How GSM-R serves railways globally

Norman FRISCH
Business Development Railway Solutions
GSM-R in the global market

- Rail has freedom of technology choice
- GSM-R recognised as safe option
- Today:
  - most GSM-R contracts are awarded outside of Europe
  - Most GSM-R tender announcements outside of Europe
GSM-R for Australia metropolitan line

Location:
GSM-R solution: Huawei
Dispatcher Subsystem: Frequentis, Funkwerk
Cab Radios:

GSM-R advanced features applied:
- Frequency 1.800 MHz
- Use of standard 3GPP chipsets
- Spectrum availability for rail customer
- MSC Dual-homing
- Distributed BTS
  - 70 km of tunnel coverage
  - 32 tunnels in Sydney
  - 43 tunnels in outskirts

Location: Metropolitan line Sydney
GSM-R solution: Huawei
Dispatcher Subsystem: Frequentis
Cab Radios: Funkwerk

BTS, DBS, Shunting yard
GSM-R for Etihad Rail Project, UAE

**Telecom Sub-System Integrator:** Selex ES
**GSM-R solution:** Huawei
**Cab Radio:** KCC
**Next generation IP based dispatcher:** Siemens CVC
**End Customer:** Etihad Railway
**Length:** 260km

**GSM-R advanced features applied**
- Duo-location BSC
- MSC Dual-homing
- ETCS L2 line

![Map of UAE Railway Network](image)
GSM-R Flat Shunting Voice & Data
Xinfeng shunting yard China 1/2

Project background:
- Xinfeng nerve center of cargo transport
- tens of loco’s simultaneously running in shunting yard
- only 4MHz GSM-R bandwidth
- Voice and Data services transmitted in parallel in VGCS
- Requirement specification finalised in 2006
- In rail operation since 2010

Customer:
- Location: Xi’an city
- GSM-R solution: BSS: Huawei, NSS: European GSM-R

Supplier:

Shunting Member 1

Shunting Member 2

Shunting Member 3

Driver
Flat Shunting Voice & Data
Xinfeng shunting yard China 2/2

Customer
Location: Xi’an city
GSM-R solution: BSS: Huawei
NSS: European GSM-R

supplier

Technology applied
ETSI: 3GPP TS 43.068: “Voice Group Call Service (VGCS)”
3GPP TS 44.018: “Mobile radio interface layer 3 spec”
3GPP TS 48.008: “MSC-BSS interface “
FACCH signalling
SMD (Short Message Data) service

Flat Shunting Features
- Receive “Work Order” of current shunting task
- 500ms data transfer delay
- Data supported in all states of VGCS call (PTT, idle, talker change, talker, listener…)
- Shunting cab radio display “state of signal” controlled through data service by pre-defined shunting members (i.e. leader..)
- typical use cases : Link assurance & emergency break
- Automated voice announcements of emergency break status (i.e. originator) to all group members
- Flat Shunting initiation, acknowledgements and states are recorded and stored by equipment for post incident analysis
GSM-R Locomotive Synchronisation
Daqin Freight Line, China

Geo-Redundant GSM-R Release 4 Core

200% freight capacity increase thanks to Locomotive control system and GSM-R CSD
GSM-R distributed BTS
Eskişehir Kütahya Balıkesir Line, Turkey

**Customer**
- Location: TCDD, Turkish Railways
- Integrator: ALSTOM
- GSM-R solution:
  - BSS: Huawei
  - NSS: European GSM-R

**Length:** 466 km

**GSM-R features applied**
- ETCS L2 ALSTOM
- Multi Vendor Integration
- Distributed BTS
  - 42 tunnels
  - total length: 7100 m
  - max length: 789 m
R4 GSM-R core for CTCS L3
Harbin-Dalian highspeed line, China

Customer
Location: MoR, Chinese Railways
GSM-R solution: NSS/BSS: Huawei
CTCS L3 solution: Bombardier
Length: 895 km
Put into rail operation: December 2012

GSM-R features applied
• CTCS L3 design speed 350 km/h
• QoS according to ERTMS
• Permafrost, high-altitude environment
• Geo-redundant R4 MSC’s
• First R4 GSM-R core on operational CTCSL3-ETCS L2 line

Analysis of the equivalence between ETCS-L2 and CTCS-L3, in terms of requirements related to GSM-R

GSM-R solution:
NSS/BSS: Huawei
CTCS L3 solution: Bombardier
Length: 895 km
Put into rail operation: December 2012

Customer
Duo-BSC
R4
MSC Server
MGW/IWF
Conclusion

• Strong demand and utilization of GSM-R outside of Europe
• UIC vital role to promote GSM-R and its evolution
• Promotion campaigns in Central Asia, South America and Africa would help the continuation of this success
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