

GSM for Railways

Executive Summary

May 2010



Overview

- About GSM-R
- Market Overview
- GSM-R Applications
- Our GSM-R Solution
- Our References
- Conclusion

Why GSM-R? In A Nutshell...

- **Interoperability: Railway communication without system borders**
 - Increase average travel speeds through optimized braking points
 - Increase maximum speeds with line of sight signals replaced with radio
 - Increase track capacity through minimized inter train distance
- **Efficiency: Railway communication at reduced cost**
 - Reduce infrastructure cost by using widely adopted GSM technology
 - Reduce infrastructure cost through competition

GSM-R provides operational and commercial advantages to railways and makes them more competitive in a changing environment.

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GSM Market Growth

- Market size continues to far exceed analyst forecasts – Towards 3Billion GSM customers
- LTE emerging as selected 4G technology



GSM MARKET DRIVERS

Capacity & spectral efficiency

Operational effectiveness

OPEX: power consumption, shared IP Backhaul

Emerging trend : Preparing transition 2G-4G

3G like Data capability on 2G: Evolved Edge

GSM-R Market Maturity

- “Pioneering phase” exited in 2007
- Multiple networks in commercial service
- QoS meeting and exceeding expectations
- Legacy radio systems being switched off
- Continued market growth, extended to Africa, Oceania and Southern America



GSM-R MARKET DRIVERS

Total Cost of Ownership & Opex

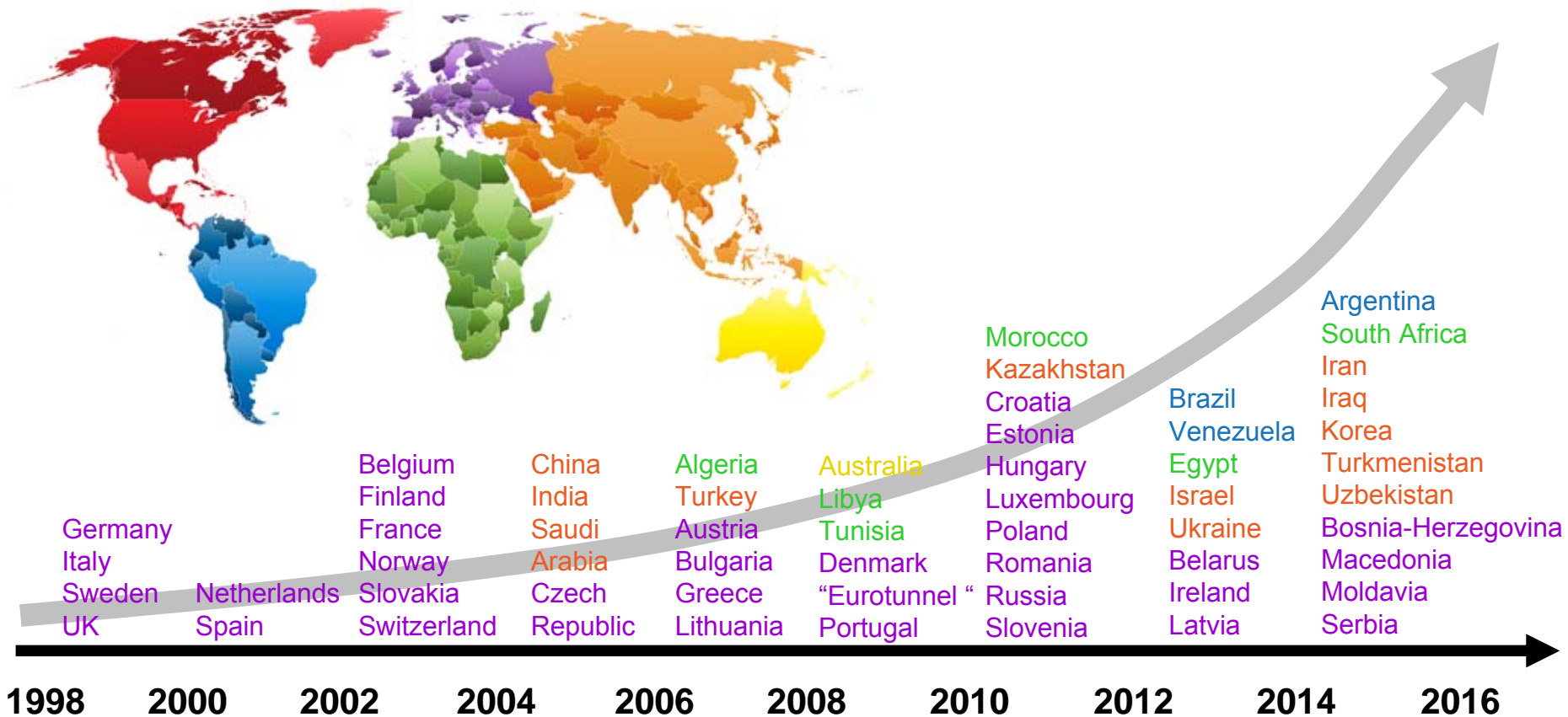
Interoperability in the long term

ERA/ERIG/IG change in GSM-R standard evolution: Version Management

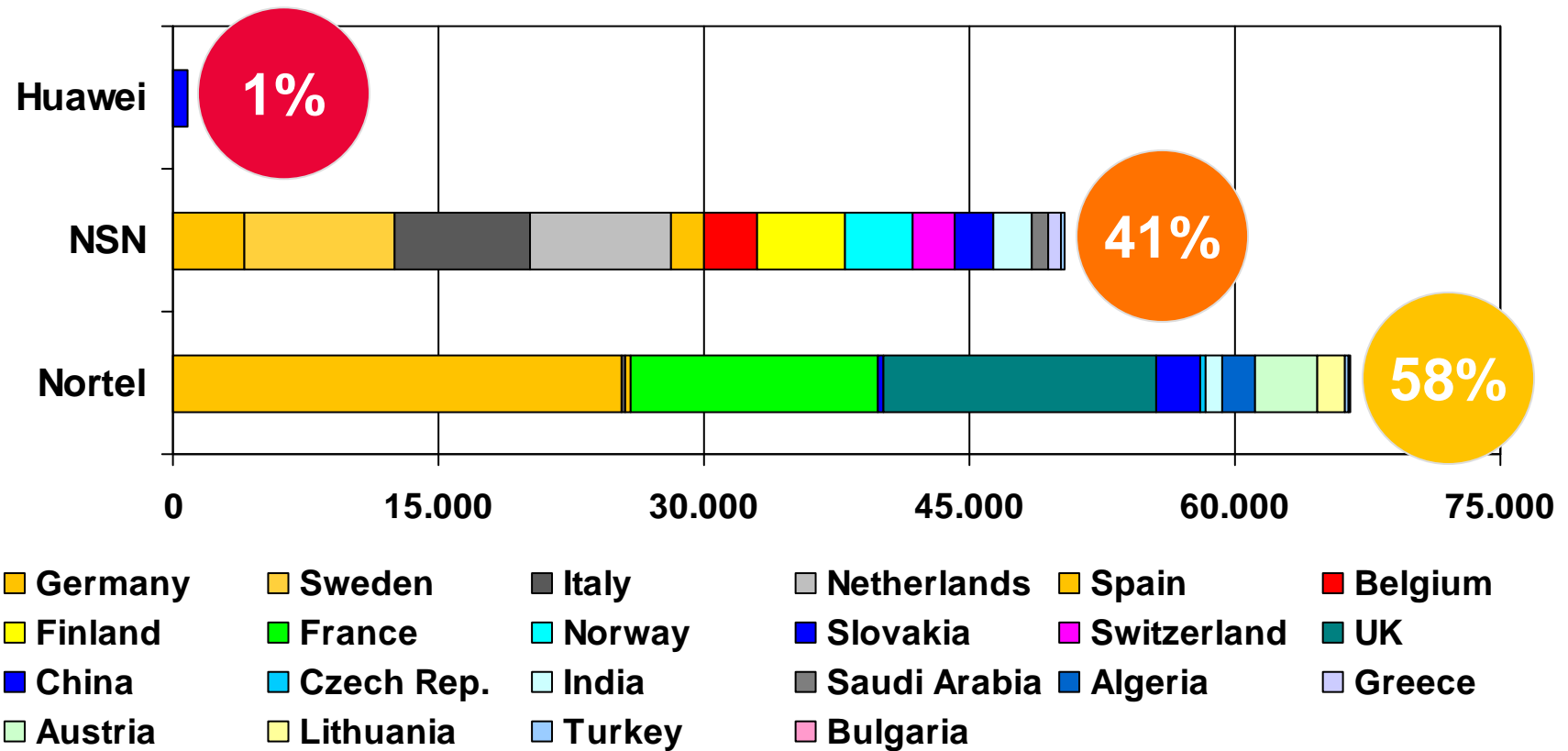
GSM-R Is Growing

Countries joining the GSM-R community

56 countries in 5 continents expected to select GSM-R until 2016



GSM-R Market View

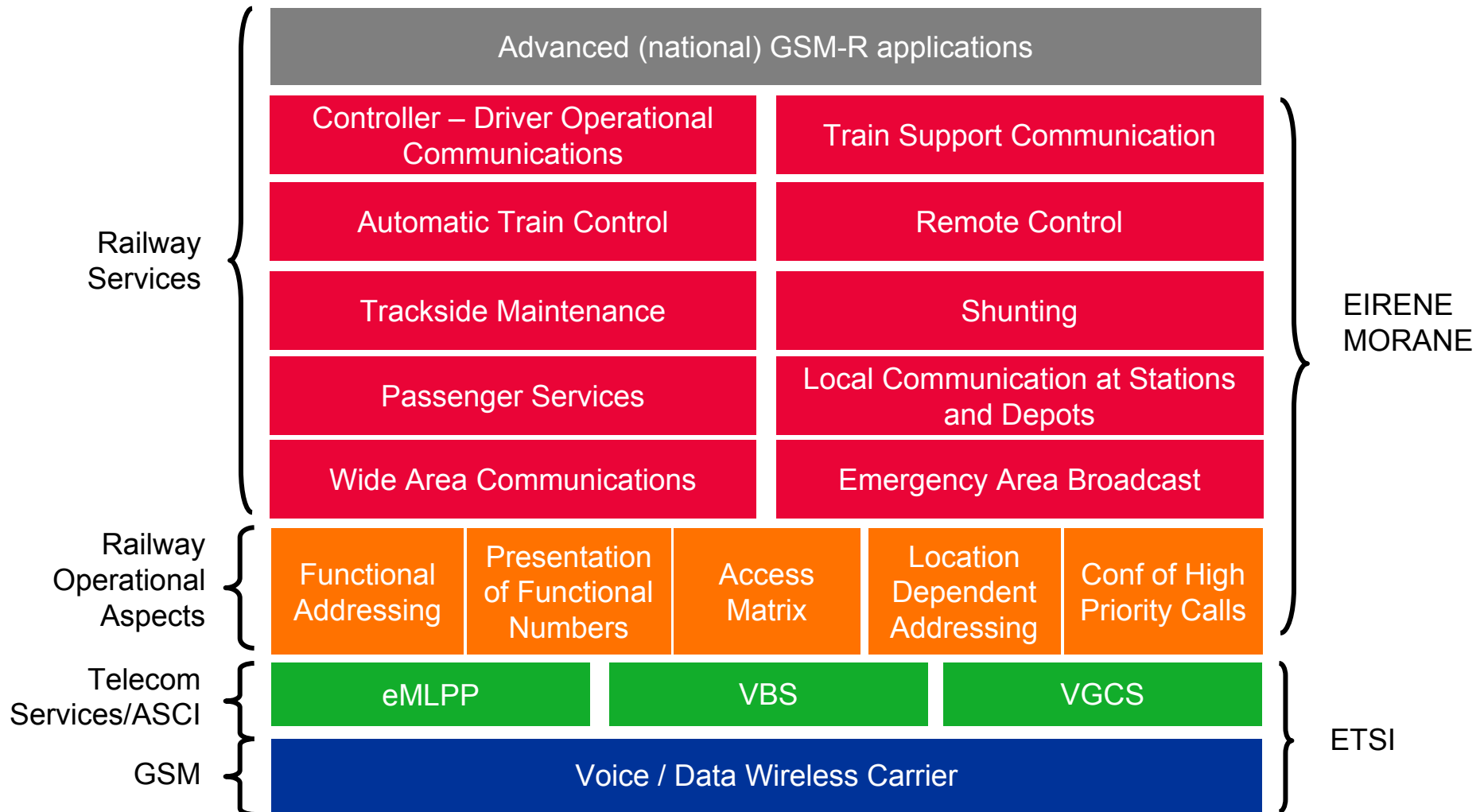


KCC is supplier for the largest and most advanced GSM-R networks.

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EIRENE GSM-R Services



Advanced GSM-R Services

SAFETY

- Faster information transfer, e.g. to control centers
- Increase of visibility through image transmission
- Reduction of installation and transmission cost

OPERATIONS

- Faster information transfer, e.g. to maintenance centers
- Increase of visibility through image transmission
- Reduction of installation and transmission cost

PASSENGERS

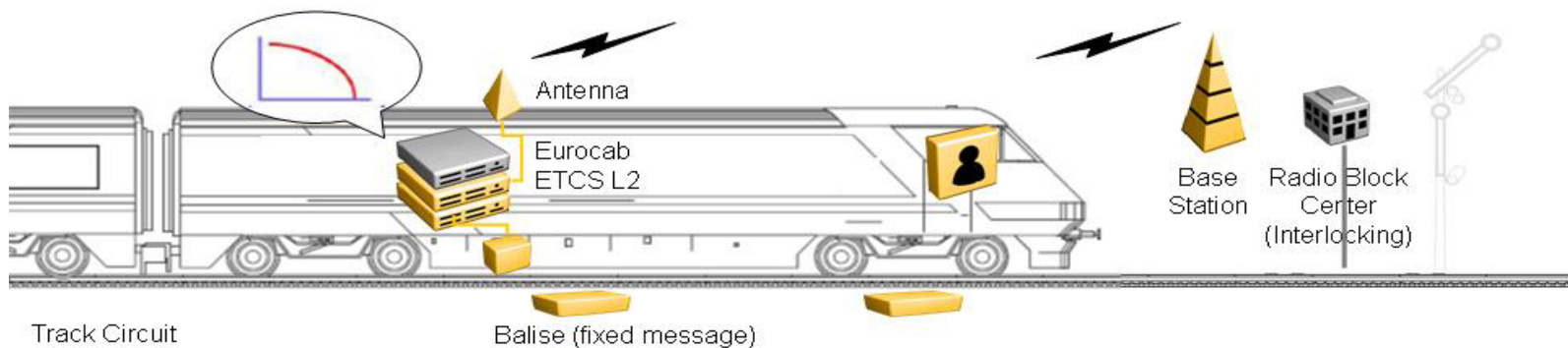
- Improved information processing
- Increased flexibility, e.g. through last minute ticketing
- Value added services generate revenues and improve customer satisfaction

OFFICE

- Staff always reachable with national GSM roaming
- Integration of mobile workers into office suite
- Increased comfort due to higher data capacity
- Increased efficiency of work processes

European Train Control System

- Integration of independent subsystems into a single train control and command solution
 - ETCS and GSM-R are the building blocks of the European Railway Traffic Managements System (ERTMS)
 - ERTMS is designed for International communication and signaling
- International standardizations and interoperability
 - Increased competition in the signalling market
 - Speed up of border crossing travel reduces travel time and cost



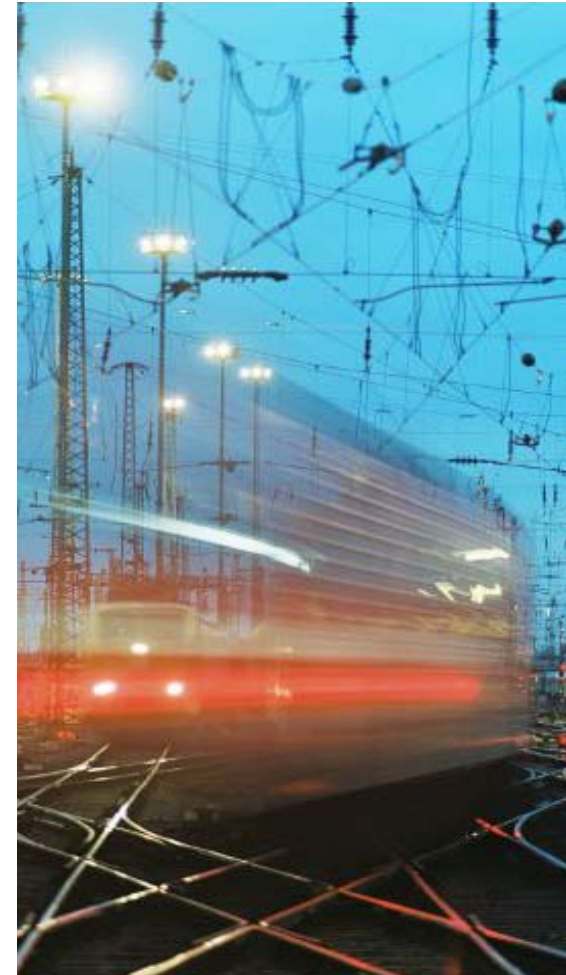
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A Long Way Behind Us

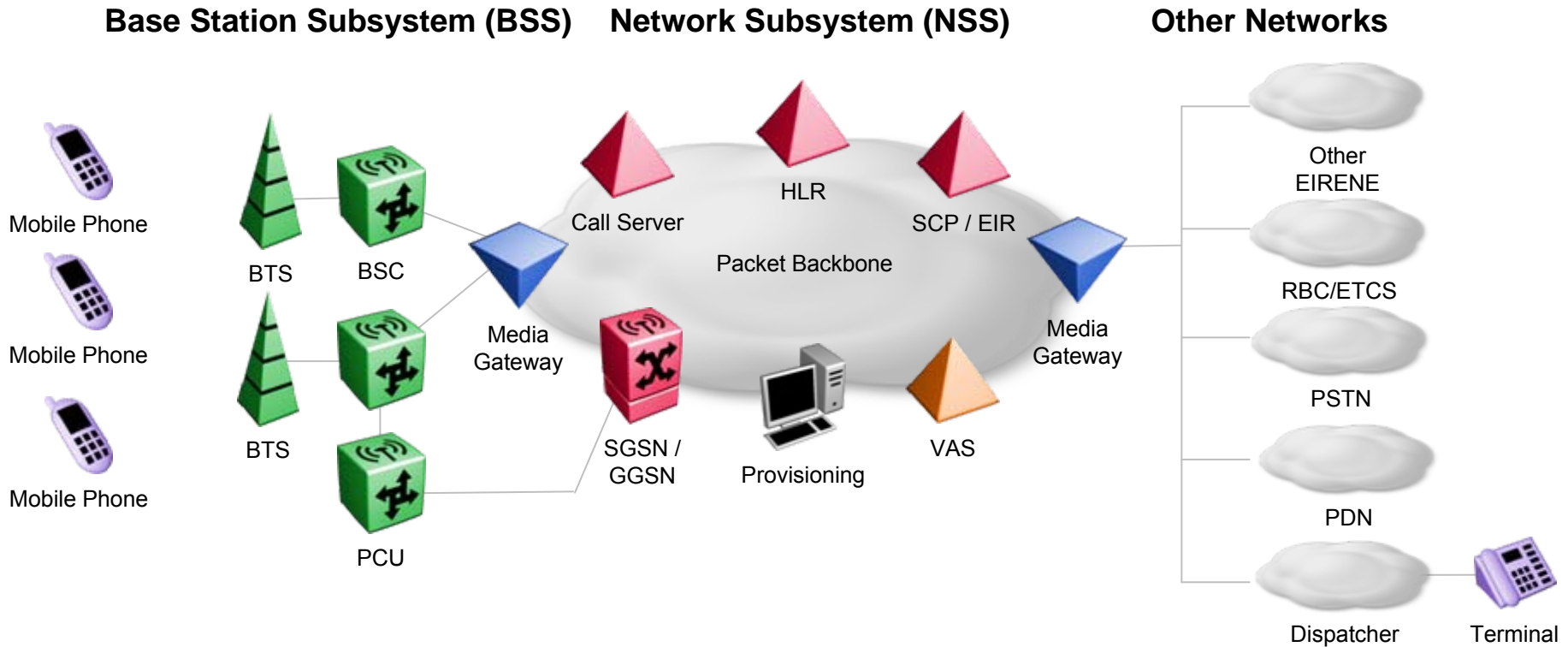
Technical Leadership

- 2009 First GSM-R calls over **ATCA** solution in customer network
- 2009 Integration of 3rd party IP dispatcher solution
- 2008 Deployment of **RLD** solution with DB and OBB
- 2008 Introduction **RM2** and of **Dual TDMA**
- 2008 Introduction of GSM BTS 6000 and GSM BTS 9000
- 2008 Introduction of **BICN for Railways**
- 2007 Demonstration of an **integrated GSM-R / WLAN** solution
- 2007 Participation in GSM-R record with over **500km/h** on LGV EST
- 2007 **GPRS** integration completed in customer network
- 2007 Major release changes (BSS V16, NSS17R, SCP 3.0)
- 2006 **Disaster recovery** concept and customer implementation
- 2006 **Field IOT** for IOT Phase 4.1 completed
- 2006 Start of **commercial operation for ETCS L2** (RFI, DB)
- 2005 First **EDGE** calls supporting GSM-R features
- 2005 Completion of **IOT Phase 4.1**
- 2005 Support of **eLDA feature**
- 2004 GSM-R in a **double coverage** configuration (Tibet Line)
- 2004 GSM-R dispatcher network in service DB (phase 1)
- 2004 **Late Entry** Feature for VGCS and OTDI calls
- 2004 **ETCS L2 live** demo at more than **300km/h** in Italy
- 2003 **Shunting Radio** demo over GSM-R
- 2003 GSM-R **cab radios certified** by the European Safety Body
- 2002 GSM-R **HSL in commercial operation at 300km/h** with DB
- 2001 First **standard-compliant GSM-R system** delivered by Nortel



Railway Communication with GSM-R

Network Overview



KCC's GSM-R BICN solution provides the same EIRENE service capabilities to Railway operators as are available using traditional TDM technology.

GSM-R Portfolio Highlights

NSS – Refreshed portfolio adapted to railway needs for capacity and reliability

BSS – New BTS 6000 and BTS 9000 and additional features that reduce site related cost

VAS – A portfolio of Nortel SCP and OEM services that completes our solution

OSS – A User friendly control environment balanced between ease of use and level of details

Our Terminal Portfolio Products

Handhelds



Data & Voice Cab Radios



**INTEGRATION
SERVICES**



Dispatchers



Modems



SIM cards

Railway Services

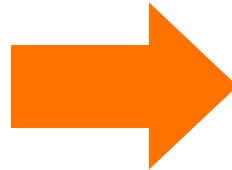
| | | | |
|-------------------|--------------|---------------------|------------------|
| Full support | | | Turnkey Services |
| Dedicated support | | Customized Services | |
| Expertise support | Key Services | | |

A clear definition of the scope of the service requirements at the very early project stage is a key factor to success.

Our Railway Service Model

Delivery Services

- Design & Deploy
 - Engineering Services
 - Installation Services
 - Integration Services
 - Project Management
 - Consultancy Services



Operation Services

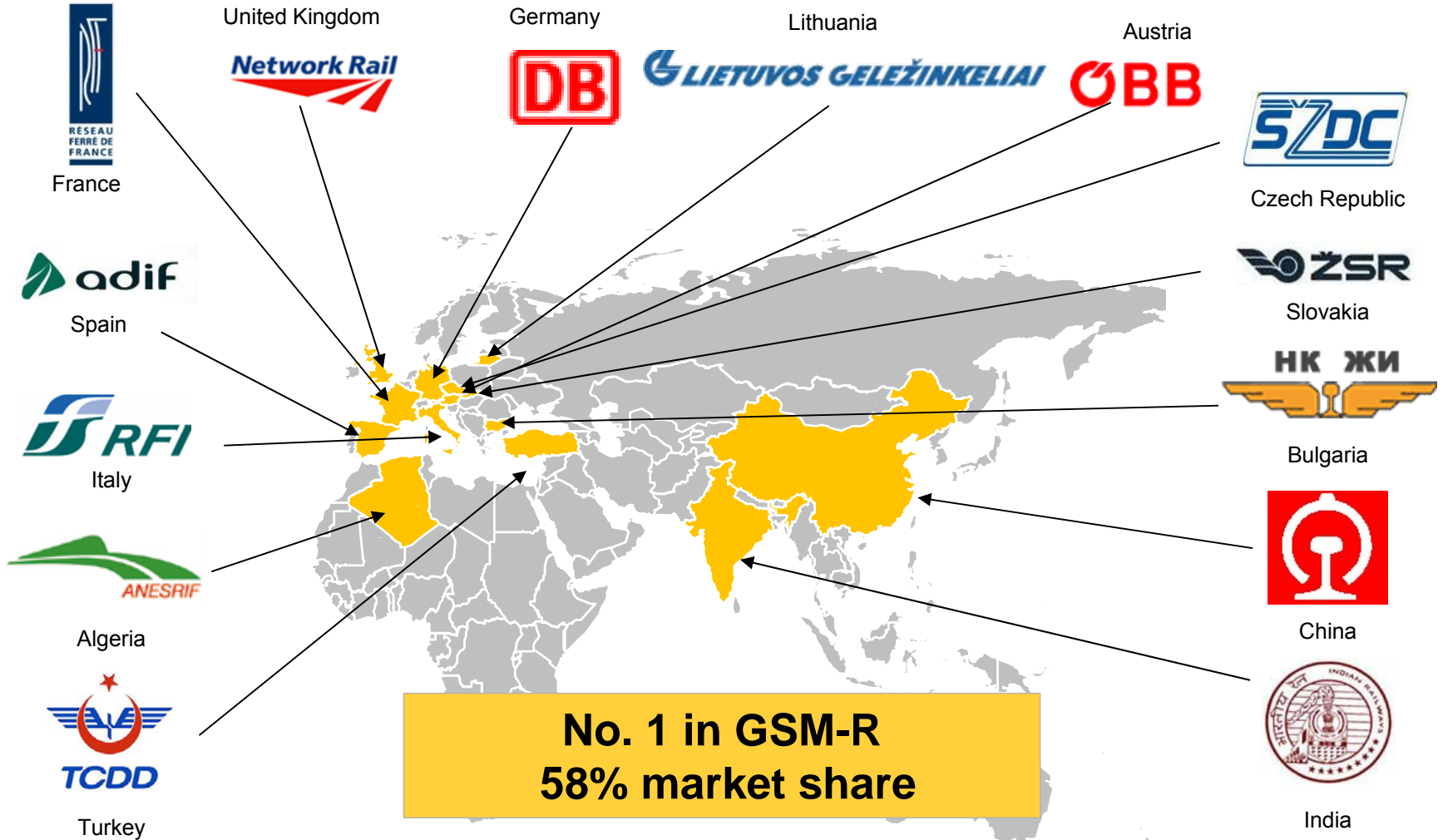
- Hosted Services
- Managed Services

Always customized !

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Worldwide Market Presence Railway Networks



KCC's ETCS L2 involvement



- In commercial operation
 - DB / Jüterbog – Leipzig in commercial operation since Dec 05
 - TAV / Roma – Naples in commercial operation since Jan 06
 - RFF / LGV Est as first phase in commercial operation since June 07
- Under validation
 - CD / Prague – Kolin CL
- Under deployment
 - Adif / Barcelona – Figueres HSL
 - NRIC / Plovdiv – Svilengrad CL
 - TCDD / Polatli – Konya HSL



Interoperable international freight transport is the key driver for this corridor program

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Why KCC?

Experience Matters !

- Committed to GSM-R
 - Market leader with presence on 3 continents
 - Major investment in GSM-R solution portfolio
- Leading High Speed experience
 - First commercial GSM-R high speed line in 2002
 - GSM-R calls hold up to the world record speed at >500km/h
- Unique integration capabilities
 - Unique GSM-R Competence Center provides full E2E testing
 - Flexible GSM-R infrastructure supporting different signalling systems

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Thank you for your attention.

Dr. Rainer Lasch

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• Shukran



• Vielen Dank



• Благодаря



• 谢谢



• Děkuji mnohokrát



• Merci beaucoup



• Vielen Dank



• Shukriya



• Grazie



• Neblogai



• Mnohokra´td'akujeme



• Muchas Gracias



• Sağol



• Thank you