Session 4 TELECOM

GSM-R IG: More efficient ETCS data transport with GPRS and eGPRS

Jean Michel Evanghelou
Kapsch CarrierCom
More efficient ETCS data transport with GPRS and eGPRS

Jean Michel Evanghelou
Head of Railways Solution
Kapsch CarrierCom

www.gsm-rail.com
## Context and drivers

- Need to provide more capacity for ETCS due to some saturation areas
- First step towards packet switched technology to prepare future IP evolution of GSM-R
- TEN-T program to assess, define and validate the end-to-end solution
- Finalizing standardisation / regulation in ETSI TC-RT, UIC and ERA
- GSM-R product adaptations and real benefits from GPRS / eGPRS (edge) implementation
GPRS & E-GPRS
An evolution sponsored by ERA & UIC

Today’s view within the railway market

The limited capacity of GSM-R circuit technology is a limiting factor for the ERTMS deployment in dense traffic areas and in railway stations.
ETCS over GPRS
European Commission Decision C(2012) 693

The activity aims at developing ETCS over GPRS specifications and demonstrating the suitability of a packet switching technology, such as GPRS, as a transmission system for ETCS. The ETCS over GPRS specifications will be developed with the aim to achieve a bearer independent system, and the interface description with the communication system in order to allow the data transmission over a packet switched technology, such as GPRS, while maintaining the current capabilities (transmission over a circuit switched technology – GSM-R)."

CR 0741: Packet transmission for ETCS under ERA CCM process for inclusion in ETCS Baseline 3 MR2
TEN-T program
ETCS over PS - A long process

Phase 1
Telecom test
- GPRS feature selection
- SNCF/Kapsch/UIC Lab testing with Sierra Wireless, Funkwerk & Triorail
- Nokia, Banedanmark, Comtest lab testing
- High Speed Line testing at SNCF
- UIC O8662: EoG phase 1 report

Phase 2
UNISIG lab test
- ETCS validation
- UNISIG/KCC/Network Rail
- Lab testing of ETCS over GPRS & Edge
- Conventional Speed Line test
- Alstom, Thales and Bombardier

Phase 3
UNISIG live test
- ETCS validation
- UNISIG/KCC/SNCF
- UNISIG live test HSL SNCF
- Alstom, Thales and Ansaldo
- UNISIG phase 2&3 report

TENT results
- Multiplexing by 4
- Edge/GPRS a valid bearer for ETCS
- UNISIG/KCC/Network Rail

CR 0741 in B3 MR2 CCS TSI
Q4 2015
Edge/GPRS EIRENE 8.0/16.0
Q4 2015

2012 - 2016

Standard activities (ERA, ETSI)
CCS TSI B3 MR2 in force Jan 2017

Work on going:
- UNISIG subset 026, 037, 092, 093
- UIC FFFIS, O2475 and EIRENE SRS/FRS
- ETSI TC-RT: TS 103 328

Specific function needed (NACC, PFC,...)

Tested, Demonstrated and Standardized
Our involvement in standardisation

Driving standardisation to inforce GPRS readiness

- Active driver in all area: TEN-T (ERTMS UG), ERA, ETSI TC-RT, UIC
- CEF call participant for Activity 3: ETCS over GPRS/EDGE capacity study in station environment

Main outcomes to date

- ETSI TC RT update
  TS 103 328: GPRS/EGPRS requirements for ETCS (final draft)
- ERA
  CR 0741 - Packet Data transmission for ETCS
- EIRENE update
  FRS-SRS 8/16 (CR9225)

Driving standardisation towards Next Generation

- Active driver in major program: ERA Next Generation, ETSI NG2R, Shift2Rail
ETCS over GPRS study

Key findings

GPRS/EDGE

Efficient Resource Usage

Direct benefits
- Support for high traffic density areas (multiplexing)
- Flexible resource usage (sporadic connections, traffic spikes handling)
- Relaxation of constraints on frequency planning

GPRS/EDGE

More Flexible Network Engineering

Recipes for an efficient and highly available network
- Geo-redundancy and high-availability features (Gb-Flex)
- EDGE offers Incremental Redundancy for robust communications in non-ideal radio conditions
- A careful radio planning still required to get the best performance

PF-2

NACC
Extended UL TBF
PFC

PF-1

C2 (m) for cell Reselection
Delayed DL TBF
RLC/MAC
BSSGP LLC re-routing

GPRS Mobility Management
Session Management

TEN-T Parameter Feature Set

PF-2 required for best performance

GSMR-IG has the expertise to deliver an efficient network in support of the growth of the railway traffic.
GPRS benefits
An enabler for ERTMS deployment

**Capacity.**
Multiplexing capability demonstrated using GPRS/EDGE.
- Will allow deployment of ETCS L2 in dense traffic areas, border areas and railway stations
- Will increase as such the track capacity and ERTMS deployment

**Performance.**
- Will enhance the ground to train transmission and shorten time delay in case of deconnection
- Will increase track capacity and open the way towards ETCS L3, ATO

**Maximize investment.**
Mixed Traffic Operation
Open the gate for other applications.
- Removal of trackside signal equipments
- GPRS and EDGE pave the path towards an all IP evolution and will allow the deployment of other applications such as ATO, On line KMS, train diagnostic,…
ETCS over GPRS: solution enablers

GPRS and Edge already answering the need of tomorrow
CONCLUSION

- Proven optimization of spectrum => ETCS operational benefits
- Packet switched technology => Preparing Next Gen & Anticipating new Apps
- Standardization and Tests done => Ready to Go