CLEPA position on "short range" V2V, V2P and V2I within C-ITS communication technologies (5.9 GHz frequency band)

Intelligent Transport Systems (ITS) represent "*advanced applications aiming to provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated and 'smarter' use of transport networks*"[1].

ITS applications consist of the use of "short range" communication technologies for establishing communication between vehicles (V2V) from same or different manufacturers, infrastructure (V2I) and pedestrian (V2P).

The success of ITS depends on an interference free environment, seamless communications and its fast and broad availability to all road users. This is a safety related application that will save lives: to this extent technology neutrality, coexistence, interoperability and compatibility are the leading principles.

This paper addresses the most relevant issues concerning the operation of short range direct communication technologies in the 5.9 GHz frequency.

1. ***CLEPA supports technology openness. Spectrum regulation neutrality shall be maintained not to endanger DSRC/V2X ITS-G5, C-V2X/LTE-V2X, 5G, or prospective future technologies.***

In the mandate of the Radio Spectrum Committee to CEPT (RSCOM17-26)[2], the European Commission noted: "*In line with the EU principle of technology neutrality in spectrum regulation, the existing Decision 2008/671/EC[3] already allows the use of any technology that falls within the definition of ITS*".

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[1] Recital (3) of Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32010L0040

[2] RSCOM17-26 rev.3 (Final), "to study the extension of the Intelligent Transport Systems (ITS) safety-related band at 5.9 GHz", http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=48026

[3] 2008/671/EC: "Commission Decision of 5 August 2008 on the harmonised use of radio spectrum in the 5875 - 5905 MHz frequency band for safety-related applications of Intelligent Transport Systems (ITS)" http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008D0671&from=en

Also Decision 676/2002/EC[4], underlines the need of efficient spectrum use. Furthermore, Decision 243/2012/EU[5] sets through spectrum policy the framework for efficient spectrum use, technology neutrality and avoidance of harmful interference.

Up to now two communication technologies can be considered for short range:
- V2X ITS-G5 / IEEE802.11p, called in U.S. DSRC Wave / IEEE802.11p
- LTE-V2X release 14

For IEEE802.11p a group in IEEE started studying how to enhance the technology with NGV (new generation V2X). LTE-V2X will be further improved in 3GPP towards release 15 and then 16. New Radio V2X (NR-V2X) is synonym to 5G-V2X and starts development in 3GPP with release 16. Cellular V2X (C-V2X) groups the LTE-V2X family and NR-V2X together.

<u>Modifying the existing technology neutral spectrum regulation to become technology specific would prevent the deployment of any other technology and therefore impede the enhancement of future C-ITS safety applications.</u>

2. *"Vehicle to Vehicle", "Vehicle to Infrastructure" and "Vehicle to pedestrian" "safety related applications" shall remain in the designated C-ITS 5.9 GHz band.*

Specific spectrum band in the 5.9GHz is set aside for vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I) and vehicle-to-pedestrian (V2P) communication to improve traffic safety applications whose aim is to reduce the number of traffic fatalities or accidents (Decision 2008/671/EC[6], ECC Decision 2008(01)[7] and ECC Recommendation 2008(01)[8]. This was reconfirmed by the European strategy on Cooperative Intelligent Transport Systems C-ITS (COM (2016)766[9]) which designated 5.9 GHz for C-ITS.

<u>Due to the scarcity of the spectrum band, V2V, V2I and V2P should use the 5.9GHz band for traffic safety applications, while Vehicle to Network (V2N) should use IMT bands.</u>

3. *Additional spectrum for ITS is needed for future safety short range direct communication.*

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[4] Decision No 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community (Radio Spectrum Decision) http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32002D0676&from=EN

[5] Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programe, http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012D0243&from=EN

[6] Commission Decision 2008/671/EC of 5 August 2008 on the harmonised use of radio spectrum in the 5875-5905 MHz frequency band for safety-related applications of Intelligent Transport Systems (ITS) http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008D0671&from=en

[7] ECC Decision (08)01: "The harmonized use of the 5875-5925 MHz frequency band for Intelligent Transport Systems (ITS)" https://www.efis.dk/documents/14764

[8] ECC Recommendation (08)01: "Use of the band 5855-5875 MHz for Intelligent Transport Systems (ITS)" https://www.efis.dk/documents/14765

[9] Communication COM(2016)766 "A European strategy on Cooperative Intelligent Transport Systems", https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1530886259868&uri=CELEX:52016DC0766

As of today it can be estimated that the seven 10 MHz ITS channels (70MHz across the 5.9GHz band) are sufficient and necessary for the foreseeable "beyond Day-1" applications (e.g. Car2Car V2X list[10]), under the assumption that a single use case will be implemented by one dedicated technology. An ETSI contribution[11] to CEPT WG-FM[12] proves that 70 MHz in total are not enough to accommodate the deployment of currently envisioned services. Any further enhancement of C-ITS towards automated driving will imply higher levels of functional and operational safety requiring redundant communications on separated frequency bands, as indicated in the Car2Car position paper[13].

4. *CLEPA does not support a segmentation and segregation of the ITS band 5855 – 5925 MHz in the spectrum regulation.*

The EU Commission mandated CEPT to study the extension of the Intelligent Transport Systems (ITS) safety-related band at 5.9 GHz taking into account existing V2X ITS-G5, LTE-V2X and urban rail (RSCOM 17-26)[2]. This mandate explicitly sets the condition that: "*it should not result in segmentation and segregation of the band. The principle of equal access to shared spectrum shall be applied taking into account the need to avoid harmful interference and the need for reliable safety-related operation in the whole band*".

A spectrum regulation that would segment the spectrum band cannot be technology neutral: technology A would be considered to use one part of the band and technology B to use another part. A new technology C could not use the band.

Segmenting and segregating the spectrum band would impede new technologies to share the spectrum.

5. *CLEPA does not support sharing the ITS 5.9 GHz band with RLAN. RLAN can harm the ITS performances.*

Some studies contributing to CEPT PTD[14] and CEPT CPG[15] have proven that RLAN (e.g. WLAN communication) sharing the ITS band would lead to harmful interference to safety ITS applications. CEPT agreed with this conclusion, as explained in the draft CEPT brief 1.16[16].

[10] https://docbox.etsi.org/Workshop/2016/201603_ITS_WORKSHOP/S04_TWDS_ACCIDENT_FREE_ AUTOMATED_DRIVING/C2C-CC_Roadmaps_C2CCC_Buburuzan.pdf

[11] FM(15)099_LS Request for information about 63-64 GHz, https://www.cept.org/Documents/wg-fm/24521/fm-15-099_ls-request-for-information-about-63-64-ghz

[12] https://cept.org/ecc/groups/ecc/wg-fm/client/introduction/

[13] https://www.car-2-car.org/index.php?id=289

[14] https://cept.org/ecc/groups/ecc/cpg/cpg-pt-d/client/introduction/

[15] https://cept.org/ecc/groups/ecc/cpg/client/introduction/

[16] In CPG19-5 the draft CEPT Brief on WRC-19 Agenda item 1.16 concludes on sharing RLAN: "In the 5 850-5 925 MHz band, CEPT notes that the current studies have shown difficulties in achieving co-existence with other incumbent services without imposing any additional constraints on existing services such as FSS (space station receivers) and existing applications under the mobile service such as ITS (including urban rail). Therefore, supports no change to the RR in this band…. There is an EC spectrum Decision for non-exclusive ITS use under the existing primary mobile allocation in this band and CEPT studies also looked at sharing between ITS and RLAN. The current outcome of the

6. Any technology accessing the ITS 5.9 GHz band has to prove coexistence with existing IEEE 802.11p (ITS-G5).

Coexistence means that any technology does not harmfully interfere with existing ITS-G5 technology using that frequency band.

In the context of spectrum regulation in the 5.9 GHz, the technology already used in the market receives such a protection status, that any newcomer has to prove not to interfere the existing one.

This is reflected in the EU Radio Spectrum Committee17 mandate to CEPT (RSCOM17-26)2: "…study measures which allow coexistence of LTE-V2X and Urban Rail ITS ([…]) with existing ETSI ITS-G5 within the 5 875-5 925 MHz frequency band".

Short range ITS-G5 V2X is already deployed in the EU single market. C-Roads[18] Member States have regionally equipped ITS infrastructure with short range ITS-G5, Renault[19] and PSA[20] have produced thousands of vehicles with ITS-G5. In addition, Volkswagen has announced to equip V2X (ITS-G5) as a standard feature on the mass market production of all volume models from 2019[21].

Any new coming technology should not create harmful interference to existing technology.

7. CLEPA supports interoperability and compatibility of C-ITS.

ITS Directive 2010/40/EU[22] sets the legal framework for Cooperative ITS (C-ITS) implementation in Europe, to ensure a "*coordinated and coherent deployment and use of Intelligent Transport Systems (ITS) within the Union, in particular across the borders between the Member States, and sets out the general conditions necessary for that purpose*". C-ITS needs to be based on interoperable and compatible communication, without that, vehicles will not be able to understand the safety messages sent to/from each other and to/from the road infrastructure. Within the scope of this Directive:

TR 103 319 shows that none of the presented mitigation techniques is individually sufficient to protect ITS from WAS/RLAN and needs further investigation.
https://www.cept.org/Documents/cpg/40842/cpg-18-017-annex-iv-16_draft-cept-brief-on-ai-116

[17] The European Commission and the European Member States are members of the EU Radio Spectrum Committee : https://ec.europa.eu/digital-single-market/en/radio-spectrum-committee-rsc

[18] C-ROADS is the platform for harmonisation of the deployment activities of C-ITS across Europe, https://www.c-roads.eu/platform.html

[19] https://media.group.renault.com/global/en-gb/renault/media/pressreleases/21200353/renault-prepare-les-infrastructures-pour-la-voiture-autonome-et-connectee-de-demain-avec-scoop

[20] http://media.groupe-psa.com/en/ds-4-and-citro%C3%ABn-c4-owners-can-take-part-scoop-project?idtok=edce6bbb235

[21] https://www.volkswagen-media-services.com/detailpage/-/detail/Volkswagen-Konzern-bernimmt-Vorreiterrolle-zur-schnellen-Erhhung-der-Verkehrssicherheit/view/6248906/6e1e015af7bda8f2a4b42b43d2dcc9b5?p_auth=oBW7

[22] Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32010L0040

- "interoperability" means the capacity of systems and the underlying business processes to exchange data and to share information and knowledge
- "compatibility" means the general ability of a device or system to work with another device or system without modification

Interoperability and compatibility are the base for a safe and efficient C-ITS deployment across the whole European Union single market.