ESOA
EMEA SATELLITE OPERATORS ASSOCIATION

15 March 2019

ESOA Comments on
"Beleidsvoornemen Uitgiftebeleid 3.5 GHz band"
by the Ministry of Economic Affairs and Climate Policy (EZK)

INTRODUCTION

ESOA would like to thank the Dutch Ministry for Economic Affairs and Climate Policy ("EZK") for the opportunity to comment on their proposed approach towards the licensing of the 3.5 GHz band (3400-3800 MHz). ESOA would also like to thank the Ministry for accepting that ESOA provides its input in English.

ESOA[1] (the EMEA Satellite Operators Association) 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 30 members, including satellite operators who deliver information communication services across the globe as well as EMEA space industry stakeholders and insurance brokers.

Satellites bring unique and valuable services to modern societies, in Europe and elsewhere. ESOA wishes to highlight the value of satellite services to The Netherlands and the significant investment in, and growth of, the sector in Europe. Furthermore, the industry continues to innovate with the planned introduction of new satellite systems and applications over the coming years.

Within our industry we are confident that satellite communications will play a key part of the 5G ecosystem. 5G is not only about mobile technology (e.g. IMT-2020) and it is more than just "Cellular:" it is an end-to-end wireless and wireline ecosystem of different technologies – a network of networks**.** 5G will result in interworking and integration between technologies, encompassing LTE, WiFi and other terrestrial systems, but also satellite systems, as explained in ECC Report 280.[2]

Although the Ministry has indicated that it was most interested in receiving feedback on the three consultation questions at the end of the consultation document, ESOA would prefer to highlight a number of aspects that are mentioned in the consultation, that deserve the Ministry's further attention.

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1 The activities and other details about ESOA can be found at www.esoa.net

2 https://www.ecodocdb.dk/document/2989

Studies by Kwink Groep and Agentschap Telecom

The consultation document refers to two studies that have been commissioned prior to this consultation.

Kwink Groep study

One study[3] has been done by the Kwink Groep ("Toekomst 3.5 GHz-band - Behoeftepeiling en internationale vergelijking"), which focused on the need of the 3.5 GHz band by current and potential future license holder. W.r.t. satellite services, we note that the scope taken in this study has not been very wide. The Kwink Groep has taken a very narrow view on the use of the 3.5 GHz by Fixed Satellite Services (FSS). In its report it is implied that C-band is exclusively for "Space to Earth feeder-links" and used only for "emergency communication for shipping and for communication in remote areas".

ESOA would like to point out that C-band is used for a much wider scope of applications. In fact, worldwide coverage via C-band is anchored through satellite earth stations that are based in Europe and used for intercontinental links and links with high reliability requirements (including broadcast distribution and TT&C). The data traffic that is being served by millions of users worldwide eventually breaks out from teleports based in Europe that are notably operating in the 3600 – 3800 MHz band. Note that one of the main reasons why such earth stations exist in Europe is due to the strong high throughput fibre infrastructure: in fact, Europe is truly considered as one of the major fibre hubs in the world, which makes it ideally suited to be a satellite hub too.

The maritime sector is also increasingly using C Band earth stations, and ships with C Band earth stations are cruising in various national territorial waters across Europe.

Nonetheless, ESOA notes that the Kwink Groep study does recommend further study into the size of a protection area for FSS. ESOA is of the view that existing FSS Earth Station usage needs to be protected, and we therefore support such further study.

Agentschap Telecom study

Agentschap Telecom was asked to study the current usage of the 3.5 GHz band and investigate potential migration scenarios. The study[4] indicates on page 7 that "Most satellite earth stations can tune to a frequency anywhere within the range 3410-4200 MHz. Migration to the top part of the band (3800-4200 MHz) is possible therefore.". It is ESOA's view that such a statement is not accurate as any migration of traffic to 3800-4200 MHz

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[3] Kwink Groep, Toekomst 3,5 GHz-band, Behoeftepeiling en internationale vergelijking, augustus 2018. (see https://www.tweedekamer.nl/downloads/document?id=62ad67d1-8597-4b38-9df3-95f99c99a956&title=Toekomst%203%2C5%20GHz-band.pdf)

[4] Agentschap Telecom, Evaluatie van het frequentiegebruik in de 3,5 GHz-band en mogelijke migratie van bestaand gebruik, oktober 2018. (see https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2018/10/24/evaluatie-van-het-frequentiegebruik-in-de-35-ghz-band-en-mogelijke-migratie-van-bestaand-gebruik/evaluatie-van-het-frequentiegebruik-in-de-35-ghz-band-en-mogelijke-migratie-van-bestaand-gebruik.pdf)

needs to be considered from a system point of view, depending on the availability of transponder capacity in the upper part of the band. Migration of traffic to above 3800 MHz faces a number of serious challenges, and the following points are necessary to take into account":

- "Equivalent" capacity is not necessarily available in higher bands, as satellites can have different configuration in lower bands (e.g. Hemi beams) than in higher band (e.g. Global beams)
    - Customers would not get same "throughput" or coverage, and might need additional bandwidth or larger antennas to compensate
    - Inter-satellite coordination might lead to different operational constraints applicable in different bands
- "Equivalent" capacity might only be available on a different satellite
    - Different satellite means different coverage, and this might mean that certain remote stations fall outside of the new coverage
    - Repointing of all earth stations would be required. These changes can take a long time to complete and are very expensive as customers would require "dual illumination"
- Changing the downlink frequency of an earth station means changing the uplink frequency of all remote stations which are anchored with this downlink path
    - Many networks services from Europe act as anchored hubs to (many) remotes sites (which might not be in Europe). A single frequency change in Europe (e.g. Netherlands) means a frequency change at (very) remote sites in Africa or anywhere else in the coverage. These changes can take a long time to complete and are very disruptive and expensive as customers may require "dual illumination"
- C-band traffic often consists of many individual carriers. Therefore, if a customer would need to move a 20 MHz carrier to a higher band, this capacity might be available in theory, but in practice it is possible that there is only two "blocks" of 10 MHz available, and therefore the migration is not possible
- Inmarsat satellites are not capable of operating in the 3800-4200 MHz band. Furthermore, Inmarsat satellites using C-band for feeder links have user links in a different frequency band (L-band) and no alternative satellites are available to carry this traffic. It is therefore not possible to move the Inmarsat traffic to a different part of C-band

Numerous other studies showed that co-frequency sharing between IMT-2020 and FSS is not feasible. Even when IMT-2020 and FSS operate in adjacent bands, interference into FSS can occur, unless carefully managed. This is because IMT signals are considerably more powerful than satellite signals, which complicates coexistence between mobile and satellite technologies.

Since satellite earth stations are so sensitive to terrestrial interference, Mobile 5G signals can interfere with FSS receive earth stations in two ways:

1. Saturate the LNB of the satellite earth station, even if the Mobile 5G signal is adjacent to the satellite signal

2. Cause in-band interference to FSS signals generated by Out-of-Band-Emissions (OOBE) of the Mobile 5G signal

Currently, OOBE levels specified in 3GPP standards do not protect FSS signals in adjacent bands, so using a guard band and imposing strict OOBE on Mobile 5G are required to ensure protection of FSS earth stations.

Agentschap Telecom indicates that the 3700-3800 MHz band should be used as a guard band to protect the satellite usage in the 3800-4200 MHz band. ESOA welcomes this approach towards establishing a guard band, but also would like to seek more clarification on the fact that it is recommended that 3700-3800 MHz would still be used for local/private networks: how would such operations ensure the protection of the satellite services in the adjacent band?

ESOA is of the view that not all aspects have been properly considered in the Agentschap Telecom study, while these could have an impact on the time needed to complete any migration.

Technical conditions for the use of the 3400-3800 MHz band

The Ministry indicates that it plans to make available the 3500-3700 MHz band in September 2022, and make available the 3400-3500 MHz band in September 2026. It is further mentioned that the technical conditions will be applied based on CEPT Report 067 and EU Decision 2019/235.

ESOA's concerns with the technical conditions indicated in the documents referred to above is that effectively, there is no upper bound to the power (eirp or TRP) that an IMT base station can transmit. In order to protect FSS earth stations sites, ,ESOA would thus propose that the Ministry set the limit value for base station transmitter and repeater in the downlink direction within the license holder's own frequency block to 47 dBm / 5 MHz TRP for BS with AAS and 68 dBm / 5 MHz eirp for BS without AAS. Further, ESOA believes that each new license holder needs to ensure as well that it complies with the aggregate power density levels produced by its stations at existing FSS sites for in-band and out-of-band emissions

ESOA believes these principles and values are in line with most of the discussion that took place in the various technical meetings and that these rules will effectively protect earth stations that operate in the 3500-3700 MHz band.

Furthermore, ESOA proposes that in their regulations/licences, the Ministry requires a Block Edge Mask (BEM) for protection of FSS earth stations above 3800 MHz in accordance with 3GPP TS 38.740 rather than the levels of EU Decision 2019/235. ESOA also proposes that for each registered earth station, the reception of C-band satellite signals is protected for any antenna diameter between 3 meters and 13 meters, and for any elevation angle greater than 5 degrees.

Finally, the Ministry does not reference any technical conditions to be applied to the local/private networks foreseen in the 3700-3800 MHz band. ESOA is seeking clarification as to what conditions will be applied to ensure protection of the satellite services in the

adjacent 3800-4200 MHz band. Ensuring compliance can be achieved through a combination of options, such as selecting a specific antenna design, using mechanical or electric down-tilting, implementing dynamic antenna pointing restrictions or power reduction. These engineering techniques are already being used elsewhere for the design and optimization of existing radio networks, and more sophisticated techniques are expected in the future.

Consultation questions

ESOA remains at the Ministry's disposal for any further clarification or discussion on our proposals. ESOA has no further view to provide on the specific consultation questions in the document.

Sincerely,

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ANNEX

C Band Remains Essential Spectrum to Satellite

For over 40 years, the satellite sector has used 3400-4200 MHz frequency bands (C-band) for fixed-satellite services ("FSS"). Today, there are approximately 170 geostationary satellites operating in the C-band providing essential services to a multitude of consumers around the world. The existing and planned uses of the 3400-4200 MHz band demonstrate that C-band will remain very important spectrum for the satellite sector.

C-Band FSS remains a highly efficient, reliable, and economical distribution platform because of its:

- Reach: C-band beams cover large geographic areas, facilitate intercontinental and global communications.
- Economics: 100s of thousands of installed earth stations around the world; over a hundred satellites in orbit, global reach, and distribution efficiency
- Resilience: C-band has unique propagation and coverage characteristics that cannot be replicated in other frequency bands

New C-band earth stations are being deployed on a regular basis, not to mention the countless number of Receive Only Earth Station (ROES) antennas used for TV reception that are distributed in their millions globally. Governments, non-governmental organisations (NGOs), intergovernmental organisations (IGOs), businesses as well as individual consumers from everywhere in the world all depend on and benefit from the crucial services that are provided by FSS in the C-band. Other critical telecom sectors which rely on FSS C-band include:

1. Mobile Backhaul: the only way to bring mobile telephony to remote areas
2. Broadcasting: the only robust way to bring TV and next generation video across the whole territory
3. Oil & Gas: the most reliable way to connect exploration sites and offshore platforms
4. Humanitarian Programs: C-band recognized as a standard by the UN for emergency communications
5. Air Navigation & Meteorology Services: the only solution for high reliability and wide coverage
6. Maritime: the only solution for vessels in remote regions/ long routes

The prospects of increased use of part of this spectrum for fixed and mobile terrestrial services such as WiMAX and LTE cast doubt on existing and future FSS business confidence in the C-band, as that use would be likely to cause harmful interference into the existing satellite services using the band and constrain the deployment of new FSS earth stations.

At present, some 55 C-band satellites have coverage over Europe, and satellite operators are in the process of launching additional satellites to serve Europe within the next 15 to 20 years.

Furthermore, the usage of C-band frequencies has been renewed and confirmed for the Galileo project because of its uniqueness.[5] And it is to be reminded that this same C-band is the spectrum on which several United Nations emergency communications systems are relying, such as UNHCR and emergency.lu.[6]

It should also be noted that ROES (e.g. for the direct-to-home reception of TV signals from outside Europe) may also operate in the whole band 3400-4200 MHz on an unlicensed basis, in accordance with CEPT Decision ERC/DEC/(99)26 on "Exemption from Individual Licensing of Receive Only Earth Stations (ROES)".[7] The locations of such earth stations are unknown, so it is not feasible to define coordination contours.

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[5] https://www.ses.com/press-release/ses-provides-managed-services-galileo

[6] https://www.dotmagazine.online/issues/connecting-the-world-whats-it-worth/challenges-in-eu-telecom-security/when-disaster-strikes

[7] As implemented by 30 countries in the CEPT