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Agenda item: 9.2.1

Source: Apple Inc., Ericsson

Title: Regulatory update for the 6GHz frequency range

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 the following information:

- ITU region 1: Regulatory decisions in Israel, Kenya, Jordan, Qatar and UK.

- ITU region 2: Regulatory decisions in Dominican Republic and further corrections of regulatory parameters for Chile and Columbia.

- ITU region 3: Clarification of regulatory parameters for Japan.

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

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### 4.1.8 Kenya

On June 2022, Communications Authority of Kenya (CAK) issued “Guidelines On the Use of Radiofrequency Spectrum by Short Range Devices” [66] allowing the use of frequency band 5925-6425 MHz with the following technical requirements:

- For the LPI mode:

- 23dBm (200 mW) mean EIRP;

- 10dBm/MHz mean EIRP density for in-band emissions;

- Restricted to indoor use only, outdoor use including in road vehicles is not permitted;

- An adequate spectrum sharing mechanism shall be implemented for channel access and occupation.

- For the VLP mode:

- 14dBm (25 mW) EIRP;

- 1dBm/MHz mean EIRP density for in-band emissions;

- Indoor and outdoor use, use of drones is prohibited;

- VLP device is a portable device.

### 4.1.9 Qatar

On April 2022 the Qatar Communications Regulatory Authority (CRA) issued the Class License for the use of Radio Local Area Network (RLAN) devices over the lower part 5925 – 6425 MHz of the 6GHz band with the following technical characteristics [67]:

- Low power mode with 23dBm EIRP for indoor use only;

- Very low power mode with 14dBm for indoor and outdoor use.

### 4.1.10 Jordan

On May 2022 the TRC of Jordan updated the rules for WLAN devices allowing unlicensed operation in 5925-6425MHz frequency range with the following technical conditions [68]:

- 14dBm EIPR for portable devices operated indoor and outdoor;

- 23dBm EIRP for indoor usages only.

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### 4.2.5 Chile

On 22th October 2020, Ministry of Transport and Communication of Chile published Resolution 1985 [45] 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] 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.

On September 2022, the Chilean authority issued a Resolución 2844 Exenta [70], which revises Resolución 1985 Exenta [45] as follows:

- the frequency range for unlicensed operation is changed to 5925-6425MHz;

### 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 draft resolution [56] according to which the 5925-7125MHz frequency range is opened for the license-exempt operation. November 2022 another resolution No. 000737 [71] was released setting 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;

- access point devices must be powered directly from the commercial electrical power network, the use of batteries is not allowed, and their structure must not support outdoor use;

- access point devices must only work with an antenna integrated into their structure;

- 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;

### 4.2.10 Dominican Republic

On September 2022 the Instituto Dominicano de las Telecomunicaciones (INDOTEL) has published Resolución No. 082-2022 [72], which establishes operating conditions for Low and Very Low Power Equipment in the 5925-7125 MHz frequency band with the following conditions:

- For indoor access points operating and for devices subordinate to it, the maximum power spectral density must not exceed 8 dBm/MHz. The maximum EIRP over the operating frequency band should not exceed 30 dBm.

- For client-type devices the maximum power spectral density shall not exceed 2 dBm/MHz in any 1MHz chunk and the maximum EIRP over the operating frequency band should not exceed 24 dBm.

- Very Low Power (VLP) devices with maximum power spectral density not exceeding -8 dBm/MHz and maximum EIRP over the operating frequency band not exceeding 14 dBm may be used outdoors.

- For transmitters any emissions outside the 5925-7125 MHz frequency band must not exceed -27 dBm/MHz.

- The power spectral density must be suppressed by 20dB at 1MHz outside the edge of the channel, by 28dB at channel width from the center from the channel and by 40dB at one and a half times the channel width from the center of the channel. At frequencies between 1MHz outside the channel edge and one channel width from the center of the channel, the limits should be linearly interpolated between 20 dB and 28 dB of suppression. At frequencies between one channel width plus 1MHz, and one channel with one-half times the channel width the limits must be linearly interpolated between 28 dB and 40 dB of suppression.

- The operation of indoor access points and fixed client devices is prohibited in automobiles, trains, ships and airplanes, except for large aircraft while flying above 3000 meters and only access points indoor operating in the frequency band 5925-6425MHz.

- Usage of indoor access points and fixed client-type devices is prohibited for control or communications with unmanned aircraft systems.

- Indoor access points and fixed client-type devices must use an antenna integrated or permanently fixed to its body or structure, as well as use a contention-based communications protocol.

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### 4.3.6 Japan

In April 2022 Japanese Ministry of Internal Affairs and Communications published the document describing technical conditions for the 6GHz band unlicensed systems:

- LPI and VLP mode in the frequency range of 5925-6425MHz;

- Maximum EIRP should be less than 200mW in LPI mode and less than 25mW in VLP mode;

- For the LPI mode frequency use is limited to indoors;

- Operating channel bandwidth size of 20, 40, 80, and 160MHz with the following centre frequencies:

- 20MHz channel: 5955, 5975, 5995, 6015, 6035, 6055, 6075, 6095, 6115, 6135, 6155, 6175, 6195, 6215, 6235, 6255, 6275, 6295, 6315, 6335, 6355, 6375, 6395, 6415 MHz;

- 40MHz channel: 5965, 6005, 6045, 6085, 6125, 6165, 6205, 6245, 6285, 6325, 6365, 6405 MHz;

- 80MHz channel: 5985, 6065, 6145, 6225, 6305, 6385 MHz;

- 160MHz channel: 6025, 6185, 6345 MHz;

- Adjacent channel leakage power:

- 20MHz channel: -25dBc/20MHz for the 20MHz offset and -40dBc/20MHz for the 40MHz offset;

- 40MHz channel: -25dBc/40MHz for the 40MHz offset and -40dBc/40MHz for the 80MHz offset;

- 80MHz channel: -25dBc/80MHz for the 80MHz offset and -40dBc/80MHz for the 160MHz offset;

- 160MHz channel: -25dBc/160MHz for the 160MHz offset and -40dBc/160MHz for the 320MHz offset MHz;

- Unwanted emission requirements:

- For the LPI mode:

- -27dBm/MHz for frequencies 5925MHz and below for all channel sizes;

- -13dBm/MHz for frequencies from 6425MHz to X value limit, and -19dBm/MHz for frequencies above X value limit, where X limit depends on the channel size as follows:

- X = 6435.9MHz for 20MHz (the reference channel at 6415MHz);

- X = 6440.1MHz for 40MHz (the reference channel at 6405MHz);

- X = 6440.4MHz for 80MHz (the reference channel at 6385MHz);

- X = 6425.5MHz for 160MHz (the reference channel at 6345MHz).

- For the VLP mode:

- -37dBm/MHz for frequencies 5925MHz and below for all channel sizes;

- -13dBm/MHz for frequencies from 6425MHz to X value limit, and -19dBm/MHz for frequencies above X value limit, where the X limit depends on the channel size as follows:

- X = 6425.5MHz for 20MHz;

- X = 6425.4MHz for 40MHz;

- X = 6425.2MHz for 80MHz;

- X = 6425.1MHz for 160MHz.

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## 4.5 Regulatory parameters comparative for license-exempt

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| --- | --- | --- | --- | --- | --- | --- |
| 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/MHz10dBm/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 4.1.7) | 5925 – 6425MHz | 23 dBm |  |  |
| VLP (see 4.1.7) | 14 dBm |  |  |
|  |  |  |  |  |  |
| Saudi Arabia | LPI (see 4.1.4) | 5925 – 7125MHz | 30dBm (AP)24dBm (CL) | 10dBm/MHz |  |
|  |  |  |  |  |  |
| Kenya | LPI (see 4.1.8) | 5925 – 6425MHz | 23dBm | 10dBm/MHz |  |
| VLP (see 4.1.8) | 14dBm | 1dBm/MHz |  |
|  |  |  |  |  |  |
| Qatar | LPI (see 4.1.9) | 5925 – 6425MHz | 23dBm |  |  |
| VLP (see 4.1.9) | 14dBm |  |  |
|  |  |  |  |  |  |
| Jordan | LPI (see 4.1.10) | 5925 – 6425MHz | 23dBm |  |  |
| VLP (see 4.1.10) | 14dBm |  |  |
|  |  |  |  |  |  |  |
| Region 2 | US | SP (see 4.2.1) | 5925 – 6425MHz6525 – 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 – 6425MHz | 30dBm (AP)24dBm (CL) | 5dBm/MHz (AP)-1dBm/MHz (CL) |  |
| VLP (4.2.5) | 17 dBm |  |  |
|  |  |  |  |  |  |
| Costa Rica | LPI (see 4.2.8) | 5925 – 7125MHz | 30dBm (AP)24dBm (CL) |  |  |
| VLP (see 4.2.8) |  | 14dBm  |  |  |
|  |  |  |  |  |  |
| Colombia | LPI (see 4.2.9) | 5925 – 7125MHz | 30dBm (AP)24dBm (CL) | 5dBm/MHz (AP)-1dBm/MHz (CL) | -27 dBm/MHz (outside operational range) |
|  |  |  |  |  |  |
| Dominican Republic | LPI (see 4.2.10) | 5925 – 7125MHz | 30dBm (AP)24dBm (CL | 8dBm/MHz (AP)2dBm/MHz (CL) | -27 dBm/MHz (outside operational range) |
| VLP (see 4.2.10) | 14dBm | -8dBm/MHz |
|  |  |  |  |  |  |  |
| 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) |
|  |  |  |  |  |  |
| Hong Kong | LPI (see 4.3.3) | 5925 – 6425MHz | 23dBm | 10dBm/MHz | In accordance with ETSI EN 303 687 |
| VLP (see 4.3.3) | 14dBm | 1dBm/MHz |
|  |  |  |  |  |  |
| Australia | LPI (see 4.3.4) | 5925 – 6425MHz | 24dBm | 11dBm/MHz |  |
| VLP (see 4.3.4) | 14dBm | 1dBm/MHz |  |
|  |  |  |  |  |  |
| New Zealand | LPI (see 4.3.5) | 5925 – 6425MHz | 24dBm | 11dBm/MHz |  |
| VLP (see 4.3.5) | 14dBm | 1dBm/MHz |  |
|  |  |  |  |  |  |
| Japan | LPI (see 4.3.6) | 5925 – 6425MHz | 23dBm |  | -27dBm/MHz (below 5925MHz)-13dBm/MHz and -19dBm/MHz (above 6425MHz) |
| VLP (see 4.3.6) | 14dBm |  | -37dBm/MHz (below 5925MHz)-13dBm/MHz and -19dBm/MHz (above 6425MHz) |
|  |  |  |  |  |  |
| Malaysia | LPI (see 4.3.7) | 5925 – 6425MHz | 23dBm | 10dBm/MHz |  |
| VLP (see 4.3.7) | 14dBm | 1dBm/MHz10dBm/MHz (for the narrowband usage) |  |
| 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.) |

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