A Better Connected Railway

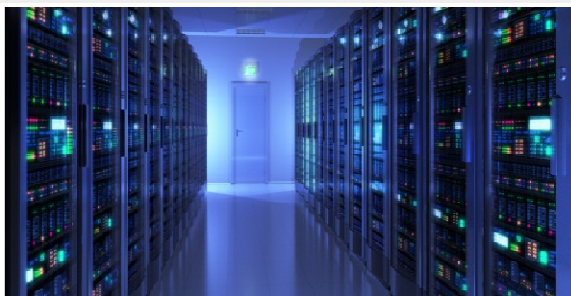**Marc Poujet**
Huawei Transport Solutions

Rail Technical Innovation : the only way towards A Better Connected Railway

HUAWEI

Infrastructure:
intelligent &safe

CCC : A flexible, real-time intelligent traffic management

Railway People:
organized, well trained and professional people

Safety:
Automated interventions, Collaboration tools, reduce human factor

Rolling Stock:
self-monitoring, real-time and robust connection

Security:
Redundancy, resilient systems, emergency response

Energy Supply:
green, resource-efficient solution

Connected Operation & Infrastructure

Information Management:
Shared and robust information platform

Huawei Innovative Rail ICT solution shapes a better connected Railway
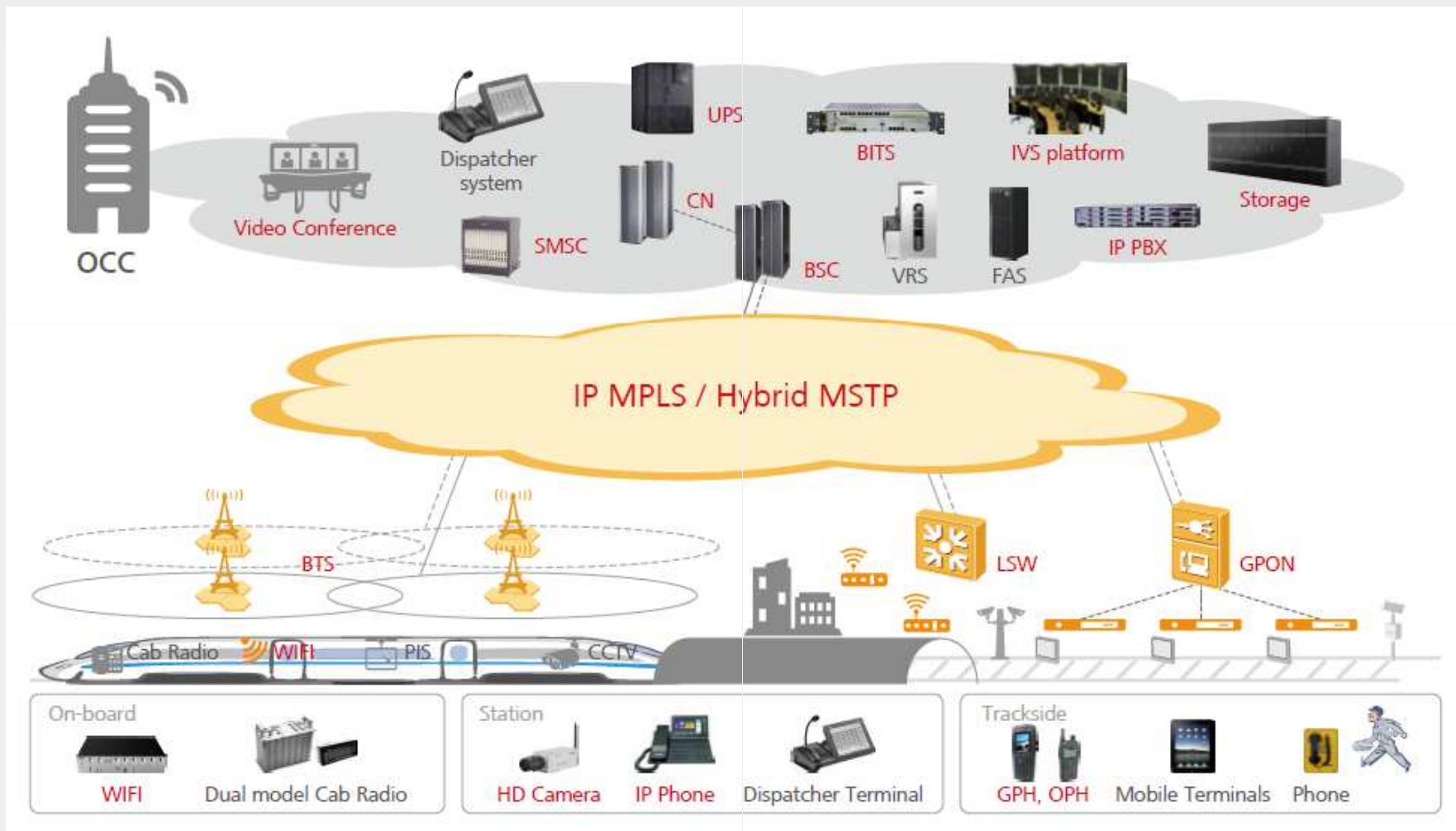
Fusion OCC

Agile station

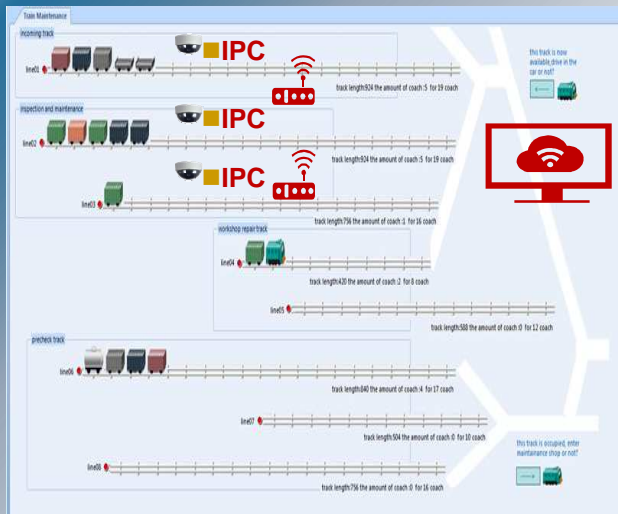Future-oriented rail operational communication

Digital Train

Huawei Digital Railway Operational Communication Solution

Agile station : visualization automation and Intelligent Infrastructure management

- **Visualized management**
- **reduce maintenance cycle by 20%**

- **Converged ICT and OT**
- **Optimize maintenance scheduling**

- **Mobile working**
- **3m LBS accuracy**
- **Real-time data acquisition, improve efficiency**

Fusion OCC : the hub of Rail information management

Rolling stock | Infrastructure | Depot | Command & control | OA

- Information Isolated
- Inefficient network infrastructure
- Difficult business expansion

Rolling stock | Infrastructure | Depot | Command & control | OA

Cloud data center

DWDM
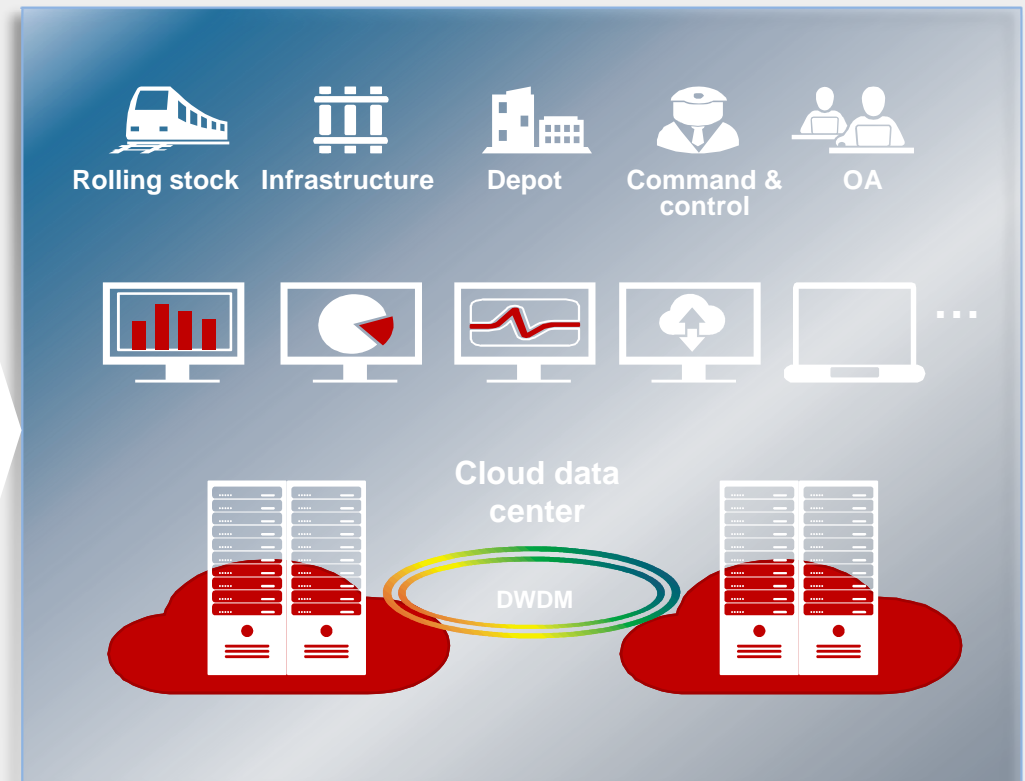
- Dual-activation DC
- Performance improvement: 200%
- Resilient intermodal platform

Digital train : seamless journey and intermodal

Live news or sports program

TCMS on-line

Business & entertainment online

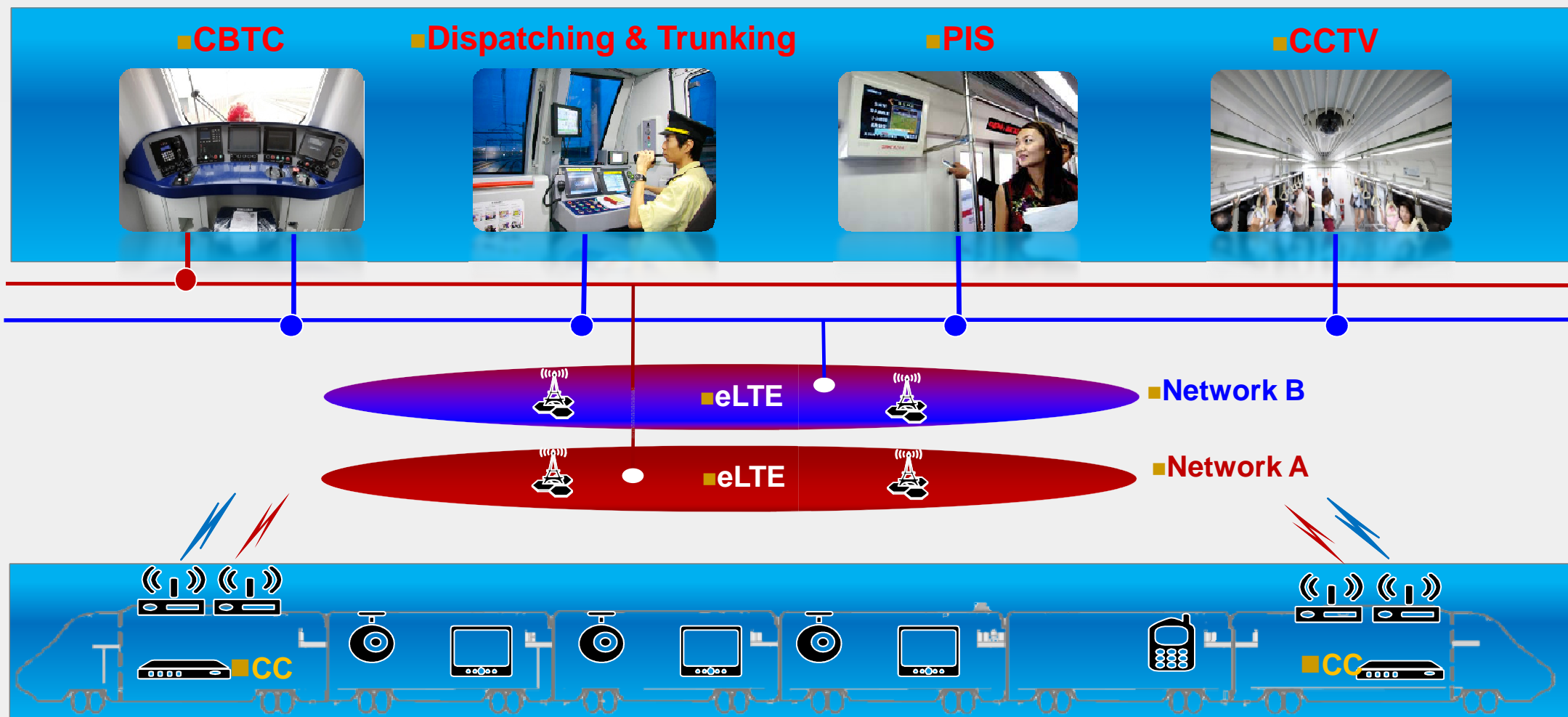**Real-time video surveillance on board**

- **4G T2G communication > 100Mbps@431km**

- **Unified gateway (AR) support 4 in 1, support WiFi/UMTS/LTE access**

- **WDS and High-density WiFi on board coverage**

Huawei eLTE Solution Overview for Mass Transit

- **CBTC**
- **Dispatching & Trunking**
- **PIS**
- **CCTV**

- **eLTE** — **Network B**
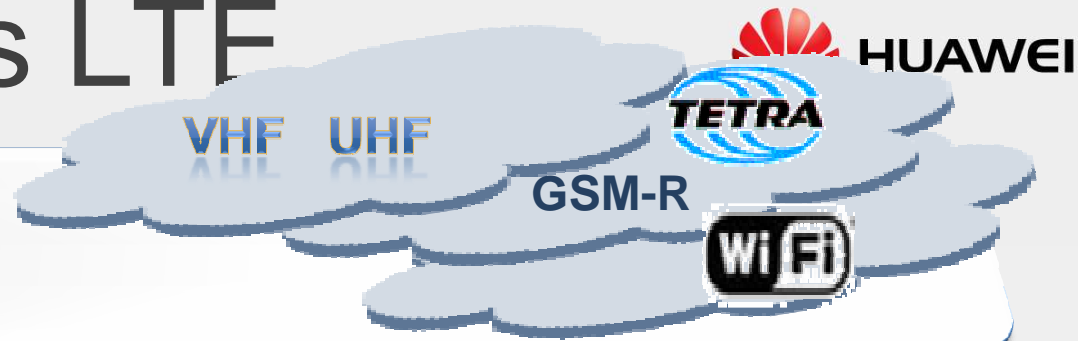- **eLTE** — **Network A**

- **CC**
- **CC**

- Dual network in redundancy for high reliability, one network for multi services to simplify the network.
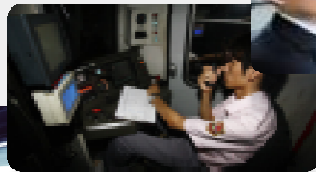
Mission Critical goes LTE

the 90's
- Physical separation of services
- Multiple skills
- Exponential OPEX

VHF   UHF

GSM-R

TETRA

Wi-Fi

HUAWEI

today
- More bits per MHz
- abundant data bandwidth
- Easy to operate
- Enable commercial synergies

Lte

PIS

Dispatch

Asset Management

	Pre-2007	2007	2008	2009	2010	Post-2010
GSM EDGE Evolution	EDGE	Enhanced EDGE				
WCDMA HSPA Evolution	WCDMA R99	HSPA HSDMS	HSPA+		LTE	4G IMT-Advanced OFDM Based Technology
TD-SCDMA Evolution	TD-SCDMA					
CDMA2000 Evolution	EV-DO Rev 0	EV-DO Rev A	EV-DO Rev B		UMB	
Mobile WiMAX Evolution	Fixed WiMAX	802.16e		802.16m		
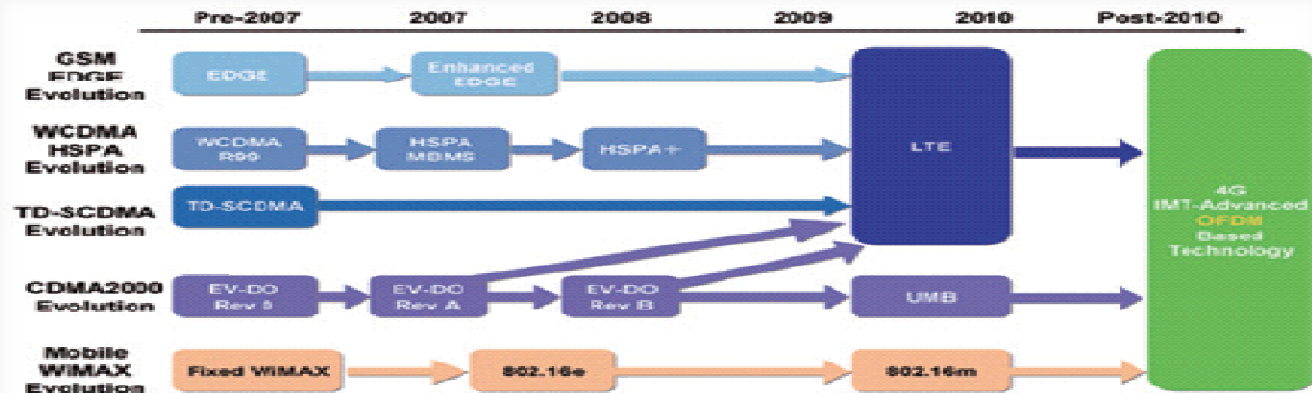
Several partners to develop innovative solutions

HUAWEI

LTE demo with
Bombardier (Poland)

C/LTE pilot with
Alstom (France)

DB GSM-R lab (Germany)
Munich Industry Solution Open Lab
(Germany)

Cooperation with Siemens CVC
GSM-R lab in Croatia

GSM-R/LTE lab with
Selex (Italy)

CREEG-Huawei Joint
Innovation Centers

Suzhou Industry
Solution Open Lab

SMRT-Huawei Joint
Innovation Centers

ALSTOM   AnsaldoSTS   BOMBARDIER   SIEMENS
A Finmeccanica Company

CREG   funkwerk   Selex ES   卡斯柯   THALES
traffic & control communication   A Finmeccanica Company   CASCO

ST Electronics   佳讯飞鸿   MOBATIME   BOSCH   Neusoft
A company of ST Engineering   JIAXUN

Huawei Operational Communication Solution's New Highlighted Achievements

HUAWEI

5 of the World's Top 10 Railway

Germany DB
➤ GSM-R Swap

Spain Adif
➤ IP/SDH of newly build HSR

Turkey TCDD
➤ GSM-R/SDH of newly build HSR

Morocco ONCF
➤ GSM-R/SDH of newly build HSR

Morocco country wide GSM-R coverage

Overview

- **Contract awarded in 2014**
- **End customer = ONCF (Moroccan State Railways Operator)**
- **Consortium: Huawei/IMET/Thales (consortium leader)**
- **Scope of supply : GSM-R network + SDH network**
- **1,923 km, including the high-speed ETCS2 line between Tangiers and Kénitra (185 km)**

Huawei Solution

- **BTS in double coverage for high-speed line, single coverage elsewhere**
- **Distributed BTS for coverage of tunnels**
- **3 BSC sites, with geographic hot standby backup mechanism**
- **Geo redundant Release 4 Core network**

THALES   HUAWEI   IMET

Germany GSM-R BSS modernization

Overview

- **End customer: Deutsche Bahn AG (German Railways)**
- **Replacement of KCC BTS for North region, approx. 12,000 km to be covered**
- **Project completion expected in 2024**

Huawei Solution

- **1250 x BTS3900 (LTE ready) with highly customized outdoor cabinet + 17 BSCs**
- **GSM-R Solution is compliant to EU Directive 2008/57/EC, as certified by TüV Rheinland and NoBo LuxControl (Sept. 2014)**
- **IOT and integration to DB's Release 4 core network will be performed**
- **Migration to be performed during ongoing rail operation**
- **Option to expand to mobile broadband services, including 4G (LTE)**

Tuesday, July 14, 2015

DB selects Siemens-Huawei for GSM-R upgrade

Written by Kevin Smith

GERMAN Rail (DB) has selected a consortium of Siemens Convergence Creators and Huawei to perform a migration of DB's first-generation GSM-R network in northern Germany.

The rollout comprises the replacement of existing GSM-R base stations with Huawei GSM-R components, and covers 12,000km, or 40% of DB's network. The new network is compliant with Eirene GSM-R and ETCS level 2/ERTMS standards, and the contract includes the option to expand the network to mobile broadband services, including 4G Long Term Evolution (LTE).

As part of the migration process, Huawei's GSM-R radio infrastructure will be integrated into DB's existing switching centre. The consortium says that "substantial measurements" have been performed to make sure that Huawei's GSM-R components are interoperable with the existing network.

■ © International Railway Journal

Current eLTE rollout for urban rail Projects in China

- Zhengzhou metro line 1
- Zhengzhou metro line 2
- Shenzhen metro line 11
- Changsha metro line 1
- Lanzhou metro line 1
- Shijiazhuang metro line 1&3
- Xiamen metro line 1
- Changchun metro line 1
- Beijing metro Yan-Fang line
- Chongqing metro line 10
- Wenzhou metro line S1
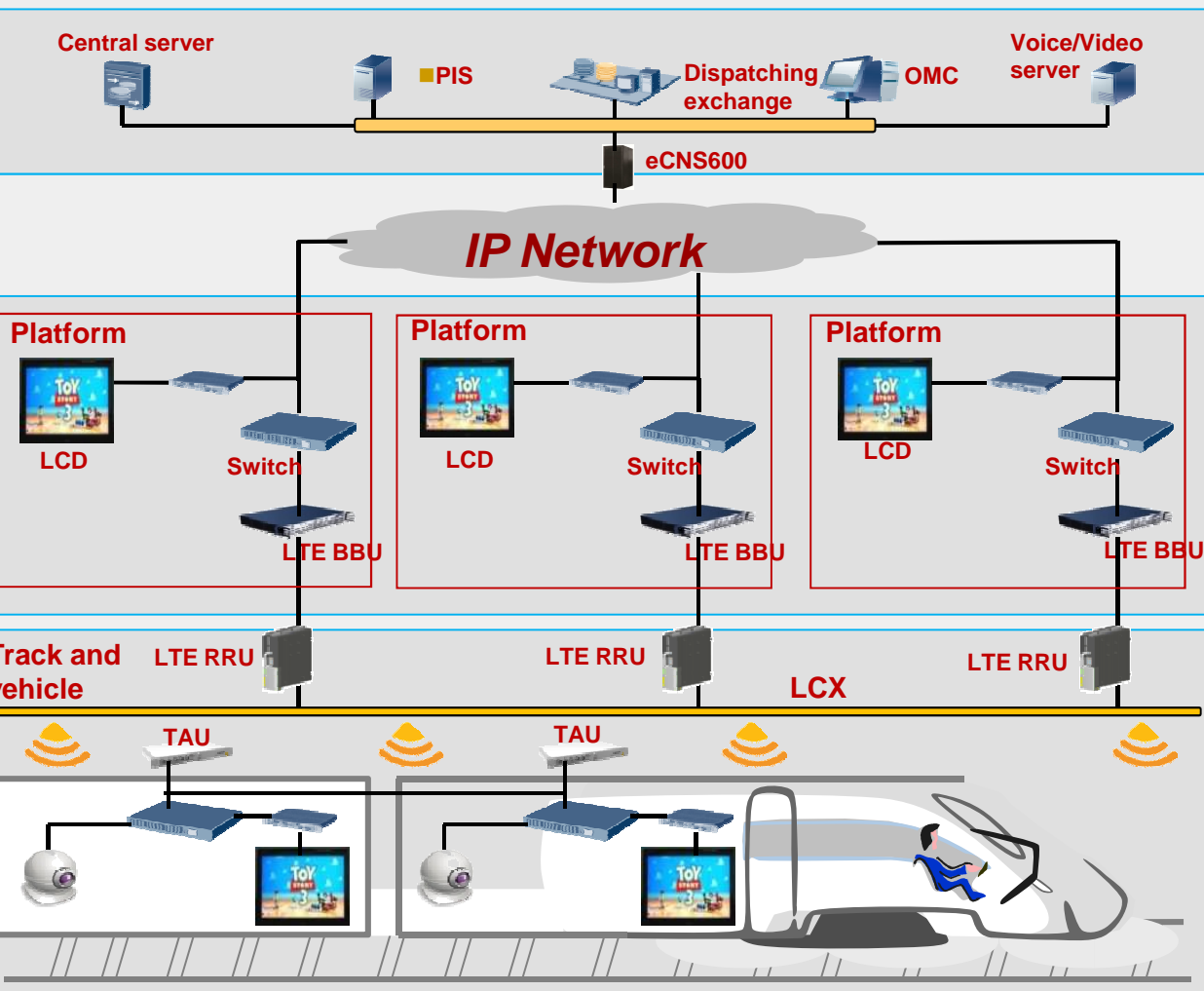- Hangzhou metro line 4
- Urumqi metro line 1

World's first commercial LTE network for rail industry

ShuoHuang Railway

- capacity increase requirement

  350 million Ton/Year

- Multi-locomotive synchronization

- Wireless video-surveillance

- Train dispatching based on voice trunking

- In operation since Dec. 2014

Innovation: Smart 4G eLTE Network for Zhengzhou Metro

Central server ■PIS Dispatching exchange OMC Voice/Video server eCNS600 IP Network Platform LCD Switch LTE BBU Track and vehicle LTE RRU LCX TAU

Solution

- Mass transit **TD-LTE solution**: high-quality, train-ground broadband communications.

- Bidirectional communications services over entire **26 km** of Zhengzhou Metro Line 1.

- **QoS guarantee** mechanism: PIS and video surveillance data in train compartments

- In **passenger operation** since **Dec. 2013**

Railway Gazette INTERNATIONAL
Chinese metros setting the pace

HUAWEI

World's 1st eLTE Application in Light Rail

HUAWEI

Light Rail · Ethiopia

9 Radio Units for around a **30km** line

One network for trunking, ticket data transmission and video surveillance.
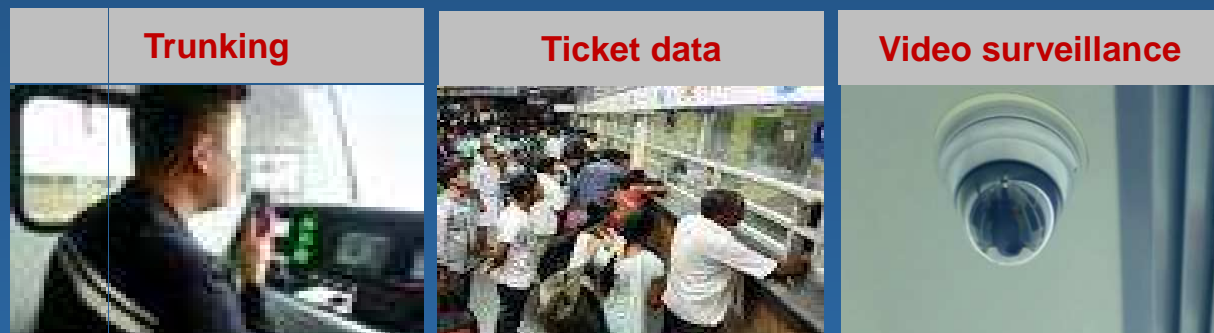
Contract award June 2014

- **Addis Ababa light rail phase one, _31.3km_, includes east – west and north-south lines, _44 stations_, 13 viaduct stations, 1 underground station.**
- **Design speed _70km/h_, train access units mounted both in front and rail of train.**
- **Continous coverage for the entire rail.**

Trunking	Ticket data	Video surveillance

THANK YOU

Huawei GSM-R/CCTV/SDH projects in Turkey (2012-2015)

Alsancak-Cumaovas

ETCS L2

51 km, 1 tunnel

Macro BTS and Distributed BTS

Full SDH Network

Mobile GSM-R terminals

Signalling vendor Thales

Eskisehir-Kutahya-Balikesir

- ETCS L2
- 467 km, 42 tunnels
- Macro BTS and Distributed BTS
- Full SDH Network
- Mobile and fixed GSM-R terminals
- Signalling vendor Alstom
- Outdoor trackphones and PBX

Kayas-Kayseri

- ETCS L2 ready
- 366 km, 23 tunnels
- Macro BTS and Distributed BTS
- Full SDH Network
- Mobile and fixed GSM-R terminals
- No signalling vendor yet
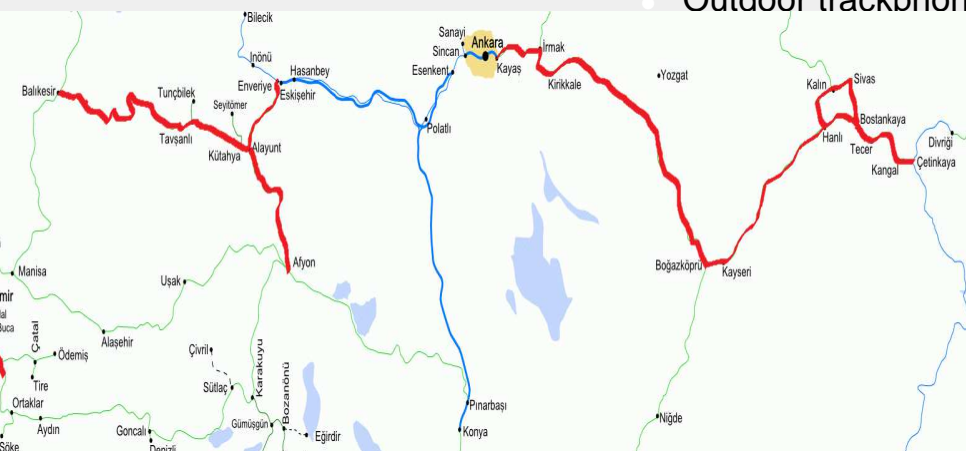
Ankara-Eskisehir

- Contract with Savronik
- 1st video surveillance system for high speed trains in Turkey
- CCTV (335 cameras), DWDM, data-center
- Project in operation since 2.5 year

Kayseri Sivas Çetinkaya

- ETCS L2 ready
- 372 km, 13 tunnels
- Macro BTS and Distributed BTS
- Full SDH Network
- No signalling vendor yet

■ **GSM-R Core Network Release 99 Vendor: Nokia**

Comprehensive international certifications confirming compliance with Railway standards

European Industry Certification

Lloyd's   **RINA**   **TÜV**

Third-Party integration report

Interoperability Test and Certification