EXHIBIT A

PETITION FOR DECLARATORY RULING

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

In the Matter of	)	
	)	
Viasat, Inc.	)	
	)	File No. _____
Petition for Declaratory Ruling for Authority to Access the U.S. Market Using a Non-U.S.-Licensed Ka-Band Geostationary Satellite at the 79º W.L. Orbital Location	)	

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PETITION FOR DECLARATORY RULING

Viasat, Inc. ("Viasat"), pursuant to Section 25.137 of the Commission's rules[1] and the Commission's *Space Station Licensing Reform Order*,[2] hereby files this Petition for Declaratory Ruling ("Petition") seeking to use a geostationary orbit ("GSO") satellite under authority of the government of the United Kingdom (the "VIASAT-79W" satellite) to access the United States market using portions of the Ka band at the 79.0° W.L. orbital location. Specifically, Viasat seeks to serve CONUS, Alaska, Puerto Rico, and the U.S. Virgin Islands. Viasat provides in this Petition information required by Section 25.137 for applicants seeking U.S. market access from non-U.S.-licensed spacecraft. Technical information relating to the proposed spacecraft is provided on Schedule S and in narrative form in the associated Attachment A, Technical Information to Supplement Schedule S (the "Technical Annex").

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1 47 C.F.R. § 25.137.

2 *See Amendment of the Commission's Space Station Licensing Rules and Policies*, 18 FCC Rcd 10760 ¶ 294 (2003) ("*Space Station Licensing Reform Order*"); *see also Comprehensive Review of Licensing and Operating Rules for Satellite Services*, 30 FCC Rcd 14713 ¶ 250 (2015) ("*Part 25 Second Report and Order*") (modifying filing procedures for U.S. market access by non-U.S.-licensed space stations to require the filing of a "petition for declaratory ruling," rather than a "letter of intent").

I. GRANT OF VIASAT'S PETITION FOR DECLARATORY RULING WILL SERVE THE PUBLIC INTEREST

Viasat has previously demonstrated its qualifications as a Commission licensee of spacecraft and earth station networks. Viasat has a long history and extensive expertise in providing and developing satellite communications technologies for both military and commercial uses, as well as innovating by improving the performance and bandwidth efficiency of satellite networks. In addition, Viasat is currently a leading provider of satellite-based broadband services to consumer, enterprise, and government users. Viasat's broadband satellite network provides service throughout the United States, including through the ViaSat-1 and ViaSat-2 satellites. Viasat will soon launch the first of its ViaSat-3 class of satellites (at 89.0° W.L.) to serve the United States. Each generation of Viasat's satellites employs iterations of groundbreaking capabilities that reduce the "cost per bit" of delivering satellite broadband service, to provide continually improved bandwidth economics.

By this application, Viasat seeks to expand the capacity of its broadband communications network in the United States using Ka-band spectrum resources at the 79° W.L. orbital location on the VIASAT-79W satellite. Among other things, the additional capacity on this satellite will support the continued increase in broadband usage by end users, satisfy the demand for faster broadband speeds, and allow Viasat to serve more broadband subscribers. In addition, this capacity will enhance Viasat's ability to help bridge the digital divide and increase the availability and affordability of high-quality, high-speed connectivity for unserved and underserved communities—areas without cost-effective alternatives or where services with only slower speeds are available. Moreover, the additional capacity of VIASAT-79W will better enable Viasat to satisfy the demand for satellite-powered broadband services that are growing

exponentially, as people increasingly demand high-speed service in mobile settings—on airplanes, trains, buses, cars, trucks, helicopters, ambulances, and ships alike.

VIASAT-79W is intended to provide a wide array of communications services to meet the needs of individual and commercial users. All of the capacity on the satellite will be provided on non-common carrier basis in the United States.[3]

Viasat has demonstrated its commitment to developing technologies that make the most efficient use of spectrum, responding to customers' expanding needs for greater broadband bandwidth and capacity. This satellite will play a vital role in providing affordable high-data rate communications services and will efficiently employ Ka-band spectrum in doing so. As an innovative leader in the provision of broadband communications, Viasat intends to continue to advance satellite technology and design to satisfy the ever-growing demand for those services.

II. *DISCO II* SHOWING – SECTION 25.137(A)

On behalf of Viasat's wholly owned subsidiary, Viasat Satellite Holdings Ltd., the United Kingdom's Office of Communications ("Ofcom") has made International Telecommunication Union ("ITU") filings under UK-KA-7 for a Ka-band satellite at the 79º W.L. orbital location. Because this spacecraft will operate under the authority of the government of the United Kingdom, the Commission's *DISCO II* framework applies to this Petition.[4] The *DISCO II* analysis includes consideration of a number of factors, such as the effect on competition in the United States, spectrum availability, eligibility requirements, technical requirements, national

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3 *See Amendment to the Commission's Regulatory Policies Governing Domestic Fixed Satellites and Separate International Satellite Systems*, 11 FCC Rcd 2429 ¶¶ 46-50 (1996) ("*DISCO I*") (concluding that there is "no longer a need to require [domestic satellite] licensees to provide capacity on a common carrier basis").

4 *See Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States*, 12 FCC Rcd 24094 ¶¶ 30-49 (1997) ("*DISCO II*").

security, law enforcement, foreign policy, and trade concerns.[5] Each of these factors weighs in favor of granting this Petition.

A. Effect on Competition in the United States

In *DISCO II*, the Commission established a rebuttable presumption that it will further competition in the United States to allow non-U.S. satellites authorized by WTO Members to provide services covered by the U.S. commitments under the WTO Basic Telecommunications Agreement.[6] The United Kingdom is a member of the WTO. Furthermore, Viasat seeks to use the requested spectrum to provide satellite services that are covered by the WTO Basic Telecommunications Agreement.[7] Accordingly, the presumption in favor of entry applies to this Petition.

Grant of this Petition will enhance competition in the United States for satellite service by permitting Viasat to expand the available capacity of its satellite broadband network. Grant of this Petition thus will improve service quality, increase broadband service options, and foster technological innovation. The Commission consistently has relied on these same public interest benefits in granting similar requests.[8]

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5 *See*, *e.g.*, *Telesat Canada, Petition for Declaratory Ruling for Inclusion of Anik F2 on the Permitted Space Station List, Petition for Declaratory Ruling to Serve the U.S. Market Using Ka-band Capacity on Anik F2*, 17 FCC Rcd 25287 ¶ 6 (2002).

6 *DISCO II* at ¶ 39; *see also* 47 C.F.R. § 25.137(a)(2).

7 Viasat does not seek to provide direct-to-home ("DTH"), direct broadcast satellite ("DBS"), or digital audio radio service ("DARS") in the United States.

8 *See*, *e.g.*, *Digital Broadband Applications Corp.*, 18 FCC Rcd 9455 (2003); *Pegasus Development Corp.*, 19 FCC Rcd 6080 (2004); *DIRECTV Enterprises, LLC, Request for Special Temporary Authority for the DIRECTV 5 Satellite*, 19 FCC Rcd 15529 (2004).

B. Spectrum Availability

This Petition proposes market access using the 17.7-19.3 GHz and 19.7-20.2 GHz band segments for downlinks (space-to-Earth) and the 27.5-29.1 GHz, and 29.5-30.0 GHz band segments for uplinks (Earth-to-space).[9] Specifically, Viasat seeks market access using spectrum (i) on a primary basis in the 18.3-18.8 GHz (downlink), 19.7-20.2 GHz (downlink), 28.35-28.6 GHz (uplink), and 29.5-30.0 GHz (uplink) band segments; (ii) on a secondary basis in the 17.8-18.3 GHz (downlink), 18.8-19.3 GHz (downlink), 27.5-28.35 GHz (uplink) and 28.6-29.1 GHz (uplink) band segments; and (iii) on a non-conforming basis in the 17.7-17.8 GHz (downlink) band segment. Viasat requests a waiver of the U.S. Table of Frequency Allocations in Section 2.106 of the Commission's rules ("U.S. Table") in connection with the proposed operations on an unprotected, non-interference basis in the 17.7-17.8 GHz band segment with respect to Broadcasting Satellite Service ("BSS" or "DBS") and FS.[10]

No other GSO FSS spacecraft is authorized by the Commission to operate within two degrees of 79º W.L. on the band segments for which market access is sought. And, as discussed below and as demonstrated in the Technical Annex, Viasat's proposed operations are compatible with other authorized co-frequency operations in relevant band segments.

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9 TT&C will be provided from facilities outside of the United States within portions of the Ku band. The spacecraft will be capable of operating across the entire 17.7-21.2 GHz (space-to-Earth) and 27.5-31.0 GHz (Earth-to-space) frequency bands. Technical information is being provided in this application only for those band segments for which authority is being sought to serve the United States (as identified above). *See, e.g.*, Telesat Canada, IBFS File No. SAT-PPL-200605016-00061, at 1 n.2 (filed May 16, 2006; granted Jan. 18, 2007) (disclosing the existence of Ka-band payload on Anik F3 but not seeking market access for that payload and providing only technical information regarding the C- and Ku-band operations).

10 47 C.F.R. § 2.106.

For these reasons, this Petition is fully consistent with the policies articulated in the *Space Station Licensing Reform Order* regarding processing of applications for GSO-like spacecraft.[11] As detailed in the following sections, this request also is consistent with Commission spectrum policies.

1. Primary GSO FSS Allocations

In the 18.3-18.8 GHz (downlink), 19.7-20.2 GHz (downlink), 28.35-28.6 GHz (uplink), and 29.5-30.0 GHz (uplink) band segments designated for the GSO FSS on a primary basis, the spacecraft will comply with the uplink off-axis EIRP density envelopes in Section 25.218(i) and downlink PFD levels specified in Section 25.140(3)(iii) of the Commission's rules.[12] Therefore, the use of these frequencies will be compatible with adjacent satellite systems.

2. Secondary GSO FSS Allocations

(i) 18.8-19.3 GHz and 28.6-29.1 GHz

The 18.8-19.3 GHz and 28.6-29.1 GHz band segments are designated by the Commission for the NGSO FSS on a primary basis and GSO FSS on a secondary basis. The Commission has made clear that GSO FSS networks should be allowed to access the band as this "will increase spectrum use and can be done compatibly with NGSO FSS operations."[13] As demonstrated by the Technical Annex, Viasat's proposed operations in the United States are compatible with NGSO use of this band segment, and Viasat will operate in these band segments in the United States consistent with Commission requirements.

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11 *See Space Station Licensing Reform Order* at ¶ 113.

12 *See* 47 C.F.R. §§ 25.140(a)(3)(iii), 25.218(i).

13 *See Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, 32 FCC Rcd 7809 ¶ 14 (2017) ("*NGSO Order*").

(ii) 27.5-28.35 GHz

The 27.5-28.35 GHz band segment is allocated to the FSS and fixed and mobile terrestrial services on a co-primary basis, and the Commission has designated FSS as secondary to UMFUS but with protection for FSS earth station operations in accordance with the conditions set forth in Section 25.136(a).[14] Because operations in this band will consist of transmissions from earth stations to the VIASAT-79W satellite, Viasat will demonstrate compatibility with UMFUS operations in the context of the future earth station applications.

(iii) 17.8-18.3 GHz

The 17.8-18.3 GHz band segment is allocated to the FSS on a secondary basis with respect to FS operations;[15] GSO FSS operations are subject to the PFD limits in Section 25.208(c) of the Commission's rules established to protect FS stations.[16] As specified in the Technical Annex, VIASAT-79W satellite downlinks will comply with these limits.

3. Non-Conforming Spectrum Use at 17.7-17.8 GHz

In the United States, the 17.7-17.8 GHz band segment is allocated on a co-primary basis to FS and FSS, but the FSS allocation is limited by footnote US271 to DBS feeder links in the Earth-to-space direction.[17] The 17.7-17.8 GHz band segment may be used in the space-to-Earth direction by 17/24 GHz BSS space stations, but such services are limited to earth stations located outside of the United States.[18] Viasat requests a waiver of the U.S. Table and the Commission's

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14 47 C.F.R. § 25.136(a).

15 *See NGSO Order* at ¶ 7.

16 *See* 47 C.F.R. § 25.208(c).

17 *Id.* § 2.106 n.US271.

18 *Id.* § 25.202(a)(9) note 2.

Ka-band band plan to allow FSS downlink communications from VIASAT-79W in the 17.7-17.8 GHz band segment, as discussed below.

C. Waiver Requests for Non-Conforming Use

As referenced above, Viasat requests waivers of the U.S. Table and the Commission's Ka-band band plan to allow VIASAT-79W downlink operations in the 17.7-17.8 GHz band segment. The Commission has granted waivers to facilitate non-conforming spectrum uses in cases such as this.[19]

Good cause exists for the Commission to grant the requested waivers.[20] Access to this frequency band will provide for more intensive use of the scarce radio spectrum resources and enable greater capacity for broadband service to end users and thus will serve the public interest. At the same time, because Viasat's operations will not cause harmful interference into conforming uses on this band segment, and because Viasat proposes to operate on a non-protected, non-interference basis with respect to conforming uses, grant of the requested waivers "would not undermine the policy objective of the rule in question."[21]

1. Terrestrial Fixed Services in the 17.7-17.8 GHz Band Segment

VIASAT-79W operations in the 17.7-17.8 GHz band segment will not cause harmful interference into FS operations. With respect to FS operations in the 17.7-17.8 GHz band

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19 *See, e.g.*, *contactMEO Communications*, LLC, 21 FCC Rcd 4035 ¶ 34 (2006); *Northrop Grumman Space & Mission Systems Corp.*, 24 FCC Rcd 2330 ¶¶ 76, 90 (2009); *Hughes Network Systems, LLC*, 26 FCC Rcd 8521 ¶ 13 (2011).

20 *See* 47 C.F.R. § 1.3.

21 *Northeast Cellular Tel. Co. v. FCC*, 897 F.2d 1166 (D.C. Cir. 1990); *see also Fugro-Chance, Inc.*, 10 FCC Rcd 2860 ¶ 2 (1995) (waiver of U.S. Table of Frequency Allocations appropriate "when there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from authorized services").

segment, VIASAT-79W downlinks will comply with the PFD limits in Section 25.208(c) of the Commission's rules established to protect FS stations in this band segment.[22] The Commission has previously granted waivers to allow GSO FSS operations in the 17.7-17.8 GHz band segment based on compliance with these same PFD limits.[23]

2. DBS Feeder Links and 17/24 GHz BSS in the 17.7-17.8 GHz Band Segment

As demonstrated in the Technical Annex, downlinks from VIASAT-79W in this band segment will not cause harmful interference into adjacent DBS spacecraft feeder link receivers. The off-axis PFD of the VIASAT-79W downlinks in this band segment will be significantly lower than the coordination trigger threshold for DBS spacecraft. In addition, downlinks from VIASAT-79W will be compatible with 17/24 GHz BSS downlinks outside the United States, with geographic separation mitigating any potential for harmful interference, as explained in the Technical Annex.

D. National Security, Law Enforcement, and Public Safety Matters

Grant of this Petition is consistent with U.S. national security, law enforcement, and public safety considerations. The satellite's authorization from the United Kingdom will be held by Viasat Satellite Holdings Ltd., a direct, wholly owned subsidiary of Viasat. Viasat has a long history of providing satellite communication service to U.S. government and military users.

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22 *See* 47 C.F.R. § 25.208(c).

23 *See, e.g.*, Viasat, Inc., File No. SAT-MOD-20160527-00053, Call Sign S2902 (granted Jan. 12, 2017); *Inmarsat Mobile Networks, Inc.*, 30 FCC Rcd 2770 ¶ 27 (2015).

III. LEGAL AND TECHNICAL INFORMATION – SECTION 25.137(B)

A. Legal Qualifications

Viasat's legal qualifications are set forth in this Petition and in the attached Form 312. Specifically, the Petition and attached Form 312 demonstrate Viasat's satisfaction of the applicable requirements for space station applicants set forth in Section 25.114 of the Commission's rules.[24] As noted above, Viasat holds several Commission licenses, and its legal qualifications are a matter of record before the Commission.

B. Technical Qualifications

The attached Form 312, Schedule S, and Technical Annex (including an orbital debris mitigation showing) include the required Part 25 technical information. No ground spare is currently planned.

C. Orbital Debris Mitigation

Section 25.137 of the Commission's rules requires market access applicants to provide an orbital debris mitigation showing.[25] Section A.13 of the accompanying Technical Annex provides the information required by Section 25.114(d)(14) regarding the design and operational strategies that will be used to mitigate orbital debris in accordance with the new rules adopted in 2020,[26] consistent with Viasat's prior recommendations that the Commission's orbital safety requirements apply to all applications for U.S. licenses or market access.[27]

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24 *See* 47 C.F.R. § 25.114.

25 *See id.* §§ 25.114(d)(14), 25.137(b).

26 *See Mitigation of Orbital Debris in the New Space Age*, 35 FCC Rcd 4156 (2020) ("*2020 Orbital Debris Order*"). Although the application disclosure requirements adopted in the *2020 Orbital Debris Order* are not yet in effect, the Technical Annex provides the information that will be required when these rules are in effect.

27 *See, e.g.*, Consolidated Opposition to Petitions for Reconsideration of Viasat, Inc., IB Docket No. 18-313, at 10-11 (Nov. 24, 2020).

In addition to the showing in the Technical Annex, the U.K.'s authority over VIASAT-79W provides direct and effective regulatory oversight regulation of the space activities of VIASAT-79W. VIASAT-79W will be operated under the authority of the United Kingdom, and will be subject to the United Kingdom Outer Space Act 1986 ("Outer Space Act"). The Outer Space Act ensures compliance with the U.K.'s obligations under international treaties and principles covering the use of outer space and specifies that the U.K. licensing authority has the power to require licensees to conduct operations in such a manner as to "prevent the contamination of outer space," to "avoid any breach of the United Kingdom's international obligations," and to impose conditions "governing the disposal of the payload in outer space on the termination of operations under the license."[28] In addition, the UK Space Agency ("UKSA"), the U.K. agency charged with licensing activities in outer space, including the launch and operation of space objects, requires applications for a space activities license to provide information regarding the plans for disposal of the space object at the end of life.[29] The UKSA evaluates such applications pursuant to published standards, including the IADC Space Debris Mitigation Guidelines. Viasat will seek a space activities license from the UKSA at a time consistent with practices in the U.K.

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28 Outer Space Act 1986, 1986 Ch. 38, § 5(2)(e) (1986) (U.K.).

29 *See* UK Space Agency, Guidance for Orbital Operator license applicants and Orbital Operator Licensees §§ 3.7, 5.7, Annex A (July 29, 2021), *available at* https://publicapps.caa.co.uk/docs/33/Guidance%20for%20Orbital%20Operator%20licence%20applicants%20and%20Orbital%20Operator%20Licensees%20(CAP2210).pdf.

IV. ADDITIONAL REQUIREMENTS – SECTION 25.137(D)

A. Milestones and Bond Requirement

Viasat plans to implement the spacecraft in compliance with the Commission's milestone and surety bond requirements in accordance with the requirements established in the Commission's rules.

B. Reporting Requirements

Viasat will comply with all applicable reporting requirements for the spacecraft.

C. Ownership Information

Viasat is a Delaware corporation and a publicly traded company headquartered at 6155 El Camino Real, Carlsbad, California 92009. As a publicly traded company, the stock of Viasat is widely held. Based on publicly available SEC filings, the following entities and their affiliates beneficially owned 10 percent or more of Viasat's voting stock as of November 19, 2021:

Beneficial Owner	Citizenship	Voting Percentage
The Baupost Group, L.L.C. 10 St. James Avenue Suite 1700 Boston, MA 02116	Massachusetts	22.19%

No other stockholders are known by Viasat to directly hold 10 percent or more of Viasat's voting stock. No stockholder (or principal of such stockholder) "controls" Viasat or otherwise exercises voting rights with respect to Viasat beyond those rights ordinarily conferred by stock ownership.

1. Indirect Ownership in Viasat, Inc.

Viasat reviewed SEC filings to identify persons or entities that may have an indirect ownership interest in Viasat of 10 percent or greater, and discloses such persons or entities herein out of an abundance of caution.

Based on publicly available SEC filings, the following entity and individual affiliated with The Baupost Group, L.L.C. may have a 10 percent or greater interest in Viasat.

Name	Address	Citizenship
Baupost Group GP, L.L.C.	10 St. James Avenue Suite 1700 Boston, MA 02116	Delaware
Seth A. Klarman	10 St. James Avenue Suite 1700 Boston, MA 02116	United States

The most recent Schedule 13D filed by The Baupost Group, L.L.C. in connection with Viasat, Inc. states as follows: "BG GP, as the manager of Baupost, and Mr. Klarman, as the sole managing member of BG GP and a controlling person of Baupost, may be deemed to have beneficial ownership under Section 13 of the Securities Exchange Act of 1934, as amended, of the securities beneficially owned by Baupost."

No other stockholders are known by Viasat to indirectly hold 10 percent or more of Viasat's voting stock.

2. Officers and Directors of Viasat, Inc.

The following are the officers and directors of Viasat, all of whom can be reached c/o Viasat, Inc., 6155 El Camino Real, Carlsbad, CA 92009. Each director and officer listed below is a U.S. citizen.

Directors

Mark D. Dankberg, Executive Chairman
Richard A. Baldridge, President and Chief Executive Officer
James Bridenstine
Dr. Robert W. Johnson
Sean Pak
Varsha Rao
John P. Stenbit
Dr. Theresa Wise

Officers/Senior Management

Mark D. Dankberg, Executive Chairman
Richard A. Baldridge, President and Chief Executive Officer
Melinda Kimbro, Senior VP, People & Culture and Chief People Officer
Shawn Duffy, Senior VP, Finance and CFO
Kevin Harkenrider, Executive VP, Global Operations and Chief Operating Officer
Keven K. Lippert, Executive VP, Strategic Initiatives and Chief Commercial Officer
Mark J. Miller, Executive VP, Chief Technical Officer
Robert Blair, VP, General Counsel and Secretary
Girish Chandran, VP and Chief Technical Officer
Dave Ryan, Senior VP and President, Space and Commercial Networks
James Dodd, President, Global Enterprise and Mobility
Evan Dixon, President, Global Fixed Broadband
Krishna Nathan, Chief Information Officer
Craig Miller, President, Viasat Government Systems

V. REQUEST FOR WAIVERS

In addition to the waiver of the U.S. Table of Frequency Allocations discussed above, Viasat requests a limited waiver of Section 25.114(c) of the Commission's rules, which requires certain information to be filed in the Schedule S. VIASAT-79W employs a large number of identical spot beams for two beam types that will be used for communications links. For these two beam types Viasat is providing the predicted antenna gain contours for one transmit and one receive representative spot beam for each of the two beam types. In addition, Viasat is providing isoline gain contours, in both uplink and downlink directions, that depict, on a composite basis across the entire coverage area, the maximum gain of all spot beams that may be operated within that area.[30] Similarly, because these antenna beam types are replicated multiple times to form the coverage area of the satellites, Viasat is providing antenna beam characteristics for these representative beams in lieu of replicating the beam information for each beam.

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[30] 47 C.F.R. § 25.114(c)(4)(vii) (option (iii) for geostationary satellites with large numbers of identical fixed spot beams).

To the extent necessary, Viasat seeks a waiver of Section 25.114(c)(4) of the Commission's rules and the Schedule S requirements to depict the antenna gain contours and beam characteristics in this manner.[31] The representative beam information in the Schedule S reflects the maximum EIRP for all identical transmit beams, and the maximum G/T and minimum saturation flux density for all identical receive beams. This information regarding the representative beams, taken with the composite isoline diagram identifying the maximum possible gain across the coverage area, provides the Commission with all data required to assess compatibility with adjacent spacecraft, while reducing the type of filing burdens on applicants that the Commission sought in amending the satellite application requirement in the *2013 Part 25 Reform Order*.[32]

In addition, Viasat also requests a technical waiver of the cross-polarization isolation requirement in Section 25.210(i) of the Commission's rules to the extent this requirement applies to Viasat's operations in the 17.7-17.8 GHz band.[33] The Commission eliminated the cross-polarization isolation requirement for FSS space stations in 2015, and that requirement now only applies to 17/24 GHz BSS space station antennas transmitting in the 17.3-17.8 GHz band.[34] Viasat seeks a waiver out of an abundance of caution to the extent Section 25.210(i) applies to

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31 The Commission has granted such a waiver in connection with the ViaSat-2 satellite. *See* ViaSat, Inc., IBFS File No. SAT-MOD-20141105-00121, Condition 2 (granted Apr. 15, 2015).

32 *Comprehensive Review of Licensing and Operating Rules for Satellite Services*, 28 FCC Rcd 12403 ¶¶ 73-99 (2013).

33 *See Part 25 Second Report and Order* at ¶ 333.

34 The Commission has confirmed that the requirement in Section 25.210(i) also would not apply to FSS space stations under the default service rules in Section 25.217. *See, e.g.*, *Viasat, Inc., Petition for Declaratory Ruling Granting Access for a Non-U.S.-Licensed Non-Geostationary Orbit Satellite Network*, 35 FCC Rcd 4324 ¶ 46 (2020) (confirming that "the current section 25.210(i), which applies to DBS operations, was never intended to be applied as a default service rule for FSS operations" in Section 25.217).

non-conforming GSO FSS operations in the 17.7-17.8 GHz band. More specific information supporting this waiver request is contained in the Technical Annex at Section A.14.

VI. WAIVER PURSUANT TO SECTION 304 OF THE COMMUNICATIONS ACT

In accordance with Section 304 of the Communications Act of 1934, as amended, Viasat hereby waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise.

VII. CONCLUSION

For the foregoing reasons, granting Viasat's Petition seeking to access the United States using the proposed Ka-band satellite under the authority of the United Kingdom will serve the public interest, convenience, and necessity. Viasat respectfully requests that the Commission promptly grant this Petition.

Respectfully submitted,

/s/

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Attachment A

Technical Information to Supplement Schedule S

ATTACHMENT A

Technical Information to Supplement Schedule S

A.1 Scope and Purpose

Viasat, Inc. (Viasat) seeks United States (US) market access for the VIASAT-79W satellite in the 17.7 – 19.3 GHz and 19.7 – 20.2 GHz band segments in the space-to-Earth direction and the 27.5-29.1 GHz and 29.5 – 30.0 GHz band segments in the Earth-to-space direction. The VIASAT-79W satellite will be capable of operating in the 27.5 – 31 GHz (Earth-to-space) and the 17.7 – 21.2 GHz (space-to-Earth) bands (the "Ka-bands"). The satellite will operate under the authority of the United Kingdom using the UK-KA-7 ITU filing. This attachment, in conjunction with the companion Schedule S, provides the technical characteristics required by §25.114.

A.2 General Description

The VIASAT-79W satellite will operate from the 79.0° W.L. orbital location. Viasat seeks Commission authority to serve the CONUS, Alaska, Puerto Rico, and the US Virgin Islands (to the extent possible from its 79.0° W.L. location) in the 27.5 – 29.1 GHz and 29.5 – 30.0 GHz band segments (Earth-to-space) and the 17.7 – 19.3 GHz and 19.7 – 20.2 GHz band segments (space-to-Earth). All analyses in this Attachment apply to that service area and those bands. The VIASAT-79W network will provide service to small, fixed, temporary-fixed, and mobile Earth Stations (ESs), referred to as user terminals (UTs). In addition, larger gateway-type ESs will be employed, referred to as Satellite Access Nodes (SANs).

The satellite's antenna beam coverage, both transmit and receive, consists of multiple spot beams that collectively are capable of providing service to all parts of the Earth visible from 79.0° W.L. The satellite network uses asymmetric forward and return links. It also uses adaptive coding and modulation to combat rain fades—*i.e.,* the modulation type, amount of coding and/or user data rate will be dynamically varied to meet the link requirements during rain events (in addition to employing uplink power control).

A.3 Frequency and Polarization Plan

The frequency plan for US market access is provided in Table A.3-1, indicating channel center frequency, polarization, and bandwidth. The table also shows the connectivity between each uplink and downlink band segment. Circular polarization (including right-hand circular (RHC) and left-hand circular (LHC) polarization) is used on both the uplink and downlink with the downlink polarization being orthogonal to the uplink polarization. The satellite employs state-of-the-art full frequency reuse such that each channel is reused multiple times through a combination of polarization and spatial isolation. This satisfies the requirements of §25.210(f).

Table A.3-1. Frequency Plan for US Market Access

Uplink Center Frequency (MHz)	Uplink Polarization	Downlink Center Frequency (MHz)	Downlink Polarization	Bandwidth (MHz)
28300	LHC	18500	RHC	1600
28300	RHC	18500	LHC	1600
29750	RHC	19950	LHC	500
29750	LHC	19950	RHC	500

Viasat is not seeking US market access in the 19.3 – 19.7 GHz, 20.2 – 21.2 GHz, 29.1 – 29.5 GHz, or 30.0 – 31.0 GHz band segments at this time.

The VIASAT-79W network will operate in a manner that adequately protects the following services in the specified band segments while serving the US:

- GSO FSS (see Section A.8)
- UMFUS in the 27.5 – 28.35 GHz band segment (see Section A.9)
- FS in the 17.7 – 18.3 GHz band segment (see Section A.10)
- 17/24 GHz BSS (s-E) and DBS Feeder Links (E-s) in the 17.7 – 17.8 GHz band segment (see Section A.11)
- NGSO FSS in the 28.6 – 29.1 GHz and 18.8 – 19.3 GHz band segments (see Section A.12)

A.4 Satellite Antenna Beams and Antenna Gain Contours

The satellite's payload employs multiple spot beams in both the uplink and downlink directions. There are two types of spot beams: small beams ("A"-type beams) and larger beams ("B"-type beams). For each beam-type, the beams are nominally identical.

In accordance with §25.114(c)(4)(vii), Viasat is providing the predicted antenna gain contours for representative transmit and receive beams of each type, and maps of the isolines formed by combining all the spot beams into composite beams. In both the uplink and downlink directions, the isoline contours depict, on a composite basis across the entire coverage area, the -2 dB relative gain of all spot beams that may be operated within that area.

The representative transmit and receive antenna beam contours are plotted on an area map at 2 dB intervals down to 10 dB below the peak gain and at 5 dB intervals between 10 dB and 20 dB below the peak gain. The composite and representative beam contours are provided in a GIMS database container file attached to the associated Schedule S, as listed in Table A.4-1.

Table A.4-1. Beam Contours

Beam Contour	Beams[1]	Link	Beam Type	Polarization	Contour Type
RXAR	RXAR & RXaR	Up	A	RHC	Composite
RXAL	RXAL & RXaL	Up	A	LHC	Composite
TXAR	TXAR & TXaR	Down	A	RHC	Composite
TXAL	TXAL & TXaL	Down	A	LHC	Composite
RXBR	RXBR & RXbR	Up	B	RHC	Composite
RXBL	RXBL & RXbL	Up	B	LHC	Composite
TXBR	TXBR & TXbR	Down	B	RHC	Composite
TXBL	TXBL & TXbL	Down	B	LHC	Composite
RXAR_REP	RXAR & RXaR	Up	A	RHC	Representative
RXAL_REP	RXAL & RXaL	Up	A	LHC	Representative
TXAR_REP	TXAR & TXaR	Down	A	RHC	Representative
TXAL_REP	TXAL & TXaL	Down	A	LHC	Representative
RXBR_REP	RXBR & RXbR	Up	B	RHC	Representative
RXBL_REP	RXBL & RXbL	Up	B	LHC	Representative
TXBR_REP	TXBR & TXbR	Down	B	RHC	Representative
TXBL_REP	TXBL & TXbL	Down	B	LHC	Representative

[1] The VIASAT-79W transmit beams span the 17.7 – 20.2 GHz band and the receive beams span the 27.5 – 30 GHz band. The Schedule S form does not allow beams to include disjoint frequency segments. Thus, Viasat has entered each beam twice in the Schedule S with the 3rd character of the beam name uppercase for the lower segment in each band and the 3rd character lowercase for the upper segment. For example, the RXAR composite and representative contours apply to both the RXAR and the RXaR beams.

A.5 TT&C Information

TT&C operations will be conducted from outside the US in the conventional Ku-band and thus are not the subject of this application. For informational purposes, the TT&C center frequencies available to be used by VIASAT-79W are provided in Table A.5-1.

Table A.5-1. TT&C Frequency and Polarization

Usage	Frequency (MHz)	Polarization[2]
Command	14000.3	V
	14001.0	V
	14498.5	H
	14499.0	H
Telemetry	11700.25	H or V
	11701.75	H or V
	12197.5	H or V
	12199.5	H or V

A.6 Cessation of Emissions

All VIASAT-79W downlink transmissions can be turned on and off by ground telecommand, thereby causing cessation of emissions from the satellite, as required by §25.207.

A.7 Power Flux Density at the Earth's Surface

Viasat certifies that the proposed space station will not generate power flux-density (PFD) at the Earth's surface in excess of -118 dBW/m^2/MHz at any point in US territory in the 17.7 – 20.2 GHz band segment, and that associated uplink operation of earth stations within the US will not exceed applicable EIRP density envelopes in §25.218(i) unless the non-routine uplink and/or downlink operation is coordinated with operators of authorized co-frequency space stations at assigned locations within six degrees of the orbital location. This satisfies the requirements of §25.140(a)(3)(iii).

[2] Horizontal (H) polarization or vertical (V) polarization.

Because PFD is dependent on the slant path and hence spreading loss, the maximum EIRP density from the satellite can vary accordingly. For example, for a spreading loss of 162.8 dB (25° elevation angle), the satellite's transmissions would not exceed an EIRP density of 44.8 dBW/MHz.

The -118 dBW/m^2/MHz maximum PFD is compliant with the §25.208(c) limits that apply in the 17.7 – 19.7 GHz band segment and the §25.208(d) limit that applies in the 18.6 – 18.8 GHz band segment.

A.8 Sharing with GSO FSS

The VIASAT-79W satellite is two-degree compliant in all portions of the Ka-band for which Commission authority is sought and is thus compatible with other GSO FSS operations. VIASAT-79W will operate within the US in compliance with the limits on downlink EIRP density and PFD specified in §25.140(a)(3) and communicate only with earth stations in the US operating in conformance with routine uplink parameters specified in §25.212(e) or §25.218.

There are no co-frequency FSS space stations authorized by the Commission within two degrees of the 79.0° W.L. location.[3] As required by §25.140(a)(3)(vi), Viasat provides an interference analysis demonstrating compatibility with a hypothetical co-frequency space station two degrees away with the same receiving and transmitting characteristics as VIASAT-79W.

Table A.8-1 provides a summary of the typical transmission parameters used by the VIASAT-79W satellite network. These parameters were derived from the link budgets that are provided in Annex 1 and were used in the interference analysis. The interference calculations assume a 1 dB advantage for topocentric-to-geocentric conversion and that all wanted and interfering carriers are co-polarized. Table A.8-2 shows the results in terms of the overall C/I margin, which is positive for all cases.

[3] Compatibility with NOVAVISION GROUP, INC.'s 17/24 GHz BSS satellite, S2861, located at 78.8° W.L. which overlaps in the 17.7 – 17.8 GHz band segment is addressed in Section A.11.

Table A.8-1. Typical VIASAT-79W Network Parameters

Carrier ID	Emission Designator	Bandwidth (MHz)	Tx E/S Gain (dBi)	Uplink EIRP (dBW)	Downlink EIRP (dBW)	Rx E/S Gain (dBi)	C/I Criterion (dB)
1	600MG7D	600	65.0	75.0	70.8	49.3	19.7
2	500MG7D	500	65.0	75.0	70.0	49.3	20.5
3	500MG7D	500	65.0	75.0	70.0	40.7	13.8
4	500MG7D	500	65.0	75.0	70.0	33.7	9.3
5	400MG7D	400	65.0	75.0	69.0	40.7	14.7
6	300MG7D	300	65.0	75.0	67.8	40.7	9.6
7	200MG7D	200	44.3	58.3	63.0	61.4	14.0
8	100MG7D	100	44.3	57.7	60.0	61.4	13.3
9	50M0G7D	50	44.3	57.1	57.0	61.4	11.3
10	12M5G7D	12.5	44.3	55.4	51.0	61.4	11.9
11	6M25G7D	6.25	37.3	39.1	48.0	61.4	9.3

Table A.8-2. Summary of the Overall C/I Margin (dB)

	Interfering Carriers										
Carrier ID	1	2	3	4	5	6	7	8	9	10	11
1	9.0	9.0	9.0	9.0	9.0	8.9	10.7	9.9	8.7	5.8	5.6
2	8.3	8.3	8.3	8.3	8.2	8.2	10.1	9.4	8.3	5.6	5.4
3	6.5	6.5	6.5	6.5	6.4	6.4	9.3	9.1	8.9	8.1	8.0
4	4.0	4.0	4.0	4.0	4.0	3.9	6.9	6.9	6.8	6.6	6.6
5	5.5	5.5	5.5	5.5	5.5	5.5	8.3	8.2	8.0	7.3	7.3
6	10.6	10.6	10.6	10.6	10.6	10.6	13.5	13.4	13.3	12.7	12.7
7	17.5	16.9	16.9	16.9	16.1	15.0	9.8	7.3	5.0	0.6	0.3
8	19.9	19.4	19.4	19.4	18.7	17.7	12.8	10.4	8.1	3.8	3.4
9	23.3	22.9	22.9	22.9	22.3	21.5	17.1	14.7	12.4	8.1	7.8
10	24.6	24.3	24.3	24.3	24.0	23.5	20.5	18.3	16.1	11.9	11.5
11	16.5	16.0	16.0	16.0	15.4	14.6	10.2	7.8	5.5	1.2	0.8

A.9 Sharing with UMFUS in the 27.5 – 28.35 GHz Band Segment

In the US, FSS is secondary to the Upper Microwave Flexible User Service (UMFUS) in the 27.5 – 28.35 GHz band segment. However, a transmitting earth station in this band segment that meets one of the criteria of §25.136(a) may be authorized to operate without providing interference protection to UMFUS stations.

Applications for earth stations communicating with VIASAT-79W in the 27.5 – 28.35 GHz band segment within the US will include an appropriate demonstration that the proposed operations will comply with §25.136(a) or otherwise proceed on a secondary basis.

A.10 Sharing with Fixed Service (FS) in the 17.7 – 18.3 GHz Band Segment

Viasat seeks authority to operate in the 17.7 – 18.3 GHz band segment on a non-interference, unprotected basis with respect to the Fixed Service (FS) in the US.

A.10.1 Interference from VIASAT-79W Satellite to FS Receiver

As discussed in Section A.7, the maximum PFD transmitted towards US territory by VIASAT-79W will be compliant with the §25.208(c) PFD limits that apply to the 17.7 – 18.3 GHz band segment thereby ensuring protection to FS stations using the band segment.

A.10.2 Interference from FS Transmitter to VIASAT-79W Earth Station (ES)

The potential exists for interference from a transmitting FS station into a receiving FSS ES if they are near each other. The separation distance required to prevent interference depends on the FS antenna's main-beam pointing, propagation conditions between the stations, and shielding. Viasat accepts the potential risk of FS station interference into Viasat's Earth Stations in this band segment in the US.

A.11 Sharing with 17/24 GHz BSS (space-to-Earth) and DBS Feeder Links (Earth-to-space) in the 17.7 – 17.8 GHz Band Segment

Viasat's operations in the 17.7 – 17.8 GHz band segment in the US would be on a non-conforming, unprotected basis, pursuant to a waiver being requested in this application. In the US, use of this band segment in the Earth-to-space direction by the FSS is limited to DBS feeder links, and use in the space-to-Earth direction by the 17/24 GHz BSS is limited to transmissions to receiving earth stations located outside of the US and its Possessions.

A.11.1 Interference from VIASAT-79W to 17/24 GHz BSS ES

The only 17/24 GHz BSS satellite authorized, or pending authorization, by the Commission to operate in the 17.7 – 17.8 GHz band segment within four-degrees of 79.0° W.L. is the NOVAVISION satellite located at 78.8° W.L.[4] As the NOVAVISION satellite only transmits to receiving earth stations located outside of the US, in this case Mexico, Viasat will limit operations as necessary near the US-Mexico border. VIASAT-79W's narrow spot beams facilitate this.

A.11.2 Interference from 17/24 GHz BSS Satellite to VIASAT-79W ES

Viasat accepts the risk of interference from a transmitting 17/24 GHz BSS satellite into a receiving VIASAT-79W Earth Station (which is possible near international boarders, depending on beam pointing and rolloff).

A.11.3 Interference from VIASAT-79W Satellite to DBS Satellite Feeder Link

The Commission has examined the potential for interference from 17 GHz satellite downlinks into co-frequency satellite uplinks in the context of sharing between 17/24 GHz BSS satellite networks and DBS feeder links.[5] The requirements to facilitate 17/24 GHz BSS operation anywhere within the 17.3 – 17.8 GHz band segment are codified in §25.264.

In accordance with §25.264(a), Annex 2 provides predicted off-axis gain cuts in the X-Z plane over a range of ±30° from the negative and positive X-axes, for both the A-type beams and B-type beams, in both polarizations, in planes rotated from the X- Z plane about the Z-axis over a range of ±60° relative to the equatorial plane, and at a center frequency of 17.775 GHz. §25.264(a)(4) seeks antenna off-axis gain information at three different frequencies: 17.735 GHz, 17.55 GHz, and 17.775 GHz. As Viasat does not seek to operate in the 17.3 – 17.7 GHz band segment, which includes the 17.735 GHz and 17.775 GHz frequencies, Viasat believes it has complied with §25.264(a)(4) by providing predicted off-axis gain cuts at 17.775 GHz. However,

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[4] NOVAVISION GROUP, INC.'s 17/24 GHz BSS satellite, S2861.

[5] *See Establishment of Policies and Service Rules for the Broadcasting-Satellite Service at the 17.3-17.7 GHz Frequency Band and at the 17.7-17.8 GHz Frequency Band Internationally, and at the 24.75-25.25 GHz Frequency Band for Fixed Satellite Services Providing Feeder Links to the Broadcasting-Satellite Service and for the Satellite Services Operating Bi-Directionally in the 17.3-17.8 GHz Frequency Band*, 26 FCC Rcd 8927 (2011).

out of an abundance of caution, Viasat requests a waiver of §25.264(a)(4) to the extent necessary to avoid the need to make similar showings at frequencies outside the 17.7 – 17.8 GHz band segment.

Viasat has performed PFD calculations at the orbital locations of all prior-filed US DBS stations as required by §25.264(b)(1). These calculations show that the worst-case off-axis PFD at each of these orbital locations does not exceed a PFD level of -117 dBW/m^2/100 kHz.

As an illustrative example, the nearest US licensed DBS satellite, ECHOSTAR-12, is located at the nominal 86.4° W.L. location. Based on the off-axis gain information provided in Annex 2, the highest off-axis gain for any of the pattern cuts is 10.2 dBi, which corresponds to a worst-case off-axis EIRP density of -14 dBW/100 kHz. The worst-case spreading loss towards the ECHOSTAR-12 satellite is 135.5 dB(m^2). Thus, the worst-case PFD at this satellite from VIASAT-79W is

$$-14 \text{ dBW/100 kHz} - 135.5 \text{ dB}(m^2) = -149.5 \text{ dBW}/m^2/100 \text{ kHz}$$

This value is far below the coordination trigger threshold of -117 dBW/m^2/100 kHz. All other prior-filed US DBS space stations have a larger orbital separation from VIASAT-79W; hence the off-axis PFD levels at those space stations will be less than that calculated for ECHOSTAR-12.

A.11.4 Interference from DBS Satellite Feeder Link ES to VIASAT-79W ES

Viasat accepts the risk of interference from a transmitting DBS feeder link Earth Station into a receiving VIASAT-79W Earth Station (which is possible depending on proximity and shielding levels).

A.12 Sharing with NGSO FSS in the 28.6 – 29.1 GHz and 18.8 – 19.3 GHz Band Segments

Viasat proposes to operate VIASAT-79W on a secondary basis to NGSO FSS systems in in the US in the 18.8 – 19.3 GHz and 28.6 – 29.1 GHz band segments.

Viasat has successfully coordinated use of these band segments with OneWeb and is pursuing coordination with other NGSO systems. Viasat will limit emissions in these band segments to

avoid harmful inference into any authorized NGSO system with which coordination has not been completed.

Viasat will use ephemeris data to determine the positions of NGSO satellites in such systems. Knowing these positions and that of the VIASAT-79W satellite, the separation angles between the line-of-sight vectors from any location in the US can be readily calculated. Thus, Viasat will be able to proactively predict potential harmful interference events and mitigate them as necessary.

Table A.12-1 shows, for various authorized and pending NGSO systems, the minimum separation angle required to ensure less than a 6% $\Delta T/T$ impact to a NGSO downlink, and the percentage of time that the separation angle between VIASAT-79W and the NGSO satellite with the least angular separation from 79.0° W.L. exceeds that angle.[6] Note that the percentages for other visible satellites in each NGSO constellation will be higher, as the satellite with the least angular separation is the worst case. The results reflect that VIASAT-79W would be able to utilize the 18.8 – 19.3 GHz and 28.6 – 29.1 GHz band segments a significant percentage of the time without exceeding a 6% $\Delta T/T$ threshold.

Table A.12-1. Minimum Percentage of Time VIASAT-79W Can Transmit in 18.8 – 19.3 GHz Without Causing 6% $\Delta T/T$ Impact to NGSO Earth Stations

System[7]	#Satellites	Separation Angle Required for $\Delta T/T < 6\%$[8]	Percentage Time $\Delta T/T < 6\%$
Kuiper	3236	7.5°	67.4%
Mangata	791	6.4°	87.8%
New Spectrum	15	9.4°	99.3%
O3b	42	9.8°	97.8%
Space Norway	2	9.8°	99.5%
SpaceX	4408	7.4°	66.9%
Telesat	117	6.8°	97.0%
Theia	120	7.5°	98.6%

[6] The worst case of collocated GSO ES and NGSO ES is evaluated, and a location at the center of the CONUS is used.

[7] The NGSO systems included in this analysis are those from the First Round and Second Round that have been granted, and those from the Second Round that are on Public Notice. EOS was not included as it does not operate in these bands. OneWeb was not included as Viasat has completed coordination with that system.

[8] Calculated using RECOMMENDATION ITU-R S.1428-1 "Reference FSS earth-station radiation patterns for use in interference assessment involving non-GSO satellites in frequency bands between 10.7 GHz and 30 GHz," and ES parameters provided in FCC and ITU filings associated with each system.

Critically, though, this analysis ignores commitments that each NGSO system has made (or will make) with respect to separation from the GSO arc. As discussed above, Viasat has already completed coordination with OneWeb and is pursuing coordination with other NGSO systems. Certain operators have otherwise committed to operate with a minimum level of separation from the GSO arc across the Ka-bands (*e.g.,* SpaceX has committed to maintain at least 18° of separation[9]). With respect to such systems, VIASAT-79W would be able to use the 18.8 – 19.3 GHz and 28.6 – 29.1 GHz band segments a much higher percentage of the time.

Furthermore, each of these NGSO systems has otherwise suggested that it would operate with a higher degree of angular separation than the *minimum* separation angle calculated in Table A.12-1 above in portions of Ka-band where Art. 22 EPFD limits are applicable, in order for the NGSO system to avoid operating near the GSO arc. Table A12-2 shows the GSO arc avoidance angles for each NGSO system. It is reasonable to assume that each NGSO system will use the same level of separation in the 18.8 – 19.3 GHz band segment (*e.g.,* because Viasat and/or other GSO FSS systems have priority in this band segment outside of the US, for reasons of engineering efficiency, etc.). As shown in Table A.12-2, under this assumption VIASAT-79W would be able to operate 100% of the time without the possibility of a 6% $\Delta T/T$ impact to the NGSO ES, except for O3b (in which case VIASAT-79W would be able to operate a minimum of 98.5% of the time).

[9] *See, e.g.*, Consolidated Opposition to Petitions and Response to Comments of Space Exploration Holdings, LLC, IBFS File No. SAT-MOD-20200417-00037, Call Signs S2983, S3018, Appendix A at A-8 (July 27, 2020).

Table A.12-2. Minimum Percentage of Time VIASAT-79W Can Transmit in 18.8 – 19.3 GHz Without Causing 6% ΔT/T Impact to NGSO Earth Stations with NGSO EPFD GSO Arc Avoidance

System	#Satellites	NGSO System's Specified EPFD GSO Arc Avoidance Angle[10]	Percentage Time ΔT/T < 6%
Kuiper	3236	18.0°	100%
Mangata	791	7.5°	100%
New Spectrum	15	35.0°	100%
O3b	42	7.6°	98.5%
Space Norway	2	35.4°	100%
SpaceX	4408	18.0°	100%
Telesat	117	11.9°	100%
Theia	120	10.0°	100%

Applications for earth stations communicating with VIASAT-79W in the 28.6 – 29.1 GHz band segment within the US will include an appropriate demonstration that the proposed operations will be compatible with NGSO systems authorized by the Commission that are serving the US in this band segment.

A.13 Orbital Debris Mitigation Plan

The VIASAT-97W satellite is based on the flight-proven Boeing 702 HP and MP heritage platform. In conjunction with Boeing, Viasat has assessed and limited the amount of debris released in a planned manner during normal operations. The satellite has been designed to not become a source of debris during launch, drift, or operating mode. All separation and deployment mechanisms, and any other potential source of debris, are expected to be retained by the spacecraft or launch vehicle. VIASAT-79W will not engage in any proximity operations.

A.13.1 Large Debris and Operational Space Stations

Viasat has assessed and limited the probability of VIASAT-79W becoming a source of debris by collisions with large debris objects and operational space stations. Requirement 4.5-1 of NASA-STD-8719.14B requires that for GSO spacecraft the probability of accidental collision with space

[10] The various NGSO system's EPFD GSO arc avoidance angles were obtained from FCC and ITU filings associated with each system.

objects larger than 10 cm in diameter shall not exceed 0.001 when integrated over 100 years from time of launch. NASA's DAS software shows that VIASAT-79W meets this requirement with a value of 0.000158, i.e., is better than the requirement by over a factor of 6.

A.13.2 Small Debris and Meteoroids

Viasat and Boeing have assessed and limited the probability that the space station will become a source of debris by collision with small debris or meteoroids that could cause loss of control and prevent disposal. NASA-STD-8719.14B requires that during the mission of the spacecraft the probability of accidental collision with orbital debris and meteoroids sufficient to prevent compliance with the applicable post-mission disposal maneuver requirements does not exceed 0.01.

The satellite includes redundant TT&C, bus control electronics, and propulsion subsystems to ensure successful end-of-life disposal. The spacecraft TT&C system, vital for orbit raising, is extremely rugged with regard to small debris and meteoroids less than 1 cm, by virtue of its redundancy, shielding, separation of components and physical characteristics. The TT&C subsystem has no single points of failure. Near-omni-directional antenna coverage is provided using a combination of independent bicone and forward/aft pipe antennas. These antenna feeds are extremely rugged and capable of providing adequate coverage even if struck, bent or otherwise damaged by a small or medium sized particle. The command receivers and decoders and telemetry encoders and transmitters are located within a shielded area and totally redundant and physically separated. The Xenon tank, shielded in the spacecraft structure central cylinder, and a redundant pair of thrusters, provide the energy for orbit-raising.

Boeing's high-fidelity assessment, using NASA and ESA tools, calculates that the probability of accidental collision with orbital debris and meteoroids sufficient to prevent compliance with the post-mission disposal maneuver requirements does not exceed 0.01.

A.13.3 Minimizing Accidental Explosions

Viasat and Boeing have assessed and limited the probability, during and after completion of mission operations, of accidental explosions or of release of liquids that will persist in droplet

form. Stored energy (chemical, pressure, and kinetic) will be removed or depleted and made safe at the spacecraft's end of life. Valves in the propulsion subsystems will be opened and residual fuel vented, battery charging will be disabled, reaction wheels will be turned off and disabled, and drivers will be turned off and power removed from any redundant squibs and other unfired pyrotechnic valves. Thus, debris generation will not result from the conversion of energy sources on board the spacecraft into energy that fragments the spacecraft.

A.13.4 Safe Flight Profiles

Viasat has taken multiple precautions to ensure safety of flight and sustainability of operations. These include entering into a SSA Sharing Agreement with USSPACECOM and routinely providing ephemeris data to the 18th Space Control Squadron (18 SPSC) to ensure identification of potential collisions. Viasat receives conjunction assessment services from 18 SPSC as well as the Space Data Association (SDA), an organization which aims to enhance safety of flight via sharing of operational data and promotion of best practices across the industry, where it also processes Viasat's ephemeris and incorporates planned maneuver data in their assessments. Additionally, as a participant in the USSF Commercial Integration Cell (CIC), Viasat is privy to additional threats to its spacecraft and their operation.

Prior to deployment, Viasat will register VIASAT-79W with the 18 SPSC. Viasat maintains accurate track of its spacecraft by conducting hourly ranging sessions from two separate geographic locations. This provides the data to generate precise ephemerides that feed into the SDA and 18 SPSC assessments. Viasat will operate VIASAT-79W such that its orbit is maintained within 0.05° of its assigned orbital longitude in the east/west direction, except during end-of-life disposal.

Viasat has assessed the known satellites located at, or reasonably expected to be located at, the requested 79.0° W.L. orbital location, in addition to those assigned in the vicinity of that location such that the station keeping volumes of the respective satellites might overlap or touch. In doing so, Viasat has reviewed data from Space-Track, the ITU's Space Network Systems (SNS), and the Commission's International Bureau Filing System (IBFS). The nearest satellites currently in orbit are listed in Table A13-1. None of them has a station keeping volume that overlaps, or touches,

that planned for VIASAT-79W. Viasat is unaware of any proposed satellites expected to be located within ±0.15° of the 79.0° W.L. location.

Table A13-1. Satellites Near 79.0° W.L. Orbit Location

Satellite	Orbit Location	E-W Station Keeping
ARSAT 2	81.0° W.L.	±0.05°
SKY MEXICO-1	78.8° W.L.	±0.05°
QUETZSAT 1	77.0° W.L.	±0.05°

A.13.5 Post-Mission Disposal

At the end of its useful life, and barring catastrophic failure of satellite components, VIASAT-79W will be relocated, to an orbit with a perigee altitude of 36,086 km (300 km above GSO). This exceeds the requirement of §25.283 for a minimum disposal orbit perigee altitude of:

$$36{,}021 \text{ km} + (1000 \cdot C_R \cdot A/M)$$

where C_R is the solar radiation pressure coefficient of the spacecraft, and A/M (m^2/kg) is the Area-to-Mass ratio of the spacecraft.

For VIASAT-79W:

$C_R = 1.3$

A/M = 0.0229 m^2/kg

Thus, the minimum disposal orbit perigee altitude is:

= 36,021 km + 1000 x C_R x A/m
= 36,021 km + 1000 x 1.3 x 0.0229
= 36,051 km
= 265 km above GSO (35,786 km)

Thus VIASAT-79W's 300 km above GSO disposal orbit provides an additional margin of 35 km. Disposal will require 1.7 kg of Xenon propellant which will be reserved, taking account of all fuel measurement uncertainties, to perform the final orbit raising maneuver.

A.14 Waiver Request

In 2015, the Commission amended §25.210(i) such that its cross-polarization isolation requirement is applicable only to 17/24 GHz BSS space station antennas transmitting in the 17.3-17.8 GHz band segment. In addition, the Commission has confirmed that the §25.210(i) requirement referenced in the default service rules in §25.217 was not intended to apply to FSS space stations.[11] As discussed above, Viasat is seeking a waiver to allow it to operate GSO FSS stations in the 17.7 – 17.8 GHz band segment on a non-conforming basis. Therefore, out of an abundance of caution, Viasat is requesting a waiver of any requirement that VIASAT-79W space station antennas meet a cross-polarization isolation of 25 dB within the primary coverage area of the antenna in the 17.7 – 17.8 GHz band segment (to the extent such a requirement would otherwise apply). The VIASAT-79W space station transmit and receive antennas can have a cross-polarization isolation as low as 20 dB. This cross-polarization isolation shortfall creates a negligible amount of additional self-interference into the VIASAT-79W satellite network, and the link budgets are sufficiently robust to compensate for the negligible degradation caused by the reduced cross-polarization isolation performance. In any event, the uplink cross-polarization isolation shortfall is solely an intra-system design issue creates only a negligible amount of additional downlink interference into adjacent satellite networks. Compared to 25 dB cross-polarization isolation, a 20 dB cross-polarization isolation will decrease the downlink C/I into an adjacent satellite network by approximately 0.037 dB.

[11] *See Viasat, Inc.*, 35 FCC Rcd 4324 ¶ 46 (2020).

Annex 1

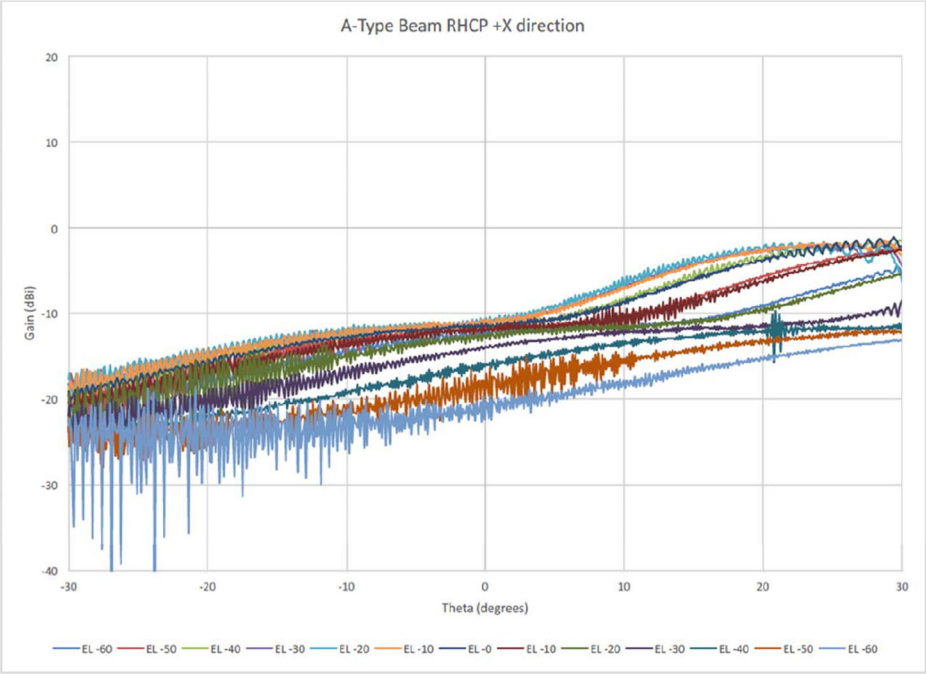
Clear Sky Link Budgets

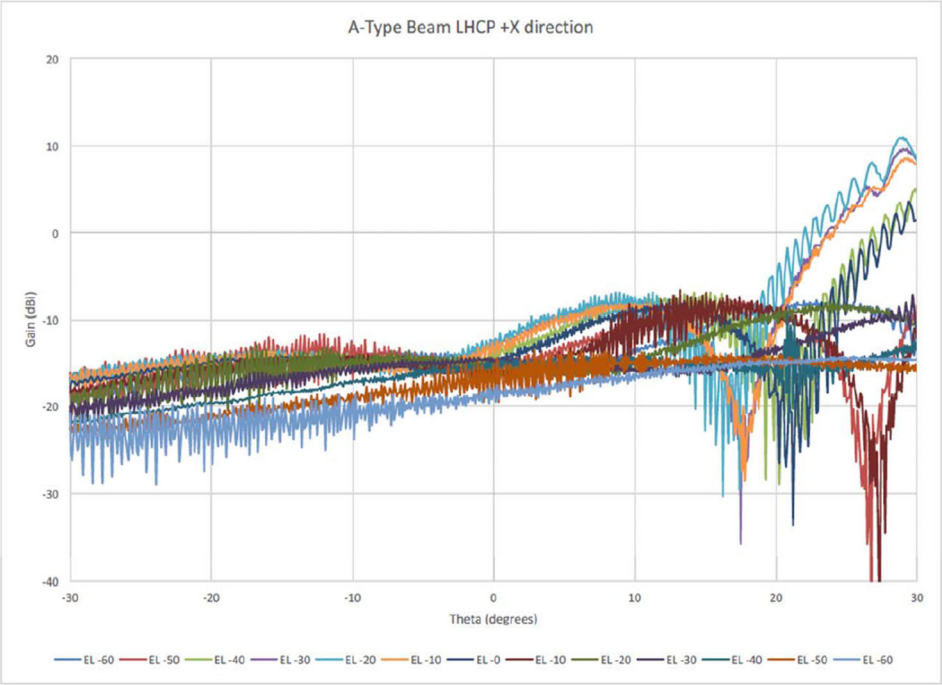
General												
Emission Designator		600MG7D	500MG7D	500MG7D	500MG7D	400MG7D	300MG7D	200MG7D	100MG7D	50M0G7D	12M5G7D	6M25G7D
Carrier Bandwidth	MHz	600	500	500	500	400	300	200	100	50	12.5	6.25
Uplink Frequency	GHz	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3
Downlink Frequency	GHz	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
Uplink												
Tx E/S Antenna Diameter	m	7.4	7.4	7.4	7.4	7.4	7.4	0.7	0.7	0.7	0.7	0.3
Tx E/S Power to Antenna	W	10.0	10.0	10.0	10.0	10.0	10.0	14.0	13.4	12.8	11.1	1.8
Tx E/S Antenna Gain	dBi	65.0	65.0	65.0	65.0	65.0	65.0	44.3	44.3	44.3	44.3	37.3
Tx E/S EIRP per Carrier	dBW	75.0	75.0	75.0	75.0	75.0	75.0	58.3	57.7	57.1	55.4	39.1
Tx E/S Antenna Pointing Loss	dB	1.2	1.2	1.2	1.2	1.2	1.2	0.5	0.5	0.5	0.5	0.5
Atmospheric and Rain Losses	dB	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Free Space Loss	dB	213.6	213.6	213.6	213.6	213.6	213.6	213.6	213.6	213.6	213.6	213.6
G/T (peak)	dB/K	16.1	16.1	16.1	16.1	22.2	22.2	22.2	22.2	22.2	22.2	22.2
C/I - Intra-system	dB	25.5	25.5	25.5	25.5	25.5	25.5	14.3	14.3	14.3	14.3	14.3
Downlink												
EIRP per Carrier towards Rx E/S	dBW	70.8	70	70	70	69	67.8	63	60	57	51	48
Atmospheric and Rain Losses	dB	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Free Space Loss	dB	210.1	210.1	210.1	210.1	210.1	209.9	209.9	209.9	209.9	209.9	209.9
Rx E/S Antenna Pointing Loss	dB	0.5	0.5	0.5	0.5	0.5	0.5	0.55	0.55	0.55	0.55	0.55
Rx E/S Antenna Diameter	m	1.8	1.8	0.7	0.3	0.7	0.7	7.4	7.4	7.4	7.4	7.4
Rx E/S Antenna Gain	dBi	49.3	49.3	40.7	33.7	40.7	40.7	61.4	61.4	61.4	61.4	61.4
Rx E/S G/T	dB/K	23.3	23.3	14.7	7.7	14.7	14.7	36.6	36.6	36.6	36.6	36.6
System Noise Temp (LNA+Sky)	K	400	400	400	400	400	400	300	300	300	300	300
C/I - Intra-system	dB	18.7	18.7	18.7	18.7	18.7	13.3	13.3	13.3	13.3	13.3	13.3
End-to-End												
C/N - Thermal Uplink	dB	16.6	17.4	17.4	17.4	24.5	25.7	11.5	13.9	16.3	20.6	7.3
C/I Up - ASI	dB	22.7	23.5	16.8	12.3	17.7	12.6	17	16.3	14.3	14.9	12.3
C/N - Thermal Downlink	dB	23.9	23.9	15.3	8.3	15.3	15.5	34.4	34.4	34.4	34.4	34.4
C/I Down - ASI	dB	22.7	23.5	16.8	12.3	17.7	12.6	17	16.3	14.3	14.9	12.3
C/(N+I) - Total Actual	dB	12.8	13.2	9.8	5.2	10.8	7.2	7.1	7.6	7.4	8.0	4.1
C/N - Required	dB	10.3	3.6	-2.8	-0.9	6.2	-1.3	-0.9	6.2	-1.3	3.6	-0.9
Excess Margin	dB	2.5	9.6	12.6	6.1	4.6	8.5	8.0	1.4	8.7	4.4	5.0

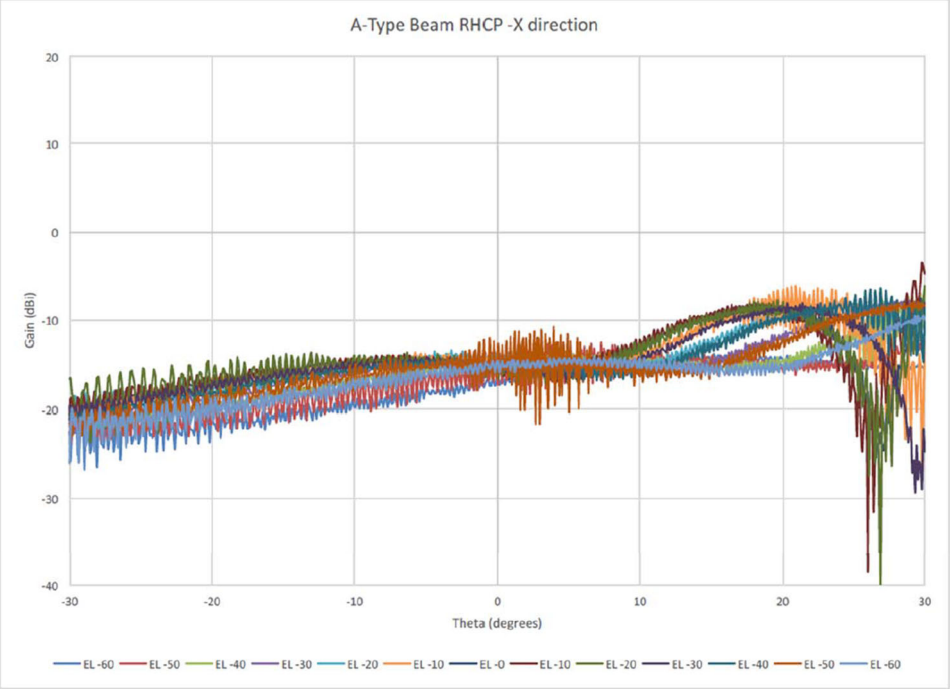
Annex 2

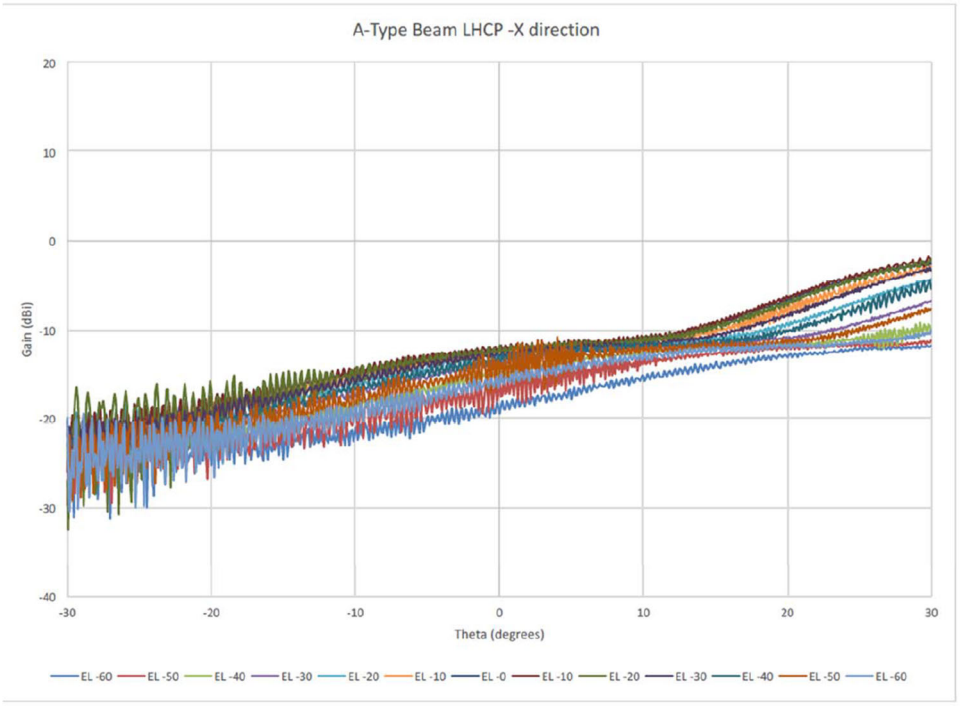
Predicted Off-Axis Gain Pattern Cuts

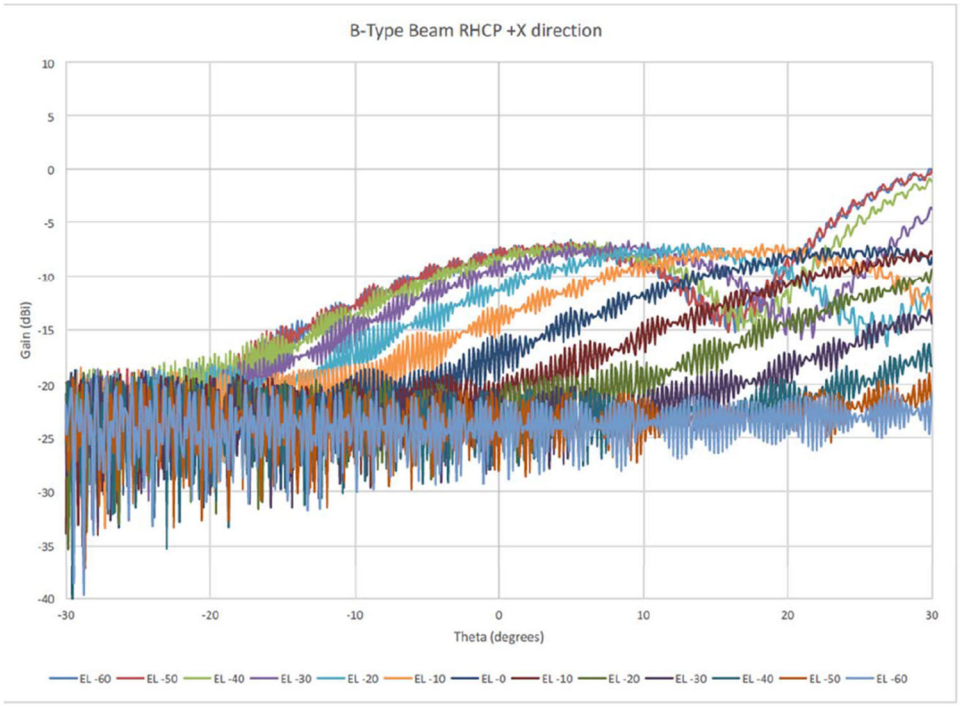
The following eight figures are the predicted off-axis gain pattern cuts for VIASAT-79W in the X-Z plane over a range of ±30° from the negative and positive X-axes, for both the A- type beams and B-type beams, in both polarizations, in planes rotated from the X-Z plane about the Z-axis over a range of ±60° relative to the equatorial plane, and at a center frequency of 17.775 GHz.

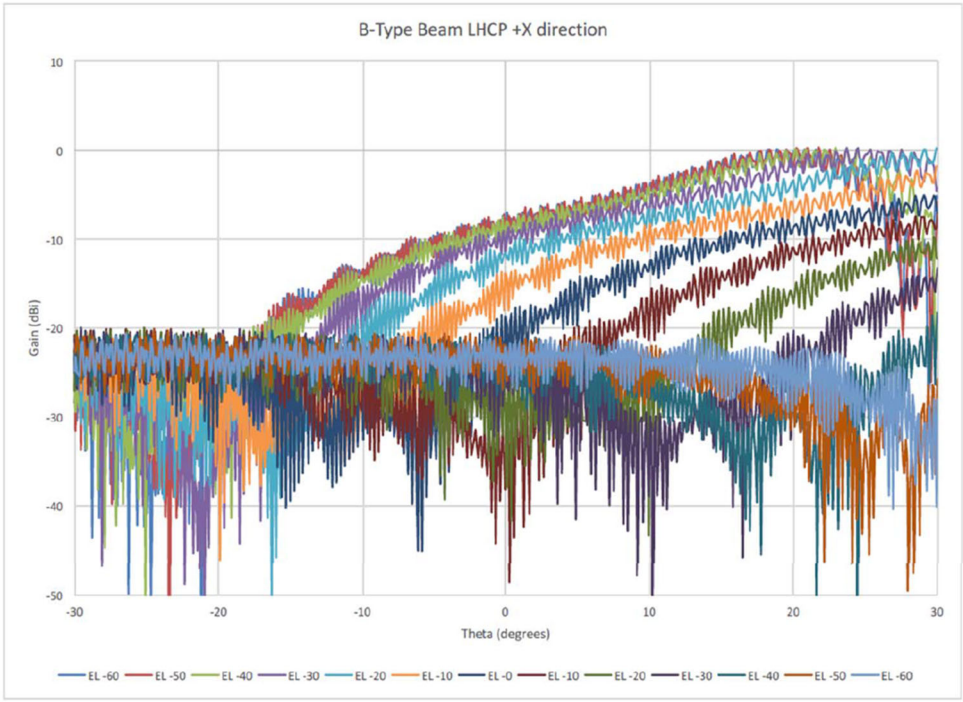


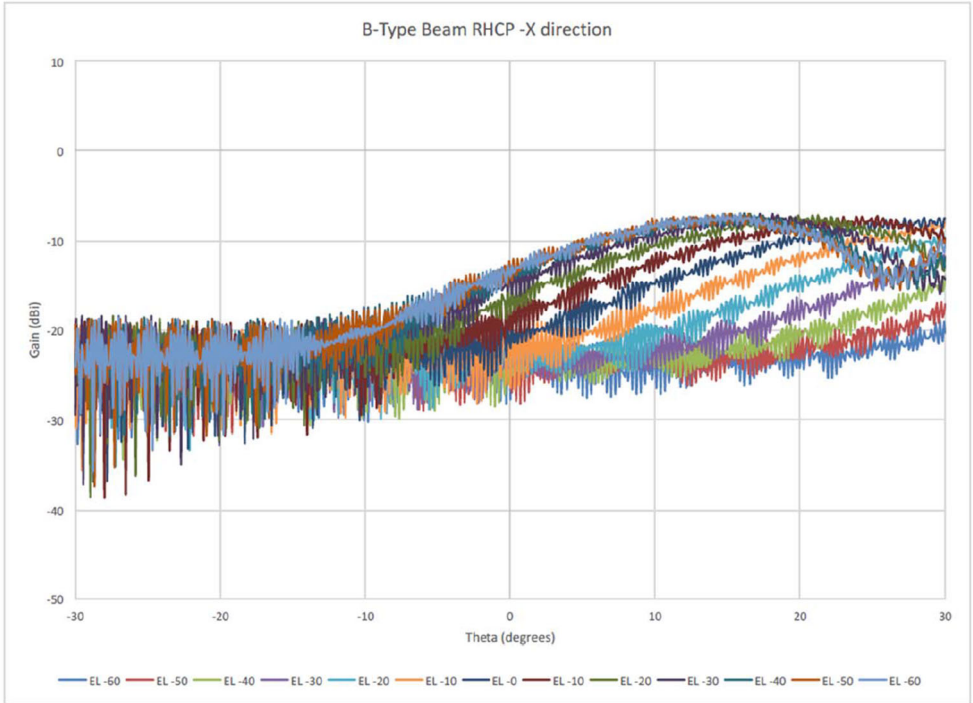

A-Type Beam LHCP +X direction
Gain (dBi)
Theta (degrees)
EL -60 EL -50 EL -40 EL -30 EL -20 EL -10 EL -0 EL -10 EL -20 EL -30 EL -40 EL -50 EL -60

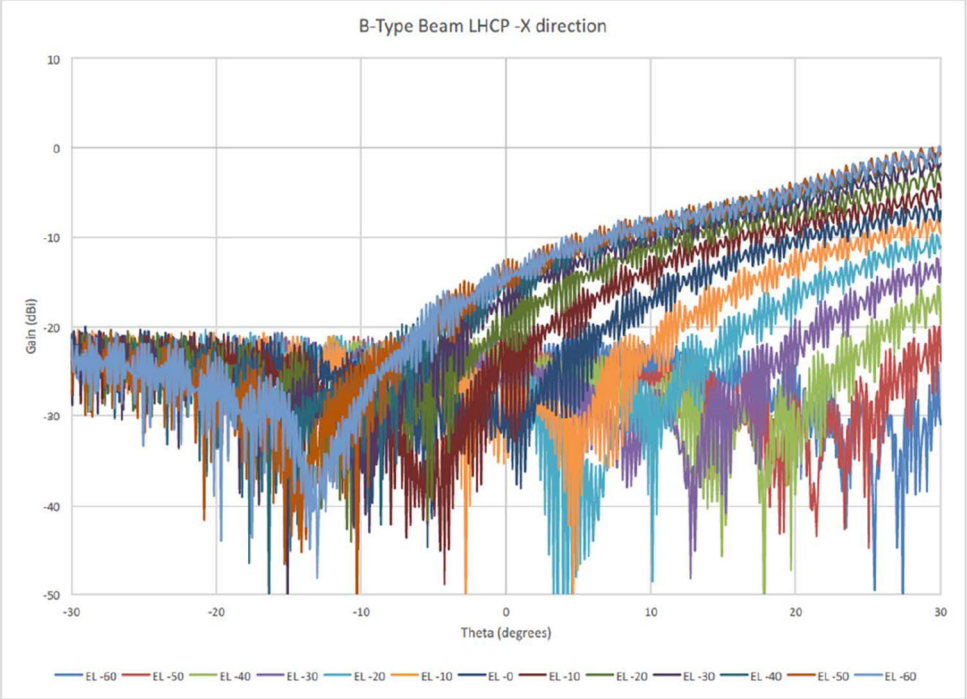

A-Type Beam RHCP -X direction
Gain (dBi)
Theta (degrees)
EL -60 EL -50 EL -40 EL -30 EL -20 EL -10 EL -0 EL -10 EL -20 EL -30 EL -40 EL -50 EL -60


A-Type Beam LHCP -X direction
Gain (dBi)
Theta (degrees)
EL -60 EL -50 EL -40 EL -30 EL -20 EL -10 EL -0 EL 10 EL 20 EL 30 EL 40 EL 50 EL 60


B-Type Beam RHCP +X direction
Gain (dBi)
Theta (degrees)
EL -60 EL -50 EL -40 EL -30 EL -20 EL -10 EL -0 EL 10 EL 20 EL 30 EL 40 EL 50 EL 60


B-Type Beam LHCP +X direction
Gain (dBi)
10
0
-10
-20
-30
-40
-50
-30
-20
-10
0
10
20
30
Theta (degrees)
EL -60
EL -50
EL -40
EL -30
EL -20
EL -10
EL -0
EL -10
EL -20
EL -30
EL -40
EL -50
EL -60


B-Type Beam RHCP -X direction
Gain (dBi)
10
0
-10
-20
-30
-40
-50
-30
-20
-10
0
10
20
30
Theta (degrees)
EL -60
EL -50
EL -40
EL -30
EL -20
EL -10
EL -0
EL -10
EL -20
EL -30
EL -40
EL -50
EL -60


B-Type Beam LHCP -X direction
10
0
-10
-20
-30
-40
-50
Gain (dBi)
-30
-20
-10
0
10
20
30
Theta (degrees)
EL -60
EL -50
EL -40
EL -30
EL -20
EL -10
EL -0
EL -10
EL -20
EL -30
EL -40
EL -50
EL -60

CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING INFORMATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this application, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this application, and that it is complete and accurate to the best of my knowledge and belief.

/s/
Mark A. Sturza
3C Systems Company
President