Express Rail Link (XRL) - Seamless Integration with Mainland's High Speed Rail Network

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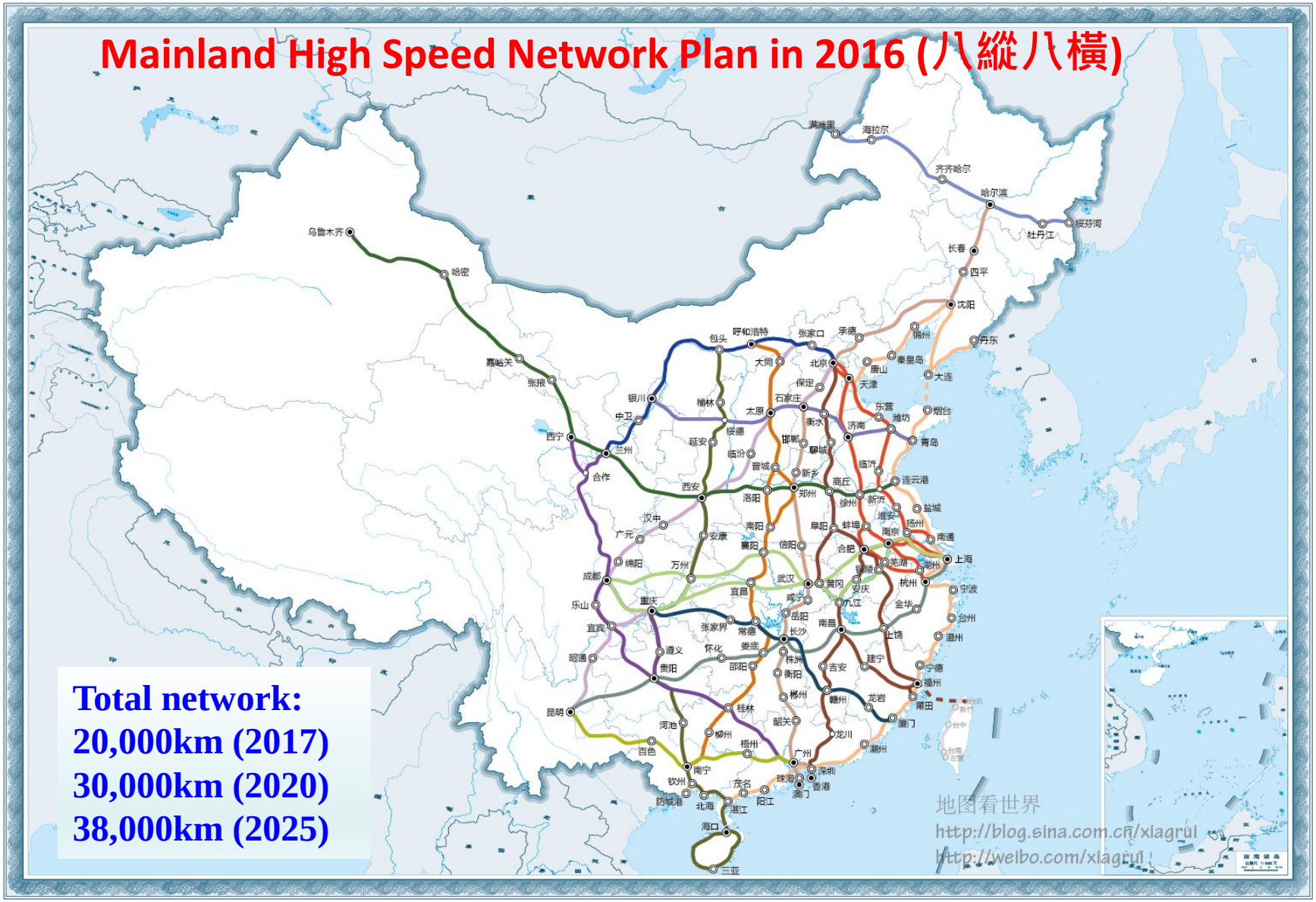
Agenda

1. Key Project Information
2. Interface with Mainland
3. High Speed Train
4. Railway Systems
5. Present Challenges

1. Key Project Information

Mainland High Speed Network Plan in 2016 (八縱八橫)



Total network:
20,000km (2017)
30,000km (2020)
38,000km (2025)

Guangzhou - Shenzhen - Hong Kong Express Rail Link

	路線長度 (公里)	行車時間 (分鐘)
西九龍總站 往 福田	30	14
西九龍總站 往 深州北 (龍華)	39	23
西九龍總站 往 虎門	91	33
西九龍總站 往 廣州南 (石壁)	142	48

XRL Alignment

Tunnel Alignment & Facilities

Vent Building (VB)

Emergency Access Point (EAP)

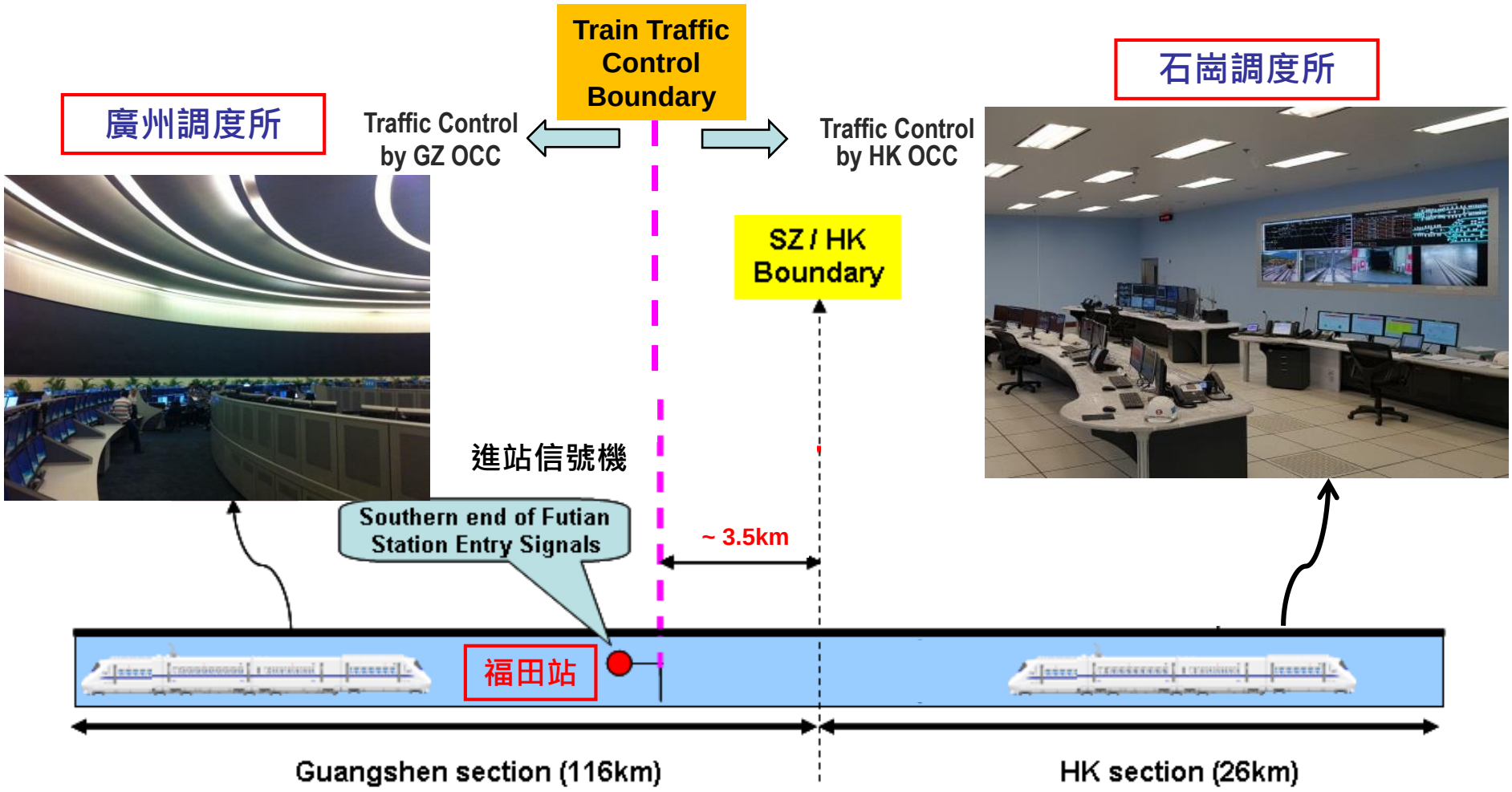
2. Interfaces with the Mainland

Mainland E&M Interface Designs

- Mainland Interface Design by 4th Design Institute (鐵四院) and approved by China Railway Corporation
- Hong Kong / Mainland communication links approved by Ministry of Industry and Information Technology
- Follow MTR design management practice : Interface Requirement Specification, Detailed Interface Specification, Detailed Interface Test Plan, etc

Train Traffic Control Boundary for HK Section

- Adopted Regional Control (屬地管理) for XRL in 2012



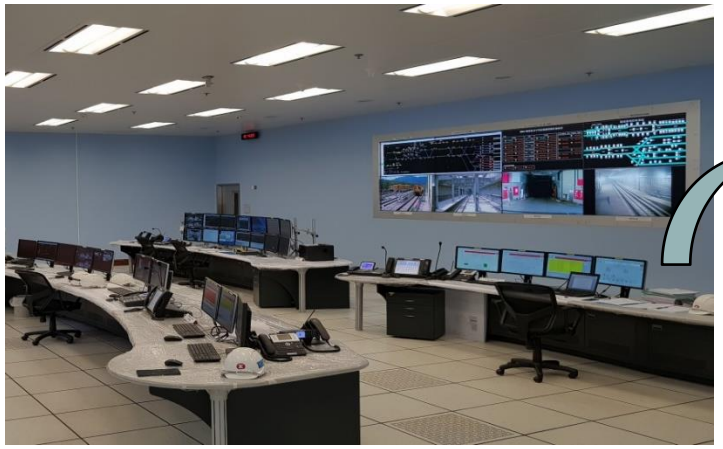
Centralized Control in HK OCC

- **Line overview for traffic monitoring from WKT to Guangzhou South**

Centralized Control in HK OCC

- Traffic Control, Traction Power, Tunnel ECS
- Communications – CCTV, FAS(COM), O&M radio, GSM-R, video conferencing and Emergency Communication System
- Fallback control at WKT SCR in case of HK OCC failure

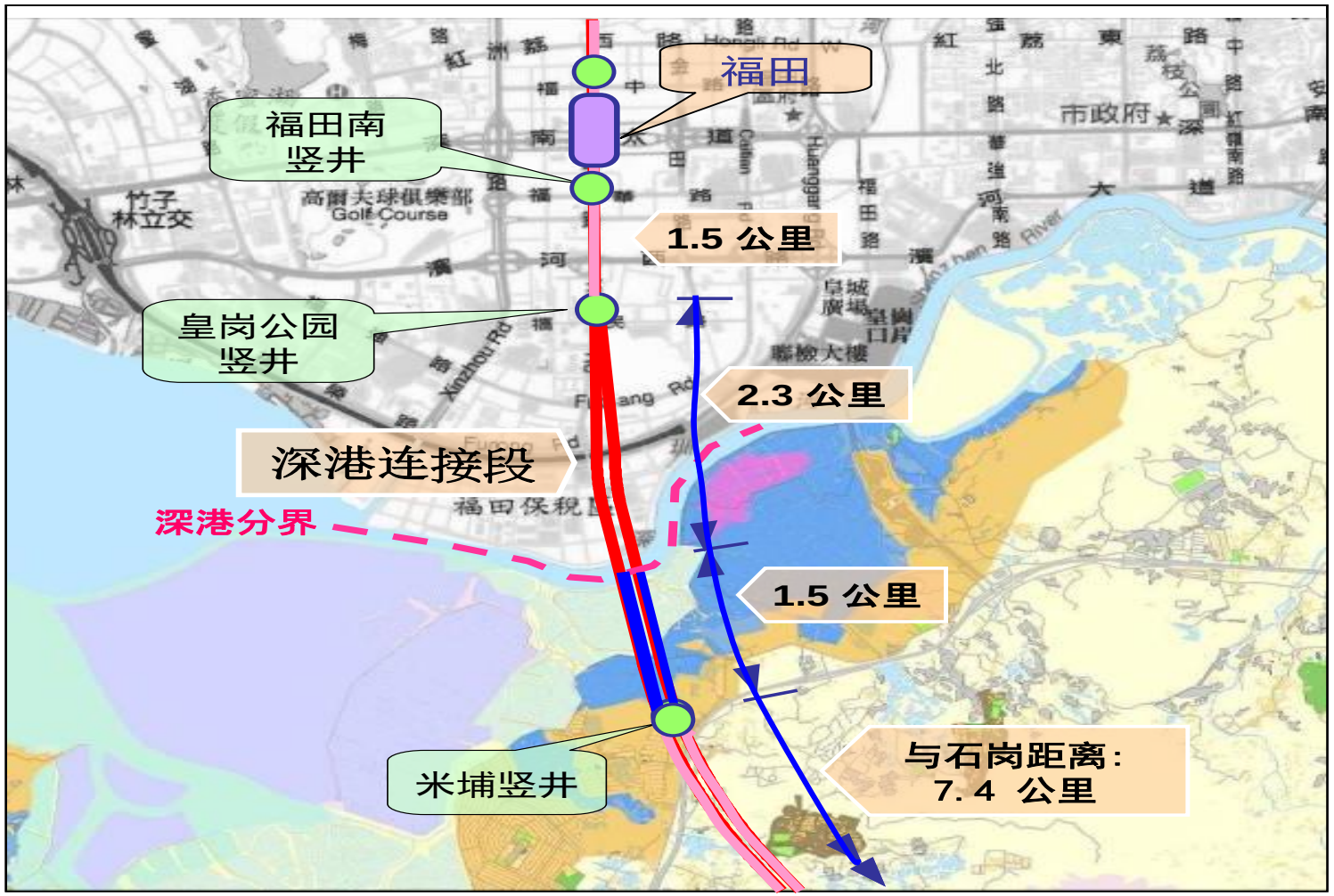
Shek Kong Operations Control Room



Fall Back

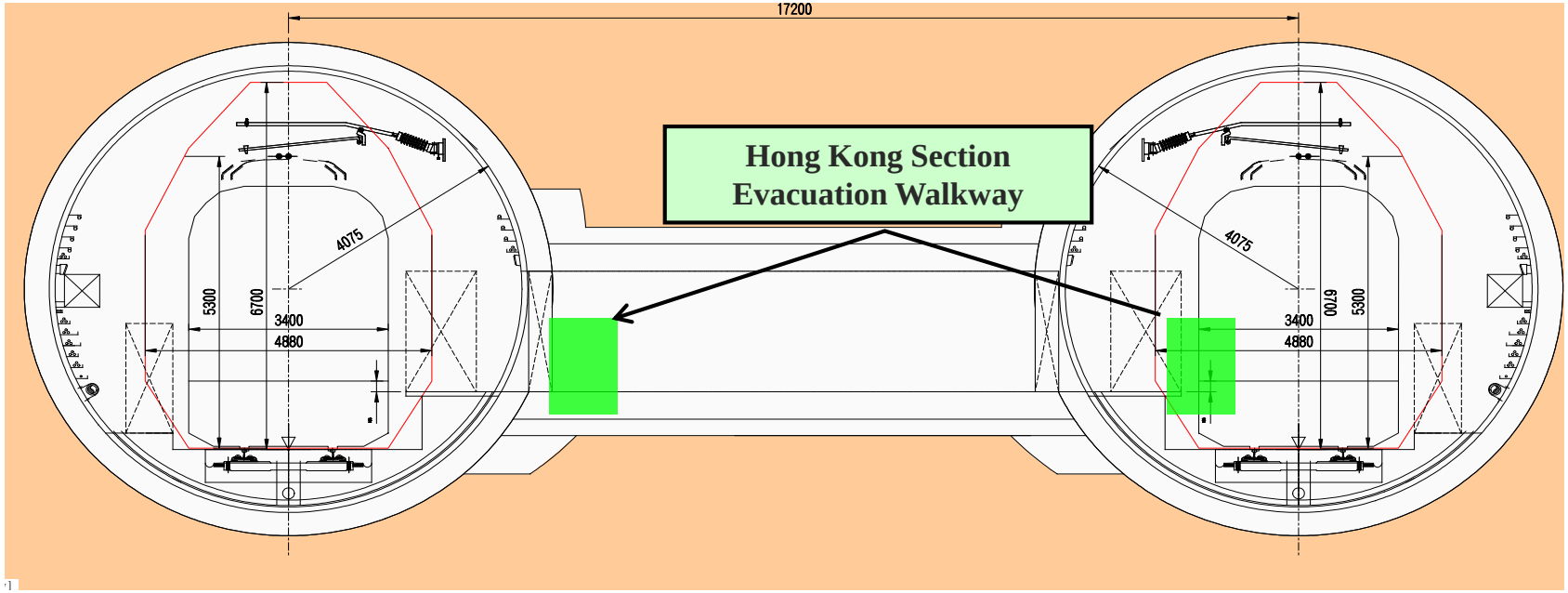
West Kowloon Station Control Room

Cross-boundary Tunnels



Evacuation Walkway in Tunnel

- Cross passage at 250m interval, and doors 4 hours fire-rated
- Cross passage doors normally locked with remote controlled from OCC
- HK section adopts high level evacuation walkway while Mainland section adopts low level evacuation walkway



3. High Speed Train

XRL Train Design from Hong Kong

- Nine 8-car trains procured from Qingdao Sifang 青島四方
- Follow design baseline of CRH380A type developed by Sifang (CRH ~ China Railway High Speed 和諧號)
- New aesthetic interior and exterior outlook
- Type Testing at Hangzhou-Changsha section (杭州~長沙段)
- Technical enhancements on top of the proven CRH380A design following specific MTR requirements
  - Number of passengers: 579 seats + 2 wheel chair space
  - Design speed : 350km/h
  - Operating speed (mainland section): 300km/h
  - Operating speed (HK section): 200km/h

3rd party trains from Mainland

- Mainland train type certification to operate in HK
  - Over 10 train types, i.e. CRH380A/AL, CRH 380B/BL, CRH 1A/1B/1E, CRH1A-A, CRH2A/2B/2E, CRH3C, CR400AF, CR400BF
- Kinematic Envelope endorsed by Expert Review Panel (專家評審) to accommodate evacuation walkway and other specific areas,

3rd party trains certification framework

- Kinematic Envelope endorsed by Expert Review Panel (專家評審) to accommodate evacuation walkway and other specific areas
- Certification process :-
  - Preparation Stage to identify the verification items, review technical documentation, prepare test procedure
  - Verification Stage to perform inspection and testing in the Mainland and Hong Kong
  - Approval Stage to compile technical assessment report and obtain approval from the regulatory authority

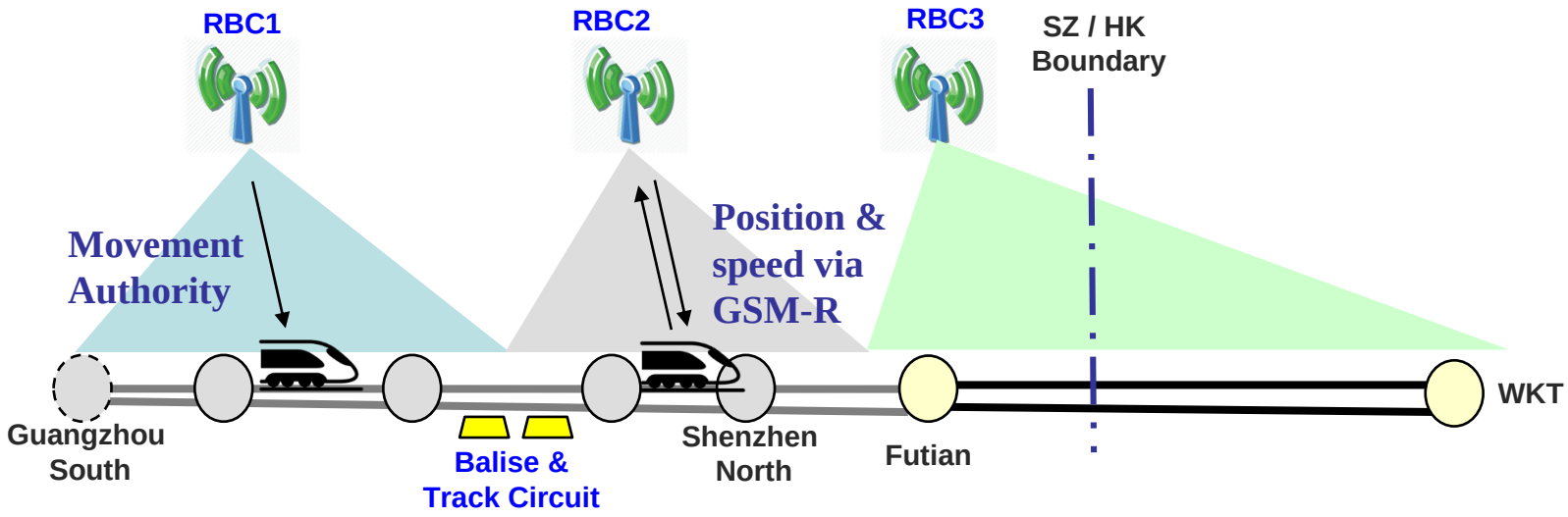
4. Railway Systems

Signalling System

- Chinese Train Control System (CTCS) to ensure interoperability with Mainland infrastructure and trains
- CTCS-2 based on ETCS Level 1
  - Train-track communications via track circuit and balise
- CTCS-3 based on ETCS Level 2
  - GSM-R radio for train-track communications for 350km/h design speed
- CTCS-3 train using CTCS-2 as back up in case of failure

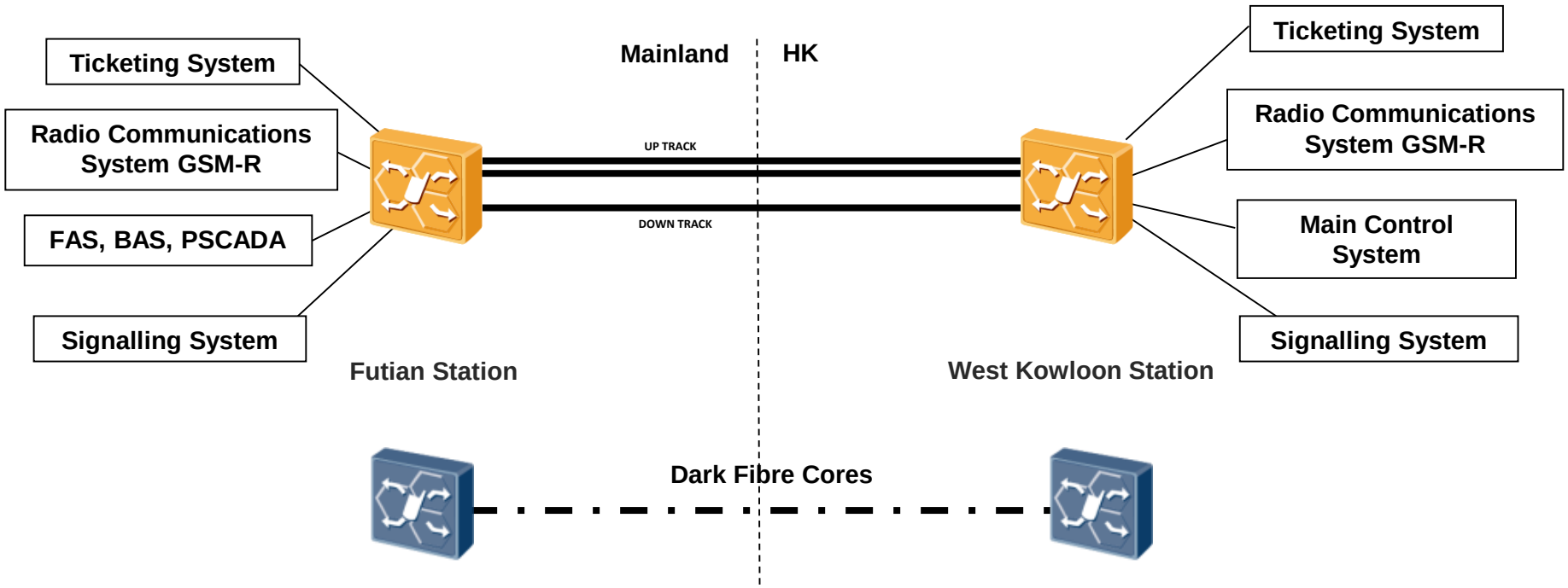
Signalling System for CTCS-3

- Radio block centre (RBC) issues movement authority to train based real time information – position, speed, alignment, route, temporary speed restriction
- On-board computer provides target speed for driver

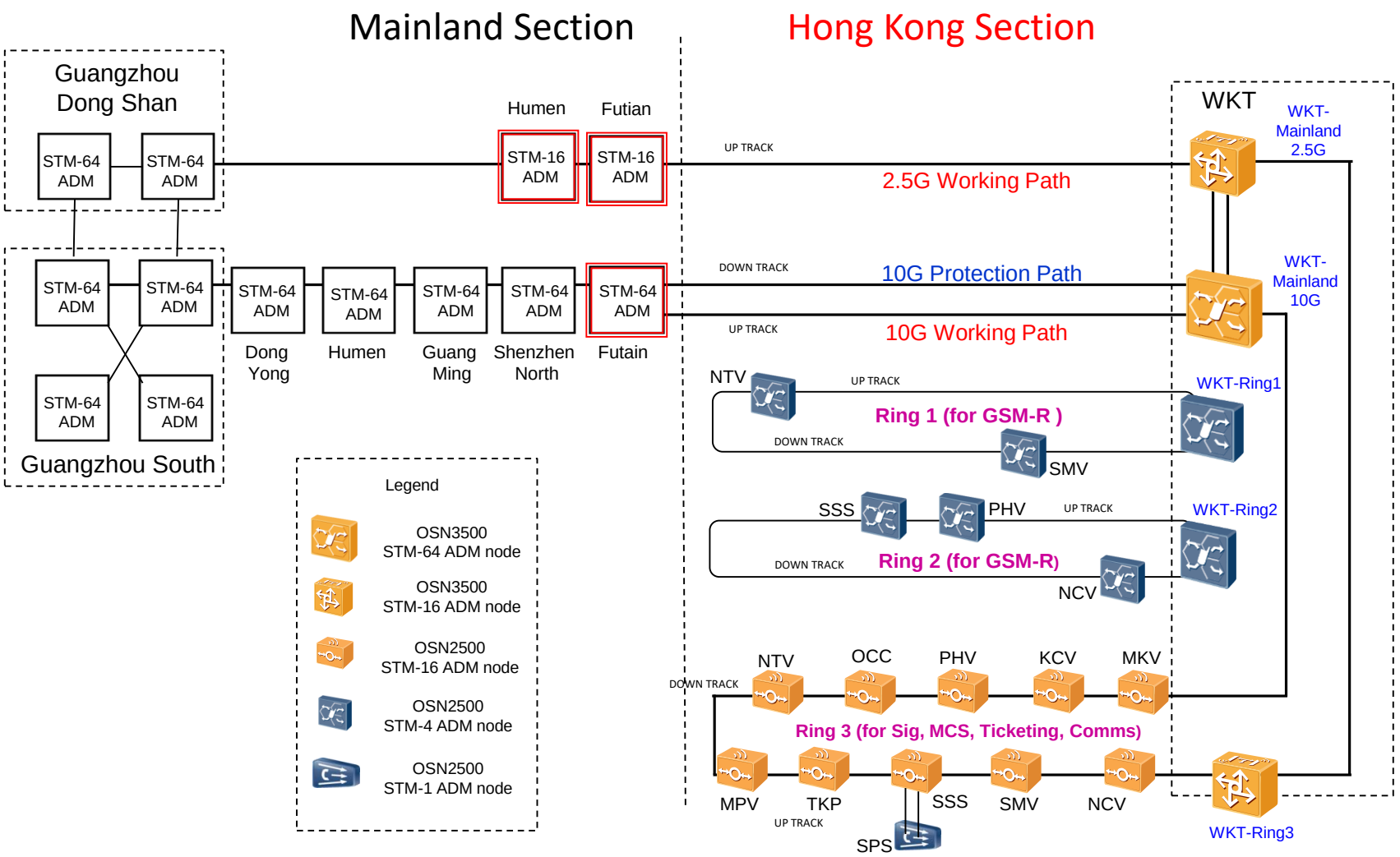


BackboneTransmission Network

- Dedicated fibre optic cables via cross-boundary tunnel
- Transmission of voice and data with cable route diversity
- Dark fibre cables provided for Signalling, MCS, Ticketing

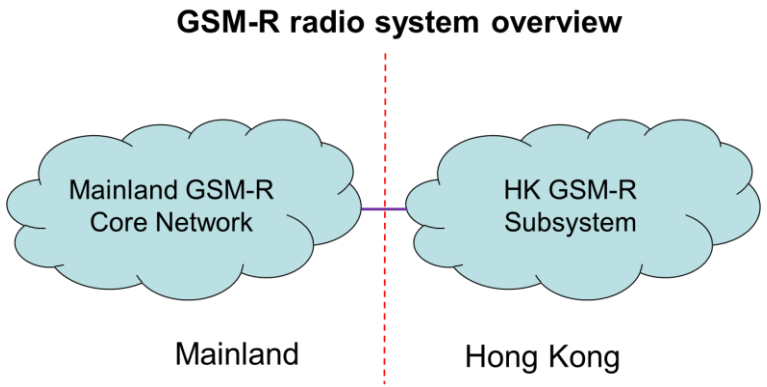


Backbone Transmission Network



Radio Communications Systems : GSM-R

- System function
  - 2-way data transmission channel for signaling CTCS-3 train control at high speed based on GSM technology
  - Seamless wireless voice and data communication for train crew and OCC
- Same frequency band as the Mainland :
  - 885-889MHz Up-link, 930-934MHz Down-link
- Base station subsystem in HK to connect with Mainland GSM-R core network via optical fibre
- Coordination with HK Mobile Network Operator to ensure no interference



Main Control System

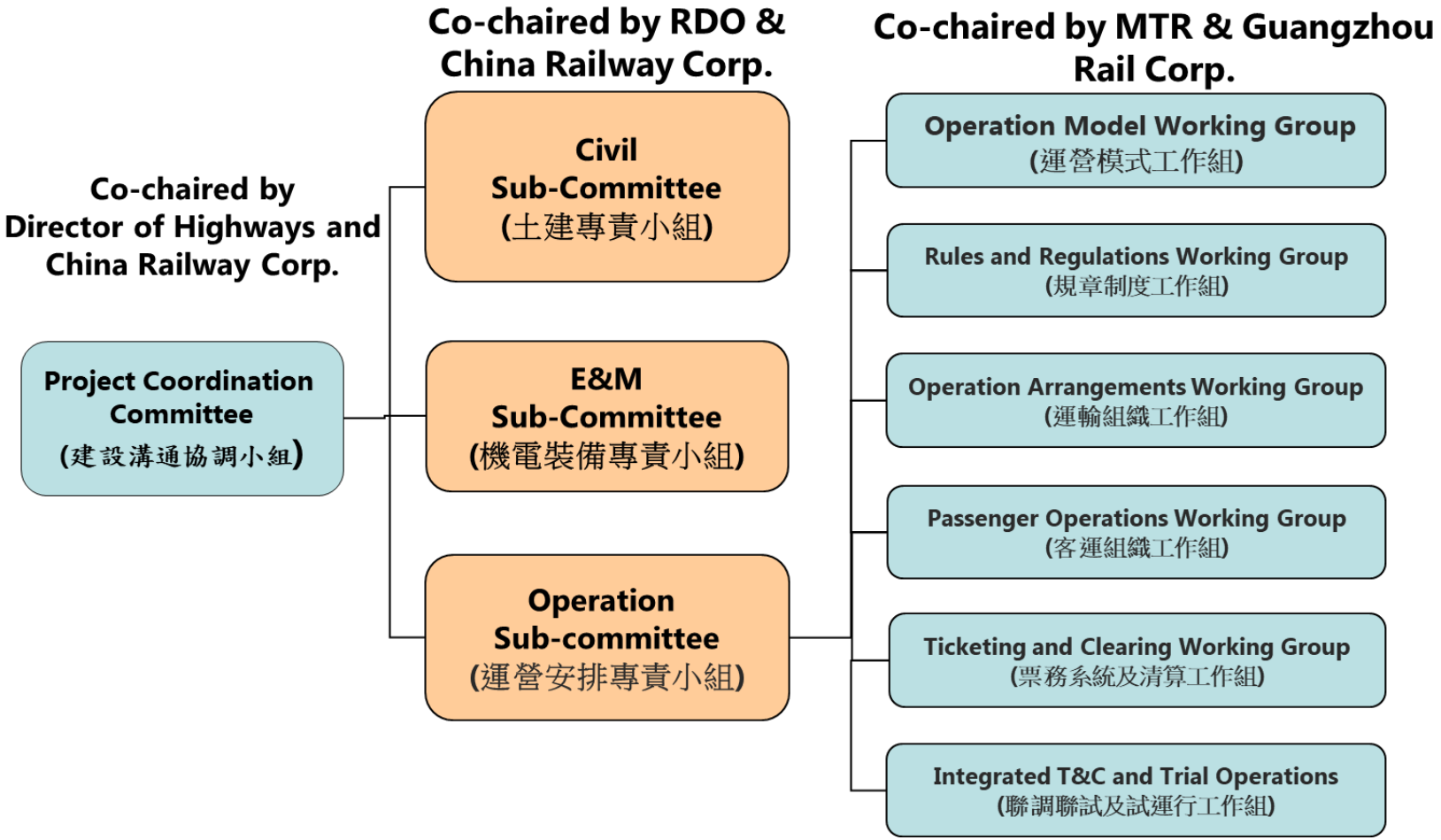
- **Hong Kong Main Control System interfaces with 3 subsystems of Mainland :**
  - **Fire Alarm System (FAS) for Futian Station and trackside services**
  - **PSCADA for 25kV Traction Power and Overhead Line equipment**
    - **Monitor 25kV traction equipment without control**
  - **Building Automation System (BAS) for tunnel lighting, exit signs, cross passage door, sump pumps and tunnel ventilation fans**
    - **Tunnel Ventilation Fan coordinated control mode via MCS/BAS interface**

5. Key Challenges

Key Challenges

- **Numerous stakeholders :**
  - **China Railway Corporation, Guangzhou Rail Corporation, Mainland Guang-Shen-Gang project company, 4th Design and Survey Institute, China Academy of Railway Sciences (CARS), Government of Hong Kong SAR**
  - **3-tier hierarchy of coordination committees, subcommittees and working groups**
  - **Dedicated T&C Command Centre**

Mainland Liaison – Committee, Subcommittees and Working Groups



Progress of Cross Boundary Dynamic T&C

- Guangzhou OCC and HK OCC connected
- Cross boundary dynamic T&C commenced in July 2017
- Speed Verification tests at 220km/h for infrastructure using the Comprehensive Inspection Train successfully completed
- Signaling dynamic tests by 841A and CARS 鐵科院 in progress
- Type testing on Hong Kong Train completed
- Dynamic T&C to be completed by end 2017
- XRL opening expected Q3/2018

Q & A