Ericsson Response to CA's Consultation on Creation of a Class Licence for Regulating the Use of and Trade in 6 GHz Devices for Wireless Local Area Network and Variation to the Class Licence for Provision of Public Wireless Local Area Network Services

1 Executive Summary

Spectrum is an extremely scarce resource, and the consideration of the benefits for society when allocating new spectrum is therefore key for regulators.

The build-out of 5G networks is continuing to accelerate and, to date, there have been more than 180 commercial launches across the world. It is estimated that 5G networks will cover over 2 billion people at the end of 2021. By end of 2027, Ericsson estimates that 5G population coverage will have reached around 75 percent[1].

Access to sufficient spectrum is of paramount importance in terms of providing affordable mobile broadband and meeting the tremendous growth in mobile data traffic in Hong Kong. While spectrum allocated in the recent auction in October 2021 will address the initial 5G deployments (both in low and mid-bands)[2], additional spectrum is necessary in the longer term. In particular, the upper 6 GHz is key for the development of 5G.

Ericsson thanks and welcomes the opportunity to comment on the Communications Authority's (CA) proposal in relation to the 6 GHz spectrum band (5925-7125 MHz). Ericsson applauds the CA's decision to hold the upper part of 6 GHz (6425-7125 MHz) for 5G and to follow developments towards IMT identification at WRC-23, while considering the lower part of the band (5925-6425 MHz) for potential RLAN expansion (e.g. Wi-Fi, NR-U).

[1] Ericsson Mobility Report November 2021 (https://www.ericsson.com/assets/local/reports-papers/mobility-report/documents/2021/ericsson-mobility-report-november-2021.pdf)

[2] We note that mmWave spectrum was made available for use from April 2019.

2 International Landscape

The CA provides in its consultation an accurate situation of the 6 GHz landscape. In particular, the CA notes that while some economies have designated the lower part of the band (5925/45-6425 MHz) for unlicensed and are considering the upper part for licensed, as example Europe[3], UK or UAE; others have designed the complete band 5925-7125 MHz for unlicensed (e.g. USA, Canada or South Korea). China is also considering the usage of the complete band for licensed usage and RCC has recently approved a Recommendation on IMT within 6425-7125 MHz[4].

As also named by the CA, the range 6425-7125 MHz is being considered for IMT identification at WRC-23 by the ITU. The 6425-7025 MHz band is being considered for Region 1 and the 7025-7125 MHz band globally. Ericsson would like to note that ITU is a unique opportunity for harmonization and that an IMT identification in Region 1 will further improve a strong ecosystem, together with other large markets outside the region that release the band for licensed usage.

Ericsson would like to share the preliminary Region 1 sub-regional positions in relation to IMT identification of the band 6425-7125 MHz:

- In Europe, while the formal position remains to be defined, the RSPG (Radio Spectrum Policy Group), which is currently developing the "WRC-23 Opinion" to advise on the European positions to be adopted by EU Council states that *the band 6425-7125 MHz may respond to additional spectrum demand in mid-band since it has similar propagation conditions to the 5G pioneer band 3400-3800 MHz. However, there is a need to study compatibility with incumbent services and those in adjacent bands*[5].

- The RCC Administrations are in favour of the identification of all or part of the frequency band 6525–7025 MHz and 7025–7100 MHz for IMT systems, taking into account the results of the compatibility studies[6].

[3] Note that CEPT has defined a WI on "Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) in the 6425-7125 MHz band". However, as part of the scope, this includes to perform any additional studies, dependent upon the CEPT position and the results of WRC-23. The Work Item targets its finalization on July 2024, to account for the outcome of WRC-23.

[4] RP-213605, https://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_90e/Docs/RP-202844.zip

[5] RSPG21-031final_RSPG_interim_opinion_WRC23.pdf (rspg-spectrum.eu)

[6] ECC PT1(21)168, PRELIMINARY POSITION OF THE RCC ADMINISTRATIONS ON AGENDA ITEMS OF THE WORLD RADIOCOMMUNICATION CONFERENCE 2023

- ATU preliminary position is as follows: preliminarily support identification of the frequency band 6425-7125 MHz for IMT, taking into account the result of the coexistence studies in ITU-R[7].

The CA rightfully refers to the 3GPP Work Item (WI) on "6GHz NR licensed bands" (RP-202844). This work will be accelerated after the request from RCC mentioned above, as indicated by 3GPP[8].

3 Spectrum needs for the evolution of 5G

Spectrum is an extremely scarce resource and thus it is of extreme importance for regulators to analyze the society needs and potential benefits of different allocations. In this regard, GSMA has studied the spectrum needs in the mid-band range for the timeframe 2025-2030 and concluded that 2 GHz of mid-band spectrum will be needed. The study considers the spectrum available today – or to be made available in the considered time-frame – in low, mid and high bands; as well as densification (Wi-Fi offload is also implicitly included)[9].

This spectrum is required to reach the user experience data rates defined by ITU-R for IMT2020: 100 Mbps DL and 50 Mbps UL citywide, as well as to address the needs for a smart sustainable city.

In particular, the report looks at the needs for Hong Kong specifically (Highlighted in the figure below).

[7] RPA23-2, Rapport de la 2ème réunion préparatoire africaine en vue de la conférence mondiale des radiocommunications 2023, 6-10 septembre 2021.

[8] RP-213698, 3GPP Liaison Statements: R4-101-bis-eseries

[9] GSMA | 5G Mid-Band Spectrum Needs - Vision 2030 - Spectrum

Exhibit 14: Total (incl. base line) mid-band spectrum needs (MHz)

DL and UL total (including baseline) mid-bands spectrum need [MHz]														
	Popn density	Dense Area	Activity factor 10%			Activity factor 15%			Activity factor 20%			Activity factor 25%		
			High bands offload			High bands offload			High bands offload			High bands offload		
City	per km²	km²	30%	20%	10%	35%	25%	15%	40%	30%	20%	45%	35%	25%
Tehran	8,000	1,704	730	810	890	910	1020	1140	1040	1200	1350	1140	1330	1530
Amsterdam	8,386	117	940	970	1010	1010	1130	1260	1150	1320	1480	1260	1460	1660
Munich	8,836	92	870	940	1030	1050	1180	1300	1200	1370	1540	1300	1520	1730
Marseille	9,035	43	950	990	1040	1060	1200	1330	1220	1390	1570	1330	1540	1760
Hamburg	9,289	69	890	970	1060	1080	1220	1350	1240	1420	1600	1350	1580	1800
Minsk	9,541	192	920	1010	1100	1120	1260	1400	1290	1470	1650	1400	1630	1860
Baku	9,636	115	920	1010	1110	1130	1270	1410	1290	1480	1670	1410	1640	1880
Makkah	10,070	434	1150	1190	1230	1240	1360	1510	1390	1580	1780	1510	1750	2000
Milan	10,162	141	980	1030	1130	1150	1300	1450	1330	1520	1720	1450	1690	1940
Lyon	10,595	73	990	1060	1160	1190	1340	1500	1370	1570	1780	1500	1750	2010
Rome	10,955	171	1000	1090	1190	1220	1380	1540	1400	1610	1830	1540	1800	2060
Berlin	11,859	163	1030	1150	1260	1290	1460	1630	1490	1720	1950	1630	1920	2210
Amman	11,930	109	1130	1230	1350	1380	1550	1720	1580	1810	2040	1720	2010	2300
Tashkent	14,088	164	1180	1320	1450	1490	1690	1900	1720	2000	2270	1900	2240	2580
Johannesburg	14,681	222	1160	1300	1440	1480	1690	1900	1730	2010	2300	1900	2260	2610
Bangkok	14,696	513	1240	1380	1530	1560	1780	1990	1810	2100	2380	1990	2340	2700
Riyadh	15,000	145	1290	1430	1580	1610	1830	2050	1870	2160	2450	2050	2410	2770
Barcelona	15,576	179	1250	1400	1550	1590	1810	2040	1850	2150	2450	2040	2410	2790
Madrid	15,773	303	1260	1410	1560	1600	1830	2060	1870	2170	2480	2060	2440	2820
Bogotá	16,240	584	1290	1450	1600	1640	1880	2110	1920	2230	2550	2110	2510	2900
Mexico City	16,640	864	1380	1540	1700	1740	1980	2220	2020	2340	2660	2220	2620	3030
Istanbul	17,316	698	1420	1590	1760	1800	2050	2300	2090	2430	2760	2300	2720	3140
Jakarta	17,439	515	1370	1540	1710	1750	2000	2260	2040	2380	2720	2260	2680	3100
Beijing	18,185	953	1470	1640	1820	1860	2130	2390	2170	2520	2880	2390	2830	3270
Paris	18,400	243	1410	1590	1770	1810	2080	2350	2120	2480	2830	2350	2790	3230
Nairobi	18,758	241	1370	1560	1740	1780	2050	2330	2100	2460	2820	2330	2780	3230
Cairo	18,934	961	1400	1580	1760	1810	2080	2360	2130	2500	2860	2360	2820	3270
Tokyo	19,440	176	1450	1620	1810	1850	2130	2420	2180	2560	2930	2420	2890	3360
Ho Chi Minh City	20,087	484	1520	1720	1910	1960	2250	2540	2300	2690	3080	2540	3030	3510
New York	20,770	348	1530	1730	1930	1980	2280	2580	2330	2730	3130	2580	3080	3590
Moscow	20,975	204	1580	1780	1990	2040	2340	2640	2390	2800	3200	2640	3150	3660
Sao Paulo	21,542	266	1620	1830	2040	2090	2410	2720	2460	2870	3290	2720	3240	3760
Mumbai	24,773	944	1610	1850	2090	2150	2510	2870	2570	3050	3530	2870	3470	4070
Hong Kong	25,327	291	1730	1980	2220	2280	2650	3020	2710	3200	3690	3020	3630	4240
Yangon	25,327	291	1900	2140	2390	2450	2810	3180	2870	3360	3850	3180	3790	4410
Lagos	30,968	215	2140	2440	2740	2810	3260	3710	3340	3940	4540	3710	4460	5210

Spectrum need	< 10 MHz	10 to 500 MHz	500 - 1000 MHz	1000-2000 MHz	> 2000 MHz

Source: Coleago

Note: Figures are rounded down to the nearest 10 MHz. The figures exclude low-band spectrum.

The GSMA report also analyzes the impact of the lack of additional spectrum in terms of densification (economical cost, power consumption as well as technical impossibilities).

The report further looks at the benefits of this additional spectrum outside the citywide areas, in particular to bring Fixed Wireless Access (FWA) to busy towns and villages areas where fixed broadband is unavailable.

Enterprises/event areas/Industry 4.0 use cases and automotive communication are of relevance to this range and could be addressed, in addition, by mobile operators. Additional mid-band spectrum can indeed add capacity to major roads and rail links outside cities, both for eMBB, e.g. car entertainment, and autonomous driving. 5GAA has also analyzed the spectrum needs for automotive in rural and urban areas and concluded the following (5GAA TRS-200137, 20.06.2020):

- At least 50 MHz of additional service-agnostic low-band (< 1 GHz) spectrum would be required for mobile operators to provide advanced automotive V2N services in rural environments with affordable deployment costs;

- At least 500 MHz of additional service-agnostic mid-band (1 to 7 GHz) spectrum would be required for mobile operators to provide high-capacity city wide advanced automotive V2N services.

4 6 GHz

Ericsson would like to invite the CA to follow the GSMAi livestreaming session on "Maximising the benefits of the 6GHz band"[10]. In this session, the GSMAi will present a socioeconomic study on the different allocations of the 6 GHz spectrum (1200 MHz for IMT or RLAN or a balanced approach on 700 MHz for IMT and 500 MHz for RLAN).

4.1 Upper 6 GHz is key for the development of 5G

Hong Kong has allocated a bit less than 900 MHz in the mid-bands range (between 1.5 GHz and 6 GHz) for territory wide outdoors usage. Thus, there is a gap larger than 1 GHz to achieve the spectrum needs estimated by GSMA. The upper 6 GHz is key to help addressing these needs by adding 700 MHz of mid-bands spectrum.

We applaud the CA's proposal to consider this band for 5G services subject to the outcome of WRC-23. Ericsson believes that this will benefit Hong Kong citizens, ensuring mobile operators to address the capacity needs at an affordable price, which will keep Hong Kong at a leading level in the region.

Hong Kong will be able to benefit from the technical studies performed towards WRC-23 in terms of sharing with incumbents and of the emerging large ecosystem for Region 1 as well as for large markets outside Region 1.

[10] (11) LinkedIn

4.2 Lower 6 GHz and factors to consider

Fixed Broadband penetration and speed

Ericsson congratulates Hong Kong for being ranked third among 141 economies in terms of the number of fibre internet subscriptions per 100 population by The World Economic Forum's Global Competitive Report 2019[11].

According to OFCA's webpage, the household BB penetration rate in March 2021 was 95.1%, being the FTTH/B penetration rate 78.6%.

Hong Kong residents may be able to benefit from the license-exempt usage of the 5925-6425 MHz if FTTH/B speeds are large enough (i.e. not only a few of them with high speeds but all of the subscriptions). Otherwise, if the fixed broadband connection is the bottleneck, additional spectrum for RLAN would not allow to improve the end user experience and thus not add any societal benefit. We would invite Hong Kong to analyze this element when taking a decision in the lower part of the 6 GHz band.

Use cases

As part of the consultation, the CA refers to the innovative applications that WiFi6E targets, including Augmented Reality/Virtual Reality and Internet of Things (IoT).

Ericsson would like to remark the high-capacity needs required by AR/VR and the importance of efficient use of spectrum. In this regard, Ericsson is of the view that high bands (i.e. 57-66 GHz) would be the right choice and would allow as example to connect AR/VR glasses with the mobile device.

IoT includes many different types of communications and devices and thus requirements, from low-capacity sensors or wearables up to URLLC applications. While unlicensed may address certain IoT use cases requiring only best effort behavior, a licensing regime is required for low latency and high reliability use cases, as example, a factory.

4.3 6 GHz incumbent users

From an incumbent's perspective, the 6 GHz band includes Fixed Service Satellite (FSS) uplink as well as Fixed Service (FS).

[11] Telecommunications - Office of the Communications Authority (https://www.ofca.gov.hk/filemanager/ofca/en/content_113/telecommunications.pdf)

- FSS UL is indeed an international issue and in our view, ITU is the relevant place in which co-existence studies should take place.

- FS is a national issue, however, while a licensing regime allows for coordination on a case-by-case basis, unlicensed usage implies a risk of interference (i.e. even when restricted indoors, control of equipment becomes difficult from an administration perspective).

4.4 RLAN technical conditions

Ericsson shares the CA's view in relation to the designation of RLAN spectrum under NPNI (Non-Protection and Non-Interference) basis due to the characteristics of the spectrum allocations, i.e. free of spectrum fees.

Any RLAN compliant device should follow national regulations. Solutions are today in place for other RLAN ranges (2.4 GHz and 5 GHz) for which the operating range as well as technical conditions may differ among countries. The same solution would apply to 6 GHz. However, Ericsson understands regulators' challenges when allowing unlicensed equipment in the country and the difficulties to control such equipment. Ericsson supports the CA's efforts to try to limit this issue. Stringent certification and labelling requirements, as proposed in the consultation, can help consumers understanding the type of equipment they are buying as in many cases users are not aware of these devices not fulfilling local regulations. Compulsory certification is also another method to enforce compliant devices in the markets. Ericsson notes that the CA is only considering certification of APs, however, we would like to note that use cases may also target device-to-device communication as mentioned in the use cases chapter (i.e. not connected though an AP) and we would recommend the CA to consider certification of these as well.

If the lower part of the band is envisioned by the CA as necessary, based on the fixed broadband characteristics of the country, Ericsson would recommend to follow the technical conditions defined by CEPT[12]:

- Low power indoor (LPI) use, maximum mean 200 mW EIRP or 23 dBm, with no outdoor use allowed;

- Very low power (VLP) portable use, maximum mean 25 mW EIRP or 14 dBm, that may both operate indoor and outdoor.

[12] ECC DEC (20)01, ECO Documentation (cept.org)

Our proposal is based on sharing and compatibility studies that CEPT has done in terms of incumbent's protection in Europe (FS[13] and FSS UL). Ericsson particularly worries on FS protection and would like to ensure that this service is fully protected in case an unlicensed decision is taken. Thus, Ericsson believes that high power devices could impose high risk of interference. Noting that USA has allowed this with the implementation of AFC, we would like to emphasize that the effectiveness of this mechanism has not been proven, yet.

We would also like to note that CEPT allows RLAN within the range 5945-6425 MHz (i.e. 20 MHz above the CA's proposal), and the ETSI harmonized standard EN 303 687 will reflect the CEPT regulatory decisions. Thus, while we agree that ETSI is the correct set of technical requirements for this spectrum range, we would like to highlight that compliance is expected to be required above 5945 MHz (instead of 5925 MHz).

The ETSI EN is under construction now and Ericsson would like to invite the CA to follow developments closely, in particular, discussions in relation to the definition of receiver blocking requirements for RLAN equipment operating within the 5945-6425 MHz band. Ericsson believes that this requirement is essential to secure efficient use of spectrum should licensed be made available in the upper 6 GHz (6425-7125 MHz).

[13] Studies are based on European FS situation.