GSM-R EVOLUTION TOWARDS FRMCS

Presented by Ingo Wendler TC-RT / SBB for Managing Rail Mobile Communications Evolution
**Voice services** over Adaptive Multi-user Channels on One Slot (VAMOS) relies on multiplexing several circuit switched users on the same radio timeslot.

- Doubles multiplexing rate of Voice Circuit Switched channels

**NewTON (New Training Sequence Codes for GERAN)** extends VAMOS capabilities by factor 2.

**VAMOS/NewTON** capacity gain depends on:

- Average radio link quality
- Chipset feature availability for GSM-R → actually no support
- penetration of compatible Mobiles in the network
GSM-R evolution – Data Communication

GPRS/EGPRS packet switched data bearers provide

- Enhanced reliability e.g. Hybrid Automatic Repeat Request
- Improved GSM-R radio resource utilisation
- ETCS session multiplexing gain per timeslot
- GPRS/EGPRS: 4 sessions (confirmed) up to 7
- EGPRS: 8-14 ETCS sessions depending on radio conditions and modified resource allocation timer handling

ETSI TS 103 328 - GPRS/EGPRS features for operating ETCS

ETSI TS 103 368 – Applicable (AT) commands for railway operation

- Latest development: Automatic GPRS Attach

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GSM-R evolution – SMS Functional Addressing

- SMS exchange extension to EIRENE numbering plan
- Focus on interworking between GSM-R networks when the GSM-R user is abroad
- Align Follow Me Functional Nodes about originator and recipient location
- GSM-R user is allowed to address SMS based on functional address e.g. Train number
- Applicable for Forward/Reception of SMS
- ETSI TS 103 418 (stable draft) addresses interworking to enable SMS exchange

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**Railway targets**

- Improve punctuality
- Increase line utilisation (more trains per hour)
- Reduce system costs (track, rolling stock)
- Lower the amount of interfaces and complexity
- Automation of processes
- Accuracy in positioning (rolling stock, track system)
FRMCS targets in 3GPP

3GPP Release 15
«The fundament of FRMCS»

- Functional Use Cases
  - Role Management
  - Power Up and initialisation
  - Location Management
  - Prioritisation end-to-end
  - communication Invitation
  - Voice communication
  - Train safety application

- System principle Use Cases
  - High reliability communication
  - Bearer Independence
  - Interworking to GSM-R
  - Accuracy in positioning
  - Security (system and subscriber)
  - Availability & Maintainability

3GPP Release 16
Left over use cases

- Functions+ System principles
Timeplan for 3GPP Release 15

3GPP Rel-15 SA1 Timeline

- Use Case < 20%
- Use Case ~ 50% Information to SA#74
- Use Case ~ 80% for approval to SA#75
- TR 22.989

- Normative WID approval by SA#75
- Transfer requirements into normative approval by SA#76 based on WID

- SA1#75 08.2016
- SA1#76 11.2016
- SA1#77 02.2017
- SA1#78 05.2017

- SA#74 12.2016
- SA#75 03.2017
- SA#76 06.2017

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Thank you!