OneWeb, Ltd. ("OneWeb") has the honor of responding to Ofcom's Call For Input on the "Strategic review of satellite and space science use of spectrum".

OneWeb (the trade name of Network Access Associates Ltd; a subsidiary of WorldVu Satellite Ltd, Jersey) is a communications company building a global network to provide low latency broadband to underserved areas. Starting in 2019, the communications network will operate world-wide via an initial constellation of 648 low earth orbiting (LEO) satellites providing broadband to end-users anywhere in the world through small, affordable terminals. In particular, OneWeb will have the opportunity to address broadband access requirements for underserved and unconnected communities in rural and remote areas of the UK and its dependencies, as well as all other countries, with speed and capacity comparable to, if not better than, that offered today in urban areas.

Question 1: Do you have any comments on our approach to this review?:

Regarding your question on the approach, OneWeb commends Ofcom for considering current trends in different parts of the satellite value chain, as it affects spectrum supply and demand over the next 20 years. We agree that the impact of new technologies and business models must be considered in this review. OneWeb also agrees that the evolution of manufacturing and implementation techniques must be considered, as companies, like OneWeb, embark on efforts to revolutionize the satellite manufacturing and launch processes.

Question 2: Do you have any comments on our broad overview of the satellite sector set out in this section? In particular, do you have comments on the completeness of the list of applications, their definitions and their use of the relevant ITU radiocommunications service(s)?:

OneWeb appreciates Ofcom's efforts in categorising the various applications and linking these to the ITU definitions for satellite services. We believe the list is comprehensive and adequately reflects today's situation. In the majority of applications, the earth stations, the user terminals and the satellite transponders used to provide the user applications generally fall within one of these categories. However, there are other satellite applications that may not be fully captured in the table. For example, satellite backhaul for cellular base stations and satellite links into remote areas to connect back to the Internet, which are not end-user satellite applications, would appear to be missing. It could be argued that these may fall into the "Legacy telephony and carrier" category, however the description in the call for input (CFI) has a connotation that would seem to relate more to point-to-point voice and data lines than the IP-based Internet access. Also, it may be argued that M2M or Internet-of-things would not only be carried over MSS satellites as per Table 1 of the CFI, but that low-power FSS earth stations such as those used for LEO constellations like OneWeb's network could also provide such applications. In addition, FSS systems like OneWeb can also make use of inter-satellite links, although these are not planned for the first generation constellations, so ISS is not strictly associated with the MSS as per the table in the CFI.

OneWeb would therefore like to caution Ofcom not to rely too heavily on this list of applications and their linkages to radio services as defined by the Radio Regulations.

In the past, telecommunications services, especially the terrestrial applications, were provided over separate networks using different technologies and data protocols (i.e. telephony, private

line services, e-banking, broadcasting, email, etc.). Similarly, in the satellite environment, such applications were typically carried separately over distinct transponders, or at least by discrete radio channels (carrier frequencies), and in some cases over distinct satellites. One has but to look at the FSS and BSS industry: traditionally, FSS services were used for two-way applications and BSS was used for one-way broadcasting or direct-to-home TV services, much like the service descriptions in Section 3.2 of the CFI. More recently, there has been somewhat of a blurring of these lines, for example, with SES and Eutelsat, providing similar services on both FSS and BSS bands, often carried on the same satellites.
In today's digital economy, virtually all telecommunications services are provided using the Internet Protocol (IP) over the Internet, except for some legacy voice applications and some broadcasting services. But even then, looking at Voice over LTE (VoLTE) technologies and Internet television applications such as Netflix, it can be argued that in the very near future, even such services will be replaced entirely by consumers' Internet access. For this reason, it is not necessarily appropriate to link the previously distinguishable applications in terms of satellite services. In order to ensure that all of the World's citizens participate in the digital economy, the Internet, which is provided through fixed and mobile high-speed broadband access, either through terrestrial or satellite means, must be accessible everywhere. Only satellites can provide ubiquity.

The likely scenario is that most satellites will eventually be used to extend the reach of the Internet everywhere, at speeds, costs and quality equal to their terrestrial counterparts in urban areas. Whilst GSO satellites will continue providing such services, LEO satellites have inherent advantages that will be described in our response. Regardless of application and service categorisation, Ofcom would be well advised to continue supporting a satellite regulatory regime that already allows for the co-existence of GSO and non-GSO satellites, based on established sharing rules in the ITU RR, and encourage the development and adoption of new satellite technologies that will increase the reach of the Internet to the entire planet.

Question 4: Do you have any comments on our representation of the value chain for the satellite sector? How do you think industry revenues are broken down between players at different positions in the chain?:

Our main comment on the representation of the value chain for the satellite sector is that it appears complete and adequate for the task, but that it may be overly simplistic in its approach. While it covers all the components in the industry, it does not differentiate large systems integrators in the satellite manufacturing business from providers of sub-systems and components, either for satellite or earth station facilities manufacturing. Similarly, it does not distinguish providers of satellites, from those of Earth stations or user terminals, and does not distinguish them from suppliers to launch providers, most of which currently do not build their own rockets. So, when analysing responses to this CFI, Ofcom will need to carefully assess each respondent's position in the value chain.

OneWeb believes that the revenues are higher on the right half of the satellite sector value chain, which includes the network & service providers, distributors (including niche sector experts) and the content/application providers, than on the left half side which includes equipment manufacturers, launch providers, earth station/teleport operators, and satellite operators.

Question 5: What is the extent of your organisations? role(s) in the value chain? Which satellite applications (as summarised in Table 1 in section 3) does your organisation:
- use
- provide: or
- help to deliver?

Please list all applications that apply and your role in each in your response.:

OneWeb will serve as a satellite manufacturer, satellite operator, earth station/Teleport operator, and network & service provider in order to help deliver low-cost and high-quality Internet content to its users (consumer and corporate).

OneWeb will work together with its satellite manufacturing partner Airbus to integrate equipment it designs and manufactures along with equipment that it purchases from other suppliers into satellites that it will send to a launch provider. As a satellite operator, OneWeb will ensure safe operations of its spacecraft and full operability with its earth stations/Teleports.

Also, as a network and service provider, OneWeb will provide an Internet backhaul service that will extend the network of existing fixed and mobile service providers to reach underserved areas that are currently cost prohibitive to serve through fibre and other terrestrial means.

OneWeb will be partnering with Mobile Operators to provide LTE/4G/WiFi through its terminals, which will act as small cells with a 200m radius coverage area. Hence, what may be missing in the CFI's depicted value chain is the mobile service provisioning by satellite backhaul.

In terms of applications, OneWeb will mostly provide broadband internet access to its customers and will use telemetry, tracking and command for maintaining the health of its spacecrafts. OneWeb will also provide military and government services, but also legacy telephony and carrier, contribution and OU TV, Distribution, Corporate Networks, and Direct-to-Home Broadcast TV, as long as such services are IP based.

As mentioned in the response to Question 2 above, over the past decade, telecommunications services have converged into the Internet. Access to high-speed Internet is therefore the only telecommunications facility required to provide all telecommunications services necessary to fulfil the needs of the UK and the World's citizens in today's digital economy. OneWeb will be able to offer any service that users can currently receive from their terrestrial providers where high-quality fibre, cable or xDSL services are available, and will significantly improve the quality for those citizens that only have second-class services from poorer solutions (e.g., xDSL located far away from the telco switching centre, low-bandwidth cable, or low-capacity and high latency satellite links).
OneWeb believes that Ofcom should take into account service specifications for broadband access services when evaluating the future of the satellite industry and its spectrum needs. We have described some of the most important specifications below:
- Coverage is the most important aspect of any service. Whether a user is mobile or at rest, they must have access to simple, affordable, and reliable connectivity. Coverage is highly

personal. Internet access at the end of the street is different than Internet access that reaches your home. Often an area, for instance within a postal code, will be designated as "covered" when, in actual fact, Internet access is available to only a small percentage of the homes.

Coverage must also be feasible, meaning affordable and installed quickly after an order is placed. For satellite technology, feasibility requires that operation occurs at a high look angle (i.e. the satellite dish should be pointed above a certain elevation angle, e.g., 40 degrees, to avoid trees, buildings and mountains), that the terminals should have autonomy through solar power and/or battery backup options, and the installation cost and service must be affordable to the target customer class.

- Speed, Volume, and Latency are the key elements to define the quality of a link:
o Speed (Mbps) defines how fast data can be downloaded and uploaded, which is often proportional to the cost of the service;
o Volume (Gigabytes per month or GB/Month) defines how much data the user can consume per period of time, within a given cost structure; and,
o Latency (milliseconds or ms) defines the usability and experience of the link.
Most new applications are designed for these low latency links. Cloud computing, for instance, requires lots of back-and-forth between data centers and user devices. The user experience is thus highly impacted by the time for each of the round trip connections (latency). Voice, gaming, videoconference and other communications are also highly affected by latency. LTE and cellular backhaul also require low latency links in order to allow for handover between sites. OneWeb is designed to provide a latency of <30ms, which is roughly equivalent to fiber and cable Modems.
In comparison to legacy geostationary orbit ("GEO") satellites, OneWeb will provide:
- Increased availability with high look angle operation, as the satellites are almost always straight up;
- Smaller and less expensive terminals, which are easier to install and do not require any pointing;
- Lower power terminals, which can operate on solar power;
- Low latency to enable an Internet experience identical to that of any terrestrial technology, such as a cable modem;
- LTE wireless coverage neutral to any carrier and useable by all carriers to extend their networks to rural and remote areas, not-spot fill in, or provide densification in areas of high demand; and,
- Mobile LTE Wireless coverage for emergency vehicles such that a 400m diameter LTE coverage spot will travel with the emergency vehicle anywhere in the UK and the rest of the World.

Question 6: For each of the satellite applications you use, provide or help deliver (as identified in Question 5), and taking into account your role in the value chain, where applicable please provide:
- the specific spectrum frequency ranges used for each application, distinguishing between the frequencies used for service provision, for the feeder / backhaul links and for TT&C
- the coverage area for services links or, in the case of TT&C and feeder / backhaul links, the location of the gateway station(s)
- the estimated number of users (e.g. MSS terminals, DTH subscribers, FSS earth stations)

- an estimate of the average use by end user (for those applications for which the demand for spectrum is driven by end user traffic) and
- for applications for which the demand for spectrum is driven by other factors, please state what the factor is and the scale of the factor (e.g. for DTH TV the number of TV channels broadcast by format).

Please provide your response with respect to the UK, the rest of Europe, and other parts of the world where this may be relevant to UK use.:

OneWeb will be launching its first batch of satellites by the end of 2017, and introduce its full service as early as 2019.

OneWeb will provide Fixed Satellite Service (FSS) through its non-geostationary Low Earth Orbit (LEO) satellite network. Two-way communications links over OneWeb satellites will be established between the gateway earth stations, operating in Ka-band, and large numbers of small user terminals (UTs) operating in Ku-band, which are simultaneously visible from the same OneWeb satellite. Each satellite will communicate with Ku-band UTs installed on buildings and on aircraft, ships and vehicles, using service links in the Ku-band (10.7-12.7 GHz (downlink) and 14.0-14.5 GHz (uplink)) and via gateways in the Ka-band (17.7-20.2 GHz (downlink) and 27.5-30 GHz (uplink)). The provision of hotspots using this architecture will provide connectivity to the global Internet.

The space segment will consist of small satellites in circular orbits at approximately 1200 km altitude, with an orbital inclination of approximately 88 degrees. The system has 18 orbital planes, each plane consisting initially of 36 or more satellites. The OneWeb constellation provides full coverage of the Earth, and most locations will be covered with an elevation angle greater than 45 degrees. The high elevation angles reduce the path distance over which the signal must transmit and reduces the probability of signal blockage, which together increase the quality of connectivity. Furthermore, satellites will be fuelled for a 10 year life, but will likely be replaced with newer, more efficient satellites at earlier intervals.

OneWeb expects to have 50 - 100 gateway stations located around the Earth. We plan to locate three gateway stations in the UK. High latitude stations will be used for TT&C stations where the satellites converge due to the high inclination angle of their orbit.

OneWeb will provide broadband internet access to hundreds of thousands of users (corporate and consumer) around the world, and maybe much more as the business becomes successful. OneWeb also plans to connect two million schools and health-care centres, as well as provide emergency response services to end users. Due to the diverse profile of our user base and the current developmental stage of our network, it is challenging to accurately estimate the average use of our end users.

The limited frequencies available in Ku-band (2 GHz downlink and 500 MHz uplink) for non-GSO satellites will only be capable of sustaining a certain number of users, depending on their usage pattern, and this can only be achieved by the relatively small footprints of each OneWeb satellite beam. The beams will be 300 km diameter on the ground with 16 beams per satellite. The total satellite capacity will reach approximately 7 Gbps.

In order to provide end users in remote and rural areas with a comparable service to their

urban counterparts, based on today's figures, the satellite broadband service should be capable of offering the following capabilities, at a cost commensurate with the current terrestrial solutions available in dense areas:

- Speed (to/from UT): 25-50 Mbps / 5Mbps
- Volume: 100 GB/Month
- Latency: 30ms

The above figures should be available to much of the subscribers who wish to procure such quality, but a Basic Service for those that have no Internet access should be defined to include at least the following:
- Speed: 5 Mbps / 1 Mbps
- Volume: 10 GB/Month
- Latency: 30ms

Even in dense urban areas, the OneWeb satellite network and its comparable performance parameters, can be used to provide backhaul services and Internet connectivity to the terrestrial cellular and LTE base stations, solving one of the sometimes difficult and costly portion of the network.

Question 7: For each of the satellite applications you provide, please could you indicate how UK consumers and citizens benefit from their use? Where possible please also provide an indication of the scale of the benefits (either qualitatively or quantitatively).:

UK citizens and consumers will benefit from the OneWeb system, as it will provide high-speed broadband access to remote and rural areas, and serve as a terrestrial backhaul service to provide additional capacity to terrestrial systems everywhere, with <30 ms latency, allowing extended backhaul communications for LTE/4G services, as well as broadband communications to rural and remote areas of the UK.

Today, the terrestrial service providers are not able to provide full geographical or population coverage of the UK, and the same is said about many other developed countries, such as those across Europe (e.g. Italy, Norway, Sweden), USA, Canada and Australia. When one looks at the situation very closely, it is clear that in most populated areas there remains gaps in terrestrial coverage and a large percentage of the territory with low population density have no reliable Internet connectivity or with very low quality of services, except when satellite services are used. However, only GSO solutions are offered today which have considerable disadvantages that OneWeb will remedy - the latency and data rates/capacity issues will be a thing of the past.

Question 8: From your perspective, what high level trends will affect the satellite sector in the coming years?:

OneWeb is revolutionising the way satellites systems are produced. OneWeb's assembly lines will be developed in a cost- and time- efficient way in order to produce hundreds of satellites and gateways antennas necessary to provide global coverage. OneWeb satellites are also being designed to be less complex, with fewer components, lighter in weight, and easier to manufacture. Furthermore, OneWeb terminals will have the capacity to integrate

WiFi/LTE/3G and 2G radios to provide coverage directly to end users.

OneWeb is developing new relationships between all stakeholders of the value chain based on the concept of partnership, bringing effectiveness in the value chain that in turn will bring benefits to all, and especially end users. OneWeb will also partner with Mobile Operators to provide LTE/4G/WiFi coverage with its small cell user terminals.

Question 9: For each of the satellite applications you use, provide or help deliver what do you see as the a) current demand trends, and b) underlying current and likely future drivers of demand for the satellite application(s) your organisation uses or provides?

Please include in your response for both a) and b) above:
- the scale and future impact of the trends/drivers on demand
- any variations in the type and scale of trends/drivers by geography (i.e. in the UK, the rest of Europe, and other parts of the world where this may be relevant to UK use) and why
- whether future demand is expected to be temporary or intermittent, and the reasons for this.

In your response, please provide any evidence which supports your position on the drivers of demand (e.g. forecasts, studies and statistics).:

Bridging the digital divide is becoming more and more important in Europe and on a global scale. Governments have realised the importance of providing a comparable level of coverage to all citizens regardless of their geographic location in a given country. In the UK, the Government has set a goal that by 2017, 95% of the UK will have access to high-speed broadband internet, with plans to extend this to the remaining 5% starting in 2018. OneWeb provides a key solution to broadband connectivity that will match requirements in latency, capacity, and compatibility with terrestrial services, and will support initiatives around the world to ensure that every citizen has the access to the Internet he/she deserves. OneWeb has already made contact with the UK Government to address the specific needs of the country.

In addition, OneWeb provides a system which will fully supports disaster and emergency relief, as its user terminals can be powered with solar panels, provide local access to the mobile terrestrial networks, and can be considered as an early stage of any disaster management strategy.

OneWeb does not agree with the view that the enhancement of terrestrial systems will adversely affect the service provided by the satellite sector. It is rather the opposite, as OneWeb is proud to count terrestrial telecoms providers as key shareholders of our business, proving that both systems can work hand in hand in the short and longer term. Through OneWeb's innovative approach, the efficient production of satellites, terminals and earth stations will bring the user cost down from the current alternatives, while providing a service of greater quality through smaller latency and improved capacity.

Question 10: Taking into account the drivers you have identified in your response to Question 9 above, what (if any) challenges is your organisation concerned about

in meeting potential future demand? Please provide the information by application and band, along with any supporting evidence, if available.:

OneWeb's necessary upfront investment in the technology, satellites launch and overall project, will create jobs and value in the UK and the EU, both in the short and longer terms. In order to achieve this, it requires stability in the regulatory and licensing frameworks. This need for stability is actually shared by all stakeholders, as the whole telecoms sector faces the same challenges of large upfront costs for setting up the infrastructure which supports the relevant services.

OneWeb's key bands of operations are Ka and Ku, which are traditional bands for the satellite sector. Some portions of these bands (i.e. 14.0-14.25 GHz, 19.7-20.2 and 29.5-30 GHz) are not shared with terrestrial services, and so facilitate earth station and user terminal deployments.

In the many bands that are shared between satellite and terrestrial facilities (10.7-13.25 GHz, 13.75-14,0, 14.250145 GHz, 17.3-19.7 GHz and 27.5-29.5 GHz), it is imperative that growth of terrestrial services remain in check so as not to preclude the deployment of satellite facilities, or even be reduced if possible to allow more frequencies for the growth of space services. Unconstrained growth of terrestrial services in the Ku and Ka bands will not only make it much more difficult to locate ground stations, but in the Earth-to-space bands, it could jeopardise the operation of the satellite receivers.

Going forward, planning for the longer term, the potential use of some parts the Q/V band (33 GHz to about 53 GHz) should be secured for satellites as this will provide more opportunities to develop the next generation of satellite systems.

Limiting the instances for coordination, will allow to maintain costs down, reduce the risks and provide a service to the end user which is more reliable.

Question 11: Do you have any comments on the list of potential mitigations we have identified? What likely impact would each of the mitigations have on spectrum demand? E.g. what order of magnitude increase in frequency re-use might be achieved? To what extent do you believe that these mitigations apply only to certain applications?:

OneWeb, as a responsible organisation, will efficiently manage its allocated spectrum. OneWeb is actively working on technology improvements that would impact spectrum utilization and will employ all the technical improvements described in the CFI. Each satellite reuses the entire Ku band spectrum at least four times through spatial reuse by having 16 beams, and will provide a total capacity of approximately 7 Gbps.

In OneWeb's view, the potential to share with terrestrial systems is not the way forward, as the needs and technology used in terrestrial and fixed satellite systems are unique, and do not facilitate sharing. Furthermore, as explained previously, the OneWeb system will complement and may serve as a backhaul solution to current and future mobile networks, thus band sharing could preclude such solutions. While it could be tempting to segregate spectrum between terrestrial and satellite applications along an urban-rural split, it must be recognised that there are significant rural or sub-urban areas that are still not served by

terrestrial means and such areas are not always located at large distance from urban centres or their periphery. In addition to the mutual interference that can be caused between the satellite ground station (Earth station or user terminal) and the terrestrial stations, due consideration must be given to the impact of high density deployment of terrestrial stations, especially those with low directivity (large antenna beam width) into the satellite receive beam. Such beams cannot be tailored to rural areas and will necessarily overlap urban areas, even if there were no satellite customers in those areas. Again, it is worth pointing out that even in urban areas, there are some dwellings that are not adequately served and mobile base stations can make use of the OneWeb satellite network for connectivity to the Internet.

Question 12: What other mitigation opportunities do you foresee that we should consider? For what applications are these likely to be applicable and what scale of improvement are they likely to deliver?:

Through regulatory measures adopted at the ITU, the sharing between GSO and non-GSO networks is well established through EPFD limits that ensure co-existence. Through the application of coordination and notification procedures of Article 9 and 11, it is possible for multiple non-GSO constellations to co-exist. Therefore, spectrum that is dedicated for satellite use is already being reused multiple times over, and this reuse factor will continue to increase with new satellite networks such as the OneWeb system. OneWeb sees no need to review or change these regulatory procedures that have already been proven.

In regard to sharing with terrestrial services, it is difficult for terrestrial systems to share with HDFSS type services, like those OneWeb intends to offer. OneWeb urges Ofcom to consider making the Ku-band frequencies available to satellite use only, especially in the band 14.25-14.5 GHz where the band has been closed to the terrestrial services for some years now and it is in urgent need for deployment of HDFSS. services.

Question 13: Beyond the activities already initiated and planned for the satellite sector (e.g. as part of WRC-15), do you think there is a need for additional regulatory action that may, for example, help your organisation to address the challenges it faces?

In your response, please indicate what type of action you consider may be needed and why, including any evidence to support your view.:

OneWeb benefits from a group of committed and visionary founding shareholders who bring both innovation and experience to our solution. OneWeb's investor team includes Airbus Group, Bharti Enterprises, Intelsat SA, Hughes Network Systems, Qualcomm Incorporated, the Coca-Cola Company, Totalplay (a Grupo Salinas company), and Virgin Group.

OneWeb's unique capability to operate without causing any interference to other satellite users enables global operations and even seamless handover with the Intelsat Epic Ku-band GSO satellites. With full validation of epfd compliance and operations that conform to ITU rules that have been in place for over 15 years, the OneWeb system has a stable and solid regulatory environment to attract the significant investment capital and local partners necessary to implement such a large and important global telecommunications project.

OneWeb believes Ofcom's support is critical to ensure the sustainability of the satellite

industry. OneWeb's satellite filing, through the UK administration, is a sign of trust that OneWeb places in the UK to defend its assets and position in the international regulatory scene. OneWeb suggests that the UK support the protection of the Ku, Ka and parts of the Q/V bands for FSS in order to ensure long term existence of the satellite sector (see response to Question 12 above). Through the UK's support, the OneWeb system will bridge the digital divide, in the UK, in Europe and around the world.

Question 3: Do you have any comments on our broad overview of the space science sector? In particular, do you have comments on the completeness of the list of applications, their definitions and their use of the relevant radiocommunications service(s)?:

Question 14: Do you have any comments on our representation of the value chain for the space science sector? How do you think industry revenues are broken down between players at different positions in the chain?:

Question 15: What is the extent of your organisations? role(s) in the value chain? Which space science applications (as summarised in Table 2 in section 3) does your organisation:
- use
- provide, or
- help to deliver?

Please list all applications that apply and your role in each in your response.:

Question 16: For each of the space science applications you use, provide or help deliver (as identified in Question 15), and taking into account your role in the value chain, where applicable please provide:
- the specific spectrum frequencies used, distinguishing between the frequencies used for the science application, the frequencies use for downlinking data and, for TT&C
- whether the application is limited to use of specific frequencies and why (e.g. due to fundamental characteristics of the phenomena being measured and/or availability of technology designed for that frequency)
- whether the applications use continuous or intermittent measurements
- the typical resolution and associated measurement bandwidths, including an indication of any implication for spectrum requirements
- the geography this use extends over (e.g. land or sea, and regional or global)
- the location of the gateway station(s) for TT&C and downlinking data
- the estimated number of users.:

Question 17: For each of the space science applications you provide, please could you indicate how UK consumers and citizens benefit from their use? Where possible please also provide an indication of the scale of the benefits (either qualitatively or quantitatively).:

Question 18: From your perspective, what high level trends will affect the space science sector in the coming years?:

Question 19: For each of the space science application(s) your organisation uses or provides, what are the a) current trends, and b) likely future drivers of demand for spectrum?

Please include in your response:
- the scale of the demand drivers
- the reason for additional demand (e.g. higher resolution radar data rates/bandwidth required) and whether this increased demand is for data delivery or for the taking of measurements
- whether increased demand can only be met at specific frequencies and why
- any variations in demand drivers by geography (i.e. regional or global), and why, and
- whether future demand is expected to be temporary or intermittent, and the reasons for this.

In your response, please provide any evidence which supports your position on the drivers of demand (e.g. forecasts, studies and statistics).:

Question 20: Taking into account the drivers you have identified in your response to Question 19 above, what (if any) challenges is your organisation concerned about in meeting potential future demand? Please provide the information by application and band, along with any supporting evidence, if available.:

Question 21: Are there any future developments, such as the radio astronomy SKA, that could reduce the demand for space science spectrum in the UK?:

Question 22: Do you have any comments on the list of potential mitigations we have identified? What likely impact would each of the mitigations have on spectrum demand? To what extent do you believe that these mitigations apply only to certain applications?:

Question 23: What other mitigation opportunities do you foresee that we should consider? For what applications are these likely to be applicable and what scale of improvement are they likely to deliver?:

Question 24: Beyond the activities already initiated and planned for the space science sector (e.g. as part of WRC-15), do you think there is a need for additional regulatory action that may, for example, help your organisation to address the challenges it faces?

In your response, please indicate what type of action you consider may be needed and why, including any evidence to support your view.: