

## ARCEP Consultation “5G / FSS Coexistence in C-band”

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29 October 2021

To:

Direction mobile et innovation

Autorité de régulation des communications électroniques, des postes et de la distribution de la presse

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### **Introduction**

ESOA is pleased to respond to the ARCEP consultation on the terms and conditions allowing coexistence between 5G networks in the 3.4 - 3.8 GHz band and fixed satellite service earth stations in the 3.8 - 4.2 GHz band in metropolitan France.

ESOA<sup>1</sup> (the EMEA Satellite Operators Association) is a non-profit organisation established with the objective of providing a platform for collaboration between satellite operators globally and a unified voice for the sector. ESOA is recognised as the representative body for satellite operators by international, regional and national bodies including regulators, policymakers, standards-setting organisations such as 3GPP and international organisations such as the International Telecommunications Union and the World Economic Forum. As the world's only CEO-driven satellite association, ESOA leads the sector's response to global challenges and opportunities. It offers a unified voice for the world's largest operators, important regional operators and other companies that engage in satellite-related activities.

ESOA understands this new ARCEP consultation follows ARCEP's Decision 2019-1386 which defined the terms and conditions for the allocation of authorizations for the use of frequencies in the 3.4-3.8 GHz band by 5G mobile networks.

It should be reminded that C-band satellite communications have developed a lot in Southern Europe and Africa to best contribute and respond to increasing needs for international telecommunication services. In particular, various satellite operators who are members of ESOA together with others are providing essential connectivity relying on more than 10 geostationary C-band satellites that are covering the Europe + Africa region, given the unique characteristics of this spectrum in terms of signal robustness and beam coverage.

Furthermore, the architecture of some of our members' next generation of spacecrafts now enables the use of digital transparent processors, which can generate dynamically channels of arbitrary size over the entire frequency bands. As satellite operators undergo plans for replacement of assets including for those

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<sup>1</sup> The members, activities, and other details about ESOA can be found at [www.esoa.net](http://www.esoa.net)

using C-band, all technical options will be made available to ensure that the objectives of the various missions to our customers are fulfilled, under improved technical conditions.

Importantly also, the role of satellite in the global 5G ecosystem cannot be underestimated, by helping to extend the reach and resilience of 5G networks as well as providing connectivity for IoT, M2M, media services, connected transport networks and many other services. In doing so, satellite will also ensure 5G-type services will benefit a maximum of citizens and are not be limited to serving urban areas. ESOA is convinced that in order to realise a viable 5G ecosystem and ubiquitous coverage, the integration of satellites into 5G networks at an early stage will be critical to make it seamless and realise the EU vision for the 'Gigabit Society'.

The role of satellite in 5G has been well recognized and explained by the Electronic Communications Committee (ECC) of the CEPT in its report dated 18 May 2018 entitled *Satellites in 5G* which presents the main use cases of 5G by satellite already made possible with numerous high-throughput satellites (HTS) today in operation.<sup>2</sup> 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 dedicated to ensuring satellite integration into the 5G ecosystem.<sup>3</sup>

For more information on the exact role of satellite in 5G, ESOA invites ARCEP to review the very comprehensive White Paper on Satellite, an Integral Part of the 5G Ecosystem.<sup>4</sup>

### **ARCEP's proposals are not consistent with the announced scope of the Decision 2019-1386**

As a reminder, ARCEP Decision 2019-1386 of November 21, 2019 addressed the protection of fixed satellite service earth stations in the 3.8-4.2GHz band, by specifying (section 6.2):

"The winners [of the spectrum auctions in 3.4-3.8 GHz] shall not cause harmful interference to fixed-satellite service earth stations in the 3.8 - 4.2 GHz band and shall implement the necessary measures to comply with these power levels.

(...)

On the basis of the initial work of the ECC and after any additional work has been carried out, ARCEP may specify, if necessary, the regulatory constraints to ensure the protection of fixed satellite service earth stations to users in the 3490 - 3800 MHz band."

ESOA does not find any evidence in today's ARCEP's proposals that these principles are respected. The proposal made by the ARCEP consultation seems to promote vacating satellite services in the 3.8 – 4.2 GHz band to avoid adding any constraint on the 5G network deployment in the adjacent band. While the decision n° 2019-1386 aimed at finding efficient ways to share spectrum, **this consultation seems to be promoting inefficient spectrum usage with removing services from the adjacent band** without even studying or proposing alternative mitigation measures.

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<sup>2</sup> See <https://www.ecodocdb.dk/download/e1f5f839-ba17/ECCRep280.pdf>

<sup>3</sup> See 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://www.esoa.net/5g>

ARCEP also makes a distinction between sites subject to "high impact" or to "moderate impact" based on the following criteria (section 2.2):

- Number of existing radio sites in the current mobile networks in the area for which deployment of a network in the 3.4 - 3.8 GHz band is constrained to meet the field strength limits described in the previous section
- Population residing in the constrained area
- Size of the agglomeration to which the area belongs

ESOA has the following comments:

- Concerning the sites categorised as "high impact" the proposed field strength limits only protect the FSS earth station for one specific pointing, towards the current geostationary orbit (GSO) target. ARCEP's approach would thus prevent any evolution inherent to the satellite activity. In addition to ARCEP indicating its unwillingness to provide new licenses for "high impact" earth station it is also making the usage of a new earth station on the same site or pointing towards another satellite at a new orbital position (requiring a different field strength mask for its protection) simply impossible. These constraints are a strong obstacle to the operation of a site until the indicated deadline
- It is unclear from the consultation how the specific field strength levels will be enforced at the various earth station locations. ESOA hopes that ARCEP would pro-actively verify the compliance of the mobile operators with these limits on the field to prevent interference and avoid a long and draining process of identifying the interference source.
- Some sites have an expiry date in 2022 or early 2023, and ARCEP's decision would only leave a few months for the operators of the affected earth stations to set up an alternative solution, if at all possible. Such a short notice would create difficulties to earth stations operators to renegotiate their contracts with the satellite capacity operators.

ESOA therefore considers ARCEP's proposals as impractical and one-sided with all the constraints being imposed on satellite operations to alleviate any constraints on 5G networks in the adjacent band.

### **ARCEP's proposals would necessarily lead FSS to vacate the whole C-band**

ARCEP explicitly contemplates that for sites subject to "high impact":

- Protection is provided only for the current uses at those sites
- Protection is provided only until the expiration of current authorizations

ESOA can very simply conclude that FSS will soon have no more operational safety on sites subject to "high impact". Without any specific protection measures applicable to 5G networks towards the "high impact" sites, and without a license issued by ARCEP, the very operation of the earth stations will be jeopardized, and the quality of service cannot be guaranteed anymore. By 2022-2029 (license expiration dates), the satellite earth stations on these sites will no longer be able to operate in the 3800-4200 MHz band.

This may already seriously bring into question the economic and strategic viability of satellite teleports in France.

ESOA also notes that the "moderate impact" sites will remain protected as long as they do not interfere with the deployment of 5G networks. Although the consultation provides the criteria used to determine whether an FSS earth station has a "high or moderate impact", no absolute technical levels for any of those criteria are presented. Furthermore, the FSS earth stations in areas currently listed as having a "moderate impact" risk could change status in the future if the surrounding area becomes of interest for 5G deployment. The consultation does not provide any guidance on how the current categorization might evolve in the future. There is therefore no guarantee whatsoever that a "moderate impact" site will not re-categorised as "high impact", if and when 5G is densifying its deployment and abovementioned criteria of section 2.2 are modified.

ARCEP further explains that the current "high impact" sites would only benefit from a protection until the end of their licenses and will not be granted new ones. The proposal for "high impact" sites to either accept 5G interference or to relocate to "moderate impact" zones for which there seems to be no certainty results in a very poor choice for satellite operators indeed.

ESOA therefore questions **how "efficient" and respectful of "competitive spectrum sharing" a spectrum management that cannot guarantee coexistence in adjacent bands** is, in light of the principle enshrined in the French Post and Electronic Communications Code whereby (Article L. 32-1):<sup>5</sup>

"The French Regulatory Authority for Electronic Communications, Posts and Press Distribution shall take, under objective and transparent conditions, reasonable and proportionate measures to achieve the following objectives: [...]

para 7. The efficient use and management of radio frequencies [...]

para 9. The promotion of spectrum sharing, with respect to competition rules."

As a reminder, the principles of the EC Decision 2008/411/EC on the harmonization of the C-band for terrestrial systems capable of providing electronic communications services remain valid, and they state that the decision aims at harmonizing – **without prejudice to the protection and continued operation of other existing use in this band** – the conditions for the availability and efficient use of the band for terrestrial systems capable of providing electronic communications services.

EC decision 2014/276/EU on amending Decision 2008/411/EC even states that the legal framework for using the band set by Decision 2008/411/EC should **remain unchanged and thus ensure continued protection of other existing services within the band**. In particular, fixed satellite systems (FSS) including earth stations would require continued protection through appropriate co-ordination between

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<sup>5</sup> From: [https://www.legifrance.gouv.fr/codes/article\\_lc/LEGIARTI000043545201](https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000043545201)

such systems and wireless broadband networks and services by national authorities on a case-by-case basis. This could hardly be clearer.

### **Lack of consideration of potential mitigation techniques**

A number of mitigation measures have been and are still studied at the CEPT and ITU level,<sup>6</sup> yet none seem to be considered by ARCEP in this case. There are two main interference mechanisms to consider between 5G operations and FSS earth stations in adjacent bands:

1. Saturation of the Low Noise Amplifier/ Block-downconverter (LNA/LNB) of the satellite earth station;
2. Out of Band Emissions (OOBE) produced by 5G transmissions, which result in in-band interference from the perspective of the satellite earth stations.

Some examples of the mitigation techniques available to the Mobile industry today are listed in the following table that could help reduce required separation distances that the 5G networks would normally have to respect to meet the field strength limits at the earth stations:

Example mitigation techniques	
1	RF waveguide filter between the output of the antenna and the input of the LNB
2	Appropriate frequency guard band between services
3	Use lower transmit power levels for the base station and user equipment.
4	Install better transmit OOBE mask.
5	Use Multiple-Input Multiple-Output (MIMO) technology to null the radiation pattern in the direction of earth stations.
6	Deploy microcells near FSS earth stations which have lower transmit powers.
7	Force user equipment to roam to non-C-Band frequencies near FSS earth stations

A number of the above listed mitigation measures requires that the earth station locations are known, and such is the case in this consultation. Ultimately the effectiveness of mitigation techniques is dependent on their application to individual site situations and applied when the specific details of the 5G base stations are known.

ESOA therefore requests **ARCEP to properly study the situations around high-impact sites on a case-by-case basis**, in order to implement a solution for real and lasting coexistence through the implementation of mitigation measures.

### **France at odds with other countries in Europe**

ESOA notes that, with the noticeable exception of the UK, other European countries with developed satellite communications activities in C-band have classified several satellite sites (FSS teleports) to

<sup>6</sup> See for instance <https://www.itu.int/pub/R-REP-M.2109>, or <https://docdb.cept.org/download/3a143dbe-7cbc/ECCRep287.pdf>.

ensure their protection and future viability and developments. This is the case of Germany, Italy or Switzerland.

It is also noticeable that France recently commented within the Radio Spectrum Committee shared by the EU Commission on the draft mandate to the CEPT on the technical conditions of shared use of the 3800-4200MHz band by broadband wireless systems providing local connectivity on the need to recognize and protect satellite systems in this band. We can for example highlight the following statement:<sup>7</sup>

"Those harmonised technical conditions should in particular ensure the protection and the possibility of future evolution and development of incumbent spectrum users in this band (notably receiving satellite earth stations in the fixed satellite service and terrestrial fixed links)"

It is very unclear to ESOA how such a position in European circles reconciles with ARCEP's proposals.

## **Conclusion**

ESOA does not find any evidence that ARCEP has even considered viable measures to allow for a real 5G / FSS coexistence in the long term. The sharing issue is related to the harmful effect of out-of-band emissions from 5G base stations operating in the 3400-3800 MHz band (today identified for IMT services) in the satellite earth stations operating in the 3800-4200 MHz band (today allocated to the Fixed Satellite Service).

ESOA urges ARCEP to respect EU decisions as well as national rules by conducting a campaign to measure the real performance of filters for 5G equipment on these out-of-band emissions and compare them to the model derived from Table 7 of EU Decision 2019/235 to ensure coexistence with FSS.<sup>8</sup>

ESOA more specifically requests ARCEP to:

- Study the situations around high-impact sites on a case-by-case basis, in order to implement a solution for real and lasting coexistence
- Guarantee the protection of sites with moderate impact without limitation in time, and in all frequencies of the 3800-4200MHz band
- Take advantage of the deployment of 5G systems to improve 5G IMT models, including out-of-band masks

ESOA remains at ARCEP's disposal for any further question this response may raise.

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<sup>7</sup> From: <https://circabc.europa.eu/ui/group/af096568-9b95-4bb2-84db-45b307b06a22/library/e29235a3-0bd6-4380-8903-b700dd77bb12/details>

<sup>8</sup> <https://docdb.cept.org/download/163>