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GSOA Response to BEREC draft report on satellite connectivity for universal service

Introduction

GSOA welcomes the opportunity to comment on the draft report which BEREC published in June 2022 on satellite connectivity for universal service. The Global Satellite Operators Association[1] "GSOA" is the leading global platform for collaboration between satellite operators. As the world's only CEO-driven satellite association, GSOA leads the sector's response to global challenges and opportunities. It offers a unified voice for the world's largest operators, important regional operators and other companies that engage in satellite-related activities.

Digital Divide is today a reality everywhere in the world, including in Europe. Addressing it is a policy priority for all countries. Improving connectivity and including all citizens in the digital economy wherever they live is imperative to Europe's socioeconomics.

Therefore, we welcome and share BEREC's view that satellite has an important contribution to make in ensuring that all European citizens have access to resilient and secure connectivity, In fact, satellite connectivity is sometimes the only viable connectivity solution, given challenging geographic terrains such as mountains, thick forests, and large water areas. High-speed broadband coverage is key for both citizens and businesses. In this context, the European Electronic Communications Code (EECC) approved in 2018 expands the universal service entitlement to an "available adequate broadband internet access service." To achieve this ambitious objective to make broadband available to every European household, an all-technologies approach to take advantage of the strengths of some technologies (e.g., satellite's coverage, rapid deployment) and minimize the weaknesses of other technologies (e.g., fiber's high cost and lengthy time for deployment) is preferable. Indeed, no single solution will be sufficient to bridge the digital divide in a timely fashion, and a one-technology approach will leave many households without broadband. We agree with the ambition of the EU to bridge the digital divide, as a vector of international competitiveness for Europe. However, Europe's cohesion is also a key objective to pursue, and *all* European households need access to high-speed broadband. Rapid deployable, affordable, high quality satellite broadband can best help Europe achieve the goals of delivering broadband to all.

Even though telecoms operators overall have been able to adapt to increase data traffic over networks and capacity needs to address consumer demand, the COVID pandemic has revealed that the digital divide has effectively isolated many people in many geographical areas of Europe - either insufficiently connected, or sometimes deprived of any connectivity. GSOA has already commented to BEREC in 2021 on some of the lessons to be learnt from the pandemic.[2]

[1] The Global Satellite Operators Association now counts among its members: Airbus CIS, Amazon, Amos Spacecom, APT, Arabsat, Arsat, Asiasat, Avanti, Azercosmos, Echostar-Hughes, HellasSat, Hispasat, Inmarsat, Intelsat, Intersputnik, Lockheed Martin, Nigcomsat, Nilesat, Omnispace, OneWeb, Rascomstar, SES, SSI-Monacosat, Star One, Telenor, Telesat, Telespazio, Thuraya, Turksat, Viasat and Yahsat as well as representatives of the broader space industry including Airbus Defence and Space, Arianespace, Astroscale, Mansat, ST Engineering and Thales Alenia Space.

[2] *See*: BEREC Report on COVID-19 crisis - GSOA - Global Satellite Operator's Association (gsoasatellite.com)

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As explicitly acknowledged by BEREC in this consultation, with reference to the recent reports released by the Fraunhofer Institute in Germany and PTS in Sweden, the satellite industry is now proposing connectivity solutions which performance is largely comparable to terrestrial options and cost is decreasing, thanks to increased competition and innovation in our sector.

If full coverage for citizens and businesses in both urban and remote areas is to be reached by 2025 / 2030, all technologies must be included as contributors to the EU's challenging broadband targets. In the longer term, there will always be plenty of areas that terrestrial technology will *not* be able to reach efficiently or before long, and that is where satellite can contribute to ensure that everyone, everywhere, no matter their location, can have access to quality high-speed broadband services.

In its 2021 Communication on stronger, connected, resilient and prosperous rural areas by 2040, the European Commission has acknowledged with regard to broadband coverage that *"a combination of terrestrial and space-based connectivity, ensuring high-speed broadband everywhere for resilient and cost-effective services will help achieve this."*[3] Indeed, several technological options and especially hybrid solutions (with a mix of technologies involving Satellite, Terrestrial Mobile, WiFi) exist and have proven successful in enabling meaningful/ high speed connectivity, especially in the areas where it is not cost-efficient to deploy fiber. Most countries with universal service plans in Europe and elsewhere have to rely on a mix of technologies to achieve their objective. Universal coverage will only be achievable by ensuring that all wireless systems contributing to high-speed connectivity are utilized to support full connectivity.

Satellite provides effective geographic coverage of telecommunications to everyone across the globe and has a key role to play to ensure consumer broadband is available to all. This is particularly vital since a significant proportion of users most in need of connectivity are located in rural or underserved areas, as well as refugee camps and temporary dwellings, all locations which satellite has a clear cost advantage, or is able to overcome geographic barriers to serve. As opposed to other technologies, satellite can serve citizens scattered over vast regional, national or continental areas, with a cost that is independent of the end-user location. Today satellite also supports government and business broadband needs as well as providing broadband to consumer solutions relying on a combination with Wi-Fi. These options are fully available anywhere in Europe.

Important challenges remain about how to provide full coverage and connectivity in Europe where rural, remote or isolated territories are many. Satellite operators have also long worked to deploy backhaul networks to extend the reach of terrestrial networks and contributed to enhance capacity provision to end users in all parts of the world. Satellite backhaul enables cellular services to be provided in areas where traditional terrestrial connectivity such as fiber, cable, or microwave are not economic or very challenging to install. Satellite can be chosen as a more cost-effective and more reliable option of backhaul technology to address these challenges. It is essential that BEREC members do not only allow but also encourage this option.

Here below, GSOA members are proposing their own responses to the questionnaire which BEREC shared with their members.

[3] Communication from the Commission on A long-term Vision for the EU's Rural Areas - Towards stronger, connected, resilient and prosperous rural areas by 2040, **COM(2021)345.** *See also*: Broadband Commission (2020) "The role of geostationary satellite networks in meeting the rural connectivity challenge." https://broadbandcommission.org/insight/the-role-of-geostationary-satellite-networks-in-meeting-the-rural-connectivity-challenge/

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Questionnaire

Q1: What are the regulatory steps needed in the event that Satcom would be used for universal service in Member States?

BEREC has identified several regulatory aspects in relation to the usage of satellite for communications ("satcom") services in section 2.3 of its draft report. GSOA has the following comments to make:

- Most satellite systems in Europe today use Ku-band 10.7-12.7 GHz/ 14-14.5GHz and Ka-band 17-30 GHz systems, and some are using C-band 3800-4200 MHz platforms to respond to dedicated needs. Satellite systems using Q-V band in the 37-43 GHz frequencies are also burgeoning.
- Authorisation of satellite network / earth stations operating in these bands is best handled based on the various ECC decisions of the CEPT adopted during the last 15 years or so. These decisions cover both GSO and NGSO systems, for fixed and mobile platforms (VSATs and ESOMPs), and encompass the compliance of satcom equipment with the RED Directive 204/53/EC. Several European countries have adopted national rules that comply with these decisions, and GSOA encourages all other countries to follow suit. In practice, this will facilitate simplified authorization procedures (such as "blanket" or "class" licensing regimes). These types of regulatory regimes expedite the practical, economical and widespread deployment of customer terminals and network gateways.
- The compatibility between GSO and NGSO systems is also being studied at CEPT level, in line with ITU decisions adopted at WRC-19 and to be adopted soon at WRC-23.
- GSOA members are also used to address national rules on legal interception in many countries of the world, when their customers or partners are providing connectivity solutions for broadband to consumer solutions.
- As BEREC rightly highlights (footnote 8): "Rights to operate a satellite network over certain frequencies and geographical area are essentially granted by the ITU on a first-come first-served basis", which essentially addresses the need to coordinate with domestic satellite and terrestrial networks.

Q2: How may projected Satcom capacities (geostationary as well as non-geostationary) suit Universal Service generally?

Based on the Fraunhofer Institute's study conducted for German BNetzA, BEREC estimates that: "In general, the available GSO and NGSO capacities in the coming years seem to be sufficient to address those needs assuming an increase of capacity in 2020 to 2025 to about 10 times of the capacity (…) satellite solutions will not capture a mass market role in the European market. The available data throughput capacities in the sky seem to point to niche / limited role."

GSOA membership includes the majority of GSO and NGSO satellite operators active in Europe [with the exception of Starlink]. Comprehensive data on satellite capacity from all types of satellite systems is available today and will further develop in the coming months. This includes Eutelsat VHTS Konnect, Viasat-3, O3b and mPOWER, OneWeb, Amazon's Project Kuiper and many others.

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Already today, the satellite industry enables to deliver broadband services to millions of customers in all applications worldwide, including by contributing to fill in the digital gap in many countries, as considered in this BEREC consultation.

Q3: How is the suitability of internet access services via satellite communication to be assessed in the context of the amended universal service described above, especially with regard to the support of the services anchored in Annex V of the EECC? Are there any possible limitations with regard to the application scope?

Article 84 of the EECC specifies: *"Each Member State shall, in light of national conditions and the minimum bandwidth enjoyed by the majority of consumers within the territory of that Member State, and taking into account the BEREC report on best practices, define the adequate broadband internet access service for the purposes of paragraph 1 with a view to ensuring the bandwidth necessary for social and economic participation in society. The adequate broadband internet access service shall be capable of delivering the bandwidth necessary for supporting at least the minimum set of services set out in Annex V."*

Annex V of the ECC lists the minimum set of services which the adequate broadband internet access service shall be capable of supporting:

(1) E-mail
(2) search engines enabling search and finding of all type of information
(3) basic training and education online tools
(4) online newspapers or news
(5) buying or ordering goods or services online
(6) job searching and job searching tools
(7) professional networking
(8) internet banking
(9) eGovernment service use
(10) social media and instant messaging
(11) calls and video calls (standard quality)

Most advanced GSO and NGSO satellite systems available today and in the future in Europe are fully capable of providing direct access to the above set of services, by or contributing to last-mile connectivity via backhaul or trunking.

A pragmatic approach to implementing affordable and adequate connections for all has to be adopted, as only 59% of rural households have access to broadband at speeds greater than 30Mbps.[4] The main reasons are cost of deployment; policy and lower revenue due to sparse population. Policy should foster a range of connectivity solutions and/or hybrid solutions based on a combination of them, as appropriate, avoid imposing overambitious technical requirements not required for most applications, and be flexible to enable meaningful connectivity based on cost-effectiveness for the region/context in question.

In particular, GSOA wishes to highlight the relative importance of latency in communications. Although latency is indeed critical from some applications, the latest generations of GSO and NGSO satellites can

[4] *See*: Communication from the Commission on A long-term Vision for the EU's Rural Areas - Towards stronger, connected, resilient and prosperous rural areas by 2040, **COM(2021)345**

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accommodate all services listed above and many others such as videoconferencing or VPN access. The truth is, end2end connectivity nowadays often relies on a mix of technologies which all affect latency at various degrees, leading to an accumulation of delays which occur in different segments of a same network; and latency anyway depends on many factors including propagation (related to distance and altitude), routing and switching times or congestion – notwithstanding the effect of jitter. Let's also not forget that video streaming is the dominant use of the Internet, and this application is *not* latency sensitive.

Q4: What improvements in terms of technical performance (e.g. increase in available capacities, expansion of the service or application portfolio, technical advances with regard to cost and size of customer premises equipment) can be expected over time as a result of new forms of implementation (GEO HTS — High Throughput Satellites, as well as broadband MEO and LEO satellite systems)? To what extent do the new forms of implementation have more favourable cost structures for end users supply via satellite communication?

Satellite operators have invested massively into future-proof systems, and as a result, the satellite communications sector has been through several major innovations during the last decade. Technologies adopted from the mobile sector (such as small-cell spectrum frequency reuse) have enabled higher-capacity satellites to provide lower cost services. This trend is set to continue with mobile-edge computing enhancing both network performance and the user experience for rural residents. The new generation of satellites are very-high-throughput, all-electric, software-defined and fully interoperable with terrestrial systems, providing operators with greater flexibility over the frequencies the satellite operates and/or the capacity delivered in different locations over the lifetime of the spacecraft.[5] Constellations of telecoms satellites deployed in NGSO today increase the overall satellite broadband offering over Europe, put it on par with performance from terrestrial mobile networks. Furthermore, satellite companies are deploying an integrated mix of GSO and NGSO satellite capacity to meet all requirements on land, at sea and in the air.[6] Similarly, commercially available flat panel antennas supporting fixed and mobile service have demonstrated interoperability with both GSO and NGSO constellations, so each type of satellite system brings its advantages, and their complementarity permits to further develop the efficiency of the offering, enabling choice and redundancy for the satellite users.[7]

The technical advances in the design of spacecrafts and ground antennas, the adoption of digital and software-based components, automated satellite assembly line, in addition to reusable launch options have all contributed to unprecedented technological progress, higher performance and decrease in satellite communications costs.

GSO and NGSO broadband offerings with performances of up to 100 Mbps and more are today available across Europe, providing high-speed connectivity services to end-users in rural and remote areas. Some examples are France (Nordnet), Ireland (Digiweb), Germany/Austria (SoSat), Switzerland, Greenland (1, 2), Spain as well as in Canada (most remote areas of Alaska and Canada) - as again listed below:
Internet par satellite - neosat | Nordnet
Delivering superfast satellite broadband. No matter where you live. (digiweb.ie)
SOSAT - Internet via Satellit

[5] See for example SES-17: Experience endless connectivity | SES
[6] *See e.g.* https://www.satellitetoday.com/government-military/2021/12/07/us-army-uses-ses-meo-technology-in-multi-orbit-tests/; https://news.satnews.com/2021/11/04/intelsat-oneweb-linchpin-solutions-demo-global-multi-orbit-satellite-service-to-u-s-army-u-s-dod/; https://www.viasat.com/about/newsroom/blog/viasat-gives-u-s-military-ability-to-operate-across-multiple-satellite-networks/.
[7] https://www.kymetacorp.com/news/kymeta-oneweb-successfully-tests-leo-geo-capable-land-maritime-flat-panel-user-terminal/

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Swisscom | SES
Tusass | SES
Greensat | Hispasat
Spain | Hispasat
Bridge digital divide remote Canada - OneWeb
OneWeb connecting village with population of 405 in Akiak, Alaska

Satellite-powered connectivity to end users is also used extensively in several regions of the world to extend network coverage, both for cellular and mobility applications. There are good reasons for telecoms operators and service providers in the service chain to make more intensive use of satellite services for 4G and 5G connectivity solutions - by relying on the technological and business options available for using satellite-backhaul, as well as recent technology innovations such as VHTS satellites and new constellations of NGSO satellites. Some examples include:

- intelsat-MNO-Japan_case-study.pdf
- Avanti Communications set to deliver life-enhancing connectivity to millions in rural Africa with launch of Avanti EXTEND - Avanti Communications (avantiplc.com)
- Gilat Satellite Networks «SES Selected Gilat to Enable Tier-1 4G/LTE MNO in Brazil to Provide Broadband Connectivity for Education
- OneWeb and Telefónica collaborate to extend connectivity across Europe and Latin America
- HISPASAT and the Mexican communications agency CFE TEIT collaborate to connect the unconnected
- Altán's Red Compartida to multiply the base stations connected through HISPASAT's Ka-band

Satellite networks can also be deployed rapidly since they do not require to carry out extensive civil work. Connectivity is immediately established by the simple installation of an antenna and user equipment, which significantly reduces the overall cost of network deployment. Satellites can also provide backhaul to terrestrial networks, thus optimizing existing structures and reducing the need of additional civil works.

Q5: What other dimensions do Member States consider relevant and to what extent? (redundancy / resiliency / environmental issues)

It is not GSOA's role or mandate to speak on the Member States' behalf. That said, GSOA would like to take the opportunity to affirm that redundancy, resilience and environmental issues are considered critical in today's telecoms ecosystem. In this regard, it should be noted that satellite is the most sustainable technology with respect to network deployment since it does not require extensive civil work. A customer premise equipment (CPE) is enough to provide connectivity to the end-user, thus reducing significantly the impact on the environment. In addition, satellite connectivity is not affected by natural disasters such as earthquakes or floodings; and a simple dish suffices to restore connectivity. These are the main reasons why satellite is the solution-of-choice to re-establish connectivity in the event of emergency and disaster. Finally, satellites are often designed with several layers of redundancy for critical systems and payloads to ensure the continuity of service.

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Q6: What needs in terms of the availability of satellite capacity are seen in the Member States so that satellite-based solutions can be considered for the amended universal service requirement?

N/A

Q7: To what extent are these needs already met by existing capacity? What impact can be expected from commercial satellite projects that are already in operation or in the planning/construction phase?

Today's capacity includes GEO satellites from several GSOA members (incl. Intelsat, Eutelsat, Hispasat, SES), whilst NGSO capacity is already available from OneWeb in Northern Europe and SES-O3b. VHTS Konnect from Eutelsat, Viasat-3, O3b mPOWER, OneWeb, Amazon's Project Kuiper are all to be made available in Europe later in 2022, in 2023 and soon after.

GSOA wholly subscribes to BEREC's statement that: *"high-speed networks are concentrated in the most densely populated areas, while in areas with low population density, such infrastructure is not yet available. The increase in the coverage of areas not yet covered implies higher investment costs, either because they are far from the transmission networks already deployed, or because they are areas of complicated terrain which require the installation of more network elements than in other areas commercial satellite projects can be a potential solution to bring broadband connection everywhere."*

Q8: If there is a gap between the needs and the current/projected capacities: Does a coordinated approach between Member States make sense to create the additional capacities? If so, what could such an approach look like?

GSOA fully supports the approach proposed by the Greek regulator that: *"member states could implement coordinated policies into simplifying and expediting licensing of ground base stations and satellite networks, as well as their optical fiber networks investment, that connect and transmit broadband signals to the satellite network and that additional ground stations would enhance expected geographical coverage."*

Furthermore, in addition to the member state level, a coordinated approach at European level of aggregating demand, and addressing all connectivity needs resulting from the digital divide, would be the most pragmatic approach. It would need to be technology neutral and identify the appropriate EU or national funding mechanisms to rely on. In particular, it would be important to invite all technologies to participate, including satellite, and take advantage of the strengths of satellite broadband including fibre-like speeds, 100% coverage of Europe, affordability, rapid deployment and quality and continuity of service.

Q9: To what extent are satellite systems a viable fallback option in case other technologies such as mobile networks fail to transmit disaster warnings? Specifically, can satellite systems be of an efficiency equal to that of cell broadcasting, even in cases of widespread power outages (possibly relying on back-up batteries)?

The use of satellite imagery to monitor large scale changes to the planet is well understood and documented. The role of satcom, however, is less well-known, but of equal and increasing importance. Satellite communications can be very useful for the early warnings of emergency and disaster situations, and such satellite solutions are extensively used in the meteorological sector to monitor weather patterns and provide critical information to multiple sectors including agriculture and transport, as explained in the

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report from GSOA: Satellite for Early Warning, Environmental Monitoring & Climate Change - GSOA - Global Satellite Operator's Association (gsoasatellite.com)

Q10: Specifically with regard to areas struck by or affected by disaster: To what extent are satellite systems fit to maintain and/or swiftly re-establish the connectivity of end users, even if only as an interim solution during the immediate aftermath of such events?

A new report by Access Partnership has revealed that the annual number of natural disasters is expected to increase by 37% (from 442 to 541 occurrences) by 2025 worldwide.[8] It is not surprising, as organisations such as the Intergovernmental Panel on Climate Change, the International Monetary Fund (IMF), the World Bank, and the World Meteorological Organization (WMO) all agree that weather-related disasters are likely to increase and range farther in the coming years due to climate change.

For example, satellite telecommunications equipment was deployed in Mozambique and Zimbabwe after the severe devastation caused by Hurricane Ida in 2019. Satellite companies like Inmarsat, Intelsat, Iridium, and SES Satellites and many others worked with national governments, ensuring they remain connected and undertake critical communications.

Terrestrial networks are particularly vulnerable to a wide range of disasters such as hurricanes, floods, and earthquakes that can disrupt their services. Thanks to their ubiquitous coverage and resilience against catastrophic events, satellite communications are available for rapid deployment when other communications systems have been destroyed or become overloaded, enabling immediate vital communications for relief efforts. In addition, combining satellite backhaul with or a vehicle mounted or an existing cellular base station (disconnected from fiber) can re-establish the entire public mobile network in a matter of hours.

In addition, satellites can play a critical role in the provision of the Internet of Things (IoT), machine-to-machine (M2M) and Smart City communications, which fits very well with the need to maintain always-on continuity of such critical services.

Examples of satellite communications restoring connectivity in critical situations are manyfold, and the most recent ones include:

Intelsat Disaster Relief Program Provides Emergency Communications Support to Qualified Humanitarian Organizations within 24 Hours | Intelsat
https://www.ses.com/press-release/ses-enables-digicel-restore-first-international-calls-tonga
https://www.ses.com/blog/restoring-communications-disaster-stricken-mozambique-satellite
https://www.ses.com/press-release/sess-and-gilat-telecoms-resilient-network-restores-connectivity-africa

Today, as demonstrated by the Covid pandemic, access to the Internet has become so integral to daily life, education, healthcare, and commerce, that even a short-term disruption of the communication networks can have a high economic and human cost. Ensuring that satellite communications is integrated into the communications network provides the peace of mind that, in any situation, connectivity will always be available to those that need it most.

[8] https://accesspartnership.com/the-citizen-natural-disasters-set-to-increase-by-37-globally-by-2025-report/?hss_channel=lcp-472410&utm_campaign=Access%20Alerts&utm_medium=email&_hsmi=210545090&_hsenc=p2ANqtz-9Nyz2q3Z193Mx309mlvRfur35BMaMX5pQOEI6cF2NazWplrJeWDk2YkRAcilckymLyORUyNuzHZIW1lI4avTmyJeVUMQ&utm_content=210545090&utm_source=hs_email