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	)	

REPLY OF ELEFANTE GROUP, INC.

Elefante Group, Inc. ("Elefante Group"), pursuant to Section 309(d) of the Communications Act of 1934, as amended, and Section 25.154 of the Commission's rules,[1] by its attorneys, hereby submits its reply to portions of the Opposition and Response ("Opposition") of Audacy Corporation ("Audacy") in connection with the above-captioned application ("Application") and the Satellite Policy Branch's May 26, 2017, Public Notice.[2] As explained herein, Audacy's Opposition only confirms, as Elefante Group explained in its Comments,[3] that the Commission should defer action on the Application and direct Audacy to supplement its application with additional information and data to allow proper evaluation of the proposed system's spectral compatibility with other services in the 22.55-23.55 and 24.45-24.75 GHz bands. The Commission, in considering the Audacy proposal, should take care so as not to inhibit

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1 47 U.S.C. § 309(d); 47 C.F.R. § 25.154.

2 DA 17-254, Report No. SPB-271 (Sat. Pol. Branch May 26, 2017) ("Public Notice").

3 *See* Comments of Elefante Group, Inc., File No. SAT-LOA-20161115-00117 (filed June 26, 2017)("Elefante Group Comments").

existing and impede emerging Fixed and Mobile solutions, but instead enhance the prospects for diverse systems to share the spectrum and maximize its use.

As an initial matter, Audacy seeks to characterize Elefante Group's stratospheric platforms as unavoidably falling into the category of high altitude platform stations ("HAPS").[4] After attempting unjustifiably to so constrain treatment of Elefante Group's operations, Audacy goes on to suggest that Elefante Group cannot operate within existing allocations in the 22.55-23.55 GHz band absent a new spectrum allocation. To remove any doubt, Elefante Group never stated in its Comments that it would operate as a HAPS in the 22.55-23.55 GHz band. Not all or even most stratospheric operations will fall within what is internationally defined as HAPS. Rather, Elefante Group made clear that its plan is to operate within the existing co-primary allocations in the band, which include the Fixed and Mobile services.[5] These co-primary allocations would readily accommodate Elefante Group's planned operations without the need for a new HAPS spectrum identification.

By way of further explanation, HAPS systems, by definition, as Elefante Group noted in its Comments,[6] are limited to systems at or above 20 km. The FCC's Rules provide that a HAPS is "[a] station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth. (RR)."[7] Stated simply, stations operating below 20 km do not fall

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4 Opposition at 17-19.

5 Consequently, Elefante Group will not respond to those contentions of Audacy that were aimed toward Elefante Group which were based on the assumption that the allocations in the 22.55-23.55 GHz band would not accommodate Elefante's planned operations and that Audacy used as a cover to not responding to many of Elefante Group's significant concerns about the efficiency and spectral compatibility of the Audacy Application.

6 *See* Elefante Group Comments at 13.

7 47 C.F.R. § 2.1.

within the HAPS category of stations.[8] Although the Elefante Group Comments also explained that the international community, in preparation for the 2019 World Radiocommunication Conference ("WRC-19"), is examining additional spectrum for HAPS designations which overlaps with some of Audacy's proposed inter-satellite links ("ISLs") (i.e., at 24.45-24.75 GHz),[9] that hardly constitutes an acknowledgment, implied or otherwise, that Elefante Group plans to operate as a HAPS in the 22.55-23.55 GHz band.

Having clarified that Elefante Group's planned airborne platforms will not be deployed as HAPS as a default matter, it bears repeating that the Commission should take into account the potential impact on the future development of systems operating at the altitudes qualifying for HAPS classification in considering the Audacy application, a concern also raised by Facebook in its comments in connection with the proposed use of the 24.45-24.75 GHz band.[10] Audacy's limited response to these concerns is a contention that there is little to worry about because the 300 MHz of spectrum will be used only in the Advanced User scenario and "represents less than 6% of the total spectrum being considered for United States HAPS use."[11] That argument fails to take into account the potential needs for HAPS spectrum: the 300 MHz of spectrum in question may prove important for the development of a HAPS marketplace of multiple providers – how much spectrum is necessary to support economically and competitively robust deployment of modern HAPS systems is a matter being considered at WRC-19 as part of Agenda Item 1.14.

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8 Moreover, while certain spectrum bands have been designated for HAPS in the footnotes to the Table of Frequency Allocations, these designations are not HAPS *spectrum allocations* on the same level as Fixed, Mobile, or Inter-Satellite ("ISS") Service allocations, but instead fall *within* existing spectrum allocations, i.e., Fixed and/or Mobile allocations.

9 *See* Elefante Group Comments at n.5.

10 *See* Comments of Facebook, Inc. ("Facebook"), File No. SAT-LOA-20161115-00117 (filed June 26, 2017).

11 *See* Opposition at 15.

In its comments, Elefante Group raised a variety of concerns about the spectral efficiency of Audacy's planned operations, none of which Audacy responded to directly in its Opposition.[12] Considering Audacy's dismissal of concerns about potential conflicts with HAPS at 24.45-24.75 GHz, what Audacy fails to point out is that the 300 MHz of its proposal that overlaps with spectrum under consideration for HAPS is *less than 3% of the 11.9 GHz of spectrum that Audacy, as a single satellite applicant, seeks to use for ISLs.* And, notably, by the same measure, the 22.55-23.55 GHz band is only 8.4% of the 11.9 GHz of spectrum Audacy requests for ISLs.[13] By Audacy's own standards in discussing the significance of 300 MHz of 24 GHz spectrum to HAPS systems as a whole, it appears that perhaps the ISS bands are of minimal importance to achievement of Audacy's plans as a single operator.

Audacy does provide some limited additional information – information not clearly found in its original Application materials – in its Opposition in an attempt to answer concerns about potential interference to Fixed and Mobile systems.[14] Although Elefante Group welcomes the

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12 *See* Elefante Group Comments at 1-2 and 15-17.

13 *See* Elefante Group Comments at 1-2.

14 Audacy also seeks to correct one significant error in its Application but, in so doing, apparently introduces unwarranted assumptions in an effort to achieve the same understated result about potential impact on terrestrial systems. A proper analysis shows that the impact to Fixed services may be materially more than Audacy represents. In its Application, Audacy examines the scenario of high elevation angle fixed receivers. *See* Application, Narrative Exhibit, p. 67 (Table 6: Relay → HD FS interference analysis ("Table 6")). Audacy grossly underestimates interference into high gain Fixed service receivers in that situation by miscalculating the interference power. Audacy claims in Table 6 that -124.8 dBW/m^2/MHz PFD (power flux density) incident on the boresite of a 35 dBi antenna results in -159.8 dBW/MHz PSD (power spectral density) interference received, and therefore only -20.8 dB interference to receiver noise floor density ratio, a negligible 0.04 dB increase over the noise floor. At 23 GHz (co-primary with Fixed services and transmitting to the Earth through the base user service so presumably the band analyzed), the PSD value should actually be *-138.5 dBW/MHz* and therefore a 0.52 dB I/N, *a dramatic 3.3 dB increase over the noise floor*. The error appears to have been calculating interference power as PFD (dBW/m^2/MHz) - Gain(dBi), instead of as PFD(dBW/m^2/MHz) + Gain(dBi) + 10log(λ^2 /(4π)).

The Fixed/Mobile link interference analyses provided in Audacy's Opposition (at 13-14) corrects the calculation error but then introduces radical changes in the Fixed service

applicant's acknowledgment that it must take into account the impact on other co-band users, Audacy's clarifications and information raise new questions regarding Audacy's spectrum compatibility and further underscore the need for supplemental data and the exploration of compatibility solutions, a point which Elefante Group already emphasized in its Comments.[15]

For example, Audacy explains in its Opposition that its Base User Service, the one Elefante Group expressed the most concern about, will involve "forward link emissions towards these User satellites in a volume of space up above the earth's surface."[16] But Audacy now claims that only *"[i]n a minority of cases*, a User satellite will appear from the Relay satellites to be passing across the visible earth disc, so any forward link beam from the Relay to the User at that time would intersect the earth's surface. *The majority of the Relays' coverage volume does not intersect the earth's surface,* thus earth-intersecting transmit beams are the exception rather

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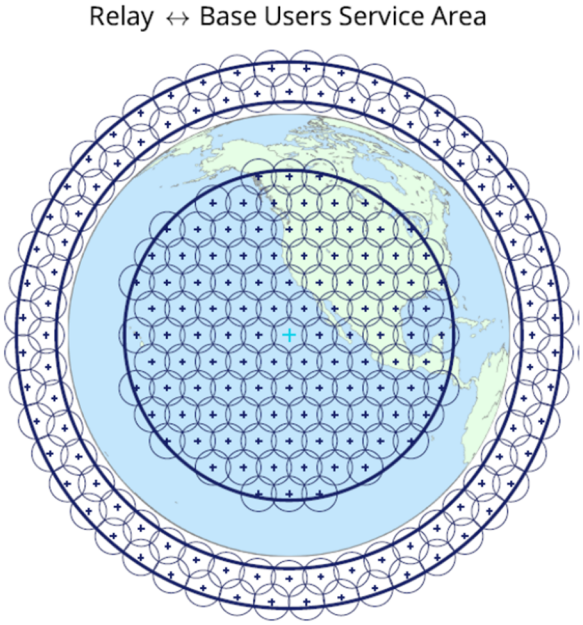
victim receiver characteristics and other unknowns or unstated, and perhaps inexplicable, assumptions (in Audacy's favor) that, when addressed, mask what is still a troubling potential for interference. For example, in Audacy's "Worst-case/Worst-case" scenarios, it is not clear how a -150.7 dBW/MHz interference and -139 dBW/MHz receiver noise results in -13.7 dB I/N rather than -11.7 dB I/N. *See, id.*, at 13. Further, by conveniently reducing the user equipment gain 22 dB from 35 dBi to 13 dBi (albeit increasing incident PFD by 10 dB) – comparing the values in the Application to the Opposition – Audacy proffers the same conclusion of negligible interference in the case of "Interference into Fixed/Mobile Forward Link (user terminal or handset)." *Id.* Using the Application's assumption for receiver gain, however, the I/N actually increases dramatically to 10.3 dB. The Elefante Group analysis, taking into account intended receive gain and full system noise temperature (including antenna noise temperature, not just the receiver noise figure), indicates a corresponding "worst" and "typical" case interference degradation of 16.4 and 12 dB, respectively, and I/N of 16.3 and 11.7 dB, respectively.

15 Elefante Group reiterates that it looks forward, once Audacy provides the supplemental information discussed herein, to an opportunity to collaborate with Audacy to examine measures by which spectrum sharing, and therefore maximum use of the spectrum by all users, may be enhanced.

16 Opposition at 11

than the rule."[17] A majority (109 of 205) of the Base Service beams illustrated in Figure III-3 of the Narrative Statement (reprinted below) are directed at the Earth.[18]



Elefante Group acknowledges that, with the edge of the Earth facing pattern at approximately 25 degrees elevation relative to the Audacy Relay satellites, the majority of the < 1500 km altitude coverage volume nonetheless is served by the 96 beams directed above the Earth's limb. Despite this, Audacy's contentions in the Opposition appear to be a material departure from the Application. The Narrative Statement, Section III-H, describes "hundreds of Users within [Each Relay's] service area,"[19] implying that the number of Base User satellites in the coverage volume uniquely served by the Earth-intersecting beams will not be inconsequential, especially given the large area of the Earth's surface covered by each such beam.

17 *Id.*

18 *See, e.g.,* Application, Narrative Statement, at 16-18 and Figure III-3.

19 *Id.* at 37.

In any event, Audacy's *qualitative* effort at rebuttal cannot be evaluated meaningfully because it is not accompanied by a clear *quantitative* assessment of the percentage of the time that Audacy will transmit above the earth's surface relative to the frequency Base User signals will be directed toward the earth. Audacy makes no commitments in this regard as to how it will operate its network. This information and data about its operations, which Audacy has not satisfactorily provided, is essential to substantiate and better understand Audacy's claims and to assess the potential for compatibility with other operators, including those developing and deploying new and emerging terrestrial applications of the spectrum, such as Elefante Group.[20] The potential severity of interference into these terrestrial applications will be a product of frequency overlap, geometric alignment, and the duty cycle of channels in the Audacy system's beams. Any interference analysis must take all of these into account to assess magnitude and statistical significance. The Commission should require Audacy to supplement its filings to provide this data and related quantitative assessment to ensure a proper evaluation of the potential compatibility of its proposal with other uses of the spectrum can be undertaken by interested parties.

In an attempt to further placate concerns about potential interference to Fixed and Mobile systems, Audacy clarifies in its Opposition that it "will only transmit on beams that have a User satellite passing through them and when the operator of that User satellite has requested instantaneous command use of Audacy's network."[21] Without providing supporting data, Audacy asserts that "[i]t is highly unlikely that the Network would have a sufficiently large

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20 This data would also be useful to ascertain the feasibility of Audacy not using the 22.55-23.55 GHz Band (or the 24.4.5-24.75 GHz band, for that matter) for down link "earth-intersecting transmit beams," one of several measures Elefante Group suggested in its Comments could and should be considered. *See* Elefante Group Comments at 16-17.

21 Opposition at 11-12.

number of Users, all of whom are commanding their satellites simultaneously, to necessitate the concurrent operation of all Relay transmit beams."[22] Audacy adds that "any single location on the earth's surface would not be in the direct boresight of the Relay's transmit beam for more than an instant at a time."[23] However, in contrast with these statements, it appears that in the Base User scenario, the beams, due to their two degree 3dB beamwidths, are not narrowly targeted on individual User satellites so as to substantiate that statement, but, at the Earth's surface, they are rather broad, indeed, hundreds of miles in radius. By way of proof, Figure III-3 of the Narrative Statement of the Application, copied above, depicts five contiguous beams in the Base User scenario as sufficient to stretch the twenty-five hundred miles from the East to the West Coast of the continental United States.

Consequently, a single Base User satellite will be within a given Earth-intersecting beam much longer than "an instant at a time," which is what matters for a compatibility analysis since the entire beam's footprint on the surface may remain illuminated for as long as a single User satellite is within the beam, depending upon the service received. The dynamic effect of multiple Base User satellites in the beam will only compound the potential incompatibilities.

Consequently, rather than assuaging the compatibility concerns Audacy correctly acknowledged the need to respond to, Audacy's Opposition leaves numerous questions open: how many Base Users does Audacy anticipate, i.e., what does Audacy mean when it projects a "limited" number of Users? What is the expected duty cycle of each of the Earth-intersecting beams if Audacy reaches its projected number of Base Users (and, separately, what is the

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22 *Id.* Of more than passing interest, Audacy allows that continuous, simultaneous transmission "would likely be detrimental to the performance and lifetime of the Relays," *id.* at 12, which itself raises a number of additional questions regarding the capacity and efficiency of the Audacy design.

23 *Id.* (emphasis added).

number of Base Users before operations would be "detrimental to the performance and lifetime of the Relays")? Based on the services Audacy will provide, what will be the mean, median, and distribution (e.g., in terms of deciles of duration) of transmission durations to Base Users?[24] Will the communications be limited to command and control operations in support of the Base User satellites or handle a variety of communications? These and related questions are all begging for answers to allow spectrum compatibility analyses related to the proposed Audacy Application to be undertaken. Further and more importantly for companies like Elefante Group (and one would presume, Audacy) that wish to focus their energy and resources, as much as possible, on deploying their networks and serving customers, this information will be very useful for developing spectrum efficient sharing solutions, minimizing the incidence of, if not eliminating altogether, any meaningful impacts on the provision of service. Again, the Commission should require this information to be provided or identified to allow Audacy's potential impact on other systems to be properly evaluated before the Commission considers taking any action on the Application.

In conclusion, for the reasons set forth above and in Elefante Group's initial comments, which are incorporated here by reference, the Commission should defer acting on Audacy's Application. The Commission should require Audacy to supplement its Application to allow its proposed operations to be properly and quantitatively understood by other users and interested

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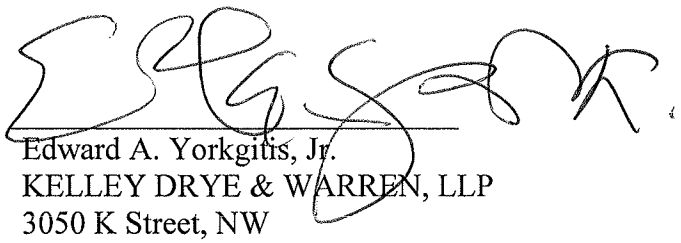
[24] Possibly these questions are ones to which Audacy has not yet assigned quantitative measures. It certainly would be difficult for an outside party to provide the metrics for Audacy. One option for the percentage time an area of the Earth will be illuminated by the Relay satellite might be look at a sample set of low earth orbiting ("LEO") satellite orbits and, based on data rates and the time for which forward control link will be active for the LEO satellites, Audacy can estimate the percentage time their Relay satellites will illuminate earth's surface. This, combined with an average number of Base User satellites Audacy anticipates will be in any given beam, taking into the dynamic nature of the beam patterns, will give a possibly reasonable estimation of this parameter.

parties. This information is needed so that matters of the proposal's spectral compatibility and potential ability of Audacy and other services in the 22.55-23.55 and 24.45-24.75 GHz bands to share can be appropriately assessed. Elefante Group welcomes that opportunity and the chance to work with Audacy to develop efficient solutions to maximize the availability of affected spectrum bands for all users. While the Audacy systems may appear to be an innovative solution, it should not be granted at the expense of other existing and emerging, and more efficient, applications in common spectrum bands, especially when, with additional information and collaboration, there is a strong prospect that diverse systems can all be accommodated.

Respectfully submitted,

ELEFANTE GROUP, INC.



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DECLARATION OF WILLIAM WHITE

I, William White, declare under penalty of perjury that the following is true and correct:

1. I am Chief Technology Officer to Elefante Group, Inc.

2. I have read and am familiar with the content of the Reply of Elefante Group, Inc. filed on this date in the above-referenced matter. I have personal knowledge of the facts alleged therein pertaining to Elefante's system and its analysis of Audacy's Application, and such facts are true and correct to the best of my knowledge, information, and belief.

William White

Executed on July 14, 2017

CERTIFICATE OF SERVICE

I hereby certify that I have caused a true and correct copy of the foregoing Reply of Elefante Group, Inc. to be served via U.S. Mail on this 14th day of July 2017, to the following:

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