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WI/SI: FS\_6GHz\_LTE\_NR

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# 1 Introduction

Study on 6 GHz for LTE and NR in Licensed and Unlicensed Operations is the RAN level study item, which aims at capturing the latest information and status of the regulatory decisions for the 6GHz frequency range. In this discussion paper we present a text proposal for the corresponding TR 37.890 that captures new regulatory decisions in the ITU region 1 (EU/CEPT, Morocco, UAE), and Region 2 (Chile, Columbia).

# 2 Text proposal

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

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[8] Reply Comments of the Wireless Internet Service Providers Association, in GN Docket No. 17-183;

[9] Comments of Ericsson, in GN Docket No. 17-183;

[10] Comments of T-Mobile USA, in GN Docket No. 17-183;

[11] Comments of Verizon, in GN Docket No. 17-183;

[12] Reply Comments of the Satellite Industry Association, in GN Docket No. 17-183;

[13] Reply Comments of the Fixed Wireless Communications Coalition, in GN Docket No. 17-183;

[14] Comments of Dynamic Spectrum Alliance, in GN Docket No. 17-183;

[15] Comments of the National Spectrum Management Association, in GN Docket No. 17-183;

[16] Comments of CTIA, in GN Docket No. 17-183;

[17] Reply Comments of Cisco Systems, Inc., in GN Docket No. 17-183;

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### 4.1.1 Europe

#### 4.1.1.1 Introduction

According to the European Common Allocations Table (ECA Table) [20] in ERC Report 25 and the ECO Frequency Information System (EFIS), only the, 5.925-6.700 GHz frequency range is allocated on a primary basis to MS-Mobile Service, FS- Fixed Service and FSS-Fixed Satellite Service (earth to space), and on a secondary basis to Earth Exploration Satellite Service - EESS (passive); 6.700-7.075 GHz frequency range is allocated on a primary basis to FS and FSS (earth to space, space to earth), and on a secondary basis to EESS (passive); 7.075-7.145 GHz is allocated on a primary basis to FS and on a secondary basis to EESS (passive). In Russian federation, according to RR 5.459, 7.100-7.125 GHz is allocated to space operation service (Earth-to-space) on a primary basis. Generic SRD (UWB), LPR and TLPR also operate in 5.925-7.125 GHz frequency ranges on a no protection and no interference basis. More details are provided in Table 4.1.1.1-1 [20].

Table 4.1.1.1-1: European Allocation in 6 GHz

|  |  |  |
| --- | --- | --- |
| Frequency Range [MHz] | Allocation | Applications/Notes |
| 5 925 – 6 700 | MOBILE  FIXED  FIXED-SATELLITE (EARTH TO SPACE)  Earth Exploration Satellite (Passive)  5.149  5.440  5.458 | ESV/Within 5925-6425 MHz  FSS Earth stations/Priority for civil networks  Fixed/Point-to-point  Passive sensors (satellite)/For sea surface temperature, sea surface wind speed and soil moisture measurements  Radio astronomy/Spectral line observations, VLBI  Radiodetermination applications/Within 4500-7000 MHz for TLRP application and 6000-8500 MHz for LPR applications  UWB applications/Generic UWB as well as UWB on-board aircraft regulation within 6.0-8.5 GHz |
| 6 700 – 7 045 | FIXED  FIXED-SATELLITE (EARTH TO SPACE) (SPACE TO EARTH) 5.441  Earth Exploration Satellite (Passive)  5.458  5.458A  5.458B | FSS Earth stations/Within 6725-7025 MHz. Priority for civil networks  Feeder links  Fixed/ Point-to-point    PMSE/ portable or mobile wireless video, cordless cameras, temporary P-t-P video links in 7-8.5 GHz tuning range  Passive sensors (satellite)/For sea surface temperature, sea surface wind speed and soil moisture measurements  Radiodetermination applications/Within 4500-7000 MHz for TLRP application and 6000-8500 MHz for LPR applications  UWB applications/Generic UWN as well as UWB on-board aircraft regulation within 6.0-8.5 GHz |
| 7 045 – 7 145 | FIXED  Earth Exploration Satellite (Passive)  5.458 | Fixed/ Point-to-point  PMSE/ portable or mobile wireless video, cordless cameras, temporary P-t-P video links in 7-8.5 GHz tuning range  Passive sensors (satellite) / For sea surface temperature, sea surface wind speed and soil moisture measurements  Radiodetermination applications/Within 6000-8500 MHz for LPR applications  UWB applications/Generic UWB as well as UWB on-board aircraft regulation within 6.0-8.5 GHz |

Allocation for services (ITS, UWB, WIA, non-specific SRDs) in adjacent bands is shown in Table 4.1.1.1-2 and 4.1.1.1-3.

Table 4.1.1.1-2: Adjacent services below 5.925 GHz

|  |  |  |
| --- | --- | --- |
| Frequency Range [MHz] | Allocation | Applications/Notes |
| 5 850 – 5 925 | FIXED  FIXED-SATELLITE (EARTH TO SPACE)  MOBILE  5.150 | BFWA/Within 5725-5875 MHz  DA2GC/Within 5855-5875 MHz  FSS Earth stations/ priority for civil networks  ISM/Within 5725-5875 MHz  MBR/Within 5852-5872 MHz and 5880-5900 MHz  ITS/ Within 5875-5925 MHz and 5855-5875 MHz. Traffic safety applications within 5875-5905 MHz  NON-specific SRDs/Within 5725-5875 MHz  Radiodetermination applications/ Within 4500-7000 MHz for TLPR applications  WIA/Within 5725-5875 MHz |

Table 4.1.1.1-3: Adjacent services above 7.145 GHz

|  |  |  |
| --- | --- | --- |
| Frequency Range [MHz] | Allocation | Applications/Notes |
| 7 145 – 7 190 | FIXED  MOBILE  SPACE RESEARCH (DEEP SPACE) (EARTH TO SPACE)  Space Operation (Earth-to-space)  5.458 | Fixed/ Point-to-point  PMSE/ portable or mobile wireless video, cordless camera, temporary video links in 7-8.5 GHz tuning range  Radiodetermination applications/ within 6.0-8.5 GHz for LPR applications  UWB applications/Generic UWB. On-board aircraft regulations within 6.0-8.5 GHz |

#### 4.1.1.1a European standardisation

There are a number of ETSI deliverables that pertain to the 5925-7125 MHz frequency range. The relationship between these ETSI deliverables, System Reference Document (SRDoc), Technical Report (TR), the EC Mandate to CEPT, and Harmonized Standard (EN), is as shown in Figure 4.1.1.1a-1.



Figure 4.1.1.1a-1: Relationship between ETSI Deliverables and EC 6GHz Mandate.

The ETSI deliverables are as follows:

- ETSI TR 103 524 [22]: this document provides information on the intended applications, the technical parameters, mitigation techniques, the relation to the existing spectrum regulation and additional new radio spectrum requirements for Wireless access systems including radio local area networks (WAS/RLANs). The present document presents justification on the need for additional new license exempt spectrum for Wireless Access Systems including Radio Local Area Networks (WAS/RLANs) in the 5 925 MHz to 6 725 MHz frequency range to support future growth, particularly of WAS/RLANs with greater utilization and efficiency of this spectrum. This document was also suggesting considering the additional 6 425-6 725 MHz frequency range and not only the 5 925-6 425 MHz frequency range, which was opposed by two Administrations.

- ETSI TR 103 631 [27]: this document provides information on the intended applications, the technical parameters, mitigation techniques, the relation to the existing spectrum regulation and additional new radio spectrum requirements for technology neutral wireless access systems including radio local area networks (WAS/RLANs) capable of operating in the 6 725 MHz to 7 125MHz range.

- ETSI TR 103 612 [26]: this document considers the possibility of sharing the frequency range 6 425 - 7 125 MHz between the incumbent services and MFCN (Mobile/Fixed Communication Network) services. It was concluded that the frequency range 6 425 - 7 125 MHz has the potential to support the growing demand for mobile broadband and other use cases. Further feasibility studies are required to assess the challenges around the co-existence and compatibility of 5G NR technology with the incumbent services in the same frequency range and neighbouring frequencies respectively.

- Draft ETSI EN 303 687 [36]: this Harmonised standard will specify technical characteristics and methods of measurements for Wireless access systems including radio local area networks (WAS/RLANs) operating in the band 5 925 MHz to 6 425 MHz.

#### 4.1.1.2 Licensed operations

ETSI TFES has finalized a Technical Report [26] on the “possibility of sharing the band 6425-7125 MHz between the incumbent services and MFCN (Mobile/Fixed Communication Network) services.”. The summary of the document indicates that "*The present document does not include the co-existence studies to analyse the risk of interference between incumbent services and the 5G NR technology, which can be the next step in the process of feasibility study*".

The conclusions, state that "*… further feasibility studies are required to assess the challenges around the co-existence and compatibility of 5G NR technology with the incumbent services in the same frequency range and neighbouring frequencies respectively. The present document can be considered as the base for such studies to determine the technical conditions to use the MFCN in this band*".

#### 4.1.1.3 Unlicensed operations

In December 2017, EC Radio Spectrum Committee finalized the Mandate to CEPT [21] to study and identify harmonised compatibility and sharing technical conditions for a sustainable and efficient use on a shared basis of the frequency range 5.925-6.425 GHz for Wireless Access Systems including Radio Local Area Networks (WAS/RLANs).

CEPT created two project teams, ECC SE 45 (coexistence) and ECC FM 57 (regulatory). ECC SE 45 was tasked to undertake compatibility and sharing studies in the 5.925-6.425 GHz frequency range to support ECC FM 57, and the latter defined the regulatory rules for the band. The scope of the work items in these groups was the introduction of low power wireless access systems (including RLAN) in the frequency range 5.925-6.425 GHz under a licence-exempt / general authorisation regulatory regime,, ensuring certainty of continued operation, development and protection of existing services (Fixed Services (FS), Fixed Satellite Service (FSS)) considering RR 5.440 and 5.458.

ETSI has published the TR 103 524 [22] providing information on the technical parameters for WAS/RLANs to support the CEPT Work Items activities covering the frequency range 5.925 GHz to 6.425 GHz. In addition, it contains a request for considering additional frequencies up to 6.725 GHz. Furthermore, ETSI published TR 103 631 [27] providing information on the intended applications, the technical parameters, mitigation techniques, the relation to the existing spectrum regulation and additional new radio spectrum requirements for technology neutral wireless access systems including radio local area networks (WAS/RLANs) capable of operating in the 6725 MHz to 7125MHz range.

The ECC Report 302 [24] on sharing and compatibility studies related to Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) in the frequency band 5925-6425 MHz, developed by ECC SE45, used the technical characteristics specified in the ETSI TR 103 524 [22] for RLAN as starting point, and the technical parameters provided from ECC SE19 and ECC SE40 for FS and FSS respectively. It is to be noted that some of the technical parameters (for example max EIRP, TX unwanted emissions, etc.) for RLAN in the ETSI TR 103 524 may differ from the final rules for the band, depending on the results of the compatibility studies done by CEPT.

ECC approved the new Work Item to undertake coexistence studies in upper 6GHz (specifically 6425-7125MHz) between WAS/RLAN and incumbents [52]. The scope of the work is to study possible technical conditions under which Wireless Access Systems including Radio Local Networks (WAS/RLANs) could operate and co-exist with existing services in the 6425-7125MHz band. The studies will address technical and operational characteristics of LPI and VLP WAS/RLANs in 6425-7125MHz covering sharing and compatibility issues with incumbent services in the aforementioned range.

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### 4.1.5 United Arab Emirates

On December 2020, the telecommunications Regulatory Authority (TRA) has designated an additional 500 MHz radio spectrum, specifically 5925-6425MHz, for indoor use at an EIRP of 250 mW under class authorization [53].

### 4.1.6 African Telecommunication Union

The African Telecommunications Union (ATU) has validated the ATU working group decision on making the lower 6GHz band available on a license-exempt basis [TBD].

### 4.1.6a Morocco

On May 2021, the Moroccan National Telecommunications Regulatory Agency (ANRT) published a new decision on Short Range Devices (SRD) in 5925-6425MHz frequency range [54] with the following technical parameters:

- 23dBm EIRP for indoor usage only, not allowed inside vehicles;

- 14dBm EIRP for indoor and outdoor usage for the portable devices, not allowed for unmanned flying devices (i.e. drones).

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### 4.2.5 Chile

On 22th October 2020, Ministry of Transport and Communication of Chile published Resolution 1985 according to which low power access equipment, also referred to as AP, may operate in the frequency band 5925-7125 MHz under exclusive use for indoor environment and the following transmission power requirements:

- maximum EIRP of 30dBm;

- maximum spectral density of 5dBm/MHz.

- low-power AP equipment may only have integrated antennas, which cannot be removable or replaceable, nor may they have connectors that allow the connection of additional external antennas;

- likewise, they should not be able to operate with internal batteries or have spaces for their installation

User terminal devices that are associated with low power AP equipment must operate at the following power levels:

- maximum EIRP of 24dBm;

- maximum spectral density of -1dBm/MHz.

On July 2021, the Chilean authority developed Resolution 1321 [55] on July 2021 updating Resolution 1985 and covering the technical standard for short range devices in Chile:

- very low power devices with personal reach may operate outdoors, using internal batteries, in the 5925-7125 MHz frequency band;

- the maximum average EIRP power is 17 dBm.

### 4.2.6 Mexico

The Instituto Federal de Telecomunicaciones (IFT) in Mexico has opened a public consultation for the 5925-7125 MHz frequency band with the objectives to establish the technical operating conditions of WAS/RLAN systems that could make use of the of the 5925-7125 MHz frequency band and to increase the harmonization based on international best practices and existing technological advances.

### 4.2.7 Honduras

The National Telecommunications Commission (CONATEL) of Honduras has published Resolution NR 003/21 [48], which updates the National Frequency Allocation Plan (PNAF) to open the use of the 5925-7125MHz frequency range for the license-exempt usage.

### 4.2.8 Costa Rica

The Superintendencia de Telecomunicaciones (SUTEL) in Costa Rica has published its Plan Nacional de Atribución de Frecuencias (PNAF) [49], according to which the 5925-7125MHz frequency range is opened for the license-exempt usage with the following technical conditions:

- maximum EIRP is 30dBm;

- maximum output power of the equipment is 24dBm;

- unlicensed usage is allowed at the following conditions:

- low power indoor applications (LPI) in accordance with the power limits indicated above;

- very low power (VLP) indoors and outdoors with a maximum EIRP of 14 dBm;- LPI applications are restricted to operation inside buildings for RLAN type systems (wireless local area networks) or similar, which use contention protocols to get access to the environment;

- VLP applications are for portable or similar type devices, limited in power, allowing connectivity over short distances.

### 4.2.9 Colombia

On October 2021, Colombian National Agency (Agencia Nacional del Espectro) released a new resolution [56] according to which the 5925-7125MHz frequency range is opened for the license-exempt operation with the following technical parameters:

- only indoor usage is allowed;

- the use of devices located on oil rigs, automobiles, trains, boats and aircraft is not allowed with the exception of aircraft flying above 10,000 feet;

- the operation of equipment intended to control or communicate with unmanned aerial vehicles is not allowed;

- maximum EIRP of 30dBm for AP devices with maximum PSD of 5dBm/MHz;

- maximum EIRP of 24dBm for CL devices with maximum PSD of -1dBm/MHz;

- the spectral density should be attenuated 20 dB at a distance of 1 MHz from the end of the channel, 28 dB at a distance of one channel apart from the center of the channel, and 40 dB at a distance of 1.5 channels apart from the center of the channel;

- emissions outside the 5925-7125MHz frequency range should be limited to -27 dBm/MHz;

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## 4.5 Summary of Regulatory parameters for license-exempt

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Region | Country | Permissible operation  (Note 1) | Frequency range | Maximum mean EIRP for in-band emissions | Maximum mean EIRP density for in-band emissions | Maximum mean EIRP density for out-of-band emissions |
| Region 1 | EU/CEPT | LPI (see 4.1.1) | 5945 – 6425MHz | 23dBm | 10dBm/MHz | -22 dBm/MHz  (below 5935MHz) |
| VLP (see 4.1.1) | 14dBm | 1dBm/MHz  10dBm/MHz (for the narrowband usage) | -45 dBm/MHz  (below 5935MHz); |
|  |  |  |  |  |  |
| UK | LPI (see 4.1.3) | 5925 – 6425MHz | 24dBm | 11dBm/MHz | In accordance with directive 2014/53/EC |
| VLP (see 4.1.3) | 14dBm |  |
|  |  |  |  |  |  |
| UAE | LPI (see 4.1.5) | 5925 – 6425MHz | 24 dBm |  |  |
|  |  |  |  |  |  |
| Morocco | LPI (see 4.1.6a) | 5925 – 6425MHz | 23 dBm |  |  |
| VLP (see 4.1.6a) | 14 dBm |  |  |
|  |  |  |  |  |  |  |
| Region 2 | US | SP (see 4.2.1) | 5925 – 6425MHz  6525 – 6875MHz | 36dBm (AP)  30dBm (CL) | 23dBm/MHz (AP)  17dBm/MHz (CL) | -27 dBm/MHz  (outside operational range) |
| LPI (see 4.2.1) | 5925 – 7125MHz | 30dBm (AP)  24dBm (CL) | 5 dBm/MHz (AP)  -1 dBm/MHz (CL) |
|  |  |  |  |  |  |
| Canada | SP (see 4.2.2) | 5925-6875 MHz | 36dBm | 23dBm/MHz |  |
| LPI (see 4.2.2) | 5925-7125 MHz | 30dBm | 5 dBm/MHz |  |
| VLP (see 4.2.2) | 14dBm | -8dBm/MHz |  |
|  |  |  |  |  |  |
| Brazil | LPI (see 4.2.3) | 5925 – 7125MHz | 30dBm (AP)  24dBm (CL) | 5dBm/MHz (AP)  -1dBm/MHz (CL) | -27 dBm/MHz (outside operational range) |
| VLP (see 4.2.3) | 17 dBm | -5 dBm/MHz |
|  |  |  |  |  |  |
| Peru | LPI (see 4.2.4) | 5925 – 7125MHz | 30dBm (AP)  24dBm (CL) | 5dBm/MHz (AP)  -1dBm/MHz (CL) |  |
|  |  |  |  |  |  |
| Chile | LPI (see 4.2.5) | 5925 – 7125MHz | 30dBm (AP)  24dBm (CL) | 5dBm/MHz (AP)  -1dBm/MHz (CL) |  |
| VLP (4.2.5) | 17 dBm |  |  |
|  |  |  |  |  |  |
| Colombia | LPI (see 4.2.9) | 5925 – 7125MHz | 30dBm (AP)  24dBm (CL) | 5dBm/MHz (AP)  -1dBm/MHz (CL) | -27 dBm/MHz (outside operational range) |
|  |  |  |  |  |  |  |
| Region 3 | South Korea | LPI (see 4.3.2) | 5925 – 7125MHz | 24dBm | 2dBm/MHz | -27 dBm/MHz (outside operational range) |
| VLP (see 4.3.2) | 5925 – 6425MHz | 14dBm | 1dBm/MHz | -34 dBm/MHz (outside operational range of the VLP mode) |
| Note 1: For the exact conditions of operation, refer to the sub-clause which is mentioned in parenthesis (e.g. for the exact conditions for operating SP in US, refer to sub-clause 4.2.1.) | | | | | | |

-------------------------------------------------- TP END --------------------------------------------------