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| CPG19-4 |
| Cluj-Napoca, Romania, 4th - 7th July 2017 |
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| Subject:  | Draft CEPT Brief on WRC-19 Agenda item 1.12 |
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| Summary:  |
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| Proposal: |
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DRAFT CEPT BRIEF ON AGENDA ITEM 1.12

1.12 to consider possible global or regional harmonized frequency bands, to the maximum extent possible, for the implementation of evolving Intelligent Transport Systems (ITS) under existing mobile-service allocations, in accordance with Resolution 237 (WRC-15);

# ISSUE

Resolution 237 (WRC-15) resolves to invite WRC-19 to consider, based on the results of the ITU-R studies, possible global or regional harmonized frequency bands for the implementation of evolving ITS under existing mobile-service allocations

# Preliminary CEPT position

CEPT is of the view that its existing regional harmonisation measures for ITS in the bands 5 855-5 925 MHz and 63-64 GHz are sufficient and no changes to the RR are required in response to WRC-19 Agenda item 1.12.

CEPT is of the view that harmonisation measures for ITS on ITU-R level can be achieved through the development of an ITU-R Recommendation (and an ITU-R Report if needed).

CEPT is of the view that the requirements developed for ITS operations under the existing primary mobile allocation have already addressed the necessary sharing and compatibility requirements of the other primary services, and consequently do not impose additional constraints on primary services having allocations in the considered frequency bands.

CEPT is also of the view that harmonisation of ITS under AI 1.12 is limited to the exchange of information to improve traffic management and assisting safe driving.

# Background

Since 1995, research and development activities have been conducted in info-communication systems as core technologies of ITS. ITS applications have been globally deployed. Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications[[1]](#footnote-1) called “co-operative ITS” have been developed to achieve safe drive support systems.

Under Agenda Item 1.12, ITS refers to the exchange of information to improve traffic management and assisting safe driving.

## Existing Harmonisation in Europe

With ECC Decision (08)01 and ECC Recommendation (08)01, CEPT has harmonised the use of the frequency band 5 855‑5 925 MHz by deciding that:

* within CEPT, in the 5.9 GHz range, the spectrum for ITS services is split into channels with a bandwidth of 10 MHz each;
* the maximum spectral power density for ITS stations should be limited to 23 dBm/MHz e.i.r.p. but the total power shall not exceed 33 dBm e.i.r.p. with a Transmit Power Control (TPC) range of 30 dB.

It is also considered that:

* ITS systems implement duty cycle restrictions and specified frequency re-use conditions (e.g. for periodic ITS messages and ITS channel congestion control considerations) are not only beneficial for the compatibility with other systems in the same or adjacent frequency bands but also for the efficient use of the spectrum by cooperative ITS;
* the Technical Specification TS 102 792 V1.2.1, which specifies requirements to ensure coexistence between ITS at 5.9 GHz and TTT within 5 795-5 815 MHz, was published by ETSI in June 2015.

In ECC Decision (09)01, CEPT has also harmonised the use of the frequency band 63-64 GHz for ITS by deciding that maximum radiated power (e.i.r.p.) for ITS stations should be limited to 40 dBm e.i.r.p.

ITS operates within CEPT under the primary mobile service allocation on a non-exclusive basis and ITS devices cannot claim protection from existing systems operating under other current primary services.

CEPT is of the view that the use of the band 5 855-5 925 MHz by ITS within the mobile service will require special care for the manufacturing and deployment operations of ITS services to ensure the ITS receivers are designed in such a way as to afford the interference created by FSS earth stations and other incumbent co-primary services. Description of ITS and applications.

It is also considered that standardisation of radio equipment and communication protocols to ensure cross-border interoperability for various applications envisaged is ongoing within ETSI, which has developed EN 302 686, and other international standardisation organisations.

Communicating with moving vehicles is one of the typical use cases for radiocommunications, and a variety of ITS applications, greatly depend on functionality of radiocommunication.

Radiocommunication technology is essential for ITS, especially for increasing traffic safety and traffic efficiency as well as for the support of automated driving system, etc.

Moving vehicles or other traffic participants are regularly crossing borders. Therefore, interoperability between the communication partners is necessary and high equipment rates of interoperable ITS systems is a condition to build up a communication network between the traffic participants to ensure improvement of traffic safety using radio communication.

Cooperative ITS communication (C-ITS) has to be based on standardized and interoperable wireless ad-hoc communication systems. The interoperability has to be guaranteed at least inside the different regions. This interoperability requirement does not imply the use of exactly the same system in all regions, e.g. C-ITS in CEPT in 5.9 GHz is mainly based on IEEE 802.11p and ETSI ITS-G5, whereas the US implementation in 5.9 GHz is based on IEEE 802.11p and WAVE (wireless access in vehicular environments, slightly different to ETSI ITS-G5) system. For these technologies the standards are fully developed, intensive tested and validation has taken place, first implementations are done and deployment is planned or ongoing. For other systems e.g. LTE based V2X, technical specifications are under development.

### Latency

As refers to the [Recommendation ITU-T G.9959 (01/2015)](http://www.itu.int/rec/T-REC-G.9959-201501-I), the latency definition below was considered:

 “3.2.15 latency: A measure of the delay from the instant that a frame has been transmitted through a reference point of the transmitter protocol stack to the instant when a frame reaches the corresponding reference point of the receiver protocol stack.”

The latency has to be measured between the reference points, OSI-Layer 2 of the transmitter protocol stack and OSI-Layer 2 as reference point of the receiver protocol stack, in accordance to this, the latency will take 5ms by transmitting one message CAM or DENM (400 byte) via IEEE802.11p technology.

### Reliability

1. PTD-3 received one contribution (PTD/17/(66)) with different views regarding the latency and reliability definitions, which not has been discussed because of lack of time.

## deployment situation

In some CEPT countries, ITS applications are in deployment phase, e.g. in Germany there is deployment of traffic light and road works warning ongoing. In France, car manufacturers under the aegis of the Ministry of Transport are participating in a pre-deployment project of C-ITS (Cooperative Intelligent Transport Systems) using ITS-G5 technology involving 3000 vehicles over 2000 km road[[2]](#footnote-2).

The European Union has established the C-Roads Platform. The aim is to make the European roads safer for citizens, traffic more efficient and reducing harmful emissions from transport. This will also benefit European economy as a whole as it needs a safe, reliable and efficient transport system. It is the intention to develop harmonised specifications, taking the EU-C-ITS platform recommendations into account linking all C-ITS deployments[[3]](#footnote-3).

As core technologies, ITS is considered important in resolving road traffic problems such as congestion and accidents.

In the U.S.A. and CEPT the study of sharing ITS spectrum to be used for V2V and V2I, with Radio Local Area Network (RLAN), has begun.

C-ITS spectrum in US is designated in the range of 5 850-5 925 MHz similar to Europe, foreseeing the range of 5 855-5 925 MHz.

In the USA, one car manufacturer has deployed vehicle equipped with ITS in the beginning of 2017[[4]](#footnote-4). In Europe, one car manufacturer is planning to deploy vehicle equipped with ITS in 2019[[5]](#footnote-5).

## RelAtion with other WRC-19 Agenda items

WRC-19 Agenda item 9.1 issue 9.1.8 covers narrowband and broadband machine-type communication infrastructures, where a new ITU-R Report on IMT verticals is under development within WP5D. The draft ITU-R Report includes ITS applications via LTE-based V2X feature as ad-hock communication. This belongs to Agenda item 1.12 only. The part of the operation scenario via an operator network is in the scope of Issue 9.1.8.

# List of relevant documents

ITU-Documentation (Recommendations, Reports, other):

* Recommendation ITU-R M.1890 “Intelligent transport systems - guidelines and objectives”
* Recommendation ITU-R M.1453-2 “Intelligent transport systems - dedicated short range communications at 5.8 GHz”
* Report ITU-R M.2228 “Advanced intelligent transport systems (ITS) radiocommunications”
* Recommendation ITU-R M.2084 “Radio interface standards of vehicle-to-vehicle and vehicle-to-infrastructure communications for intelligent transport system applications”
* ITU Handbook on Land Mobile (including wireless access) volume 4: Intelligent transport systems, 2006
* Draft Report ITU-R M.[ITS USAGE] “Intelligent transport systems usage Report in ITU Member States”

CEPT and/or ECC Documentation (Decisions, Recommendations, Reports)

* ECC/DEC/(08)01 “ECC Decision of 14 March 2008 on the harmonised use of the 5875-5925 MHz frequency band for intelligent transport systems (ITS)
* ECC/REC//(08)01 “ECC Recommendation on the band 5 855-5 875 MHz for intelligent transport systems (ITS)”
* ECC/DEC/(09)01) “ECC Decision on the harmonised use of the 63-64 GHz frequency band for intelligent transport systems (ITS)”
* ECC Report 101 “Compatibility studies in the band 5 855–5 925 MHz between intelligent transport systems (ITS) and other systems”
* ECC Report 109 “Aggregate impact from ITS, BBDR and BFWA in the 5 725-5 925 MHz band on the other services/systems”
* ECC Report 113 “Compatibility studies around 63 GHz between intelligent transport systems (ITS) and other system”
* ECC Report 114 “Compatibility studies between multiple gigabit wireless systems in frequency range 57-66 GHz and other services and systems (except ITS in 63-64 GHz)”
* ECC Report 228 “Compatibility studies between ITS in the band 5 855-5 925 MHz and other systems in adjacent bands”
* ECC Report 244 “Compatibility studies related to RLANs in the 5 725-5 925 MHz band”
* ECC Report 250 “Compatibility studies between TTT/DSRC in the band 5 805-5 815 MHz and other systems”
* CEPT Report 57 “Report A from CEPT to the European Commission in response to the Mandate “To study and identify harmonised compatibility and sharing conditions for wireless access systems including radio local area networks in the bands 5 350-5 470 MHz and 5 725-5 925 MHz ('WAS/RLAN extension bands') for the provision of wireless broadband services”

EU Documentation (Directives, Decisions, Recommendations, other), if applicable

* EC Decision 2008/671/EC “Commission Decision of 5 August 2008 on the harmonised use of radio spectrum in the 5 875-5 905 MHz frequency band for safety-related applications of intelligent transport systems (ITS)”
* Radio Spectrum Committee working document “Mandate to CEPT to study and identify harmonised compatibility and sharing conditions for wireless access systems including radio local area networks in the bands 5 350-5 470 MHz and 5 725-5 925 MHz ('WAS/RLAN extension bands') for the provision of wireless broadband services”
* Directive 2010/40/EU of the European Parliament and of the Council“ on the framework for the deployment of intelligent transport systems in the field of road transport and for interfaces with other modes of transport”
* Commission Implementing Decision 2013/752/EU amending Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices and repealing Decision 2005/928/EC

# Actions to be taken

RLAN / ITS coexistence studies to be performed as part of the WRC-19 Agenda item 1.16 activities.

Coexistence studies between ITS systems and other applications of the mobile service need to be performed.

Recall existing coexistence studies between ITS applications in the mobile service and applications in the fixed satellite service and if necessary conduct further studies.

CEPT view regarding road tolling under Agenda item 1.12 in 5 795-5 815 MHz needs to be clarified.

Update WP5A "ITS usage report" related to CEPT usage (Draft Report ITU-R M.[ITS USAGE] “Intelligent transport systems usage Report in ITU Member States”).

# Relevant information from outside CEPT (examples of these are below)

## European Union (date of proposal)

## Regional telecommunication organisations

APT (date of proposal)

In Japan ITS systems using vehicle-to-infrastructure are already heavily used in the frequency band 5.8 GHz. Japan already deployed its vehicle-to-vehicle and vehicle-to-infrastructure communication system in a 9 MHz channel in the frequency range 755.5‑764.5 MHz.

ATU (date of proposal)

Arab Group (10 May 2017)

The Arab Spectrum Management Group (ASMG) has requested its member administrations to consider the possibility of identifying appropriate frequency bands for ITS systems within the current allocations of the mobile service.

CITEL (July 2017)

Preliminary Views

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| CAN | Canada is of the view that the Agenda item 1.12 is restricted to studying spectrum for intelligent transport systems in spectrum already allocated to the mobile service; therefore, Canada is of the view that this agenda item can be satisfied through ITU-R Recommendations and Reports without the need of changes to the Radio Regulations.  |

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Draft Inter-American Proposal

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| CAN, USA | NOC DIAP/1.12/1Radio Regulations Volumes 1, 2 and 4Reason: It is unnecessary to identify spectrum specifically for Intelligent Transport Systems. Regional and global harmonization can be satisfied by developing applicable ITU-R Reports and Recommendations. Therefore, no change to the Radio Regulations or regulatory action is required under this agenda item.SUP DIAP/1.12/2RESOLUTION 237 (WRC-15)Intelligent Transport Systems applications |

RCC (16 Sept 2016, 14 April 2017)

The RCC Administrations consider it reasonable to harmonize frequency bands at global and regional levels within existing mobile service allocations in order to implement evolving Intelligent Transport Systems, including through the development of ITU-R Recommendations and Reports.

The RCC Administrations in the view that the implementation of evolving transport systems within existing mobile service allocations shall not impose additional constraints on services already having allocations in these or adjacent frequency bands.

## International organisations

IATA (date of proposal)

ICAO (date of proposal)

IMO (date of proposal)

SFCG (June 2016)

SFCG supports the protection of existing space science service allocations. Since no specific frequency bands have been proposed for study, SFCG does not have a specific concern on this agenda item at this time.

WMO and EUMETNET (January 2017)

Since no specific frequency bands have been currently proposed for study, WMO does not have a specific concern on this agenda item. Consideration of frequency bands used for meteorological operations would increase WMO concerns.

## Regional organisations

ESA (date of proposal)

Eurocontrol (date of proposal)

## OTHER INTERNATIONAL AND REGIONAL ORGANISATIONS

EBU (date of proposal)

GSMA (date of proposal)

CRAF (March 2017)

CRAF supports the protection of existing RAS frequency allocations. Depending on the vicinity of the selected frequency bands to RAS allocations, CRAF requests no changes to the RR unless acceptable sharing and compatibility criteria are developed to ensure the protection of RAS from the future ITS operations.

IARU (April 2017)

The 5 GHz band is challenged by WRC-19 both by AI 1.12 and 1.16.

The frequency band 5 650 to 5 850 MHz (5 650 to 5925 in Region 2) is allocated to the amateur service on a secondary basis.

The frequency band 5 830 to 5 850 MHz is allocated to the amateur satellite service (space-to-Earth) on a secondary basis, and in the frequency band 5 650 to 5 670 MHz, the amateur-satellite service (Earth-to-space) may operate subject to not causing harmful interference to other services operating in accordance with the Table.

The frequency band 5 760 to 5 765 MHz is used for amateur weak-signal communication activity including terrestrial and Earth-Moon-Earth communications and propagation beacons.

There is a growing interest among radio amateurs in experimentation, investigation of propagation phenomena, point-to-point communication and space communication in this band.

The IARU requests that existing and future amateur use in this band is protected with special attention to the bands 5 760 to 5 765 and 5 830 to 5 850 MHz.

NATO (June 2017)

This NATO military assessment summary is a common military assessment of the NATO Nations on the potential impacts and benefits of Agenda Item 1.12. It does not constitute a common position of the NATO Nations.

The frequency band 5 850-5 925 MHz is not a NATO harmonised frequency band. It is however used by some NATO nations for dedicated military applications in the fixed, fixed satellite, radiolocation, and mobile services in support of NATO military operations. While current regulation for ITS and WAS/RLAN type applications in 5 850 - 5 925 MHz is without prejudice to military systems used in this frequency band, it is essential, from a military perspective, that any evolution of the regulation allows the continuation of the operation for military systems in-band and ensure the protection of the NATO harmonised band for radiolocation applications below 5 850 MHz.

1. Vehicle-to-infrastructure refers to communication between vehicles and dedicated Road Side Units (RSU) infrastructure; such like V2X equipped traffic lights, traffic signs, road construction trailors or RSU at road intersections. [↑](#footnote-ref-1)
2. [www.scoop.developpement-durable.gouv.fr/en](http://www.scoop.developpement-durable.gouv.fr/en) [↑](#footnote-ref-2)
3. [www.c-roads.eu](http://www.c-roads.eu) [↑](#footnote-ref-3)
4. <http://media.cadillac.com/media/us/en/cadillac/news.detail.html/content/Pages/news/us/en/2017/mar/0309-v2v.html> [↑](#footnote-ref-4)
5. <http://www.automobilwoche.de/article/20170422/HEFTARCHIV/170429981/1334/pwlan-ab--in-serie-vw-laesst-autos-kommunizieren> [↑](#footnote-ref-5)