Before the
NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION,
DEPARTMENT OF COMMERCE
Washington, DC 20230

In the Matter of	)	
Request for Comments on Developing a Sustainable	)	Docket No. 181130999-8999-01
Spectrum Strategy for America's Future	)	

COMMENTS OF SES AMERICOM, INC. AND O3B LIMITED

SES Americom, Inc. and O3b Limited (together, "SES") hereby respond to the above-referenced Request for Comments on a Sustainable Spectrum Strategy, which seeks input to assist the National Telecommunications and Information Administration ("NTIA") in developing a sustainable spectrum strategy.[1]

SES, one of the world's largest commercial communications satellite operators, is uniquely positioned to address issues raised by the NTIA. SES entities operate more than 50 geostationary orbit ("GSO") satellites able to reach 99% of the world's population using spectrum in the C, Ku- and Ka-band to provide critical services to U.S. customers. These spacecraft serve broadcasters, direct-to-home ("DTH") service providers, and corporate and U.S. government ("USG") customers domestically and worldwide with offerings that include video and audio content distribution, DTH, private networks, broadband, satellite news gathering, aeronautical and maritime services, and mobile backhaul.

The SES fleet includes the O3b Medium-Earth-Orbit ("MEO") non-geostationary ("NGSO") system, which provides high-throughput, low-latency connectivity for enterprise, government, and mobility clients. The O3b system combines satellite reach with fiber optic

[1] *See Request for Comments on Developing a Sustainable Spectrum Strategy for America's Future*, Docket No. 181130999-8999-01 (rel. Dec. 20, 2018).

speed, delivering the performance of terrestrial networks in places those networks do not reach, and making affordable broadband connectivity accessible for billions of consumers and businesses in nearly 180 countries. SES currently operates sixteen MEO satellites, and in 2018 was granted authority by the Federal Communications Commission ("FCC") for additional spacecraft and spectrum[2] in order to accommodate growing demand, particularly among USG users, for O3b's high-performance connectivity.[3]

As noted in the President's Space Directives[4] and the White House Spectrum Memorandum,[5] the satellite industry plays a critical role in the U.S. economy and national security. SES is at the forefront of providing innovative satellite services to both the commercial market and the USG. Accordingly, as the NTIA works towards implementing spectrum policy that enables the U.S. space industry to retain its primacy, it is critical that it consider the comments of SES and others in the satellite industry.

SES's responses to specific NTIA questions are presented below.

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[2] *O3b Limited*, Call Sign S2935, Order and Declaratory Ruling, FCC 18-70 (rel. June 6, 2018) (the "O3b Market Access Grant").

[3] *See, e.g.,* Ryan Schradin, *Landmark DoD contract to make MEO satellite service available to the entire military,* The Government Satellite Report (June 7, 2018), available at: https://ses-gs.com/govsat/defense-intelligence/landmark-dod-contract-to-make-meo-satellite-service-available-to-the-entire-military/.

[4] *See* Space Policy Directive-1, Reinvigorating America's Human Space Exploration Program (Dec. 11, 2017); *see also* Space Policy Directive-2, Streamlining Regulations on Commercial Use of Space (May 24, 2018); *see also* Space Policy Directive-3, National Space Traffic Management Policy.

[5] Presidential Memorandum on Developing a Sustainable Spectrum Strategy for America's Future (October 25, 2018), available at: https://www.whitehouse.gov/presidential-actions/presidential-memorandum-developing-sustainable-spectrum-strategy-americas-future/.

1. **In what ways could the predictability of spectrum access for all users be improved?**

The predictability of spectrum access is critical for the efficient deployment of satellite services. SES and other satellite operators have invested billions of dollars in satellites operating in the United States and globally that provide important services to American consumers, businesses and the USG. Satellite systems, both GSO and NGSO, require investments long in advance of commencing operations and take years to design and deploy. Once in service, satellite systems generally remain operational for ten to twenty years or more, and this hardware cannot be meaningfully modified to adapt to changing spectrum policy on the ground. Additionally, these systems are designed to cover wide geographic areas, and a single system will typically cover multiple countries, if not continents. Satellite operators must be able to rely on stable and internationally-harmonized spectrum policies to use satellite capacity efficiently, deliver affordable and innovative services, and ensure that these long-term investments are successful.

This need for long term certainty goes beyond the satellite operators themselves. Customers of satellite services invest in hardware to communicate with various satellite systems and make business development and operational decisions in reliance on the availability of satellite services. This includes not only video content distributors but enterprise and government users, who often make their own internal commercial or operational decisions based on available connectivity. When spectrum policy is subject to changes, the upheaval experienced by satellite operators affects their customer bases as well, impacting U.S. consumers as well as USG users.

Policy makers can improve the predictability of spectrum access by consulting with satellite users regarding their reliance on satellites as part of the global communications

infrastructure when the USG is contemplating changes to long-standing domestic and international spectrum allocations. By giving current and future satellite service stakeholders a chance to weigh in on U.S. spectrum policy, regulators can ensure past investments are protected and that private sector and USG customers are able to maintain current services while also preserving the ability to expand the use of those services to meet growing demand.

Similarly, where satellite is a priority spectrum user we encourage the NTIA to find ways to harmonize U.S. spectrum policy with those existing priority designations. This will allow satellite operators and satellite service customers, such as the USG, to implement regional and global business and operational plans while avoiding the uncertainty and prohibitive expense of designing systems to accommodate spectrum allocations that differ across national and regional boundaries. A lack of harmonized spectrum access not only imposes costs and burdens on governments in the form of increased cross-border coordination, but also raises prices and creates barriers to accessing services that consumers, businesses and governments now expect to be available everywhere. Should policy makers feel it is in the interests of the U.S. to depart from the prioritization of satellite services in a particular band, the NTIA should take steps to protect incumbent satellite users and the investment of satellite operators, both domestically and at international spectrum forums such as CITEL and the ITU. This will help mitigate any complications that may be caused by non-homogenous spectrum prioritization policies in a given region.

Recognizing, though, that the international allocation process can be very lengthy, a key way greater flexibility could be provided to the satellite sector would be allowing services that are similar technically to operate in a band not allocated to that service. This has happened, for example, with mobile-satellite service in fixed-satellite service ("FSS") bands and could be

further expanded through allowing FSS use of broadcasting-satellite service ("BSS") bands as the two services are technically similar. If anything, FSS can often share more easily with BSS systems and other services than BSS itself, given its focus on service to small, consumer terminals.

2. What is the practical extent of applying standards, incentives, and enforcement mechanisms to promote efficient and effective spectrum use?

If the U.S. government wishes to facilitate efficient and effective spectrum use, including spectrum sharing, it must ensure that it has enforcement mechanisms in place that can address very real potential harms that might result from such sharing. In particular, the FCC has created spectrum sharing schemes that threaten reliable reception of uplink transmissions to satellites because of aggregate interference to in-band receivers on satellites[6] and is contemplating creating a similar approach in yet another satellite band.[7]

Yet, rather than address the matter with serious and practical enforcement mechanisms, the FCC has generally chosen to date to ignore the risk and continue without serious consideration as to how to protect current and future satellite operations from a very real risk.[8] Robust, technology-neutral sharing policies that benefit U.S. end users, businesses, and the USG must include effective enforcement measures that can protect the multi-billion dollar investments made by the satellite industry. Without meaningful enforcement mechanisms, satellite services

[6] *See Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 at ¶¶ 61-69 (2016) ("Spectrum Frontiers R&O"); *GlobalStar, Inc.,* Petition for Notice of Inquiry Regarding the Operation of Outdoor U-NII-1 Devices in the 5 GHz Band, ET Docket No. RM-11808 (filed May 21, 2018).
[7] *See Unlicensed Use of the 6 GHz Band*, Notice of Proposed Rulemaking, ET Docket No. 18-295, FCC 18-147, ¶ 2 (rel. October 24, 2018).
[8] *See* Spectrum Frontiers R&O at ¶¶ 61-69.

that millions of commercial and USG users rely on could face unresolvable interference that dramatically impairs service quality and availability.

3. **What are the risks, if any, to the global competitiveness of U.S. industries associated with spectrum management and policy actions?**

Current U.S. spectrum management and policy actions may hamstring the competitiveness of U.S. industries that deploy and rely on satellite services. Satellite network operators have long looked to U.S. industry to design and manufacture new generations of satellites and associated ground station equipment.

While USG policies on spectrum have not reduced demand for satellite services, they have made it more difficult for operators to test and deploy equipment in the U.S. If due to such barriers satellite operators are forced to test equipment abroad, it could disadvantage U.S. manufacturers.

4. **How could a spectrum management paradigm be structured such that it satisfies the needs of commercial interests while preserving the spectrum access necessary to satisfy the mission requirements and operations of Federal entities?**

In considering the balance between commercial and federal spectrum users, the NTIA must be mindful that many federal users rely on commercial satellite operators for services across the globe. In many instances, there are no alternatives for the services that the USG acquires from the commercial satellite industry. SES, which has long provided satellite capacity to USG customers, provides both ubiquitous GSO satellite coverage and O3b MEO capacity to USG users around the world.[9] This combination of coverage and uniquely fiber-like capacity is unavailable from any other provider and is particularly valuable for USG needs.

[9] The demand for these services is growing for both the commercial and government users, and it is critical for SES to have access to sufficient spectrum to meet this demand for all its customers.

SES can bring to bear capacity on over 50 GSO satellites in multiple frequency bands, including C-, Ku- and Ka-band, to serve USG users. This capacity and coverage ensure that the USG has access to reliable and redundant satellite connectivity anywhere in the world.

Meanwhile, the O3b MEO constellation provides a truly unique service to the USG, as it is the only satellite constellation of its kind that is currently in operation. The O3b constellation uses Ka-band, including spectrum in the 27.5-28.35 GHz band (the "28 GHz band"), to provide high throughput and low-latency capacity to serve Department of Defense user needs in theater and at its command hubs.[10] This fiber-like connectivity is ideal for many USG applications and operations and is currently in high demand.[11] SES will launch four additional current generation MEO satellites this year to help meet the high demand in the market for its unique capacity. By 2021, SES will begin launching its second generation MEO constellation, mPower, which will provide far greater capacity while using the entirety of Ka-band and, eventually V-band. Many other NGSO satellite systems hold U.S. authority and are planning to provide low latency, high throughput capacity globally.[12] U.S. policy makers must make sure that these cutting-edge

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Despite widespread USG use, USG services are not, alone, sufficient to support the deployment of these capabilities.

[10] In fact, more than half of the SES MEO constellation's capacity is in the 28 GHz band. Where rules limit access to this band for satellite services, those policies will necessarily limit the capacity available to USG customers and drive up the cost of that capacity.

[11] *See U.S. DoD Contracts MEO Services via Blanket Purchase Agreement with SES Government Solutions*, SES Press Release (June 4, 2018), available at: https://www.ses.com/press-release/us-dod-contracts-meo-services-blanket-purchase-agreement-ses-government-solutions.

[12] *See, e.g., Telesat Canada,* Order and Declaratory Ruling, File No. SAT-PDR-20161115-00108 (rel. Nov. 3, 2017); *Space Norway AS,* Order and Declaratory Ruling, File No. SAT-PDR-20161115-00111 (rel. Nov. 3, 2017); *LeoSat MA, Inc*., Order and Declaratory Ruling, File No. SAT-PDR-20161115-00112 (rel. Nov. 19, 2018); *Karousel LLC*, Memorandum Opinion, Order and Declaratory Ruling, File Nos. SAT-LOA-20161115-00113 & SAT-AMD-20180801-00058 (rel. Aug. 16, 2018); *Audacy Corporation*, Order and Authorization, File No. SAT-LOA-20161115-00117 (rel. June 6, 2018); *Space Exploration Holdings, LLC*, Memorandum Opinion,

satellite systems have access to sufficient spectrum domestically and abroad to meet the needs of USG and commercial end users alike.

5. **What are the likely future needs of spectrum users, both terrestrially and for space-based applications, within the next 15 years? In particular, are present allocations of spectrum sufficient to provide next generation services like Fifth Generation (5G) cellular services and emerging space-based applications? For commenters who assert that existing allocations are insufficient, NTIA is interested in understanding better the amount of spectrum presently available to provide particular services (or similar services) and estimates of the amount of additional spectrum in each frequency band that the commenter believes is needed.**

The spectrum needs of satellite operators are growing steadily. This is in part due to the fact that, in addition to a host of other applications, satellite connectivity will be a key component of the deployment of 5G terrestrial wireless services, much as it currently is for the deployment of 3G/4G/LTE services around the globe.[13] The demand for satellite services is growing both domestically and internationally, even as the Commission promotes the allocation

Order and Authorization, File Nos. SAT-LOA-20161115-00118 & SAT-LOA-20170726-00110 (rel. Mar. 29, 2018); *WorldVu Satellites Limited*, Order and Declaratory Ruling, SAT-LOI-20160428-00041 (rel. June 23, 2017); *Space Exploration Holdings, LLC*, Memorandum Opinion, Order and Authorization, File No. SAT-LOA-20170301-00027 (rel. Nov. 19, 2018); *Telesat Canada*, Order and Declaratory Ruling, SAT-PDR-20170301-00023 (rel. Nov. 19, 2018).

[13] Caleb Henry, *Google using O3b satellites to connect Project Loon over Puerto Rico*, Space News (Oct. 23, 2017); https://spacenews.com/google-using-o3b-satellites-to-connect-project-loon-over-puerto-rico/; *SES Networks Brings in the Balloons as X's Project Loon Restores Cell Connectivity in Puerto Rico*, Satnews Daily (Oct. 23, 2017), available at: http://www.satnews.com/story.php?number=1803106866; Markus Payer, *Timor Telecom Deploys New 4G/LTE Network with SES Networks Service Upgrade*, MarketWatch, (Sep. 6, 2017), available at: https://www.marketwatch.com/press-release/timor-telecom-deploys-new-4glte-network-with-ses-networks-service-upgrade-2017-09-06.

of satellite bands to terrestrial 5G both domestically[14] and internationally,[15] without due consideration of the impact on incumbent and future satellite demand for this band.

Advanced NGSO broadband systems[16] that seek to operate in the Ku-, Ka- and V-bands are on the horizon, and these will help facilitate the roll-out of 5G mobile services, as well as fixed broadband, disaster relief, earth stations in motion ("ESIMs," which include terminals on land vehicles, ships at sea, and aircraft), enterprise and government services. The private sector

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[14] *See Expanding Flexible Use of the 3.7 to 4.2 GHz Band et al*., Order and Notice of Proposed Rulemaking, 33 FCC Rcd 6915 (2018); *See also Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Third Report and Order, Memorandum Opinion and Order, and Third Further Notice of Proposed Rulemaking, GN-Docket No. 14-177, at ¶ 92 (rel. June 8, 2018) ("3rd Spectrum Frontiers R&O").

[15] After the 2015 World Radiocommunication Conference, Commissioner O'Reilly emphasized the importance of global spectrum harmonization in facilitating deployment of 5G networks and criticized the decision excluding the 28 GHz band from spectrum to be considered as part of terrestrial 5G feasibility studies. *See* Michael O'Reilly, *2015 World Radio Communication Conference: A Troubling Direction*, Federal Communications Commission (Jan. 15, 2016), available at: https://www.fcc.gov/news-events/blog/2016/01/15/2015-world-radiocommunication-conference-troubling-direction. Additionally, Chairman Pai has highlighted U.S decisions to prioritize terrestrial 5G operations in satellite spectrum bands on the international stage on several occasions. *See Remarks of FCC Chairman Ajit Pai at the Mobile World Congress*, Barcelona Spain (February 26, 2018), available at: https://www.fcc.gov/document/chairman-pai-remarks-mobile-world-congress; *Remarks of FCC Chairman Ajit Pai at the Israel Business Conference 2018*, Jerusalem, Israel (Dec. 20, 2018), available at: https://www.fcc.gov/document/chairman-pai-remarks-israel-business-conference-2018.

[16] Markus Payer, *SES Networks Announces Partnerships for Groundbreaking O3b mPOWER Customer Edge Terminals,* SES (Mar. 8, 2018), available at: https://www.ses.com/press-release/ses-networks-announces-partnerships-groundbreaking-o3b-mpower-customer-edge-terminals; Markus Payer, *SES opens new era in global connectivity with O3b mPOWER,* SES, (Sep. 11, 2017), available at: https://www.ses.com/press-release/ses-opens-new-era-global-connectivity-o3b-mpower; Sallyann Nicholls, *Connectivity, speed and travel: how and when 5G will impact your life,* Euronews, (Feb. 2, 2018), available at: https://www.euronews.com/2018/07/17/connectivity-speed-and-travel-how-and-when-5g-will-impact-your-life; *Government Communications,* Telesat, available at: https://www.telesat.com/services/government-services; Asha McLean, *SpaceX approved to send over 7,000 satellites into orbit,* ZDNet (Nov. 15, 2018), available at: https://www.zdnet.com/article/spacex-approved-to-send-over-7000-satellites-into-orbit/.

has recognized the commercial potential of these networks, pouring billions of investment dollars into these systems.[17] Meanwhile, GSO networks continue to increase in raw capacity and technological sophistication in response to the growing global demand for communications capacity.[18] These systems serve urban, suburban and rural customers, as well as government users across the world, in bands that policy makers have targeted for terrestrial encroachment. Even as the FCC allocates record-setting amounts of spectrum for terrestrial use, it continues to chip away at satellite spectrum access, disregarding the growth of satellite services.[19]

Instead of actively working to limit the spectrum satellite systems will have access to, as it has recently in the Ka-band, U.S. policymakers should be looking to expand satellite access to spectrum in existing bands such as Ka-band while protecting satellite growth spectrum in V-band and beyond. Where sharing is necessary, regulators should strive to create sharing rules that reflect the physical and economic realities of each spectrum band.

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[17] Caleb Henry, *LeoSat gains Hispasat as second investor, drops demo satellite plans,* Space News (July 10, 2018), available at: https://spacenews.com/leosat-gains-hispasat-as-second-investor-drops-demo-satellite-plans/; Andy Pasztor and Mayumi Negishi, *SoftBank to Invest Around $500 Million More in OneWeb Satellite-Internet Venture*, Wall Street Journal (Dec. 11, 2017), available at: https://www.wsj.com/articles/softbank-to-invest-around-500-million-more-in-oneweb-satellite-internet-venture-1512990003; Eric Ralph, *SpaceX kicks off $750M investment round as BFR and Starlink infrastructure needs grow,* (Nov. 8, 2018), available at: https://www.teslarati.com/spacex-750m-financing-round-bfr-starlink-capex/.

[18] *SES and Thales Unveil Next-Generation Capabilities Onboard SES-17*, SES, (April 4, 2017), https://www.ses.com/press-release/ses-and-thales-unveil-next-generation-capabilities-onboard-ses-17; Caleb Henry, *Dankberg: ViaSat 3 Satellite Will Have More Capacity than the Rest of the World Combined,* Via Satellite (Feb. 10, 2016), available at: https://www.satellitetoday.com/telecom/2016/02/10/dankberg-viasat-3-satellites-will-have-more-capacity-than-the-rest-of-the-world-combined/; *Hughes Launches World's Largest and Fastest Broadband Satellite Network,* EchoStar, (Mar. 7, 2017), available at: https://www.echostar.com/en/press/newsandmedia/hughes%20launches%20worlds%20largest%20and%20fastest%20broadband%20satellite%20network.aspx.

[19] *See* https://www.businesswire.com/news/home/20181025006140/en/SES-S.A.-YTD-2018-Results. SES Networks, which provides data and broadband services around the globe, grew 13.6% through Q3 in 2018.

The U.S. has recognized the need to allocate spectrum for other data-intensive services. It has supported Agenda Item 1.13 at the ITU, which would make available upwards of 33 GHz of spectrum for terrestrial 5G while the Commission has allocated spectrum at 24.75-25.25 GHz; 27.5-28.35 GHz; 37.0-40.0 GHz; 42.0-42.5 GHz; and 47.2-48.2 GHz for terrestrial use and is considering further terrestrial allocations in the 3.7-4.2 GHz band as well as the 25.25-27.5 GHz and 50.4-52.6 GHz bands. In order to ensure that U.S. policy goals such as the speedy deployment of 5G[20] and bridging the Digital Divide[21] are met, the USG should undertake a similar effort to allocate more spectrum for satellite services as well. It remains unclear whether U.S. policy makers will maintain that balance, but it would be in the U.S. interest to make sure there is sufficient spectrum for the full and efficient deployment of current and next-generation GSO and NGSO satellite services.

Put simply, the need for satellite spectrum will mirror the growth of the demand for data because satellites are a critical component of the fixed and mobile broadband ecosystem. As long as the U.S. government views satellite services as distinct from 4G/5G mobile services and other data-intensive services, it will underestimate the need for spectrum for broadband satellite services and hinder satellite operators from meeting market demand for their services.

6. Conclusion

The NTIA is wise to develop a long term national spectrum strategy. This approach should benefit the operators, customers and end-users of satellite networks that rely on spectrum access. All of these stakeholders stand to benefit from this effort.

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[20] *See* 3rd Spectrum Frontiers R&O.

[21] *See Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion*, 2018 Broadband Deployment Report, GN Docket No. 17-199 (rel. Feb. 2, 2018) at ¶ 13.

SES appreciates the opportunity to comment and hopes that its submission helps the NTIA shape spectrum policy in a way that will ensure the U.S. maintains its leadership in the space and satellite industry for the foreseeable future.

Respectfully submitted,

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