



GWIN

GOVERNMENT-WIDE

INTERNET OF THINGS NETWORK

Government Wide IoT Network (GWIN)

EFFICIENT & PRIVATE GOVERNMENT IoT NETWORK

- Private Common Network Sharing Platform



Reduce
costs and inefficiencies



Safe and Secure



INTRODUCTION

1

LPWAN – LORA

EFFICIENT AND PRIVATE GOV IOT NETWORK

2

GWIN INFRASTRUCTURE

HOW WE BUILD THE CITY-WIDE NETWORK

3

IOT APPLICATIONS

HOW IOT BENEFITS EMSD & OTHERS

4

WAY FORWARD

DIRECTIONS

Government Wide IoT Network (GWIN)

Sigfox

LoRa
(Private Network)

NB-IoT

Service Provider	Sigfox	Privately Owned	CMHK
Coverage	Governed by Sigfox	Customizable	CMHK Mobile Coverage
Core Server	3 rd Party	3 rd Party / Self Owned	3 rd Party
Monitor and Control	Bi-directional	Bi-directional	Monitor only

LPWAN – LORA

EFFICIENT & PRIVATE GOVERNMENT IoT NETWORK

Low Power Wide Area Network

Realised by LoRA

- Private Common Data Sharing Platform
Gov. premise gateways and On-premise network servers



Gateway to EMSD HQ Server :



LPWAN – LORA

EFFICIENT & PRIVATE GOVERNMENT IoT NETWORK

Low Power Wide Area Network

Realised by LoRA

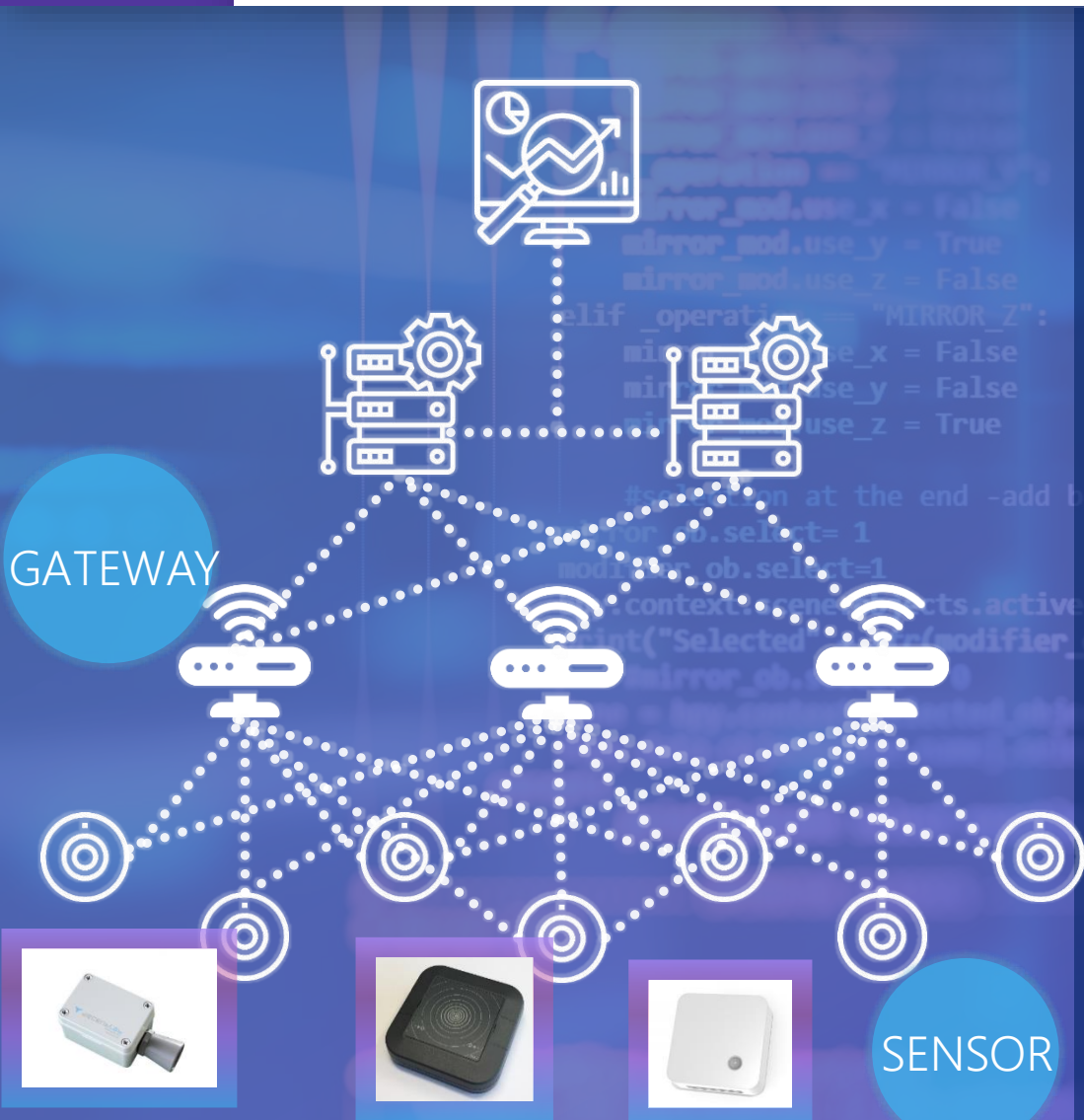
- Private Common Data Sharing Platform
Gov. premise gateways and On-premise network servers
- Long Range Transmission
Sensor-to-gateway (7km) for indoor and outdoor applications

Sensor to Gateway: LoRa (Private Network)



LPWAN – LORA

EFFICIENT & PRIVATE GOVERNMENT IoT NETWORK



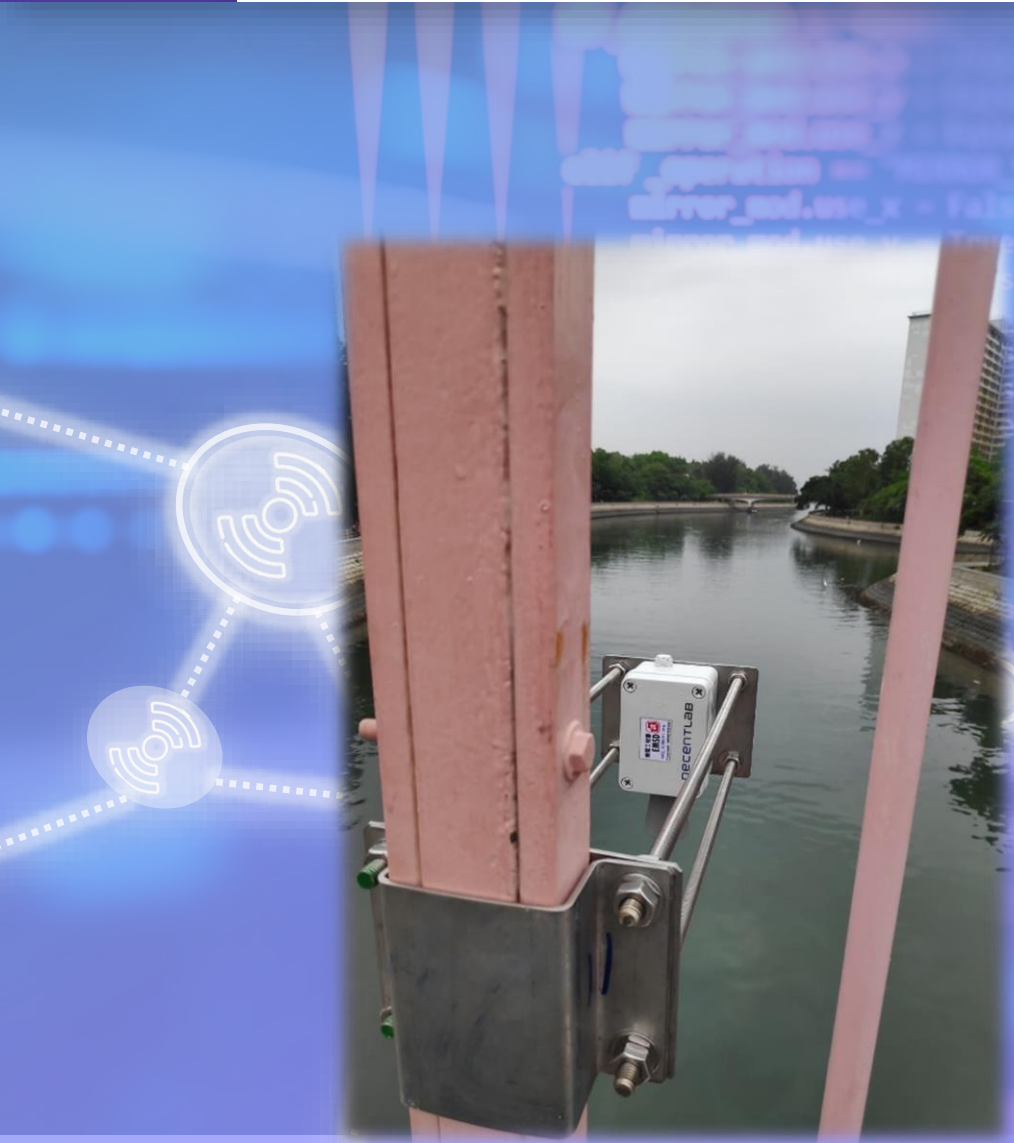
Network Layer

- Sensor connectivity independent of mobile network (but not real-time)
- Sensor connectivity to multiple gateways depending on QoS (to reduce chance of data loss)



LPWAN – LORA

EFFICIENT & PRIVATE GOVERNMENT IoT NETWORK



Low Power Wide Area Network

Realised by LoRA

- Private Common Data Sharing Platform
Gov. premise gateways and On-premise network servers
- Long Range Transmission
Sensor-to-gateway (7km) for indoor and outdoor applications
- **Efficient Sensor Deployment**
Battery-operated cost-effective sensor, easy to install

→→→ Massive sensors deployment for digitization and further data analytics & applications

LPWAN – LORA

EFFICIENT & PRIVATE GOVERNMENT IoT NETWORK

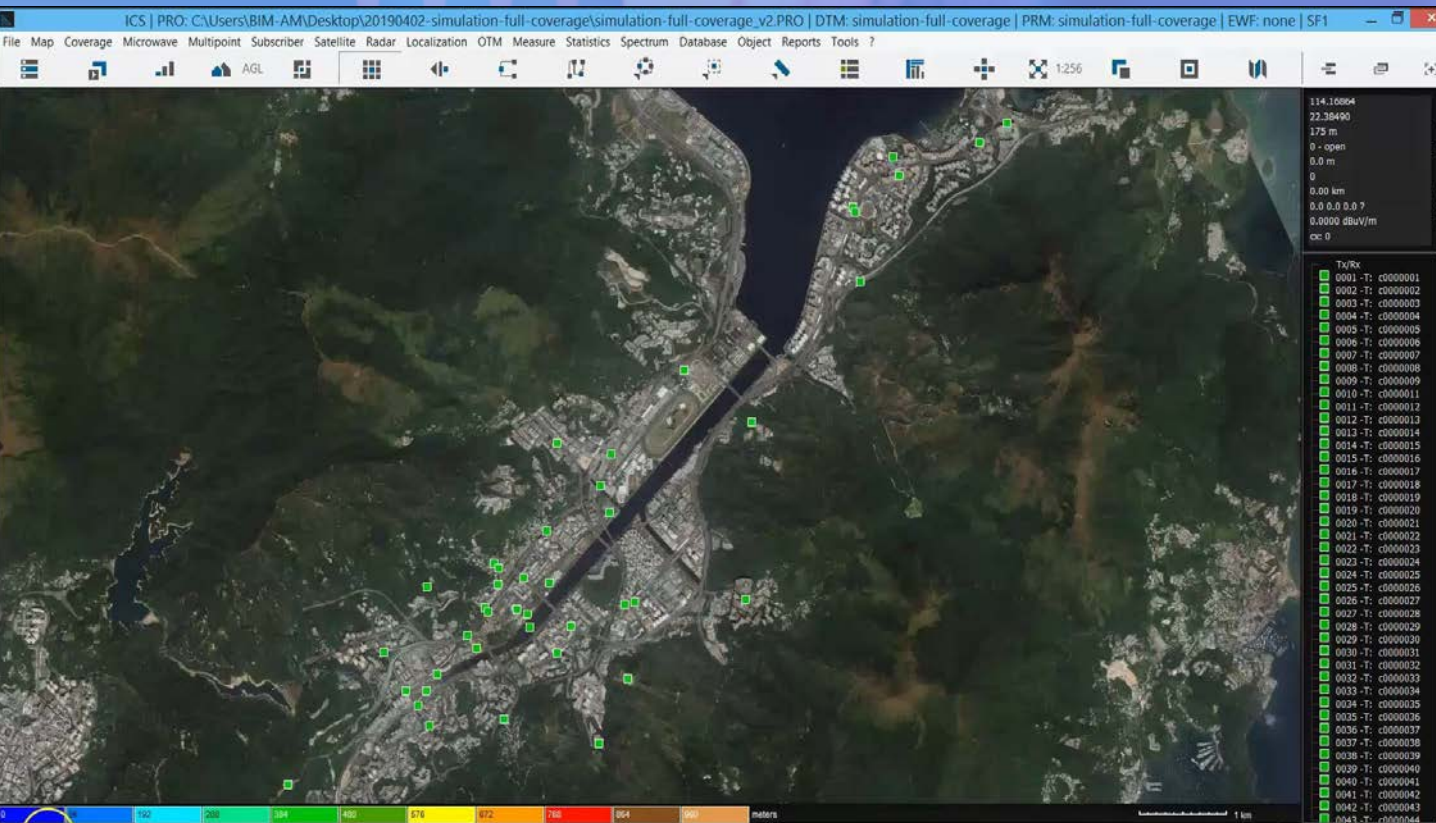
Low Power Wide Area Network

Realised by LoRA

- Private Common Data Sharing Platform
Gov. premise gateways and On-premise network servers
- Long Range Transmission
Sensor-to-gateway (7km) for indoor and outdoor applications
- Efficient Sensor Deployment
Battery-operated cost-effective sensor, easy to install
- Diversified applications
Environmental monitoring, Activity detection,
E&M monitoring, Gaseous & Water detection etc.

GWIN INFRASTRUCTURE

HOW WE BUILD THE CITY-WIDE NETWORK



Network Planning

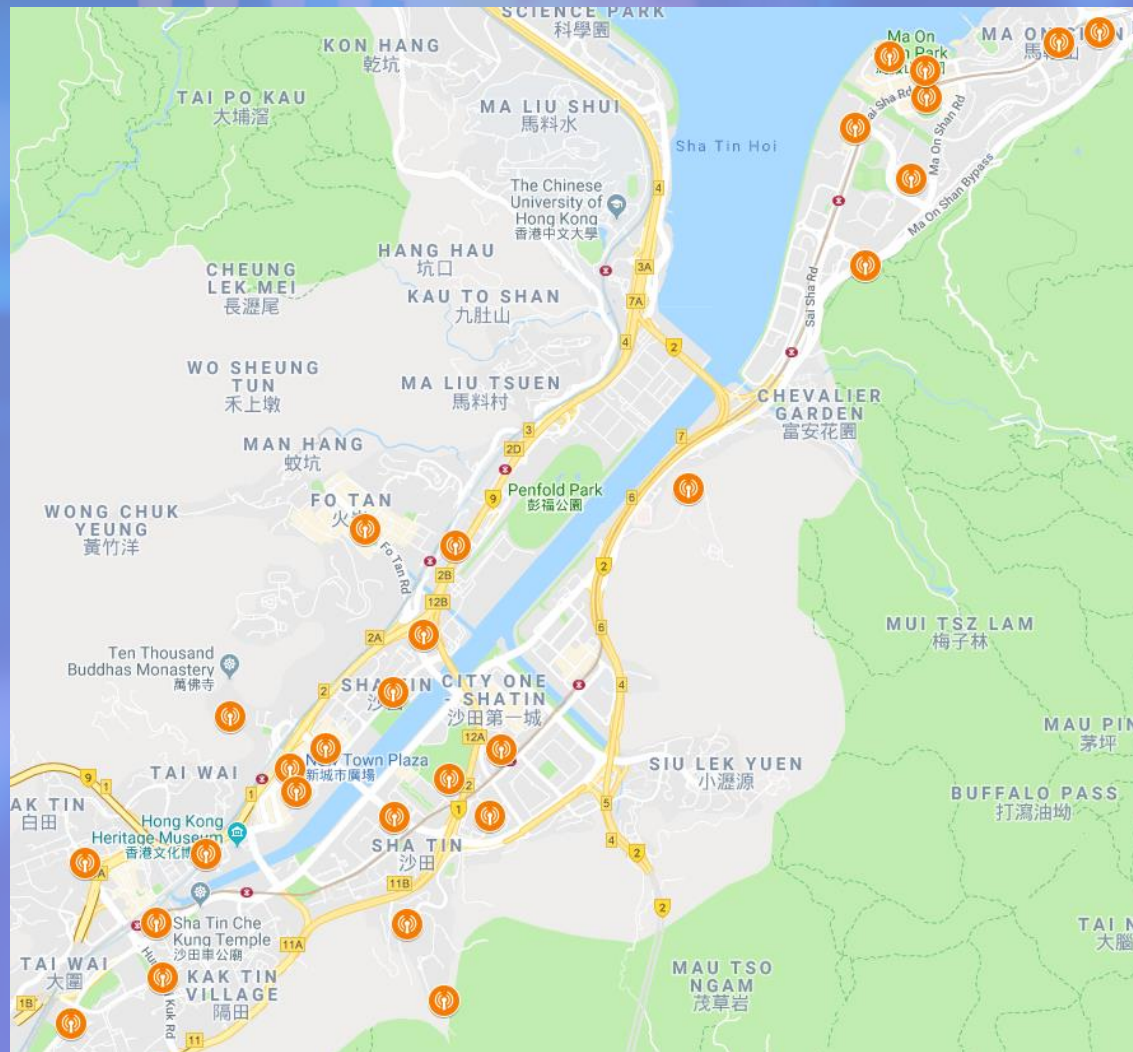
Gateway installation in Hong Kong



2

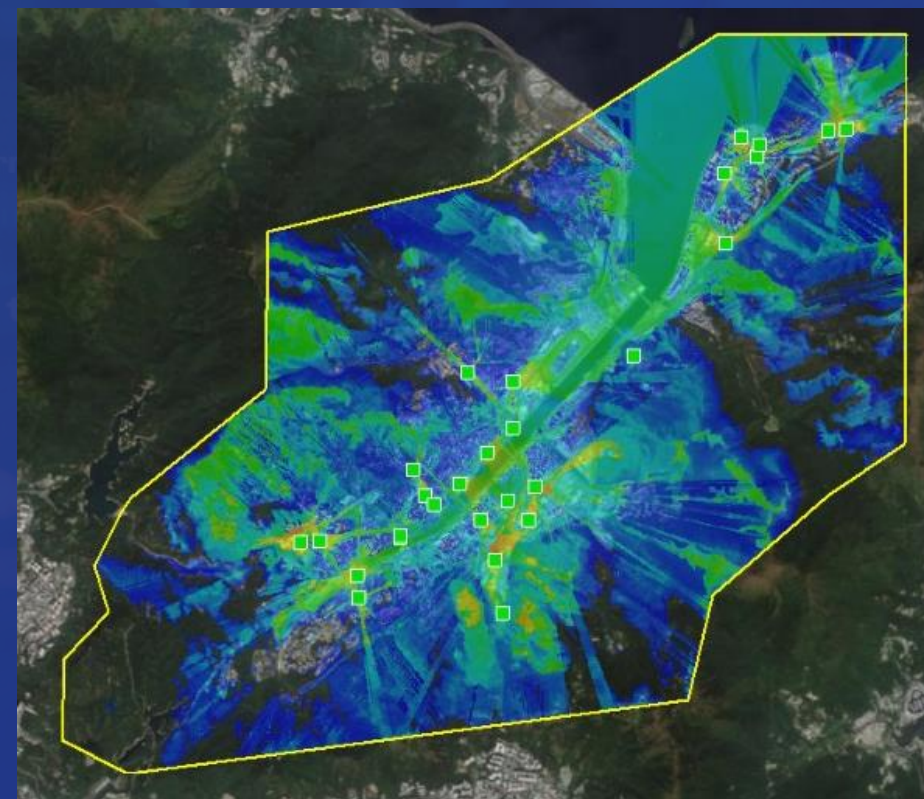
GWIN INFRASTRUCTURE

Pilot @ Shatin and Radio Coverage



Network Layer

80% outdoor LoRa coverage
(-110dBm threshold)



GWIN INFRASTRUCTURE

Pilot @ Shatin and Radio Coverage

Network Layer

- 34 Gateway Installations in Shatin:
 - 7 Public Transport Interchange
 - 7 Footbridges
 - 9 Municipal Buildings
 - 3 Fire Stations
 - 4 Community Halls
 - 1 Government Offices
 - 3 Water Service Reservoirs

Hong Kong Heritage Museum



Shatin Town Hall



Shatin Jockey Club Swimming Pool



Shatin Fire Station



Chung On PTI



Pamela Youde Child Assessment Centre



GWIN INFRASTRUCTURE

Message volume of GWIN sensors

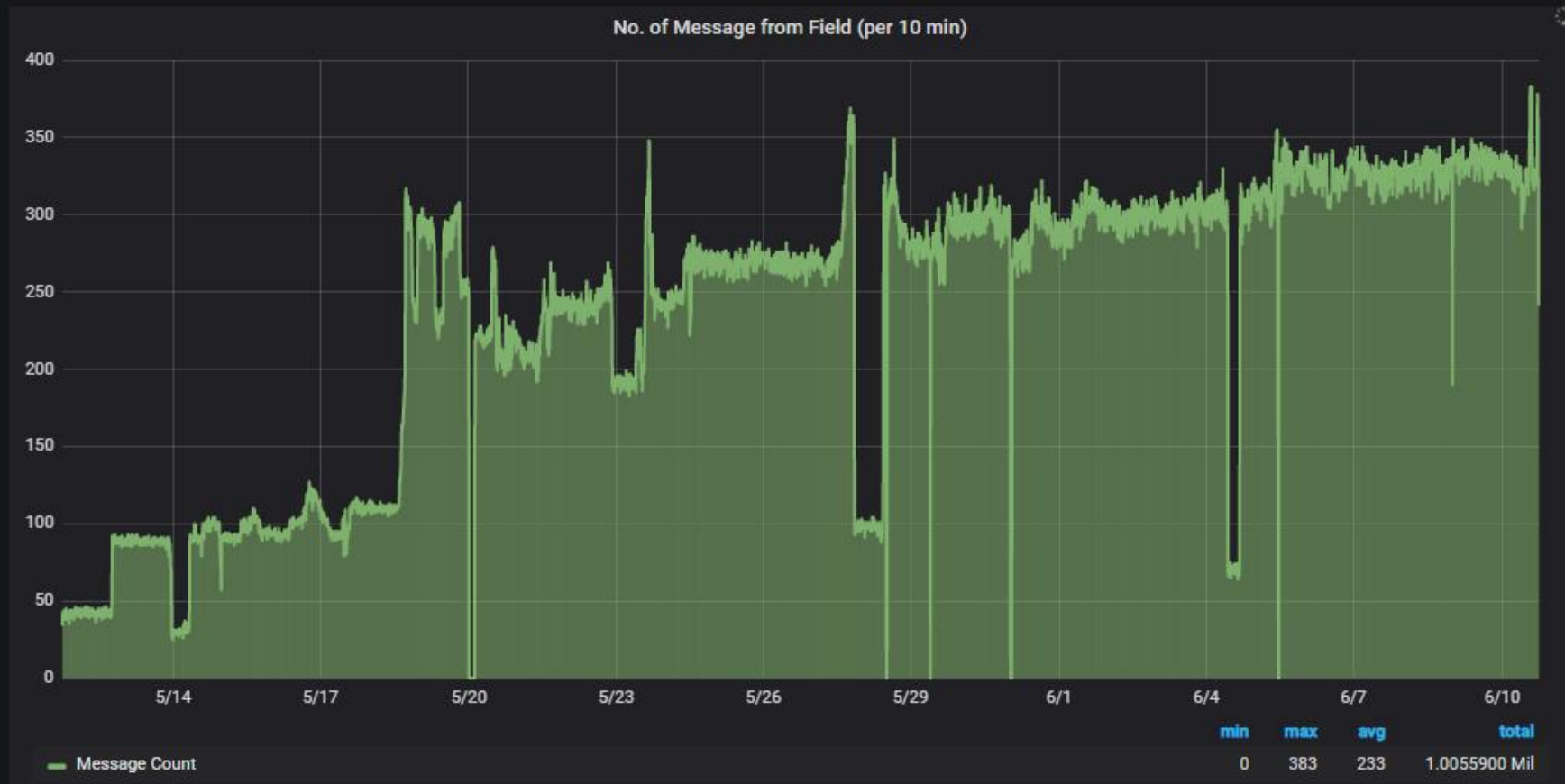
Live Status at Sha Tin Area

Total Number of Live Sensors

491

Total Number of Message

1005597



GWIN INFRASTRUCTURE

HOW WE BUILD THE CITY-WIDE NETWORK



Sensing Layer

- Environmental Monitoring
Temperature, Humidity, Soil Moisture
- Activity Detection
Smoke detection, Activity, Emergency, People counting, Presence, Security
- E&M Monitoring
Electricity, Vibration, Dry contact
- Gaseous
Industrial gas, Water leakage, Ultrasonic distance meter



Internet of
Alert
Thing



Internet of
Control
Thing



Internet of
Monitoring
Thing



Internet of
A.I.
Thing



Internet of
Green
Thing



Internet of
Underground
Thing



Internet of
Parking
Thing



Internet of
Meeting
Thing



Internet of
Environment
Thing

IOT APPLICATIONS

VISION & ACTION



Internet of
Alert
Thing



Internet of
Control
Thing



Internet of
Monitoring
Thing



Internet of
A.I.
Thing



Internet of
Green
Thing



Internet of
Underground
Thing



Internet of
Parking
Thing



Internet of
Meeting
Thing



Internet of
Environment
Thing

3 INTERNET OF ALERT THING



Internet of
Alert
Thing

- Remote monitoring of filtration plant pump status @ MOS swimming pool



LoRA RS485 Device



Filtration Pump Panel

3 INTERNET OF ALERT THING



Internet of
Alert
Thing

- Escalator fault alarm, lift car temp & humidity remote monitoring via LoRa at footbridges



Temp & Humidity Sensor



Dry Contact Device



Internet of
Alert
Thing



Internet of
Control
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Internet of
Monitoring
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Thing



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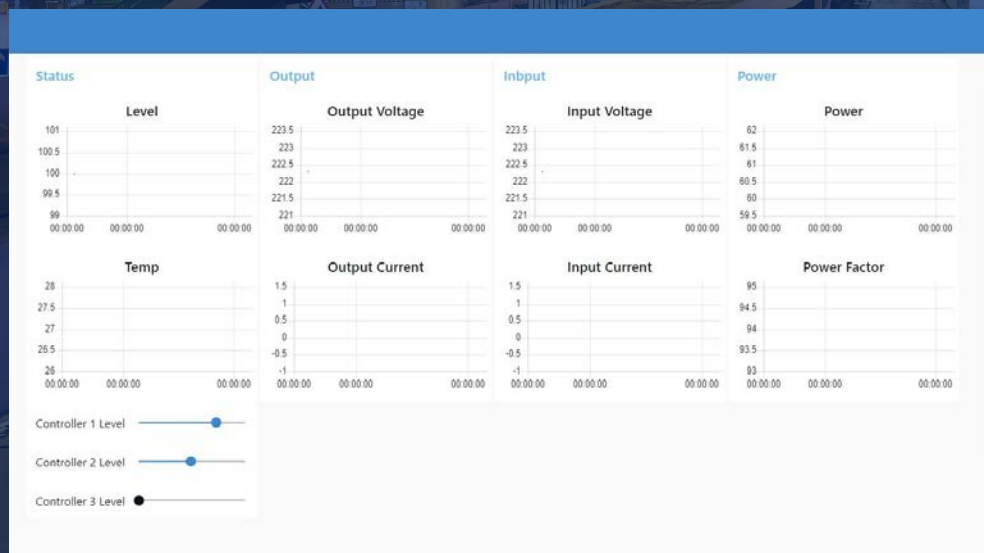
Internet of
Environment
Thing

3 INTERNET OF CONTROL THING



Internet of
Control
Thing

- Dimming and ON/OFF control of lighting via LoRA's interface with PLC master controller
- Liaison with HyD in progress for trial at Sha Tin district



Lighting Fixture





Internet of
Alert
Thing



Internet of
Control
Thing



Internet of
Monitoring
Thing



Internet of
A.I.
Thing



Internet of
Green
Thing



Internet of
Underground
Thing



Internet of
Parking
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Internet of
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Thing



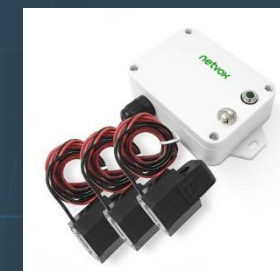
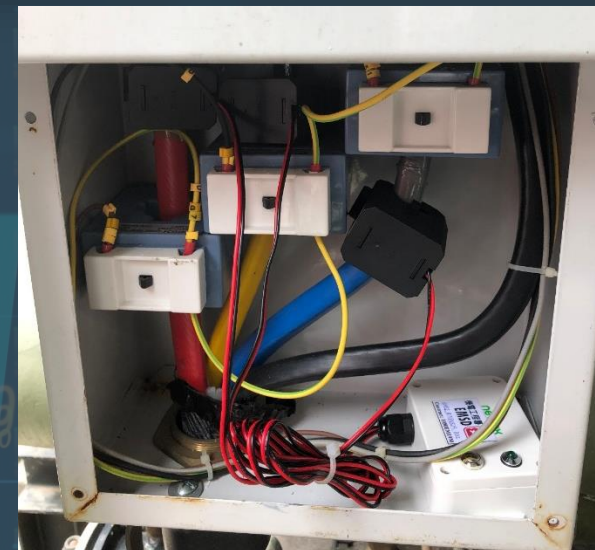
Internet of
Environment
Thing

3 INTERNET OF MONITORING THING



Internet of
Monitoring
Thing

- Measurement current of power supply to chiller and ambient temperature and humidity
- Heat pump operation status monitoring via RS485





Internet of
Alert
Thing



Internet of
Control
Thing



Internet of
Monitoring
Thing



Internet of
A.I.
Thing



Internet of
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Thing



Internet of
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Internet of
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Internet of
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Thing



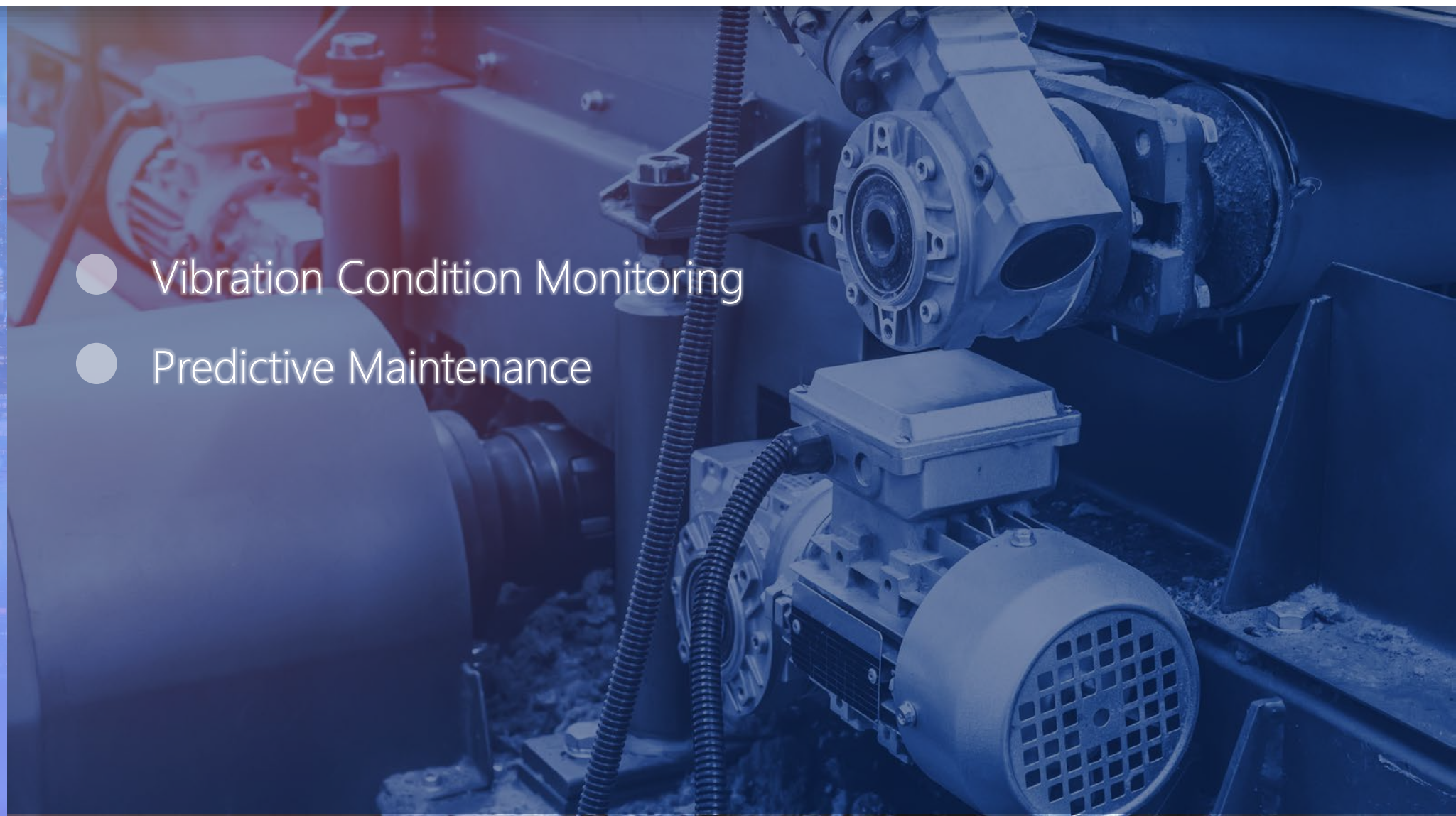
Internet of
Environment
Thing

3 INTERNET OF A.I. THING



Internet of
A.I.
Thing

- Vibration Condition Monitoring
- Predictive Maintenance



3

INTERNET OF A.I. THING



Internet of
A.I.
Thing

- With embedded AI + Machine learning ability to detect abnormal vibration of E&M equipment (i.e. air compressor, pump, engine) for fault detection and predictive maintenance



Predictive Maintenance
Ventilation Fan and Air Duct @ Public Transport Interchange

3

INTERNET OF A.I. THING



Internet of
A.I.
Thing

- Remote HVAC fault status transmission

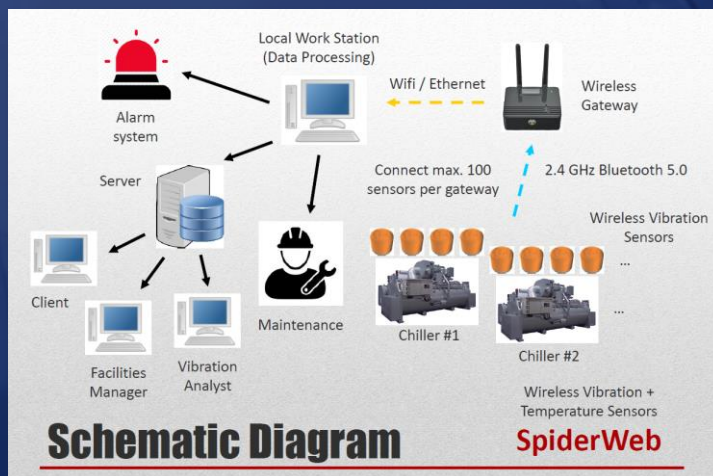


Illustration of Tri-Axial Vibration Sensor
at AHU Fan & Compressor
@ Mei Tin Community Hall

3

INTERNET OF A.I. THING



Internet of
A.I.
Thing

- Remote HVAC fault status transmission



Upcoming Plan:

- Install Tri-Axial Vibration Sensors at EMSD HQ Mechanised Carpark





Internet of
Alert
Thing



Internet of
Lighting
Thing



Internet of
Monitoring
Thing



Internet of
A.I.
Thing



Internet of
Green
Thing



Internet of
Underground
Thing



Internet of
Parking
Thing



Internet of
Meeting
Thing



Internet of
Environment
Thing

3 INTERNET OF GREEN THING



Internet of
Green
Thing

- PV panel health status monitoring

3 INTERNET OF GREEN THING



Internet of
Green
Thing

- To measure current of incoming power circuit to PV lamp pole and outgoing power circuit from PV panel to lamps via LoRA



Current meter installed at incoming power circuit @ Sha Tin Park

IOT APPLICATIONS

VISION & ACTION



Internet of
Alert
Thing



Internet of
Lighting
Thing



Internet of
Monitoring
Thing



Internet of
A.I.
Thing



Internet of
Green
Thing



Internet of
Underground
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Internet of
Parking
Thing



Internet of
Meeting
Thing



Internet of
Environment
Thing

3

WATER LEVEL SENSING



Internet of
Environment
Thing

- Water Level Monitoring
Fast deployment of water level sensor for flood monitoring, especially during typhoon season



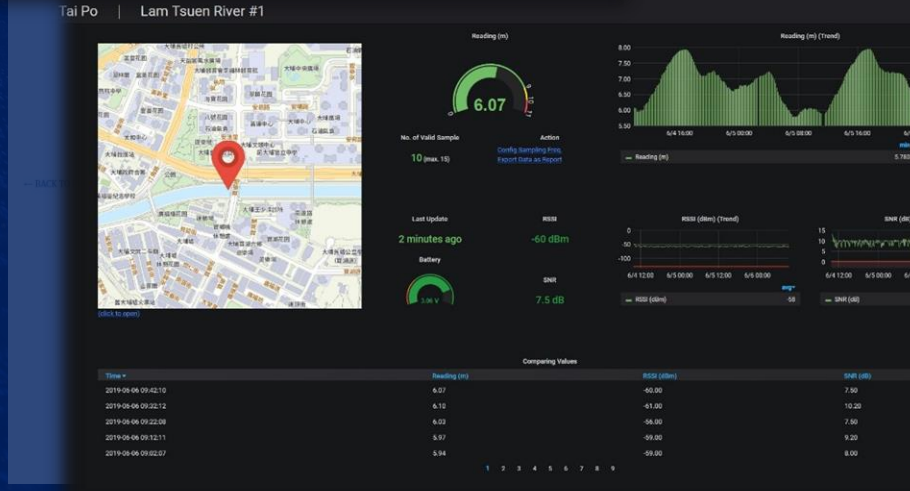
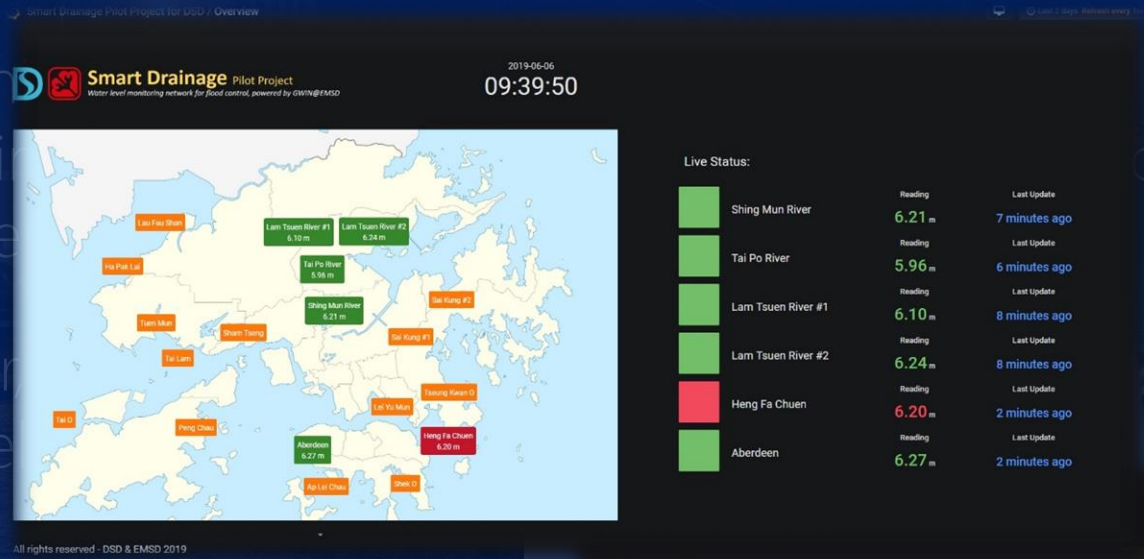
3

WATER LEVEL SENSING



Flood Monitoring Portal

- Water Level Monitoring
- Retrofitting existing sensors
- At Heng Fa Chuen
- Lam Chuen River
- 4 nos. water level



3 INTERNET OF ENVIRONMENT THING



Internet of
Environment
Thing

- Environmental Sensor: Tipping Bucking Rain Gauge, Indoor Environment Sensor, Weather Station



IOT APPLICATIONS

VISION & ACTION



Internet of
Alert
Thing



Internet of
Lighting
Thing



Internet of
Monitoring
Thing



Internet of
A.I.
Thing



Internet of
Green
Thing



Internet of
Underground
Thing



Internet of
Parking
Thing



Internet of
Meeting
Thing



Internet of
Environment
Thing

3 INTERNET OF MEETING THING



Internet of
Meeting
Thing

- Online Meeting Room Booking
- Real-time Occupancy Status
- Better office resource management

3 INTERNET OF MEETING THING



Internet of
Meeting
Thing

● Location: EMSD HQs

機電工程署
EMSD

Smart Reservation System

用戶名稱

密碼

登入

現場

7/F

全部 會議室 停車位 衛生間

Room 7102 19.8°C 67% 立即預約 報告

Room 7102 19.8°C 67% 立即預約 報告

Room 7102 19.8°C 67% 立即預約 報告

顯示平面圖

首頁 預約 現場 設定

會議室

2019年01月

WED 27 THU 28 FRI 1 SAT 2 SUN 3 MON 4 TUE 5 更多

共有 1 個結果完全符合

Room 6157 6/F 3座位 投影機

共有 3 個結果你可能有興趣

Room 7101 7/F 3座位 投影機 電視

Room 7102 7/F 3座位 投影機

Room 7103 7/F 3座位 投影機

IOT APPLICATIONS

VISION & ACTION



Internet of
Alert
Thing



Internet of
Lighting
Thing



Internet of
Monitoring
Thing



Internet of
A.I.
Thing



Internet of
Green
Thing



Internet of
Underground
Thing



Internet of
Parking
Thing



Internet of
Meeting
Thing



Internet of
Environment
Thing



Internet of
Care
Thing

- Online Carpark Booking
- Real-time Parking Status
- Better parking slot management



3 SMART PARKING RESERVATION SYSTEM



Internet of
Care
Thing





Internet of
Alert
Thing



Internet of
Lighting
Thing



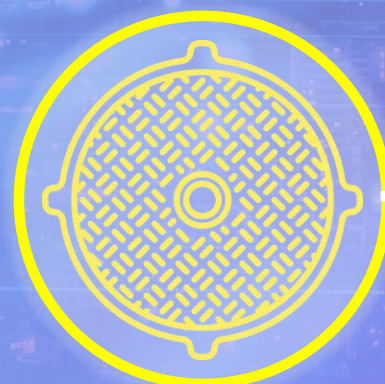
Internet of
Monitoring
Thing



Internet of
A.I.
Thing



Internet of
Green
Thing



Internet of
Underground
Thing



Internet of
Parking
Thing



Internet of
Meeting
Thing



Internet of
Environment
Thing

3

INTERNET OF UNDERGROUND THING



Internet of
Underground
Thing

- Retrofitting existing flow meter and data logger with LoRa Module
- Collecting water flow data for multiple junctions point
- for AI & data analytic to identify location of water leakage
- Manhole Antenna Prototype
- for Underground Sensor Application





Internet of
Alert
Thing



Internet of
Control
Thing



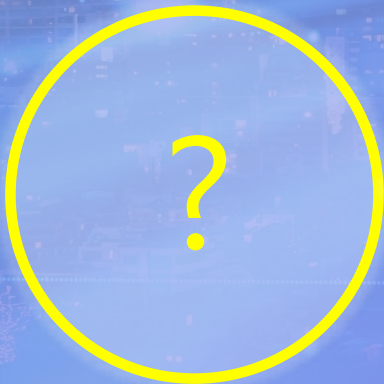
Internet of
Monitoring
Thing



Internet of
A.I.
Thing



Internet of
Green
Thing



Internet of
XXX
Thing



Internet of
Underground
Thing



Internet of
Parking
Thing



Internet of
Meeting
Thing



Internet of
Environment
Thing

WAY FORWARD

DIRECTIONS



CLP 中電



煤氣
Towngas



Collaboration



渠務署

Drainage Services Department



香港天文台

HONG KONG OBSERVATORY



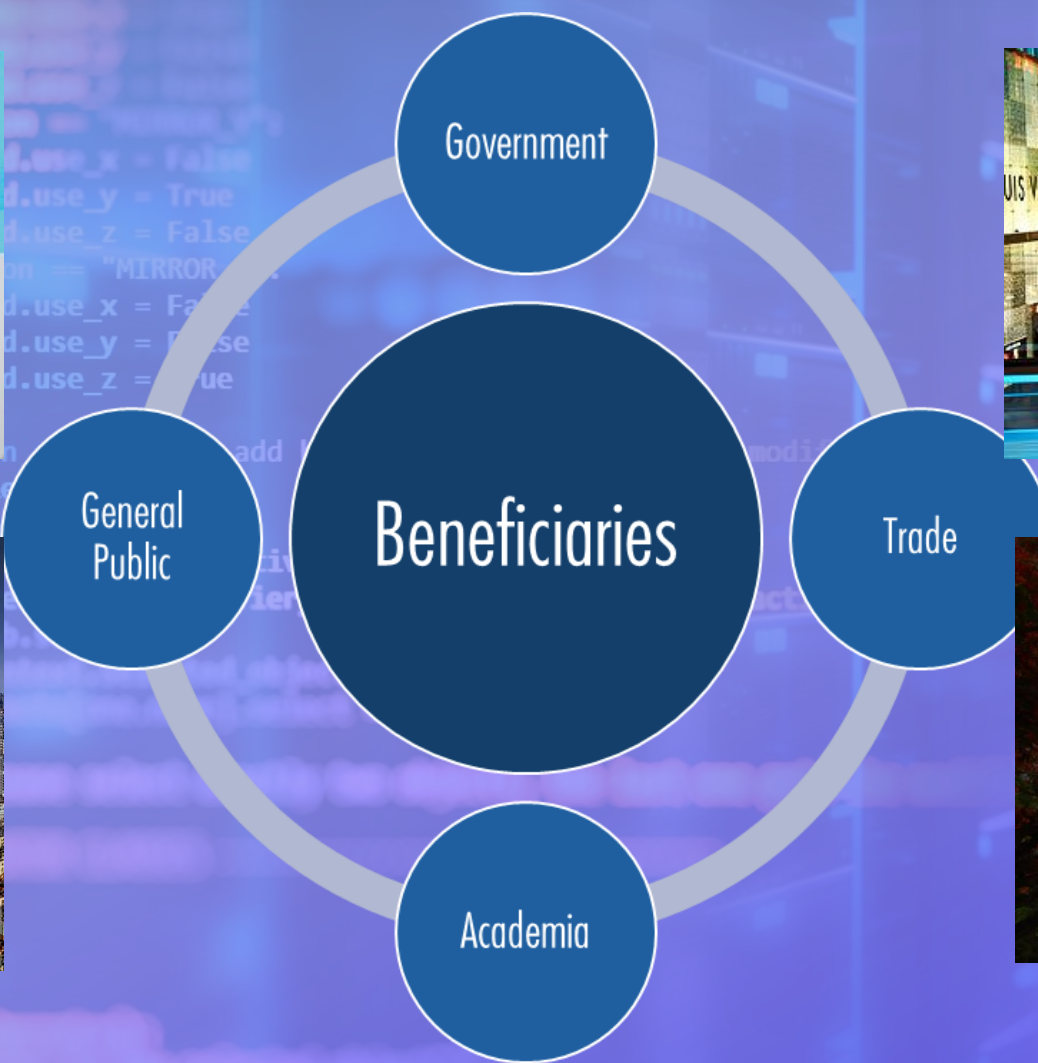
路政署

HIGHWAYS
DEPARTMENT

4

WAY FORWARD

DIRECTIONS





THANK YOU