

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Globalstar, Inc. Petition for Notice of Inquiry	)	RM-11808
Regarding the Operation of Outdoor	)	
U-NII-1 Devices in the 5 GHz Band	)	

**REPLY COMMENTS OF HEWLETT PACKARD ENTERPRISE**

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## I. INTRODUCTION AND SUMMARY

Hewlett Packard Enterprise (“HPE”) joins the diverse group of companies opposing Globalstar’s Petition for a Notice of Inquiry relating to an alleged increase in noise levels experienced by its satellites operating in a band overlapping U-NII-I. HPE is a U.S.-based technology and services company. Our Aruba business unit is one of the largest providers of managed wireless local area network (“WLAN”) infrastructure, shipping millions of Wi-Fi access points every year, representing 15 percent of the global enterprise and service provider market for these devices.<sup>1</sup> Aruba is the second largest supplier of outdoor WLAN solutions in the United States according to Dell’Oro,<sup>2</sup> so we have a profound interest in this matter.

The record makes it clear that Globalstar’s submission falls far short of establishing that the Commission should initiate a rulemaking because it (1) admits that it is not experiencing harmful interference, (2) fails to demonstrate that unlicensed operations are the cause of its claimed measurements, and (3) fails to demonstrate that noise levels will ever rise to a level that would cause harmful interference. Because of these failures, the FCC should not undermine investment in broadband service by initiating a disruptive and unnecessary proceeding. As the Commission is aware, Wi-Fi is an indispensable part of the nation’s communications infrastructure, carrying about half of all internet traffic.<sup>3</sup> U-NII-I comprises approximately a third

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<sup>1</sup> IDC, *Worldwide Enterprise WLAN Market Sees Steady Growth in Full Year and Q4 2017*, (Mar. 1, 2017), <https://www.idc.com/getdoc.jsp?containerId=prUS43599518>.

<sup>2</sup> Aruba, *Aruba’s Enterprise Wireless LAN Market Share Rises in New Dell’Oro Report* (Mar. 1, 2010), <http://news.arubanetworks.com/press-release/arubas-enterprise-wireless-lan-market-share-rises-new-delloro-report>.

<sup>3</sup> Cisco, *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2016–2021* 21-22 & fig.23 (2017), <https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.pdf> (“Cisco Visual Networking Index”).

of the spectrum generally available for Wi-Fi deployments, excluding bands encumbered by challenging Dynamic Frequency Selection rules. Merely to open a proceeding, therefore, would cause significant uncertainty and chill investment in a key portion of the nation's commercial spectrum inventory, hamstringing efforts to deploy 5G technologies which rely on significant unlicensed spectrum reserves. Moreover, as Globalstar itself highlights, U-NII-1 is not just important for Wi-Fi but also implicates LAA and other deployments by carriers seeking to leverage unlicensed spectrum to build network capacity.

## **II. GLOBALSTAR FAILS TO PROVIDE RELIABLE INFORMATION ABOUT SYSTEM CAPACITY AND DEMAND, UNDERMINING ITS CLAIMS OF FUTURE HARMFUL INTERFERENCE.**

Globalstar acknowledges that whether any potential noise actually affects its ability to serve its customers is a function of system capacity, demand for service, and magnitude of the interference.<sup>4</sup> But Globalstar fails to substantiate its claims of potential future interference along any of these three axes.

Globalstar fails to provide to the Commission the basic information about its system capacity and service demand needed to support its claim. In fact, Globalstar provides a significant amount of *misinformation* about the utilization of feeder link spectrum at issue in its petition. As NCTA's opposition reveals, Globalstar relies on numerous statistics about, for example, its SPOT service and the number of messages transmitted using the "SPOT and other simplex" service.<sup>5</sup> Globalstar also provides a map apparently depicting the locations where its SPOT service is used on a given day.<sup>6</sup> But Globalstar fails to disclose that these simplex services

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<sup>4</sup> Globalstar, Inc. Petition for Notice of Inquiry at 15-17, RM-11808 (filed May 21, 2018) ("Globalstar Petition").

<sup>5</sup> See *id.* at 4; Opposition of NCTA at 1-2, RM-11808 (filed July 6, 2018) ("NCTA Opposition").

<sup>6</sup> Globalstar Petition at 4.

*do not use the feeder link spectrum at issue here.*<sup>7</sup> Usage statistics for Globalstar’s simplex service are irrelevant to any analysis of the potential impact of interference to its 5.1 GHz feeder links.

Likewise, Globalstar repeatedly touts the use of its system during Hurricane Katrina and anchors its capacity reduction forecast off of the 78% peak load seen on certain spot beams at that time.<sup>8</sup> Again, however, Globalstar fails to disclose that this occurred well before its second-generation satellites were launched and it began offering the duplex service at issue here.<sup>9</sup> Nor do they disclose—as NCTA noted—that the second-generation satellites feature a 40% increase in capacity which substantially offsets the hypothesized 35% worst-case reduction due to outdoor unlicensed devices.<sup>10</sup> Globalstar acknowledges that, prior to 2014 and to the launch of its second-generation satellites, it was unable “to offer commercially acceptable levels of Duplex service due to the degradation of our first-generation constellation”<sup>11</sup>—the only services relevant here. Thus, Globalstar’s claims about utilization during the Hurricane Katrina recovery efforts also do not relate to usage of duplex services on its second-generation satellites.

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<sup>7</sup> See Roberson and Associates, LLC, *Impact of Iridium Operations in 1616-1617.775 MHz on Globalstar Operations* (Jan. 2015), as attached to Letter from Regina M. Keeney, Counsel for Globalstar, to Marlene H. Dortch, Secretary, Federal Communications Commission, RM-11697 (filed Jan. 14, 2015).

<sup>8</sup> Globalstar Petition at 17; Roberson and Associates, LLC, *Analysis and Impact of Noise Rise in Feeder Uplinks of Globalstar Mobile Satellite Network* 45 (May 2018) (“Roberson 2018 Report”) (attached to Globalstar Petition as Appendix B).

<sup>9</sup> See *Globalstar Licensee LLC Application for Modification of Non-Geostationary Mobile Satellite Service Space Station License et al.*, Order, 26 FCC Rcd. 3948, 3950-51 ¶ 5 (IB 2011); Globalstar, Inc., Annual Report (Form 10-K), at 13 (filed Feb. 23, 2018), available at <https://www.globalstar.com/corporate/investors/sec-filings> (“Globalstar 10-k”).

<sup>10</sup> Roberson 2018 Report at 3; NCTA Opposition at 10.

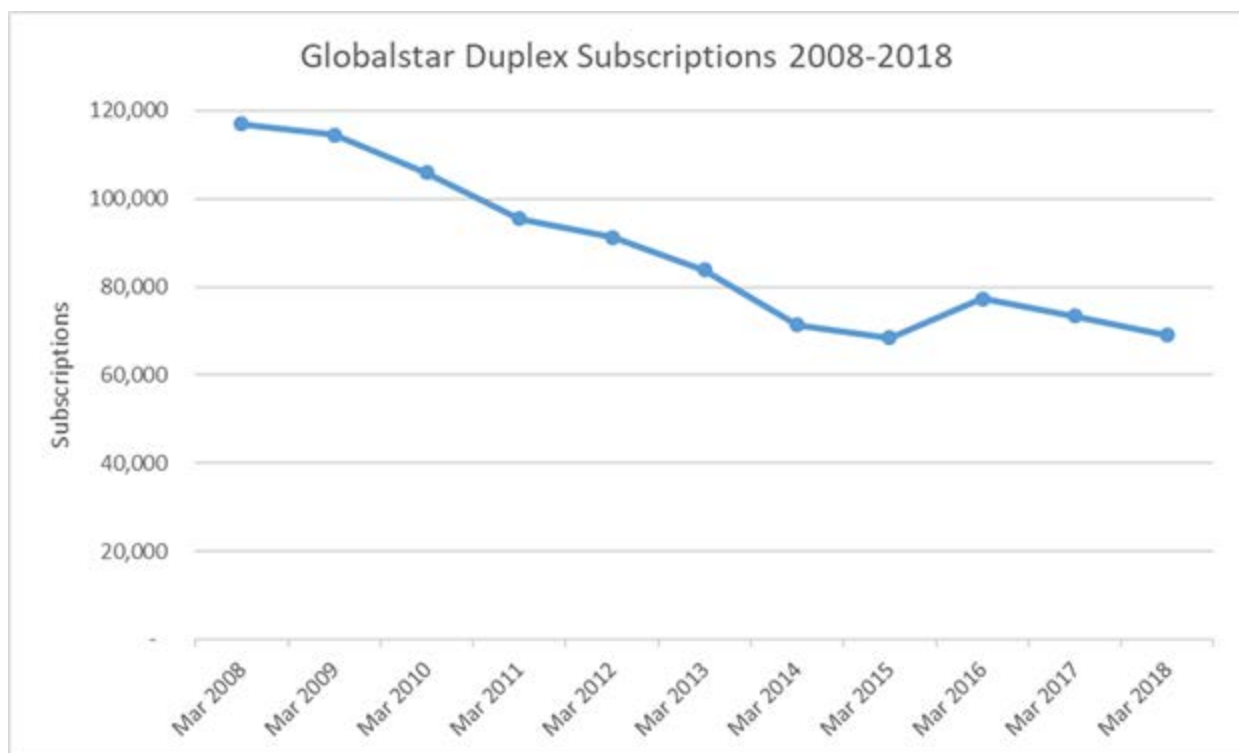
<sup>11</sup> Globalstar 10-K at 13.

Most critically, the Roberson Report states that “[s]ince 2005, the number of voice and data subscribers on Globalstar’s network has increased”—which is true insofar as it goes. However, they choose to omit the fact that the two-way duplex service that employs the spectrum at issue declined by over 40% over the last 10 years, to just 69,033 subscribers as of March, 2018 from 116,971 in March, 2008.<sup>12</sup> Duplex subscribers are now just 9.5% of total direct subscriber lines. These misrepresentations matter greatly because Globalstar explicitly alleges injury based on growth of a service that does not use this spectrum, while avoiding any mention of the steadily declining use it has been reporting for years in the service that does. Meanwhile, unlicensed spectrum in the U.S. has recently been shown to have increased from \$140 billion in 2011 to over \$525 billion in 2017, and is on track to reach \$834 billion by 2020.<sup>13</sup> The Commission should be clear-eyed when it weighs the public interest against any alleged harm.

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<sup>12</sup> Compare Globalstar, Inc., Quarterly Report (Form 10-Q), at 32 (filed May 10, 2018), *available at* <https://www.globalstar.com/corporate/investors/sec-filings>, with Globalstar, Inc., Quarterly Report (Form 10-Q), at 26 (filed May 11, 2009), *available at* <https://www.globalstar.com/corporate/investors/sec-filings>.

<sup>13</sup> Telecom Advisory Services LLC, *A 2017 Assessment of the Current & Future Economic Value of Unlicensed Spectrum in the United States* 3, Graph A (Apr. 2018), *available at* [http://dynamicspectrumalliance.org/wp-content/uploads/2018/05/WiFi-Foward Economic-Value Shared-Spectrum Report\\_05172018.pdf](http://dynamicspectrumalliance.org/wp-content/uploads/2018/05/WiFi-Foward_Economic-Value_Shared-Spectrum_Report_05172018.pdf).



### **III. GLOBALSTAR DOES NOT DEMONSTRATE THAT ITS MEASUREMENTS ARE RELIABLE OR RELATED TO UNLICENSED DEPLOYMENTS.**

Globalstar's assertions about the measured noise increase and its relationship to unlicensed deployments are no more reliable, and further demonstrate the insufficiency of its petition. As Cisco explains in its opposition, Globalstar's measurements cover only two minutes of measurement once—and in recent months, twice—per month. And that small number of measurements was performed using on-board telemetry systems that evidently are only capable of measuring noise-level variations of 1-2 dB.<sup>14</sup> Therefore, as Cisco notes, Globalstar's measurements provide no way of closely tracking the noise increase over time in order to compare deployment rates of unlicensed devices with noise level increases over time. In fact, the

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<sup>14</sup> Globalstar Petition, Appendix A at 17-18. *See also* Opposition of Cisco Systems, Inc. at 2-3, RM-11808 (filed July 6, 2018).

measurements are so coarse that some or all of Globalstar's claimed noise rise may be swamped by measurement error. Although Globalstar claims that the measurements have an accuracy of +/- 0.5 dB, this appears to ignore the equivalent or even greater uncertainty involved in Globalstar's baseline noise measurements which were made at even lower levels of precision.<sup>15</sup> The extremely limited data Globalstar has provided is also insufficient to determine whether the measured noise rise tracks the well-known busy-hour patterns of Wi-Fi networks, where power emitted varies dramatically with diurnal changes in consumers' internet usage. The overwhelming majority of Globalstar's data was collected during the hours of 9:00 AM to 6:00 PM EDT (1:00-10:00 PM GMT), making it impossible to determine whether Globalstar's measurements reflected the characteristic busy-hour variation. In recent months, however, Globalstar appears to have added a small number of measurements at approximately 8:00-9:00 AM GMT—well after the end of busy hour in most of the United States, which extends from approximately 7:00-11:00 PM local time. These results are too few and too ill-timed to provide any significant evidence that Globalstar's measurements track busy-hour utilization (especially when combined with the extremely significant imprecision in Globalstar's measured results). But what Globalstar has provided suggests that there is *no* significant correlation between time of day and measured noise levels, again indicating that unlicensed deployments are likely not the cause of the measured noise.

Moreover, Globalstar acknowledges that each of its measurements was taken over the same point in the center of the United States, where the satellite could have received interference from not just anywhere in the United States, but also anywhere in Mexico and nearly anywhere

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<sup>15</sup> See *id.*, Appendix A at 17 (providing a typical “input power transfer curve” used by Globalstar's satellite telemetry system).



in Canada. Thus, Globalstar has failed to exclude potential noise sources outside of the United States which would, of course, have nothing to do with unlicensed U-NII-1 deployments in the U.S. The fact that these measurements were all made in the same location also means that Globalstar has no information about the relationship between measured noise levels, geographic area, and elevation angle, all of which could have provided useful information about the true source of the measured interference.

Compounding these challenges, as NCTA highlights, Globalstar did not restrict its measurements to frequencies where unlicensed devices operate.<sup>16</sup> The Globalstar feeder links at issue operate across the 5096-5250 MHz band, only 100 MHz of which overlaps the U-NII-1 band. But Globalstar's measurement approach apparently does not distinguish between noise in the U-NII-1 band and noise in the remainder of its feeder link spectrum. This is significant because unlicensed devices do not operate in this lower portion of the band, but it is home to other potential sources of interference such as aeronautical radio systems operating under Part 87 of the Commission's rules.<sup>17</sup>

Notably, Globalstar was forced to launch its second-generation constellation due to unexpected deterioration of the S-band antennas on its first-generation satellites, making duplex service impossible.<sup>18</sup> This rapid deterioration was generally attributed to Globalstar's chosen orbital location of 1,414 km—an orbital location that most operators avoid due to serious

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<sup>16</sup> NCTA Opposition at 5-6.

<sup>17</sup> See 47 C.F.R. § 87.173 (listing frequencies available for various types of aviation services).

<sup>18</sup> Globalstar 10-k at 13; Via Satellite, *Degradation of Satellites Threatens Globalstar's Service, Business Plan* (Feb. 12, 2007), <https://www.satellitetoday.com/telecom/2007/02/12/degradation-of-satellites-threatens-globalstars-service-business-plan/>.

radiation hazards.<sup>19</sup> Globalstar's second-generation satellite operates at the same altitude<sup>20</sup> and, while its satellites have apparently been improved relative to the failed first-generation constellation, Globalstar continues to warn that "anomalies are likely to be experienced in the future."<sup>21</sup> In addition to the numerous other deficiencies in its petition, Globalstar fails to demonstrate that its measurements are not the result of gradual degradation of its second-generation satellites' receiver components. This is especially curious considering that Globalstar's measurements appear to vary significantly from satellite to satellite and do not correspond to any known patterns of terrestrial spectrum use. Globalstar claims that the alleged 1 dB and 2 dB rises are separated by a remarkably short interval of as little as four months,<sup>22</sup> and reports inconsistent detection levels by receivers across the Globalstar fleet. Robertson indicates that roughly 1 million outdoor access points must be deployed for each 1 dB of noise floor rise.<sup>23</sup> While it is within the realm of possibility that 1 million outdoor access points could have been deployed over three years, it strains credulity to imagine that U.S. outdoor operators have deployed *another* 1 million outdoor access points in just four months.

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<sup>19</sup> *Id.*

<sup>20</sup> Globalstar, Inc. Amendment to Application for Modification of Mobile Satellite Service Space Station License and Application for Modification of Mobile Satellite Service Earth Station and Mobile Earth Terminal Licenses at 9, File No. SAT-MOD-20080904-00165 (filed Dec. 21, 2009).

<sup>21</sup> Globalstar 10-k at 13.

<sup>22</sup> Globalstar Petition, Appendix A at A-3.

<sup>23</sup> Roberson 2018 Report at 28.

**IV. THE ANALYSIS BY ROBERSON AND ASSOCIATES DOES NOT SUPPORT GLOBALSTAR'S ASSERTION THAT THE ALLEGED NOISE RISE WAS CAUSED BY UNLICENSED OPERATIONS.**

Although Globalstar claims that an analysis by Roberson and Associates, LLC confirms its measurements and establishes that the measured noise increase is caused by unlicensed operations,<sup>24</sup> the Roberson analysis actually does the opposite. Roberson's analysis consists of a simple mathematical approximation of unlicensed emissions assuming a limited range of antenna types and radiation patterns. It does *not* include any reliable analysis of the number of access points operating in U-NII-I, how many of them operate outside, their power levels, or their intensity of use, all of which are critical factors for accurately modeling potential interference.<sup>25</sup> Rather, the Roberson paper analyzes the sensitivity of its analysis to these factors, and then *selects* values that cause the output of its model to match Globalstar's measurements. For example, Roberson claims to compare "between the noise rise predicted by the analysis in Section 4.I and the actual noise rise observed by the MSS satellites in 5170-5250 MHz," but instead of comparing predicted and measured results, the "predicted" results are adjusted to match:

If 10% (or approximately one million) of the 10 million access points claimed to be deployed by the NCTA are in use outdoors, then the noise rise is consistent with a business hour access point duty cycle of 10%. . . . [T]he same observed noise rise would be produced by other combinations of likely duty cycles and numbers of outdoor U-NII-I access points. For example, 250,000 AP's operating

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<sup>24</sup> See Globalstar Petition at 12; Roberson 2018 Report.

<sup>25</sup> In one of Roberson's few attempts to account for real-world deployment patterns, it reviewed deployment statistics from Google's free Wi-Fi deployment in Mountain View, CA. On the basis of this one deployment—which was not limited to U-NII-I—Roberson extrapolates to a possible maximum of 45 million outdoor Wi-Fi deployments. Roberson 2018 Report at 21. But a single deployment by a single operator in a Silicon Valley community is hardly representative of future Wi-Fi deployments writ large, let alone in the specific band relevant here, U-NII-I.

at an average duty cycle of 40% or 500,000 APs operating at an average duty cycle of 20% also produce this noise rise.<sup>26</sup>

Roberson does not ask the next, most important question: do any of these combinations of assumptions correspond to actual unlicensed usage in U-NII-I? According to the best available evidence, they do not. In fact, they are widely off the mark—actual duty cycles and outdoor deployment rates are both well below the values Roberson assumes. For example, a comprehensive analysis of possible future 6 GHz deployments, based on a review of 5 GHz deployment characteristics, found that outdoor access points are likely to comprise only 0.6% of device shipments—a far cry from any of the values Roberson considered.<sup>27</sup> The same is true of Roberson’s duty-cycle assumptions: a United States contribution to the International Telecommunications Union’s Working Party 5A specifically addressed the question of typical duty cycles for unlicensed devices in U-NII-I and concluded that a typical duty cycle was approximately 5%—half the minimum of 10%—that Roberson assumed.<sup>28</sup>

Thus, a comparison of Roberson’s predictions to Globalstar’s measurements tends to confirm that Globalstar’s measurements are either inaccurate or reflect noise from a source other than unlicensed devices. Consistent with other studies—including the U.S.’s own Working Party

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<sup>26</sup> *Id.* at 25-26.

<sup>27</sup> RKF Engineering Services, LLC, *Frequency Sharing for Radio Local Area Networks in the 6 GHz Band* 13 (Jan. 2018), as attached to Letter from Paul Margie, Counsel to Apple Inc., Broadcom Corporation, Facebook, Inc., Hewlett Packard Enterprise, and Microsoft Corporation, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 17-183 (filed Jan. 25, 2018).

<sup>28</sup> See *Working Document Towards a Preliminary Draft New Report ITU-R M.[RLAN REQ-PAR]*, Document 5A/722-E, at 11 (May 8, 2018).

5A contribution<sup>29</sup>—Roberson’s analysis actually tends to confirm that unlicensed activity in U-NII-I is not causing and will not cause harmful interference to Globalstar’s feeder links when adjusted to incorporate accurate assumptions about unlicensed use.

Roberson also discusses the “Evidence That Satellite Noise Rise is Due to Wi-Fi Interference.”<sup>30</sup> But this section discusses only a single drive test that Roberson conducted in the suburbs of Chicago. The unsurprising result of this exercise was the detection of a significant amount of Wi-Fi traffic in U-NII-I and little energy in the adjacent 5096-5170 MHz band. But the fact that there are few emissions in the 5096-5170 MHz band in a single area of suburban Chicago, during the course of a single measurement, fails to meaningfully address the potential for interference from operations in that band, since Globalstar’s satellites could be receiving interference from anywhere in the United States, Canada, or Mexico. Would Globalstar consider a single test drive in a single location to establish the amount of Wi-Fi energy levels its satellites may receive across the entire country? Of course not, but it asks the FCC to accept this approach for non-Wi-Fi operations. This approach does not provide useful evidence about the true source of the reported noise rise.

Indeed, this discussion ignores virtually every issue in dispute—the efficacy of the elevation mask for outdoor unlicensed access points, the prevalence of outdoor unlicensed deployments, typical unlicensed power levels and duty cycles, etc. The question is not whether unlicensed devices operate in U-NII-I. Indeed, there is little dispute that U-NII-I is a key Wi-Fi band and, therefore, one of the most important bands for terrestrial wireless communication in

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<sup>29</sup> *Sharing and Compatibility Study Between WAS/RLAN Applications and NGSO Systems in the Mobile Satellite Service with FSS Feeder Links Operating in the 5091-5250 MHz Band*, Document 5A/727-E (May 9, 2018).

<sup>30</sup> Roberson 2018 Report at 14.

the United States. The question is whether sharing rules that restrict these operations are sufficient to protect Globalstar's modest uplink traffic given the operational characteristics of real-world unlicensed deployments. But on this topic, the Roberson report is tellingly silent.

## V. CONCLUSION

Globalstar has plainly failed to establish even the basic prerequisites for its petition. It explicitly acknowledges that the reported phenomenon does not constitute harmful interference.”<sup>31</sup> It misrepresents the declining usage level of the duplex service that uses this spectrum while implying risk to growing simplex services that do not. In addition, it fails to demonstrate that the noise rise it has measured is caused by unlicensed deployments, fails to show that future unlicensed deployments will cause this noise level to rise to harmful levels, and fails to show that its service is sufficiently utilized that its operations would be impaired even if the noise level were to rise. Accordingly, the Commission should dismiss the petition and not open an unnecessary proceeding that could significantly undermine a crucial band for commercial wireless operations.

Respectfully submitted,

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<sup>31</sup> Globalstar Petition at 2-3, n.8; Roberson 2018 Report at 2.

## **CERTIFICATE OF SERVICE**

I hereby certify that, on this 23<sup>rd</sup> day of July, 2018, a copy of the foregoing pleading was served via First Class mail, postage paid, upon:

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