Your response

Question	Your response
Question 1, p.19: Are there other trends in the space sector (or the broader spectrum environment) that we should monitor and/or take account of in our strategy?	The Global Satellite Operators Association[1] "GSOA" is the leading global platform for collaboration between satellite operators. As the world's only CEO-driven satellite association, GSOA 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. Ofcom's Strategy was long awaited and is very opportune. The UK Government has a number of overarching strategic goals for the country. These include seeking to enrich lives; growing and levelling up the economy; leading scientific discovery; protecting and defending the nation; projecting Global Britain; and inspiring the nation.[2] It is challenging to achieve these goals in the context of the continuing recovery from a global pandemic, but Space offers an opportunity, a new horizon with the potential to create new jobs and expertise that both contribute to the UK landscape and also provide the underpinning technology and products for export. The critical role of Space has long been well-recognised by the UK Government, and the UKSA is releasing an annual report on the shape of the national industry.[3] Embracing and building on the UK's position in cutting edge science, engineering and technology offers great potential to help deliver national growth objectives. Services from satellites support wider industrial activities in the UK non-financial business economy that contribute at least £361 billion to UK GDP (16.9%). This evolving downstream demand can be used to pull through enhanced upstream capabilities leading to a virtuous circle of growth if directed and managed appropriately across the end-to-end supply chain. Over the last 20 years, the UK Space industry has tripled in size to the value of £16.4Bn per annum (2020), creating some of the most highly-skilled jobs in the country and delivering economic growth to all regions of the UK. The sector is critical to the UK's national infrastructure, communications, defence and security. The partnership between the space sector and the Government is fundamental to driving this progress. With global competition increasing, and a new space race emerging, the UK cannot stand still. Existing and developing satellite connectivity solutions notably will further increase and extend connectivity solutions in the UK and elsewhere, also contributing to the full deployment of 5G and the emergence of 6G. These satellite solutions will include LEO, MEO and GEO constellations with spectrum usage spanning over L, S, C, X, Ku, Ka, Q/V, W and E band spectrum. Hence, GSOA welcomes Ofcom's recognition of the importance of examination of spectrum needs and updating the licensing of satellite services.

[1] The Global Satellite Operators Association now counts among its members: Airbus CIS, Amazon, Amos Spacecom, APT, Arabsat, Arsat, Asiasat, Avanti, Azercosmos, Echostar-Hughes, HellasSat, Hispasat, Inmarsat, Intelsat, Intersputnik, Lockheed Martin, Nigcomsat, Nilesat, Omnispace, OneWeb, Rascomstar, SES, SSI-Monacosat, Star One, Telenor, Telesat, Telespazio, Thuraya, Turksat, Viasat and Yahsat as well as representatives of the broader space industry including Airbus Defence and Space, Arianespace, Astroscale, Mansat, ST Engineering and Thales Alenia Space.

[2] *See* The UK government's strategy for international development - GOV.UK (www.gov.uk)

[3] *See* Size and Health of the UK Space Industry 2021 - GOV.UK (www.gov.uk)

Ofcom indeed identified the importance in its 2021 report on Technology Futures, a key document that is referenced in the Strategy as an illustration of the changes occurring in the space sector:[4]

"In satellite telecommunications, large geostationary [GEO] satellites remain important. Here, technologies adopted from the mobile sector such as small cell spectrum frequency reuse have enabled higher capacity satellites providing lower cost services. This trend is set to continue with mobile edge computing enhancing both network performance and the user experience for rural residents, and passengers on ships and aircraft[s] (…) constellations of telecommunications satellites deployed in Medium Earth Orbit [MEO] and Low Earth Orbit [LEO] have the potential to increase overall satellite broadband capacity and offer reduced latency services – meaning a more reliable, instant connections (…) The next generation of satellites will be all-electric, software-defined satellites, providing operators with greater flexibility over either the frequencies the satellite operates and/or the capacity delivered in different locations over the lifetime of the spacecraft."

As GSOA indicated in our comments to Ofcom's document on mobile spectrum demand,[5] the foreseen trends depicted above are already a reality today: GEO, MEO and LEO satellites including all-electric, software-defined satellites were launched or are about to be launched in 2022 to reach performance levels that are without precedence.[6]

Satellite in 5G / 6G

GSOA wishes to reiterate that satellite systems are already today an integral part of the 5G ecosystem, not only through the satellite industry's active participation in research, development and standardisation activities, but also with satellite cellular backhaul service as well as virtualised and cloud-centric network capabilities becoming commercially available. In addition, specific standardisation work is being undertaken in dedicated bodies such as for instance 3GPP (in the System Aspects SA and Radio Access Network RAN groups), the International Telecommunications Union, ETSI and ATIS (NTN group).[7]

The role of satellites in contributing to acceleration and extension of 5G networks has long been defined. Satellite networks also can reinforce 5G service reliability by providing service continuity to users and improve service reliability, by scaling 5G networks through the provision of efficient multicast/broadcast resources for data delivery towards the network edges, or directly to the user equipment. However, the role of satellite in enabling the full 5G vision is rarely acknowledged as part of the discussions on radio spectrum.

We note that Ofcom referenced the Non-Terrestrial Connectivity Solutions (NTCS) Project Group set up by SES and Inmarsat (footnote 27), but there have been many other initiatives of the same kind for the last 4-5 years which have led our industry to adopt 5G-level specifications, such as:

SaT5G Project - Sat 5G (sat5g-project.eu)

[4] *See* Report: Technology Futures – spotlight on the technologies shaping communications for the future (ofcom.org.uk)

[5] *See* Discussion paper: Meeting future demand for mobile data - Ofcom

[6] See for example SES-17: Experience endless connectivity | SES

[7] www.atis.org

SATis5 – Demonstrator for Satellite-Terrestrial Integration in the 5G Context (eurescom.eu)

Non-Terrestrial Networks 5G Integration - ATIS

CellBackhaul Managed Service | Intelsat

All aboard: Darwin launches trial autonomous passenger shuttle service in Oxfordshire - Darwin Innovation (darwincav.com)

5G transparent network extension through satellite backhaul - YouTube

Tests conducted with today's satellite systems have demonstrated the ability of reaching 5G performance levels with existing satellites.[8] This evolution has led to a much-increased ability of satellite and terrestrial systems to operate seamlessly within the 5G ecosystem and for satellite to accelerate the deployment of 5G services to end-users in all geographical areas, whether urban, sub-urban or rural.

Satellite communications systems can and will contribute to increased 5G reach and capacity. Examples of the most recent 5G-related achievements in our industry which make it clear include:

World's First 5G Backhaul Demo over LEO Satellite | Telesat

SES Leads Satellite-enabled 5G Tests | SES

Intelsat's Global Network is First to Achieve MEF 3.0 Carrier Ethernet Certification for New Performance Tier | Intelsat

INSTANT5G: Avanti and European Space Agency accelerate adoption of 5G with pioneering INSTANT5G project | Avanti Communications (avantiplc.com)

SaT5G: Avanti Communications and ST Engineering iDirect Play Integral Roles in Successful Integration of 5G Core Network into Live Satellite Network | Avanti Communications (avantiplc.com)

5G, and in the future, 6G networks are based on a network of networks in order to ensure that a maximum number of customers and citizens can benefit from high-level connectivity.

While it remains to be seen which use cases for 6G will become widely deployed, 6G will need to incorporate the full range of terrestrial and non-terrestrial technologies that are under development if its benefits are to be enjoyed by all. As all previous generations of wireless networks have demonstrated, the use of non-terrestrial technologies is essential for maximizing coverage and bridging the digital divide. Specifically, 6G needs will be best addressed if the capabilities of satellite in terms of coverage and reach, energy efficiency, reliability, resilience and capacity are fully integrated.

Previous mobile generations, are being phased out (2G, 3G, and 4G), as mobile spectrum is re-farmed for 5G. Considering the amount of already harmonised spectrum as well as the efficiency of new technologies compared to the legacy ones, there should be limited need for new spectrum resources for the next mobile

[8] See for instance SES Leads Satellite-enabled 5G Tests | SES

generations. For example, Ofcom should first encourage infrastructure investment and re-farming of existing terrestrial spectrum before auctioning additional spectrum. GSOA supports the need to make additional terrestrial spectrum available only when and where there is a proper justification and need for it.

E2E Solutions for Cloud Everywhere

Another important evolution in the satellite sector is the association of the Cloud with satellite. What Ofcom is highlighting in the Strategy is confined to the improvements which cloud (and AI) bring to satellite network management. More remarkable is how much cloud players now count on satellite to extend their reach.

Big players such as IBM, Microsoft Azure or Amazon are usingsatellite to facilitate the reach of direct access to the Core or access to the Edge, allowing users to connect and have great performance for the applications they need to capitalize on the productivity, scalability and operational agility that cloud computing enables, regardless of geographical barriers.

This reality was acknowledged in Ofcom's 2021 report on Technology Futures:

"The relationship between cloud service providers and satellite operators is a symbiotic one as public cloud providers like Microsoft Azure and Amazon Web Services are turning to satellite operators to help them provide connectivity for their cloud services – even in very remote regions of the world."

GSOA members are indeed deepening their partnership with cloud players to this end, and in a world where cloud technology is becoming essential to all institutions and companies, it is a key development. See for example:

Cloud Connect | Intelsat

SES Expands Multi-Cloud Offerings with Oracle Cloud Infrastructure FastConnect | SES

SES's O3b mPOWER Tapped by Microsoft for Azure Network Cloud Services | SES

Viasat Enterprise and Cloud Services

Satellite communications platforms also benefit from much enhanced network agility and security coming out of the cloud functionalities. In particular, cloud technology combined with software designed networks and the expected advent of quantum technology are creating new ways of increasing cyber-security by using space technology, without deploying dedicated and expensive physical infrastructure. GSOA is pleased to reference its report on cybersecurity for more details:

Satellites & Cybersecurity - GSOA - Global Satellite Operator's Association (gsoasatellite.com)

ESIMs, ESOMPs, ESVs

Ofcom's Strategy acknowledges the importance of Earth Stations in Motion *(*ESIMs) and Earth Stations on Mobile Platforms (ESOMPs) which all use fixed satellite antennas mounted on aircraft, ships, trains, and vehicles, which enable the provision of high speed broadband services to end users on the move. ESIMs and ESOMPs represent an extension of terrestrial-only broadband networks, by connecting people and businesses while on the move and out of range of terrestrial wired and wireless networks. Thus, ESIMs and ESOMPs are one of the fundamental parts of current and next generation networks connecting business travelers, commuters, tourists, commercial shipping, and energy and natural resource production. ESIMs and ESOMPs also play a critical role in connecting government agencies, such as first responders following disasters, when local communications infrastructure is destroyed.

The increasing demand for broadband services on the move from airline and cruise ship passengers, as well as the government and enterprise sectors, are resulting in rapid growth in the demand for satellite connectivity via ESIM/ESOMP to facilitate the provision of flight and cruise ship broadband internet.

ESIMs and ESOMPs are an application of the Fixed Satellite Service (FSS), whether communicating with GSO or NGSO satellite systems. ESIMs and ESOMPs have been using the Ku-band and C-band Earth Stations on Vessels (ESVs) since the early 2000's. In addition, ESIMs already now use millimetre wave frequencies such as the Ka-band (27.5-30 GHz and 17.7-20.2 GHz) to deliver higher broadband speeds[9] and ESIMs and ESOMPs on aircraft will further use the Ku-band or the Q/V-band for even greater throughput in the future.

Examples of mobile platforms connected by satellite include:

Connecting Ships in the North Sea – Avanti

Empowering Extraordinary Experiences at Sea | SES

Satellite-Powered Connectivity to End Users

Satellite-powered connectivity to end users is used extensively in several regions of the world to extend network coverage, both for cellular and mobility applications. As highlighted by Ofcom in their Strategy, given the technological and business options available for using satellite- backhaul and recent technology innovations such as VHTS satellites and new constellations of NGSO satellites, there is good reason for various operators in the service chain to make more intensive use of satellite services for 4G and 5G connectivity solutions. Some examples include:

intelsat-MNO-Japan_case-study.pdf

Avanti Communications set to deliver life-enhancing connectivity to millions in rural Africa with launch of Avanti EXTEND - Avanti Communications (avantiplc.com)

Gilat Satellite Networks «SES Selected Gilat to Enable Tier-1 4G/LTE MNO in Brazil to Provide Broadband Connectivity for Education

[9] There are numerous jurisdictions that already permit ESIMs communicating with NGSO constellations using the Ka-band, including Argentina, Australia, Canada, New Zealand, Nigeria, The Bahamas, the United States, and member states of the European Conference of Postal and Telecommunications Administrations, just to name a few.

OneWeb and Telefónica collaborate to extend connectivity across Europe and Latin America

HISPASAT and the Mexican communications agency CFE TEIT collaborate to connect the unconnected

Altán's Red Compartida to multiply the base stations connected through HISPASAT's Ka-band

Broadband everywhere

Satellite provides effective geographic coverage of telecommunications to everyone across the globe and has a key role to play to ensure consumer broadband is available to all. Ofcom clearly acknowledges this important mission of our sector in their Strategy. This is particularly vital since a significant proportion of users are located in rural or underserved areas, all locations which satellite has a clear cost advantage to serve or is able to overcome geographic barriers to serve. Examples of this role include providing direct to home services to consumers for all uses including education, tele-health, business, agriculture and more. Today satellite also supports government and business broadband needs as well as providing broadband to consumer solutions relying on a combination with Wifi. This trend will continue to become available in the UK and elsewhere in Europe. Other examples include:

Broadband for all

Tusass | SES

Swisscom | SES

Providing connectivity in rural maternity clinics in DRC | Avanti

Internet connectivity for Kenyan entrepreneurs |Avanti

Connecting South Africa's libraries | Avanti

Bridge digital divide remote Canada - OneWeb

HISPASAT collaborates with the government of Ecuador on bridging its digital divide with two pilot tele-education and telemedicine projects via satellite

HISPASAT collaborates with the government of Panama on a satellite based pilot tele-education project for remote areas

Role of Satellite in M2M

Satellite support for 5G and 4G-enabled IoT markets is continuing to grow. In addition to the Inmarsat-MediaTek and Inmarsat-Microsoft IoT partnerships, EchoStar Mobile Limited offers pan-European mobile connectivity for M2M and IoT activities through a wide-variety of solutions. Examples include:

Successful trial advances global 5G IoT communications - Inmarsat

Semtech and EchoStar Mobile to Test Satellite IoT Connectivity Service Integrated With LoRaWAN® | Business Wire

hiSky expands its cooperation with Avanti Communications, offering satellite IoT network as a service over UK and Scotland - Avanti Communications (avantiplc.com)

Spectrum For In Orbit Services

In-orbit services (IOS) are those performed by a spacecraft to maintain, repair, upgrade, refuel or de-orbit a space asset while it is in orbit or to de-orbit or re-orbit a space debris object. These activities require the IOS servicer spacecraft to approach, rendezvous and dock with the space asset[10] or space debris object. Types of IOS include active debris removal (ADR), end-of-life (EOL), and life extension (LEX) services.

The issue of space debris (of which circa 1 million space objects greater than 1 cm in size are estimated to exist in LEO orbits) which are capable of seriously damaging or fragmenting active LEO spacecrafts) is an increasingly well recognised concern in the space sector. Attempting to assure or enable the sustainable use of the critical space orbital environmental resource – especially in LEO orbits – is one of the most critical issues facing the space industry globally as is also recognised by the UN and other international bodies and various national governments.

Active debris removal and end-of-life services have attracted the interest of governments, international institutions and national public agencies because of their emerging capability to mitigate or remediate the space debris problem[11],[12] in particular in LEO orbits. It is also expected that there will be an increasing market demand for such services, with some sources predicting a market size of USD 1.3 billion by 2030 (out of a total USD 4.5 billion for all IOS types)[13]. A substantial part of this demand is expected to come from providing EOL or ADR servicing for non-geostationary (Non-GSO) satellites in LEO orbits.

One of the other important issues which is facing the modern and rapidly growing space sector is how to ensure and assure the sustainable use of the space environment noting the increase in space debris (and hazardous space debris) in various orbits (such as in LEO orbits) in the context of the rapidly increasing population of existing and planned LEO satellites in such LEO orbits.

We welcome that Ofcom has recognised this topic (in 5.63 of the consultation document): "*Conversely, we recognise that physical risks to satellites from space debris etc. could ultimately impact the provision of space-based services (e.g. positioning and broadband) for UK users. We will discuss with our counterparts in the CAA and the UK Space Agency how we can work together on this issue.*" While this broad space sustainability topic is mostly managed by the UK Government,

[10] ESPI Report 76 - In-Orbit Services - Full Report, https://espi.or.at/publications/espi-public-reports/send/2-public-espi-reports/557-inhttps://espi.or.at/publications/espi-public-reports/send/2-public-espi-reports/557-in-orbit-services-full-reportorbit-services-full-report

[11] See http://www.esa.int/Safety_Security/Clean_Space/ESA_commissions_world_s_first_space_debris_removal

[12] See https://www.bbc.co.uk/news/science-environment-56420047

[13] See NSR Fourth Edition In-Orbit Servicing & Space Situational Awareness Markets, Full Report available from: NSR's Fourth Edition In-Orbit Servicing & Space Situational Awareness Markets – SatNews

	there are also important spectrum and ITU regulatory related aspects to be considered and progressed by Ofcom. For more information about it, see: Space Sustainability: The Time to Act is Now
Question 2: Do you agree with the broad areas we have prioritised for our work?	GSOA agrees with Ofcom's list of the broad areas for priority and we note that specific actions have been identified for the majority of these. However, it is concerning that no action has been identified in the areas of "Emergency and Disaster Relief". Examples of the importance of this service are not missing.[14] It may be the case that there are no or limited new spectrum requirements exclusively to support Emergency and Disaster relief communications, but it is important that Ofcom's strategy is able to ensure that such operations can be provided whenever needed, without risk of interference from other spectrum users. There is a need to ensure that satellite services which support *all* of the broad areas identified by Ofcom are able to do so on a long-term basis, without significant risk of interference from terrestrial or other satellite spectrum users. This should be a fundamental pillar of Ofcom's strategy, but one that seems to be missing from the consultation document. GSOA also supports that Ofcom has recognised that spectrum provisioning for planned In-Orbit-Servicing (IOS) satellite systems is an important topic, as illustrated by the quotes below: *"Other space applications that support the growth of the space sector include space launch, in-orbit servicing and tracking of space debris."* (clause 2.3) *"New markets are also under development. One example are in-orbit services to remove broken satellites from orbit and address the problem of space debris ."* (clause 3.22) *"The growth in satellite communications and Earth observation, fuelled by the development of smaller satellites and deployment of large NGSO constellations, depends on a range of activities that support and enable access to space. These activities include space launch and managing the safe use of space, for example through in-orbit servicing, debris tracking and removal. Demand for these activities is growing and each of them may have spectrum requirements of their own."* (See also clause 5.52)
Question 3: Are there other issues and actions that are likely to be important over the next 2 – 4 years?	In-Obit Servicing (IOS) is getting important to deal with the issue of debris. Concerning IOS, in the next 2-4 years, Non-GEO IOS space systems will be launched – including by European or UK companies supported by ESA and the UKSA to enable space debris removal. GSOA believes an important area to be progressed by Ofcom is enabling early regulatory action at national and ITU level (at WRC-23) to facilitate reliable TT&C frequency access for such Non-GEO IOS space systems. GSOA welcomes that Ofcom have submitted initial documents on this topic to the CEPT ECC in mid

[14] See for example: https://www.avantiplc.com/case-studies/powering-the-uks-emergency-services-with-ee/

	2021 and to CEPT CPG PTB later in 2021; further timely pro-active action by Ofcom in this regard would be welcomed.
Question 4: Do you have any evidence on whether specific actions should be a high priority?	GSOA believes that any initiative from Ofcom to further secure satellite access to spectrum will further incentivize investments from our industry and provide new opportunities to deploy satellite services in the UK. GSOA thus welcomes that Ofcom "expect[s] to consider satellite access to 14.25 – 14.50 GHz, 37.5 – 42.5 GHz, 47.2 – 50.2 GHz and 50.4 – 51.4 GHz." GSOA fully supports Ofcom's proposal to "consider use by ship and aircraft earth stations as part of our consultation on future use of th[e] band [14.25 – 14.50 GHz]." There is a pressing and growing need for Ku-band spectrum to be available in the UK to meet the increasing demand for connectivity, particularly for ubiquitously deployed very small aperture satellite terminals (VSATs), aircraft-mounted Earth stations (AES) and other in-motion satellite terminals. This growing demand has placed tremendous strain on the available spectrum for satellite services utilising the upper half of the 14.0-14.50 GHz frequency band (i.e., the frequency range 14.25-14.50 GHz). Market research[15] indicates that the global connected aircraft market size was USD 4.18 billion in 2019. The global impact of COVID-19 produced a decline of –39.9% in 2020, but the market was projected to grow again from USD 2.51 billion to USD 10.49 billion in 2027, as the demand is expected to return to pre-pandemic levels. GSOA is therefore supporting Ofcom's plans to look at "options for the future use of the 14.25 – 14.50 GHz band" and stands ready to actively contribute to Ofcom's consultation on their proposals in Spring 2022. GSOA notes that the 14.0 - 14.5 GHz band for non-GSO ESIM has already been harmonised in Europe via an ECC decision 18(05) for CEPT countries. In in April 2018 the UK Government set out its plans to make the UK's aviation sector the world-leading in prioritising passengers, fostering sustainable growth and promoting trade. These plans made clear the government's commitment to ensuring that the UK aviation sector continues to grow.[16] The current UK position -- with the requirement for individual licensing for FSS Earth stations -- places a significant constraint on the growth of satellite services in the Ku-band, as satellite operators cannot access the 14.25-14.50 GHz band in the UK to meet the growing demand for ubiquitously deployed VSAT and AES terminals which can be offered in the entire 14.0-14.50 GHz band in other European countries. We request that the licensing of AES terminals could be done through a variation to the Aircraft Radio Licence issued on Ofcom's behalf by the Civil Aviation Authority (CAA), with no additional fee. GSOA also supports Ofcom's intention to "develop our approach to licensing gateway earth stations in Q / V bands and higher frequencies." These frequency bands will play a vital role in enabling feeder links for the next generation high throughput satellite systems. The Q/V bands are indeed very suitable due to their sizeable contiguous spectrum and the opportunity to further augment wide bandwidth. The utilisation of Q/V bands will also be fuelled by the rapidly falling costs of components, making satellite systems that operate in these bands more affordable. Satellite

[15] *See* https://www.fortunebusinessinsights.com/industry-reports/connected-aircraft-market-101954

[16] *See* Government puts consumers at heart of the aviation industry - GOV.UK (www.gov.uk)

	operators and antenna manufacturers are further conducting trials in the Q/V bands to better understand performance in real world deployment scenarios.[17] Concerning satellite access to the 27.5–30 GHz frequency band, Ofcom does "consider[s] updating the earth station network licence to allow use of wider bands, including conditions to protect users of the Spectrum Access licences" but specifically for ESIM. In reality, this entire FSS Ka-band spectrum is crucially needed for all satellite earth stations, including VSATs and satellite gateways, and not only for ESIM. it is vital that Ofcom recognizes the role of Ka band in the development of innovative HTS and VHTS systems, based on its importance for the industry and the current operations and services provided to guarantee stable connectivity in all remote and rural areas. The whole FSS Ka-band made up of 2.5 GHz for uplinks in 27.5-30.0 GHz and 17.7-20.2 GHz for downlinks is being used by an increasing number of stakeholders and multiple services to provide high-throughput solutions for 5G and cloud connectivity by satellite. Concerning ESIM, GSOA highlights that the World Radiocommunication Conference 2019 (WRC-19) has validated the use of GSO ESIM in the entire 17.7-19.7 GHz and 27.5-29.5 GHz bands, building on the same decision of WRC-15 for GSO ESIM use across the 19.7-20.2 GHz and 29.5-30 GHz bands. WRC-19 also adopted an agenda item (1.15) that calls for ITU studies on the possible operation of earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service in the frequency band 12.75 – 13.25 GHz (Earth-to-space), in accordance with Resolution 172 (WRC-19) as well as an agenda item (1.16) that calls for ITU to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 17.7 - 18.6 GHz, 18.8 - 19.3 GHz, 19.7 - 20.2 GHz (space-to-Earth), 27.5 - 29.1 GHz and 29.5 - 30 GHz by non-GSO FSS earth stations in motion, while ensuring due protection of existing services in those frequency bands. We note that Ofcom in its Strategy is committing to "monitor and appropriately engage with work on the WRC-23 agenda item studying ESIM in 12.75 – 13.25 GHz", and we would equally appreciate that Ofcom is also engaging on WRC-23 work on NGSO ESIM in 27.5 - 29.1 GHz and 29.5 - 30 GHz.
Question 5: Do you have any other issues you wish to comment on?	As noted above, one element that seems to be missing from the Strategy is regarding the need to ensure that satellite operations in the UK are free from risk of harmful interference from other services. Ofcom has identified actions deemed necessary to ensure that satellite systems do not cause interference to other satellite systems and do not cause interference to terrestrial services. The Strategy includes an item to develop protection criteria for satellite services. However, there is no general objective for a policy statement towards ensuring that satellite services are adequately protected from interference from other spectrum users. This issue is critically important since the frequency bands currently used, and planned to be used for satellite services, are frequently under threat of interference from other services. This is first an issue in the national context, where Ofcom sometimes seeks to accommodate new terrestrial applications in bands used by satellite services. In general, the accommodation of new terrestrial applications should be done in a

[17] *See* SatMagazine *and* ThinKom Unveils New Q/V-Band Phased-Array Satellite Antennas for Next-Generation Satellite Constellations | Microwave Journal

	manner that does not cause unacceptable interference to satellite services. Surprisingly, there seems to be no general policy to ensure this. This is also an issue sometimes in the international context, where actions taken in countries other than the UK can impact on satellite services provided to UK satellite systems. Such issues are sometimes addressed in the context of WRC agenda items and in that case a policy to prevent interference would need be balanced against other objectives, such as to facilitate spectrum access for other services. While balancing of objectives may be necessary in some cases, there remains a need for an overarching policy regarding possible interference to satellite services, and GSOA proposes that this issue is added to the Strategy.
Question 6: Are there other issues and actions specifically relating to NGSO communication systems that are likely to be important over the next 2 – 4 years?	N/A
Question 7: Do you have any evidence on whether specific actions relating to NGSO communication systems should be a high priority?	N/A
Question 8: Do you have any other comments relating to NGSO systems?	N/A