

Unleashing 5G potential for Smart City Applications

FHKI 5G Symposium

29 July 2022

Cybersecurity

5G

IoT

Data
Analytics

Cloud

Robotics

AI



Smart City Blueprint 2.0



Smart Hospital



Smart Mobility



Smart Construction





5G Connected Smart Hospital

—— Digital Transformation for Medical Services ——

CUHKMC – First Smart Hospital – 5G Fully Connected Hospital



Operating Theatre

5G enables
Remote Consultation



Auditorium

5G enables
Remote Training



5G Everywhere

5G enables
applications E2E
connected to CUHKMC



5G enables Telemedicine

Doctor to Doctor Scenario



Doctor to Patient Scenario



Doctor to Student Scenario



HKT Remote Consultation - Doctor-to-Doctor

Challenges To Medical Team


- ✓ Complication in surgery need real time support from consultant
- ✓ Limited specialists resources

Remote Consultation brings in New Approach

1. Remote Consultation enabled Hospital A enables streaming of multiple videos onto the network for collaboration
2. Remote Consultation enabled Hospital B enables interactive engagement with Hospital A with diagnostic imaging
3. Extensive 5G territory-wide coverage enables consultant at any locations to attend with surgeon in the OT room of Hospital A



GSMA Publication - CUHKMC Case Study



GSMA 5G Case Studies

5G: ENABLING DIGITAL HEALTHCARE

HKT collaborates with CUHK Medical Centre to create a 5G smart hospital for remote consultation, remote training and tele-medicine

HKT **CUHK** **APAC 5G** **FEBRUARY 2022**

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GSMA CASE STUDIES - 5G SMART HOSPITAL

HKT COLLABORATES WITH CUHK MEDICAL CENTRE TO CREATE A 5G SMART HOSPITAL FOR REMOTE CONSULTATION, REMOTE TRAINING AND TELE-MEDICINE

Operator partner: HKT & CUHKMC • **Technologies:** 5G • **Country:** Hong Kong

Reliable high-speed 5G connectivity could transform healthcare by enabling smart hospitals to improve the patient journey and overall operational efficiency. For example, 5G can transfer 4K ultra high definition medical videos and images, such as those obtained from operating theatres and endoscopy centres, for real-time review by remote specialist clinicians.

According to mobile operator HKT, its 5G network is able to support speeds of over 1Gbps with latency of less than 10ms. Such connections are fast and responsive enough to support very high quality 4K video, 3D imaging, virtual reality (VR), augmented reality (AR) and multi-camera views, thereby providing a fully immersive experience for remote clinicians and students.

In Hong Kong, CUHK Medical Centre (CUHKMC) is using HKT's high throughput and low latency 5G to support innovative medical applications, such as remote consultation, remote training, tele-medicine, and treatments guided by AR services. HKT has built full 5G coverage across the entire CUHKMC hospital. Wholly owned by The Chinese University of Hong Kong, CUHKMC has 28 operating rooms, 49 consultation rooms and 516 beds for in-patients.

CUHKMC is using 5G technology to speed up consultation, diagnosis and treatment. In cases where patients need specialist advice and help, front-line medics have historically referred them to an expert in the relevant field of medicine. Such referrals can take time to arrange, delaying treatment. Now, CUHKMC is using 5G-enabled real-time

remote consultation with specialists, eliminating the need for a separate appointment. An on-site doctor can promptly seek a second opinion from a remote specialist, thereby speeding up critical decision-making.

"Through the innovative use of 5G technology to support a wide array of smart hospital applications such as remote consultation (doctor-to-doctor), remote training (doctor-to-student) and telemedicine (doctor-to-patient), resources in the hospital can be optimised and patients can receive the best possible care," explains Tom Chan, Managing Director of Commercial Group of HKT. "5G also supports other innovative applications such as the Internet of Medical Things (IoMT) and robotics to better serve the Hong Kong public."

Tom Chan - Managing Director of Commercial Group of HKT

GSMA CASE STUDIES - 5G SMART HOSPITAL

SUPPORTING SURGERY AND FOLLOW-UP CONSULTATIONS

CUHKMC operating theatres are fully covered with 5G, which is used to transmit multiple 4K video streams of the surgery as well as images captured by medical equipment, such as an endoscope. Where appropriate, multiple video streams are combined into a single view to give the remote clinician an immersive experience of the surgery. Viewed on a mobile device or PC, these visuals can help the remote specialist provide expert opinion on the surgery.

Leverage 5G connectivity, CUHKMC can provide virtual follow-up consultation for patients, reducing the need for them to revisit the hospital. The quality of diagnosis can be further improved by harnessing the IoMT. For example, a connected blood pressure monitor could track the progress of recovering patients, both in the hospital and after discharge.

KEEPING STAFF AND STUDENTS CONNECTED

At the same time, the 5G network ensures reliable connectivity for CUHKMC staff and devices, such as cameras, iPads and medical equipment in operating theatres, endoscopy rooms, patient wards, and the multi-function auditorium, which is used as a training venue for broadcasting live streams of medical procedures. The 5G connectivity is also used to enable remote clinical training for medical students and to support international medical conferences hosted by CUHKMC, with participants physically located in the Greater Bay Area and overseas.

In the face of COVID-19, 5G's capacity for transmitting videos and images to auditoria and students' mobile devices helps ensure the continuance of large-scale clinical training and seminars even during a pandemic outbreak. It can even broadcast high-definition footage of surgical processes to global medical conferences, further strengthening the international standing of Hong Kong's healthcare industry.



GSMA CASE STUDIES - 5G SMART HOSPITAL **2**

<https://www.gsma.com/iot/resources/apac-5g-case-hkt-cuhk/>

5G Connected Healthcare Changing Lives

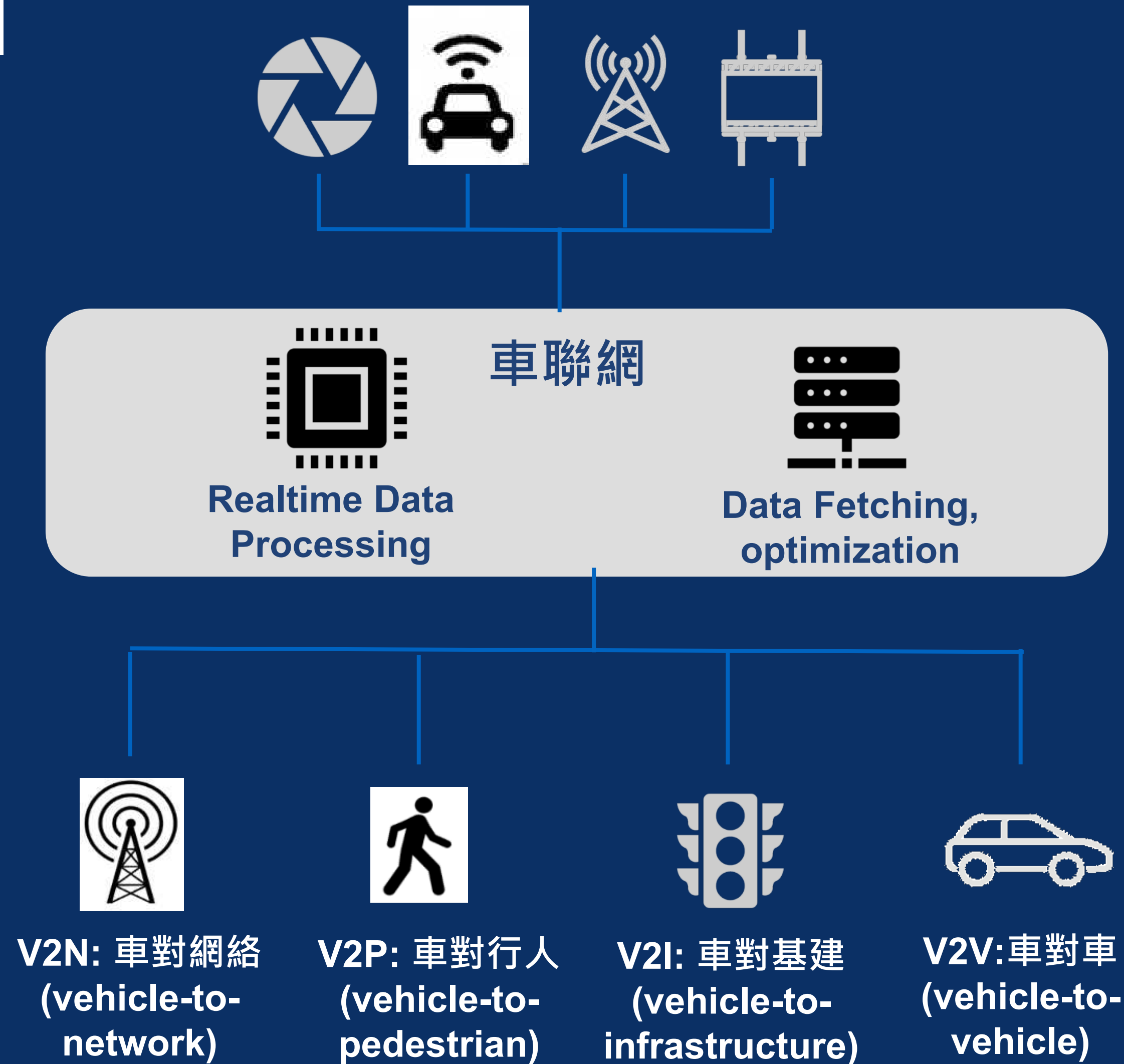




5G Connected Smart Mobility

—— Road Safety & Future Autonomous Driving ——

5G Connected Smart Mobility C-V2X 車聯網



- Provide **low-latency** and **reliable** communications
- Enhance **road safety** and **traffic efficiency**
- Based on **3GPP International Standard**
- Enable **Vehicle & Roadside Infrastructure Co-operation 車路協同** with real-time data exchange and analysis

What are the Benefits? – Early Alerts to Drivers

1. 66% traffic accidents involve:

- Vehicles/Pedestrians (20%)
- Vehicles/Vehicles (46%)

2. Traffic accidents caused by Drivers:

- Sudden braking
- Careless lane changing
- Careless overtaking/passing
- Speeding, loss control



香港青衣發生嚴重交通意外致5死32傷
2018-11-30



屯公壞車尾門奪命 3年前西隧慘劇翻版 專家籲立例禁公路開尾門
2021-08-16

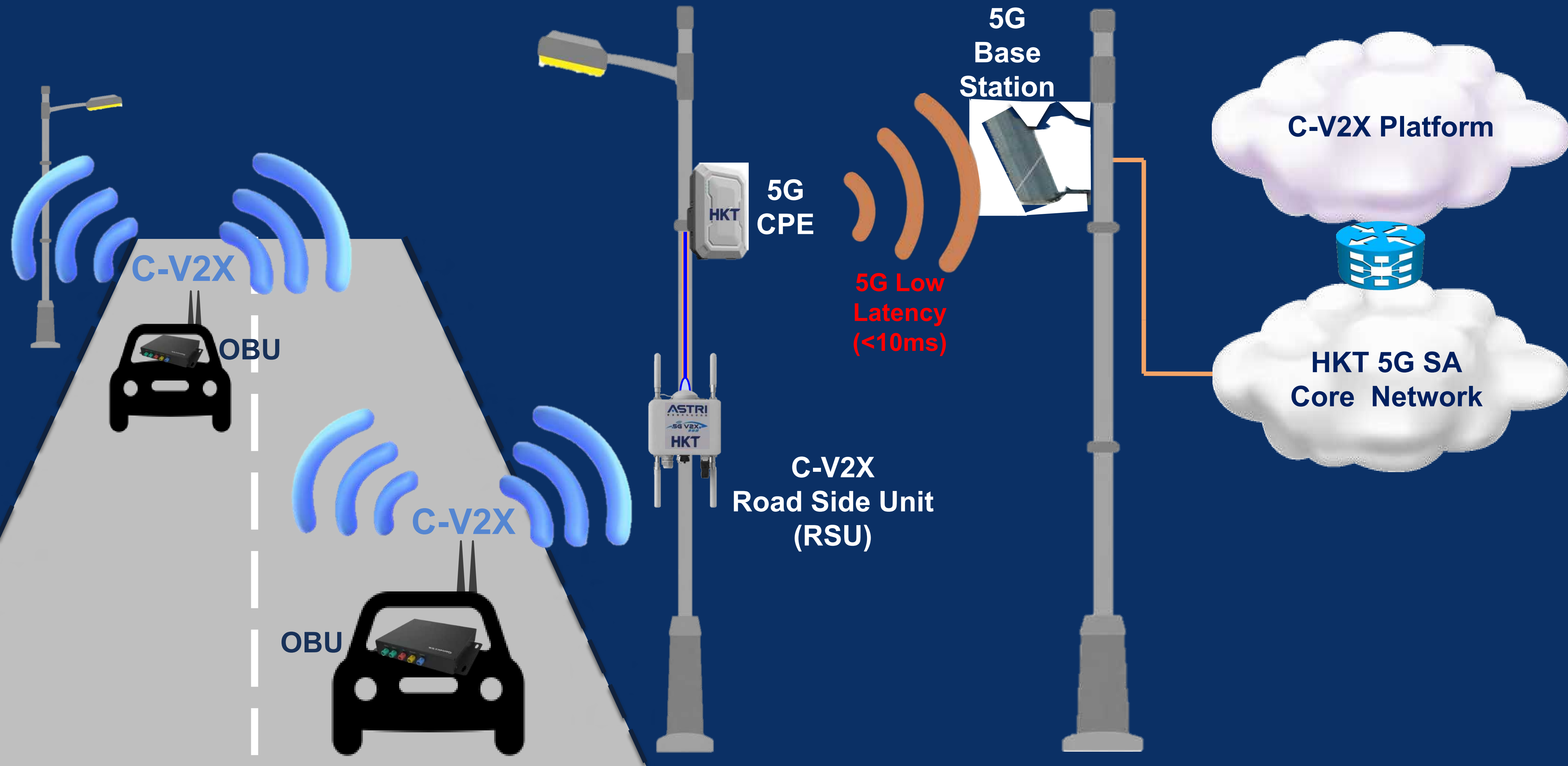


吐露港公路貨車扭避切線私家車 舞龍般失控撞壘翻側



大涌橋路奪命車禍 涉危駕女司機准保釋 另一涉衝燈司機自首
2021-06-15

Why 5G but not 4G? – 5G Ultra Low Latency



FIRST in Hong Kong – 5G C-V2X 14km on Public Road in Shatin

- **First** C-V2X road run on Public Road in HK, supported by ITC & TD
- **First** C-V2X enabled traffic light in HK
- **First** C-V2X enabled roundabout
- One of the **largest** C-V2X deployment

- 14 km road test route (from Science Park to Shatin Town Center)
- 14 Road Side Units (RSU) 路旁設備
- 5 C-V2X enabled Traffic Light 支持車聯網的交通燈
- 11 Road Safety Use Cases (用例)



C-V2X RSU on lamp posts / traffic light posts



TVB 創科導航 – 5G C-V2X 車聯網技術 提升道路安全

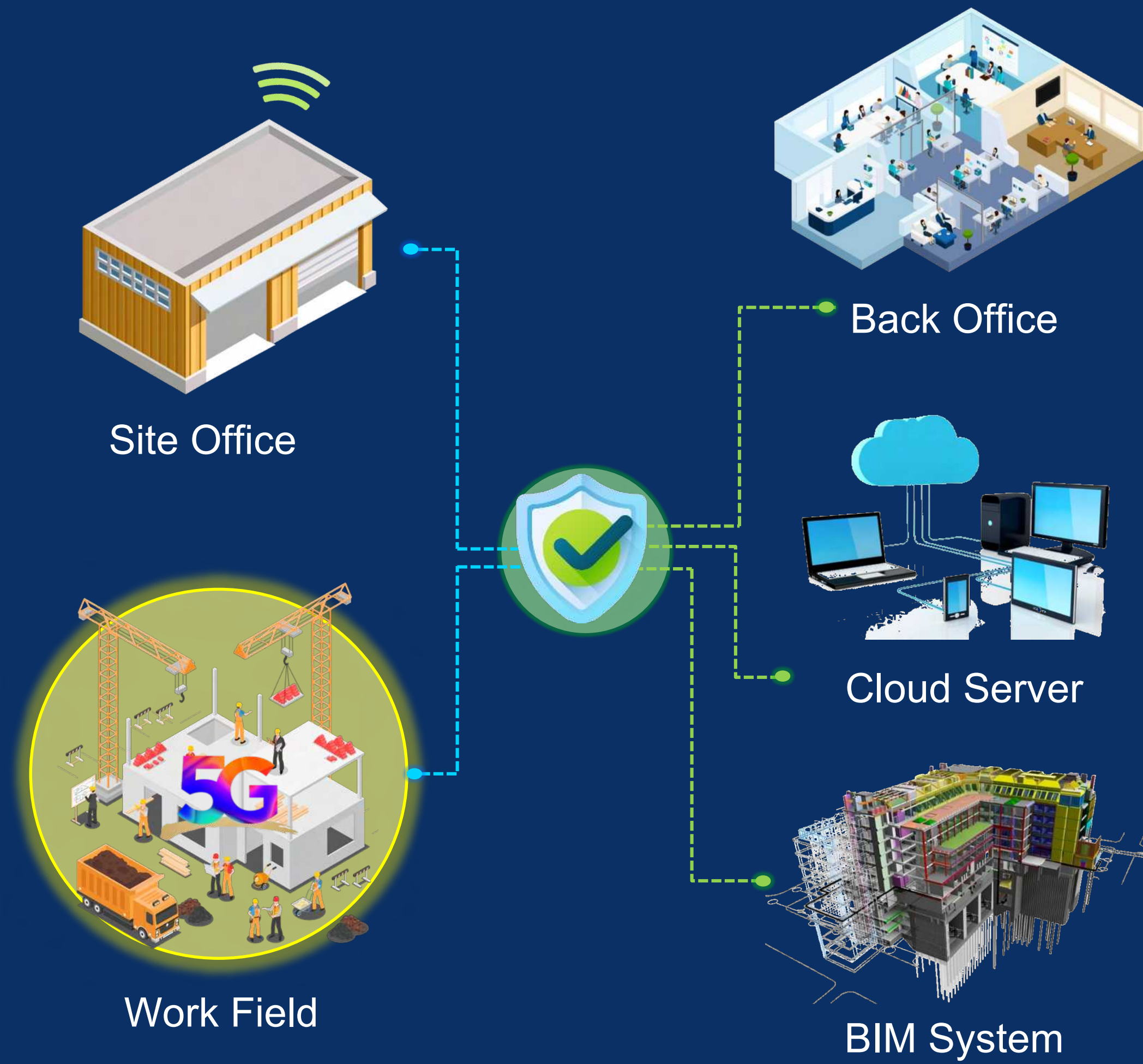




5G Connected Construction

—— Connect all applications with ONE platform ——

Hybrid Connectivity^{5G} supporting Smart Site Applications



- **Site office : Secured Fibre Broadband with Wi-Fi**
 - access BIM/ DWSS System,
 - massive file transfer
 - remote monitoring & management
- **Work field : 5G seamless wireless connection**
 - access to BIM system
 - support different sensors, cameras & other 5G/ IoT applications

Site Office - Fixed Connectivity



Work Field – 5G Connectivity



Smart Site Applications

Better control and management. Enhance Safety & Efficiency.



Camera Surveillance
Safety Guideline Enforcement



Hazard Precaution
Real-time alerts for crane anti-collision



**Manpower & Machinery
Resources Management**
Traceable Record of Machinery Activities

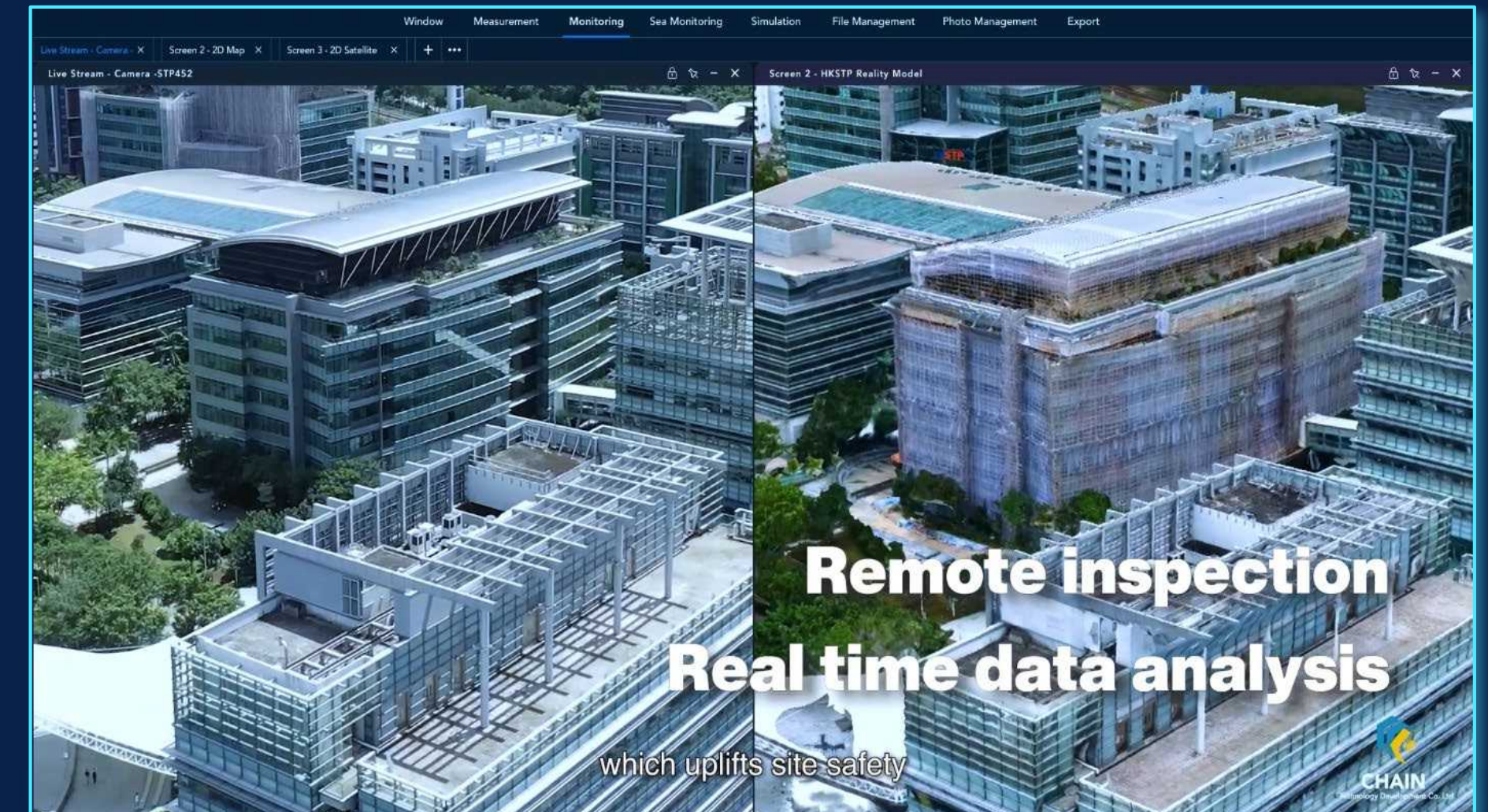


Remote Site Survey & Inspection
Images and data collection for BIM

5G Drones Real-Time Remote Site Monitoring



CAHK STAR Gold Award 2021
Best 5G Applications
最佳 5G 應用方案



5G Drones Real-Time Remote Site Monitoring



CAHK STAR Gold Award
Best 5G Applications
最佳 5G 應用方案



Thank You



Dr. Henry Wong
Head of Wireless Strategic Development
henry.wong@pccw.com