GSOA response to Bakom's consultation on "the allocation of mobile radio frequencies available from 2029 for the provision of telecommunication services in Switzerland"

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The Global Satellite Operators Association ("GSOA") is a non-profit association and collaboration of members of the global satellite ecosystem. As the world's only CEO-driven satellite association, GSOA leads the sector's response to global challenges and opportunities. As the unified voice of the satellite industry, GSOA is pleased to provide its comments on the consultation launched by the Federal Office of Communications of Switzerland (Bakom) regarding the allocation of mobile radio frequencies. The present consultation aims at identifying market demand by collecting input from interested parties on the allocation of radio frequencies available from 2029, following the expiration of current mobile licenses, and on the possibility of making additional frequency ranges available for mobile telecommunications in the next allocation.

GSOA does not have comments on the existing and future demand for terrestrial mobile radio frequencies in Switzerland but would rather take this contribution as an opportunity to highlight the criticality of satellite communications and to underline the need to make sure that spectrum allocated to the Fixed Satellite Service (FSS) in the bands considered by Bakom remains available for use by satellite systems in the long-term. In particular, GSOA would like to comment on the possibility of allocating spectrum to IMT in the 6GHz band and in mmWave bands by adopting appropriate interference mitigation and protection measures to ensure coexistence with FSS services operating within the same and/or in adjacent bands.

1. The importance of satellite communications

It is noteworthy that about one-third of the global population, or 2.6 billion people, remain currently offline. Satellite communications can help bridge the digital divide and achieve digital inclusion for everyone. As reaffirmed by the outcomes of WRC-23, satellites play a key role in extending fixed and mobile connectivity around the world and in bringing a broad range of broadband and narrowband services and new enhanced capabilities to consumers, industry verticals and enterprises. Satellite systems are a highly reliable form of electronic communications infrastructure and an essential element for maintaining network resiliency. They have a critical role to play in increasing the reach of connectivity to remote areas, generating substantial direct and indirect socioeconomic benefits. To achieve this, however, a predictable regulatory and spectrum environment is required.[1]

Satellite systems are already an integral and essential part of the 5G ecosystem and are contributing to the deployment of 5G services to end-users in many locations including the most remote geographical areas. They are enabling communications on the move, direct to premises connectivity in rural and urban areas, direct connectivity to end-user devices including consumer electronic phones and IoT devices, video content and big data delivery worldwide. Satellites are also reinforcing 5G service reliability by providing service continuity to users and reducing power consumption.[2]

[1] See GSOA's study on the Socio-economic value of satellite communications.
[2] See GSOA's White Paper on Satellite Communication Systems: an integral part of the 5G ecosystem.

2. General questions; integration of NTNs and terrestrial mobile networks

Bakom is seeking to understand future developments and effects of the possible integration of non-terrestrial networks (NTNs) and terrestrial networks (TNs) e.g. for direct connection between terrestrial network terminal devices and satellite, in the context of WRC-27 preparation.

It is without doubt that satellites will form an integral part of the future 6G architecture and will help extend global coverage of 6G for wider interconnectivity and heightened resiliency. NTNs will be pivotal in providing a ubiquitous, continuous, flexible and resilient infrastructure for telecommunications services. Especially in countries such as Switzerland, with a mountainous terrain and remote villages, the population would benefit greatly from integrated satellite and terrestrial networks capable of providing seamless coverage in unserved remote areas, at any time.[3] This partnership between space and terrestrial based networks is expected to bring significant benefits globally and to deliver great socioeconomic value to individuals and businesses around the world.

NTN is now part of the 3GPP standard following the publication of Release 17 and the upcoming Release 18. The standards adopted by 3GPP standard (i.e. Release 17) has already established a strong foundation for direct communication between satellites, smartphones, and other types of mass-market user equipment, this work is continuing in Releases 18, 19, and beyond with the introduction of additional frequency bands and features that enable additional use cases and increased service performance. Beyond the substantial benefits NTNs promise to deliver to consumers, they will also have the capability to support both industrial and governmental IoT applications for multiple industries such as transport, health care, agriculture, autonomous aircraft, and vehicles etc. For satellites to perform this role effectively, however, unfettered access to spectrum is required on a global basis.

GSOA commends Bakom for appraising the principle of technology neutrality and encourages Bakom to make sure that any future policies and regulations reflect the said principle to ensure that 6G services will be socially and economically inclusive.

3. Questions on possible new frequency bands

In response to Bakom's question on whether additional frequencies shall be made available for mobile communications in the future, we note that currently there is a general lack of demand for mmWave spectrum particularly in Europe, where countries have been very slow to assign even the 26GHz band which has been identified as a pioneer band for 5G. Notably, only 11 EU Member States have assigned the 26GHz band, for which the demand has been lowest so far despite it being harmonized at European level.[4] In this vein, we believe that no additional spectrum shall be made available for IMT in the near term.

3.1 Frequencies around 2.1 GHz

The frequency bands currently assigned to mobile operators in Switzerland are with the ranges 1920.5-1979.7 MHz (UL) and 2110.5-2169.7 MHz (DL)[5]. These frequency arrangements provide for a 300 kHz guard band with respect to the MSS allocations at 1980-2010 MHz and 2170-2200 MHz. Those MSS allocations are used to provide MSS services throughout Europe, including the "European Aviation Network", which provides broadband service to aircraft passengers in Switzerland. Bakom is

[3] See GSOA's work on Satellite Communications and their role in enabling 6G.
[4] See 5G Observatory's Biannual Report of October 2023 (CNECT/2021/OP/0008).
[5] According to information provided in ECO Report 02, https://docdb.cept.org/document/939

strongly encouraged to maintain this 300 kHz guard band in any new assignments to mobile operators from 2029, to minimise the coexistence issues between the two services.

3.2 Frequencies in the 6GHz range

While WRC-23 has designated the upper 6GHz band (6.425-7.125 GHz) for IMT in Region 1 (with country footnotes for 2 countries in Region 2 and 3 countries in Region 3), there are still significant concerns on the issue of possible coexistence between outdoor IMT and FSS receivers (onboard satellites and in earth stations), which would need to be addressed before any decision to allocate 6GHz frequencies to mobile services is made. As noted by Bakom, the technical and regulatory conditions are now being worked out at European level and there are still valid concerns for the possible impact to current users of the band, including satellite. GSOA remains cognizant of the practical issues that need to be considered to allow for hybrid sharing models. Further, while noting that WRC-23 adopted "expected" power limits for IMT base stations intended to protect FSS uplinks, GSOA remains of the view that these limits are inadequate and impractical to enforce. The same concern applies to the protection of and MSS feeder links. Incumbent satellite users would not be protected unless significant constraints on IMT base station deployment and specifications are put into place.

Noting that this frequency band is currently assigned in Switzerland to radio relay links and partly to satellite communications, and has already been partially allocated, we applaud Bakom's recognition that any future use of the band for mobile communications would require the adoption of technical and operational restrictions to enable joint use by satellite and IMT services.

At any rate, GSOA believes that any need for additional spectrum for licensed mobile systems can be accommodated first through densification in existing mobile bands and through use of the mmWave bands, which remain largely unused. If needed, Bakom could start by allocating first the lower parts of the 26GHz band, subject to appropriate interference mitigation and protection measures to ensure actual and real coexistence with satellite systems, as explained below.

3.3 Frequencies in the millimetre wave range 26GHz and 40GHz

The use of the 26GHz (24.25–27.50GHz) and 40GHz (40.5–43.5GHz) frequency bands is already harmonized at the European level (CEPT and EU). As noted in the consultation paper, these frequencies are also currently allocated and partially assigned to satellite communications in Switzerland. Therefore, although in principle GSOA and its members do not oppose their use for terrestrial mobile systems, as permitted by international regulations, we call for the necessary conditions to be created at national level before they can be made available for mobile to ensure adequate protection of incumbent users.

The technical measures required have been discussed in the context of the ITU and the CEPT during their work before and since the ITU World Radiocommunication Conference of 2019 (WRC-19). GSOA would like to highlight that any applicable licensing regime for IMT services should require technical, operational and regulatory conditions to ensure actual and real coexistence of terrestrial systems with other services in the band and adjacent bands, taking due account of continued deployment of satellite networks.

Specifically, the following elements are raised to the attention of Bakom for its kind consideration:

- **26GHz band**

In Europe, the 24.25-27.5 GHz (26 GHz) band has been identified as a pioneer band for IMT/5G, and both the ECC and the EU have issued decisions implementing this band for terrestrial IMT/5G.[6] At global level, ITU Resolution 242 (WRC-19) resolves that IMT and satellite gateways operating in portions of that band can coexist under specific technical conditions.[7] However, as described above, the demand for this band has been low so far. Therefore, GSOA proposes aligning the amount of offered spectrum in the 26 GHz band with the actual and demonstrated market demand for terrestrial IMT/5G.

The adjacent 28GHz Ka-band (27.5-30 GHz uplink) is a crucial band used by a great number of GSO and NGSO satellites to provide, among others, broadband services to consumers and businesses around the world (cf. list in annex). GSOA's members have invested heavily in the development of satellites operating in the Ka-band and therefore, we call for specific attention on this matter and for the adoption of specific guarantees to ensure they remain protected. Out-of-band emissions from IMT stations in the 26 GHz may interfere with the reception of signals transmitted from earth stations to satellites operating in the 28GHz band. GSOA therefore invites Bakom to carefully implement the conditions of EC Decision (EU) 2019/784 and those of ITU Resolution 242 (WRC-19) while ensuring the coexistence between FSS and IMT services in the 26GHz and the adjacent bands. Among several items, GSOA emphasizes the importance of the portion of Resolution 242 (WRC-19) that requires that terrestrial IMT/5G base stations within the 26GHz frequency band with high power operations (e.i.r.p. per beam exceeding 30 dB (W/200 MHz)) not point their antenna beams upward and maintain a minimum separation angle of ≥ 7.5 degrees from the geostationary orbit. These power and separation angle limitations provide specific limits on the terrestrial IMT/5G services operating in the 26 GHz band to protect existing satellite services in the adjacent 28 GHz band. Therefore, GSOA respectfully requests that Bakom adopt these terrestrial IMT/5G limitations to protect critical satellite broadband services operating above 27.5 GHz.

Increased out-of-band emissions in the 26 GHz band could adversely affect the interference environment in the 28 GHz band by interfering with the ability of satellite receivers in space to receive signals from earth stations. Therefore, GSOA invites that Bakom limit out-of-band emissions from terrestrial IMT/5G operations in the 26 GHz band to protect satellite broadband service in the adjacent 28 GHz band. GSOA also recommends that Bakom ensure that the *aggregate level* of terrestrial IMT/5G out-of-band emissions from the 26 GHz band into the adjacent 28 GHz band does not cause harmful interference to satellite receivers in the 28 GHz band.

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- **40GHz band**

GSOA notes that the Q and V bands, between 37.5 and 52.4 GHz, are key for the future of satellite services as they can enable access to wide bandwidths for the gateways of the generation of high and very high throughput satellites (HTS and VHTS). The satellite industry is investing significantly in this band to provide high speed connectivity services everywhere in the world in the foreseeable future. It is thus important for the future of satellite communications that Bakom introduces conditions in the mobile licenses to be granted in the future to ensure they remain protected.

For the 40 GHz band, there are several requirements relating to sharing with satellite services that will need to be considered. Under the ITU Radio Regulations, in Region 1, the lower part of the 42 GHz band (40.5-42.5 GHz) is allocated for FSS and BSS downlinks and the upper part (42.5-43.5 GHz) is

[6] *See* ECC Decision (18)06 on harmonized technical conditions for Mobile/Fixed Communications Networks (MGCN) in the band 24.25-27.5GHz (cept.org) and European Commission Implementing Decision (EU) 2020/590 of 24 April 2020 amending Decision (EU) 2019/784 as regards an update of relevant technical conditions applicable to the 24,25-27,5 GHz frequency band.

[7] *See* ITU Resolution 242 (WRC-19) Terrestrial component of International Mobile Telecommunications in the frequency band 24.25-27.5 GHz.

allocated for FSS uplinks. ITU Resolution 243 (WRC-19)[8] includes technical measures to provide a level of protection to satellite uplinks in this band and measures related to sharing with FSS earth stations. What is more, the ECC Decision (22)06[9] and the CEPT Report 82 set out harmonized technical conditions for 5G terrestrial wireless systems in the 40.5 – 43.5 GHz band which national regulators shall consider when developing their national spectrum policies. The elements related to sharing with satellites are very similar to the 26GHz band, and could be summarized as follows:

- Technical conditions relating to power limits and antenna characteristics of mobile base stations, as well as deployment constraints such as antenna pointing restrictions
- Limitations of the areas for placement of antennas plus geographic separation requirements between satellite earth stations and mobile base stations
- Ongoing monitoring of mobile system deployment and reporting obligations regarding the number and location of IMT base stations

While the band 40.5-43.5 GHz is envisaged for IMT or similar terrestrial mobile systems, the band is also envisaged to be used for FSS and BSS systems, on a shared basis, as set out in ECC Decision ECC/DEC/(23)01[10]. There seems to be little, if any, demand from the mobile community for access to the 40 GHz band. However, if the band is planned to be made available for mobile in Switzerland, Bakom should make sure that the CEPT and ITU conditions for coexistence with systems in the same and adjacent band are mirrored in the national mobile license conditions.

4. Conclusions

GSOA encourages the Swiss regulator to address these issues related to spectrum allocation and sharing with maximum vigilance in its future work. It is important to carefully examine whether the existing users of the spectrum in same and in adjacent bands would suffer interference from new users and that apply sufficient protection from harmful interference to safeguard satellite services. To do so, there is a need to consider the above-mentioned ECC decisions and ITU resolutions and identify any details relating to the compatibility between IMT and satellite, while monitoring real-life application of such measures.

GSOA and its members remain available to discuss the above raised points in more detail.

[8] *See* ITU Resolution 243 (WRC-19) on terrestrial component of International Mobile Telecommunications in the frequency bands 37-43.5 GHz and 47.2-48.2 GHz.
[9] *See* ECC Decision (22)06 on harmonised technical conditions for Mobile/Fixed Communications Networks (MFCN) in the band 40.5-43.5 GHz.
[10] *See* ECC Decision (23)01 on On the use of the band 40.5-42.5 GHz by earth stations in the fixed-satellite service (space-to-Earth) and broadcasting-satellite service and on the use of the band 42.5-43.5 GHz by earth stations in the fixed-satellite service (Earth-to-space).