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Federal Department of the Environment, Transport, Energy and Communications DETEC

Federal Office of Communications OFCOM
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Summary of the results of the public consultation on the allocation of mobile radio frequencies 2029

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Contents

1 Introduction

The Federal Communications Commission (ComCom) has instructed the Federal Office of Communications (OFCOM) to begin preparatory work for the allocation of frequencies available from 2029 for the provision of telecommunication services for third parties.

On 19 December 2023, OFCOM invited all interested parties to submit their statements by 26 February 2024 regarding the allocation of mobile radio frequencies that may be available for the provision of telecommunication services in Switzerland from 2029. The aim of the public consultation was to determine the needs and intentions of interested parties with regard to the future use of mobile radio frequencies for public mobile networks.

This primarily concerns the frequency usage rights allocated to mobile network licensees in 2012, in the 800, 900, 1800, 2100 and 2600 MHz bands, which are set to expire at the end of 2028. Additional frequencies in the 6 GHz, 26 GHz and 40 GHz bands may also become available for mobile telecommunications in the future.

2 Summary of the feedback

A total of 33 statements were received during the public consultation. These can be broken down into the following categories: cantons, public authorities and public authority-related companies; mobile telecommunications providers; industry and industry associations; emergency services associations and organisations; business, trade and media associations; international associations and organisations; other associations and private individuals.

The purpose of this document is to summarise the feedback received into a coherent format. The feedback is public and can be accessed individually on the OFCOM website.

Link to the website: Public consultation regarding the allocation of mobile radio frequencies available from 2029 for the provision of telecommunication services in Switzerland (admin.ch)

2.1 Cantons, public authorities and public authority-related companies

The **Canton of Fribourg Office for the Environment** calls for greater clarity on technical usage, an investigation into health implications, the definition of limits and, if necessary, the adjustment of enforcement aids, irrespective of the frequency bands available and before they are allocated. There needs to be a balance between protecting the trade secrets of mobile network operators and addressing the concerns of the general public. The authorities responsible for protection against non-ionising radiation (NIR) must be able to provide information about the new technologies, and the measurement methods and enforcement aids for evaluating site data sheets must be available at the time the bands are used.

The **Canton of Vaud authorities for digital and information systems** and **for the environment** (hereinafter: Canton of Vaud) believe that adjustments must be made to the Ordinance on Protection against Non-Ionising Radiation (NIRO) and its implementation tools (such as enforcement aids, measurement methods and quality assurance systems) before opening up new frequency bands. In the context of millimetre waves, the health implications still require further scientific investigation to establish appropriate limits in line with the principles of prevention and precaution. With regard to the integration of non-terrestrial (satellite-based) networks into mobile networks, an evaluation should be conducted on the exposure of the population and compliance with the protection goals laid out in both the Environmental Protection Act and NIRO. The Canton of Vaud proposes a two-stage award procedure to ensure fair competition. The initial stage would confirm bidders' ability to deliver the required service, while the second stage would involve selecting the best offers. Three licensees would be sufficient. The current frequency bands could also be addressed in a single process. The Canton of Vaud is also in favour of introducing licensing requirements to ensure cybersecurity and secure communication.

The **Swiss Conference of Directors of Public Works, Planning and Environmental Protection** (hereinafter: DDPE) also calls for an updated enforcement aid for the allocation of frequencies in the 6 GHz frequency band. It also calls for the investigation of health implications, for the definition of installation limit values and immission limit values, and for enforcement and measurement recommendations to be made available before frequencies in the millimetre range are allocated. The cantonal authorities responsible for protection against non-ionising radiation should be involved in the development process. Furthermore, the DDPE expects the federal authorities to take into account the wider context of the potential and the cost-effectiveness of the various categories of communication network technologies (cable/radio) when considering the need for additional frequencies, in order to minimise the risk potential of radio technologies**.**

The **Swiss Conference of the Cantonal Ministers of Public Health** declined to provide feedback. However, it would like the expert assessment of the Swiss Rescue Association (IVR), which has dealt with the issue in depth, to be consulted and appropriately taken into account.

The **Competition Commission COMCO** (hereinafter: COMCO) notes that State intervention in the market should always be inherently neutral in terms of competition. For this reason, any barriers to market entry should be kept low. COMCO is particularly focused on short licence periods, regular licence renewals (every five years) and ensuring that licences are not tied to specific technologies. With regard to potential usage conditions, such as coverage, cybersecurity and secure communication, COMCO also emphasises the principle of competitive neutrality. Furthermore, COMCO is in favour of allocating all the frequencies in question by means of an auction, as this would encourage new bidders to participate in the process, avoid barriers to entry and at the same time prevent collusion between bidders. It is keen to point out that the focus of an auction should not be on maximising revenue, but on the efficient allocation of frequencies and the promotion of competition between mobile network operators. It also states that using funds from the auction for the gigabit strategy could create false incentives for Swisscom, as it is highly likely to benefit from these subsidies as a universal service provider. COMCO therefore recommends reviewing the impact that this use of auction funds could have on the allocation of mobile radio frequencies, taking these findings into account when selecting and organising the allocation procedure.

The **Swiss Federal Office of Energy** and the **Federal Office of Police** both expressed their thanks for the opportunity to provide their feedback. Neither office has any comments or questions.

The **Federal Office for Civil Protection FOCP** (hereinafter: FOCP) states that dedicated frequencies and prioritised bandwidths should be guaranteed for authorities and organisations for rescue and security (hereinafter: AORS). All licensees should be obliged to provide prioritised bandwidth for certain services. The FOCP is therefore calling for part of the spectrum (e.g. 2 x 20MHz) to be allocated to the AORS (without auctions), as they will need frequencies for the implementation of a broadband system over the next ten years. The remaining frequencies in the spectrum should be allocated by means of an auction. According to the FOCP, the integration of non-terrestrial (satellite-based) networks into mobile networks creates a security risk and a critical dependency, as communication takes place via foreign infrastructures. There is also a risk that earth–satellite connections could be interfered with. With regard to the use of mobile radio frequency bands in airspace, the FOCP emphasises the importance and priority of developments in rescue services over the development of mobile radio in airspace. The FOCP is in favour of conditions of use for cyber security and secure communication, and emphasises the importance of giving adequate consideration to the security aspects of telecommunications networks, which are considered critical infrastructure.

The **Cyber Command** points out that the AORS will need mobile radio services in the future to replace the Polycom security radio network. Discussions are ongoing within the Armed Forces, the FOCP and the AORS as to whether this will be done using their own infrastructure (and thus their own frequencies), the services of public internet service providers or a hybrid form. Parameters such as frequency range and required frequency bandwidth also remain unclear. A required frequency range will be registered with OFCOM in good time. The required frequency resources should be made available to the

authorities as a matter of priority and without a call for tenders. There must be detailed analysis of the impact on other radio services (e.g., radar applications) when non-terrestrial (satellite-based) networks are integrated into mobile networks and certain mobile frequency bands are used in airspace. These services must also be protected from unwanted interference.

Swiss Federal Railways AG SBB (hereinafter: SBB) anticipates an increase in both applications and the number of end devices managed by SBB, as well as the mobile network traffic generated by SBB and rail travellers. International bodies expect train connectivity requirements to reach 3–5Gbit/s by 2030. The frequency spectrum should be extended beyond 3.5GHz to ensure on-board connectivity will be fit for the future. SBB is primarily interested in mobile private networks for companies for the frequencies that will be available from 2029 and are currently allocated. In SBB's view, sufficient frequency bands suitable for business applications should be reserved for mobile private networks for companies. In the event that frequency bands for mobile private networks are allocated to companies, a criteria-based selection process would be preferred. SBB also suggests examining requirements for covering railway corridors, junctions and stations, considering aspects such as data throughput, latency, quality of experience and mandatory coverage for pilot routes. SBB rates the attractiveness and benefits of the 6GHz frequency band highly, particularly for the use of Wi-Fi 7 and for trackside corridor coverage of railway lines with mobile telecommunications. It also believes that simultaneous use with WLAN and mobile telecommunications technologies should be sought for as many scenarios as possible.

2.2 Mobile telecommunications providers

2.2.1 Salt Mobile Ltd

Salt Mobile Ltd (hereinafter: Salt) is in favour of direct allocation for awarding the frequency usage rights expiring at the end of 2028, in order to maintain existing network capacities and quality. The current frequency allocation is balanced in terms of the market shares of the individual mobile network licensees. Salt considers the hypothetical market entry of a fourth licensee to be too unrealistic to justify allocating a frequency. Salt also proposes that, after the direct allocation, there should be a second phase with the opportunity to amend the allocation of frequency blocks. The aim of this amendment would be to create larger contiguous frequency bands to improve the efficiency and performance of mobile networks while retaining the current frequency shares of the licensees. Salt proposes that a clock auction be organised for the new frequency bands.

With regard to the term of the mobile network licences, Salt considers 15 years appropriate on the basis that this is standard across the industry and offers the licensees both an appropriate planning time frame and a long-term perspective.

Salt sees the upper 6 GHz band as a major frequency band for the future development of mobile telecommunications. This band should be prioritised for mobile telecommunications, and its use by radio local area networks (RLANs) should be limited to optimise capacity for mobile data traffic. At the time this feedback was provided, there was still no comprehensive device ecosystem for this frequency band; however, it is expected that one will be developed following a decision made at the World Radiocommunication Conference (WRC-23). Salt is therefore in favour of allocating the usage rights in this frequency range as early as 2027 to cover future demand for mobile communication capacity.

Salt believes that the ecosystem for the 26 GHz and 40 GHz millimetre wave bands is still underdeveloped and therefore proposes that these bands should not be allocated until 2032. In particular, Salt points out that only very few European smartphone models support the 26 GHz band, which indicates a lack of immediate interest at European level.

Salt also refers to the very strict regulations on non-ionising radiation in Switzerland, which, together with the opposition to new antenna sites, would hinder the full potential of 5G technology. Without a review and adjustment of these regulations, additional frequency bands would be useless in practice, as regulatory restrictions would limit the effective utilisation of the additional frequencies. Salt emphasises

the need to rethink the regulatory framework so as not to hinder the future development and use of mobile communication technologies. To promote fair competition, Salt is proposing the introduction of an 'NIR fairness concept'.

2.2.2 Sunrise LLC

Sunrise LLC (hereinafter: Sunrise) advises against a tender process. Sunrise proposes to renew all frequency usage rights allocated in the 2012 auction ("direct reallocation") and refers to other countries that have also taken this route. In view of the current coverage requirements, it considers the probability of a new market participant to be very low to non-existent. There are also other factors that would make the Swiss market less attractive for the entry of a fourth market player: the strict NIR installation limit values make expansion more expensive, site sharing is practically impossible as the NIR budget per installation has been exhausted in many places, and new sites are difficult to find. Furthermore, Sunrise considers it unlikely that an auction would result in a significant redistribution of the frequencies allocated in 2012. Another consideration is that an auction would only lead to unnecessary costs that would far outweigh the benefits. On the other hand, each licensee should have the option of pooling or sharing surplus frequencies so that underutilised frequencies can be dynamically relocated to where they would create the greatest economic value. If the decision is ultimately made to proceed with an auction, Sunrise would prefer the simpler auction process from 2019. This is less complex and risky than the 2012 allocation process. In terms of minimum prices, these should not be higher than at the 2019 auction.

The feedback goes on to state that Switzerland should align its NIR installation limit values with international standards. This easing would open up more opportunities for site sharing, which would lessen the need for new locations.

With regard to the frequencies in the 26 GHz and 40 GHz bands that may become available for mobile telecommunications, Sunrise is calling for an even distribution of all new frequencies. The 6GHz spectrum, however, should be allocated at a later date, together with the frequency usage rights (700 MHz, 1400 MHz, 3.5–3.8 GHz) that were allocated in 2019.

According to Sunrise, non-terrestrial networks (NTN) should be used where no terrestrial mobile network is available (e.g. in mountainous regions). For the time being, however, this technology will remain a niche application. Only over time, with integration into the international mobile telecommunications (IMT) ecosystem, would this technology become seamlessly available to Swiss consumers. Sunrise considers the 3.6 GHz band and the upper 6 GHz band to be ideal for Fixed Wireless Access (FWA). With regard to licensing requirements, Sunrise is in favour of provisions based on service and performance, with the condition that they remain neutral in terms of frequency and technology. Sunrise is opposed to any further requirements (such as those in relation to cyber or communications security) and is keen to emphasise that treating mobile network licensees and other providers of telecommunication services differently would lead to discrimination. Further provisions would therefore have to be regulated in the relevant laws or ordinances.

2.2.3 Swisscom (Switzerland) Ltd

Swisscom (Switzerland) Ltd (hereinafter: Swisscom) is in favour of a 15-year extension of the frequency usage rights allocated in 2012. The current frequency allocation in this respect corresponds to Swisscom's minimum requirements. A reduction in the frequency usage rights they previously had would have a significant negative impact.

If the licence for the frequency usage rights from 2012 is not extended, Swisscom is in favour of an auction for the new allocation. The preferred format here would be transparent and flexible with multiple rounds. Mobile radio frequencies in the various bands would be auctioned simultaneously, which would facilitate price setting and demand alignment while also preventing price gouging.

As the volume of mobile network traffic will continue to increase steadily, new mobile radio frequencies with the widest possible bandwidth will be needed for mobile network operators, in addition to the existing ones. Swisscom's demand in these new frequency bands will be in line with its market share in mobile telecommunications and Fixed Wireless Access (FWA). Swisscom therefore supports an auction of new mobile radio frequencies, but only after prior, appropriate clarification of the conditions of use (e.g., the NIRO installation limit values and measurement processes) and a clear commitment by the federal authorities to the widespread use of the new mobile radio frequencies. This would not only provide planning security for the bidders, but also ensure efficient usage of the frequencies.

For Switzerland to remain at the forefront of digital innovation, the 26 GHz band should be allocated by 2027. This band is already supported by some end devices today. Furthermore, many countries have already auctioned licences in this band, with more auctions planned in the near future. Network equipment and end devices for the 40 GHz band are not expected to be widely available in the short term, hence the allocation should be postponed until after 2027 (perhaps in 2032).

The 6 GHz band is a promising band in which many international mobile network operators have expressed interest. Swisscom expects its range of applications to be similar to the 3.6 GHz band. This band would also play a fundamental role in implementing the federal gigabit strategy, and there is strong interest in rolling it out promptly. It is to be expected that the corresponding network infrastructure and end devices will be available in the next few years. Nonetheless, there are a number of open questions, including those regarding Wi-Fi coexistence, which OFCOM could actively contribute to addressing at the European Conference of Postal and Telecommunications Administrations (CEPT).

Swisscom recommends national licences for the allocation of the new mobile radio frequencies. It proposes introducing eligibility criteria to keep unreliable bidders or speculators away from auctions. Swisscom is also in favour of expansion and coverage requirements that ensure the efficient use of mobile radio frequencies and thereby promote investment in Switzerland's digital infrastructure. Swisscom is against the expansion of usage conditions with irrelevant requirements that have no legal basis in the Telecommunications Act.

Swisscom sees potential in Switzerland for integrating satellite-based communication into mobile networks, for example as a fallback option in peripheral regions or for connecting very remote (mountainous) regions; however, significant technical challenges still persist. In addition to substantial innovation and standardisation, there is also a need for cross-border harmonisation.

Swisscom also points out that the Ordinance of 18 November 2020 on Fees in the Telecommunications Sector (FeeO-TCA; SR 784.106) would have to be amended. Considering the extensive bandwidth of higher frequencies, a revision could define appropriate lower limits for minimum bids.

2.3 Industry and industry associations

The feedback from the **Swiss Telecommunications Association asut** (hereinafter: asut) refers to the increase in application areas, quality requirements and data volumes, which will require both a further expansion of mobile networks and additional frequency spectrum in the coming years. It therefore welcomes the allocation of the new bands in the 6 GHz, 26 GHz and 40 GHz ranges in principle, but notes that the allocation is only appropriate if the legal and procedural framework conditions for successful usage of the new frequencies have been clarified beforehand. It explicitly mentions the introduction of rapid and simplified authorisation procedures, the amendment of the Ordinance on Protection against Non-Ionising Radiation (NIRO), the provision of realistic and practical enforcement aids for NIRO, and measurement methods for the new mobile radio frequencies. This applies in particular to the millimetre waves. Here, the public, communes and cantons would first expect the federal government to clarify open questions. The technical conditions of use for the frequencies would also have to be clarified before they are allocated, particularly with regard to the protection of other primary services or issues relating to Wi-Fi coexistence in the 6 GHz band. According to asut, the new mobile radio frequencies should primarily be reserved for mobile network use. No spectrum should be provided for satellite applications while international coordination has not yet been finalised.

In view of the enormous difficulties with modernising the mobile networks (such as minimal site availability, complex approval procedures and limited transmission power), it is difficult to imagine the construction of a fourth network. If no further interested parties emerge during the current consultation, the existing licences of the three mobile network operators should be extended or renewed without an auction. From asut's point of view, the aim of the allocation should be to distribute the frequencies as efficiently as possible and not to maximise the financial return. To ensure sufficient planning and investment security, the new licences should have a term of at least 15 years. This time frame has proven effective and is also considered standard worldwide. Licensing requirements would have to be limited to the core area of mobile network coverage. Additional requirements, such as those with regard to gigabit strategy or reinforcement, would create unfair competition between different access technologies and should therefore not be included in the licences.

The **association for communication networks, suissedigital**, did not provide any feedback of its own; however, it expressed its full support of the comments made by asut and Sunrise.

Ericsson AG, Switzerland (hereinafter: Ericsson) forecasts a saturation in the growth of mobile subscribers in Western Europe between 2024 and 2029, with an 85% share of 5G contracts by 2029. Total mobile data traffic in Western Europe – excluding traffic generated by fixed wireless access (FWA) – is expected to increase by 150% by the end of 2029 compared to the beginning of 2024, with the initial roll-out of services such as virtual reality (VR), augmented reality (AR) and mixed reality (XR) expected to take place in the second half of the forecast period. Ericsson believes that the existing radio licences should be extended and the licence fees replaced by obligations to expand the mobile networks. The licences should be valid for at least 15 years. Ericsson also recommends framework conditions to promote voluntary network sharing, which could contribute to meeting licensing requirements. Ericsson regards the 6 GHz frequencies as the only band that is available in Switzerland (and Europe) for licensees' network evolution. If this band is not licensed to public mobile networks, the quality of mobile services would deteriorate by 2030 and the licensees would not be able to deliver new use cases. This would put the Swiss population and economy behind on technical evolution. The 26 GHz frequencies would also offer significant net economic benefits, especially in conjunction with the 3.5 GHz frequencies, but also independently – for example, for Fixed Wireless Access (FWA). Ericsson recommends allocating the 40 GHz frequencies as a follow-up to the 26 GHz frequencies.

2.4 Emergency services associations and organisations

Police Technology and IT PTI, **the Swiss Rescue Association IVR** and **Swiss Fire Service Coordination FKS** point out that the AORS require their own frequencies (2 x 10 MHz) in the 700 MHz or 800 MHz range for the planned implementation of secure mobile broadband communications. These frequencies should be allocated directly to the AORS without restrictions on duration and without auctions. The allocation of dedicated frequencies is required in order to create a basic network that remains functional in all situations. If no frequencies can be allocated to the AORS, it is imperative to establish requirements relating to basic service/minimum coverage, hardening and prioritisation with respect to mobile network operators. The PTI, IVR and FKS see interesting new possibilities that could emerge from the integration of non-terrestrial (satellite-based) networks into mobile networks, especially for making emergency calls in previously uncovered areas. They are of the opinion that the use of mobile radio frequency bands in airspace will increase, which will become very important for autonomous systems (including drones) and aviation in the foreseeable future. The three associations are therefore in favour of using these bands in airspace. Utilising the new frequency ranges would relieve the networks during sporting or major events and ensure communication for everyone, especially for the AORS, in such situations.

2.5 Business, trade and media associations

The **umbrella organisation for the Swiss business sector, economiesuisse** (hereinafter: economiesuisse), highlights the importance of ensuring that new frequency allocations provide the mobile industry with adequate capacity, that the licences offer planning and investment security, and that condi-

tions should be kept to a minimum. It specifically refers to the regulations for hardening mobile networks, which it believes should be eliminated. Furthermore, economiesuisse emphasises that the federal government should not focus on maximising revenue and refers to the planned gigabit strategy. The efficient allocation of the available spectrum should remain the primary objective of the auction.

The **Swiss Union of Crafts and Small and Medium-Sized Enterprises sgv** (hereinafter: sgv) is in favour of the targeted use of direct allocation and auctions for allocating frequencies. Auctions should be used when frequencies are scarce; however, the aim here should not be to maximise prices and income for the federal government, but rather to make certain scarcity conditions transparent and open up the market to potential new entrants.
The sgv is in favour of maintaining the current usage conditions and is against the introduction of new or stricter requirements. It also proposes a licence term of 20 to 25 years, as this longer term would give providers greater planning and investment security. The sgv is open to the integration of satellite-based networks into mobile networks. The sgv sees potential for Fixed Wireless Access (FWA) in the newly available frequency ranges, particularly in the 26 GHz band, to help achieve the federal gigabit strategy. It therefore proposes a national licence for this band. The sgv also underlines the importance of adjusting the framework conditions to ensure the usability of the new radio frequency spectrum.

The four electronic media associations – the **Swiss Private Radio Association VSP**, **Romandie Regional Radio RRR**, the **Telesuisse** regional television association and the **Swiss Private Television Association VSPF**– have issued a joint statement. They point out that the distribution of democracy-relevant audio and video content will probably take place via Internet Protocol (IP) in future. As the licences may have a long duration, the electronic media associations believe it is necessary to impose additional conditions on network operators for the frequencies in the 470–960 MHz range with regard to the broadcasting of democracy-relevant audio and video content of a public service nature.

2.6 International associations and organisations

SpaceX emphasises the importance of a flexible spectrum allocation framework in the 800, 900, 1800, 2100 and 2600 MHz bands to support new services such as ‘Direct to Cell’. These services would make it possible to establish connectivity on conventional mobile phones in areas where terrestrial mobile networks are not normally available or in the event of mobile network failures. It also emphasises the importance of appropriate protection for frequency bands that are critical for the provision of satellite services. SpaceX also provides an overview of its Starlink activities, and notes that it announced its first “Direct to Cell” partnership in August 2022, heralding a new era of satellite connectivity. Mobile partners around the world are now interested in this service, with the first satellites suitable for “Direct to Cell” launched in January 2024. In partnership with Salt, SpaceX also wants to offer this technology in Switzerland, and asks OFCOM to make V-band frequencies available for next-generation satellite systems such as Starlink. SpaceX proposes the development of a simple licensing model for frequency usage, which would streamline the review and approval processes. It also emphasises the importance of working with OFCOM to develop a framework for the future allocation and use of frequency bands to enable the benefits of the next generation of satellite services for the people of Switzerland.

The **Dynamic Spectrum Alliance DSA** (hereinafter: DSA), encourages OFCOM to consider new and innovative approaches to spectrum management. More specifically, the DSA calls for the use of automated dynamic spectrum management systems to make more efficient use of spectrum and support a wide range of commercial services and entities. The DSA strongly supports the use of the entire 6 GHz band (5925–7125 MHz) on a licence-exempt basis. It believes it is essential to have sufficient frequencies available for the latest generations of licence-exempt technologies, including Wi-Fi 6 and 7. Another band should be considered for FWA.
As part of OFCOM’s deliberations on future allocation processes, the DSA recommends licensing approaches that would accommodate not only traditional national mobile network operators, but also smaller service providers and industrial users.

The feedback from **PolicyImpact** (co-signatories Amazon Inc, Apple Inc, Broadcom Inc, Cisco Systems Inc, Hewlett Packard Enterprise (HPE)and Meta Platforms Ireland Ltd.) uses various sources to

show that the growth in mobile data traffic has slowed. Even in Switzerland, this growth has slowed since 2015 following a plateau in the number of mobile contracts. As of 2022, the annual growth in mobile data traffic is just 14%, well below the global trend. According to Ericsson, Europeans spend around 90% of their time indoors, which means that up to 80% of data traffic is handled indoors. While Ericsson argues that these figures mean indoor 5G coverage needs to be improved, it is far more cost-effective and energy-efficient to transmit data traffic indoors using a combination of fixed broadband and Wi-Fi. PolicyImpact proposes that the 6 GHz frequencies should be made available for licence-exempt use via Wi-Fi.

The **Global Satellite Operators Association GSOA** (hereinafter: GSOA) did not comment on the existing and future demand for terrestrial mobile radio frequencies in Switzerland. It did, however, emphasise the importance of satellite communications and the need for the frequencies allocated to the Fixed Satellite Service (FSS) in the bands considered by OFCOM to remain available for use by satellite systems in the long term. The GSOA specifically pointed out the possibility of assigning IMT in both the 6 GHz band and the millimetre wave range. This is on the condition that suitable measures are taken to minimise disruption and offer protection, with the aim of ensuring the coexistence of IMT services with FSS services operating in the same and/or neighbouring bands. There is no doubt that satellites will form an integral part of the future 6G architecture and will help expand global 6G coverage to achieve better connectivity and greater reliability. Non-terrestrial networks (NTNs) would play a central role in providing an ubiquitous, continuous, flexible and resilient infrastructure for telecommunications services. Particularly in countries like Switzerland, with its mountainous terrain and remote communities, the population would benefit greatly from integrated satellite and terrestrial networks capable of providing seamless coverage in unserved and remote areas at all times. This partnership between satellite and terrestrial networks is expected to bring significant benefits globally and deliver great socio-economic value to individuals and businesses around the world. The GSOA also welcomes the principle of a technology-neutral licensing structure. It notes that there is currently little demand for millimetre waves, especially in Europe, although the 26 GHz band has been identified as the way forward for 5G. Remarkably, only 11 EU member states have allocated 26 GHz frequencies, despite this frequency band being harmonised at European level. Against this background, GSOA believes that no further frequencies shall be made available for IMT in the near future. With regard to the upper 6 GHz band, the GSOA points out that the significant existing concerns about the possible coexistence of IMT and FSS receivers outdoors (on satellites and at ground stations) would require technical and operational restrictions for mobile communications to allow shared use by satellite and IMT services. In any case, the GSOA believes that any need for additional frequencies for public mobile networks could initially be covered by densification in the existing mobile radio bands and by using the largely unused millimetre wave frequencies.

2.7 Other associations and private individuals

Doctors for the Environment AefU (hereinafter: AefU) focuses on precautionary health protection against non-ionising radiation as well as sustainability aspects and the use of millimetre waves in communication. They very much welcome the fact that the Federal Council does not intend to release millimetre waves until the necessary environmental legislation has been created, particularly with regard to non-ionising radiation. On the other hand, they are concerned about the use of millimetre waves for large-scale communication purposes. Millimetre waves should only be approved once it is possible to carry out a reliable risk assessment. For reasons of sustainability, the roll-out of fibre-optic networks for all hospitals and healthcare facilities in Switzerland should be accelerated and prioritised over wireless. With regard to the provision of mobile telecommunications for emergency services, the AefU refers to the expertise and demands of the emergency organisations. The AefU would consider it reasonable for part of the proceeds from the allocation of frequencies to be used to fund ongoing medical and biological risk research and the promotion of innovative sustainable technologies.

The **Information on Electromagnetic Fields collective INFO_EMF.ch** believes that, for health and safety reasons, preference should be given to wired technologies such as fibre-optic cables. There is no need for frequencies (e.g., 1800 MHz, 2100 MHz, 2600 MHz FDD, 2600 MHz TDD) as all planned applications such as telemedicine, remote monitoring, etc. could be handled via cable connections.

Fixed Wireless Access (FWA) only makes sense in places where laying cables is difficult or not economically viable. The health risks of wireless communication technologies should be definitively clarified, and a legal framework should be created for the control and inspection of all telecommunications devices (including devices sold to private individuals, such as mobile telephones), as well as legal liability provisions for the telecommunications industry. Radiation limit values should be based on safeguarding health rather than on the economic benefits for companies. New frequencies in the 6 GHz, 26 GHz and 40 GHz ranges would not be required, and it would be imprudent to venture into the millimetre wave range, where many health-related questions remain unanswered.

The **St. Gallen association for a measured approach to mobile telecommunications** (hereinafter: Mobilfunk mit Mass) criticised the fact that some basic questions were missing from the questionnaire. For example, the economic, ecological and social consequences of the development of mobile telecommunications in Switzerland and worldwide to date have not been analysed. It also points out the massive risks to health along with the damage to nature associated with mobile telecommunications. If the use of the 6 GHz frequency spectrum is to be seriously considered going forward, Mobilfunk mit Mass believes it is essential for the potential medical and biological impact to be comprehensively researched beforehand. This would require decisions to be postponed until the results are available, regardless of how long this takes. Research funding must take priority over expansion. This is essential for safeguarding health. Fixed Wireless Access (FWA) will become superfluous due to the secure – and soon to be nationwide – fibre-optic coverage. By promoting and authorising a technology that massively violates legal requirements, the Federal Council, ComCom and OFCOM have long shown a lack of regard for legality. Scientists (in Switzerland, those at the BERENIS Group) have conflicts of interest and are not impartial.

The **Gigaherz.ch association** is concerned about the planned allocation of additional mobile radio frequencies from 2029. It believes that the planned auction or sale of frequencies in the 26 MHz and 40 MHz band is unlawful, particularly because there are no scientific studies worldwide that would demonstrate the effects of these frequencies on human health in the event of widespread use. The use of these frequencies without sufficient data on possible health risks is criticised as a risky experiment on the public that is unconstitutional without the explicit consent of those affected. It also expresses concerns about the structure and the alleged independence of ComCom. The association criticises the fact that ComCom is not guided in its decisions by any state or democratic authority, which is inappropriate in a democracy. It also criticises the composition of ComCom, as its members have numerous links to industry and lack expertise in the areas relevant to the assessment of mobile communications technology.

The **association for protection against radiation** (hereinafter: Schutz vor Strahlung) predicts a decline in mobile data volumes in the medium term due to market saturation and a shift to the fixed network, particularly as a result of the expansion of the more energy-efficient and lower-radiation fibre-optic network. It expresses particular concern about the energy and radiation intensity of current mobile phone technologies such as 5G, and criticises the potential integration of satellite-based networks because of the additional environmental impact. Schutz vor Strahlung also takes a critical view of the use of Fixed Wireless Access (FWA) due to the high radiation exposure in residential areas. It believes that the use of new frequency bands such as 6 GHz and millimetre waves could not only significantly increase radiation exposure and energy consumption, but also have a negative impact on people and the environment. The association recommends concentrating on the expansion of fibre-optic networks to reduce radiation from mobile phone installations and reduce dependence on mobile telecommunications. The aim should be to promote the use of landlines so as to minimise emissions and reduce radiation exposure.

Mr **Jaquier** expresses concerns about the introduction of non-terrestrial, satellite-based networks into Switzerland’s mobile networks and about the increase in radiation limit values in connection with 5G stand-alone and millimetre-wave transmission. He warns of the loss of radiation-free zones, not to mention adverse effects on the environment and health, particularly impacting the human brain. He points to studies that highlight the risks of the new technologies, including the impact on children, the

early development of Alzheimer's and negative effects on arthropods, as well as the environmentally harmful effects of 5G technology in terms of greenhouse gas emissions. As a proposed solution, he advocates the use of alternative technical solutions to improve network coverage without increasing radiation levels. He emphasises the need to minimise radiation exposure and calls for a responsible approach to the introduction of new telecommunications technologies to safeguard health and protect the environment.

Mr **Treppe** expresses his concern and opposition to the increasing installation of 5G antennas not only in his commune of Lucens, but also across Switzerland in general. He describes this development as excessive, irresponsible and unjustified, emphasises the lack of transparency and information on the part of the communal authorities, and criticises the lack of consideration for the health and well-being of the public.

3 List of abbreviations

AORS	Emergency response and public safety organisations
AR	Augmented reality
FSS	Fixed Satellite Service
FWA	Fixed Wireless Access
GHz	Gigahertz
IMT	International Mobile Telecommunications
MHz	Megahertz
MR	Mixed Reality
NIR	Non-Ionising Radiation
NIRO	Ordinance on Protection against Non-Ionising Radiation
NTN	Non-Terrestrial Networks
RLAN	Radio Local Area Networks
TDD	Time Division Duplex
VR	Virtual Reality
WRC	World Radiocommunication Conference
XR	eXtended Reality

4 List of participants

Canton of Fribourg Office for the Environment
Canton of Vaud authorities for digital and information systems (DGNSI) and for the environment (DGE)
Competition Commission COMCO
Doctors for the Environment AefU
Dynamic Spectrum Alliance DSA
economiesuisse (umbrella organisation for the Swiss business sector)
Electronic media associations: the Swiss Private Radio Association VSP, Romandie Regional Radio RRR, the Telesuisse regional television association and the Swiss Private Television Association VSPF
Ericsson
Federal Office for Civil Protection FOCP
Federal Office of Police fedpol

Gigaherz.ch association
Global Satellite Operators Association GSOA
Mobilfunk mit Mass St. Gallen (association for a measured approach to mobile telecommunications)
Mr Christophe (private individual)
Mr Treppe (private individual)
Police technology and information technology PTI
PolicyImpact (co-signatories Amazon Inc., Apple Inc., Broadcom Inc., Cisco Systems Inc., Hewlett Packard Enterprise (HPE), Meta Platforms Ireland Ltd.)
Salt Mobile Ltd
Schutz vor Strahlung (association for protection against radiation)
SpaceX
suissedigital (association for communication networks)
Sunrise LLC
Swiss Armed Forces Cyber Command
Swiss Conference of Directors of Public Works, Planning and Environmental Protection DPPE
Swiss Conference of the Cantonal Ministers of Public Health GDK
Swiss Federal Office of Energy SFOE
Swiss Federal Railways AG SBB
Swiss Fire Service Coordination FKS
Swiss Rescue Association IVR
Swiss Telecommunications Association asut
Swiss Union of Crafts and Small and Medium-sized Enterprises sgv
Swisscom (Switzerland) Ltd
The Information on Electromagnetic Fields (INFO-EMF.ch) collective