

# ESOA response to the Consultation of interest for the 1.5 GHz, 3.5 GHz and 26 GHz frequency bands by the Danish Energy Agency

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## About ESOA

ESOA, the EMEA Satellite Operators Association, is the world's only CEO-driven satellite association and leads a coordinated and impactful response to the global challenges and opportunities the commercial satellite communications sector faces. Established as a non-profit organisation, ESOA has as its objective to serve and promote the common interests of global and regional satellite operators headquartered in Europe, the Middle East, Africa and the Commonwealth of Independent States (CIS) who deliver information communication services across the globe.<sup>1</sup>

## General Comments

ESOA welcomes the opportunity to respond to the Danish Energy Agency consultation on this important subject and offers the following general comments for consideration.

- 1. Role of Satellite in 5G:** Satellite is increasingly being recognised as a complementary part of the global 5G network, for example for IoT, M2M, media services, connected transport networks and many other services, not only for their reach and resilience but also considering the amount of data that will require backhauling or broadcasting to users, base stations and devices. Satellite will also ensure network extension to ensure 5G-type services benefit a maximum of citizens and are not limited to serving urban areas.

This role of satellite has been recognized and elaborated by the Electronic Communications Committee of the CEPT (European Conference of Postal and Telecommunications Administrations) in its report dated 18 May 2018 entitled Satellites in 5G<sup>2</sup> which also notes the increasing role of numerous high-throughput satellites (HTS): "HTS networks are operating on a global basis and can provide broadband service to end-users with bit rates in excess of 100 Mbit/s. Satellite operators are also involved in the work of 3GPP, the international body that provides a framework in which 5G standards are being developed, specifically supporting the 2 work items<sup>3</sup> dedicated to ensuring satellite integration into the 5G ecosystem. For more information on the role of satellite in 5G, ESOA invites OFCA to review the paper '*Satellite Communication Services: An integral part of the 5G Ecosystem*'<sup>4</sup>.

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<sup>1</sup> A complete list of ESOA Members can be found at [www.esoa.net](http://www.esoa.net)

<sup>2</sup> <https://www.ecodocdb.dk/download/e1f5f839-ba17/ECCRRep280.pdf>

<sup>3</sup> 3GPP TR 38.811 v0.3.0 "Study on New Radio (NR) to support non terrestrial networks (Release 15)" and 3GPP TR 22.822 "Technical Specification Group Services and System Aspects; Study on using Satellite Access in 5G" Stage 1 (Release 16).

<sup>4</sup> <https://gscoalition.org/cms-data/position-papers/GSC%205G.pdf>

2. **Importance of Global Harmonisation:** ESOA further invites the DEA to give due consideration to the following elements given the importance of taking a global harmonised approach to the allocation of radio spectrum for 5G:
- In line with WRC-15 outcomes, Europe and the CEPT have taken an unambiguous position against the use of the 27.5-29.5 GHz band for terrestrial 5G mobile systems and have instead harmonised this band for broadband satellite and ESIM applications. WRC-15 decided **NOT** to consider the 28 GHz band as a candidate band for IMT (5G) under WRC-19. The European Conference on Post and Telecommunications (CEPT) has issued a 5G Roadmap that explicitly notes as an action B.3: “... **Europe has harmonised the 27.5-29.5 GHz band for broadband satellite and is supportive of the worldwide use of this band for ESIM. This band is therefore not available for 5G.**”<sup>5</sup> In addition the Radio Spectrum Policy Group (RSPG) is in the process of adopting its Opinion on WRC-19 which indicates: “*The RSPG recommends that the European Commission propose an EU position to the Council **opposing** any consideration of the 27.5 - 29.5 GHz band under Agenda item 1.13 [of WRC-19]*”<sup>6</sup>
  - Any decision to introduce terrestrial 5G mobile services into the bands identified in Resolution 238 (WRC-15) must allow current operations and future satellite deployments in these bands. This is notably the case of the 24.25-27.5 GHz band within which in Europe, the Fixed Satellite Service (FSS) has a 500 MHz allocation in the 24.75-25.25 GHz band. The most recent CEPT decision on this regard states: “*CEPT administrations need to maintain, with appropriate provisions in their authorisation for MFCN, the possibility for existing and future EESS/SRS earth stations in the 25.5-27 GHz band and FSS earth stations in the 24.25-25.25 GHz to use their respective bands **and to safeguard their future operations taking into account the Radio Regulations***”<sup>7</sup>

## Responses to Consultation Main Points & Questions (translated with Google)

### 1.5 GHz

ESOA notes that the DEA seeks information to assess the interest in making the 1.5 GHz band available for terrestrial mobile broadband. ESOA is not able to provide information to answer the specific questions but would like to highlight the need for careful consideration of adjacent band compatibility measures with respect to mobile satellite systems operating in the band 1518-1559 MHz, if the DEA does decide to make this the 1.5 GHz band available.

The band 1518-1559 MHz is used by GSO MSS operators to provide communication services to ships, aircraft and land mobile users. MSS systems in this frequency band are used for mission-critical voice and data services, including mandatory safety-of-life communications, for the maritime and aviation communities around the globe. MSS is essential to maritime operations. L-Band MSS terminals are a

<sup>5</sup> [https://cept.org/Documents/ecc/45004/ecc-18-104-annex-17\\_cept-roadmap-5g](https://cept.org/Documents/ecc/45004/ecc-18-104-annex-17_cept-roadmap-5g)

<sup>6</sup> [https://circabc.europa.eu/sd/a/7ab8a6bb-f59a-434f-9b66-606b5a8067ce/RSPG18-023final-Opinion\\_WRC19-for\\_public\\_consultation.pdf](https://circabc.europa.eu/sd/a/7ab8a6bb-f59a-434f-9b66-606b5a8067ce/RSPG18-023final-Opinion_WRC19-for_public_consultation.pdf)

<sup>7</sup> <https://www.ecodocdb.dk/download/5e74d0b8-fbab/ECCDec1806.pdf>

means of complying with International Maritime Organisation (IMO) Safety-of-Life At Sea (SOLAS) communications equipment requirements in all sea areas, and in some areas they are the only permissible equipment. As such, many ships rely upon MSS terminals to meet these obligations. Regarding aviation use, L-band satellite communications supports the AMS(R)S and is important for ensuring flight safety. A satellite communications terminal is required to fly in many preferred flight tracks. Airlines are also expecting to make greater use of L-band MSS in the future to support the “GADSS”.

L-Band MSS terminals – including maritime and aeronautical - are vulnerable to interference from mobile service base stations transmitting in the adjacent 1427-1517 MHz band. An MSS terminal operating within a certain range of a base station could be prevented from operation by receiver overload or by base station out-of-band emissions. The interference range varies depending on mobile and MSS characteristics, but can be as much as 20 km. If deployed without mitigations, interference from LTE transmissions in the 1427-1518 MHz spectrum will cause substantial disruption to these operations. Mobile base stations deployed in the upper part of the 1.5 GHz band near to ports and inland waterways could prevent ships from using their satellite terminals, including the mandatory testing of terminals before departure. If the terminal is unable to pass a required systems test, the ship cannot legally sail. Similarly, mobile base stations deployed in the upper part of the 1.5 GHz band near to airports could prevent aircraft from being able to perform vital satcom equipment checks before takeoff. If the terminal is not able to be successfully tested at the airport prior to takeoff, a plane will have to adjust its route, resulting in travel delays and unforetold economic impacts. Without some modest deployment constraints on mobile systems, interference could cause severe operational and economic impact on the maritime and aeronautical industries in Denmark.

The European Commission Implementing Decision (EU) 2018/661 highlights that in addition to the technical conditions on base stations: “Further measures may be needed at national level to enhance coexistence with services in the adjacent 1 400-1 427 MHz and 1 518-1 559 MHz frequency bands, such as around airports seaports and ground stations used for receiving Search and Rescue signals relayed via satellite.” CEPT is currently developing a new ECC Report to provide guidance to regulators on the measures needed to ensure compatibility between mobile broadband systems and MSS systems. While this Report is currently being completed, it is already apparent that protection areas for ships and aircraft will need to be defined, where mobile base stations using the band 1492-1518 MHz will not be able to operate or will need to adopt mitigations, such as frequency offsets and emissions limits.

If the DEA does decide to proceed with making the 1.5 GHz band available for mobile broadband in Denmark, the DEA will need to carefully define the critical areas for MSS operations (e.g. in ports and airports) and define the protection requirements for those areas. The conditions for compatibility will need to be included in any mobile operator license conditions and hence will need to be defined before any new authorization for the 1.5 GHz band can take place.

### 3.5 GHz

*At European level, the CEPT (European Telecommunications Agency) is to finalize the revision of the ECC Decision, which sets out the more detailed technical framework for the use of the mobile broadband in the 3400-3800 MHz band. The revision consists in adapting the technical framework so that the 5G standards developed by 3GPP can be used in the 3400-3800 MHz frequency band. The decision was adopted by CEPT at the beginning of July 2018 for publication in public consultation. Final adoption is expected to take place until October 2018.*

*At EU level, a new implementation decision for the 3400-3800 MHz frequency band is expected to be prepared during the autumn of 2018 so that it can enter into force at the beginning of 2019. The new implementation decision is expected, like the above ECC Decision, to consist of adapting the technical requirements (...)*

*It is therefore appropriate that a decision on future frequency utilization in the 3400-3800 MHz frequency band be made now to clarify when the frequency band should be used for mobile broadband.*

*Questions:*

- *When do you prefer the frequency band 3400-3800 MHz to be offered to mobile broadband?*
- *What services will the 3400-3800 MHz frequency band be used for and when are the services expected to be available on the market?*
- *What is the 3400-3800 MHz frequency band best suited to? To improve the capacity of mobile networks, to improve mobile telephony in general or otherwise?*
- *What is the significance of the frequency band for rolling out new 5G services and how much frequency is needed to build a 5G network?*
- *Should the frequency band be provided with other frequency bands?*
- *Are there any other considerations in relation to when the frequency band could be applied? Should the entire frequency band be offered at one time?*
- *How much bandwidth will be interesting to be assigned?*
- *How can coverage requirements be formulated when taking into account the technical characteristics of the frequencies such as location in frequency spectrum and available bandwidth?*
- *Should part of the frequency band be permissible so that users can establish their own local networks, eg internally in companies, or should parts of the frequency band be allocated to local / regional services?*

Even though the 3400-3800 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 in accordance with the EC Decision on this band (2008/411/EC, amended), the use of the band for terrestrial electronic communication services is “Without prejudice to the protection and continued operation of other existing use in this band”. Also, the Radio Spectrum Policy Group (RSPG) of the European Commission in their 2nd opinion on 5G networks (RSPG18-005) encouraged Administrations to find a proper balance between the benefits of allowing 5G use and keeping access to satellite operators in the 3600 MHz band.

Today, more than 190 geostationary satellites operate in the C-band, providing essential services to a multitude of consumers globally. European satellite operators have invested large sums of money in developing Fixed-Satellite Service (FSS) communications platforms and networks in the whole C-band. With continued investments, satellite operators are constantly working to further improve and expand the reach of these services. This is notably the case in countries that are neighbouring Denmark.

For example, the Netherlands is home to important C-band satellite operations in the 3.400-3.800 GHz band, including use by Inmarsat for feeder links. The Burum satellite earth station in northern Holland is about 250km from Denmark, and almost all of Denmark falls within the ITU defined earth station coordination area. These earth station operations will need to continue, and sharing arrangements will need to be found in consultation with neighbouring administrations to accommodate any new 5G systems.

Generally, ESOA is concerned that any suggestion to clear some parts of the C-band to “free up” 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 the 3400-3800 GHz 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 and the satellite industry depends on continued access to the 3400-3800 MHz spectrum globally for existing and future satellite deployments due to continued demand for existing and new services. Due to the critical nature of these teleport facilities, even more important than the economic value is the consideration of the societal impact of the continued C-band satellite services to both commercial customers and critical communications around the world.

## 26 GHz

*At European level, CEPT (European Telecommunications Agency) finalised an ECC Decision (18)06 laying down the more detailed technical framework for the use of the 24.25-27.5 GHz band for mobile broadband. The decision was adopted in CEPT in July 2018. There is a particular focus on protecting the 23.6-24.0 GHz frequency band, which is used for research and meteorological purposes.*

(...)

*At EU level there are discussions on the preparation of an implementing decision that will harmonize the use of the 24.25-27.5 GHz broadband band for mobile broadband in the EU. The Danish Energy Agency expects this implementation decision to be prepared during the autumn of 2018 with expected adoption in the first half of 2019.*

*It is therefore appropriate to make a decision now about future frequency utilization in the 24.25-27.5 GHz frequency band to clarify when the frequency band should be used for mobile broadband. Against that background, the Danish Energy Agency has decided to initiate a consultation to identify the industry and users' wishes for the future use of this frequency band, including the timing of when frequencies should be used for mobile broadband.*

*Questions:*

- *When do you prefer the 24.25-27.5 GHz frequency band to be offered for mobile broadband?*
- *What is the 24.25-27.5 GHz frequency band best suited to?*

As per ECC Decision (18)06 recommended timelines.

- *What services will the 24.25-27.5 GHz frequency band be used for and when are the services expected to be available on the market?*

ESOA considers that 5G deployment in the 26 GHz frequency range is expected to be used for small cell coverage. ESOA does not agree that dedicating the 26 GHz band to one single service at national level would facilitate an efficient introduction of 5G without having an unnecessary negative impact on the current users of the band.

The 24.65-25.25 GHz band is foreseen for use primarily for BSS feeder links and the expected use is for a limited number of larger earth stations (teleports, pay TV providers and Broadcasters). The ability to provide uplinks from these earth stations needs to be safeguarded. In this band, the minimum earth station antenna diameter of 4.5m as per RR 5.532B would facilitate co-existence between FSS and IMT 5G. To protect receiving space stations, 5G transmitters in this band will need to comply with ITU-prescribed restrictions and those inherent in the studies used to demonstrate compatibility between the services.

- *What is the significance of the frequency band for rolling out new 5G services and how much frequency is needed to build a 5G network?*

2,650 MHz of spectrum is available in the 26 GHz band (24.25-24.65 GHz and 25.25-27.5 GHz) which could be suitable for large scale public 5G services without raising concerns for the Fixed Satellite Service. If we additionally consider that up to another 600 MHz of spectrum (24.65-25.25 GHz) could be available under certain conditions to ensure continuing compatibility with the Fixed Satellite Service, in total up to 3,250 MHz could be made available for 5G use.

- *Should the frequency band be provided with other frequency bands?*

ESOA considers that any use of the 26 GHz band should not be extended above. There is no global trend to identify the 27.5-29.5 GHz band spectrum that is adjacent to the 24.25-27.5 GHz band for the new 5G services. This spectrum is part of the 27.5-31 GHz globally allocated FSS band. The 27.5-28.35 GHz band specifically has been allocated to 5G by one single country, and a few other countries are conducting trials or testing its use in the 27.5-29.5 GHz band overall.

In Europe, the CEPT has already designated the 27.5-29.5 band for Fixed Satellite Services uplinks and terrestrial Fixed Services, but not for 5G.

Again, in view of the satellite investment, growth and increasing need for high-capacity satellite services, WRC-15 decided **NOT** to consider the 28 GHz band as a candidate band for IMT (5G) under WRC-19 Agenda Item 1.13.