Your response

Question	Your response
Do you have any comments on our proposals?	Intelsat is the world's leading provider of fixed-satellite services (FSS), delivering high performance connectivity applications for the past 50 years covering more than 99% of the world's populated regions and serves a wide variety of customers in the UK, from large telecommunications carriers and broadcasters to corporate networks and Internet service providers. Intelsat is intending to grow its already strong presence in the UK (we are already a large exporter of satellite services from the UK) engaging with UK Government to build on the Government's commitment to enable broadband for at least 95% of UK residents using satellite solutions and employs a highly skilled workforce in its London office (directly contributing to the UK work force in space technology as outlines in the UK Space Agency report)[1] Intelsat serves a wide variety of customers in the UK, from large telecommunications carriers and broadcasters to corporate networks and Internet service providers. Intelsat welcomes the opportunity to respond to the Ofcom Proposed Plan of Work 2020/21 and offers the following insights for the consideration of Ofcom. Intelsat sees this opportunity as a vital step, since this is an indictor to Ofcom's priorities which helps us to be informed and engaged. Intelsat therefore looks forward to continuing to work constructively and collaboratively with Ofcom, on the key elements we have highlighted below: **1)** ***Better broadband and mobile – wherever you are:*** *we will support ongoing investment in faster broadband and better mobile coverage across the country.* In accordance to the proposed Plan of Work 2020/21, one of the strategic priorities of Ofcom is to ensure everyone can access fast and reliable broadband and mobile services, regardless of where they live, work, and travel. This includes ensuring that more consumers in the hardest to reach and most remote locations have access to decent broadband communications. Intelsat fully agrees that this is a very important objective. However, looking at the measures that Ofcom wants to see with regards to this priority item under Section 5.3 (page 20-21), Intelsat is quite disappointed with the fact that all of the measures relate to either mobile or fixed networks. It is generally acknowledged, that there are limitations to what can be achieved by using terrestrial networks only, and that satellite networks play an important role in complementing them. This relates both to providing broadband to remote areas and to connecting people on travel, especially in airplanes.

[1] https://www.gov.uk/government/publications/uk-space-industry-size-and-health-report-2018

There are currently a number of GSO and NGSO systems operating in Ku and Ka band offering more than 20 Mbps throughput speeds. Moreover, with the advent of high throughput satellites (HTS)[2] where very small and reconfigurable beams offer extremely high frequency re-use factors, we expect the delivery speeds to increase further.

Therefore, the UK Government should include satellite technology in their National Broadband Plans. As such, it is essential to add a strategy or specific goal on satellite solutions for the hard to reach areas. National Broadband Plans need to recognize satellite technology as an essential element to provide broadband access to rural, remote or geographically challenging areas of the UK.

Another area where connectivity on the move is becoming more importance is In-Flight-Connectivity (IFC) where according to Valour Consultancy[3] the installed base of aircraft with IFC reached 8,891 at the end of Q3 2019, up from 6,965 at the end of Q3 2017[4]. All of British Airways (BA) long-haul aircraft will be equipped with IFC system in the near future. IFC systems for Virgin Atlantic, Delta Air Lines and Cathay Pacific all serving the UK are expected to grow over the next few years and the majority of long-haul flights serving the UK will be IFC-equipped[5].

The UK represents an important gateway for flights serving Europe and North America, and thus the policies of Ofcom will have a major impact on aircraft and passengers on these routes. The demand for these services has been raising in rapid pace and is expected to do so also in the future and the satellite technology is already available to meet this demand.

2) ***Supporting UK broadcasting:*** *we will support the UK's vibrant broadcasting sectors, including public service broadcasting, to deliver continued benefits to all UK audiences.*

Intelsat welcomes another strategic priority of Ofcom, which is to support UK broadcasting. Intelsat believes that ensuring broadcasting regulatory certainty in terms of access to spectrum is one of the key aspects

The BBC for example has an ongoing interest in 3.6 to 4.2 GHz which is used by BBC monitoring to provide access to footage from TV channels around the world for the UK and global news audiences and serve a range of other clients. This spectrum is also used by BBC World Service, as detailed in the BBC response to "Enabling opportunities for innovation". Therefore as an incumbent user of the spectrum (i.e.3.6-3.8 GHz) as well as a user of the adjacent bands (i.e. 3.8-4.2 GHz), Intelsat is keen to ensure that our uses are protected from interference from mobile

[2] Intelsat's 37e HTS

[3] In-Flight Connectivity Update, Q3 2019, Valour Consultancy

[4] https://www.valourconsultancy.com/aviation-market-research/future-of-in-flight-connectivity/

[5] Gogo partner airlines carry over 22 millions air passengers annually to and from the UK on Ku-band IFC equipped aircraft and there is increasing demand for these services.

For 3.6 to 3.8 GHz and adjacent bands 3.8-4.2 GHz, we believe Ofcom underestimates the risk of interference to adjacent services including the BBC's operations above 3.8 GHz and would ask Ofcom to further consider developing mitigating to avoid this risk. Such as:

- 5G/IMT can saturate the low-noise block downconverter ("LNB") of the earth station, even if the 5G/IMT signal is adjacent to the satellite signal.
- Out-of-Band-Emissions ("OOBE") of the 5G/IMT signal can cause in-band interference to FSS signals.

Currently, OOBE levels specified in 3GPP standards do not protect FSS signals in adjacent frequency bands. Using a guard band and imposing strict OOBE on 5G/IMT are required to prevent interference.

Furthermore, terrestrial mobile network operators have a number of out-of-band mitigation tools at their disposal to manage their networks in order to reduce the aggregate OOBE from 5G/IMT base stations and user equipment to acceptable levels. The Table below summarizes some of the tools available to mobile network operators to reduce the OOBE levels. These mitigation techniques can be deployed by mobile network operators on a localized, case-by-case, basis to ensure the interference is at or below the OOBE threshold level.

	Mobile Network Operator Tools to reduce OOBE
1	Using Multiple-Input Multiple-Output (MIMO) technology to null the radiation pattern in the direction of earth stations.
2	Lowering the transmit power levels for the base station or user equipment.
3	Force user equipment to roam to non-C-Band frequencies near FSS earth stations.
4	Deploring microcells near FSS earth stations which have lower transmit powers.
5	Install better transmit OOBE mask for select base stations near FSS earth stations.

Intelsat also wishes to highlight to Ofcom an outcome from WRC23 relating to issue 9.1.c where potentially consideration is being given to the study of frequencies used for Direct-to-Home (DTH) services (namely, the 11 GHz band) for the deployment of IMT-type services in spectrum with an allocation to Fixed Service (FS). This will undoubtedly create regulatory uncertainty for customers such as the BBC that could harm the use of the 11 GHz band for the delivery of crucial satellite services. A number of GSO and NGSO FSS systems are currently in use or being planned to operate across the 10.7-11.7 GHz frequency range, extensively used by customers such as the BBC throughout the Middle East and Africa for broadcast feeds and to provide DTH services to millions of households across.

If FS operators start deploying P-t-mP services in this band as was the original proposal behind Issue 9.1.c, then these FS deployments would mainly be in urban areas with no consideration given to DTH services that currently operate or could operate in the band. Such FS P-t-mP deployments would lead to a number of interference cases to DTH stations and denigrate satellite service offerings.

3) ***Continuing to innovate in regulation and data to help consumers and businesses:*** *we will improve our data capabilities to deliver better consumer outcomes and regulation. We will work with stakeholders including other regulators in exploring new regulatory approaches.*

One of the focus areas identified by Ofcom is to create innovate and future-looking regulatory solutions to respond to fast-changing and highly innovative markets. Intelsat welcomes the focus area as defined by Ofcom and acknowledges Ofcom's role in the past as one of forerunners of spectrum sharing solutions.

Innovation in antenna technology:
As satellite communication terminals continue to become cheaper, smaller and more power efficient, a wide variety of technology is already available and is being made available such as the innovation in flat panel antenna technology for satellite communications. These 'phased array' antennas have no mechanical components, relying on software and electronics for steering and making them more suitable for mobile platforms such as IFC as well as connectivity for trains and other vehicles.

Phased array antennas rely on microprocessor technology and software algorithms for combining signals received by numerous antenna elements. In most cases, each antenna "panel" is populated with a collection of independent "patch" antennas and corresponding beam forming microchips. It is equivalent to one big antenna made up of multiple smaller antennas that receive signals that must be processed and combined much like the technology you find in terrestrial 5G.

Antenna technology used for In Flight Connectivity:
Ofcom has already taken a proactive and positive approach in authorising new satellite services in 2014 for Earth Stations on Mobile Platforms (ESOMPs)[6] operating with GSO satellites in Ka band, which included land, maritime and aircraft stations.

However, existing spectrum in Ku band 14.0-14.25 GHz is only able to use the lower 250 MHz of the Ku-band uplink spectrum, hence only around 300 Mbps of network capacity are available for aviation, and at a conservative 10 Mbps per aircraft this will saturate the network with just 30 aircraft. However, with access to the upper 250 MHz (i.e. 14.25-14.5 GHz) this would double the capacity of spectrum to sustain the demand of double the number of aircraft.

These candidate bands within 14.25-14.50 GHz could be made available to ubiquitously deployed land based ESIM[7] and AES terminals[8] following existing procedures established within the CEPT framework (i.e., ECC Decisions), allowing the efficient use of this spectrum for the benefit of UK industry and

[6] Statement on the Authorisation of Earth Stations on Mobile Platforms, 20 January 2014.
[7] ECC/DEC/(18)04 on the harmonised use, exemption from individual licensing and free circulation and use of land based Earth Stations In-Motion (ESIM) operating with GSO FSS satellite systems in the frequency bands 10.7-12.75 GHz and 14.0-14.5 GHz.
[8] ECC/DEC/(05)11 on the free circulation and use of Aircraft Earth Stations (AES) in the frequency bands 14-14.5 GHz (Earth-to-space), 10.7-11.7GHz (space-to-Earth) and 12.5-12.75 GHz (space-to-Earth), updated 2019.

	consumers. Therefore, we ask Ofcom to adopt the existence procedures in relation to Ku band in the 14.25 -14.50 GHz. Furthermore, considering the 2 GHz of spectrum available for both uplink and downlink in the Ka band, Intelsat would like to draw the attention of Ofcom to another ECC Decision that can increase the amount of uplink spectrum in the Ku band into 1 GHz, in line with the recent WRC 23 Agenda Item 1.15. Intelsat is of the view that allowing aeronautical ESIM to use the 12.75-13.25 GHz band, while protecting incumbent services in the band , is one of the innovative approaches to further increase the efficiency of spectrum use and to allow administrations to make better use of the national FSS allotments in Appendix 30B. The use of the band by aeronautical ESIM is based on European harmonized decision ECC DEC (19)04. Intelsat is pleased that Ofcom acknowledges the role and importance of international stakeholders in the development of regulatory solutions. Looking at the measures indicated by Ofcom in Section 5.3 (page 21) for this focus area, Intelsat would welcome a tangible measure that relates to correspondence to and co-operation with stakeholders in addition to Ofcom internal measures and where appropriate, help to enable growth in satellite broadband communications. This will support the goal of making communications work for everyone, by enabling: 1. better fixed broadband options for residential consumers and businesses in the hardest to reach locations in the UK, which terrestrial broadband technologies may not serve well at the moment; and 2. better broadband connectivity (e.g., satellite based Wi-Fi) for passengers on aircraft and on ships. The above is also consistent with Ofcom's three priority areas which inform its approach on developing the necessary framework for spectrum authorisation in the UK.