

ECC Decision (08)01

The harmonised use of Safety-Related Intelligent Transport Systems (ITS) in the 5875-5935 MHz frequency band¹

approved 14 March 2008

latest amendment on 06 March 2020

¹ Comparable technical specifications to those given in this ECC Decision are given in Commission Decision 2008/671/EC. EU Member States and, if so approved by the EEA Joint Committee, Iceland, Liechtenstein and Norway are obliged to implement the Commission Decisions

EXPLANATORY MEMORANDUM

1 INTRODUCTION

This CEPT/ECC Decision addresses frequency designation within the band 5875-5935 MHz for the harmonised implementation of safety-related Intelligent Transport Systems (ITS). The frequency band is allocated to the Mobile Service, the Fixed Service and the Fixed-Satellite Service (Earth-to-space) on a primary basis in ITU Region 1 and in accordance with the European Common Allocation Table (ECA).

Throughout this ECC Decision where the term ITS is used it is related to safety-related ITS unless otherwise stated.

ITS encompass Road ITS and Urban Rail ITS. Road ITS includes any kind of ground-based transportation systems, e.g. cars, trucks, bicycles, motor bicycles, tramways, pedestrians, constructions equipment, agricultural equipment, etc. Urban Rail ITS means urban or suburban railway lines segregated from road and pedestrian traffic.

The objective of frequency designation for road safety applications in the 5.9 GHz band is to support the European Union eSafety initiative with its goals to reduce the number of road fatalities and improving the efficiency of road traffic with Intelligent Vehicle Safety Systems.

Road ITS traffic safety and traffic efficiency communication includes Inter Vehicle Communication (IVC or V2V), Infrastructure to Vehicle (I2V) communication and ITS stations in highly dynamic ad hoc networks. A portable ITS station can be incorporated in a mobile phone or as standalone devices for inclusion of pedestrians and cyclists into the overall traffic safety operations. Throughout this ECC Decision, these portable ITS stations are also covered by the terminology "vehicle", when IVC, V2V or I2V is addressed. At application level, the ITS station concept shows no role difference for the different ITS stations such as IVC or I2V. In order to support the time critical traffic safety applications where fast information exchange is necessary to warn and support the driver without time delay, all ITS station types may be involved.

Similarly, the objective of frequency designation for urban rail applications in the 5.9 GHz band is to support the development of urban rail mass transport systems. Urban Rail ITS, such as Communication-Based Train Control (CBTC) systems, provide wireless automatic train control with and without driver, at a high level of performance with short intervals between successive trains (90s headway between trains). The wireless system is used to transmit traction order or braking order in a safe mode. If trains cannot transmit/receive messages, they will not be authorised to move. CBTC systems have been deployed for more than 15 years in several European countries.

To support a quick development and deployment of ITS systems within Europe, it is essential that common frequency bands and associated harmonised equipment standards are available throughout Europe. A stable solution needs to be made available as soon as possible in order to support the European industry developments in this area.

CEPT Report 71 [1] identified the frequency band 5875-5935 MHz for the development and deployment of Road ITS and Urban Rail ITS applications. In some CEPT countries, Road ITS applications are currently using frequencies in 5875-5905 MHz and Urban Rail ITS applications are currently using frequencies in 5905-5975 MHz.

The CEPT/ECC compatibility studies addressed in ECC Report 101 [2] conclude that between 5875 MHz and 5905 MHz ITS will not suffer from excessive interference resulting from other systems/services.

ECC Report 228 [3] includes a review of the compatibility studies between ITS in the frequency band 5855-5925 MHz and other systems in adjacent bands and concluded that regarding ITS unwanted emissions at the antenna, a level of -65 dBm/MHz e.i.r.p. will be required in the band 5795-5815 MHz for truck installation and -60 dBm/MHz e.i.r.p. for car installation respectively². ECC Report 228 also lists a number of mitigation

² Equivalent mitigation techniques, as defined in the relevant Harmonised European Standard ETSI EN 302 571, may also be used.

techniques and if so employed, an unwanted emission limit of -30 dBm/MHz e.i.r.p. is sufficient for the protection of the adjacent FS above 5925 MHz.

ECC Report 290 [4] examines the applicability of ECC Reports 101 [2] and 228 [3] for LTE-V2X and Urban Rail ITS applications; the conclusions of the analysis are presented in Table 1 of that Report and can be summarised as follows:

- For Urban Rail ITS applications, compatibility is generally achieved. For radiolocation, road tolling and fixed service, an adequate system design may be required. Co-frequency operation between Urban Rail ITS and Fixed Service in 5925-5935 MHz was not assessed in ECC Report 290 as it was considered out of scope;
- Compatibility between LTE-V2X in mode A³ and road tolling is achieved; while compatibility between LTE-V2X in mode B³ and road tolling could be achieved if timing requirements (Ton & Toff) and aggregated spurious emissions do not exceed those of ITS in ECC Report 228 in the interference zone.

ECC Report 291 [5] studies the compatibility between smart tachograph, weight & dimension applications and systems operating in the band 5795-5815 MHz and in the adjacent bands.

ECC Report 302 [6] studies compatibility between WAS/RLAN in 5925-6425 MHz and other systems, including Road ITS and Urban Rail ITS applications. CEPT Report 73 [7] contains summaries of technical studies and assessment of coexistence scenarios for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) systems with incumbent systems in the 5925-6425 MHz band and adjacent bands, in response to Task 1 of the Mandate from the European Commission to CEPT.

The ECC Report 109 [8] “on the aggregate impact from ITS, BBDR and BFWA in the 5725-5925 MHz band on the other services/systems currently operating in this band” and ECC Report 110 [9] “on compatibility studies between broad-band disaster relief (BBDR) and other systems” also relate to ITS.

The ECC Report 109 concludes that:

- The existing results of the different compatibility studies between each of the systems, Broadband fixed wireless access (BFWA), Broadband Disaster Relief (BBDR), ITS and existing services will not be significantly changed by their aggregate impact.

The ECC Report 110 concludes that:

- If the band 5875-5925 MHz is used for BBDR radio applications, protection distances between ITS and BBDR could exceed several kilometres in both directions in the rural case whereas it is limited to hundreds of metres in urban and suburban cases. Compatibility between BBDR and ITS may be improved by the use of appropriate mitigation techniques in that case.

It is essential for the implementation and deployment of ITS traffic safety applications in the CEPT countries and thus the possibility to meet the general European Union policies on road safety that a European harmonised solution on spectrum availability is adopted within the CEPT/ECC providing the necessary regulatory certainty for the ITS industry.

An ECC Decision making spectrum available for ITS within the band 5875-5935 MHz based on compatibility studies developed within the CEPT/ECC will also ensure that future Fixed and Mobile Service systems in this frequency band will have to prove their compatibility with ITS as well as with other existing services and applications in the band.

2 BACKGROUND

The frequency band 5875-5925 MHz has been identified by ETSI within their System Reference Document TR 102 492-1/2 [10] as the most suitable frequency band for development and deployment of Road ITS providing road safety and traffic efficiency applications all over Europe.

³ Modes A & B are specified in ETSI TS 102 792 v1.2.1 Table 5.3, which is part of the requirements defined in Harmonised European Standard ETSI EN 302 571.

In CEPT countries safety related ITS in road vehicles and road side infrastructure based on the ETSI ITS standards are currently using frequencies in 5875-5905 MHz.

The frequency band 5.9 GHz has been identified by ETSI within their System reference document TR 103 111 [12] as the most suitable frequency band for development and deployment of Urban Rail ITS in Europe.

In October 2017, the EC issued a mandate for CEPT [13] to study the extension of the Intelligent Transport Systems (ITS) safety-related band at 5.9 GHz. In particular, the purpose of this mandate was to study the possibility of:

- extending the upper edge of the EC harmonised safety-related ITS band (5875-5905 MHz) by 20 MHz up to 5925 MHz;
- allowing, in addition to road transport, other means of transport such as Urban Rail, using Communication Based Train Control (CBTC), in the EC harmonised safety-related ITS band.

In response to the mandate, the ECC approved CEPT Report 71 [1] on 8 March 2019.

3 REQUIREMENT FOR AN ECC DECISION

The allocation or designation of frequency bands for use by a service or system under specified conditions in CEPT administrations is laid down by law, regulation or administrative action. ECC Decisions are required to deal with radio spectrum related matters and the carriage and use of equipment throughout Europe. The harmonisation on a European basis supports the Directive 2014/53/EU [14] of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment. A commitment by CEPT administrations to implement an ECC Decision will provide a clear indication that the required frequency bands will be made available on time and on a European-wide basis.

ECC DECISION OF 14 MARCH 2008 ON THE HARMONISED USE OF SAFETY-RELATED INTELLIGENT TRANSPORT SYSTEMS (ITS) IN THE 5875-5935 MHZ FREQUENCY BAND (ECC/DEC/(08)01), AMENDED 3 JULY 2015 AND AMENDED 06 MARCH 2020

“The European Conference of Postal and Telecommunications Administrations,

considering

- a) that there is an industry requirement for designation of frequency spectrum within the band 5875-5935 MHz for harmonised implementation, deployment and cross border operations of Intelligent Transport Systems (ITS);
- b) that ITS encompass Road ITS and Urban Rail ITS, which should be part of the same spectrum regulatory framework;
- c) that Recommendation ITU-R M.2121-0 [19] encourages administrations to “consider using the frequency band 5850 to 5925 MHz, or part thereof, for current and future ITS applications”;
- d) that Directive 2010/40/EU [15] of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport was adopted;
- e) that, in some CEPT countries, Road ITS applications are currently using frequencies in 5875-5905 MHz and Urban Rail ITS applications are currently using frequencies in 5905-5975 MHz;
- f) that technical solutions already deployed should remain available for maintenance and evolution and that the continued rollout of these systems should not be unduly hindered by a change of the spectrum regulatory environment;
- g) that the frequency band 5875-5935 MHz is allocated to the Mobile Service, the Fixed Service and the Fixed-Satellite Service (Earth-to-space) on a primary basis in ITU Region 1 and in the European Common Allocation table (ERC Report 25 [16]);
- h) that ITS applications providing communication to and from mobile units are considered as an application in the Mobile Service and that frequency spectrum should be designated to ITS as to any other mobile service application based on the agreed compatibility conditions;
- i) that ITS critical safety applications are not seeking the status of safety service (ITU RR 1.59);
- j) that ITS devices cannot claim protection from FSS earth stations in the frequency band 5875-5935 MHz and administrations, when authorising new FSS earth stations, may need to consider the potential impact on ITS (e.g. avoiding locations close to motorways);
- k) that ECC Report 228 [3] provides the requirements to protect TTT in 5795-5815 MHz and Fixed Service above 5925 MHz as adjacent band systems;
- l) that ECC Report 101 [2] provides the requirements to protect other services below 5850 MHz and above 5925 MHz as adjacent band systems;
- m) that ECC Report 290 [4] examines the applicability of ECC Reports 101 and 228 for LTE-V2X and Urban Rail ITS applications up to 5925 MHz;
- n) that Fixed Service links are widespread above 5925 MHz, and therefore Road ITS applications are not considered above 5925 MHz;
- o) that coordination with FS may be needed when deploying Urban Rail ITS in 5925-5935 MHz;
- p) that ECC Report 291 [5] studies the compatibility between smart tachograph, weight & dimension applications and systems operating in the band 5795-5815 MHz and in the adjacent bands;

- q) that CEPT Report 71 [1] studies the extension of the ITS safety-related band at 5.9 GHz in response to the EC Mandate [13];
- r) that ECC Report 302 [6] studies compatibility between WAS/RLAN in 5925-6425 MHz and other systems including Road and Urban Rail ITS applications;
- s) that CEPT Report 73 [7] contains summaries of technical studies and assessment of coexistence scenarios for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) systems with incumbent systems in the 5925-6425 MHz band and adjacent bands, in response to Task 1 of the Mandate from the European Commission to CEPT;
- t) that ETSI has developed the Harmonised European Standard EN 302 571 [11] for Road ITS equipment that includes requirements which ensure the protection of existing services in 5855-5925 MHz and in adjacent bands;
- u) that the ETSI Technical Specification TS 102 792 [17] specifies requirements to ensure coexistence between Road ITS at 5.9 GHz and TTT within 5795-5815 MHz;
- v) that transmitter power reduction, duty cycle restrictions and specified frequency re-use conditions (e.g. for periodic Road ITS messages and ITS channel congestion control considerations) are not only beneficial for the compatibility with other radio applications in the same or adjacent frequency bands but also for the efficient use of the spectrum by cooperative ITS.
- w) that the average conveyed Road ITS message duration is assumed to be below 1 millisecond with a duty cycle below 1% over one hour;
- x) that ITS devices should apply spectrum access techniques⁴ in 5875-5925 MHz to enable sharing of the spectrum and that CEPT invited ETSI to develop sharing and interference mitigation techniques within 3 years, for ensuring co-channel coexistence in the frequency range 5875-5925 MHz between Road ITS and Urban Rail ITS applications and efficient co-channel sharing between Road ITS radio technologies;
- y) that technical conditions to be defined by CEPT for WAS/RLAN shall address coexistence with Urban Rail ITS below 5935 MHz and Road ITS below 5925 MHz;
- z) that Urban Rail ITS devices should be robust against adjacent WAS/RLAN emissions in 5925 - 6425 MHz;
- aa) that defining sharing priority between Road ITS and Urban Rail ITS applications in 5875 – 5925 MHz is not against the principle of technology neutrality, prevents segmentation and provides certainty and a clear frequency regulatory framework to all ITS applications;
- bb) that, in the absence of solutions allowing Road ITS applications to protect Urban Rail ITS applications in 5915-5925 MHz, on a national basis Road ITS applications limited to infrastructure to vehicle (I2V) communications may be permitted and coordinated in 5915-5925 MHz, and that vehicle-to-vehicle (V2V) communications can be permitted when solutions ensuring protection of Urban Rail ITS become available from standardisation in ETSI.
- cc) that CEPT administrations may implement an individual authorisation regime for Urban Rail ITS in 5915-5935 MHz and for Road ITS infrastructure in 5915-5925 MHz in order to facilitate coexistence between Urban Rail ITS and Road ITS in 5915-5925 MHz as well as between Urban Rail ITS and Fixed Service above 5925 MHz;
- dd) that the regulatory solutions for the coexistence between Road ITS and Urban Rail ITS applications should not impose the use of a specific Road ITS or Urban Rail ITS technology;

⁴ With respect to Road ITS, CEPT REPORT 71 states "no specific safety related ITS technology use should be excluded from parts of the spectrum in 5875–5925 MHz. This means that technologies are allowed to use the spectrum regulations for safety related ITS for 5875–5925 MHz when they support sufficiently polite spectrum access and/or interference mitigation which allows sharing of the spectrum in principle" and "The overall communication channel loading and decentralised communication traffic congestion control must be such to ensure that safety-related messages have a very high predictability to be received by other ITS stations."

- ee) that the frequency band 5855-5875 MHz has been made available for non-safety ITS applications by ECC Recommendation(08)01 [18];
- ff) that in EU/EFTA countries the radio equipment that is under the scope of this Decision shall comply with the Directive 2014/53/EU [14]. Conformity with the essential requirements of the Directive 2014/53/EU may be demonstrated by compliance with the applicable harmonised European standard(s) or by using the other conformity assessment procedures set out in the Directive 2014/53/EU.

DECIDES

1. that the purpose of this ECC Decision is
 - to harmonise the use of safety-related Intelligent Transport Systems (ITS) in the 5875-5925 MHz frequency band and;
 - to harmonise the use of safety-related Urban Rail ITS in the 5925-5935 MHz frequency band.
2. that for the purpose of this Decision, safety-related Road ITS applications mean those applications whose aim is to reduce the number of traffic fatalities or accidents using communications between ITS stations;
3. that for the purpose of this Decision, safety-related Urban Rail ITS applications mean wireless Automatic Train Control (ATC) applications used along urban or suburban railway lines segregated from road and pedestrian traffic⁵;
4. that CEPT administrations shall designate the frequency band 5875-5925 MHz on a non-exclusive basis for all safety-related ITS applications and that Road ITS applications shall have priority below 5915 MHz and Urban Rail ITS applications shall have priority above 5915 MHz, so that protection is afforded to the applications having priority;
5. that, Road ITS and Urban Rail ITS applications shall remain confined to their respective prioritised frequency range until polite protocols and/or a proper co-channel sharing mechanisms are defined by ETSI, unless *considering bb*) is applied on a national basis;
6. that CEPT administrations shall designate the frequency band 5925-5935 MHz on a non-exclusive basis for safety-related Urban Rail ITS applications, subject to national market demand and coordination with existing Fixed Service links;
7. that the spectrum for safety related ITS applications is split into blocks as defined in Annex 1;
8. that the maximum spectral power density for ITS stations shall be limited to 23 dBm/MHz e.i.r.p. and the total power shall not exceed 33 dBm e.i.r.p. with a Transmit Power Control (TPC) range of 30 dB;
9. that the protection of existing services needs to be ensured in the ITS bands and in adjacent bands;
10. that CEPT administrations shall permit free circulation and use of ITS equipment subject to the provisions of this Decision;
11. that CEPT administrations shall exempt Road ITS road-side equipment falling under this Decision from individual licensing in 5875-5915 MHz;
12. that CEPT administrations shall exempt all ITS on-board equipment falling under this Decision from individual licensing;
13. that this ECC Decision enters into force on 06 March 2020;
14. that the preferred date for implementation of this ECC Decision shall be 06 September 2020;
15. that CEPT administrations shall communicate the national measures implementing this Decision to the ECC chairman and the Office when the Decision is nationally implemented;

⁵ Railway lines not segregated from road or pedestrian traffic (such as tramways) shall be considered as part of Road ITS.

16. that a review of this ECC Decision shall be initiated before the end of 2022.”

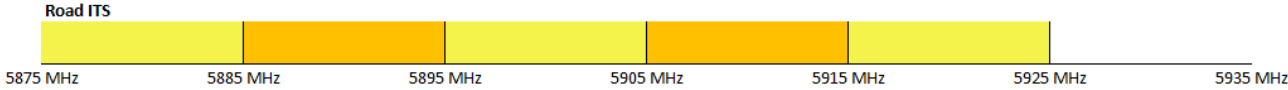
Note:

Please check the Office documentation database <https://www.ecodocdb.dk> for the up to date position on the implementation of this and other ECC Decisions.

ANNEX 1: FREQUENCY ARRANGEMENT

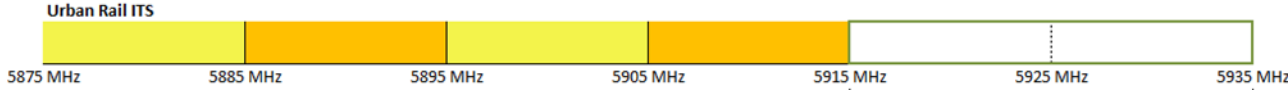
The frequency arrangement is based on a block size of 10 MHz starting at the lower edge of the band, at 5875 MHz.

For Road ITS:



In 5875-5925 MHz, Road ITS applications shall use channels within the boundaries of each 10 MHz block. Channel bandwidth may be lower than 10 MHz.

For Urban Rail ITS:



In 5875-5915 MHz, Urban Rail ITS applications shall use channels within the boundaries of each 10 MHz block. Channel bandwidth may be lower than 10 MHz.

In 5915-5935 MHz, the maximum channel bandwidth is 10 MHz for Urban Rail ITS applications. The dotted line shows the preferred harmonised frequency arrangement but, at national level, some rollouts may use a channel centred at 5925 MHz.

ANNEX 2: LIST OF REFERENCES

This annex contains the list of relevant reference documents.

- [1] CEPT Report 71: "Report from CEPT to the European Commission in response to the Mandate to study the extension of the Intelligent Transport Systems (ITS) safety-related band at 5.9 GHz", March 2019
- [2] ECC Report 101: "Compatibility studies in the band 5855– 5925 MHz between Intelligent Transport Systems (ITS) and other systems", February 2007
- [3] ECC Report 228: "Compatibility studies between Intelligent Transport Systems (ITS) in the band 5855-5925 MHz and other systems in adjacent bands", January 2015
- [4] ECC Report 290: "Studies to examine the applicability of ECC Reports 101 and 228 for various Intelligent Transport Systems (ITS) technologies under EC Mandate (RSCOM 17-26Rev.3)", January 2019
- [5] ECC Report 291: "Compatibility studies between smart tachograph, weight&dimension applications and systems operating in the band 5795-5815 MHz and in the adjacent bands", January 2019
- [6] ECC Report 302: "Sharing and compatibility studies related to Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) in the frequency band 5925-6425 MHz", May 2019
- [7] CEPT Report 73: "Report from CEPT to the European Commission in response to the Mandate to study feasibility and identify harmonised technical conditions for Wireless Access Systems including Radio Local Area Networks in the 5925-6425 MHz band for the provision of wireless broadband services; Report A: Assessment and study of compatibility and coexistence scenarios for WAS/RLANs in the band 5925-6425 MHz", March 2020
- [8] ECC Report 109: "The aggregate impact from the proposed new systems (ITS, BBDR and BFWA) in the 5725-5925 MHz band on the other services/systems currently operating in this band", September 2009
- [9] ECC Report 110: "Compatibility studies between Broad-Band Disaster Relief (BBDR) and other systems", September 2009
- [10] ETSI TR 102 492-1/2: ETSI System Reference Document on "Intelligent Transport System; "Part 1: Technical characteristics for pan-European harmonized communications equipment operating in the 5 GHz frequency range and intended for critical road-safety applications" "Part 2: Technical characteristics for pan European harmonized communications equipment operating in the 5 GHz frequency range intended for road safety and traffic management, and for non-safety related ITS applications"
- [11] ETSI EN 302 571: "Harmonised European Standard on "Intelligent Transport Systems (ITS); Radiocommunications equipment operating in the 5 855 MHz to 5 925 MHz frequency band; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU"
- [12] ETSI TR 103 111: "System Reference Document on "Spectrum requirements for Urban Rail Systems in the 5.9 GHz range"
- [13] Document FM(18)006: "Mandate to CEPT to study the extension of the Intelligent Transport Systems (ITS) safety-related band at 5.9 GHz; document RSCOM17-26 rev3 (final);"
- [14] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC Text with EEA relevance
- [15] 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 in the field of road transport and for interfaces with other modes of transport Text with EEA relevance
- [16] ERC Report 25: "The European table of frequency allocations and applications in the frequency range 8.3 kHz to 3000 GHz"
- [17] ETSI TS 102 792: "Technical Specification on "Intelligent Transport Systems (ITS); Mitigation techniques to avoid interference between European CEN Dedicated Short Range Communication (CEN DSRC) equipment and Intelligent Transport Systems (ITS) operating in the 5 GHz frequency range"
- [18] ECC Recommendation (08)01: "Use of the Band 5855-5875 MHz for Intelligent Transport Systems (ITS)", March 2020
- [19] Recommendation ITU-R M.2121-0 (01/2019): "Harmonization of frequency bands for Intelligent Transport Systems in the mobile service"