

ESOA/GVF Joint Consultation response

Question 1: Do you agree with our proposed approach towards registered fixed link and satellite earth stations users of the 3.6GHz to 3.8GHz band?

Ofcom proposes to follow Option B: to “remove existing users’ authorisation to transmit for fixed links and no longer take satellite earth stations with a receiver component in the 3.6GHz to 3.8GHz band into account for frequency management purposes.” For the reasons set out further below, we do not agree with OFCOM’s proposed approach towards registered fixed satellite earth station users of the 3.6 to 3.8 GHz band:

OFCOM’s proposed option goes against Ofcom’s own duty and does not respect the spirit of European Decisions

As set out in our response to the October 2016 consultation *Improving Consumer Access to Mobile Services at 3.6 to 3.8 GHz* we do not think that Ofcom has done enough to address the concerns of fixed-satellite service earth station (FSS-ES) operators. Our position is that Option B was an inappropriate and damaging proposal, which goes against Ofcom’s statutory duty to protect incumbent services for its citizens¹.

In addition we believe that the course of action outlined in Option B is contrary to the requirements prescribed in the European Commission Decision 2008/411/EC, amended by Decision 2014/276/EU Decision, which seeks to harmonise conditions for the availability and efficient use of the 3.4 to 3.8 GHz frequency band.

Article 2 of this Decision states that member states shall designate and subsequently make available on a non-exclusive basis the 3.4 - 3.8 GHz band for terrestrial electronic communications networks “*without prejudice to the protection and continued operation of other existing users in this band*”.

We also note the conditions set out in the separate ECC Decision (11)06 *Harmonised frequency arrangements for mobile/fixed communications networks (MFCN) operating in the bands 3400-3600 MHz and 3600-3800 MHz* that “CEPT administrations shall designate the frequency bands 3400-3600 MHz and 3600-3800 MHz on a non-exclusive basis to mobile/fixed communications networks (MFCN), without prejudice to the protection and continued operation of other existing users in these bands”.

It is not clear to us how the course of action described under Option B could be consistent with the ECC requirement that service designation in this band should be on a non-exclusive basis and we would be grateful for clarification from Ofcom on

¹ Ofcom’s primary duty is to citizens and consumers. However, when considering the use of this spectrum by the satellite service, it is important to recognise that UK industry stakeholders have international interests which may not directly impact citizen benefits, but will benefit the UK economy and UK influence

this point. For example, does Ofcom envisage that spectrum made available for terrestrial service in this band will be licensed on an exclusive basis for 5G?

It is our strong contention that the proposed approach towards registered fixed link and satellite earth stations users of the 3.6-3.8 GHz band is incompatible with the requirements stipulated by both the European Commission and the CEPT Electronic Communications Committee, and is therefore an unsatisfactory way to proceed.

Facilitating future coexistence for satellite earth stations

Satellite earth stations are deployed in a variety of locations across the UK, and it is important that Ofcom takes this into account; it is one thing to arrange protection for an earth station situated in a well-shielded rural area, where demand for mobile broadband is limited, and quite a different proposition to mandate protection for an earth station in or near to urban areas. The two options set out by Ofcom are possibilities, but are blunt instruments, the optimal approach almost certainly lies somewhere in the middle.

For example FSS-ES and FS terrestrial links in sub-urban or rural areas would be afforded protection, while incumbents in cities and urban areas would have their protection assessed on a case by case basis. If it was determined that protection would be withdrawn then a suitable notice period – to be determined with incumbents - be applied in order to give ample time for a transition with minimal disruption to services. For incumbents classified as sub-urban and rural, exclusion/coordination zones would be put in place around the sites, which new mobile licensees would be required to respect. The mobile licensee could negotiate with the operators of rural earth stations to modify these zones as necessary.

Whilst we recognise this approach would leave a dilemma for Ofcom in specifying which sites fall into which category, it is consistent with Ofcom's own statement in Paragraph 1.23:

"To facilitate continued operation of satellite services in the band where possible, we will explore applying localised restrictions in future mobile licences, where these would not have a material impact on mobile deployment. Such conditions would place technical restrictions on a mobile network operator deploying base stations in the immediate vicinity of satellite earth station sites. In general, we would expect these arrangements to apply to relatively small areas. However, we will consider larger areas if these would not have a material impact on mobile deployment."

We therefore urge Ofcom to put this approach into full effect, allowing deployment of mobile systems without restriction in those areas where demand is apparently strongest but making sure to protect incumbent earth station installations.

Ofcom's proposal for option B, and proposed approach w.r.t. satellite earth stations takes away important operational certainty for the satellite earth station operator.

Ofcom proposes to no longer take into account *registered* satellite earth stations with a receive component in the 3.6 - 3.8 GHz band, and refers to the *net* benefit for citizens and consumers. In Ofcom's proposed approach there is also benefit for the terrestrial mobile operator and equipment provider. However, there is *no* benefit for the incumbent users of the spectrum. Ofcom proposes an "appropriate" notice period, and from Section 8.8 it appears that by 1 June 2020 satellite earth station operators would need to have made the necessary adjustments to their operations to avoid receiving interference. We also note Ofcom's assumption that "most, if not all the benefits currently delivered by services in this band could continue to be achieved using alternative frequencies and technologies".

We believe such a notice period is too short, and reiterate our earlier comments that, in fact, reconfiguring receive earth stations in this band is in practice not possible in many cases for the following reasons:

- Migration to upper parts of the C-band downlink spectrum would require existing satellite service providers to revisit long-term commercial arrangements with space station operators;
- Migration to other parts of the C-band could require extensive renegotiation between service providers and satellite operators;
- Earth station operators currently using these frequencies have limited scope to transition to the upper part of the C-band spectrum, as this band is already extensively used for satellite services;
- No guarantee that this time-consuming and costly process will identify alternative C-band spare capacity, which may result in lapses in or full termination of services to customers in UK and beyond;
- "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). As such customers would not get same "throughput" or coverage, and might need additional bandwidth or higher antenna to compensate. Further, Inter-satellite coordination might lead to different operational constraints be applicable in different bands;
- "Equivalent" capacity might only be available on a different satellite. This could mean different coverage (due to a different orbital position), and this might mean that certain remote stations fall outside of the new coverage. Further, repointing of all remote stations would be required. These changes can take a long time to complete and are very expensive as customer would require "dual illumination", and are often located in locations that are difficult to reach (e.g. in central African regions);
- Changing the downlink frequency of a UK earth station means changing the uplink frequency of all remote stations. Many networks services from the

UK are hub to (many) remotes. A single frequency change in the UK 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 expensive as customer would require “dual illumination”.

Ofcom indicates *“that there may be a very small number of satellites accessed by registered stakeholders in the UK which do not have a tracking beacon using frequencies above 3.8GHz This might result in some earth stations based in areas of high 3.6GHz to 3.8GHz mobile activity needing to adopt alternative tracking mechanisms for these satellites.”*

Adapting to alternative tracking mechanisms might require entirely new equipment and way of operation. Before impacting earth stations that rely on beacon tracking, Ofcom should ensure that there is sufficient time for these upgrades to be put into place, and that proper compensation is arranged for.

Ofcom’s proposal to allow full roll out of mobile 5G services in the 3.6 - 3.8 GHz band does not address any concerns with respect to the impact to earth stations operating in the 3.8 - 4.2 GHz band

High-power terrestrial IMT / 5G transmissions anywhere in the C-band downlink could cause interference to satellite operations because they can overwhelm the ability of the earth station to receive low-power satellite transmissions anywhere in the band, cause intermodulation effects, and create other interference issues. The impact of interference can be effectively addressed through interference mitigation measures, such as filtering, RF screening, and imposition of power limits on base stations around receive earth station sites. There are implementation costs for earth station operators (e.g., costs of upgraded equipment, labour and downtime) and ongoing performance impacts (e.g., installation of a filter to shield the 3.6-3.8 GHz band would reduce performance across the entire C-band receive spectrum) that must be addressed. Ofcom should apply appropriate licensing constraints on mobile operators to ensure that their operations are compatible with earth station operations above 3.8 GHz.

In addition, C-band satellite systems are generally designed with fixed frequency pairings, meaning that they cannot transmit on certain C-band uplink frequencies if the signals cannot be received in the paired C-band downlink frequencies. Thus, terrestrial IMT transmissions in the 3.6-3.8 GHz downlink band could potentially preclude use of the paired C-band uplink. Similarly, even if a gateway earth station in the UK does not receive communications traffic in the extended C-band, it must still monitor transmissions in the band sent to remote terminals outside of the UK. The inability for gateways to access the extended C-band in the UK would effectively preclude them from monitoring and diagnosing communications traffic issues. This would have an immediate impact on service provider’s day-to-day operations and will make it difficult to effectively provide commercial services in this band throughout the region. Any disruption to the C-band services will have a severe impact for countries relying on satellite services for their communication needs,

noting that some of Intelsat/SES service providers (e.g. Vodafone, BBC, BT, etc.) agree that any decision limiting FSS access to the extended C-band will have effects in the UK and beyond. Ofcom should consider these significant additional impacts in its decision-making.

Ofcom's proposed licensing changes raise further questions

With regard to licensing, we note Ofcom's commitment to "write to licensees and grant holders in the band setting out details of how, under option B, we would propose to implement our proposals by (i) varying existing authorisations for satellite earth stations operating under PES licences and grants of RSA for ROES and (ii) revoking licences for fixed links".

Noting our above concerns about the difficulty of relocating a receive earth station signal from one frequency to another due to already implemented design specification of a network, we seek clarification from Ofcom on how the actions outlined under Option B can be reconciled with current FSS licensing policy provision in Ofcom. Specifically, we request information from Ofcom on the following points:


- i) will additional grandfathered GES sites be allowed to renew existing licensing? and
- ii) can licensees deploy further antennas within the grandfathered GES site?
- iii) what compensation is Ofcom planning to introduce for existing users of this band who suffer financial loss as a result of the course of action described in Option B²?

We said in our statement in response to the October 2016 consultation that Ofcom should endeavour to allow all existing services in the 3.6 - 3.8 GHz band to continue providing service and existing services should be grandfathered and protected. Ofcom has not addressed this in the consultation document. We ask Ofcom to consider taking steps to ameliorate our concerns before proceeding any further.

Ofcom's statements concerning the 3.8 - 4.2 GHz band do not provide for an explicit recognition that this band will not be subject of future measures, creating further uncertainty for FSS earth station operators

We are wary about the precedent being created by the course of action outlined under Option B, and its potential impact on frequencies at the upper end of the C-band (3.8 to 4.2 GHz) which are more extensively used by satellite services. We are also particularly concerned about the potential opening of this band to geographical sharing, which Ofcom has suggested in previous consultations and statements. ESOA and GVF are opposed to the introduction of new mobile systems in the band 3.8 - 4.2 GHz for a number of reasons. First, as Ofcom recognises, the 3.8 - 4.2 GHz band is likely to be used to accommodate some migration from 3.4 - 3.8 GHz, where possible. This will result in an increase in demand for FSS spectrum in the 3.8 - 4.2 GHz band. Second, this creates precedent and sends a bad signal to other countries.

² Such losses are being quantified through bitrate discussion with teleport operators and services providers



Third, such a sharing would severely constrain any further development of satellite operations in the band.

Question 2: Do you have any comments on our assessment of the likely costs and benefits of our proposed approach?

For the reasons set out below, we believe that there are strong arguments for compensation of the costs that earth station operations have to incur, as they might need to make additional investment, or lose revenue.

Migration to other parts of C-band is costly, or simply not possible

Migration to other parts of the C-band downlink spectrum also would require existing satellite service providers to revisit long-term commercial arrangements with space station operators. Generally, a teleport earth station operator enters into a long-term lease agreement with a satellite operator to utilize fixed bandwidth frequency channels on the satellite. Rarely does an earth station have unfettered access to the entire uplink or downlink band, but rather it is permitted to use certain frequencies or transponders for the provisioning of services, which must be coordinated on a regional basis, given the large footprint of C-band downlink signals. Migration to other parts of the C-band could require extensive renegotiation between service providers and satellite operators. Furthermore there is no guarantee that this time-consuming and costly process will identify alternative C-band capacity, which may result in lapses in or full termination of services to customers.

Studies attempting to quantify the economic value of making C-band available for terrestrial mobile services tend to be based on methodological flaws, which result in significantly exaggerated economic benefits.

The most common flaws in the economic analysis presented by the mobile community are as follows: i) they tend to underestimate the impact on existing C-band users and the stakeholders they serve, ii) economic benefits are exaggerated by basing calculations on 2.6 GHz auctions – a band with very different characteristics – as a benchmark to value C-band spectrum; and iii) efficiency gains derived from the use of alternative access technologies to provide capacity are often underplayed or ignored.

ESOA and GVF note that there have been recent attempts to establish a mobile business in the 3.4 - 3.8 GHz band, but in the majority of cases these have not been successful and in a smaller number of cases licenses have been returned to the regulators. Even though the 3.4 - 3.8 GHz band has now been labelled as a mobile IMT “5G” band, there is still a great deal of uncertainty as to the technical parameters of this technology and the viability of business models developed around it.

As noted above, however, the introduction of terrestrial 5G IMT service in the extended C-band would create significant transition and relocation costs for FSS service providers, as well as affecting existing long-term commercial agreements with satellite operators and customers. These financial burdens should not be borne solely by the incumbent satellite service providers. Rather, regulatory measures should be adopted by Ofcom to ensure that any new terrestrial IMT operators in the band fully compensate incumbent licensees for their relocation costs.

For these reasons we think that Ofcom's assessments of the likely costs and benefits of the course of action outlined in Option B tend to be overly optimistic and exaggerate the benefits of terrestrial mobile services in this band and underplay the negative consequence on existing spectrum users and their customers and stakeholders.

Ofcom's proposal sets a concerning precedent by removing current authorisations for incumbent services

Finally, we think it is important that Ofcom consider the implications of the course of action described here on spectrum utilization by the satellite industry in other European administrations. As one of the first administrations in Europe attempting to remove current authorisations for fixed links and imposing an ultimatum to registered satellite earth stations with a receive component in the 3.6GHz to 3.8GHz band for frequency management purposes, Ofcom's strategy is unprecedented in terms of the potential disruption for existing users of the band. Such actions if taken on a regional or national basis will undermine global harmonisation. Furthermore, this approach will raise fears of a similar situation for incumbents in other candidate bands for IMT/5G services, such as the frequency bands currently being considered for 5G under WRC-19 agenda item 1.13, where the mobile industry is currently claiming to be able to share with incumbent services, like it used to claim in C-band.

We would be grateful for clarification on whether any calculation has been made as to what the implications of this action will be throughout Europe. The Ofcom statement predicts that existing users of the band will be able to migrate elsewhere without incurring significant costs.