

**Exhibit E**

**Technical Annex**

## Frazier NON-GEOSTATIONARY SATELLITE SYSTEM

### Technical Annex to Supplement Form 442

#### A.1 SCOPE AND PURPOSE

This attachment contains technical information relevant to the Federal Communications Commission’s (“Commission” or “FCC”) Part 5 rules.

#### A.2 OVERALL DESCRIPTION OF SYSTEM FACILITIES, OPERATIONS AND SERVICES

Astro Digital US Inc. (“Astro Digital”) requests authority to launch and operate a single technology demonstration satellite into a non-geostationary orbit (“NGSO”) in Low Earth Orbit (“LEO”), known as Frazier. This satellite will utilize the Corvus bus to deploy a “Spinnaker” dragsail deorbiting device payload. The mission will demonstrate the dragsail’s capability to rapidly accelerate the passive deorbiting of the satellite.

##### A.2.a Orbital Configuration

The Frazier mission consists of a single satellite in one orbital plane as depicted in Table A.2.a-1.

**Table A.2.a-1 Frazier Orbital Parameters**

Epoch Date	06 FEB2025 00:00:00.000
Inclination Angle	97.6 Degrees
Orbital Period	5695.55 Seconds
Apogee	510 +/- 15 km
Perigee	510 +/- 15 km
Argument of Perigee	293.55 Degrees
RAAN:	293.55 Degrees
Mean Anomaly	359.94 Degrees

### **A.2.b Frequency Plan**

The Frazier satellite will operate in UHF-band and S-band. Table A.2.b-1 provides the general frequency plan for the satellite:

**Table A.2.b-1 Frazier frequency bands**

<b>Type of Link and Transmission Direction</b>	<b>Frequency Ranges</b>
Space Operations Service Uplink (TT&C)	2025-2110 MHz
Space Operations Service Downlink (TT&C)	400.48-400.52 MHz

The Frazier satellite will conduct TT&C uplinks within the 2025-2110 MHz (Earth-to-space) band using only non-U.S. ground stations, consistent with the International Table of Frequency Allocations, and one U.S. ground station. The Frazier satellite will conduct TT&C downlinks within the 400.15-401.0 MHz space operations service (space-to-Earth) allocation in accordance with both the U.S. and International Tables of Frequency Allocations.

### **A.2.c ANALYSIS OF FRAZIER INTERFERENCE AND SHARING CONSIDERATIONS**

The Frazier satellite is designed to ensure that current and future operators are not constrained and that spectrum can be easily shared. It will communicate with a limited number of earth stations and, except for beacon use, will only transmit and receive signals when it is visible to the specific earth station, which occurs for limited periods during each orbit.

#### **A.2.d Frazier Sharing Considerations in the 2025-2110 MHz Frequency Band for TT&C Uplinks**

With respect to sharing with other satellite systems (Earth-to-space) in the 2025-2110 MHz frequency band, the limited number of earth stations communicating with the Frazier satellite will mitigate the potential of interference to other satellite networks. There are likely to be other NGSO satellite systems that are also using these same or nearby earth stations in this frequency band, so there may be some situations where adjustments in the operating schedules of the different satellites would need to be made during certain passes by these earth stations. These would be handled by the operators of these earth stations. With respect to Federal systems, Astro Digital has begun coordinating with relevant federal spectrum managers.

#### **A.2.e Sharing Considerations with Other Downlinks in the 400.15-401 MHz Band**

UHF downlinks are performed at the Tromsø, Milan, Unst, and Deadhorse earth stations. With respect to sharing with other satellite systems (space-to-Earth) operating in this band, the limited number earth stations will mitigate the potential of interference to other satellite networks.

#### **A.2.f Antenna Patterns**

UHF downlinks are performed at the Tromsø, Milan, Unst, and Deadhorse earth stations. With respect to sharing with other satellite systems (space-to-Earth) operating in this band, the limited number earth stations will mitigate the potential of interference to other satellite networks.

### **A.3 CESSATION OF EMISSIONS**

All downlink transmissions can be turned on and off by ground telecommand, thereby achieving cessation of emissions from the satellite. As required by Section 5.308 of the FCC's rules, Astro Digital provides below a "stop buzzer" point of contact responsible for addressing interference concerns and ceasing transmissions if interference occurs.

#### Stop Buzzer Point of Contact:

Jack Ackohen  
Program Manager  
Astro Digital US, Inc.  
3047 Orchard Pkwy Suite 20  
San Jose, CA 95128  
(408) 610-4661  
[Jack@astrodigital.com](mailto:Jack@astrodigital.com)

#### **A.4 ORBITAL DEBRIS MITIGATION AND POST-MISSION DISPOSAL**

Astro Digital confirms that the Frazier satellite will not undergo any planned release of debris during their normal operations.<sup>1</sup> All separation and deployment mechanisms, and any other potential source of debris, will be retained by the spacecraft. Astro Digital has assessed the probability of the space stations becoming sources of debris by collision with small debris or meteoroids of less than one centimeter in diameter that could cause loss of control and prevent post-mission disposal.<sup>2</sup> Astro Digital has taken steps to limit the effects of such collisions through shielding, the placement of components, and the use of redundant systems.

Astro Digital has assessed and limited the probability of accidental explosions during and after completion of mission operations through a failure-mode verification analysis.<sup>3</sup> As part of the satellite manufacturing process, Astro Digital has taken steps to ensure that debris generation will not result from the conversion of energy sources on board the satellites into energy that fragments the satellites. All sources of stored energy onboard the spacecraft will have been depleted or safely contained when no longer required for mission operations or post-mission disposal.

Astro Digital has assessed and limited the probability of the space stations becoming a source of debris by collisions with large debris or other operational spacecraft.<sup>4</sup> Astro Digital will work with its launch provider to ensure that the satellite is deployed in such a way as to minimize the potential for in-plane collision. This specifically includes minimizing the potential for collision with crewed spacecraft.

Astro Digital participates in a sharing agreement with the Combined Space Operations Center (“CSpOC”) to better coordinate collision avoidance measures and receive conjunction threat reports.<sup>5</sup> Astro Digital satellites carry onboard GPS receivers that provide for precise orbital position determination. Astro Digital also receives from CSpOC updated two-line element sets, or “TLEs,” which facilitate the identification and tracking of Astro Digital satellites. CSpOC will be able to contact the Astro Digital satellite operations team, that is accessible 24 hours per day/seven days

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<sup>1</sup> 47 C.F.R. § 5.64(b)(1).

<sup>2</sup> 47 C.F.R. § 5.64(b)(2).

<sup>3</sup> 47 C.F.R. § 5.64(b)(3).

<sup>4</sup> 47 C.F.R. § 5.64(b)(4).

<sup>5</sup> 47 C.F.R. § 5.64(b)(4).

per week to ensure that Astro Digital can take immediate action to coordinate collision avoidance measures.

Astro Digital's detailed Orbital Debris Assessment Report ("ODAR") demonstrating compliance with Section 5.64(b) of the FCC's rules is attached as Exhibit D. The disclosure of the orbital deployment parameters, orbital plane inclination, and the orbital period to be used can assist third parties in identifying potential problems. This information also lends itself to coordination between Astro Digital and other operators located in similar orbits.

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