BEREC-RSPG joint report on facilitating mobile connectivity in "challenge areas" November 2017

Executive Summary

ESOA and its Members[1] welcome the opportunity to submit these comments to the consultation on the BEREC-RSPG joint report on facilitating mobile connectivity in "challenge areas". This is an exciting time in mobile broadband development. Through a complement of technologies, including satellite, the "5G ecosystem" can achieve its vision of bringing next generation connectivity to all users across the globe. It is important that the right investments and technology decisions are made now to ensure optimal development of all of the advanced, efficient next generation communications systems that will be needed in this ecosystem.

ESOA is surprised that no reference whatsoever is made on how satellite contributes to connectivity, and how 5G will also rely on satellite communications. Our comments below are a reminder of existing and future satellite solutions that are contributing to achieving the Europe 2020 objectives and beyond, in particular as regards providing backhaul to telecoms operators and connecting mobile platforms.

ESOA is the world's only CEO-driven satellite industry association dedicated to serving and promoting the common interests of satellite operators from Europe, the Middle East, Africa, and the CIS. Together ESOA Members, who also include manufacturers, equipment providers and launch service providers, provide invaluable communications services to the whole world, including live broadcasting, broadband, emergency communications, maritime and aero communications, secure communications, 24/7 monitoring of industrial processes such as energy plants, weather forecasting and a whole range of other communications services.

[1] A complete list of ESOA Members can be found at www.esoa.net

Innovation in Satellite Technology

Satellite communications promises fast, flexible internet access anywhere in the world with major operators already deploying new-generation satellites with high data throughputs. Much like the terrestrial mobile sector, the satellite industry is innovating and growing at a rapid pace. Satellites are being used in multiple orbits, with newer, more efficient ground terminals, in combinations never seen before. In order to meet ever-growing customer demand for data, satellite operators and service providers are making substantial investments that improve spectrum efficiencies and reduce latency, including deployment of High Throughput Satellites (HTS) in geostationary orbit (GEO), as well as deployment of medium-earth orbit (MEO) and low-earth orbit (LEO) systems that offer connectivity with lower latency.

Satellites today can deliver very high data rates (> 100 Mbps – 2 Gbps) in broadcast mode to radio access points for professional video applications. In addition, new high-performance satellite platforms will combine wide beams, spot beams, and frequency reuse technology to support multi-media and mobility solutions. These investments are providing customers of satellite based services with:

- Higher performance at lower costs
- Wide beams and spot beams in the same frequency band for broadcast and high-throughput applications; frequencies which can be aligned to regional and application-specific requirements
- Smaller nomadic terminals
- Mobility-friendly earth stations
- Improved data-centric services, such as cellular backhaul

GEO HTS can deliver data directly to homes and mobile terminals with speeds of up to 100 Mbit/sec. The MEO and LEO systems can provide trunking and backhaul capacity that rivals fibre, offering speeds up to 2 Gbps and latency below 150 ms round-trip to large end-users such as Fixed and Mobile Network Operators. Unlocking the full potential of these data links for mobile applications requires an antenna solution that can track satellites while also being portable enough to attach to a vehicle or take into the field. To enable widespread adoption of satellite broadband, especially for mobile users, satellite communication terminals using electronic beam-steering are being designed and developed.

Technology Neutrality

ESOA maintains that the principle of technology neutrality as a means of enabling competition between platforms must be fully embraced to ensure that future communication solutions are cost effective, affordable, available to all, flexible and fit for purpose.

“The main forthcoming objective of Europe 2020 is to become smart, sustainable and inclusive”, the report claims. The approach to ensuring this should:

- Be open to all communications solutions available in the market. This will encourage innovation, investment and competition both now and in the future
- Enable the most appropriate combination of technologies to deliver geographical coverage for both back- and front- haul connectivity
- Secure the most efficient and cost-effective solutions to provide services
- Acknowledge that developments in satellite capability will soon deliver enhanced throughput, enabling satellite performance equivalent to a network based on optical fibre elements, e.g. Gigabit (and later Terabit) satellites

Digital Inclusion

ESOA encourages policy makers and regulators to ensure that the most cost efficient approach to connectivity in rural areas and white (underserved or unserved) areas is realised to support ubiquitous internet access. In particular, we emphasise the importance of respecting the principles of objectivity, transparency, non-discrimination and proportionality when defining the solution. Accordingly we encourage policy makers to acknowledge:

- The need to secure effective provision and access to universal service, based on a mix of technologies (Wired or Wireless Terrestrial, Satellite) and in a cost-effective manner
- The importance of private investments to achieve the 2020 Digital Agenda goals (30 Mbps to all / 100 Mbps to half the Households) – noting that coverage in rural areas is less than 30% (EU Commission 2016 scoreboard) and something the EC has sought to address by cooperating with ESOA on www.broadbandforall.eu
- The importance of promoting improved connectivity to digital exclusion areas with the intermediate target of 30+ Mbps, thus paving the way to providing 100 Mbps download speeds to all Households by 2025 (scalability)
- Pro-competition policy to the provision of communication services results in vast public value benefits in terms of price, innovation and quality of service
- The benefits of 5G should ultimately be accessible to all, and satellite communications has a significant role to play in enabling this

Backhauling

Satellite systems are already providing backhaul for 3G and 4G mobile networks. Satellite connectivity can be combined with a range of terrestrial technologies for last mile communications such as WLAN, LTE or DSL, and thus creating micro-systems which can support a large proportion of functions autonomously. In this scenario the satellite network is used for backhaul to the Internet from a terrestrial end-user interface.

For example, UK company Avanti is providing backhaul via Ka-band GEO satellite to enable 4G coverage extension to EE's 4G network in the UK as well as to support the UK Government's emergency service network (ESN). Spanish operator Hispasat is also

providing backhaul via Ku-band GEO satellite to enable 4G coverage extension to 4G MNO networks in European countries.

New satellite systems are evolving to provide affordable backhaul to accelerate the transition to 4G/LTE (and the upcoming 5G). As an example, Luxembourg SES' medium-earth orbit (MEO) constellation, known as the O3b fleet, is already in operation and providing latency under 150ms roundtrip (to large users such as ISPs and MNOs), with 700km spot beams that can provide up to 2Gbps throughput. Thus, high-throughput broadband connectivity is possible for local telecoms operators and Internet service providers even in remote locations to connect their end-users to the e-services and applications universally needed.

Further, with OneWeb low-earth orbit (LEO) satellite system multi-gigabit per second download speeds will become a reality in 2021 along with 20ms latency levels and low cost ubiquitous access. OneWeb's full performance satellites will be every bit as capable as any terrestrial technology, and likely better in many ways.

The 5G ecosystem is anticipated to include a large number of very small, dense cells for delivering high data rate communication services close to the user. Satellite communication offers truly ubiquitous coverage, mobility, and equal quality-of-experience to all users within reach, regardless of population density. These features are critical to successful deployment and operation of 5G networks. Hence, by providing backhauling services to fixed or moving base stations, satellite connectivity acts as an overlay to the macro cell backhaul network.

For more information about satellite's role in backhauling:
https://www.esoa.net/services/mobile-backhaul.asp

Aero & Maritime Connectivity

Being truly mobile means maintaining communications even while you're not on the ground. The number of connected aircraft worldwide is expected to balloon from 5,300 in 2015 to 23,100 in 2025 with Europe remaining the second-largest region in terms of traffic. The base line demands per aero plane in the domestic US is around 100 Mbps of capacity. Satellite-enabled mobility solutions trusted by industry-leading service providers such as Thales, Panasonic Avionics or Deutsche Telekom in Europe already provide in-flight connectivity with cockpit communications or cabin applications such as Internet access, in-flight HD entertainment or virtual office connectivity.

Maritime is also its own "challenge area," and satellite broadband provides connectivity solutions that optimise passengers' quality of experience. Cruise ship guests (both at sea and along inland riverways) rank having broadband internet access onboard as a top five must-have vacation amenity. Operators can now provision dedicated or shared low-latency bandwidth for one ship or across their fleet to maintain service levels as demand

fluctuates. Bandwidth is provided via single or zoned steerable tracking beams, dual tracking antennas, and redundant gateways.

Broadband performance and service levels can be guaranteed at up to 99.7% availability with seamless handovers in the event of blockages.

Optimising the 5G Ecosystem

BEREC and RSPG will surely be considering the evolution to 5G tomorrow, even as it analyzes the more pressing problem of connectivity today. With the need for higher bandwidth and the desire to be connected everywhere, along with the profusion of devices that need to be connected to the cloud (IoT) 5G is positioned as the necessary and natural progression from 4G LTE.

The significant extra capacity of the 5G radio network will need to be supported with higher bandwidth backhaul, including fibre, microwave and satellite networks. Next Generation satellite networks combined with Mobile Edge Computing (caching and content serving from the edge) can be used for 5G backhaul and to meet 5G's expected latency, coverage, availability, and security requirements. The combined benefits of low latency and high bandwidth connectivity already today bring telco customers of satellite operators closer to the reality of worldwide 5G.

For more information about satellite's role in 5G:
www.esoa.net/cms-data/positions/ESOA%205G%20Ecosystem%20white%20paper.pdf

Licensing

It is important that the licensing approach adopted is appropriate to the band in question, affords the necessary flexibility and takes account of the principle of technology neutrality. For satellite applications, the current mixture of licensing approaches (licence exempt, blanket licensing, specific earth station licensing) is probably adequate, with the particular approach determined based on the potential interference issues in each band. Where sharing is contemplated it is essential that existing / incumbent services are afforded appropriate protection to establish a co-existence regime immune from harmful interference. ESOA is hopeful that the EU Electronic Communications Code will guarantee this protection as a key principle.

Radio Spectrum

While it is widely accepted that mobile data traffic is increasing, mobile operators should also be encouraged first to improve the network density and efficiency within their existing spectrum before asking for additional spectrum which is already extensively used by other services.

Specifically also because evidence shows that (i) not all available spectrum for IMT is actually licensed or used[2] and (ii) the incremental growth in mobile data year-on-year is not exponential but in reality ultimately starts to slow down[3]. The satellite industry requires continued access to critical parts of the L-band, S-band, C-band, Ku-band, Ka-band and Q/V-band frequencies for future satellite deployments to meet continued demand for satellite services in Europe and elsewhere.

If the particular bands that are to be used for ubiquitous deployment of satellite antennas are opened to IMT services, it will not be possible for satellite systems to relocate to new bands or alternative means of delivery to be established. ESOA and its Members believe that the spectrum at 66-86 GHz could play a significant role in the development of 5G. Together, this spectrum already provides about 15 GHz of spectrum, which could support very high capacity carriers, by 5G/IMT systems in both indoor and outdoor environments. The use of these bands would also benefit from potential synergies with WiGig – currently being deployed at 61 GHz – for which chipsets are already being manufactured.[4]

[2] https://www.lstelcom.com/fileadmin/content/marketing/news/2014_Study_LicensingUseofMobileSpectrum.pdf
[3] https://www.lstelcom.com/fileadmin/content/marketing/news/2017_LStelcom_Report_WhenWillExponentialMobileGrowthStop.pdf
[4] ABI Research forecasts 180 million WiGig chipsets will ship to the smartphone market in 2017, with smartphone chipsets accounting for almost half of the 1.5 billion total market shipments in 2021 (https://www.abiresearch.com/press/mobile-and-computing-markets-catapult-60-ghz-wigig/)