Response to DIGITAL CONNECTIVITY ACTION PLAN CONSULTATION Run by the Dutch Ministry of Economic Affairs and Climate 11 April 2018

Introduction

ESOA Members[1] welcome the opportunity to submit these comments to the consultation on the national action plan for digital connectivity being undertaken by the Dutch Ministry of Economic Affairs. It is an exciting time in the development of communications in our modern societies through a mixture of technologies, including satellite: the "5G ecosystem" vision can only be achieved by bringing next generation connectivity to all users across the globe. To make 5G a reality and before it comes up in everyday's life, communications means will need to significantly improve and be made widely available within the next 7-15 years. It is therefore important that the right policy decisions and investments are made now to ensure the optimal development of all possible advanced, efficient next generation communications systems that will together contribute to tomorrow's connectivity.

ESOA is a non-profit organisation established with the objective of serving and promoting the common interests of EMEA satellite operators. The Association is the reference point for the European, Middle Eastern, and African satellite industry and today represents the interests of 34 members, including satellite operators who deliver information communication services across the globe as well as EMEA space industry stakeholders and insurance brokers.

Preliminaries - Satellite Role in 5G

Satellite communications today deliver fast, flexible internet access services from anywhere in the world. Major operators already are deploying new-generation satellites with high data throughputs. Satellites also deliver television and video services directly to nearly half a billion households worldwide: each geostationary satellite has a huge aggregate capacity (typically in the range of 2-5 Gbit/sec) accessible to all users or household within its footprint for any kind of live, downstream and push video or non-video content. The satellite industry is innovating and growing at a rapid pace. Satellites are being used in multiple orbits, with newer, more efficient throughput technics and more adapted ground terminals,. In order to meet ever-growing customer demand for data, satellite operators and service providers are making substantial investments that considerably improve spectrum efficiencies and reduce latency, including the deployment of High Throughput

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

Satellites (HTS) in geostationary orbit (GEO), the existing and forthcoming deployment of medium-earth orbit (MEO) and the future advent of low-earth orbit (LEO) systems.

GEO HTS today can deliver data directly to fixed locations and mobile users with speeds of up to 100 Mbit/sec and more.[2] Existing MEO 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. Future MEO and LEO systems will later provide multi-terabit connectivity solutions. The MEO and LEO systems can also be used in conjunction with GEOs to meet a variety of user demands.

The 5G ecosystem is envisioned as a highly-advanced, ubiquitous system of integrated networks providing a wide range of services to consumers globally. The geographic coverage, network resilience, flexibility and efficiency of 5G networks will require a wide range of networking technologies, particularly for backhaul of the large volume of traffic that they are expected to carry. The integration of satellites into 5G will include satellite.

Satellites can and will play many roles in the 5G system. The following characteristics of satellite technology that make it well suited to supporting 5G networks:

- **Ubiquity** – With a single geostationary orbit satellite it is possible to provide communications over the entire European region and beyond. This ubiquity means broad coverage everywhere, even when the terrestrial infrastructure is not available.
- **Scalability** – Using broadcast technology, a single geostationary orbit satellite can simultaneously deliver a range of services, from software updates to video content, directly to end users. This significantly reduces costs for manufacturers and content providers and is a highly efficient use of spectrum
- **Instantaneity** – Only a fraction of major transport corridors in the EU have complete 4G coverage at present.[3] By comparison, satellite communications companies already have satellites ready to deliver service, once vehicles are fitted with new antennas and related communications equipment
- **Capacity** – Next generation of non-geostationary orbit satellites to be operational within the next 4-5 years are to provide connectivity of 10s of Terabits / second
- **Resiliency** - reduced vulnerability to physical attacks and natural disasters allow space-based satellite networks to offer a level of reliability and service continuity that is unmatchable

[2] See for example: https://www.hughes.com/who-we-are/resources/press-releases/hughes-enhances-jupiter-system-worlds-most-advanced-broadband or https://www.satellitetoday.com/mobility/2018/02/26/watch-ses-ceo-setting-new-bandwidth-capacity-record/

[3] *See* National Infrastructure Commission, *Connected Future* (London, 2016), available at https://www.nic.org.uk/wp-content/uploads/Connected-Future-Report.pdf

More information can be found in the ESOA 5G White Paper available from: [4]
https://www.esoa.net/cms-data/positions/1693%20ESOA%205G%2016pp%20Booklet%20Amends%20SCREEN%20Final%201.pdf

Responses to Questions

1) **Do you recognize these developments which the action plan will focus on? Are you missing a significant trend in this?**

ESOA recognizes the developments identified by the Ministry that digitization and bandwidth requirements increase, there is fixed / mobile convergence, investments are needed, continuity and security becomes important and demand diversity requires supply diversity.

ESOA also notes that the Dutch Ministry expects particular effects out of the action plan, as summarised below: [5]

> *The action plan aims for (improved) quality, availability and affordability of digital connectivity for citizens and businesses. It is expected that measures will contribute to, among other things:*
> *- better availability of fast internet and / or mobile communication in certain areas;*
> *- a more diverse supply in the market that meets the increasing demand for connectivity from (business) sectors;*
> *- the roll-out of 5G mobile networks in the Netherlands;*
> *- the continuity of telecommunications facilities in the Netherlands.*

ESOA has identified the following challenges:

- Europe suffers from a Digital Divide: more than 50% of rural areas in Europe are not connected to high-speed broadband. There is no need to wait till 5G is available to address this issue. Satellite broadband is available today and will be increasing as new satellite systems come on line including NGSO systems that are existing today and those to come in the next few years. Because service is available once the satellite is up and in commercial service, there is no need to wait for expensive and time intensive terrestrial build out.
- The extreme cost pointed out by several CEOs of major European mobile operators for 5G infrastructure seems to indicate that 5G roll-out will not be immediate and is likely to remain more limited than that of 4G. 5G may increase the Digital Divide in mobile terrestrial services. This means that governments need to consider the use of complementary technologies (such as satellite) to ensure fast broadband reaches all citizens, beyond the coverage area of terrestrial networks

[4] Other more specific documents on the role of satellite in 5G are accessible from: https://www.esoa.net/5g/
[5] From: https://www.internetconsultatie.nl/connectiviteitsplan

- 5G is more than prevailing fixed/mobile networks "on speed" – it is about an increased interplay between different networks and technologies which seamless integration into a 5G ecosystem, which requires smart standardisation, appropriate spectrum policies and appropriate collaboration between satellite and fixed / mobile telecoms operators. Therefore any action plan to foster digital connectivity ought to be technology neutral
- Enough radio spectrum is actually available to the various technologies and players, provided policy efforts are pursued to make frequencies available above and beyond 24 GHz. There is no need to disrupt existing radio spectrum usage that is essential or innovative to respond to increased bandwidth requirements

2) **Which instrument of distribution do you consider suitable for the local issue of frequencies in the 26 GHz band and why? The aim at the issuance is for many different users (of spectrum) to have the opportunity to develop and offer 5G services. You can think of auctions, the "distribution-on-demand" allocation tool or licensing based on order of entry.**

ESOA believes that any opening of the 26 GHz band should be done in a way that enables the continued use of the band for incumbent satellite services (FSS and EESS/SRS). Satellite earth stations should be authorised based on transparent, objective and proportionate criteria to safeguard their future operations and service capabilities. In order to ensure that these do not significantly impact 5G deployment and coverage, the development and implementation of reasonable spectrum sharing criteria and mitigation methods acceptable to all users is required.

ESOA considers that 5G deployment in the 26 GHz frequency range is expected to be used for local coverage. ESOA does not agree that dedicating the 26 GHz band to one single technology at national level will facilitate an efficient introduction of 5G without having an unnecessary negative impact on the current users of the band. On this regard, ESOA would want to see the details of the release plans in full before their implementation.

3) **What do you think of the idea of making 2x20 MHz or 1x40 MHz available for company-specific applications, based on a light permit regime (in a 3GPP standardized frequency band)?**

No comment.

4) **What do you think of the idea of advocating for authorization-free use at EU level of the 66-71 GHz band?**

ESOA believes it makes sense to take action *now* to prioritise the 66 – 71 GHz, but also the 71 – 76 GHz and '42 GHz' bands for 5G / IMT-2020 use in Europe, as they present a number of advantages for its implementation. Firstly, they provide about 15 GHz of spectrum, which could support very high capacity carriers – such as up to 1 GHz. In addition, the oxygen absorption in these bands provides inherent buffer from interference and would facilitate re-use of spectrum 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 massively manufactured.[6]

ESOA even believes that more emphasis should be placed on using 66 - 71 GHz in an early timeframe (i.e. as from 2019 or even 2018) for 5G / IMT-2020 in Europe. ESOA recommends that spectrum in the 66 - 71 GHz range should be identified in 2018 by the RSPG to become a primary European band for available use by 5G / IMT services as from 2019 (or earlier).

ESOA fully supports 66 – 71 GHz being prioritised for 5G in Europe for the following reasons:

- A CEPT questionnaire[7] found there was no reported use of 66 - 71 GHz in most CEPT countries
- Its proximity to the 57 - 66 GHz band, already designated and used for WiGig, indicates that 5G equipment could potentially be available in this band relatively early by benefiting from the ecosystem being developed in the adjacent band
- It has already a primary ITU allocation to the terrestrial mobile service
- It can support very high data rate 5G service including in high density urban and sub-urban indoor environments and outdoor environments
- It can support up to say 1 GHz per mobile operator planning to deliver 5 GHz / IMT-2020 service

ESOA also recommends that RSPG take action to prioritise studies for the future use of the 71 – 76 GHz and 81 – 86 GHz bands for 5G/IMT-2020, including scope for sharing with existing space and terrestrial services in these bands. The near term identification of 71 – 76 GHz for 5G/IMT-2020 in Europe should be beneficial as it would allow for up to 10 GHz of contiguous spectrum between 66 – 76 GHz for future 5G/IMT-2020 services.

5) **For which applications and services do you want to (continue to) use the 3.5 GHz band, and how (eg national, regional, local, with high or low power, installation height of antennas, etc.)?**

Even though the 3.4-3.8 GHz band is now labelled as a "5G" band and part of the three 5G pioneer bands identified by the EU, ESOA wishes to underline the fact that European satellite operators have generally invested large sums of money in developing Fixed-Satellite Service (FSS) communications platforms and networks in the whole C-band. The Netherlands is home to important C-band operations in the 3.4-3.8 GHz band, including use by Inmarsat for feeder links. These operations will need to continue, and sharing arrangements will need to be found to accommodate any new 5G systems. We are concerned that any suggestion to clear some parts of the C-band band in order to "free up"

[6] ABI Research has forecast that smartphone chipsets would account 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/). Note: the 801.11ad has excellent Point to Multi-point performance, Wigig is now in all Qualcomm phone chipsets, and Apple is highly active on specs for next gen 802.11ay in 60 GHz that should be in all iPhones in the future

[7] See Summary of responses to questionnaire on bands for AI1.13, September 2016 – available from: https://cept.org/ecc/groups/ecc/ecc-pt1/client/meeting-documents/file-history/?fid=32182

spectrum for terrestrial 5G applications would risk undermining the investments made by satellite operators and service providers in this band and have a negative impact on European industry and consumers relying on C-band FSS services.

It is also important to note that this band is very heavily used for FSS earth stations in other parts of the world which will effectively prevent internationally harmonised use of this band for 5G.

6) **It is being considered to focus on more transparency at the national level policy, for example with a website where per municipality the antenna policy and the local costs for excavation work and fees are mentioned. Would you be a supporter of this?**

No comment.

7) **Another aspect that was mentioned is that municipalities are sometimes not familiar with the national ambitions in the field of digital infrastructure. Do you concur? And in what ways can the national government encourage municipalities to become aware of this and know about what role they can play in achieving these ambitions?**

No comment.

8) **Consideration is being given to setting standards for electromagnetic fields (EMF) so that national uniform standards apply to EMF. Are you in favor of nationally determined EMF standards? Which advantages and disadvantages do you see? Are there aspects where you special consideration is required? Do you see on a different level that it is desirable to harmonize local rules?**

No comment.

9) **If you have to identify one factor that is the greatest obstacle to the construction of fast fixed internet in the "rural" area that the government could help to solve, which is that?**

Implementing the principle of technology neutrality enables competition between platforms bringing the greatest benefits to users. Accordingly, this principle must be fully embraced to ensure that communication solutions are cost effective and immediately available to all are effectively deployed everywhere, including in rural areas.

Translated into the 5G context, this approach means:

- Governments 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

- Recognise that current and future developments in satellite capability will deliver enhanced throughput
- Enable satellite performance equivalent to a network based on optical fibre elements, e.g. Gigabit (and later Terabit) satellites

10) **Is there a need for a "toolbox" for municipalities and residents' initiatives? This could consist for example of a standard format for business models, or a new guide? Would it be further desirable from the national government for a more detailed explanation of this distribution tool to hold administrative consultations municipalities and come with "a plan of attack"?**

No comment.

11) **What do you think of the interpretation of the coverage requirement for the auction of 700 MHz licenses?**

No comment.

12) **What do you think of requiring a data rate in 2022 of 30 Mbps download and 3 Mbps upload (paragraph 2 sub a), and per 2025 a data rate of 100 Mbps download and 10 Mbps upload (paragraph 2 sub b)? Is this ambitious and realistic, or does it require further framing, for example via the probability with which this requirement must be met (x% of the time or cases)?**

ESOA encourages policy makers and regulators to ensure that the most cost efficient approach to connectivity everywhere 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 most appropriate solution. Accordingly, we encourage the Dutch government 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 EC Digital Agenda goals (30 Mbps to all / 100 Mbps to half the Households) – coverage in rural areas is less than 30% (EU Commission 2016 scoreboard)
- 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[8]
- The benefits of 5G should be accessible to all and satellite communications has a significant role to play in enabling it

[8] For more information, see http://www.brie.berkeley.edu/publications/WP102.pdf and https://jgea.org/resources/download/1766.pdf

In line with the « Gigabit Society » goals identified by the EU Commission in 2016 – and in addition to a flagship city at European level – ESOA recommends choosing a rural and isolated city representative of the digital divide. The entire communal area of this city should be considered in order to include remote households also entitled to require a continuity of service and a quality of service closer to what is expected in urban and suburban areas. The EC Broadband 2020 goals of 30 Mbit/s connectivity to 100% of EU citizens (as part of the EU Digital Agenda) adopted by numerous EU members could also be considered in such case.

13) **Do you see a role for the central government in bringing together supply and demand? Do you have plans for which connectivity is important and where the central government can play a facilitating role?**

ESOA believes in a market based approach, where governments create conditions (including access to spectrum) for different technologies to play to their strengths and realise the Gigabit society as a "network of networks".

It would be wasteful for public finances and undermining competition to fund expensive terrestrial infrastructure when satellites display already three key characteristics that are critical for the success of 5G: wide area coverage, cost-effectiveness, and reliability (resilience). Wide area coverage and reduced vulnerability of physical attacks and natural disasters allow space-based satellite networks to cost-effectively realise part of 5G.

14) **How do you view the agreement of KPIs with (vital) telecom parties for continuity (for example about how long the device will function in the event of a power failure)?**

No comment.

15) **In what way can the private-public crisis management structure be further developed or strengthened?**

ESOA and its individual members would be very interested to be part of any further discussion or structure that would be put in place to work on this issue.

16) **Through the Telekwektbaarheid ("Tele-vulnerability) program, the Radiocommunications Agency is in discussion with various parties, such as healthcare institutions and energy system operators, about their dependencies on telecom and what they can do if the telecom provision fails. It appears that it is not easy for parties to map out what their dependencies are on telecom facilities. However, it is not possible for the Radiocommunications Agency to support all parties in the Netherlands with tele-vulnerability and in choosing effective control measures to increase resilience. How can the government a) make parties aware of their dependency on telecom and b) support parties in taking technical or organizational measures that provide a perspective for action in the event of a disruption of the telecom provision?**

One way forward could be for the Radiocommunications Agency to have a targeted, systematic and transparent approach around awareness raising in workshops or round tables. These would offer institutions with need for critical telecommunications to explore together with operators their dependencies and interdependencies. At the same time, these would be occasions for telecom operators with experience in the field to give exposure to case studies of how they already implement resilience for certain parties either in the Netherlands or abroad. One of ESOA's members is for example providing the coverage and QoS requirements for rural emergency communications for a major mobile operator in UK.

17) **When it comes to innovation of connectivity, should the attention of the government go mostly to 5G, including experiments and pilots? If not, then what?**

Satellite communications already deliver broadband direct to home and business mobile backhaul, push data services, linear and non-linear TV, converged media, broadband services and many M2M services that will be later be part of the 5G ecosystem in Europe and worldwide. Satellite has become particularly critical to provide connectivity to mobile platforms (planes, ships, trains, cars) which sometimes cannot rely on any other communications means.

In the future, consumers of 5G services will also expect to be able to use their devices in aircraft, ships and vehicles and in remote areas; and the continuity of 5G networks will be critical in times of natural disasters or terrestrial network outages. Satellite communications is a means to support these important aspects of 5G deployment scenarios.

One innovation path is to encourage partnership amongst infrastructure players.

18) **What possibilities do you see for 5G innovation in different sectors [verticals]? What is needed for this; are there specific obstacles?**

With respect to satellite network services, a fundamental vertical sector is the one related to the state's public security mission: the government could be a pioneer user of the « 5G bubble » on operation theatres in the framework of crisis situations for instance. This « bubble » concept can also be used for PPDR purposes abroad (e.g. Hurricanes Harvey, Irma, Katrina in overseas territories). In times of emergency, ground-based technologies are often disrupted, and it is imperative that appropriate regulations and radio spectrum accessibility be in place to allow the ever-present satellite systems to provide crucial services both to first responders and the affected communities. The emergency.lu platform that operates in C-band frequencies and the Inmarsat services provided in L-band frequencies are examples of such a critical infrastructure.[9]

Commercial purposes could also be sought as for example to monitor media itinerant events such as a transcontinental races (e.g. Vendée Globe, Trophée Jules-Verne, Barcelona World

[9] See notably the role of emergency.lu and TSF in Saint Marteen after the hurricanes of September 2017: https://www.ses.com/press-release/emergencylu-re-establishes-critical-connectivity-caribbean-following-hurricanes-irma and https://www.inmarsat.com/news/tsf-deploys-first-global-xpress-terminal-saint-martin/

Race, etc.) or to connect billions of sensors, devices, machines, connected and self-driving cars that constitute the Internet of Things (IoT), which will become more prevalent and require ubiquitous coverage.

Similarly, the satellite industry can largely contribute to the distribution of IP video content in High Definition (HD & UHD) based on the park of more than 150 million satellite individual antennas today used for the reception of TV signals in Europe. This distribution network from space could be integrated into the 5G ecosystem and efficiently contribute to the delivery of media content that necessitates very high bandwidth, without overloading the terrestrial networks.

19) **What additional role can the government play in supporting initiatives? In how far is financing a bottleneck and can European funding (Horizon 2020) offer a solution? To what extent do you see added value in setting up an SBIR, a innovation competition whereby companies are asked to come up with 5G applications with social relevance?**

In line with the « Gigabit Society » goals – and in addition to a flagship city at European level – ESOA recommends choosing a rural and isolated city representative of the digital divide in the Netherlands. The entire communal area of this city should be considered in order to include remote households also entitled to require a continuity of service and a quality of service closer to what is expected in urban and suburban areas. The EC Broadband 2020 goals of 30 Mbit/s connectivity to 100% of EU citizens (as part of the EU Digital Agenda) adopted by numerous EU members could also be considered in such case.

It is also important to mention the active and important contribution of the satellite sector to the R&D European programs **SaT5G** and **Satis5.** The ongoing Satellite and Terrestrial Network for 5G (SaT5G) project financed by the H2020 program of the EU is to research, develop and validate key technologies required to enable the plug-and-play integration of satellites into 5G networks. The ongoing satellite project Satis5 financed by ESA is aimed at providing a testbed showcasing major technology progress and demonstrating the benefits of satellite technology for the main 5G use cases.

More information is available from:
http://sat5g-project.eu/
https://artes.esa.int/projects/satis5

Conclusions

ESOA is of the view that the Dutch government should pay attention to the following KPIs with respect to its 5G expectations:

- Evolution of the digital divide on the "rural showcase city" and beyond (whole territory)
- Field measurements of the actual quality of service compared to the theoretical offer for the entire territory

- Comparative assessment of the economic dynamism according to their 5G coverage level (especially in rural areas)

ESOA also insists that the Dutch Ministry maintain the EU firm position against the band 27.5 – 30 GHz being considered for 5G/IMT-2020, consistent with ITU Resolution 238 and CEPT's position on WRC-2019 agenda item 1.13, taking also into account the huge investments already made into Ka-band GEO and Non-GEO satellite systems and the associated services being delivered and planned to be delivered (including for 5G)