EXHIBIT B

TECHNICAL APPENDIX

ASTRANIS 157E KU GSO SYSTEM AT 157° E.L.

1.0 Overall Description (§ 25.114(d)(1))

This technical appendix is submitted in support of the application of Astranis Projects USA LLC ("Astranis") for authority to operate the ASTRANIS 157E Ku GSO System at 157° E.L. The satellite's Ku-band transponders will provide service across Southeast Asia via a series of spot beams. The ASTRANIS 157E Ku GSO System will also utilize Ka-band spot beams to provide gateway functions and will utilize on-board software defined radio.

2.0 Spectrum Usage and Sharing

The Astranis 157E Ku GSO System will use the following frequency bands:[2]

- Conventional Ku-band frequencies: 14-14.5 GHz (Earth-to-space)
- Extended Ku-band frequencies: 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 13.75-14 GHz (Earth-to-space)
- Conventional Ka-band frequencies: 18.3-18.8 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 28.35-28.6 GHz (Earth-to-space) and 29.25-30 GHz (Earth-to-space)
- Extended Ka-band frequencies: 17.7-18.3 GHz (space-to-Earth), 18.8-19.4 GHz (space-to-Earth), 19.6-19.7 GHz (space-to-Earth), 27.5-28.35 GHz (Earth-to-space) and 28.6-29.1 GHz (Earth-to-space)
- Additional FSS frequency bands: 19.4-19.6 GHz (space-to-Earth) and 29.1-29.25 GHz (Earth-to-space)
- Appendix 30B frequency bands: 11.2-11.45 GHz (space-to-Earth)

Sharing with other GSO FSS systems. With respect to sharing with GSO fixed-satellite service ("FSS") systems, the FCC's rules apply two-degree spacing rules between GSO FSS systems pursuant to § 25.140 in the conventional Ku-band, conventional Ka-band, extended Ku-

[2] The naming convention used herein for the various frequency bands follows the definitions in § 25.103 of the Commission's rules, except for the Appendix 30B frequencies.

band and extended Ka-band frequencies. As described in detail in Section 7.0 below, Astranis will comply with the relevant provisions of § 25.140. With respect to other frequency bands not covered by the FCC's two-degree spacing rules—19.4-19.6 GHz and 29.1-29.25 GHz—Astranis provides analyses in Section 7.0 below to demonstrate compatibility of the ASTRANIS 157E Ku GSO System with other GSO systems operating in these frequency bands, pursuant to § 25.140(a)(3)(vi).

With respect to proposed operation in the Appendix 30B frequency bands (11.2-11.45 GHz (space-to-Earth)), Astranis will take into account the applicable requirements of Appendix 30B of the ITU Radio Regulations in accordance with § 25.140(a)(3)(v). The closest U.S. ITU filings under Appendix 30B are more than 10 degrees away (USASAT-101C at 169° E.L.). Given that the FCC does not generally require coordination of satellite systems beyond six degrees in orbital spacing, and that the coordination arc in Appendix 30B is also six degrees,[3] Astranis is confident that the ASTRANIS 157E Ku GSO System can successfully co-exist with these two systems.

Sharing with terrestrial systems. The 17.7-18.3 GHz band is available for earth stations in motion ("ESIMs") and vehicle-mounted earth stations ("VMESs"), pursuant to footnote NG527A and § 25.202(a)(10), and is also primary for the fixed service. GSO FSS systems are secondary in 17.8-18.3 GHz.[4] GSO FSS systems are permitted on an unprotected basis vis a vis the fixed service in 17.7-17.8 GHz.[5] Astranis recognizes that in these frequency bands in the

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[3] *See* Section 1.2 of Annex 4 to Appendix 30B of the ITU Radio Regulations.

[4] *See Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service et al*, Second Report and Order in IB Docket No. 17-95 and Report and Order in IB Docket No. 18-315 and Further Notice of Proposed Rulemaking, 35 FCC Rcd 5137, 5166, Appx. B (2020); *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, IB Docket No. 16-408, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809, 7839, Appx. A (2017).

[5] *See* 47 C.F.R. § 2.106(d)(58) NG58; *Amendment of Parts 2 and 25 of the Commission's Rules to Enable GSO Fixed-Satellite Service (Space-to-Earth) Operations in the 17.3-17.8 GHz Band, to Modernize Certain Rules*

United States its earth stations may not claim protection from transmissions of non-Federal stations in the fixed service.

The 27.5-28.35 GHz band is shared with the terrestrial Upper Microwave Flexible Use Service ("UMFUS") and FSS systems are secondary in the United States. Licensing gateways in the U.S. (if any) for the ASTRANIS 157E Ku GSO System will conform to the requirements of § 25.136 regarding use of spectrum by future UMFUS networks.

Sharing with DBS feeder links. The 17.3-17.8 GHz band is also used by Direct Broadcast Satellite service feeder links transmitting in the Earth-to-space direction. Internationally, use of this frequency band for feeder links is governed by Appendix 30A of the Radio Regulations, and the FCC's rules rely heavily on Appendix 30A to address compatibility.[6] However, there are no U.S. Appendix 30A Plan assignments or ITU filings to include new Appendix 30A Plan assignments within 2° of the 157° E.L. orbit location.[7] Thus, no further analysis is required pursuant to § 25.264(b), considering that § 25.264(g) recognizes that compatibility can be achieved at orbit locations as close as 0.2 degrees away.[8]

Sharing with 17/24 GHz BSS downlinks. The 17.3-17.8 GHz band is also shared with the 17/24 GHz broadcasting-satellite service ("17/24 GHz BSS") operating in the downlink direction. Compatibility with any U.S. 17/24 GHz BSS systems is achieved through four-degree

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Applicable to 17/24 GHz BSS Space Stations, and to Establish Off-Axis Uplink Power Limits for Extended Ka-Band FSS Operations, IB Docket Nos. 20-330 & 22-273, Report and Order and Notice of Proposed Rulemaking, FCC 22-63 at 9 ¶ 18 (rel. Aug. 3, 2022).

[6] *See* 47 C.F.R. § 25.114(d)(13).

[7] The closest U.S. modification to or assignment in the Appendix 30A Plan are various original USA Plan assignments at 170° E.L.

[8] *Amendment of Parts 2 and 25 of the Commission's Rules to Enable GSO Fixed-Satellite Service (Space-to-Earth) Operations in the 17.3-17.8 GHz Band, to Modernize Certain Rules Applicable to 17/24 GHz BSS Space Stations,* IB Docket Nos. 20-330 & 22-273, Report and Order, Notice of Proposed Rulemaking, FCC 22-63, at 15-17 ¶¶ 33-38 (rel. Aug 3, 2022). For example, the FCC recognizes that "receiving DBS space stations are vulnerable to space path interference from *nearby* co-frequency 17/24 GHz BSS space station transmissions." *Id*. ¶ 33. (emphasis added).

spacing and compliance with the power-flux density ("pfd") limits contained in §25.140(a)(3)(iii). As shown in the accompanying Schedule S, Astranis complies with these limits. There are also no licensed U.S. 17/24 GHz systems within four degrees of the 157° E.L. orbital location.[9]

Sharing with U.S. Federal systems. The 17.8-20.2 GHz band is shared with Federal FSS systems. Astranis notes that there is a USAEGIS-154E system at the 154° E.L. orbital location. Astranis will coordinate with Federal systems pursuant to footnote US334. In addition, Astranis recognizes that the 13.75-14 GHz frequency band is shared with Federal systems and subject to footnotes US356 and US357 to the U.S. Table of Frequency Allocations in § 2.106, as well as footnotes 5.502 and 5.503 that apply internationally.

Sharing with NGSO FSS systems. In the 18.8-19.3 GHz and 28.6-29.1 GHz bands, non-geostationary satellite orbit ("NGSO") FSS systems are primary and GSO FSS systems are secondary in the United States.[10] Astranis will coordinate with entities authorized to operate Ka-band NGSO FSS satellite systems as required to ensure that the ASTRANIS 157E Ku GSO System does not cause harmful interference to such systems in NGSO-primary spectrum and will accept any interference caused by such systems in those bands in the United States.

Sharing with NGSO MSS feeder links. In the 19.4-19.6 GHz and 29.1-29.25 GHz bands, NGSO mobile-satellite service ("MSS") feeder links are primary and GSO FSS systems are secondary in the United States. Astranis will coordinate the ASTRANIS 157E Ku GSO System operations with entities authorized to operate NGSO MSS systems as required to ensure compatibility. In the 29.25-29.3 GHz band, NGSO MSS feeder links and GSO FSS systems are

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[9] *See* the FCC's authorized space station list, available at https://www.fcc.gov/approved-space-station-list. The FCC maintains four-degree orbital spacing with 17/24 GHz BSS systems. *See* 47 CFR 25.140(b)(4).

[10] *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, IB Docket No. 16-408, Report and Order and Further Notice of Proposed Rulemaking, 32 FCC Rcd 7809, 7813, ¶ 11 (2017).

co-primary in the United States. Astranis will also coordinate in 29.25-29.3 GHz in accordance with § 25.258.

As described herein and in the accompanying Schedule S, the ASTRANIS 157E Ku GSO System operations in these frequencies will adequately protect U.S.-authorized satellite and terrestrial systems from interference. Accordingly, grant of authority for ASTRANIS 157E Ku GSO System is fully consistent with Commission policies, except where waivers are requested herein, and will not adversely affect other authorized users of the spectrum.

3.0 Schedule S (§ 25.114(c))

The Schedule S online database is included with this filing. The Astranis payload implements a software defined radio that allows the frequencies used in any beam to be changed, which means that the Schedule S Channel size (transponder equivalents) can be changed on station, as well as the routing between beams used as gateways and user beams. In Schedule S, Receiving Channels and Transmitting Channels Tables, Astranis provides at least two sets of typical channel (or transponder equivalent) sizes, one that is representative of a possible minimum channel bandwidth and one set that is representative of a possible maximum channel bandwidth. The actual channel bandwidths can be adjusted based on customer needs and other circumstances. Multiple carriers can be transmitted within one channel (transponder equivalent), depending on the customer use case.

The GIMS database for all beams was uploaded once, under Beam KUDH.

4.0 Telemetry, Tracking and Command (TT&C) frequencies and beams.

The frequencies and beams used for TT&C are provided in the Schedule S. The TT&C earth station locations and precise TT&C frequencies will be provided to the FCC at a later date. TT&C can be provided through a Ka-band gateway beam (called Beams CGDL, CGDR, CGRL and CGRR in Schedule S), or through the omni beam (called Beams CLDL, CLDR, CLRL and CLRR in Schedule S) on the spacecraft.

5.0 Power-flux Density (PFD) limits (§ 25.208)

In determining the EIRP density and associated PFD levels of the ASTRANIS 157E Ku GSO System satellite, the Schedule S EIRP is assumed to be spread across a 375 MHz bandwidth.

There are no PFD limits for the 19.7-20.2 GHz band in § 25.208 or in No. 21.16 of the ITU Radio Regulations with respect to the operation of geostationary satellites.

6.0 Satellite Antenna Gain Contours (§ 25.114(c)(4)(vi)(A) & 25.114(c)(4)(vii)(C))

The Schedule S and accompanying gxt files provide the typical antenna gain contours for the ASTRANIS 157E Ku GSO System beams at the nominal 157° E.L. orbital location. Considering the large number of spot beams utilized, the predicted antenna gain contours and associated performance characteristics are provided for a representative set of beams called User Beam Group in the Ku-band frequencies (called beams KUUV, KUUH, KUDV and KUDH in Schedule S). Any of the Ka-band beams can be used as a gateway beam (called beams KGDL, KGDR, KGUL and KGUR in Schedule S). Specific gateway locations will be identified at a later date. Pursuant to Section 25.114(c)(4)(vii)(C) of the Commission's rules, Astranis is providing the predicted antenna gain contours for one transmit and receive antenna beam, together with a map of the isolines formed by combining all of the spot beams into one or more composite beams.

Consistent with § 25.114(c)(4)(vi)(A) of the Commission's rules, Astranis is not providing the gain characteristics for the global omni antennas (beams CLDL, CLDR, CLRL and CLRR in

Schedule S) in a GIMS-readable format because the -8 dBi contours of these beams fall beyond the edge of the visible Earth.

7.0 Interference Analyses including Two-Degree Spacing Analysis (§ 25.114(d)(7), § 25.140(a))

7.1 Two-Degree Spacing Analyses

Consistent with § 25.140(a)(2), Astranis will comply with the FCC's two-degree spacing rules for GSO FSS space stations applicable to the frequency bands in which it operates 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 proposed space station and except as provided in § 25.140(d).

With respect to its own application for another satellite to operate at this location, the ASTRANIS 157E GSO System,[11] Astranis will carefully plan frequency use to avoid interference between the two satellites.

Consistent with § 25.140(a)(3)(vi), Annex A provides analyses demonstrating the compatibility of the ASTRANIS 157E Ku GSO System at 157° E.L. with neighboring spacecraft in the Ka-band frequencies not covered by the definition of conventional or extended Ka-band frequencies in § 25.103– *i.e.*, 29.1-29.25 GHz and 19.4-19.6 GHz.

[11] *See* Astranis Projects USA, LLC, ICFS File Nos. SAT-LOA-20250618-00152 and SAT-AMD-20250919-00292.

7.2 Coordination

Astranis commits to complete coordination with U.S. government systems operating across 17.8-20.2 GHz pursuant to footnote US334 to the U.S. Table of Frequency Allocations in § 2.106.

Astranis will also coordinate with U.S. licensed NGSO MSS feeder link operators in 19.4-19.6 GHz and 29.1-29.3 GHz. For operations in 29.25-29.3 GHz, Astranis will pursue coordination with these operators in accordance with § 25.258.

8.0 Mitigation of Orbital Debris (§ 25.114(d)(14))

In Annex B, Astranis describes the design and operational strategies that will be used to mitigate orbital debris.

ANNEX A

Interference Analysis for 19.4-19.6 GHz and 29.1-29.25 GHz

Interference Analyses

There are no U.S. authorized satellites in the 19.4-19.6 GHz and 29.1-29.25 GHz frequency bands within 2° of the 157° E.L. orbital location in the Ka-band frequencies. Therefore, a hypothetical satellite assumed to be transmitting at the same maximum uplink power density and downlink EIRP density levels as those being sought for the ASTRANIS 157E Ku GSO System is used to estimate interference levels at that orbital location.

For this portion of the analysis, the carrier-to-interference ratio between two adjacent systems is estimated for a set of emissions. The analysis methodology consists of defining the emission characteristics for each network and computing the interference levels resulting from co-channel operation. C/I levels are calculated for each combination of overlapping emissions (*i.e.*, the same frequency band and link direction). Results are presented in tables providing the interference levels for combinations of emissions pairs.

The equations and parameter definitions presented above can be used to express the uplink and downlink C/I as follows:

$$C/I_{UP} = (PD_{ES,W} - PD_{ES,I}) + (G_{ES,W}(\theta_W) - G_{ES,I}(\theta_I)) + \Delta G/T$$

$$C/I_{DN} = (ED_{SS,W} - ED_{SS,I}) + (G_{ES,W}(\theta_W) - G_{ES,W}(\theta_I)) + \Delta GC$$

The off-axis performance of the earth station antenna is modeled using § 25.209.

Earth station topocentric off-axis angles are approximated by adding 10% to the geocentric angular separation.

System characteristics used in the analysis are shown in the following tables.

This analysis considers the digital emissions signals of both networks. Analog TV/FM signals are coordinated on a case-by-case basis with nearby spacecraft and are, therefore, not addressed in this analysis.

Applying the methodology presented above results in the C/I levels shown in the following tables. A separate table is provided for each frequency band/link direction pair that shows the C/I level for each emission pair.

Table B-1: ASTRANIS into Hypothetical Adjacent Satellite Ka-band Downlink C/I

Downlink C/I analysis		**Astranis into Adjacent**				*Astranis Carriers*							
Ka-band						Emission		250MG7W	100M0G7W	10M0G7W	250MG7W	100M0G7W	10M0G7W
						Bandwidth		238.1	95.2	8.3	238.1	95.2	30.0
Orbital Position Astranis		**157.0**				Receive Earth Station (m)		0.6	0.75	9	1.8	1.2	2.4
Orbital Position Adjacent Satellite		**159.0**				Satellite EIRP		62.7	62.7	62.7	62.7	62.7	62.7
Geocentric Separation		2.0				Downlink EIRP density		-30.0	-30.0	-31.5	-30.0	-30.0	-31.5
Topocentric Separation		2.1				RX Earth Station Gain		39.9	41.8	63.4	49.4	45.9	51.9
Frequency (GHz)		19.5				Sidelobe Characteristic		29.0	29.0	29.0	29.0	29.0	29.0
						Off-axis Gain		21.0	21.0	21.0	21.0	21.0	21.0
Adjacent Satellite Carriers													
Emission	Satellite EIRP	Bandw. (MHz)	Downlink EIRP density	Receive Ant. (m)	Earth Station Gain	Sidelobe Charact.	Off-axis Gain	C/I	C/I	C/I	C/I	C/I	C/I
250MG7W	62.7	238.1	-26.0	0.6	39.9	29	21.0	22.9	22.9	24.4	22.9	22.9	24.4
100M0G7W	62.7	95.2	-26.0	0.75	41.8	29	21.0	24.8	24.8	26.3	24.8	24.8	26.3
5M00G7W	62.7	8.3	-27.5	9	63.4	29	21.0	44.9	44.9	46.4	44.9	44.9	46.4
250MG7W	62.7	238.1	-26.0	1.8	49.4	29	21.0	32.4	32.4	33.9	32.4	32.4	33.9
100M0G7W	62.7	95.2	-26.0	1.2	45.9	29	21.0	28.9	28.9	30.4	28.9	28.9	30.4
10M0G7W	62.7	8.3	-27.5	2.4	51.9	29	21.0	16.4	18.3	38.4	25.9	22.4	26.9

Notes:
- Because the software defined radio can adjust the power and bandwidth shared between the beams, the satellite EIRP is assumed to be spread across 375 MHz in determining EIF
- The wanted system is assumed to have 4 dB lower EIRP
- Output back off of 3 dB is assumed for user traffic and 4.5 dB for gateways.

Table B-2: ASTRANIS into Hypothetical Adjacent Satellite Ka-band Uplink C/I

Uplink C/I analysis			**Astranis into Adjacent**			*Astranis Carriers*								
Ka-band						Emission			250MG7W	100M0G7W	10M0G7W	250MG7W	100M0G7W	10M0G7W
						Bandwidth (MHz)			238.10	95.24	8.33	238.10	95.24	8.33
						Satellite FTS			-90.0	-90.0	-104.0	-90.0	-90.0	-104.0
						Uplink EIRP			71.0	67.0	47.2	71.0	67.0	52.2
Orbital Position Astranis			**157.0**			Uplink Earth Station (m)			2.4	9	0.6	9	2.4	1.2
Orbital Position Adjacent Satellite			**159.0**			Earth Station Gain			55.4	66.9	43.4	66.9	55.4	49.4
Geocentric Separation			2.0			Upl. EIRP density			-12.7	-12.7	-22.0	-12.7	-12.7	-17.0
Topocentric Separation			2.1			Sidelobe Characteristic			29.0	29.0	29.0	29.0	29.0	29.0
Frequency (GHz)			29.2			Off-axis EIRP density			-47.2	-58.7	-44.4	-58.7	-47.2	-45.4
Adjacent Satellite Carriers														
Emission	Bandw. (MHz)	Satellite FTS	Uplink EIRP	Uplink EIRP density	Transm. Ant. (m)	Earth Station Gain	Sidelobe Charact.	Off-axis EIRP density	C/I	C/I	C/I	C/I	C/I	C/I
250MG7W	238.1	-90.0	71.0	-12.7	2.4	55.4	29	-47.2	34.4	34.4	25.1	34.4	34.4	15.6
100M0G7W	95.2	-90.0	67.0	-12.7	9	66.9	29	-58.7	45.9	45.9	36.6	45.9	45.9	41.7
10M0G7W	8.3	-104.0	47.2	-22.0	0.6	43.4	29	-44.4	31.7	31.7	22.4	31.7	31.7	27.4
250MG7W	238.1	-90.0	71.0	-12.7	9	66.9	29	-58.7	45.9	45.9	36.6	45.9	45.9	41.7
100M0G7W	95.2	-90.0	67.0	-12.7	2.4	55.4	29	-47.2	34.4	34.4	25.1	34.4	34.4	30.2
10M0G7W	8.3	-104.0	52.2	-17.0	1.2	49.4	29	-45.4	47.3	32.7	23.4	32.7	32.7	28.4

Table B-3: Hypothetical Adjacent Satellite into ASTRANIS Ka-Band Uplink C/I

Uplink C/I analysis			**Adjacent into Astranis**			*Astranis Carriers*								
Ka-band						Emission			250MG7W	100M0G7W	10M0G7W	250MG7W	100M0G7W	10M0G7W
						Bandwidth (MHz)			238.10	95.24	8.33	238.10	95.24	8.33
						Satellite FTS			-90.0	-90.0	-104.0	-90.0	-90.0	-104.0
						Uplink EIRP			71.0	67.0	47.2	71.0	67.0	52.2
Orbital Position Astranis			**157.0**			Uplink Earth Station (m)			2.4	9	0.6	9	2.4	1.2
Orbital Position Adjacent Satellite			**159.0**			Earth Station Gain			55.4	66.9	43.4	66.9	55.4	49.4
Geocentric Separation			2.0			Upl. EIRP density			-12.7	-12.7	-22.0	-12.7	-12.7	-17.0
Topocentric Separation			2.1			Sidelobe Characteristic			29.0	29.0	29.0	29.0	29.0	29.0
Frequency (GHz)			29.2			Off-axis EIRP density			-47.2	-58.7	-44.4	-58.7	-47.2	-45.4
Adjacent Satellite Carriers														
Emission	Bandw. (MHz)	Satellite FTS	Uplink EIRP	Uplink EIRP density	Transm. Ant. (m)	Earth Station Gain	Sidelobe Charact.	Off-axis EIRP density	C/I	C/I	C/I	C/I	C/I	C/I
250MG7W	238.1	-90.0	71.0	-12.7	2.4	55.4	29	-47.2	34.4	34.4	25.1	34.4	34.4	15.6
100M0G7W	95.2	-90.0	67.0	-12.7	9	66.9	29	-58.7	45.9	45.9	36.6	45.9	45.9	41.7
10M0G7W	8.3	-104.0	47.2	-22.0	0.6	43.4	29	-44.4	31.7	31.7	22.4	31.7	31.7	27.4
250MG7W	238.1	-90.0	71.0	-12.7	9	66.9	29	-58.7	45.9	45.9	36.6	45.9	45.9	41.7
100M0G7W	95.2	-90.0	67.0	-12.7	2.4	55.4	29	-47.2	34.4	34.4	25.1	34.4	34.4	30.2
10M0G7W	8.3	-104.0	52.2	-17.0	1.2	49.4	29	-45.4	47.3	32.7	23.4	32.7	32.7	28.4

Table B-4: Hypothetical Adjacent Satellite into ASTRANIS Ka-Band Downlink C/I

Downlink C/I analysis		**Adjacent into Astranis**				*Astranis Carriers*							
Ka-band						Emission		250MG7W	100M0G7W	10M0G7W	250MG7W	100M0G7W	10M0G7W
						Bandwidth		238.1	95.2	8.3	238.1	95.2	30.0
Orbital Position Astranis		**157.0**				Receive Earth Station (m)		0.6	0.75	9	1.8	1.2	2.4
Orbital Position Adjacent Satellite		**159.0**				Satellite EIRP		62.7	62.7	62.7	62.7	62.7	62.7
Geocentric Separation		2.0				Downlink EIRP density		-30.0	-30.0	-31.5	-30.0	-30.0	-31.5
Topocentric Separation		2.1				RX Earth Station Gain		39.9	41.8	63.4	49.4	45.9	51.9
Frequency (GHz)		19.5				Sidelobe Characteristic		29.0	29.0	29.0	29.0	29.0	29.0
						Off-axis Gain		21.0	21.0	21.0	21.0	21.0	21.0
Adjacent Satellite Carriers													
Emission	Satellite EIRP	Bandw. (MHz)	Downlink EIRP density	Receive Ant. (m)	Earth Station Gain	Sidelobe Charact.	Off-axis Gain	C/I	C/I	C/I	C/I	C/I	C/I
250MG7W	62.7	238.1	-26.0	0.6	39.9	29	21.0	14.9	16.8	36.9	24.4	20.9	25.4
100M0G7W	62.7	95.2	-26.0	0.75	41.8	29	21.0	14.9	16.8	36.9	24.4	20.9	25.4
5M00G7W	62.7	8.3	-27.5	9	63.4	29	21.0	16.4	18.3	38.4	25.9	22.4	26.9
250MG7W	62.7	238.1	-26.0	1.8	49.4	29	21.0	14.9	16.8	36.9	24.4	20.9	25.4
100M0G7W	62.7	95.2	-26.0	1.2	72.6	29	21.0	14.9	16.8	36.9	24.4	20.9	25.4
10M0G7W	62.7	8.3	-27.5	2.4	51.9	29	21.0	16.4	18.3	38.4	25.9	22.4	26.9

Notes:
- Because the software defined radio can adjust the power and bandwidth shared between the beams, the satellite EIRP is assumed to be spread across 375 MHz in determining EIR
- The wanted system is assumed to have 4 dB lower EIRP
- Output back off of 3 dB is assumed for user traffic and 4.5 dB for gateways.

ANNEX B

Orbital Debris Mitigation Assessment

1.0 Introduction

This Annex describes the space debris mitigation measures that Astranis will implement with respect to the ASTRANIS 157E Ku GSO System, which consists of one satellite to be located and operated at the 157˚ E.L. orbit location.

The ASTRANIS 157E Ku GSO System is designed and manufactured by Astranis Space Technologies Corp. ("Astranis") using its proprietary MicroGEO bus. The satellite design leverages flight heritage hardware, utilizes architectures and design practices common to geostationary satellite orbit ("GSO") spacecraft, and utilizes the SMC-S-016 industry standard as a basis for qualification and acceptance test plans and levels.[1] The satellite is three-axis stabilized, uses monopropellant chemical propulsion for north-south station-keeping, and uses a xenon Hall-effect thruster for east-west station-keeping.

As described below, the ASTRANIS 157E Ku GSO System will comply with § 25.114(d)(14) of the Commission's rules, and Astranis will seek to comply with other rules that the Commission may adopt in the future.

2.0 ASTRANIS 157E Ku GSO System Operations

Astranis will operate the satellite to control and limit the amount of debris released during normal operations,[2] and has assessed and limited the probability of the satellite becoming a source of debris by collisions with small debris or meteoroids that could cause loss of control and prevent post-mission disposal.[3] In addition, fault-tolerant components are spatially separated

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[1] *Space and Missile Systems Center Standard, Test Requirements for Launch, Upper-Stage, and Space Vehicles, SMC-S-016,* Air Force Space Command (Sept. 5, 2014), https://explorers.larc.nasa.gov/2019APSMEX/MO/pdf_files/SMC-S-016_05SEP2014.pdf.

[2] *See* 47 C.F.R. § 25.114(d)(14)(i).

[3] *See* 47 C.F.R. § 25.114(d)(14)(ii).

from each other and housings for electronic components contain significant shielding to further limit the effects of meteoroids.

Astranis has further assessed and limited the probability of the satellite becoming a source of debris by collisions with large debris or other operational space stations and has determined the probability of such collisions with the satellite to be negligible.[4]

The satellite is designed to avoid creating any debris during nominal on-orbit operations. A safe operational configuration is ensured due to the hardware design and concept of operations procedures. The satellite is designed such that high levels of thruster activity and orbit perturbation do not result when foreseeable onboard events occur. The satellite also incorporates significant redundancy for on-station operations and post-mission disposal.

The satellite will be controlled within its station-keeping box (157° E.L. +/- 0.05°) by routine, periodic orbit correction maneuvers. The satellite is fully trackable by existing ground stations and via radio ranging.[5]

There is no other operational spacecraft with station-keeping volume that will overlap with the station-keeping volume of the satellite.[6] Physical coordination of the satellite's on-orbit operations will be performed during orbit raise, graveyard transfer, and other appropriate circumstances and mission phases.

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[4] *See* 47 C.F.R. § 25.114 (d)(14)(iv).

[5] *See* 47 C.F.R. § 25.114 (d)(14)(v).

[6] Astranis has applied for another satellite to operate at this orbital location, ASTRANIS 157E GSO System, and will operate the two satellites in the same station-keeping box. *See* Astranis Projects USA, LLC, ICFS File Nos. SAT-LOA-20250618-00152 and SAT-AMD-20250919-00292.

Astranis has designed the satellite to limit the probability of accidental break-up or explosion both during and after the completion of mission operations and.[7] Systems that may potentially experience such an event (*i.e.,* propulsion hardware and batteries) utilize components that are designed with significant margins, thereby ensuring that energy sources onboard the satellite are contained and controlled during an event, so that they will not convert system components into fragments. Operating conditions in the satellite's batteries and tanks will be monitored by telemetry.

As described below, at post-mission disposal and after the satellite has been raised to graveyard orbit, energy sources will be rendered inactive by venting remaining propellant (via opening all valves) and by leaving the batteries in a permanent state of discharge. Considering their design safety margins, the probability of accidental explosion of the satellite is negligible.

3.0 End-of-Life Disposal

The orbit altitude of the satellite will be raised by 350 km to ensure that the satellite will not re-enter the GSO protected region (GSO altitude +/- 200 km within +/- 15 degrees of inclination) in the long term. To ensure sufficient margin, 0.3 kg of xenon propellant has been allocated and reserved to carry out the post-mission disposal maneuver. This equates to 14 m/s of delta-v, or enough delta-v to raise the orbit roughly 350 km. The Commission will be informed of any material change to the above quantity of propellant.

The minimum perigee altitude to avoid re-entering the GSO protected region can be computed using the IADC formula[8] applied to the satellite:

Delta_H (km) = 235 + 1000 * C_R * (A/m) where

[7] *See* 47 C.F.R. § 25.114(d)(14)(iii).

[8] *See also* Recommendation ITU-R S.1003-2, Environmental Protection of the Geostationary Orbit (2010).

- 235 accounts for the 200 km GEO protected region and 35 km for gravitational perturbations
- C_R is the solar radiation pressure coefficient
    - C_R = 2 in the most conservative case
- A/m is the aspect area (m^2) to dry mass (kg) ratio
    - A/m = 11.18/289.9 = 0.039 for either ASTRANIS 157E Ku GSO satellite

Therefore, a conservative Delta_H for the satellite is calculated as follows:

- Delta_H = 235 + (1000 * 2 * 0.039) = 312 km

The planned 350 km above GSO altitude (along with additional fuel margin) is sufficient to satisfy the 312 km requirement. Astranis will monitor the remaining propellant to ensure that sufficient fuel remains in the tanks to reach the minimum perigee.

As part of the end-of-life activities, energy sources on the satellite will be rendered inactive such that debris generation will not result from the conversion or dissipation of energy sources onboard the satellite.[9] Such actions involve the following:

a. Discharge the batteries and isolate them from the solar arrays to prevent further electrical energy storage.

b. Switch off the reaction wheels.

c. Deplete and vent the propellant tanks, to the extent possible, which allows depressurizing during passivation operations and results in only negligible residuals remaining in the tanks.

[9] *See* 47 C.F.R. § 25.114(d)(14)(vi)-(vii).

i. Xenon in the electric propulsion system, which is contained in two tanks, will be vented, and proportional flow control valve-based pressure regulation allows nearly complete evacuation (as compared to using a mechanical regulator). Additionally, the pressure relief valve prevents catastrophic failure regardless of venting.

ii. During end-of-life deorbiting, the monopropellant is nearly entirely consumed via depletion burns. Small residuals of less than 1 kg may remain in propellant lines and would be contained by normally closed dual-seat solenoid valves after system passivation.

iii. Monopropellant pressurant (helium) remains in diaphragm tank at low pressure. The tank has a total capacity of 91L, containing 0.1 kg of helium, which has a pressure of ~5 bar at the expected disposal temperature of -50 C.

The monopropellant tank has a burst pressure of 49.3 bar and the xenon tanks have a burst pressure of 772.4 bar. All tanks are validated against MIL-STD-1522A.[10] The satellite contains no pyrotechnic systems to passivate.

[10] *See Standard General Requirements for Safe Design and Operation of Pressurized Missile and Space Systems, MIL-STD-1522A*, Department of Defense (May 28, 1984) (superseding MIL-STD-1522).

DECLARATION

I, Kimberly Baum, hereby certify under penalty of perjury that I am the technically qualified person responsible for preparation of the technical information contained in the foregoing exhibit; that I am familiar with the technical requirements of Part 25; and that I either prepared or reviewed the technical information contained in the exhibit and that it is complete and accurate to the best of my knowledge, information and belief.

/s/ Kimberly M. Baum

Kimberly M. Baum
Head of Regulatory
Astranis Space Technologies Corp.

Dated: March 24, 2026