Thuraya response to Federal Office of Communications consultation

"Invitation to tender for frequency blocks for the national provision of mobile telecommunications services in Switzerland"

Dear Sir/Madam,

Thuraya Telecommunications Company "Thuraya" wishes to thank the Federal Office of Communications "OFCOM" of Switzerland for allowing the opportunity to comment on the paper titled "Invitation to tender for frequency blocks for the national provision of mobile telecommunications services in Switzerland" dated 9th of March 2018. Thuraya response is limited to the mobile telecommunications services in the 1400 MHz. Thuraya is looking forward to responding to any future OFCOM consultation papers on this matter and/or any other satellite related issues. Annex-1 to this document contains Thuraya response to this consultation.

Thuraya is a leading mobile satellite communications company that empowers people with tools to bring the organizations and communities they serve closer for the purpose of saving and improving lives, by offering innovative, flexible and dependable technology that achieve the highest aspirations - facilitating reliable communications where and when it matters most.

Best regards,

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Annex-1

Thuraya comments on the invitation to tender for frequency blocks in the 1400 MHz for the national provision of mobile telecommunications services

The frequency band 1 518-1 559 MHz is allocated in all three Regions to the mobile satellite service (MSS) on a primary basis. ITU-R Resolution 223 (REV.WRC-15) for additional frequency bands identified for International Mobile Telecommunications considered that:

1- There is a need to ensure the continued operations of the MSS in the frequency band 1 518-1 525 MHz.
2- Study appropriate technical measures to facilitate adjacent band compatibility between MSS in the frequency band 1 518-1 525 MHz and IMT in the frequency band 1 492-1 518 MHz

Furthermore, the Resolution 223 invited the ITU-R to

1- Conduct compatibility studies in order to provide technical measures to ensure coexistence between MSS in the frequency band 1 518-1 525 MHz and IMT in the frequency band 1 492-1 518 MHz
2- Develop harmonized frequency arrangements to facilitate IMT deployment in the frequency band 1 427-1 518 MHz, taking into account the results of sharing and compatibility studies
3- Include these frequency arrangements and the results of these studies in one or more ITU-R Recommendations.

Before finalization of the studies in the ITU, ECC finalized the following documents:

1- ECC Report 269: Least restrictive technical conditions for Mobile/Fixed Communications Networks in 1427-1452 MHz and 1492-1518 MHz
2- ECC Decision (17)06: The harmonised use of the frequency bands 1427-1452 MHz and 1492-1518 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL)
3- CEPT Report 65: Report from CEPT to the European Commission in response to the Mandate “to develop harmonised technical conditions in additional frequency bands in the 1.5 GHz range for their use for terrestrial wireless broadband electronic communications services in the Union”
4- ECC Report 263: Adjacent band compatibility studies between IMT operating in band 1492-1518 MHz and the MSS operating in 1518-1525 MHz.

The studies done within CEPT did not consider all the use cases for the MSS in the range 1518-1559 MHz. The following section summarize some of the use cases for the MSS in the range 1518-1559 MHz that need to be considered while implementing IMT in the 1400 Mhz.

1- Safety service in the range from 1 525-1559 MHz:

As per RR Article 31, the frequencies to be used for the transmission of distress and safety information under the GMDSS are contained in Appendix 15, and any emission causing harmful interference to distress and safety communications on any of the discrete frequencies identified in Appendix 15 is prohibited.

The following table defines the ranges used for safety service within the range 1525 - 1559 MHz.

Frequency (MHz)	Description of usage	Notes
1 530-1 544	SAT-COM	In addition to its availability for routine non-safety purposes, the band 1 530-1 544 MHz is used for distress and safety purposes in the space-to-Earth direction in the maritime mobile-satellite service. GMDSS distress, urgency and safety communications have priority in this band (see No. 5.353A).
*1 544-1 545	D&S-OPS	Use of the band 1 544-1 545 MHz (space-to-Earth) is limited to distress and safety operations (see No. 5.356), including feeder links of satellites needed to relay the emissions of satellite emergency position-indicating radio beacons to earth stations and narrow-band (space-to-Earth) links from space stations to mobile stations.

* *Except as provided in these Regulations, any emission capable of causing harmful interference to distress, alarm, urgency or safety communications on the frequencies denoted by an asterisk (*) is prohibited. Any emission causing harmful interference to distress and safety communications on any of the discrete frequencies identified in this Appendix is prohibited*.

As per 15.8 § 4 of the RR “Special consideration shall be given to avoiding interference on distress and safety frequencies, those related to distress and safety identified in Article 31 and those related to safety and regularity of flight identified in Appendix 27.” Furthermore, 15.28 § 20 of RR “ transmissions on distress and safety frequencies and frequencies used for the safety and regularity of flight (see Article 31 and Appendix 27) require absolute international protection and that the elimination of harmful interference

to such transmissions is imperative, administrations undertake to act immediately when their attention is drawn to any such harmful interference. (WRC-07)"

The International Civil Aviation Organization (ICAO) defined the 1.6/1.5 GHz band in 1995 as an essential element of aeronautical mobile satellite systems to enable safety communications. The bands 1525-1559 MHz and 1626.5-1660.5 MHz have been accepted into the ICAO AMS(R)S technical manual for provision of AMS(R)S service.

2- Use of the band 1518-1525 MHz

The band 1518-1525 MHz was designated to the MSS by the CEPT since 2004 in Decision ECC/DEC/(04)09.

The band 1518-1525 MHz is the downlink of "extended L-band", which has been in use since around 2013. Many new models of MSS terminals - suitable for land, maritime and aeronautical use - have been introduced since this time which tune over the "extended L-band" frequencies in addition to the standard L-band frequencies. These frequencies though not used for the safety related GMDSS and AMS(R)S communication frequency channels, but are used for important aircraft operational communications and maritime operational communications. New terminals used for safety-related communications on ships and aircraft are able to tune over the entire frequency range: 1518-1559 MHz, enabling the same terminal to be used for safety and non-safety communications.

3- Different standards and systems implemented in the range 1525-1559 MHz

As the band 1518-1525 MHz is recently allocated for MSS, not many satellites are currently in operation worldwide. However more than 8 satellites have been announced that will contain the band 1518-1525 MHz and 3 of them are under construction with anticipated launch date before the end of 2020. This situation is different when it comes to the systems operating above 1525 MHz where many satellites are currently in operation. The main standard used for geo satellite communications in L band are ESTI standards GMR-1 and GMR-2. These two standards have different characteristics when it comes to channel bandwidth, blocking characteristics and antenna/terminals size. It has also been noted that the ECC Report 263 is only considering one system characteristics (the system which currently operates in the range 1518-1525 MHz) in its studies. Furthermore, it has been noticed that the protection criteria used in the study, leads to degradation in the satellite link margin of around 1 dB from the IMT out of band emissions. This degradation is not possible when there is more than one satellite network operating in the same band, as other satellite system will be an additional contributor to the interference and not only the IMT systems. Both GMR-1 and GMR-2 standard based satellite communications are used by NGOs, aid and relief organizations, security and peacekeeping troops on global basis for decades.

Thuraya comments regarding the technical characteristics for IMT in the 1 492-1 518 MHz and its effect on the MSS above 1518MHz:

1- The frequency range 1518 MHz to 1520 MHz

The proposed EIRP limit value in the in the ECC Decision is -0.8 dBm in the range 1518-1520 MHz. This value of OOB emissions does not allow the land MSS to operate in the frequency range in this range. Operation of maritime and aero MSS in this frequency range is feasible only if OFCOM take additional action to mitigate interference, particularly with respect to base stations deployed near ports and airports. This EIRP value of -0.8 dBm, if adopted by OFCOM and other European regulators, will prohibit the access of the spectrum range not only in Europe but also the usage of the band in the overseas by the European companies and entities in different regions. In addition, the prohibition of the MSS from operation in the above band is not in-line with ITU Resolution 223 which consider the need to ensure the continued operations of the MSS in the frequency band 1 518-1 525 MHz. The value of -0.8 dBm/MHz has not been finalized as a value that will enable MSS to operate in the range 1518-1520 MHz by Report 263 or any other technical study.

2- The frequency range 1520-1525 MHz:

The out of band emission proposed in this range is -30 dBm/ MHz. This value will not provide adequate protection to satellite terminals operating in the same area where the IMT is deployed. However as per the studies done by ECC PT1, a value of -41 dBm/MHz would provide operation of satellite terminals up to 99% of time.

Operation of maritime and aeronautical terminals on these frequencies could be feasible only if regulators apply additional interference mitigation, particularly with respect to base stations deployed near ports and airports.

For continuous operation of the above band by MSS, OFCOM may add additional restriction to the IMT operating in the last IMT block range 1512-1517 MHz (exclusion zones and maximum EIRP limits).

3- The frequency range 1525-1559 MHz:

The frequency range 1525-1559 MHz has different usage by the MSS as described above. No studies have been included in Report 263 to consider existence of different satellite systems in the range 1525-1559 MHz (for example GMR-1 system was not considered and also the interference contribution of different satellite systems to the

interference environment is not assessed). It is considered by Thuraya that a value of -30 dBm/MHz as per ECC Decision is unnecessarily high value of emission. The IMT equipment in most of the IMT bands can easily achieve better performance in the spurious band domain, where -52 dBm/MHz at 10 MHz from the last block is commonly used as additional requirement for Base Station spurious emissions in the 3GPP standard TS 36.104. However, due to the sensitivity of the MSS applications in the range of 1525-1559 MHz, more strict limits need to be considered and included as essential requirement for BS spurious emissions.

Unless base stations operate with OOB emissions substantially lower than the -30 dBm/MHz limit in this band, excessive interference will occur to land terminals operated in the same area as IMT systems. In addition, all MSS terminals will be at risk of interference from receiver blocking. For IMT below 1518 MHz to be compatible with extensively used MSS terminals above 1525 MHz, the EIRP of the IMT base station, especially the EIRP of the last block, needs to be reduced to a maximum value of around 41 dBm. Operation of maritime and aeronautical terminals on these frequencies could be feasible only if regulators apply additional interference mitigation, for example reducing the EIRP or maintaining sufficient minimum separation, particularly with respect to base stations deployed near ports and airports.