

Spectrum solutions for industry sectors

03/05/2019 – Vincent Durepaire

Harmonisation ongoing at 5.9 GHz awaited by users / industry

- Preferred band: 5915-5935 MHz
- Priority over Road ITS in 5915-5925 MHz (already several existing CBTC networks)
- Move to 5G/NR?
- Synergy with RMR in the long term? (limited to urban areas)



Intelligent Transport Systems – Road

Updating harmonisation at 5.9 GHz awaited by industry / policy makers

- 40 MHz being harmonised + 10 MHz where Road ITS shall protect Urban Rail ITS
→ 20 MHz extension
- Today, only 1 channel used (10 MHz)
- For a 2nd channel, need for a 2nd transmitter chain
- Any interest in having 20 MHz (or even 40 MHz) channels to increase capacity?



ITS – Co-channel coexistence issues

Work ongoing in ETSI

- Two interesting options for Road ITS vs. CBTC
→ database in cars with wireless updates, beacons
- Major uncertainties between Road ITS radio technologies
→ by default, no co-channel operation of ITS-G5 and LTE-V2X, nor LTE-V2X and NR-V2X
→ is 'detect-and-avoid' efficient? something else?
- CEPT may take action if ETSI process fails

Road ITS – Future proof?

Is the 5.9 GHz band enough?

- If not, the additional spectrum requirement should be clarified by industry / ETSI
- Is there really an interest in the 63.72-65.88 GHz band?
Is it usable beyond the next car?
Should it remain EU harmonised?
- CEPT may search for an alternative band for Road ITS if industry / ETSI demonstrates such a need
(little or no opportunity below 6 GHz)

Railway Mobile Radio – FRMCS: successor to GSM-R

Answer to the EC Mandate on FRMCS awaited by industry / policy makers

- Key for railway interoperability
- RMR (GSM-R+FRMCS) is not just another MFCN
 - specific topology and characteristics
 - statistical considerations based on real rollouts
- 874,4-880 MHz / 919,4-925 MHz (RMR) and 1900-1910 MHz (FRMCS) bands targeted with 2290-2400 MHz range (FRMCS) also investigated



Railway Mobile Radio – FRMCS: successor to GSM-R

Low frequencies have become so rare

- Requirement on RMR cab-radio to filter adjacent emissions (MFCN and SRD) to ensure robustness
- Requirement on MFCN BS to filter emissions below 1910 MHz so that 1900-1910 MHz can be used for FRMCS macro coverage rollout (otherwise, this attempt will fail as previous ones)
- New kind of regulation for 900 MHz: default max in-block EIRP + power flux density to be fulfilled at MFCN antennas when necessity to get higher EIRP

Railway Mobile Radio – Beyond FRMCS

millimetre waves for (critical) data?

- Example: for unloading data from trains in stations and/or shunting yards
- Railways as 'primary user' in one specific channel to guarantee QoS
- Sharing with other users who would be on 'non-interference and non-protected basis'

Enhanced Flight Vision System (EFVS)

- EFVS millimetre-wave radar in 32.431-32.795 GHz vs. Fixed links in 31.8-33.4 GHz
- EFVS = on-board landing aid in very low visibility conditions (landing without ground radionavigation systems)
- A new topic for CEPT to ensure coexistence between EFVS and Fixed links at 32 GHz

Telemetry, automation & PMR

Via SRD

- Useful categories: non specific, in data networks, WiFi
- The EU regulatory framework in 874-874.4 MHz and 915-919.4 MHz shall remain stable



Telemetry, automation & PMR

Via MNO

- NB-IoT as an alternative to SRD
- Drones for remote inspection
→ work ongoing in PT1



Telemetry, automation & PMR

Dedicated spectrum for wideband PMR

- 2.6 GHz TDD band targeted in France for large PMR networks
→ Arcep's public consultation closed on April 26th
- Channels \leq 20 MHz foreseen
- Allocation process triggered by local demand
- Model: 1 network for 1 or more professional users
- Area of operation included in the demand, where a coverage obligation of 95% applies, to be fulfilled within 36 months
- Synchronisation between networks required unless stringent field strength at area border

Telemetry, automation & PMR

Narrowband PMR

- Bands in the 400 MHz range are overcrowded in several CEPT countries
- Do we need a new GSM for limited data needs?
→ Single frequency network with: channel width similar to GSM and smaller than LTE 1.4 MHz, native voice and bitrates higher than GPRS/EDGE (i.e. > 30 kb/s)
- It would ease the evolution of existing narrowband PMR networks



- Harmonisation completed in the 700 MHz and 450 MHz ranges
- Investigations about possible agreements with MNOs to provide additional spectrum when required
- Drones: 1880-1900 MHz band targeted for control-command and data acquisition



PMSE

- Audio PMSE
 - 1350-1400 MHz under discussion in France
 - No harmonisation possible of the 960-1164 MHz band: key civil aviation band
- Video PMSE
 - 2.7-2.9 GHz band at early stage of use



Better radio receivers

- Requirements on radio receivers to better filter adjacent emissions
- Major role of ETSI harmonised standards
- e.g. ETSI harmonised standard on MSS terminals in L band still to be published
- e.g. RMR cab-radio at 900 MHz vs. SRD and MFCN
- e.g. MFCN BS at 2 GHz vs. RMR below 1910 MHz



Regulatory tools for better sharing

New approaches for LRTC

- Statistics based on real rollouts to be considered when deriving LRTC
- Default max in-block EIRP / unwanted emissions
+ additional local protection requirement
 - power flux density to be fulfilled at victim antenna when necessity to get higher in-block EIRP
 - unwanted emission power flux density limit at victim site

Regulatory tools for better sharing

Registration procedure / database

- As a complement to the general authorisation regime
- To facilitate coexistence
- To give confidence in opening new bands for sharing
- To enable faster recovery when a harmful interference case occurs
- Already applicable to many cases:
→ see next slide



Regulatory tools for better sharing

Registration procedure / database Candidates for registration, examples:

- RFID interrogators and NAP in 915-919.4 MHz for coexistence with improved GSM-R cab-radio?
- Outdoor UWB devices (temporary use)?
- CBTC BS for coexistence with fixed links in 5925-5935 MHz?
- ITS road-side devices for coexistence with CBTC in 5915-5925 MHz?
- All WiFi AP* in 5600-5650 MHz for coexistence with weather radars?
- All WiFi AP* at 6 GHz for coexistence with fixed links?
- etc.

* with SSID, MAC address and location

Conclusion

- No generic study required on verticals within CEPT
- Case by case thing based on use case
- Finding new tools for better sharing is a continuous process
- **Major interest in database / registration procedure !**

Targeted action points for CEPT:

- Millimetre waves for RMR?
- Coexistence between EFVS and Fixed links at 32 GHz
- Registration procedure / database to be included in the regulation for all WiFi AP in 5600-5650 MHz and at 6 GHz

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