

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)
)
AUDACY CORPORATION)
)
Application for Authority)
to Launch and Operate a) File No. SAT-LOA-20161115-00117
Non-Geostationary Medium)
Earth Orbit Satellite System)
in the Fixed- and Inter-Satellite Services)

RESPONSE OF AUDACY CORPORATION

Audacy Corporation (“Audacy”), pursuant to Section 25.154(c) of the rules of the Federal Communications Commission (the “FCC” or “Commission”),¹ hereby submits this Response to the Comments filed in the above-captioned proceeding.² Audacy welcomes the opportunity to address questions and comments about its proposed non-geostationary satellite (“NGSO”) network.³

¹ 47 C.F.R. § 25.154(c).

² See Comments of Hughes Network Systems, LLC (“Hughes”), File No. SAT-LOA-20161115-00117 (filed July 17, 2017) (“Hughes Comments”); Comments of SES S.A. and O3b Limited (“SES”), File No. SAT-LOA-20161115-00117 (filed July 17, 2017) (“SES Comments”); Comments of Space Exploration Holdings, LLC (“SpaceX”), File No. SAT-LOA-20161115-00117 (filed July 17, 2017) (“SpaceX Comments”); Comments of Telesat Canada (“Telesat”), File No. SAT-LOA-20161115-00117 (filed July 17, 2017) (“Telesat Comments”); and Comments of ViaSat, Inc. (“ViaSat”), File No. SAT-LOA-20161115-00117 (filed July 17, 2017) (“ViaSat Comments”).

³ Audacy herein refers to its proposed aggregate network of space- and Earth-based infrastructure as the “Relay Network;” individual satellites as “Relays” or “Satellite Relays;” complementary ground stations as “Gateways;” and spacecraft using the Network’s communication services as “Users” as further described in the legal narrative accompanying Audacy’s application. See *Audacy Corporation Application for Authority to Launch and Operate a Non-Geostationary Medium Earth Orbit Satellite System in the Fixed- and Inter-Satellite Services*, Application, IBFS File No. SAT-LOA-20161115-00117 (filed Nov. 16, 2016) (“Audacy Narrative Exhibit”).

I. INTRODUCTION AND SUMMARY

Audacy proposes a space-based data relay constellation that will provide operators with always-on, seamless access to their NGSO spacecraft. End users of the Relay Network include operators of Earth observation satellites requiring real-time access to photographic and video data, launch providers needing continuous telemetry from onboard sensors, and operators of large Low Earth Orbit (“LEO”) constellations requiring continuous command and control of every satellite simultaneously, wherever they are in their orbit.

As further described in the Audacy Narrative Exhibit, Audacy’s Relay Network provides significant public interest benefits, including facilitating commercial access to 24/7 spacecraft communications and enabling new technologies such as real-time telerobotics and satellite servicing.⁴ In addition, Audacy’s Relay Network will dramatically simplify and streamline the process for coordinating communications between satellites and terrestrial gateway facilities, which has become increasingly complex and impossible in certain situations due to conflicts between commercial and scientific missions in already heavily burdened spectrum.

The Relay Network’s proposed use of V-band frequencies for its feeder link service triggered participation in the instant processing round. Audacy’s use of such frequencies is discrete and can be successfully coordinated and introduced without affecting alternative existing and planned uses of spectrum.

II. AUDACY’S DISCRETE V-BAND FEEDER LINK SERVICE IS COMPATIBLE WITH GSO AND NGSO SYSTEMS

The comments reflect consensus among interested parties that, with appropriate conditions and planning, geostationary (“GSO”) and NGSO systems can successfully share the

⁴ See Audacy Narrative Exhibit at 38-43.

V-band. Audacy agrees and addresses certain recommendations for license conditions intended to prevent unacceptable harmful interference from NGSO networks made by interested parties below.

A. Audacy Concurs with Reasonable Equivalent Power Flux Density Limits

Certain commenters representing GSO interests express concern about interference resulting from NGSO systems creating single-entry or aggregated incidence of unacceptable equivalent power-flux density (“EPFD”).⁵ To address these concerns, the GSO operators, including ViaSat, Hughes, and SES, urge the Commission to condition V-band license grants with EPFD limits.

ViaSat explains that Article 22.2 of the ITU Radio Regulations already applies to NGSOs in the V-band and requires such systems not to cause unacceptable interference to GSO systems.⁶ ViaSat elaborates that appropriate single-entry and aggregate EPFD limits, in both uplink and downlink directions, could be effective means to protect GSOs.⁷ Hughes similarly requests adoption of interim or default EPFD limits comparable to the limits specified in Article 22 of the ITU Radio Regulations.⁸ SES argues for NGSO licenses to “incorporate single entry and aggregate EPFD compliance requirements and be subject to modification as necessary to keep aggregate interference levels from causing harm to future V-band GSO systems.”⁹

Audacy appreciates the need to maintain the utility of the V-band by protecting GSO networks from EPFD-related interference and anticipates a license condition limiting V-band

⁵ See, e.g., ViaSat Comments at 6-7, recommending single entry and aggregate EPFD limits for uplink and downlink operations; SES Comments at 4, similarly recommending single entry and aggregate EPFD limits; Hughes Comments at 2, endorsing ITU Article 22 limits for EPFD and a “realistic and practicable mechanism to ensure that aggregate EPFD limits are met by all licensed Q/V-band NGSO systems.”

⁶ See ViaSat Comments at 5.

⁷ See *Id.*

⁸ See Hughes Comments at 2.

⁹ SES Comments at 4.

EPFD. Audacy has already provided the Commission with materials showing full compliance with existing Article 22 limits for K-band feeder link services¹⁰ and, although Article 22 does not currently list V-band EPFD limits, Audacy is confident that the Relay Network will meet EPFD limits comparable to those in K-band,¹¹ if and when such limits are adopted by the Commission.

Audacy also reemphasizes that its Relay Network will use FSS spectrum for feeder link service only, delivering aggregated traffic using carefully shaped, narrow spot beams to three planned gateway earth stations that will employ large, highly efficient antennas. Accordingly, with the exception of the area in immediate proximity to an Audacy gateway (in this hemisphere Audacy presently plans only a single gateway at a site in California), the Relay Network will *not* contribute to an increase in single-entry or aggregate EPFD. Moreover, given that the Relay Network will communicate exclusively with large (>6.0 meter), highly efficient/high-gain gateway antennas, even under an Audacy spot beam, EPFD levels will likely fall below the levels proposed by other NGSO systems in the instant proceeding.

B. Audacy Can Avoid In-Line Interference Events without Band Segmentation

SES argues that in-line interference events can be avoided through coordination, but that band segmentation may be needed as “a last resort.”¹² Audacy respectfully disagrees that band segmentation may be needed as a last resort to avoid in-line interference with its Relay Network.

Audacy Relays are interconnected by way of robust inter-satellite links.¹³ In the event of

¹⁰ See Letter from Jose P. Albuquerque, Federal Communications Commission, to Ralph Ewig, Audacy Corporation, IBFS File No. SAT-LOA-20161115-00117 (March 10, 2017); Letter from James Spicer, Audacy Corporation, to Marlene H. Dortch, FCC, File No. SAT-LOA-20161115-00117 at 1 (April 3, 2017) (“Audacy Response to FCC Request for Additional Information”).

¹¹ See, e.g., Opposition and Response of Audacy Corporation, File No. SAT-LOA-20161115-00117, at 5 (filed July 7, 2017) (clarifying that the Audacy Relay Network involves discrete feeder links with “EPFD levels fall significantly below ITU-R recommendations.”).

¹² SES Comments at 5.

¹³ See Audacy Narrative Exhibit at 15.

an in-line interference event that cannot be coordinated, the affected Relay will preemptively offload its customer traffic to one of the two other operational Relays and the relevant paired gateway earth stations. Hand-off between Relays will be seamless and undetectable by Audacy end users and provides a reliable interference protection mechanism that facilitates full use of the proposed FSS frequencies for Audacy feeder links.¹⁴ The orbital geometry of Audacy Relay satellite orbits and planned earth station locations is designed to preclude the possibility of multiple simultaneous in-line interference events with equatorial NGSO or GSO satellites such as those operated by SES and its affiliate O3b.

Given this proven and reliable capability, in-line interference can be effectively avoided and the Commission need not impose additional conditions related to the mitigation of such interference.

C. Audacy Supports Reasonable Additional License Conditions to Ensure the Utility of V-Band Spectrum and Compliance with FCC Rules

SES asks the Commission to apply certain conditions to ensure that planned NGSO operations will be consistent with Commission policies and rules and not create unacceptable harmful interference to future GSO satellite operations in the V-band. Audacy agrees with the need to protect GSO spacecraft and supports certain additional license conditions proposed by SES.

Specifically, SES requests, and Audacy supports, the following:

- Operations must comport with the legal and technical specifications set forth by the applicant absent a waiver request.
- Operations must comply with all coordination agreements.

¹⁴ Audacy will continually use state-of-the-art satellite modeling and orbit propagation tools to predict potential interference events with FSS networks well before they occur so that coordination and mitigation techniques can be employed.

- Operators must maintain and make available to the North American Defense Command ephemeris data for each satellite.
- Finalize a methodology by which the system will share spectrum with other NGSO constellations issued prior to or as part of this processing round.¹⁵

III. FAVORABLE TREATMENT OF AUDACY’S LICENSE SHOULD NOT BE DELAYED PENDING THE OUTCOME OF CONTEMPORANEOUS RULEMAKINGS

Several commenters urge the Commission to expand the ongoing NGSO K-band Rulemaking to the V-band and retroactively apply rules adopted in an expanded rulemaking indiscriminately to all applicants in the instant processing round.¹⁶ The NGSO-K-band rulemaking, however, was initiated for the purpose of developing service link rules for networks deploying hundreds (or thousands) of satellites intended to deliver broadband service to small, inefficient earth stations terminals deployed *en masse*.¹⁷

Given the meaningful distinctions between Audacy’s Relay Network, which involves the use of FSS spectrum only for narrowly tailored feeder links between three discrete spacecraft paired with three gateway earth stations, and other NGSO systems involved in the instant proceeding which employ FSS spectrum for widespread service links between large fleets of LEO spacecraft and potentially vast numbers of individual and/or enterprise terminals on the ground, a blanket application of service rules intended to regulate the latter on the former may prove untenable depending on the final rule.

¹⁵ See SES Comments at 6-7.

¹⁶ See Telesat Comments at 2-3; ViaSat Comments at 6-7; see also *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, Notice of Proposed Rulemaking, 31 FCC Rcd 13651 (2016) (“*K-band NPRM*”).

¹⁷ See *K-band NPRM* at ¶ 3, explaining that “proponents of a new generation of NGSO FSS systems have emerged and initiated the international coordination process for constellations of hundreds or thousands of satellites. In this Notice, we primarily explore revisions to specific rules and policies affecting such NGSO FSS systems” (internal citations omitted).

IV. AUDACY CLARIFIES ITS PROPOSED USE OF V-BAND SPECTRUM

SpaceX requests clarification on certain aspects of Audacy's proposed use of V-band spectrum. Specifically, SpaceX requests clarification on Audacy's use of "off-nominal beams," including whether such links will comply with likely EPFD limits.¹⁸

Audacy clarifies that it has applied for 4 GHz and 4.5 GHz of V-band FSS spectrum for its feeder uplink and downlink operations respectively.¹⁹ SpaceX is correct that Audacy has applied for "500 MHz of spectrum in each direction for TT&C links in off-nominal, emergency situations," however this proposed use is in the K-band,²⁰ not V-band as suggested by SpaceX. Audacy has already provided the Commission with showings of full compliance with both FCC and ITU Article 21/22 PFD and EPFD limits in these K-band frequencies by both space and earth stations,²¹ and looks forward to coordinating with individual operators to ensure that there is no possibility of harmful interference in the event that Audacy has recourse to use these bands.

¹⁸ See SpaceX Comments at 13-14.

¹⁹ Audacy Narrative Exhibit at 2.

²⁰ *Id.*

²¹ Audacy Response to FCC Request for Additional Information at 1.

Respectfully submitted,

AUDACY CORPORATION

By: /s/ James P. W. Spicer

Timothy Bransford
Denise Wood
Morgan, Lewis & Bockius LLP
2020 K Street, N.W.
Washington, DC 20006
(202) 373-6000

James P. W. Spicer
Chief Engineer
Audacy Corporation
340 S. Lemon Ave., Suite 8787,
Walnut, CA 91789
(650) 999-0331

Its Attorneys

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CERTIFICATE OF SERVICE

I, Denise Wood, hereby certify that on this 27th day of July, 2017, I served a true copy of the foregoing Response of Audacy Corporation via first-class mail upon the following:

Tim Hughes
Patricia Cooper
SPACE EXPLORATION HOLDINGS, LLC
1030 15th Street, N.W., Suite 220E Washington,
D.C. 20005

William M. Wiltshire
Paul Caritj
HARRIS, WILTSHIRE & GRANNIS LLP
1919 M Street, N.W., Suite 800
Washington, D.C. 20036

Counsel to Space Exploration Holdings, LLC

Gerald E. Oberst
SES S.A.
1129 20th Street, N.W., Suite 1000
Washington, DC 20036

Suzanne Malloy
O3B LIMITED
17th Street, N.W., Suite 300
Washington, DC 20006

Karis Hastings
SATCOM LAW LLC
1317 F Street, N.W., Suite 400
Washington, D.C. 20004

David Wendling
TELESAT CANADA
1601 Telesat Court
Ottawa, Ontario K1B 5P4
Canada

Counsel to SES S.A. and O3b Limited

Christopher J. Murphy
Daryl H. Hunter
VIASAT, INC.
6155 El Camino Real
Carlsbad, CA 92009

John P. Janka
Elizabeth R. Park
Jarrett S. Taubman
LATHAM & WATKINS LLP
555 Eleventh Street, N.W., Suite 1000
Washington, DC 20004

Counsel to ViaSat, Inc.

Jennifer A. Manner
Brennan Price
HUGHES NETWORK SYSTEMS, LLC
11717 Exploration Lane
Germantown, MD 20876

/s/ Denise Wood

Denise Wood