Intelsat welcomes the opportunity to provide feedback regarding the Draft BEREC Report on Satellite Connectivity for Universal Service.

We welcome the report's focus on how satellite networks can help boost the implementation of Universal Service across Europe. Satellite communications are continuously characterised by lower cost per bit, easy and cost-oriented deployment of infrastructure, high throughput, and improved antennas.

Intelsat's response covers three important subjects that were touched upon in the Draft Report, especially 1) the potential advantages of satellite networks for Universal Service, 2) the technological advancements of non-terrestrial network capabilities, and 3) key regulatory considerations.

Intelsat's 5G Software-Defined Network

Intelsat's EPIC NG class satellites deliver around 10 times the throughput of our traditional fleet. This narrowing of the gap between the service performance of satellites and terrestrial infrastructure enables better direct service and strengthens the role satellite plays in providing Universal Services across Europe and the world.

We are currently developing a new constellation of Software-Defined satellites that will be a critical part of 5G networks in Europe. Combining a 5G core, cloud services, different bands and multiple orbits of today's satellite and terrestrial networks into one functioning system will set a new standard for resiliency, reliability, and reach.

Leveraging industry standards such as 5G, 3GPP, ETSI MANO, and MEF, Intelsat's unified network will facilitate mass-scalability and flexible integration with—and expansion of—global telco networks. As a result, satellite connectivity will become an integral ingredient of telco networks, enabling them to expand to mobility and remote situations that terrestrial systems cannot access.

Satellite Connectivity for Universal Service

Although the report highlights some key areas where satellite connectivity is advantageous, the lack of using space assets more widely for Universal Service is worrying, especially as 18 Member States do not envisage using satellite connectivity to achieve Universal Service, with another 5 stating that they see no role of Satcoms at all.

Intelsat believes that with recent technological advancements in satellite technology, as well as increased investments from the private sector, satellite connectivity should be recognised as an instrumental tool for national regulatory authorities. Intelsat's global experience of providing connectivity shows that without satellite services, implementing Universal Service will be impossible.

The report, as well as answers from Member States, further highlight some of the key areas where satellite connectivity is advantageous for implementing Universal Service.

Broadband in hard-to-reach areas

Achieving Universal Service, a key prerequisite for reaching the digital transformation goals, through terrestrial connectivity solutions alone is not enough to ensure affordable connectivity for all. The Digital Divide is still present in many countries in Europe, with recent infrastructure developments still not adequately addressing the problem.

Rural, mountainous and hard-to-reach areas are the primary areas where terrestrial connectivity is inadequate for ensuring that citizens have access to broadband services. Laying fibre underwater or through forested, adverse, and mountainous areas to provide terrestrial connectivity to rural areas is a severely time and resource intensive process.

Satellite networks can dynamically distribute a single pool of capacity across an entire network of rural sites, also distributing costs across the entire network. Modern technologies enable high-performing, small satellite antennas to provide connectivity to rural regions which can be delivered within a matter of days and provide instantaneous connectivity.

Accessibility and cost-efficiency

Remote sites may be located up to 70 kilometres from a core network endpoint. Installing 10 kilometres of fibre to connect these locations via terrestrial backhaul can cost up to USD 190,000[2] and can take up to one year, with the cost and time to do so increasing drastically for deployment over adverse terrain.

Intelsat has partnered with mobile network operators in Europe, most recently in Germany, to provide cellular backhaul for 4G LTE services in rural parts of the country. With the goal of connecting every subscriber with reliable, high-speed connectivity (in compliance with the targets set by the Bundesnetzagentur), Intelsat provided a cost-effective alternative to microwave or fibre.

The result of the cooperation was bringing LTE services to a large portion of the population (up to 800,000 people in Germany) which lived in hard-to-reach areas. Satellite-enabled cellular backhaul therefore provides an accessible and cost-efficient way of connecting areas that would need high investments for access to broadband services.

Accessibility and cost-efficiency is also a key matter for those living in European overseas territories, many of which still remain unconnected and without reliable access to sufficient mobile services. As a result of infrastructure costs and terrain needed, overseas islands may be specifically difficult in implementing Universal Service obligations. Advances in satellite technology means smaller antennas known as Very Small Aperture Terminals (VSATs) can be used for space-based cellular backhaul for a smaller investment.

Through these collaborative ventures, space services are essential for Universal Service and satellite connectivity is an increasingly important tool for e-education and e-health, which have become an essential part of the post-Covid 19 ecosystem.

Future of mobility

Regulatory authorities need to take into account the rapid development of connected and automated mobility when assessing Universal Service obligations. Smart traffic management and intelligent transport systems, linked to connected and autonomous vehicles, will be the leading trends in mobility in the coming years. Yet, these trends present certain challenges that need to be addressed to make sure the benefits are present for all, including cybersecurity and location.

Effective wireless communications will be essential to ensure that all European citizens can enjoy the advantages of connected and autonomous vehicles. The implementation of Universal Service across Europe will therefore be a prerequisite for allowing everyone access to these types of vehicles, however satellite connectivity will need to play a larger role.

Similarly to broadband access, terrestrial networks alone will not be enough to ensure that vehicles stay constantly connected, as any interruptions in connection access may affect road safety. While

standard 5G services will enable autonomous vehicles, with good latency and speeds, there are areas where investing in FTTH/5G will not bring the ROI needed, such as mountainous areas or over large bodies of water.

Intelsat is already providing services for more than 10 000 maritime vessels across the world[1], providing stable and reliable connectivity to those on board and these services will be critical for Universal Service, as many inland maritime routes will be automated in the coming years.

Satellite services will provide ubiquitous, uninterrupted and secure networks for connected and autonomous vehicles, enabling continual security updates, fleet management and navigation services.

Resilience of networks

Intelsat welcomes the report's emphasis on the importance of satellite services in helping users stay connected in crisis situations and provide secure communications in case of cyberattacks – a scenario which must be taken into consideration when implementing Universal Service obligations. Intelsat's global network has provided connectivity in crisis situations around the globe for governments, businesses and end users.

An example of this was in 2019, when Hurricane Dorian made landfall in the Bahamas as a category 5 storm. The resulting devastation wiped out critical communications services—hobbling relief efforts. Within 24 hours, Intelsat General helped bring essential communications back online in one of the hardest hit areas. In cooperation with GATR Technologies and the Global Disaster Immediate Response Team (DIRT), satellite connectivity terminals were deployed, enabling the massive support effort. And Wi-Fi provided through Intelsat's services.

In critical communications, space-based systems provide a resilient backup to terrestrial networks anywhere in the world. As IoT scales to massive connectivity in the 5G era, satellites will deliver the service continuity needed for critical communications as well as future industrial control applications.

Technology trends

The report and questionnaires rightly observe recent technological advancements in satellite networks that would allow for better connectivity solutions to be implemented across BEREC's members. This section outlines some of the crucial advancements that Intelsat has made in the recent years, showing that satellite networks are becoming even more reliable and should be considered an important instrument for implementing Universal Service.

Geostationary and non-geostationary satellite networks

The draft report rightly notes that the usage of non-geostationary satellites will increase capacity to boost Universal Service, especially for increasing the data rates and lowering the latency which is particularly important for integrating non-terrestrial networks into terrestrial 5G networks. Intelsat has recently announced[2] a new investment in boosting its fleet of satellites with new Low-Earth Orbit (LEO) or Medium Earth Orbit (MEO) satellites.

Quality of Service

[1] https://www.intelsat.com/newsroom/intelsat-flexmaritime-now-connects-more-than-10000-vessels/
[2] https://www.intelsat.com/newsroom/intelsat-launches-new-ifc-solution-revolutionizing-airline-connectivity/

New generations of high-throughput satellites can deliver order-of-magnitude improvement in data rates and capacity. Today, high throughput satellite (HTS) networks are operating on a global basis and can provide broadband service to end-users with speeds of 25 Mbps and higher, while Intelsat's EPIC fleet can deliver 10 times the throughput of the previous generation of satellites[3].

A key initiative that Intelsat has taken is continuous investments into building the company's Global 5G Software-Defined Network that aim at fully integrating satellite services with terrestrial 5G networks. This generation of four new satellites (named Intelsat 41-44) are designed to enable greater agility, flexibility and orchestration across edge, satellite and core.

Sustainability

One of the concerns emphasised by BEREC members was the environmental impact of satellite networks, such as short lifespan, with some national regulatory authorities already establishing certain sustainability requirements for licensing. Intelsat has taken great strides to develop more sustainable uses of satellites, with one of the primary examples being two successful refuelling missions (MEV-1 and MEV-2). The MEV-2 mission was significantly important for the sustainability of satellite systems, as it took place without interrupting service for our customers and their end users, marking the first-ever in-orbit servicing of a live commercial satellite in geostationary orbit.

Regulatory considerations

The draft report also analyses some of the regulatory elements that are needed to provide satellite connectivity in Europe, including licensing and frequency authorisation procedures. These policy and regulatory constraints may artificially increase the price of deployment of networks and even the cost of health devices for users to utilise. Easing the flow of procedures will allow for more service offerings in more countries across Europe, benefiting the implementation of Universal Service.

With more NGSO systems becoming available, a key initiative is more regulatory harmonisation on an EU level. While BEREC notes that these considerations constitute a national regulatory level and are currently being handled on a case-by-case basis, promoting a more pan-European framework will help provide more clarify for operators and ensure long-term cooperation.

A lack of technological neutrality is also a key regulatory constraint for expanding satellite services in many jurisdictions. A bias against space-based connectivity means that many regulatory authorities and funding bodies focus only on terrestrial mobile networks of FTTH, blatantly excluding satellite services from competing for subsidies.

Spectrum is a key enabler for satellite services, as for all mobile networks. Long-term access to specific bands and ensuring that parts of the spectrum will be reserved for satellite on a pan-European level would be highly beneficial for using space-based connectivity for Universal Service obligations.

Intelsat therefore suggests that national regulatory authorities:

1. Consider satellite technology as a part of the overall strategies aimed at promoting Universal Service.

[3] https://www.intelsat.com/resources/blog/global-government-workshop-brings-industry-up-to-date-on-latest-satellite-technologies/

2. Ensure that funding opportunities for infrastructure rollout are technologically neutral and do not favour one specific approach.

About Intelsat

Intelsat has more than 50 satellites in orbit providing satellite service to government and military end-users. We maintain the highest standards of security, building our infrastructure and networks against the most stringent international controls and systematically detecting, approaching and mitigating attacks. Intelsat's scale allows us to move much faster than government-owned initiatives.

Intelsat is headquartered in Luxembourg, from where we oversee 5 regional offices in Europe and deliver over 1,600 channels for our European customers. Intelsat operates the industry's largest commercial teleport facility in Fuchsstadt (Germany), with USD 100m invested in the facility since 2002.