

# Internet of Things (IoT) Applications at HKIA

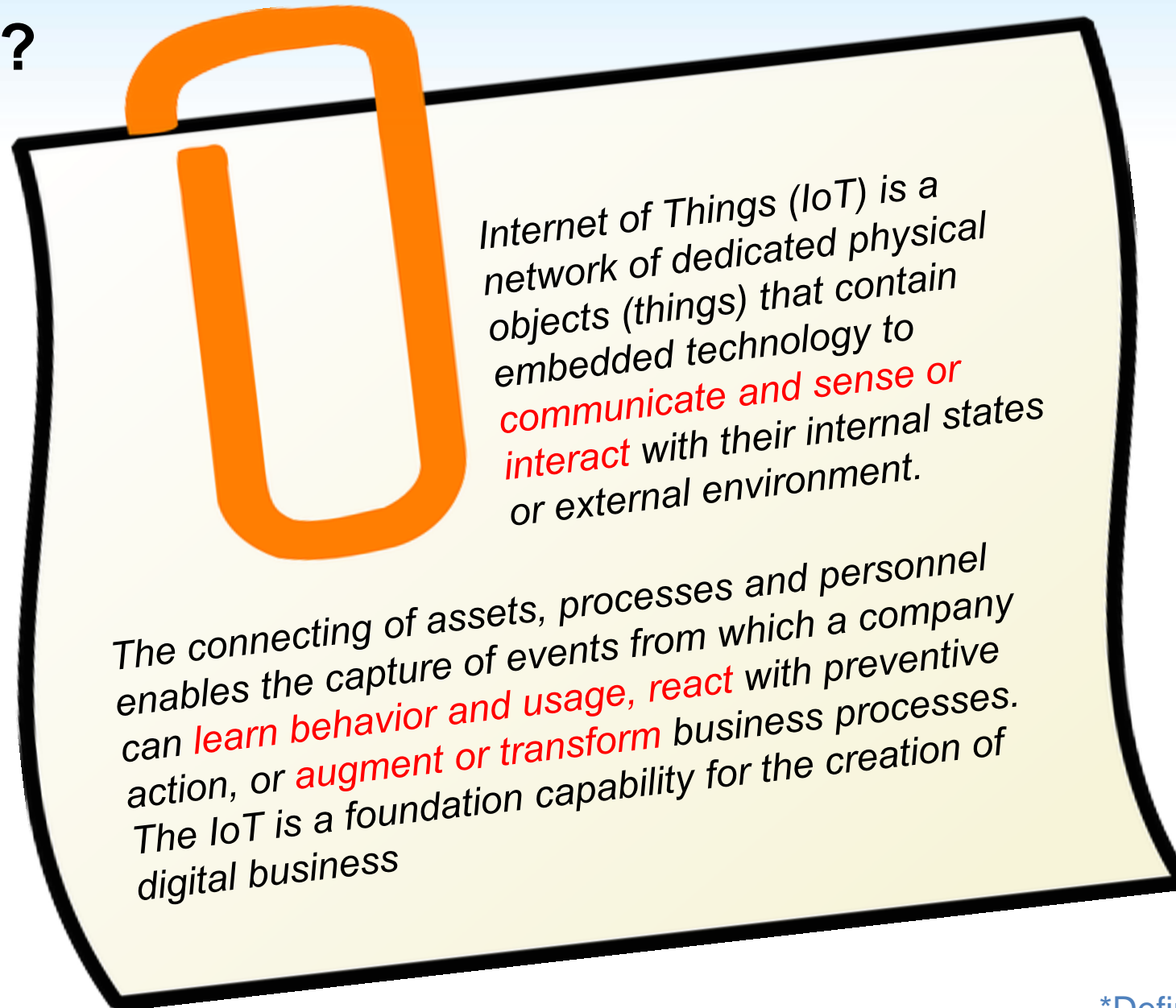
By

K.C. Fung

Senior Manager, IT Planning & Strategy



# What is IoT?



# IoT Vision of HKIA

*Intelligence enabled by interconnection of “things”  
creates a **Digital Twin** of Airport to facilitate  
holistic airport management and deliver  
unprecedented passenger service*



# Digital Twin of Airport



# Examples of Current IoT Systems/Applications at HKIA





[illegible]

# RFID Baggage Handling System

- 1st airport in the world to use RFID technology for both baggage sortation and reconciliation
- At peak handles >110,000 departure bags and >80,000 arrival bags per day
- Sortation read rate improved from 80% to >97% by using RFID

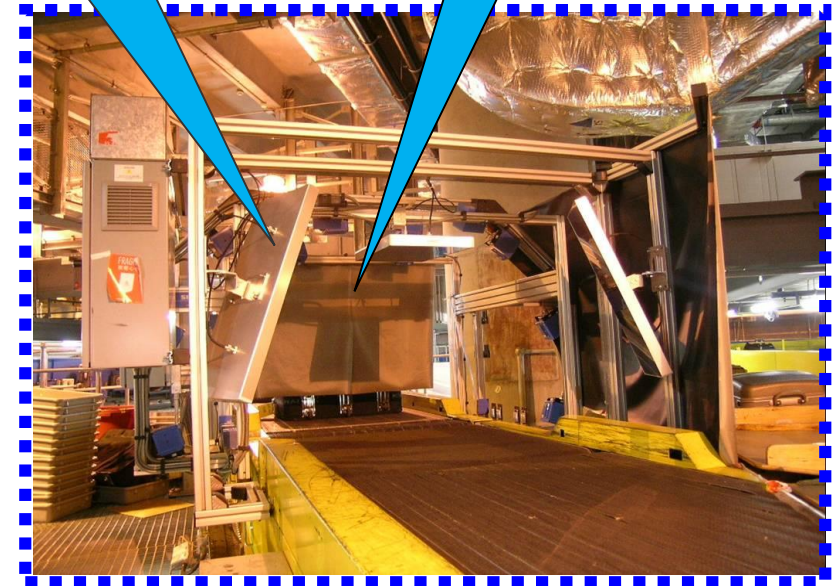


RFID Bag Tag  
Printers

RFID shielding  
curtain

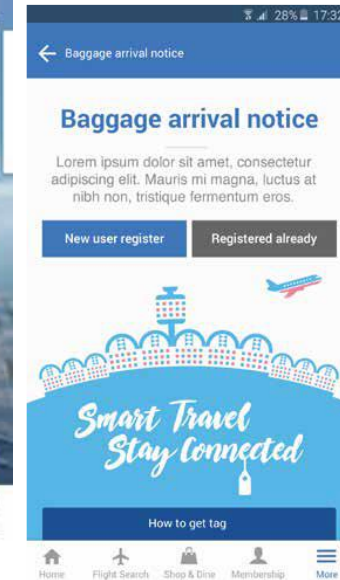
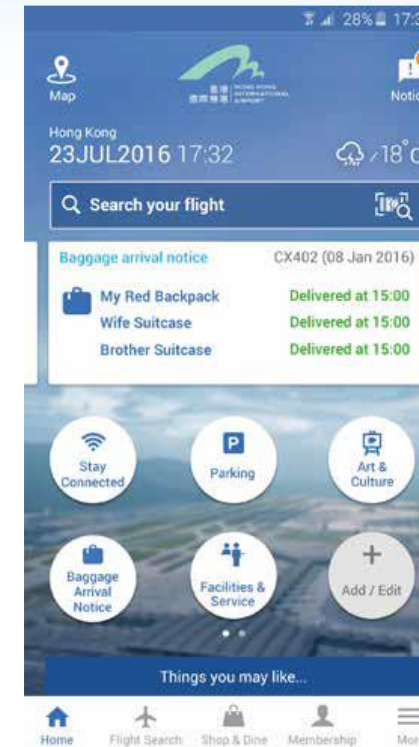
RFID antenna

Dual Mode  
Handheld Terminal





# New RFID Enabled Service – My Tag



BRAND NEW PRODUCT  
**myTAG**  
行李通

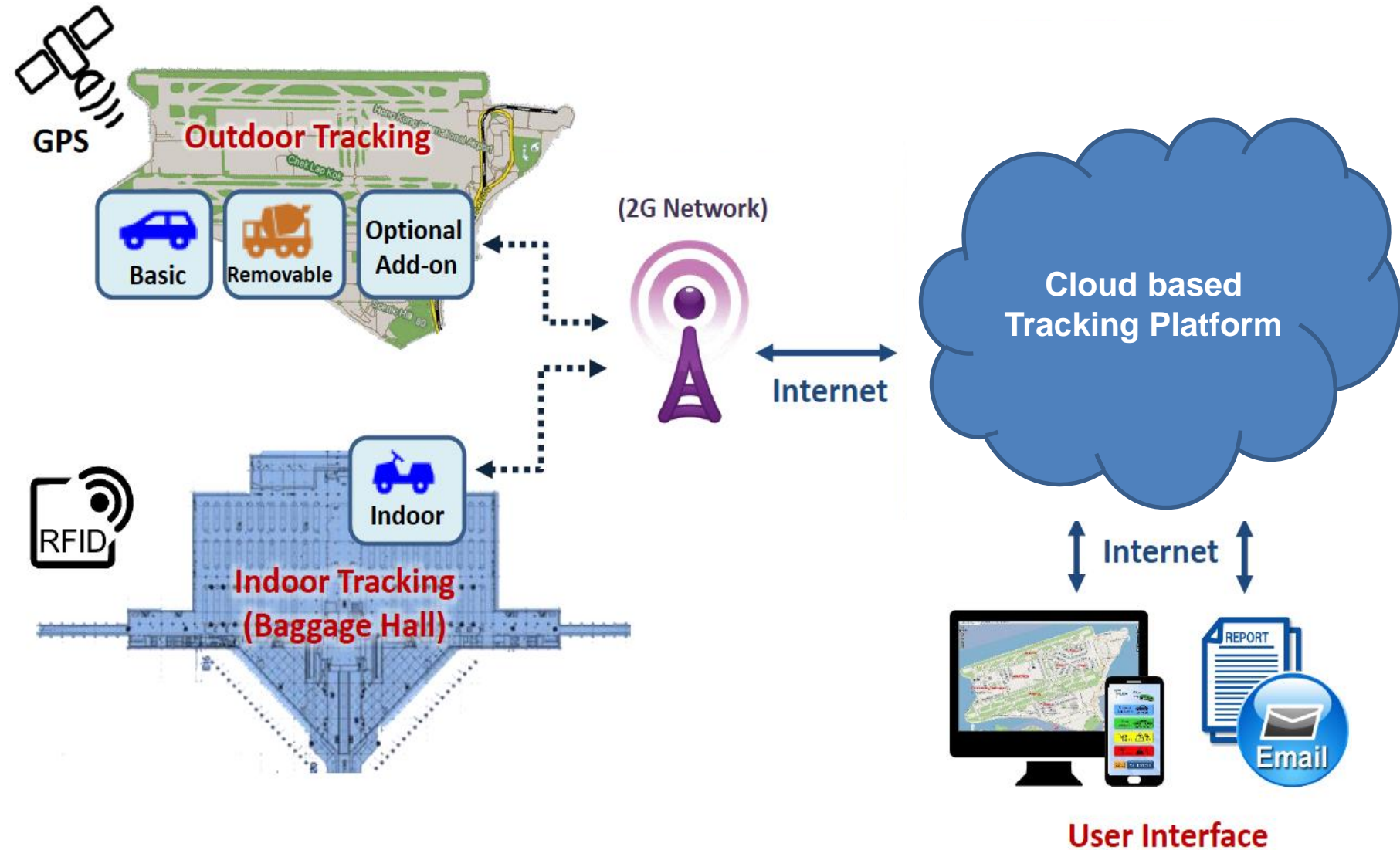


Notify as  
luggage arrives

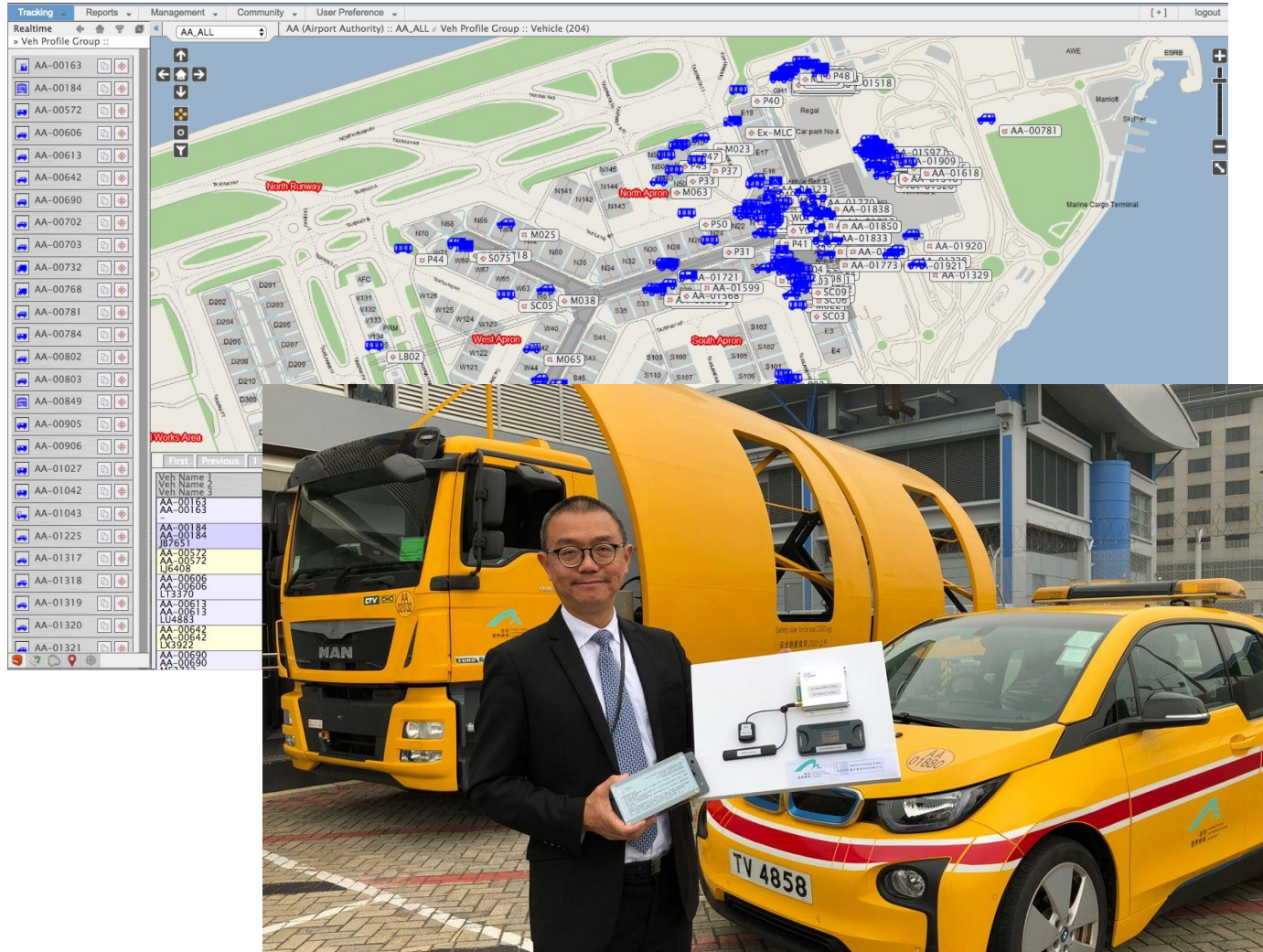
- ... Register via HKG My Flight app
- ... Receive Baggage Arrival Notice



# Vehicle Tracking System



# Vehicle Tracking System



- More than 3500 airside vehicles from >100 companies have GPS tracker installed to track their locations at the airfield
- Baggage tractors also have RFID tags installed to track the whereabouts within the Baggage Processing Area
- Tracked data can be used for incident investigation and resource management
- GPS tracker also enables driver authorization check and speeding alerts
- Future plan is to track non-motorized GSE (Ground Service Equipment)



# When BHS meets VTS



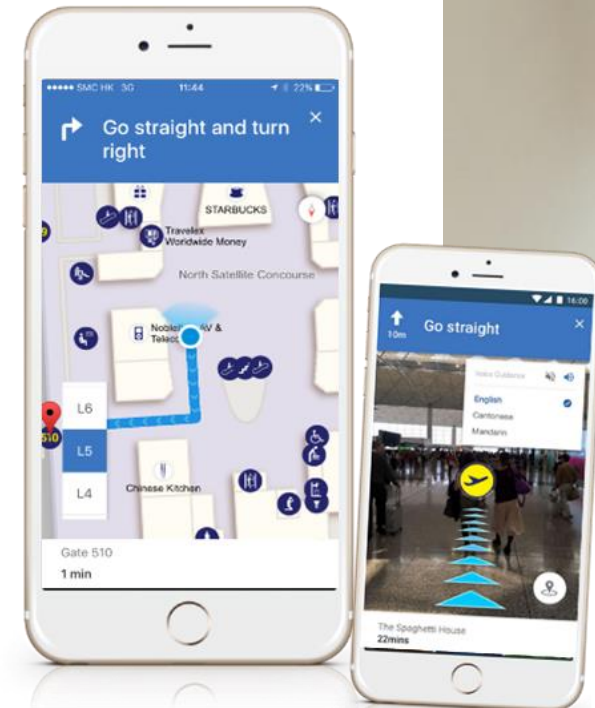
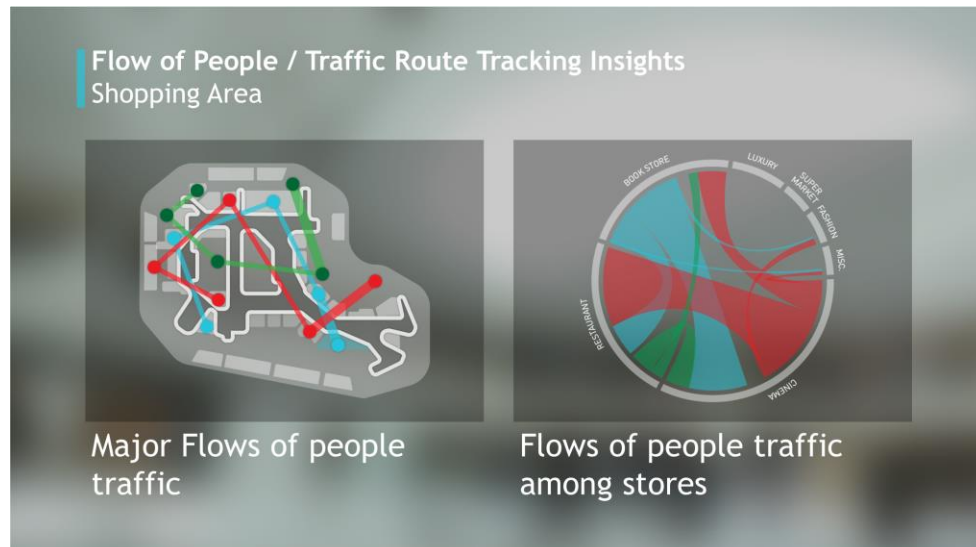
- End-to-end baggage flow can be tracked from aircraft to carousel
- Enable more effective deployment of resources to meet service level



# iBeacon Infrastructure



Around 10000 BLE beacons installed throughout terminal buildings to provide digital landmarks to enable location based mobile applications and analytics



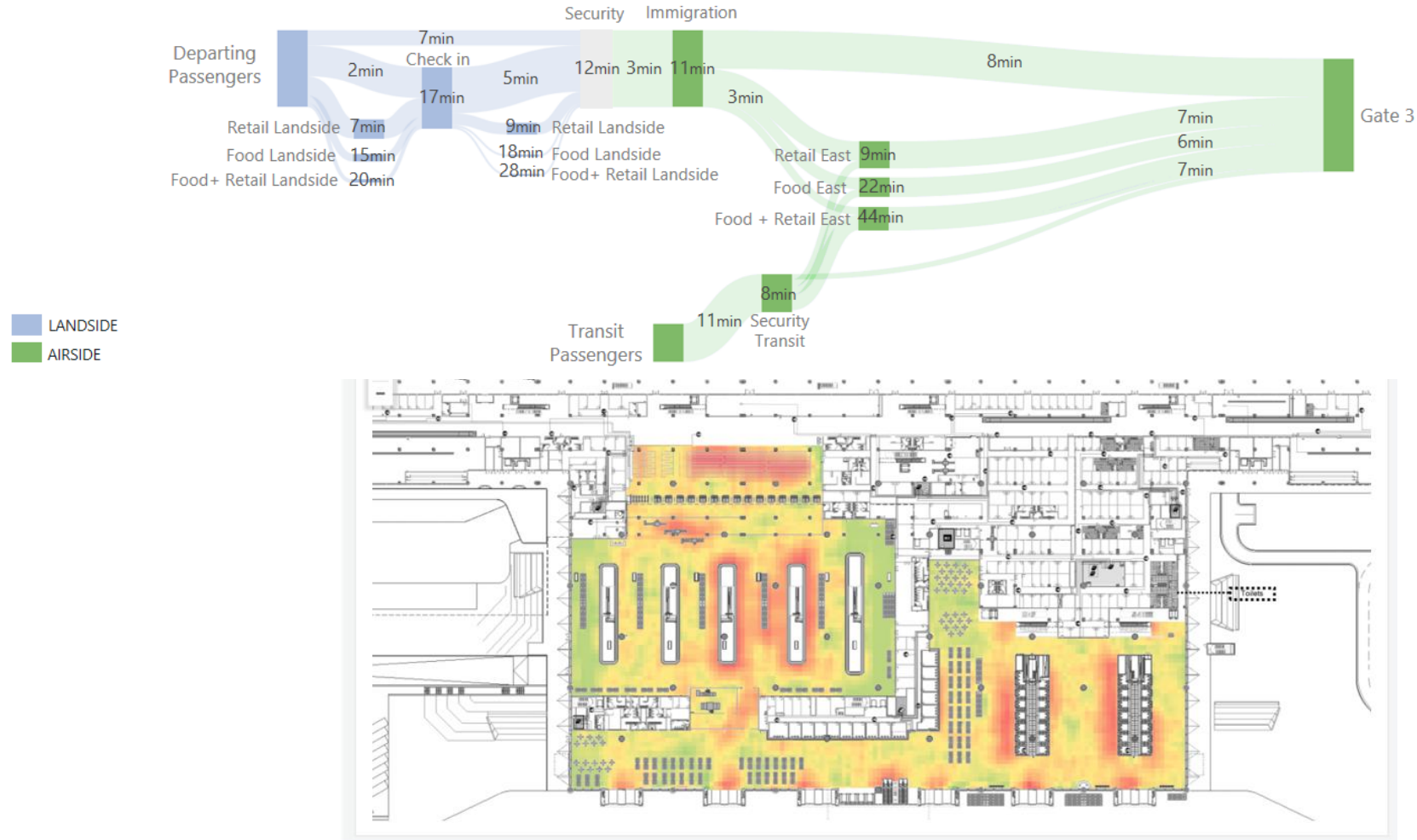


# Free Wi-Fi Infrastructure



# Free Wi-Fi Infrastructure

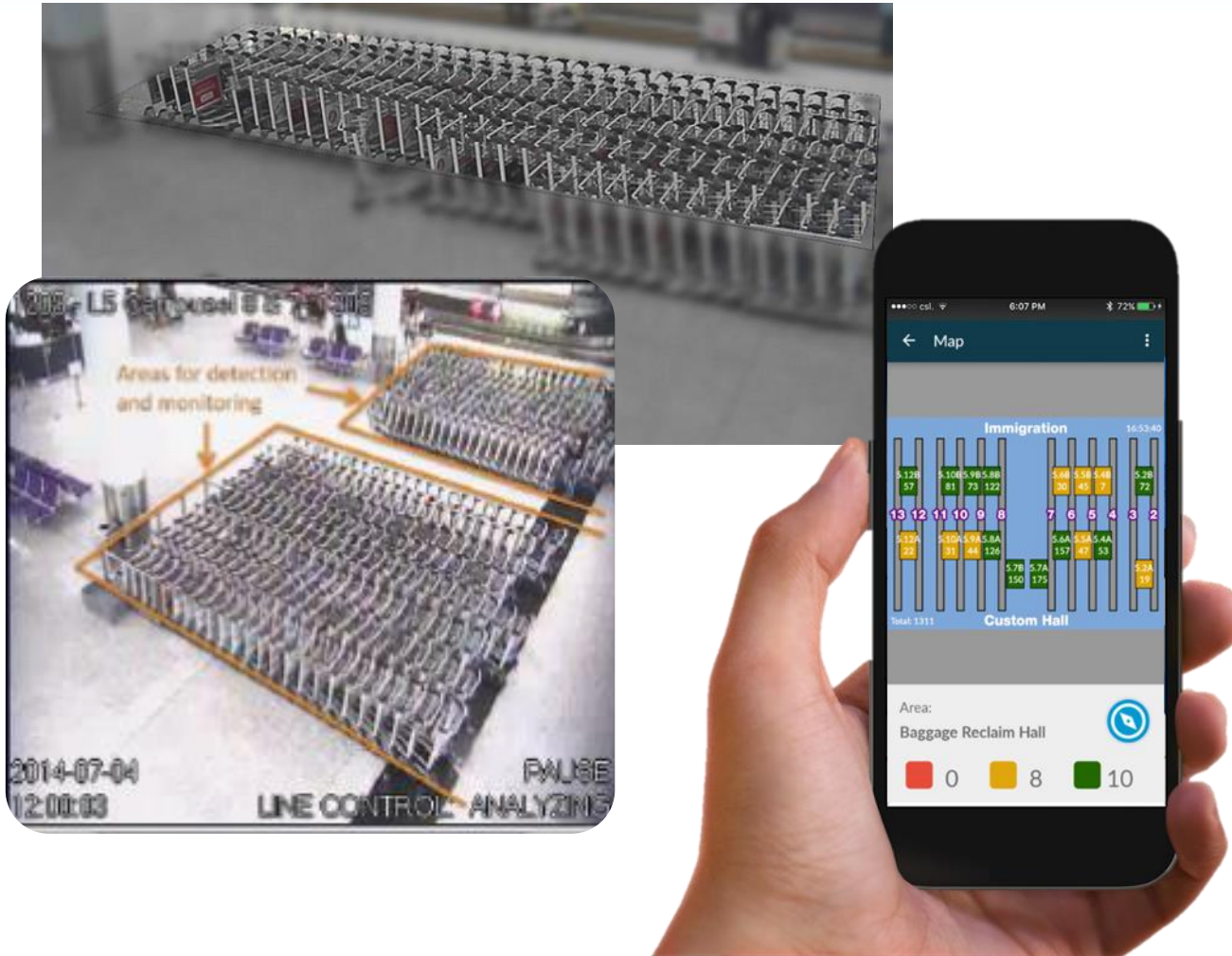
CURRENT BOARDING GATE IS GATE 3



- >700 Wi-Fi APs installed for Free Wi-Fi
- High Speed Wi-Fi Zones
- ~130,000 daily connections with close to 30,000 concurrent device counts at peak
- Passenger Flow Analytics
- Enabler for other IoT applications



# Trolley Availability Management System



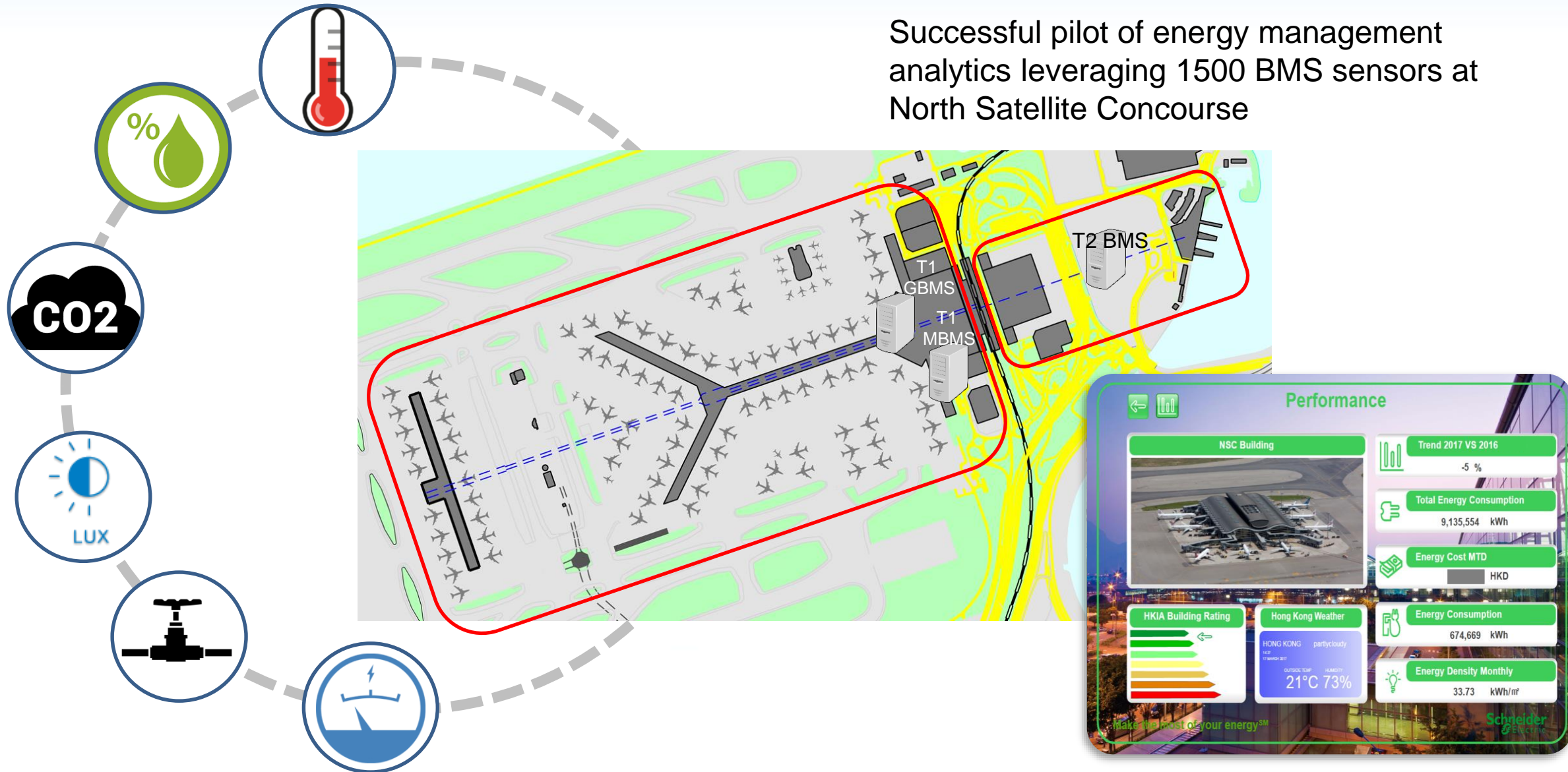
- 18 video cameras are installed in baggage reclaim hall for monitoring trolley availability through machine learning and image based technologies
- Automatic alerts to ensure trolley can be replenished in time



Development Team from CUHK and LSCM

# Building Management System

Successful pilot of energy management analytics leveraging 1500 BMS sensors at North Satellite Concourse





# New IoT Application Examples



# Smart CCTV System



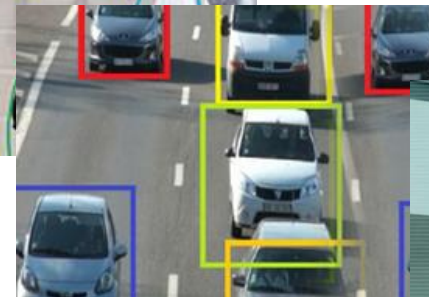
Revamp current CCTV infrastructure into fully digital at 4K resolution

A number of video analytics applications to be implemented such as

- Facial identification/tracking
- People counting/crowd management
- Retail analytics
- Traffic Monitoring



Video Analytics Applications





# Asset Tracking



NB-IoT



Trolleys Tracking



Baggage Cart



Boat Trailer



Bottle trolley



Box trolley



Container Dolly



Flat top dolly



Ground Power Unit



Service steps



Pallet dolly



Turntable container dolly



Wheel change dolly

Non-Motorized GSE Tracking

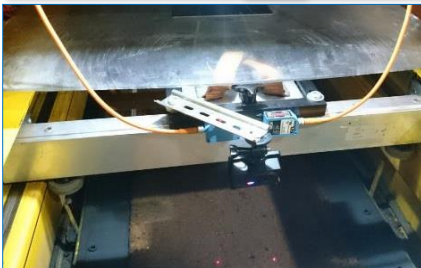
# Asset Condition Monitoring



Runway Pavement Automatic Optical Inspection



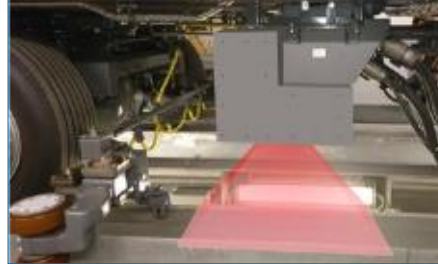
Submarine Inspection for Seawater Inlet / Culvert



BHS Smart Sorter Inspector



Voltage Dip Real-time Monitoring



APM Plinth Optical Inspection and Vibration Detection



Escalator Vibration Monitoring



Lift Monitoring



Drone Inspection for Runway / Buildings

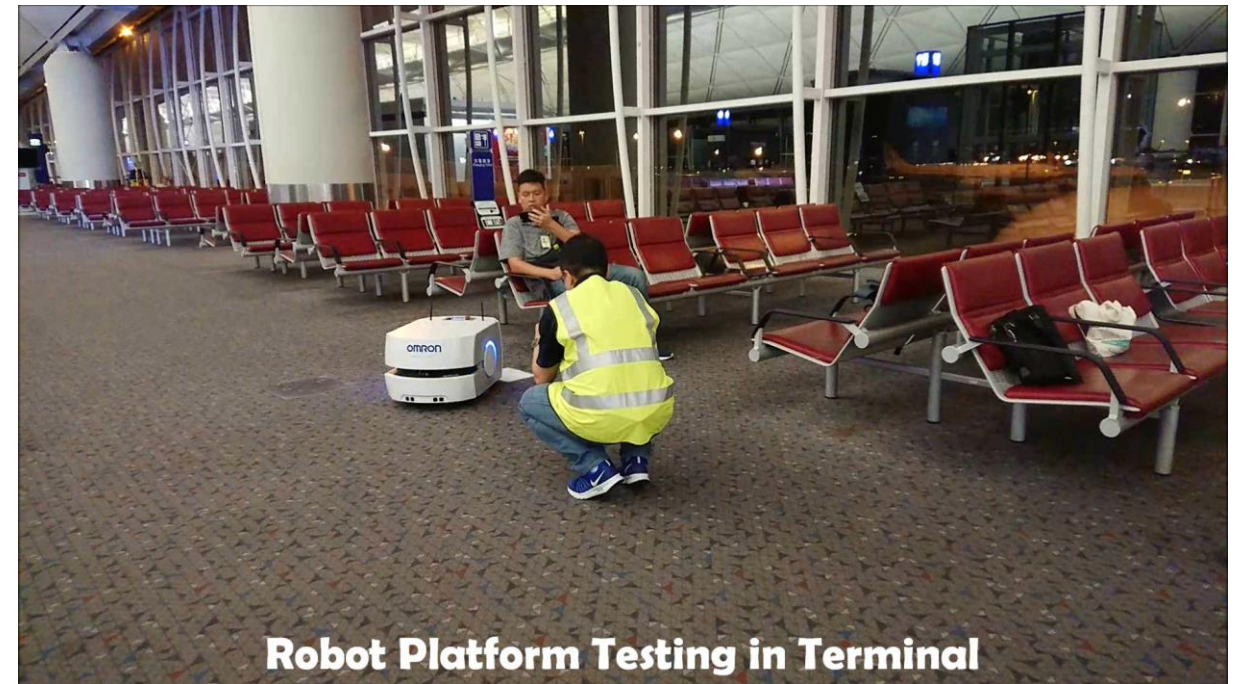


# Robotics and Autonomous Vehicles



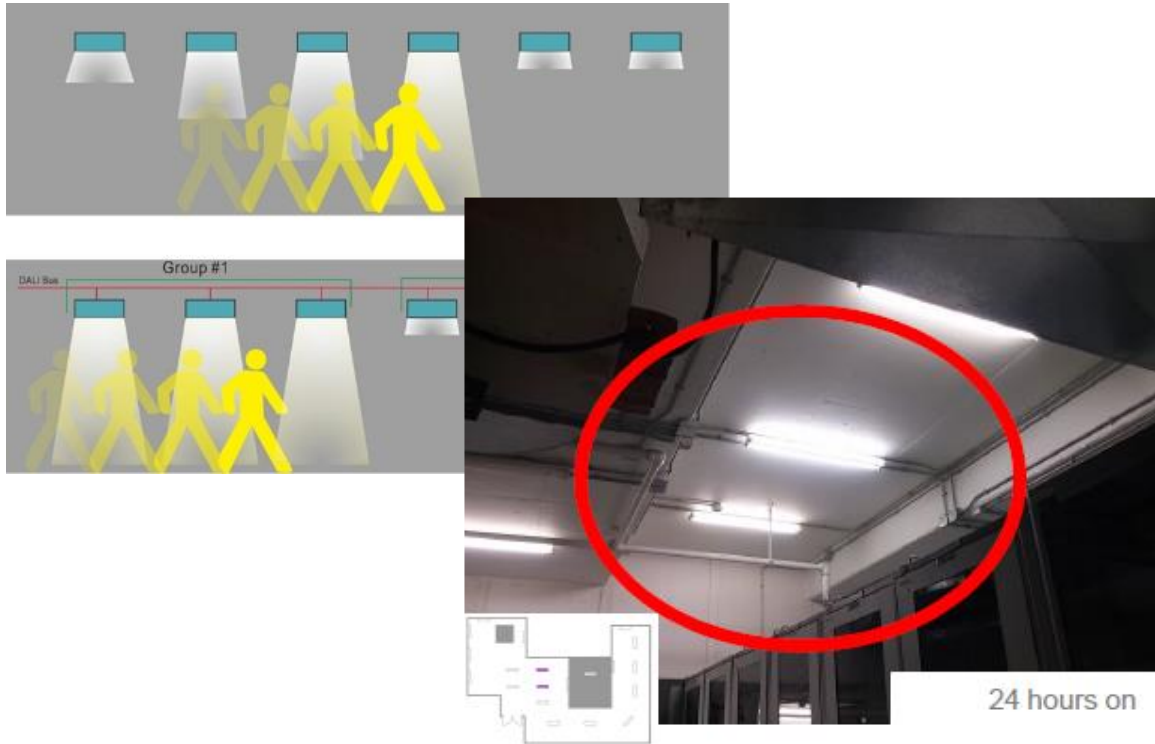
**Autonomous Electric Tractor Concept**

**Indoor robotic platform for patrol, delivery, customer services ....**



**Robot Platform Testing in Terminal**

# Smart Lighting



Smart Indoor Lighting with energy consumption metering and people tracking



Smart outdoor lamp post which can serve as a key IoT infrastructure (CCTV, sensors, wireless base station, Wi-Fi AP, charging point ...)



# Leveraging External “Sensors”

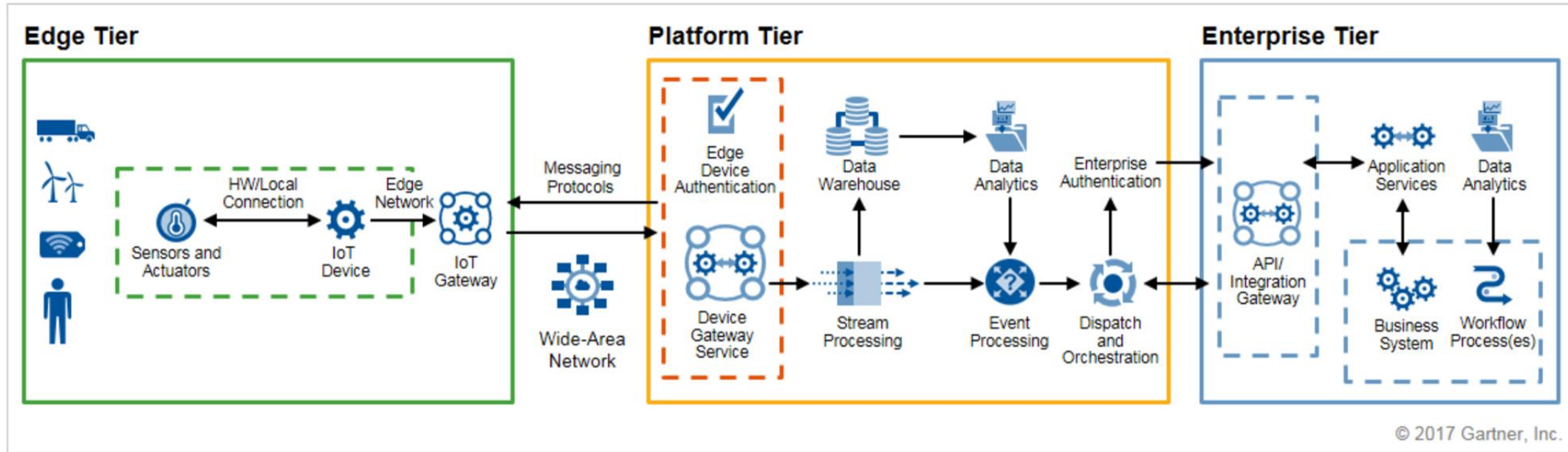


Social Listening can potentially detect abnormality sooner than traditional methods



Mobile operator location tracking data can help to analyze traffic flows and transportation means to/from Airport

# IoT Technology Stack and Challenges



- Availability of sensors and actuators
- Wireless IoT connectivity - Choice and Platform
- Conversion of legacy closed OT systems to open IoT System

- IoT device management
- Authentication and Security
- Data Integration (protocols, Streaming, real-time event processing)
- IoT data platform
- Analytics and modelling
- AI and machine learning
- Bespoke vs generic IoT platform

- Enterprise integration / API Platform
- Cross domain data analytics
- Holistic management (visualization, simulation, predictive)

← **IoT Security Framework** →



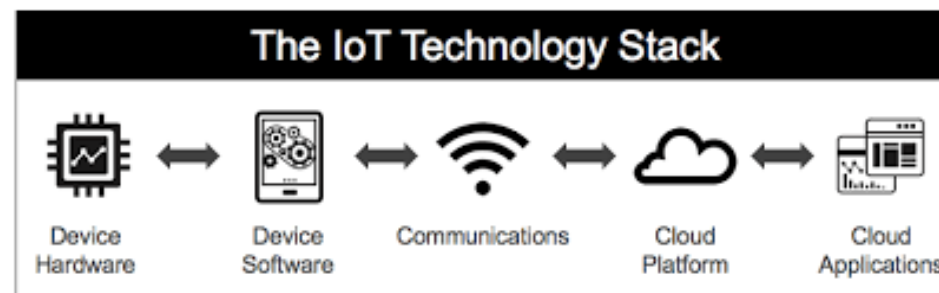
# Current Focus



## Explore more use cases to gain immediate benefits



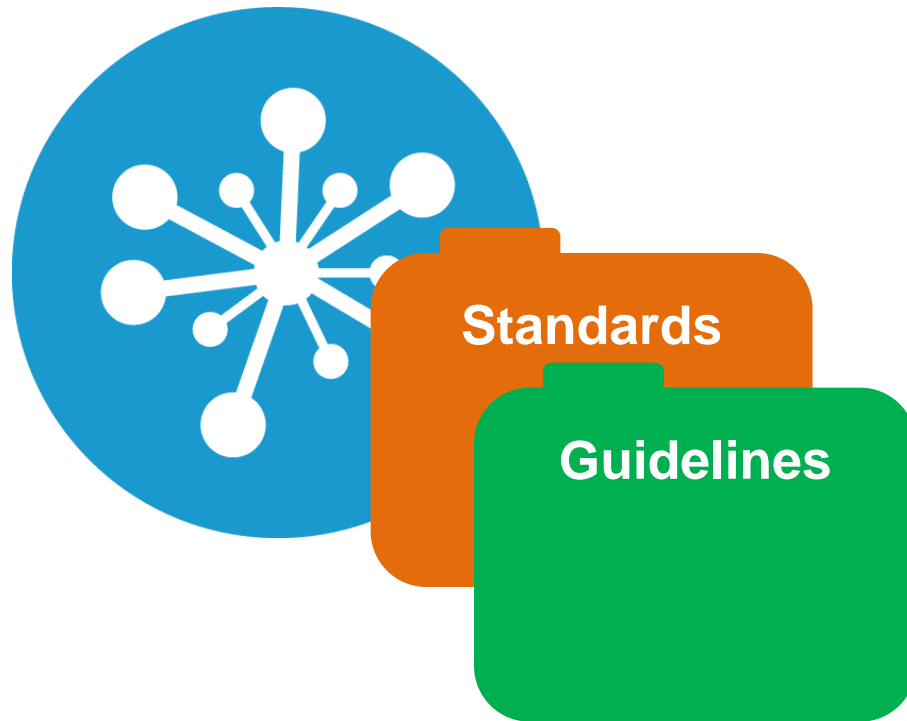
## Data extraction and big data analytics of existing IoT systems



## Seek standardization of IoT technology stack

- Wireless IoT communication
- Data integration
- Common IoT platform
- Analytics and Visualization
- IoT security

# Next Step



**Establish IoT standards and guidelines for implementation**



**Implement common IoT platforms  
(e.g. connectivity, integration, data store,  
analytics ...)**







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AIRPORT

# *Together we create a smarter airport for Hong Kong*

**Biometrics ■ Mobile Technology ■ Robotics ■ Digital Twin ■ Big Data Intelligence**