

BUBE projekt távközlési tapasztalatai, új technológiák az európai vasutak távközlési rendszereiben

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Soroksar-Kelebia line Delivery with Professional Team and Mutual Cooperation

Huawei Project Scope

Hungary Soroksar-Kelebia line: 150Km, 2 BSC & 17 BTS sites with tower and base station, IP network

Milestone Achieved



Accepted and Transferred Tower



Installed tower



Joint test for BSC UAT & NOBO certification



Joint Verification before Dark Test

Dedicated Team

- 100 + Engineers
- Rep. Office + EU region+ HQ;
- Service+ product+ R&D
- Design, delivery, NoBo certification...

High Level Support

- Huawei Corporate level

Professional Delivery

- Experts from global railway project
- E2E delivery from design to acceptance

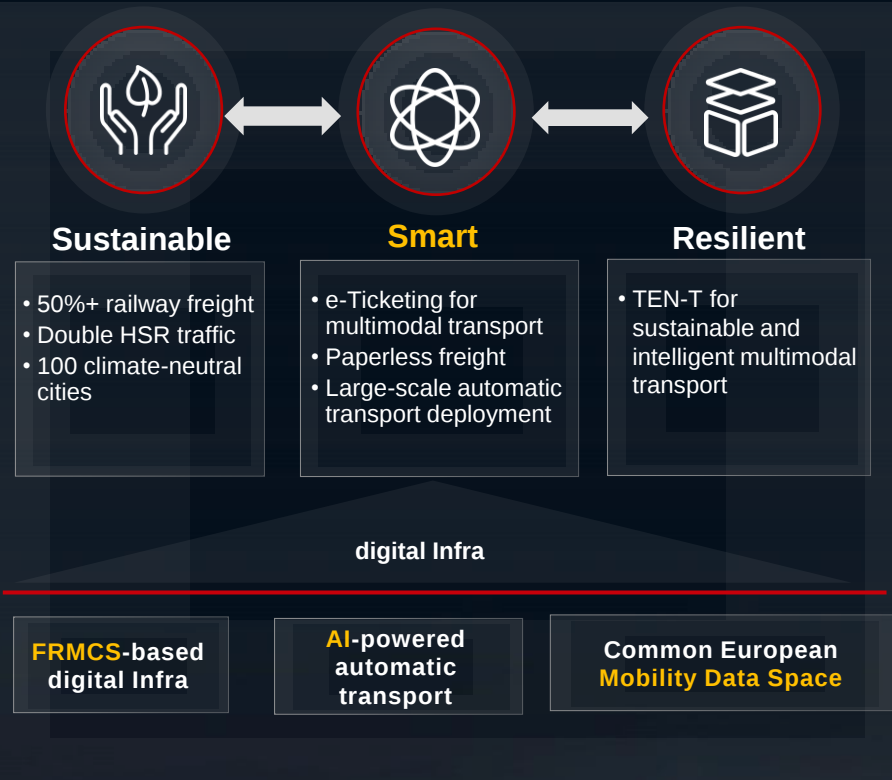
Technical Assurance

- 3-Domain team: Civil Work, GSMR, IP
- GSC/RSC 7*24 Remote support

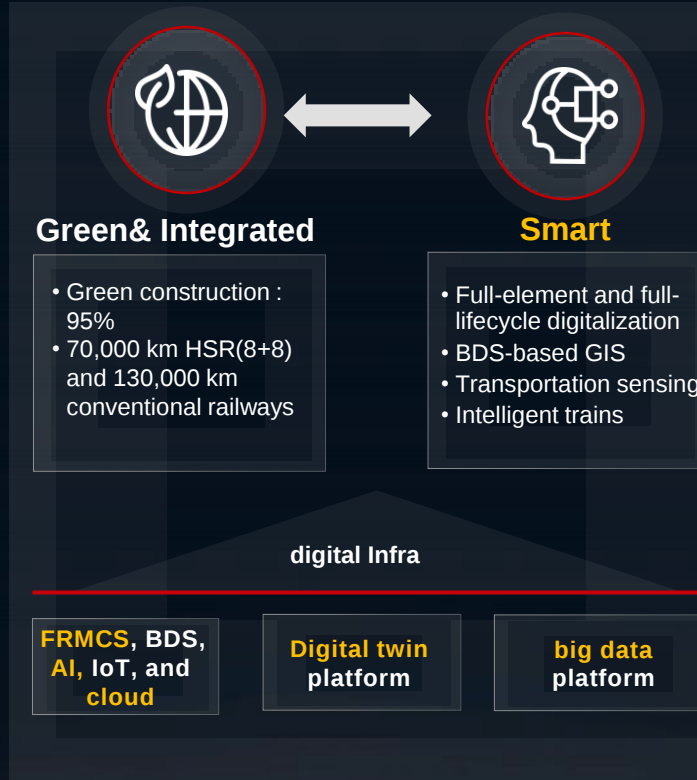
- Mature solution, Professional Team, Efficient Communication
- Smooth Collaboration among each party: MAV/JV/CRE/ITS/Huawei

3 Key Drivers to Reshape Future Railway: **Broadband, Cloud, and AI**

Europe: Future Mobility 2030



China: Strong Transportation 2035



PRASA Strategy



Go **Broadband**

Go **Cloud**

Go **AI**

Railway “Going Digital” for a Better, Safer, more Efficient Transportation

RAIL INFRA

To increase connectivity and accessibility of rail

China Railway

Vision 2035

- Railway in total: 159,000 km -> **200,000km**
Connects 99.5% of cities with 200K population
- HSR: 45,000km -> **70,000 km**
connects 98% of cities with 500K+ population



Europe

- Shift2Rail
- TEN-T(Trans-European Transport Networks)

By 2030, 500B Euro investment to complete TEN-T backbone



DIGITAL INFRA

to improve Capacity, Efficiency, Safety of Rail

Transportation Capacity



ETCS 2/3



FRMCS



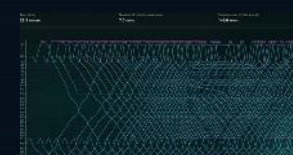
IP+OPTICAL

Europe: by 2030, 50%+ freight and 100%+ HSR traffic

Transportation Efficiency



Passenger/ Freight Flow



Train Scheduling diagram

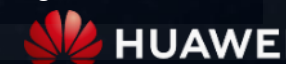
China Railway, 1M Freight wagons, 1% increase of freight train scheduling will bring **¥ 10B** more revenue

Safety First



Railway Perimeter Protection

- Multi-dimensional sensing for Railway safe operation
- “0 “missing alarm, Few false alarm



One Tech Architecture to Accelerate Rail “Going Digital”: **Broadband, Cloud, and AI**



Smart Construction



Dynamic Train Scheduling



Railway Perimeter Protection



Smart Maintenance
(Digital Depot)



Smart Maintenance
(AI-enabled TFDS)

AI-Driven Solutions



Primary maintenance of the EMU

IP



All-Optical Network



FRMCS



Digital Infra



Tunnel



Track



SCADA



Station

Rolling Stock



Camera



Depot



Dispatching
terminal



Telephone

Cloud

Broadband Connectivity

Multi-dimensional sensing

Dynamic Train Scheduling: Dynamic transportation demand-oriented Operation Diagram Adjustment

Challenges

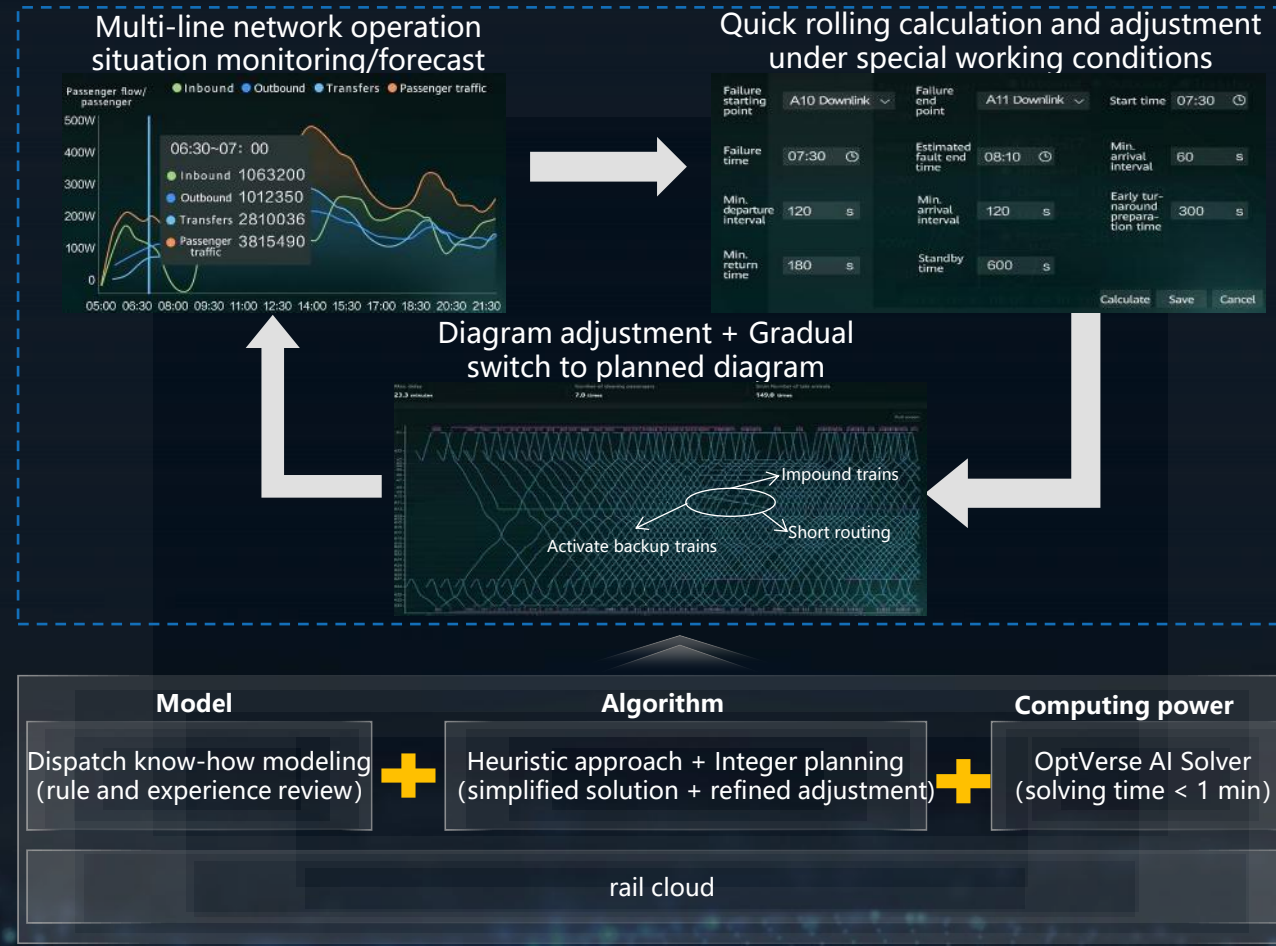
Difficult to adjust quickly

- Numerous influencing factors (stations, trains, shifts, etc...)
- Tens of millions of variables, minute-level adjustment

Difficult to inherit experience

- Long training period (3~5 years)
- Improper handling may cause faults to spread

Solution



Benefits

Efficient dispatching and reasonable handling

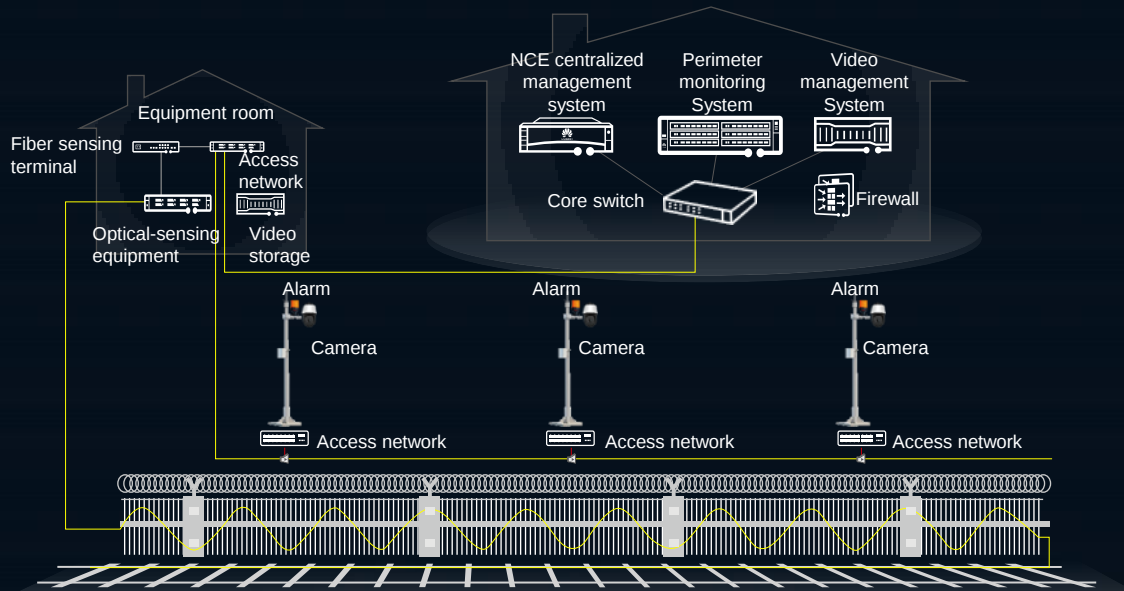
- Second-level adjustment, reduce the risk of passenger backlog
- Reduce the number of delays, shorten the delay duration

Consolidates dispatch experience

- Shorten the training period
- Provide reliable decision-making

Optic- and Video-based **Railway Perimeter Protection**

Identify Intrusions in Fenced Scenarios with Optical-sensing and PTZ Camera



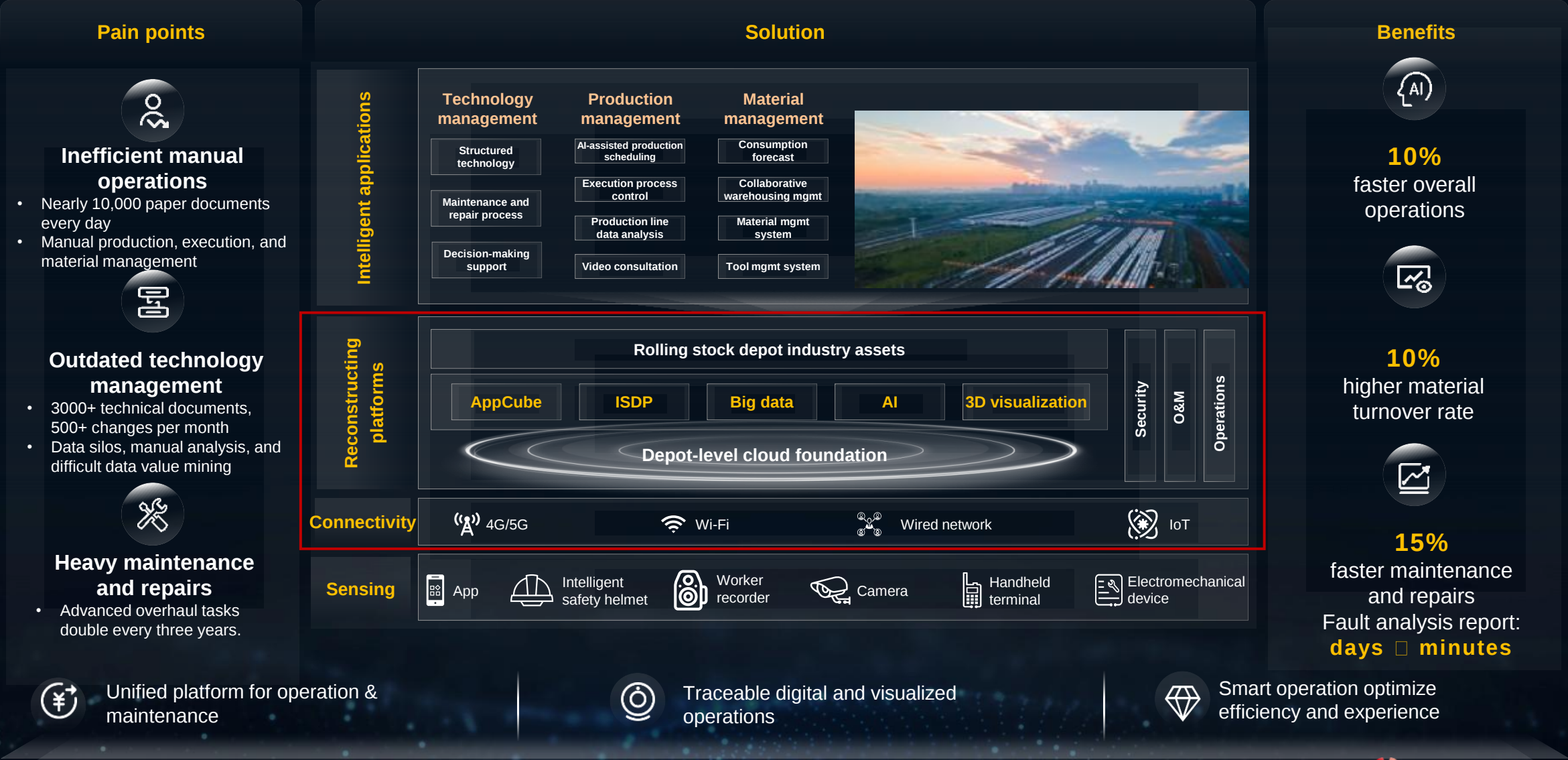
Highlight

- The ODSP module is enhanced, and the number of valid signals collected reaches **99.9%, with “0” missed alarms.**
- Unique feature identification algorithm, improving alarm accuracy by **90%.**

Benefits & Reference

- **False alarm ≤ 1 alarms/km/day** anti-interference (Passing train, wind, rain...)
- One vibration-sensing optical device covers **a distance of 20km**
- **Reference:** Depot Perimeter Protection of South Africa PRASA
Railway Perimeter Protection of Mexico Tren Maya

Digital Depot: Efficient, Collaborative Maintenance Plan



AI-Enabled TFDS: Improve Image Recognition, Enhance Train O&M Efficiency

Challenges

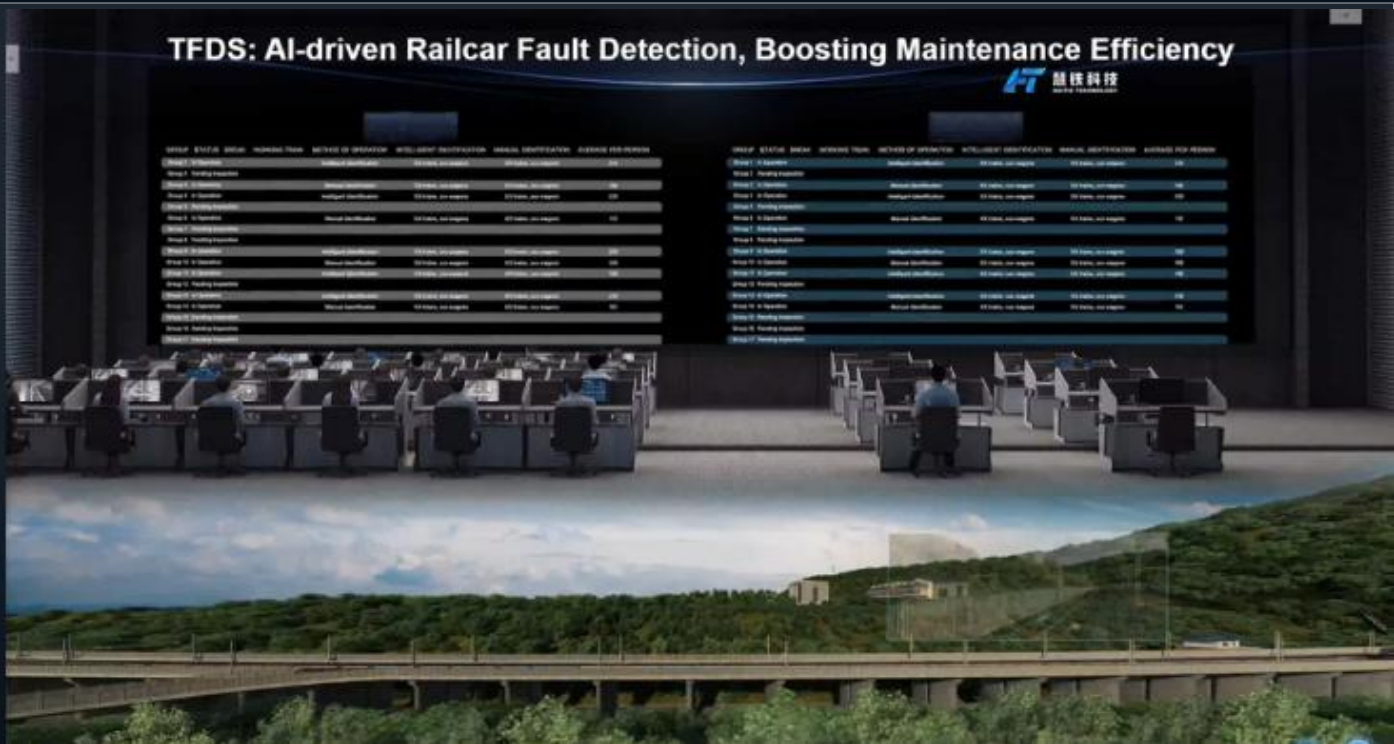
Heavy analysis workload

Hundreds of millions of images per day, causing heavy analysis workload.

Low efficiency of manual analysis

A person has to handle 15,000 items per day, with occasional omissions or misreports

Solution



Benefits

200%

Work efficiency improvement
Manual image review reduced from 4,000 to <200 per train

> 99.3%

Fault identification rate
Critical Faults 0 Omissions

Pangu railway model with **billions** parameters, **millions** of "difficult case" pool

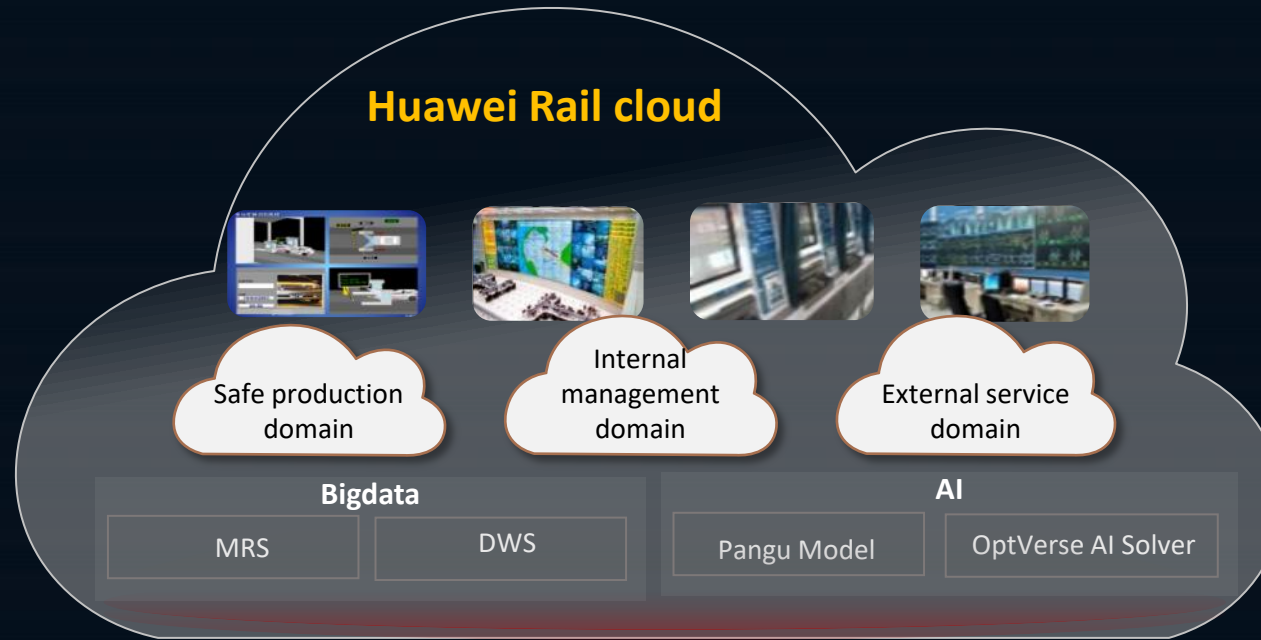
Huawei-developed algorithms can effectively identify **67** vehicle models and **430+** types of faults

AI appliances are deployed on demand, which complete identification within **5 minutes**, balance resource scheduling, and have disaster recovery capability.

Rail Cloud Builds a solid digital foundation for AI-enabled smart Solutions

90%+ China's metro companies chose to migrate their business to cloud.

50+ Metro operators in China deployed Huawei cloud



- 1** National cloud of China Railway
- 6** Railway Bureau cloud of China Railway
- 1** Public Cloud for S-Rail Operator
- 1** Hybrid Cloud for P-Rail Operator
- 1** Private Cloud for K- Rail Operator

.....

Rich Ecosystem

- **40+** ecosystem partners
- Rail service data assets: **70+** systems, **10** themed domains, **1000+** service indicators.

Industry accumulation

- Executive editor of Technical Specification for Cloud Platform Establishment of Urban Rail Transit, Big Data Platform Technical Specifications, and etc.

Secure and reliable

- Cloud-network-security integration
- Unique full-stack, innovative-driven cloud platform

Powerful capabilities

- Complete ecosystem, open architecture, and mature hybrid cloud capabilities
- Continuous high investment, long-term reliability

30 years of technology accumulation and digital practices in the ICT, **10,000+** dedicated professionals

FRMCS: A Game Changer for Global Rail Intelligence

GSM-R

2G: End of Service in 2030

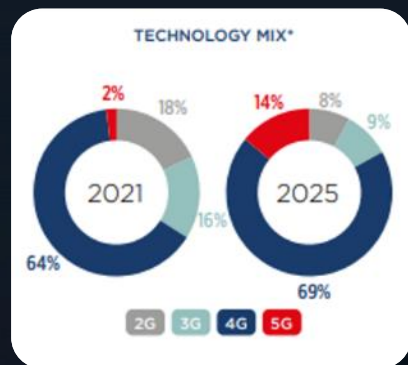
- 99.99%
- 350km/h
- 9.6 kbps

FRMCS

4G/5G : Future- Oriented

- 99.999%
- 500 km/h
- 20 + Mbps

A New Technology for Wireless



Telecom Carriers' Network

GSM: 18%(2021)->8%(2025)
4G&5G: 66%(2021)->83%(2025)

A New Standard for Railway



2025.10 – Paris
Huawei speaks at UIC
FRMCS Conference 2025



FRMCS-T
Published in July, 2024

A New Age for Digitalization



over-the-horizon
Accident Detection



Natural Disaster
Early Warning



Onboard CCTV
For Driver's Behavior



Multimedia
Dispatching

Mature Eco-system

Construction



Operation& Maintenance



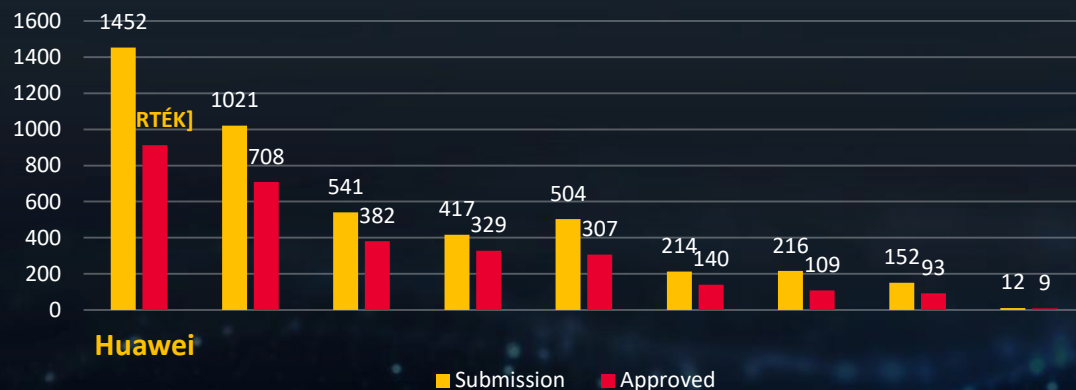
FRMCS Standard is progressing and in Practice Worldwide

Huawei's contribution to FRMCS



- **FRMCS-T published in July, 2024**
- Huawei : A key member of ETSI FRMCS Working Group
- Huawei contributed **30%** of approved MCX Specs since 2015

2989 Approved contributions to MCX specifications since 2015 (SA6)



FRMCS Global References



M-country C-customer
G- line.
3600 -> **7,200 tons/day.**



S-country P-customer
GSM-R->**FRMCS**



A-Country C-customer
10 → **15** Trains /Day



M-country ECRL
Kota Bharu to Putrajaya
only **4 hours** now

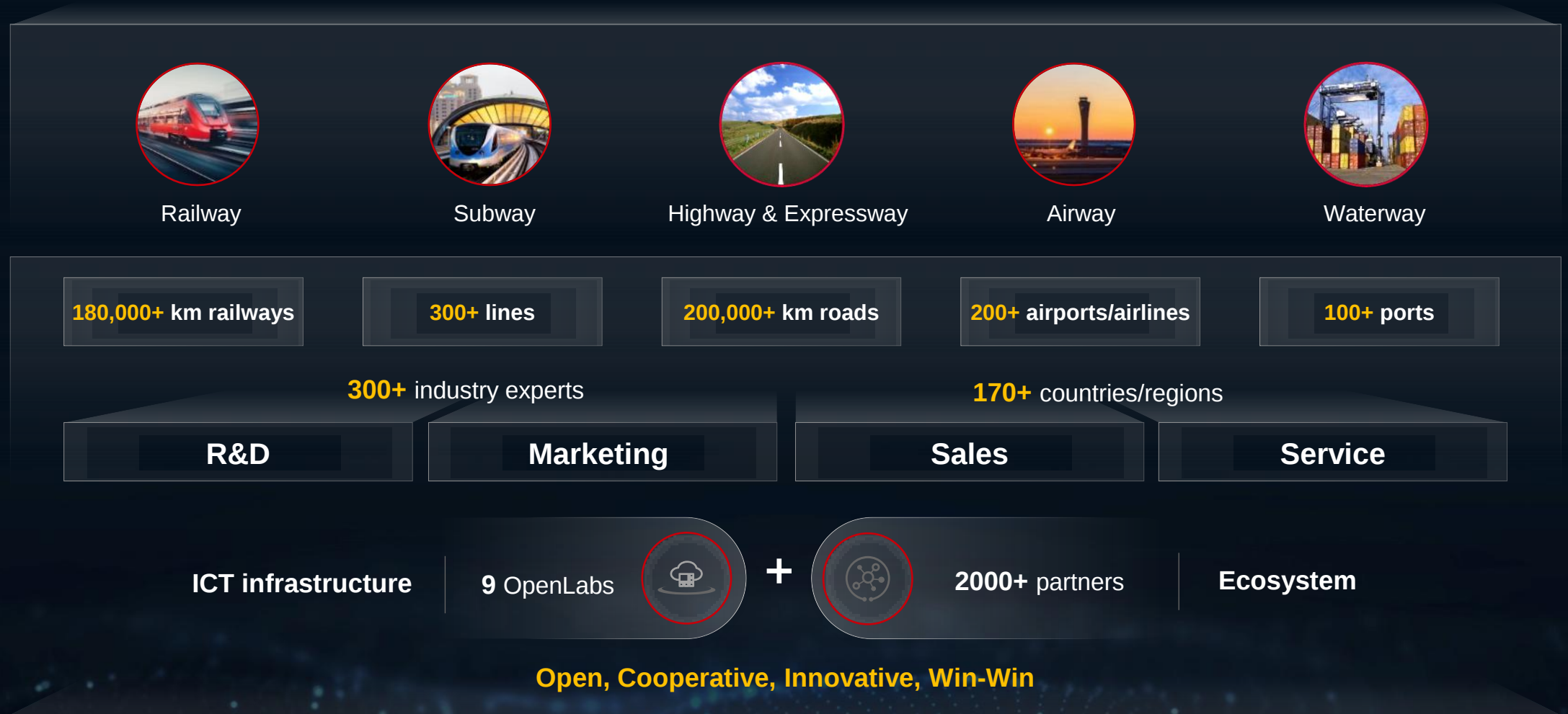


I-country Rapid Rail
37% -> **63%**
Public transport share



A-country P-Customer
40% ↑
Transportation Capacity

Huawei Smart Transportation BU: A Dedicated Team to amplify transportation intelligence



Huawei Has Served **180,000km+** Railway for **50+** Railway Operators Worldwide



Huawei Has Served **17 of Top 20** Railway Operators Worldwide
Driving railway intelligence together: **Go Broadband, Go Cloud, Go AI**

