Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
EOS Defense Systems USA, Inc.	)	File No. SAT-MOD-2020_____
	)	
Modification of Authorization for	)	
Audacy NGSO Satellite System	)	

APPLICATION FOR MODIFICATION

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APPLICATION FOR MODIFICATION

EOS Defense Systems USA, Inc. ("EOS DS") by its undersigned attorneys and pursuant to Sections 308 and 309 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 308 and 309, and Section 25.117 and other relevant provisions of the Federal Communications Commission's ("FCC" or "Commission") rules, hereby requests authority to modify its license for a medium-earth orbit ("MEO"), non-geostationary satellite orbit ("NGSO") constellation utilizing certain V- and Ka-band frequencies (Call Sign S2982) (the "Audacy Network").[1]

By this application, EOS DS requests authority to modify the Audacy Network to: (i) add new service links in the 17.7-18.6 GHz, 18.8-20.2 GHz and 27.5-30.0 GHz bands; and (ii) provide enhanced feeder link service in the 19.7.20.2 GHz and 29.5-30.0 GHz bands. The proposed modification would not otherwise alter the nature of the authorized Audacy Network. After implementation of the proposed modification, the Audacy Network will remain a MEO constellation involving three spacecraft primarily designed to serve Low Earth Orbit ("LEO")

[1] *See, e.g., In the Matter of Audacy Corporation Application for Authority to Launch and Operate a Non-Geostationary Medium Earth Orbit Satellite System in the Fixed and Inter-Satellite* Services¸ Order and Authorization, IBFS File No. SAT-LOA-20161115-00117 (rel. June 6, 2018).

systems as a relay network, with certain enhanced capabilities for serving gateway and customer ground stations. This application identifies all changes that EOS DS requests for the Audacy Network. EOS DS is also filing an FCC Form 312, Schedule S, and updated Technical Narrative to account for the changes proposed. EOS DS certifies that all other information provided in the Audacy Network's original application remains unchanged. As described herein and in the attachments, grant of this request for modification will serve the public interest, convenience and necessity.

I. INTRODUCTION

In response to several applications filed with the Commission for operations in the K- and Ka- frequency bands, on March 24, 2020, the Commission released a Public Notice announcing that it initiated a new processing round for additional applications and petitions for operations in the 10.7-12.7 GHz, 12.75-13.25 GHz, 13.85-14.5 GHz, 17.7-18.6 GHz, 18.8-20.2 GHz, and 27.5-30 GHz frequency bands by non-geostationary orbit fixed-satellite service ("NGSO FSS") systems, pursuant to section 25.157 of the Commission's rules,.[2]

Audacy Corporation ("Audacy") received a license to develop and launch the Audacy Network under the Commission's recent NGSO processing rounds.[3] The Audacy License authorizes the construction, deployment, and operation of three satellites in MEO using certain V-band spectrum for feeder links between its spacecraft and Earth and using certain Ka- and V-band

[2] See *Cut-Off Established For Additional NGSO FSS Applications or Petitions for Operations in the 10.7-12.7 GHz, 12.75-13.25 GHz, 13.8-14.5 GHz, 17.7-18.6 GHz, 18.8-20.2 GHz, And 27.5-30 GHz Bands*, Satellite Policy Branch Information, Report No. SPB-279, DA 20-325 (rel. March 24, 2020) (the "Processing Round Public Notice").

[3] *See Audacy Corp.*, 33 FCC Rcd. 5554 (2018) ("Audacy License").

spectrum for intersatellite service ("ISS") links with other spacecraft.[4] This innovative constellation will establish a space-based data relay platform to provide always-on, low latency, seamless connectivity to other operators in space. Potential users of the network include operators of Earth observation satellites seeking real-time photographic and video data, launch providers needing continuous telemetry from onboard sensors, and operators of large LEO NGSO constellations who require continuous command and control of every satellite, wherever they are in their orbit. The Audacy Network was conceived and designed to make efficient use of spectrum to facilitate transmission of information to and from in-orbit satellites and thereby enable more operators to provide more services in response to technologies and market conditions that continue to evolve rapidly.

On March 26, 2020, the Commission authorized the transfer of control of the Audacy License (the "Transfer of Control Transaction") to EOS DS's ultimate parent company, Electro Optic Systems Holdings Ltd ("EOS").[5] EOS is a leading Australian technology company operating in the space and defense markets, whose shares are publicly traded on the Australian Securities Exchange. Its products incorporate advanced electro-optic applications based on EOS core technologies in operating and tracking software, laser ranging, optronics, and precision gimbal mechanisms. EOS has been actively involved in the space industry for decades. Its EOS Space Systems division is a global leader in the design, manufacture, delivery, and operation of sensors and systems for space situational awareness and space control. For over 35 years, EOS has been

[4] The Audacy Network is authorized to use the 37.5-42.0 GHz, and 47.2-50.2 GHz bands for feeder links and the 22.55-23.18 GHz, 23.38-23.55 GHz, 24.45-24.75 GHz, 32.3-33.0 GHz, 54.25-56.9 GHz, 57.0-58.2 GHz, and 65.0-71.0 GHz bands for ISS operations. The Audacy Network is also authorized to use the 19.7-20.2 GHz and 29.5-30.0 GHz bands for back-up telemetry, tracking, and command functions.

[5] *In the Matter of Electro Optics Systems Ltd., Transfer of Control*, Grant of Authority SAT-T/C-20200124-00013, DA No. 20-240 (rel. March 26, 2020).

directing energy beams to space objects for applications including tracking, characterization, identification, communications, remote maneuver, and missile defense, and has developed a significant private database/3D map of satellites and other objects in orbit around the Earth. EOS has invested heavily to develop sophisticated tracking, space awareness, and communications technologies for use in space, and plans to expand those efforts still further, including through the Audacy License. Information regarding ownership and management of EOS DS and EOS is provided in **Exhibit B** to this application.[6]

In response to the Processing Round Public Notice, EOS DS requests authority to modify the Audacy License to permit additional operations using the Audacy Network.

II. DISCUSSION

By this application, EOS DS requests Commission authority to modify the Audacy Network to: (i) add new service links in the 17.7-18.6 GHz, 18.8-20.2 GHz and 27.5-30.0 GHz bands; and (ii) provide enhanced feeder link service in the 19.7.20.2 GHz and 29.5-30.0 GHz bands. In particular, and as described in more detail in the Schedule S and the updated Technical Attachment, EOS DS requests additional spectrum resources for the Audacy Network for two discrete uses.

First, EOS DS seeks spectrum to facilitate point-to-point data services between Earth-based end user terminals and the Audacy Network. Such services will augment Audacy's already licensed relay services. The Modification will allow the establishment of communications between Ka-band ground terminals and end user point(s) (*i.e.* a private network) via the Audacy relay

[6] EOS DS notes that the Transfer of Control Transaction closed today.

satellites and Audacy Gateway(s).[7] This will provide clients with one-stop-shopping for a secure turn-key service for relaying commands and communications from users in the field to client communications centers, and forwarding data and communications to users in the field. In particular, such services will appeal to sensitive clients that demand the highest levels of reliability, greater throughput, and that enjoy the ability to operate relatively large terminals from their own secure sites.[8]

Second, EOS DS seeks spectrum to make more efficient use of the 19.7-20.2 GHz and 29.5-30.0 GHz for routine feeder link service. Audacy's original grant of authority authorized these bands for feeder link service during only off-nominal operations, and such authority involved omnidirectional antennas with little utility during normal operations. The instant application seeks authority for routine feeder link service employing more higher gain, directional antennas. Such authority is a more efficient use of spectrum resources, and, given the discrete nature of the gateway ground stations, should facilitate coordination with other operational and planned

[7] User terminals for this service are anticipated to utilize highly directional 1 to 2 meter parabolic or equivalent phased array antennas. These antennas will be steered to track the Audacy relay satellites in Medium Earth Orbit (MEO). Such terminals are required to support the anticipated data rate requirements on the order of 100 Mbps or more.

[8] To the extent that end user terminals are vehicle-mounted and land, sea or air-based, such terminals will comply with the FCC's amended 47 CFR § 25.202, which authorizes communications between NGSO FSS space stations and Earth Stations in Motion ("ESIM") in the following frequencies: 10.7-11.7 GHz (space-to-Earth); 11.7-12.2 GHz (space-to-Earth); 14.0-14.5 GHz (Earth-to-space); 17.8-18.3 GHz (space-to-Earth); 18.3-18.6 GHz (space-to-Earth); 18.8-19.3 GHz (space-to-Earth); 19.3-19.4 GHz (space-to-Earth); 19.6-19.7 GHz (space-to-Earth); 19.7-20.2 GHz (space-to-Earth); 28.4-28.6 GHz (Earth-to-space); 28.6-29.1 GHz (Earth-to-space); 29.5-30.0 GHz (Earth-to-space). *See Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service And Facilitating the Communications of Earth Stations in Motion with Non-Geostationary Orbit Space Stations*, Second Report and Order in IB Docket No. 17-95 and Report and Order in IB Docket No. 18-315 and Further Proposed Rulemaking, at Appendix B 37-38, (May 14, 2020). EOS DS acknowledges that in-motion operations are not permitted outside of these frequencies, and will strictly limit communications between its space stations and ESIMs to the above bands.

systems. Finally, the implementation of Ka-band frequencies for routine feeder link services will enable EOS DS to more readily source hardware from an already mature ecosystem.

The proposed modification would not alter the fundamental nature of the Audacy Network. After implementation of the proposed modification, the Audacy Network will remain a MEO constellation involving three-spacecraft primarily designed to serve LEO systems as a relay network, with some enhanced capabilities for serving stations on the ground.

Moreover, and as discussed below in Section IV, the demand for the Audacy Network remains robust. Clients are likely to be commercial, civil, and military operators of spacecraft primarily in LEO, but also in other Earth and Lunar orbits and in interplanetary space. Many client spacecraft will gather Earth observation data and/or data of a commercial or scientific nature. Most relay traffic is expected to be between client spacecraft and client data or communications centers by way of Audacy operated gateway ground station facilities. In some cases, however, clients will take requests from and deliver data to users in the field, which will require point-to-point relay of data and communications between the client data or communications center and the users in the field. While client data or communications centers are anticipated to be land-based, users in the field could be on land, at sea, or in the air.

Finally, EOS DS notes that the Audacy Network using spectrum allocations in the V-band and Q-band as currently licensed by the Commission can provide excellent and reliable service to clients connected by optical fiber to a gateway located in dry or desert environments. In other environments, the Ka-band will help improve better performance and availability. The modification sought herein utilizing Ka-band spectrum for these communications on a non-interference basis would be consistent with the intent of the original allocation, that is to provide

reliable/available relay services and gateway communications between ground users and the Audacy MEO satellites.

Except as otherwise noted herein, in the attached FCC Form 312, Schedule S, and updated Technical Attachment, all other aspects of, and all other information provided in the Audacy Network's original application remain unchanged and are incorporated by reference herein.

III. WAIVER REQUESTS

The Waiver Standard

The Commission may grant waivers "on its own motion or on petition if good cause therefor is shown."[9] Good cause" has been interpreted to exist when the facts of a particular case make strict compliance inconsistent with the public interest and when the relief requested will not undermine the policy objective of the rule in question. To prevail, a petitioner must demonstrate that application of the involved rule would be inequitable, unduly burdensome, or contrary to the public interest. The Commission may also take into account considerations of "hardship, equity, or more effective implementation of overall policy" on an individual basis.[10] The courts have likewise found that "a general rule, deemed valid because its overall objectives are in the public interest, may not be in the 'public interest' if extended to an applicant who proposes a new service that will not undermine the policy, served by the rule that has been adjudged in the public interest."[11] Waivers are appropriate if "special circumstances warrant a deviation from the general rule and such deviation will serve the public interest."[12]

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9 47 C.F.R. §1.3.

10 *WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969) ("*WAIT Radio*").

11 *Id.*, 418 F.2d at 1157.

12 *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990) (citing *WAIT Radio*, 418 F.2d at 1159) (explaining the necessary criteria to establish good cause for a waiver).

The waivers sought in the instant Application will not undermine the policy objective of the involved rules – namely, protecting incumbent spectrum users and not precluding operation of later-filed NGSO FSS systems – and will further the public interest by alleviating the ongoing spectrum crisis hindering the ability of innovative space-based systems from communicating with terrestrial infrastructure by promoting shared spectrum use among current and future NGSO operations. The shared use of spectrum resources and promotion of innovative new services will benefit other NGSO operators and American consumers, as further discussed below.

Waiver of § 25.146(b) Coverage Requirement

EOS DS requests limited waiver of Rule 25.146(b) of the Commission Rules to operate in the 18.8-19.3 GHz and 28.6-29.1 GHz bands while providing near-continuous service throughout the United States and its territories.[13] Rule 25.146(b) requires that "an NGSO FSS applicant proposing to operate in the 10.7-12.7 GHz, 12.75-13.25 GHz, 13.75-14.5 GHz, 18.8-19.3 GHz, or 28.6-29.1 GHz bands must provide a demonstration that the proposed system is capable of providing FSS on a continuous basis throughout the fifty states, Puerto Rico, and the U.S. Virgin Islands."

Although the Audacy Network is capable of delivering coverage over all fifty states, Puerto Rico, and the U.S. Virgin Islands, the constellation consists of only three spacecraft operating from an inclined MEO orbit. Resultantly, service interruptions can occur when spacecraft are near or below the horizon. As discussed in detail in **Exhibit A**, ground stations situated throughout the coterminous United States, Puerto Rico, and the United States Virgin Islands will experience

[13] 47 C.F.R. §25.146(b).

limited interruption for brief periods during a full day.[14] Ground stations at higher latitudes will enjoy coverage for more than 50% of the time.[15]

Given these coverage downtimes, EOS DS requests a limited waiver of the obligations under Section 25.146(b) for its NGSO systems to provide continuous coverage. Rigid application of Section 25.146(b) in the instant situation would harm innovation and not serve the public interest as the Commission already recognizes. In 2017, the Commission asserted that Section 25.146(b) is likely "unnecessary and counterproductive," and sought comment on a proposal "to remove the domestic coverage requirement for NGSO FSS systems operating in all permitted spectrum bands, which we believe will afford operators greater flexibility in their system designs."[16]

The Commission's proposal has garnered broad industry support, particularly among operators of specialized and innovate NGSO systems. For example, the Boeing Company has supported the withdrawal of Section 25.146(b) to give NGSO operators "the flexibility to optimize the capabilities of their constellations to serve populations in all regions," such as adopting polar orbits tailored for energy, shipping, and aviation industries operating in the arctic.[17] Space X has similarly warned that a mechanical application of Rule 25.146(b) "could effectively preclude an innovative NGSO design" that provides tailored service to identifiable customers yet does not

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[14] For example, ground stations at the approximate latitude of New Orleans should experience a loss of coverage for less than 5% of any given day.

[15] For example, the daily service interruption for earth stations at the approximate latitude of Fairbanks, Alaska will not exceed 35%.

[16] *In the Matter of Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters,* Report and Order and Further Notice of Proposed Rulemaking, IB Docket No. 16-408, para 75-76, (September 27, 2017) (the "2017 R&O").

[17] *In the Matter of Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Comments of the Boeing Company, IB Docket 16-408, at 3, (January 2, 2018).

otherwise provide universal domestic coverage.[18] As noted by SES and O3B Limited, the Commission frequently waives Rule 25.146(b),[19] and removal of the domestic coverage requirement will further encourage the deployment of "flexible and novel NGSO systems reflecting a variety of business cases and usage scenarios without being unduly limited by regulatory constraints."[20]

A limited waiver of the coverage obligation under Section 25.146(b) will further the Commission's stated goal of promoting innovation as outlined in the 2017 R&O, and is consistent with industry consensus towards greater design flexibility and optimization. As the world's only commercial relay network, Audacy represents a milestone in private-public space cooperation that brings innovative capabilities to client satellite systems. Permitting service links in the Ka-band will further enhance Audacy's relay network by allowing customers to make enhanced use of bent-pipe communications between gateways and client earth stations deployed on land, air, and sea. Such tailored secure communication capability is critical for Audacy customers, which include sensitive government end users that need to maintain strict control of their communications. Grant of the limited waiver will also promote spectral efficiency by moving traffic from the congested, scientific bands that were never intended to support large-scale commercial operations. By

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[18] *In the Matter of Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Comments of Space Exploration Technologies Corp., IB Docket 16-408, at 2-3, (January 2, 2018).

[19] *In the Matter of Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Comments of SES S.A. and O3B Limited, IB Docket 16-408, at 3, (January 2, 2018)(citing O3b Limited Applications, SAT-LOI-20141029-00118 and SAT-AMD-20150115-00004 (granted Jan. 22, 2015) and *Space Norway AS*, Order and Declaratory Ruling, IBFS File No. SAT-PDR-20161115-00111, Call Sign S2978, FCC 17-146 at para 20 (rel. Nov. 2, 2017)).

[20] *Id.* at 3.

providing relief to the polar regions and scientific bands, the Audacy Network will in turn clear the way for further innovative services optimized for coverage in these newly decongested areas.

Accordingly, for good cause shown, EOS DS urges the Commission to waive coverage obligations in Section 25.146(b).

IV. PUBLIC INTEREST STATEMENT

As noted in the Audacy Network's initial application, the Audacy Network provides a solution for the demands and burdens that have arisen as a result of the unprecedented surge in new satellite operators. By allowing a large number of space network operators to trunk their communications through Audacy gateways and relays, the Audacy Network offers an innovative means to support LEO operators that are facing coordination and cost issues to utilize and coordinate with ground stations. EOS DS now aims to expand the benefits of its system by adding satellite links that facilitate end-to-end connectivity for customers that may require or prefer to deploy their own closed network via Audacy satellite infrastructure. The proposed modification is a discrete, value add to an innovative relay system that not only affords commercial and federal customers greater flexibility and infrastructure control, but also facilitates Commission and U.S. Government goals for spectrum use and satellite deployment.

Grant of the modification will serve the public interest, convenience and necessity, including because the modification fosters spectral efficiency.[21] As noted in Audacy's initial application, the Audacy Network eliminates the need for individual uplink and downlink frequencies for each system. The proposed modification will further promote spectral efficiency, in furtherance of the Commission's "mission-critical" goal of "making sure that scarce spectrum

[21] *See, e.g., Streamlining Licensing Procedures for Small Satellites*, Statement of Commissioner Geoffrey Starks, IB Docket 18-86, available at https://docs.fcc.gov/public/attachments/FCC-19-81A6.pdf.

is used in the most efficient way,"[22] by moving traffic from the congested, scientific bands not intended to support large-scale commercial operations (most notably the X-band) to bands allocated for FSS where deconflicting in-line interference events can occur seamlessly and without disruption to end user communications. In doing so, the Audacy Network will bring much-needed relief to the communications needs especially for the polar regions.

In addition, grant of the modification will promote national security and deepen private-public partnerships in space. The U.S. Government has long recognized the need for secure communications.[23] The modified Audacy Network, with its inter-satellite links will allow federal customers to communicate directly with end user facilities without funneling communications through remote gateways and or terrestrial infrastructure. Moreover, the Audacy Network will also bring higher throughput to customers, federal or commercial, who may have similar concerns about secure communications and resultantly do not want to rely on remote gateways operated by third parties. Grant of the modification will also fulfill other U.S. Government objectives to expand the commercial space industry through private and government cooperation. For example, the White House has noted the importance of "fostering continued growth and innovation in the U.S. commercial space sector."[24]

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[22] Remarks of Chairman Tom Wheeler, 19th Annual Satellite Leadership Dinner (March 7, 2016), available at https://apps.fcc.gov/edocs_public/attachmatch/DOC-338135A1.pdf

[23] *See generally Critical Information Protection: Commercial Satellite Security Should be More Fully Addressed*, Report to the Ranking Minority Member, Permanent Subcommittee on Investigations, Committee on Government Affairs, U.S. Senate, GAO-02-781 (August 2002), available at https://www.gao.gov/new.items/d02781.pdf; *Challenges to Security in Space*, Defense Intelligence Agency at 6 (January, 2019), available at https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf.

[24] *Space Policy Directive-3, National Space Traffic Management Policy*, Presidential Memorandum, (issued June 18, 2018), available at https://www.whitehouse.gov/presidential-actions/space-policy-directive-3-national-space-traffic-management-policy/ ; *Remarks by Vice President Pence at the Sixth Meeting of the National Space Council*, Remarks, (issued August 20, 2019), available at

The proposed modification will also enhance the Commissions deconfliction objectives. The Commission has repeatedly acknowledged the importance of orbital debris mitigation as the number of satellites in orbit continues to increase.[25] In doing so, the Commission has noted that "the successful identification of satellites and sharing of tracking data are important factors in the provision of timely and accurate assessments of potential conjunctions with other spacecraft."[26] Here, the proposed modification expands the relay capability of the Audacy Network, thereby further enabling the continuous tracking of orbital debris and supporting the "safe and reliable use of space for satellite communications and other activities."[27]

Finally, the proposed modification will allow clients in tropical locations or users that are not close to a gateway with fiber connections, to have better access to the Audacy Network, thereby providing reliable/available relay services and gateway communications between ground users and the Audacy MEO satellites.

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https://www.whitehouse.gov/briefings-statements/remarks-vice-president-pence-sixth-meeting-national-space-council/.

[25] *See In the Matter of Mitigation of Orbital Debris in the New Space Age*, Report and Order and Further Notice of Proposed Rulemaking, IB Docket No. 18-313, para. 4, (April 23, 2020), *available at* https://docs.fcc.gov/public/attachments/FCC-20-54A1.pdf

[26] *Id.* at 54.

[27] *Id.* at 4.

V. CONCLUSION

As demonstrated herein and in the attached materials, the modified Audacy Network will continue to provide innovative satellite services in the United States, is compliant with Part 25 of the Commission's Rules and is in the public interest. Accordingly, EOS DS respectfully requests that the Commission grant the requested modification expeditiously.

Respectfully submitted,

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