Straight Path Communications, Inc.
600 Sylvan Ave. Suite 402
Englewood Cliffs, NJ 07632

June 1, 2016

VIA ELECTRONIC FILING

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Written *Ex Parte* Presentation

GN Docket No. 14-177, *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*

Dear Ms. Dortch:

In a series of recent *ex parte* filings, The Boeing Company ("Boeing") claims that "it is developing a non-geostationary satellite orbit ("NGSO") satellite system that requires access to the entire fixed-satellite service ("FSS") allocation in the V-band to provide low-latency and very high data-rate broadband services" and requests that the Commission allow non-gateway FSS ground stations and a 12 dB increase in FSS power flux density ("PFD") limit in the 37 GHz and 39 GHz bands.[1/] Straight Path Communications, Inc. ("Straight Path") opposes Boeing's proposal and urges the Commission to adhere to its proposal to create capacity for 5G mobile broadband in the 37 GHz and 39 GHz bands, as well as in the 28 GHz band.

The Commission's Proposal Strikes the Correct Balance Between Terrestrial and Satellite Needs

While there are few details about proposed satellite use of the millimeter wave bands – particularly at 37 GHz and 39 GHz – there has been a substantial amount of work in those bands by the information and communications technology ("ICT") sector to which the Commission's proposal responds. Significant investment has been committed to 5G research and development, and major milestones have been achieved on research, prototype development, demonstration, trial systems, and global standardization. Feasibility has been demonstrated by leading

[1/] *See, e.g.*, Letter from Bruce A. Olcott, Counsel to The Boeing Company to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al.*, at 5 (filed May 27, 2016); Letter from Bruce A. Olcott, Counsel to The Boeing Company to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al.*, at Attachment, "Broadband Satellite Services in the 37/39 GHz Bands" (filed May 25, 2016).

infrastructure vendors including Ericsson,[2/] Samsung,[3/] and Nokia,[4/] among others. 5G standardization has commenced in full scale in 3GPP. The United States is appropriately leading in 5G commercialization with Verizon,[5/] AT&T,[6/] T-Mobile,[7/] and Sprint[8/] starting or announcing trial and deployment plans for 2016 or 2017. Straight Path also plans to trial a 39 GHz phased array transceiver in 2016.

These plans have proceeded based on the current "soft segmentation" regime in the 37.5–40 GHz and 40–42 GHz bands. Boeing's requests to allow non-gateway ground stations and to increase the PFD limits in the 37 GHz and 39 GHz bands would frustrate both industry and Commission goals by making the provision of terrestrial services in these bands untenable. Boeing provides no legitimate justification for its proposed significant expansion of FSS rights in the 37 GHz and 39 GHz bands and rejection of the soft segmentation approach, particularly given the fact that there has been no deployment of FSS service in the entire 37.5–42 GHz band for the 12 years that spectrum has been available for FSS. Moreover, Boeing does not demonstrate why the soft segmentation plan, which already makes the 40–42 GHz band available for satellite use in line with Boeing's proposal (*i.e.*, allowing non-gateway ground stations and -105 dBW/m^2/MHz PFD), is insufficient.

Under Boeing's plan, the Commission would make a total of nine gigahertz of spectrum available for FSS use. Yet the Commission has only proposed to make 3.85 GHz of spectrum in the proceeding – in the 28 GHz, 37 GHz, and 39 GHz bands – available for 5G mobile broadband, which is the primary purpose of the proceeding.

Dedicating Spectrum for Mobile Broadband Will Provide Significant Capacity for 5G

While FSS has a role in broadband access, especially in places where terrestrial services cannot reach, the Commission must recognize the capacity requirements that spectrum designated for mobile broadband can satisfy. The satellite industry argues that reuse factors for FSS system can

---

2/ *See, e.g.*, Press Release, *T-Mobile and Ericsson partner for 5G pre-standard trials*, Ericsson (Feb. 23, 2016), *available at* http://www.ericsson.com/news/1988513.

3/ *See, e.g.*, White Paper, *5G Vision*, Samsung Electronics Co., Ltd., at 13 (Feb. 2015), *available at* http://www.samsung.com/global/business-images/insights/2015/Samsung-5G-Vision-0.pdf.

4/ *See, e.g.*, Press Release, *Brooklyn 5G Summit showcases Nokia innovations accelerating 5G and the evolution of the Internet of Things*, Nokia.com (Apr. 18, 2016); *available at* http://networks.nokia.com/news-events/press-room/press-releases/brooklyn-5g-summit-showcases-nokia-innovations-accelerating-5g-and-the-evolution-of-the-in.

5/ *See, e.g.*, Letter from Maggie McCready, Vice President, Federal Regulatory and Legal Affairs, Verizon to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, ET Docket No. 15-105 at 1 (filed Dec. 18, 2015).

6/ *See, e.g.*, Press Release, *AT&T Unveils 5G Roadmap Including Trials In 2016*, AT&T (Feb. 12, 2016), *available at* http://about.att.com/story/unveils_5g_roadmap_including_trials.html.

7/ *See* note 2 *supra*; *see also, e.g.* Dan Meyer, *T-Mobile 5G plans look to maintain pace with AT&T and Verizon*, industrialiot5g.com (Apr. 15, 2016), *available at* http://industrialiot5g.com/20160415/5g/t-mobile-5g-plans-look-maintain-pace-att-verizon.

8/ *See, e.g.*, Sean Kinney, *CEO details Sprint 5G plans, upcoming trial*, industrialiot5g.com (May 4, 2016), *available at* http://industrialiot5g.com/20160504/5g/sprint-5g-plans-tag17.

be high.[9/] However, the 4.3 gigahertz of spectrum used by O3b Limited ("O3b") does not overlap with the three gigahertz of spectrum used by ViaSat-1, and Boeing now requests expanded rights in yet another nine gigahertz of spectrum that does not overlap with the 7.3 gigahertz of spectrum used by O3b and ViaSat-1. In mobile broadband systems, the same spectrum can be successfully re-used more often, potentially by different providers, and in different geographic areas.

The different system architectures are evidenced by the fact that in the United States, there are about 355 million mobile broadband subscribers, about 102 million fixed broadband subscribers,[10/] and only two million satellite broadband subscribers.[11/] Boeing's proposal to expand the FSS rights in the 37 GHz and 39 GHz bands while limiting 5G operations in the same band will unnecessarily constrain 5G growth.

Existing PFD Limits Must be Preserved to Allow The Full Range of 5G Applications

Boeing claims that "(e)xisting [PFD] limits (§ 25.208(r)) were intended to protect long-haul fixed links using older technologies and exceed what is needed to adequately protect short range 5G mobile services or the fixed link services that exist today." Straight Path disagrees. The Commission appropriately proposes flexible rules that enable a wide range of terrestrial services in the 39 GHz band. These services include, but are not limited to, point-to-multi-point ("PtMP") broadband access, PtMP backhaul, and mobile services that employ phased-array antennas that can dynamically generate and steer beams in both azimuth and elevation. Many of the phased array receivers are more susceptible to interference from satellites than current point-to-point links with fixed narrow beams along the horizon. These phased array receivers need more, not less, protection from FSS services.

Boeing's request for a 12 dB increase of the FSS PFD limit is based on the following assumptions for 5G services:[12/]

1. bandwidth of 20 MHz (uplink) or 50 MHz (downlink); and
2. a link budget of less than 140 dB at 37 GHz and 39 GHz.

These assumptions differ significantly from those the mobile industry has been using for 5G mobile services, as expressed in numerous filings.[13/] Boeing's assumptions would limit 5G

9/ *See* Reply Comments of the Satellite Industry Association, GN Docket No. 14-177, *et al.*, at 8-9 (filed Feb. 26, 2016).

10/ *See* OECD Broadband Portal, *Total fixed and wireless broadband subscriptions by country*, OECD.org (June 2015), *available at* http://www.oecd.org/sti/ieconomy/oecdbroadbandportal.htm (last visited June 1, 2016).

11/ *See* Comments of the Satellite Industry Association, GN Docket No. 14-177, *et al.*, at 2 (filed Jan. 28, 2016).

12/ *See* Letter from Bruce A. Olcott, Counsel to The Boeing Company to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al.*, at Attachment, "37.5-40.0 GHz Satellite and Terrestrial Spectrum Use" (filed May 9, 2016).

13/ *See, e.g.*, Comments of Straight Path Communications, Inc., GN Docket No. 14-177, *et al.*, at Appendix A (filed Jan. 27, 2016) (including link budget analyses of 5G systems at 39 GHz) ("Straight Path Comments"); Reply Comments of Nokia, GN Docket No. 14-177, *et al.*, at Appendix (filed Feb. 26, 2016); Letter from Robert Kubik, Director, Public Policy, Engineering and Technology, Samsung Electronics Washington Office, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al.*, at Attachment "Spectrum Frontiers" (filed Mar. 11, 2016).

services to a hotspot solution with coverage, data rate, and throughput far below what is needed to meet the explosive mobile traffic demand. In order to permit 5G to fully develop, the Commission must therefore reject Boeing's proposal. As we have shown in our analysis,[14/] increasing the FSS PFD limits by 12 dB in the 39 GHz band would significantly damage the prospect of a successful 5G deployment in this band and defeat the primary purpose of this proceeding.[15/]

Boeing further cites CTIA's comment that "the primary opportunity for mmW deployment is in areas with the greatest population density. This is due to the fact that mmW spectrum is unlikely to deliver extensive coverage in a market but instead will be best suited to providing capacity via small cells and backhaul, particularly in densely populated areas."[16/] Straight Path disagrees with this assumption, which has been disproved by research,[17/] measurement campaigns,[18/] and commercial products. For example, the 39 GHz band VectaStar system by Cambridge Broadband Networks Limited ("CBNL") can achieve range up to 12 miles.[19/] While some operators may start deployment with small cells and hot spots in the 28 GHz, 37 GHz, and 39 GHz bands to improve capacity for mobile broadband in urban areas, others may decide to deploy fixed millimeter-wave broadband services in suburban and rural areas first and add mobile services later. In fact, Verizon expects fixed 5G services will be profitable regardless of an eventual move to mobile 5G.[20/] In addition, Verizon "won't limit its fixed 5G deployments only to the areas where it currently offers its fiber FiOS service", and "could run fiber from its cell towers in order to deliver fixed 5G services, including in rural areas."

[14/] *See* Straight Path Comments at Appendix A.

[15/] Ironically, Boeing advocates for high speed broadband communication between satellites and customer premises units that are thousands of miles apart in the 37 GHz and 39 GHz bands, while simultaneously claiming that terrestrial services can only be deployed in urban area as small cells or hot spots in the same band.

[16/] *See* Letter from Bruce A. Olcott, Counsel to The Boeing Company to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al.*, at 1-2 (filed May 24, 2016) (citing Letter from Scott K. Bergmann, Vice President, Regulatory Affairs, CTIA to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177, *et al.*, at 2 (filed May 20, 2016)).

[17/] *See, e.g.*, Zhouyue Pi, Junil Choi, and Robert Heath, *Millimeter-wave Gigabit Broadband Evolution Toward 5G: Fixed Access and Backhaul*, 54 IEEE Communications Magazine, no. 4, at 138-144 (July 28, 2015), *available at* https://www.researchgate.net/publication/280104695_Millimeter-wave_Gbps_Broadband_Evolution_towards_5G_Fixed_Access_and_Backhaul.

[18/] *See, e.g.*, T. S. Rappaport, G. R. MacCartney, M. K. Samimi, and S. Sun, *Wideband Millimeter-Wave Propagation Measurements and Channel Models for Future Wireless Communication System Design*, 63 IEEE Transactions on Communications, no. 9, at 3029-3056 (Sept. 3, 2015); *available at* http://ieeexplore.ieee.org/xpl/articleDetails.jsp?reload=true&tp=&arnumber=7109864; *see also* White Paper, *5G Channel Model for Bands up to 100 GHz*, 5G Workshops (Dec. 6, 2015), *available at* http://www.5gworkshops.com/5G_Channel_Model_for_bands_up_to100_GHz(2015-12-6).pdf.

[19/] *See* Press Release, *CNBL and Straight Path to bring 39GHz licensed point-to-multipoint to major US cities*, Cambridge Broadband Networks (Nov. 3, 2015), *available at* http://cbnl.com/news/cbnl-and-straight-path-bring-39ghz-licensed-point-multipoint-major-us-cities.

[20/] *See* Mike Dano, *Verizon's McAdam on 5G: Fixed deployment 'gives you all the return on capital that you need' – Carrier's 5G tests in Basking Ridge show 1.8 Gbps, reach of up to 1,000 meters*, FierceWireless (May 24, 2016), *available at* http://www.fiercewireless.com/story/verizons-mcadam-5g-fixed-deployment-gives-you-all-return-capital-you-need/2016-05-24.

Gigabit mobile broadband will create significant economic value, but only if there is wide area coverage. Boeing's proposal would significantly reduce the footprint achievable by each 5G cell, creating coverage holes, increasing the cost of 5G infrastructure, and degrading the throughput for every 5G user.

* * * *

We therefore urge the Commission to deny Boeing's request, maintain the current limited use of this band by FSS, and adopt Straight Path's proposal[21/] that can adequate accommodate FSS ground stations within the "soft segmentation" regime while protecting the prospect of a success 5G deployment in the 37 GHz and 39 GHz bands. This approach can help achieve the balance the Commission seeks between promoting the terrestrial 5G operations that will allow the United States to maintain its leadership in the mobile wireless industry and protecting FSS operations. Straight Path looks forward to working with all interested stakeholders to produce a timely resolution of this proceeding. Should there be any questions, the Commission is asked to contact the undersigned directly. Pursuant to Section 1.1206(b)(2) of the Commission's rules, a copy of this letter has been submitted in the record of the above-referenced proceeding.

Respectfully submitted,

/s/ Davidi Jonas

Davidi Jonas
CEO and President
Straight Path Communications, Inc.

21/ *See* Letter from Davidi Jonas, CEO and President, Straight Path Communications, Inc. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177 (filed May 13, 2016).