UNIFE vision about the future communication system for ETCS and the Railway signalling system

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11th of September 2013
AGENDA

- GSM-R background
- ERTMS market requirements
- The role of the telecom sub-system in the current and future signalling system
- Current and future R&D programs addressing the Railway telecom sub-system
- Conclusions
Main GSM-R functions
- Voice radio between driver and dispatcher
- Data communication for ETCS level 2 and 3 between trackside and train

GSM-R requirements for ETCS data communication
- Performance of ETCS level 2 and 3 is fully dependent on the radio communication performance
  - Continuous communication between mobile and trackside (max time for disconnection)
  - Quality of service (bit error rate, delays)

GSM-R drawbacks
- Long call procedure
- Sub-optimal use of available bandwidth – limits the number of trains to be controlled in station areas
- Obsolete technology (end of life expected in 2025)
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In Europe, GSM-R obsolescence expected in 2025
- Roadmap for future European standard to be prepared
- Backward compatibility is key to preserve investments made by Railways and Suppliers

Outside Europe

- Some customers cannot use GSM-R to deploy ETCS Level 2 and are currently looking for alternatives
- Projects are already developed with ETCS and other communication standard, like Tetra
- A “bearer independent” ETCS is a priority for customers as highlighted by the UNIFE “Global ERTMS” market (in 2011)
- Modern telecom standards are all “IP-based”. In the future, ERTMS shall be based on IP communication principles, while offering “backwards” compatibility
- The above requirements are included in the 2012 ERTMS MOU (clauses 69 to 74)
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Current ERTMS L2 based signalling System

GSM-R local radio equipment

Voice + Data

ATS - Automatic Train Supervision

RBC – Radio Block Center

Local IXL

Data Communication Wide Area Network

ERTMS Air Gap

Local IXL

Object Controller

ERTMS on-board

ERTMS Air Gap

Train detection
(Track Circuits or Axle Counters)

Point Machine

Fixed Beacon relocalisation
Vision = what do we want to achieve and how?

- Management of a set of intelligent mobiles (trains, passengers, freight, workers…) on a “dumb” infrastructure thanks to an intelligent Integrated Mobility Management (IM²) system offering/maintaining:
  - the highest capacity
  - the lowest costs (all costs: LCC)
  - the highest reliability
  - the highest safety (a reminder!)

Meaning:

- **Highly performant/resilient/secure communications**
- Automation together with new operation principles
- No track-side elements any more (or nearly, apart from point elements) = no track circuits, no axle counters, no balises… and much less cables (and much less stolen/failing equipment), meaning track access charges dramatically reduced; rail becoming more performant
- The train holds the intelligence and has an ensured operating performance
- Traffic management = basically, which passenger/freight goes where and when? An area where rail is/must keep to be smarter than road
- Less energy consumption + an ever greener transport
- Rail is 100% available, maintenance being always achieved before the failure happens
- Rail is 100% weather/climatic change resilient
- A higher security
Future Signalling System for Mainlines based on ERTMS level 3

- IP based Communication Wireless Network
- Voice + Data
- ATS - Automatic Train Supervision
- RBC – Radio Block Center
- Centralised IXL
- + Advanced Traffic Management
- + Maintenance Management
- Data Communication Wide Area Network
- + Maintenance Data
- + ATO Data
- + Train Position
- Positioning Satellite
- + Train integrity
- + Track integrity
- ERTMS on-board
- Radio Object Controller
- Fixed Beacon relocation
- Train detection (Track Circuits or Axle Counters)
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Current and future R&D programmes addressing Railways communications

**FP7 - NGTC**
WP6: IP based Radio Communication
Sept. 2013 - Aug. 2015

**Shift²Rail IP2**
Advanced Traffic Management and Control System

- TD1: Adaptable communications for railways
- TD11: Smart radio-connected wayside objects

**TEN-T MAP 2011**
Activity 9: ETCS over GPRS

2011 2013 2015 2022
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Performances of ETCS are fully dependent upon the quality and availability of the telecom network.

Independency between ETCS and the telecom network is mandatory to cope with worldwide market needs and different industrial cycles.

Trainborne and trackside ETCS equipment must move to IP based technology.

Many initiatives are popping up across the Sector. Coordination between the stakeholders is key to strengthen the European Standards.

Shift2Rail Sector initiative with EC and ERA support is an opportunity to gather all actors and prepare the future standards.
Thanks for your attention!

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