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| **Radiocommunication Study Groups** |  |
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| Source: Document 5A/TEMP/259(Rev.1)Subject: WRC-19 agenda item 1.12 | **Annex 31 to** **Document 5A/650-E** |
| **20 November 2017** |
| **English only** |
| Annex 31 to Working Party 5A Chairman’s Report |
| preliminary draft new recommendation ITU-R M.[ITS\_FRQ] |
| Harmonization of frequency [bands/ranges] for Intelligent Transport Systemsin the mobile service |

Scope

This Recommendation provides guidance on harmonized frequency [bands/ranges] to be used by intelligent transport systems (ITS) pertaining to the exchange of information to improve traffic management and to assist safe driving. The Recommendation encourages administrations to use harmonized frequency [bands/ranges] throughout the ITU-R regions for those ITS applications. Examples of the relevant frequency [bands/ranges] are provided in the Annex to this Recommendation.

The ITU Radiocommunication Assembly,

considering

*a)* that the growing radiocommunication needs of national and international road management can be satisfied through evolving intelligent transportation systems (ITS);

*b)* that national spectrum planning for ITS requires cooperation with other concerned administrations, in order to facilitate greater levels of spectrum harmonization;

*c)* that usage of the same frequencies of the same Service will enable administrations to benefit from harmonization while continuing to meet national planning requirements;

*d)* the benefits of cooperation between countries providing effective transportation operations;

*e)* that the use of ITS applications could improve traffic management, assist safe driving and support automated driving;

*f)* that the benefits of spectrum harmonization for ITS are:

– increased potential for transportation operations, especially cross-border;

– a broader manufacturing base and increased volume of equipment resulting in economies of scale and expanded equipment availability;

– improved spectrum management and planning,

*g)* the need for the development of harmonized frequency bands for the purposes of implementing ITS;

*h)* that the designation of those harmonized frequency bands or parts thereof for ITS does not preclude the use of these bands/frequencies by any other application of the services to which they are allocated and does not establish priority in applying and using the Radio Regulations;

*i)* that other land mobile systems may effectively complement ITS;

*j)* that ITS is not intended to provide broadband connectivity to the drivers/passengers,

[recognizing]

*[Editor’s note: “This part should contain specific factual background statements or studies which have formed a basis for the work and have been taken into account, as appropriate; the references should normally refer to ITU documents”– should any other Recommendations and Reports be cited here? If not, optional “recognizing” section would be removed]*

noting

*[Editor’s note: “This part should indicate generally accepted information that supports and/or relates to the Recommendation and should include reference to appropriate Annex”]*

*a)* that ITS are implemented under existing mobile-service allocations;

*b)* that the frequency [bands / ranges] harmonized by this Recommendation are allocated to a variety of services in accordance with the relevant provisions of the Radio Regulations;

*c)* that ITS applications are not understood as an application of a safety service (RR No.**1.59**);

*d)* that spectrum planning for ITS is performed at the national level, taking into account the benefits of harmonized frequency bands used by neighbouring administrations;

*e)* that flexibility, when using ITS, should be afforded to administrations:

– to determine, at the national level, how much spectrum will be made available in order to meet their particular national requirements taking into account the existing applications and their evolution;

– to have the harmonised bands being used by all services having allocations according to the provisions of the Radio Regulations, taking into account the existing applications and their evolution;

*f)* that the protection of existing services needs to be ensured in the ITS bands and in adjacent bands;

*g)* [that frequency usage for advanced ITS, as shown in the examples in the Annex to this Recommendation, supports harmonization of common frequency [bands / ranges] currently being used by many countries and groups,]

*[Editor's note: Suggestion is to remove the following four items from this document, and consider keeping them with the ITS frequency arrangements material in the ITS\_USAGE document or a new frequency arrangements report]*

*[h)* that LTE based V2X, completed in 2017, supports transmission in existing mobile allocations up to 6 GHz, which includes both PC5 (device-to-device direct link) and Uu (link between base station and device);

*i)* that results of several sharing and compatibility studies conducted by CEPT are summarized in ECC Report 101 (“Compatibility studies in the band 5 855‑5 925 MHz between ITS and other systems”) which also describe the requirements to protect other services below 5 850 MHz and above 5 925 MHz;

*j)* that it has been considered that ITS devices cannot claim protection from the FSS earth stations in the frequency band 5 875-5 925 MHz in Region 1;

*k)* that ITS use has been designated on a non-exclusive basis under the primary mobile allocation, but devices are designed in such a way to accommodate the potential interference created by FSS earth station uplinks and other incumbent co-primary services,]

recommends

1 that the frequency [band/range] [5 850-5 925 MHz, or parts thereof,] should be used for current and future ITS applications;

[2 that those examples of current ITS frequency [bands/ranges] in current use, as listed in the Annex, should be taken into account for Regional harmonized ITS frequency [bands/ranges;]]

3 that administrations implementing harmonized frequency [bands/ranges] should ensure compatibility between ITS stations and stations of other services.

*[Editor's note: The following annex is proposed to indicate the examples of ITS frequency [bands/ranges] in countries, groups and/or regions]*

Annex 0

Examples of frequency usage for advanced ITS within Regions

|  |
| --- |
| **Region 1** |
| **Country or Group** | **Frequency [bands / ranges]** |
| CEPT | 5855-5925 MHz |
| […] | […] |
|  |  |
|  |  |
| **Region 2** |
| **Country or Group** | **Frequency [bands / ranges]** |
| United States | 5850-5925 MHz |
| […] | […] |
|  |  |
|  |  |
| **Region 3** |
| **Country or Group** | **Frequency [bands / ranges]** |
| China | 5 905-5 925 MHz |
| Japan | 755.5-764.5 MHz5 770-5 850 MHz |
| Korea | 5 855-5 925 MHz |
| Singapore | 5 855-5 925 MHz |
| […] | […] |
|  |  |
|  |  |

*[Editor's note: The following annexes are proposed to either remain as annexes to this Recommendation, be moved into the ITS\_USAGE Report or form the basis for a new Report on ITS Frequency Arrangements]*

Annex 1

Harmonized frequency arrangements
for evolving intelligent transportation systems (ITS) in Region 1

Attachment 1

CEPT frequency arrangement for ITS

CEPT designated parts of the 5 855-5 925 MHz band in 2008 for the use by ITS. In addition, the frequency range 63-64 GHz band was also identified by CEPT in 2009 for use by ITS.

Those harmonization measures include the following arrangements:

## 1.1 Band 5 855-5 925 MHz

The frequency band 5 855-5 925 MHz for ITS applications is split into channels with a bandwidth of 10 MHz. The maximum spectral power density for ITS stations should be limited to
23 dBm/MHz e.i.r.p. but the total power should not exceed 33 dBm e.i.r.p. with a Transmit Power Control (TPC) range of 30 dB. The CEPT has designated the lower part of the frequency band for non-traffic safety related ITS applications such as enhancing traffic-efficiency, while the middle and (possibly in the future) upper parts of the frequency band are intended for traffic-safety related ITS applications such as time critical status information exchange whose aim is to reduce the number of traffic fatalities or accidents using communications between ITS stations (see Table A1 below).

Table A1

CEPT channel arrangement for ITS in the band 5 855-5 925 MHz

|  |  |
| --- | --- |
| Application | Frequency range [MHz] |
| Non-Traffic-Safety related  | Lower partSee [ECC/REC/(08)01](http://www.erodocdb.dk/Docs/doc98/official/pdf/REC0801.PDF) | 5 855 to 5 865 |
| 5 865 to 5 875 |
| Traffic-Safety related  | Middle partSee [ECC/DEC/(08)01](http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC0801.PDF) and [2008/671/EC](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008D0671&from=en) | 5 875 to 5 885 |
| 5 885 to 5 895 |
| 5 895 to 5 905 |
| Upper part See [ECC/DEC/(08)01](http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC0801.PDF) | 5 905 to 5 915 |
| 5 915 to 5 925 |

## 1.2 Band 63-64 GHz

For ITS applications, to provide possibilities to exchange a large amount of data at close proximity, the band 63-64 GHz should be used. In addition, this band is essential to provide an additional redundancy in spectrum for ITS applications such as C-ACC (cooperative adaptive cruise control), platooning, or other ITS applications to serve for ITS redundancy, where appropriate. The maximum radiated power for ITS stations should be limited to 40 dBm e.i.r.p. The CEPT has defined the regulatory framework for the deployment of ITS stations in the band 63-64 GHz in the [ECC/DEC/(09)01](http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC0901.PDF).

Attachment X

XXX frequency arrangement for ITS

XXX identified …

Annex 2

Harmonized frequency arrangements
for intelligent transportation systems (ITS) in Region 2

Attachment 1

Frequency arrangement for advanced ITS in the United States

WAVE is one technology being pursued in the United States “to improve traveler safety, decrease traffic congestion, facilitate the reduction of air pollution, and help to conserve vital fossil fuels”[[1]](#footnote-2), and as a particular focus in the United States, to reduce highway fatalities[[2]](#footnote-3). In order to address the need for advanced ITS to provide these public benefits, a number of applications have been developed, with more still under development, to leverage the characteristics of WAVE. These applications include communications among vehicles and other mobile end users, as well as between mobile users and roadside infrastructure.

A given WAVE application may use one of several 10 MHz channels on a dynamic assignment basis under the direction of the control channel as shown in the following table. Advanced ITS safety-related applications use dedicated channels for crash-imminent safety-related and high-powered public safety-related applications, as well as flexible assignment of other service channels through the control channel mechanism to support the wide range of advanced ITS WAVE applications. Many applications will only partially use a particular assignable channel at a particular time and location, permitting sharing among WAVE applications on individual assignable service channels.

Safety-related applications which are not pre-assigned to the dedicated channels typically use the control channel to transmit very short, infrequent messages, or else use WAVE Service Announcements (WSA) on the control channel to indicate a service channel upon which to communicate, if those messages are less dependent upon having very low latency. Lower priority messages typically use WSAs on the control channel to be assigned to a service channel which is not fully occupied by safety-related communications at that location at that time. This flexible designation of application messages to different service channels in various locations facilitates spectral efficiency and reduces interference among WAVE applications.

Current Band Plan for WAVE in the United States[[3]](#footnote-4)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5.850 GHz |  |  |  |  | 5.925 GHz |
|  | CH175 |  | CH181 |  |
| 5 850-5 855reserve 5 MHz | CH172service 10 MHz | CH174service 10 MHz | CH176service 10 MHz | CH178control 10 MHz | CH180service 10 MHz | CH182service 10 MHz | CH184service 10 MHz |

Note – This band plan may need to be revised if regulatory changes occur as a result of ongoing regulatory proceedings in the United States.

CITEL identified …

Annex 3

Harmonized frequency arrangements
for intelligent transportation systems (ITS) in Region 3

Some Region 3 countries identified the bands [5 770-5 850 MHz and/or 5 855-5 925 MHz] for the use by ITS applications.

Those harmonization measures include the following arrangements:

# 1 Band 5 770-5 850 MHz in Japan

The frequency band 5 770-5 850 MHz for ITS applications (Refer to ITU-R M.1453-2, 2005) is split into channels with a carrier frequency spacing of 5 MHz.

The maximum transmission power for roadside equipment (RSE) should be less than 44.7 dBm e.i.r.p. The maximum transmission power for on-board equipment (OBE) should be less than 20 dBm e.i.r.p.

Table A1 shows channel arrangement of ITS applications using DSRC at 5.8 GHz band in Japan.

Table A1

Channel arrangement for ITS applications at 5 770-5 850 MHz band in Japan

|  |  |
| --- | --- |
|  | Carrier frequency[MHz] |
| Road Side Equipment Channel | 5 775 |
| 5 780 |
| 5 785 |
| 5 790 |
| 5 795 |
| 5 800 |
| 5 805 |
| On-Board Equipment Channel | 5 815 |
| 5 820 |
| 5 825 |
| 5 830 |
| 5 835 |
| 5 840 |
| 5 845 |

# 2 Band 5 855-5 925 MHz

*[Text should be inserted.]*

Annex 4

Other frequency arrangements
for intelligent transportation systems (ITS)

*[If considered necessary]*

1. FCC Report and Order, October 1999, ET Docket No. 98-95. [↑](#footnote-ref-2)
2. Press Release, U.S. Transportation Secretary Mineta Announces Opening of Crash-Preventing “Intelligent Intersection” Test Facility (June 24, 2003) (<http://www.its.dot.gov/press/fhw2003.htm>). [↑](#footnote-ref-3)
3. FCC 03-324 REPORT AND ORDER, December 2003, ET Docket No. 98-95. [↑](#footnote-ref-4)