European Rail Interoperability
ETSI Workshop, Sophia Antipolis, 2 November 2016

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The Interoperability Vision

handover

National network A
National rules A
National monopoly operator A

National network B
National rules B
National monopoly operator B

Single Rail Area (European network)
Harmonised specification
Operators work seamlessly across borders (in competition)

one set of rules (= network)
The European Rail Traffic Management System (ERTMS)

To make rail transport safer and more competitive

The European Union Agency for Railways is the **System Authority for ERTMS**

To develop and to deploy a **single harmonised Control, Command, Signalling and Communication** system (fully interoperable across borders, sourced from a broad supply base, evolution based on compatibility)
Fragmented national railway systems

- National supplier oligopolies (captive)
  - obsolescence
- Cross-border:
  - change of locomotive
  - multiple systems fitted
- Limitations in terms of functionality and safety

Clarity on goals is needed

"Seamless train operation without borders (caused by signalling) at best economic conditions"

Need to define the target state and intermediate states
The Target State for ERTMS Migration

Onboard: Full Specification Compliance
ETCS-only able to run anywhere in Europe

Specification B3-R2

A compatible onboard can safely operate on any compatible section of infrastructure, with acceptable performance

Infrastructure: Compatibility Platform
(regional subsets, engineering rules)
Investment cost determined by interlockings

ETCS Function

Specification scope from 2.3.0d onwards
ERTMS – Where Are We?

- **Long-term evolution of ERTMS** proposed to stakeholders
- Technical aspects of ERTMS are now governed by the **ERTMS Stakeholders Platform**
- Focus now has to shift to **MIGRATION**

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<th>Latest ERTMS specifications (B3-R2) adopted and in force since July 2016 (new TSI CCS)</th>
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<td>Deployment of <strong>ETCS</strong> is ongoing (Europe and beyond)</td>
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<td>Implementation of <strong>GSM-R</strong> is nearly finished (approx. 80%)</td>
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<td>With the 4th Railway Package, the Agency has new powers for trackside &quot;opinion&quot; and vehicle authorisation</td>
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ERTMS success can only result from a collective, disciplined approach.

Main objectives to be followed in migration:

- Protection of investments made in CCS TSI compliant systems and products
- Achieving and maintaining compatibility
- Achieving positive economies for the rail system, i.e. coordinated deployment under best economic conditions
Future Evolution of ERTMS and Roadmap

New Capabilities – Game Changers

Automation (incl. ATO)
- ETCS Level 3 (moving block, etc.)
- Bearer-independent radio
- Satellite-based functions

Results of SHIFT2RAIL (to be phased in)

Scope extension to global perspective

New brand: GRTMS/URTMS?

Future Evolution
Bearer independent radio
Others (e.g. SHIFT2RAIL)

Next Evolution
L3, GPS, Automation

2.3.0d BL 3
Compatibility Reference

approx. 5 years
Evolution of Railway Communication - Key Principles

To minimize the risk of non-availability of radio solutions: definition of the new rail radio communication system in 2018, possible deployment from 2022, included in TSI CCS

Packet based communication (both for voice and data)
› Evolution: all IP
› Driven by QoS; low latency
› Opportunity: increased bandwidth

Bearer independent system architecture
› Evolution: application, core network and services independent from the radio access technology
› Coexistence of multiple bearers,
› Opportunity: increased flexibility to adapt infrastructures to traffic needs

Secure communications
› Opportunity: increase overall availability and robustness
A Programme for the Evolution of Railway Communications

Proposal for the new radio communication system planned for end 2018

Mobile Connectivity is the backbone for Digital Railways!

Spectrum: close cooperation with DG CONNECT and DG MOVE, to promote the railway needs and to position with national radio regulators and the Member State representatives in the Radio Spectrum Committee

Multi-annual programme until 2020 to analyse the options (technical and operational) and to define the roadmap for the evolution of operational radio

Working Groups launched with representative organisations of the sector, with representatives from S2R, ETSI, UIC

Mobile Connectivity is the backbone for Digital Railways!
Challenges for Interoperability

Current situation

Unwanted future situation

Risk of fragmentation

- Different frequencies, multiple radio technologies in national or regional areas
- Uncoordinated introduction, border crossing issues
- New applications (ATO) should have no impact
Challenges for Interoperability (2)

Which radio technology/technologies to be selected

- Timeline for deployment crucial, e.g. will 4G be available after 2030? 5G? Satcom?
- Note that on-board equipment may have to support multiple public network technologies, too

Limit the impact of migration from GSM-R towards its successor

- Migration will take several years (10-15 years), costs and benefits can be different for RU and IM
- Need for dual mode on-board radio communication architecture, future proof, covering 2022 – 2040 (?) (Agency study on migration, published June 2016)
Evolution of Railway Communication – Threat or Opportunity?

GSM-R will be in operation up to 2030 and beyond

- The system is successful, packet switching for ETCS is introduced, interferences can be managed
- Does this situation create long term stability or does this block innovation and/or cost reduction?

ERA investigates the current and future needs

Definition of GSM-R successor, introduction and migration has to be planned

- Functionality, performance, technology, radio spectrum
- Potential migration scenarios and the economic impact

ERA leads the coordination forum with users and contributors (UIC, ETSI, UNISIG, S2R)

The main challenges:

- Is additional radio spectrum needed and can it be made available?
- What technology can offer sustainability and flexibility?
- What is the optimal migration scenario and window?

ERA to define solutions and recommendations to legislator and stakeholders
European ERTMS Migration is a Collective Exercise

The "E" in ERTMS is there for a meaning!
Making the railway system work better for society.

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