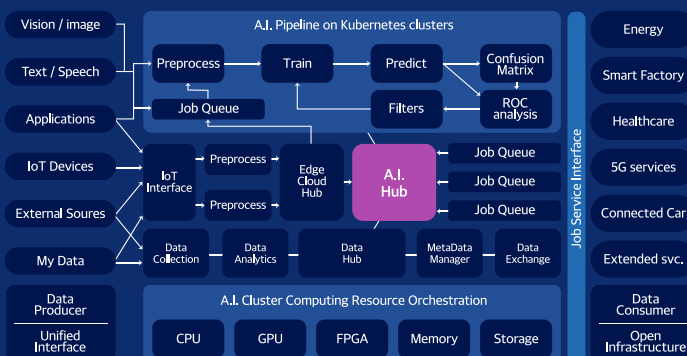
“**Converged & Connected**”

Smart City solution is an integrated platform that enriches the Smart City residents' lives through AI analysis and cloud services. It connects everything in the city to form Big Data to create a better future.



The Smart City platform, based on the technologies of the 4th Industrial Revolution, such as AI, Big Data and cloud computing, provides services and experiences to boost the quality of your life and respond flexibly to future technologies and services.

## A.I. Powered Service Platform

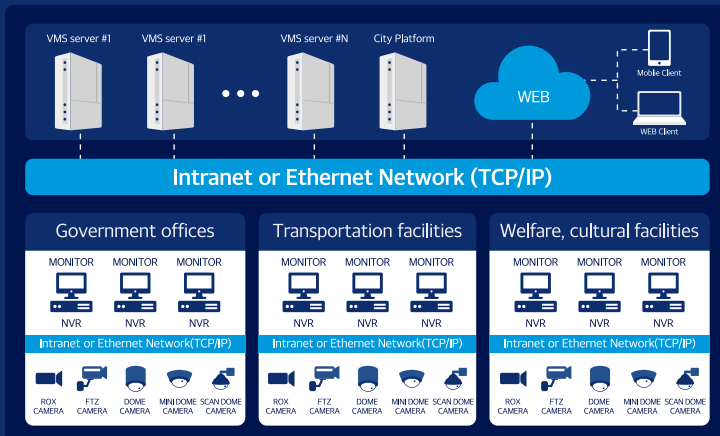


- **IoT Platform:** Device connectivity, Device management
- **Process Platform:** Process automation, Task & work management, Content management, Rules management
- **Data Lake Platform:** Big Data integration, Storing, and Management
- **Analytics Platform:** Machine learning, Streaming analytics, Predictive analytics, Alert & actions
- **Hybrid Cloud:** on Premise cloud, Public cloud Service linkage
- **API:** API gateway, API portal, Application integration, API & Service catalog

# SAFETY

For a safer city...

## Deep learning based VMS



### Provided Services

- City monitoring camera and event integration control
- Geofence-based videos and event monitoring within VMS
- Secured system scalability through application of ONVIF industry standards

### Expected Effects

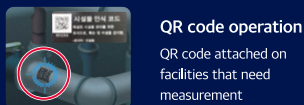
- Overcoming control limits and maximizing operational efficiency through integrated control
- Secured city operation stability with an intelligent image analysis-based monitoring system in an open city
- Establish a basis for big data services such as recognition of pedestrian and vehicle models in images with AI Deep Learning technology

### Major Features and Characteristics

- VMS (Video Management System, intelligent video analysis system) various event monitoring and system control
  - Loiterer detection, intrusion detection, virtual passage detection, smoke detection, pedestrian crossing danger detection, fall detection, disposal detection, fire detection, crowd detection, violence detection, people/vehicle counter, reverse direction detection
- HTML5 based web monitoring and control, storing DB, search, split-screen, thumbnail Note 3, Streaming, PTZ control
- Constant monitoring with vector tracking-based technology
- Face recognition with deep learning (detect face, age, sex, facial expression, recognition results report)

## Digital Twin based FMS

### Real-time measurement



**QR code operation**  
QR code attached on facilities that need measurement

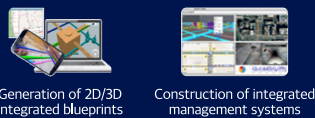
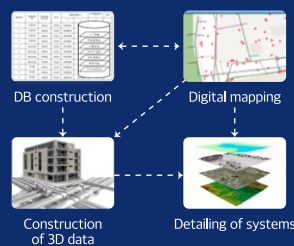


**Total station /GPS measurement**  
Acquisition of detailed coordinates of underground facilities



**3D scanning/drone**  
Acquisition of detailed coordinates of buildings and geographical features

### Construction of integrated data



### Provided Services

- Integrated management of facility information errors or omission
- 3D (AR, VR) map-based facility data analysis and visualization
- Agile management and decision-making through the integrated management of facilities
- "Progress of Subsidence and Safety Review" with a ground subsidence monitoring interface

### Expected Effects

- Accurate information and efficient management through precise measurements
- Facilities information and third party damage management through 3D (VR, AR) maps
- Faster first response with MAP-based facilities-integrated management
- Prevent hot-water plumbing and gas explosions with an IoT sensor interface

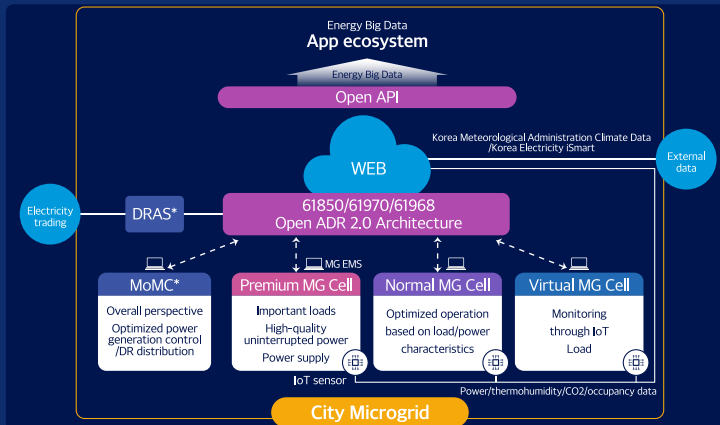
### Major Features and Characteristics

- Search and manage facility information and history with QR codes
- Add and edit real-time measurement (2D/3D) data
- Edit and secure blueprints upon maintenance construction
- Search property information and facility locations
- Search property information and facility locations
- Dynamic multi-view (2D or 3D maps, air view, etc.)
- Input and output blueprint files (GIS blueprints, CAD blueprints)
- IoT sensor (water leak, corrosion, and ground subsidence detection) interface

# ENERGY

To create a city that uses energy more efficiently...

## Lego-style customized microgrid



### Provided Services

- Premium MG Cell: A city's high-quality, uninterruptible power supply
- Normal MG Cell: Combines with distributed generators to supply power to general loads that need energy efficiency
- Virtual MG Cell: Supplies power to general loads that have no distributed generators

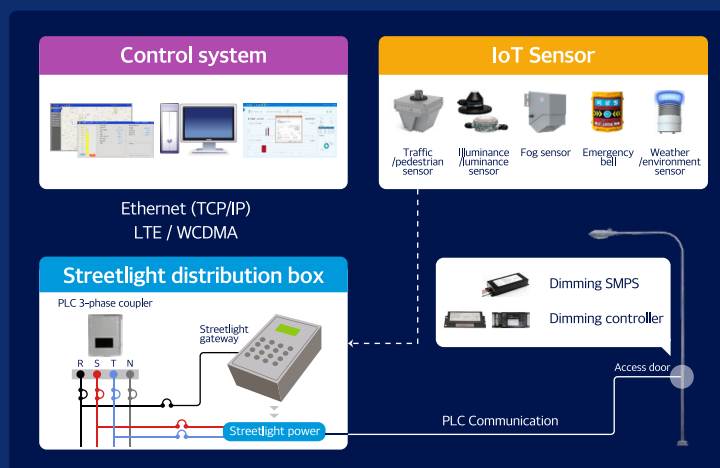
### Expected Effects

- Peak reduction through DER and ESS, energy cost optimization through real-time fee response and protection of important loads in case of emergencies
- Reduction of CO2 and response to future carbon credit trading
- Guarantee of economic feasibility and improvement of energy independency through City microgrid operation

### Major Features and Characteristics

- Customized, Lego-style city microgrid model optimization and development according to customer requirements
- IoT-based technology and Big Data platform
- Optimized design technique of cell microgrid per model, multi-agent-based distribution optimization technique
- MG stability real-time simulation and effect analysis
- Multi-inverter parallel drive technique, response-to-demand potential calculation technique
- DER, ESS (Energy Storage System), control, network, and monitoring between loads
- System interface, separate operation prevention, independent and parallel operation, peak shaving, load leveling

## Smart Streetlight with IoT Sensor



### Provided Services

- Save energy and prevent light pollution with dimming control
- Traffic/pedestrian detector: save energy with an illuminance/luminance sensor interface
- Provide a city environment map with an environment sensor interface
- Provide resident safety services when interfaced with BLE

### Expected Effects

- Save 30% on energy with dimming control and minimize complaints by reducing and preventing pollution
- Reduce maintenance costs with self-diagnostics
- Increase convenience with various IoT network infrastructure

### Major Features and Characteristics

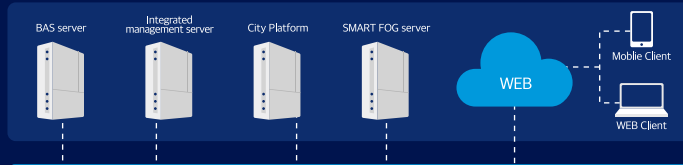
- Supports power line communication standard ISO/IEC 14908-3
- Predicts lamp lifecycle by managing lamp operation time
- Efficient maintenance through map-based monitoring
- Provides a DC 0-10V dimming interface and self-diagnostics
- Individual, group, bulk control; schedule, scene, sensor interface control
- SMS notification in case of system failure; collection, search, and analysis of energy usage

# ENVIRONMENT

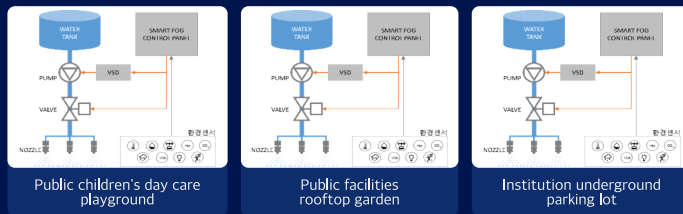
For a healthier environment...

## Smart Fog Fine Dust Detection

### Integrated Disaster Prevention Center



### Intranet or Ethernet Network (TCP/IP)



### Provided Services

- Provides a safe and comfortable resting space from fine dust to children's playground and rooftop park users
- Improves parking lot environments by reducing dense fine dust in underground parking lots and preventing the spread of pollution
- Eliminates floating dust, utilizes secondary methods for odor reduction, prevention, and disinfection

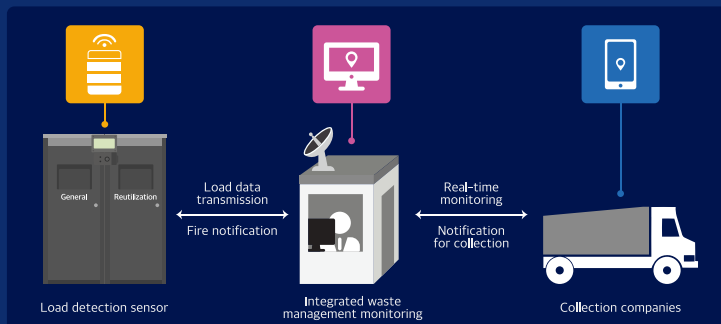
### Expected Effects

- Reduce fine dust and odor, and prevent heat damage
- Guarantee of a healthy life for school staff and their families by improving playground environments
- Preparation of pleasant education and research through rooftop garden improvements
- Preparation of environmental information Big Data-based environment maps and service operation infrastructure (ex: improve heat islands and living environments in cities)

### Major Features and Characteristics

- Monitors air quality environment: Temperature, humidity, precipitation, fine dust, wind direction and speed, toxic gas, TVOC, CO<sub>2</sub>, illumination
- Improves internal air quality through real-time analysis of fine dust data and interface with HVAC
- Sets and controls spray pressure, spray temperature, and air current features, forms air curtains and positive pressure conditions through different pressures
- Sprays fine water particles below 20 $\mu$ m according to the discomfort index through environment monitoring (using single and twin stainless steel nozzles)
- Controls fog spraying pressure and time to maintain consistent humidity through inverter (VSD) control
- Operates with optimal energy when linked to motion detection interface

## Solar-Powered Garbage Bins



### Provided Services

- IoT sensor-based smart garbage management and monitoring
- Smart garbage collection and operation monitoring

### Expected Effects

- 100% eco-friendly energy (using solar panel)
- Reduce the use of garbage bags with trash compaction
- Collect various data and user locations through real-time monitoring

### Major Features and Characteristics

- Solar-Powered Garbage Bins (Station): Compaction feature
  - Compacts when loaded more than 80% (max. 300kg)
  - X-frame motion operated by motors (patent owned)
- Load detection sensor: Collects data through ToF (Time of Flight) sensors
  - Provides and notifies real-time load data (website, mobile app)
  - Provides statistical data on garbage loads and collection through accumulated data