3rd World Conference on Rail Transport Telecoms

Towards an intelligent rail transport system

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Ensuring an interoperable transition

Agenda

- Rail Context
- Current metro case
- A path towards the future
- How to build the future urban rail telecom
- Systuf program return on experience
- Wuhan L6 return on experience
- Ecosystem and next steps
- Conclusion

Rail context

- More rail operator needs & more passengers expectation
  - Train operation and traffic management
  - Security through platform and train video surveillance
  - Efficient remote base maintenance
  - Real-time information to passengers
  - Increased services to passengers

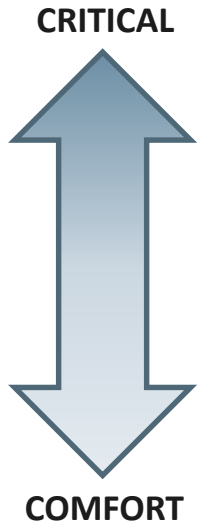
⇒ Need to optimize the rail operation efficiency and enhance the passengers services

⇒ More train-to-ground data exchange

⇒ But cost control and legacy/migration to take into account

Current metro case : heterogeneous applications

Applications	Type	Downlink	Uplink	Comment
Signaling	Data	Low	Low	Per Train
Operational Telephony	Voice	Low	Low	Per Train
Platform TV	Video	High	Low	Per Station
CCTV	Video	Low	High	Per Train
Maintenance	Data	Low	Low	Per Train
Passenger Info	Data	Low	Low	Per Train
Internet on Board	Data	High	Medium	Per Train



Already today, a large diversity of applications can be implemented for metro :

- From critical to comfort
- From low to high bandwidth
- Mainly Uplink or mainly downlink or balanced
- Voice or data services

A path towards the future

- From experience…
  - WIFI-based metro signaling and other applications already deployed
  - GSM-R installed based railways signaling and operational call
- … looking for alternatives or evolutions …
  - Multi-services on single bearer vs dedicated system or spectrum
  - Studies on new technologies (LTE / 4G)
- .. to new experiments launched in Urban Rail segment

⇒ Build on experience and Drive by Innovation

How to build the future urban rail telecom

- SYSTUF collaborative project evaluating LTE/4G for CBTC and multi-services (2012-2016)
- Dynamic LTE/4G tests done the France Valenciennes tests track to evaluate CBTC, CCTV, operational calls (2014-15)
- Several experiments done in China metro lines to assess LTE/4G based CBTC and data/video (2016)
- Commercial service open of the CBTC over LTE/4G in Wuhan L6 (December 2016)

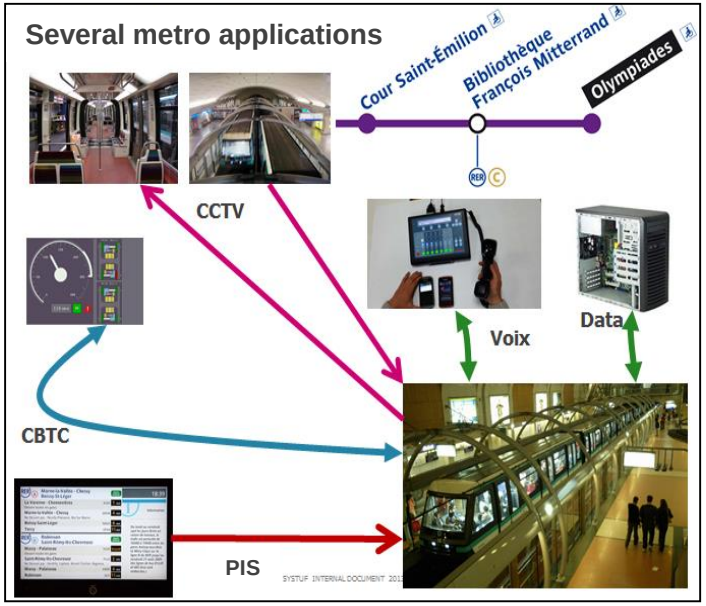
⇒ **The return of experience of the urban rail signaling 4G deployment serves the future railway telecom system**

SYSTUF program Return on Experience

SYStème de Télécommunication Urbain du Futur

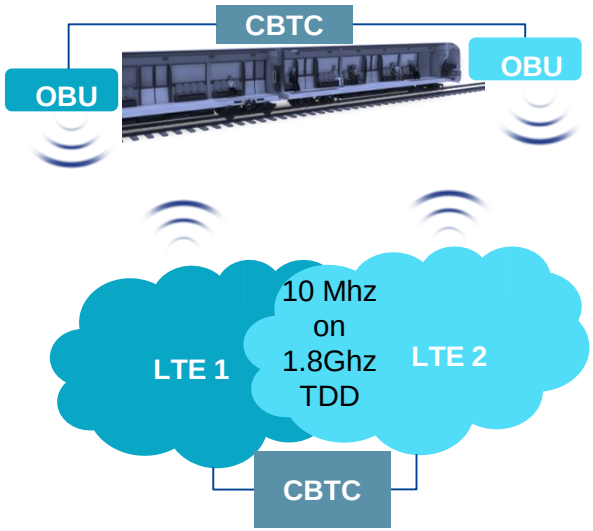
Next Generation Telecommunication System for Public Ground Transportation

ALSTOM, NOKIA, RATP, IFSTTAR, Eurecom, Merce, Telecom Br, Simpulse



- Experiment LTE based multiservice and broadband end-to-end communication system (2013-2016)
- LTE studies, reference architecture, prototype
- Demo done in Paris RATP L14
- **CBTC signaling performance and QOS validated**
- **Positive results confirm 4G performance & multiservice**

Wuhan L6 metro commercial service REX



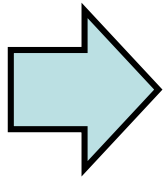
Metro signaling commercial service on LTE (Dec 2016)

- Solution based on **3GPP**
- Focus on **multi-services** :
  CBTC (ready for non-critical data)
- Focus on **nominal** and **degraded** operational cases ensuring **QOS**

- **High availability** for mission critical through redundant architecture, multiple networks cross links
- **Interoperability** between Rail applications and 4G network through the Alstom onboard mobile router

Ecosystem and next steps

- Railway Operational Communication IG
- EuRA-UIC-ETSI: FRMCS & other studies
- Shift2Rail X2Rail-1 WP3 Adaptable Communication
- Urban Rail multi-services LTE experiments & commercial deployments
- SYSTUF and future LTE/5G programs



Future scalable and flexible radio system for Railways & Urban Rail

- Convergence capability offered by the 3GPP technology, including operational voice from R13/14 and other access technologies from R15

Conclusion

- Urban rail experiments & commercial services on LTE gives return on experience for railway future radio system studies
- The future radio system must be studied globally
  - Convergence of applications on a common bearers
  - Convergence of Urban-Mainlines segments
  - Convergence of radio accesses
- Frequency spectrum is rare
  - Last Addendum to CEPT Report 59 on the 870-876 MHz and 915-921 MHz
  - Spectrum candidate for the GSM-R to FRMCS migration and long run … but challenge with SRD sector
- ROC Industry ready for the next step

Railway Operational Communications Industry Group

ALSTOM

FREQUENTIS

funkwerk

ISKRATEL

kapsch >>>

LEONARDO

NOKIA

SIEMENS

triorail

WENZEL ELECTRONIC::SYSTEMS

Thank you

Alstom
Pierre Cotelle

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