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Via ICFS June 11, 2026

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
45 L Street, NE
Washington, D.C. 20554

Re: Response to Technical Questions,
ICFS File No. SAT-MOD-20251206-00374

Dear Ms. Dortch:

Ligado Networks Subsidiary LLC, Debtor-in-Possession ("Ligado") submits this letter in response to technical questions about the above-captioned application filed recently by several parties (the "May 15 Letter").[1] While these questions go well beyond the information the Commission has required from other satellite license modification applicants, the company offers this information as part of its ongoing effort to keep its spectrum neighbors fully informed regarding its plans for the SkyTerra Next system. As discussed in its application, the SkyTerra Next system will be hosted on AST & Science, LLC's (AST SpaceMobile), U.S.-authorized satellite network and will be used by AST SpaceMobile to provide additional capacity and coverage for the first and only space-based mobile broadband network to its MNO partners, AT&T and Verizon Wireless, as well as FirstNet.

Before turning to the specific issues raised in the May 15 Letter below, it bears emphasis at the outset that SkyTerra Next, working with AST SpaceMobile, will improve use of Ligado's existing L-band spectrum without causing harmful interference to other users. Technical analyses conducted by Ligado, AST SpaceMobile, and their independent consultants clearly demonstrate that SkyTerra Next: (i) fits within Ligado's existing spectrum authorizations and coordination agreements; and (ii) will not cause harmful interference to adjacent-band systems. The application was complete before, but we provide this supplemental information to emphasize the intentionality of the AST SpaceMobile design and to provide additional details to other parties and we expect the Commission to move forward on granting the pending application.

We now turn to addressing the three topics raised in the May 15 Letter (using their nomenclature) and identify the specific issues before setting out our response.

1. **"General assumptions, methodology, and frequency plan"**

   - *Please provide the actual frequencies that Ligado will use for its operations.*

[1] Letter of Aviation Spectrum Resources, Inc., CNH Industrial, Deere & Company, GPS Innovation Alliance, Iridium Communications Inc., and Trimble Inc., ICFS File No. SAT-MOD-20251206-00374 (filed May 15, 2026).

As the May 15 Letter notes, the description of the exact frequencies to be utilized by SkyTerra Next is confidential sensitive business information for Ligado and other coordinated parties. All frequencies will be within its allocated and coordinated MSS spectrum.

- *The Application does not clearly state the bandwidth of each discrete channel on which uplink and downlink service will be provided……..Please provide information on the frequencies to be utilized and individual channel bandwidths.*

Ligado plans to utilize two 10 MHz 3GPP LTE/NR-based channels for providing broadband D2D services via SkyTerra Next. Ligado does not anticipate using 15 or 20 MHz channels in connection with the SkyTerra Next broadband services. SkyTerra Next's services will comply with the established FCC rules and regulations for MSS operations in this band.

- *Does SkyTerra Next's proposed frequency usage impose any frequency coordination, operational, or equipment constraints on GMDSS and/or AMS(R)S systems and services in these safety allocations? More specifically, the requested 1545-1559 MHz (space-to-Earth) authority covers the Viasat AMS(R)S band (1545-1555 MHz) that is designated a safety fallback if interference is encountered in the Viasat generic MSS band (1525-1545 and 1555-1559 MHz). How will this core AMS(R)S band be protected from the expected co-frequency emissions for all current and future aircraft satellite receiver avionics?*

Spectrum use within the L-band is coordinated with other L-band operators. As Ligado has consistently stated, SkyTerra Next will be operated subject to the same rules and compliance framework to which SkyTerra-1 currently is subject, and Ligado has not requested waivers of existing MSS rules.

- *Please verify whether all of the [SkyTerra Next] satellite beams are shapeable and explain how this capability will be used to reduce interference, given that the AST payloads will be expected to provide blanket coverage across the United States and RNSS receivers will be operating throughout the coverage area.*

Yes, the beams are shapeable. The beam descriptions in the SkyTerra Next Schedule S are of generic beams representing the frequency envelopes in which shapeable beams will operate, as described in the RKF analysis. SkyTerra Next payloads will use an advanced electronically steerable phased array system supporting multiple shapeable beams.

2. **"Satellite downlink emissions"**

- *What is the downlink channelization plan?*

SkyTerra Next will utilize two 10 MHz downlink channels leveraging 3GPP-based technology for AST SpaceMobile to use to provide its planned D2D broadband services.

- *What is the maximum power spectral density in EIRP per channel at maximum traffic loading?*

The maximum power spectral density capability will be a maximum power flux density (PFD) level of -110.8 dBW/m²/4 kHz. The maximum channel power varies based on factors such as bandwidth deployed, total available satellite power, beam antenna gain, targeted Carrier-to-

Noise Ratio (C/N) in the beam, traffic in the beam, or operational needs. Each satellite has a nominal Total Radiated Power (TRP) of 36 dBW in linear operation that ensures 45 dB Adjacent Channel Leakage Ratio (ACLR) for LTE/5G waveforms. Each satellite uses an active direct radiating array with thousands of actively controlled radiating elements to form a beam. The system utilizes a technology that actively distributes power to form each beam among different HPAs in the system. Peak Isotropic Antenna Gain is 46 dBi. For each satellite beam, the emission power is dynamically adjusted to achieve 5-20 dB C/N on the ground. Each satellite beam has a minimum of 15 dB transmit power control range for operation and interference management.

- *What is the received forecast maximum signal strength across Earth of the LEO constellation beams?*

This detail depends on the receiver antenna gain. As noted, the maximum power spectral density capability will be a maximum power flux density (PFD) level of -110.8 dBW/m^2/4 kHz. *Please provide some context on the level of the requested emission power (i.e. is it needed to provide indoor coverage?).*

As stated earlier, emission power is dynamically adjusted with the goal of achieving a 5 dB to 20 dB C/N on the ground for all intended users. There is no fixed indoor loss for all environments, as that will depend on reflections, scattering, and signal blockages. Indoor radio frequency (RF) loss depends on a building's construction and surrounding environment.

- *Please describe the range of actual EIRP of transmissions and what operational factors influence the actual EIRP so that the operational characteristic of the phased array antennas and individual spot beams can be properly analyzed.*

The range of actual EIRP depends on a range of factors. Key factors include user C/N, achievable C/N, traffic load, and the satellite's overall power. Dynamic power control will be employed as needed to reduce carrier EIRP in beams. The RKF analysis relies on worst case assumptions and confirms that SkyTerra Next will not cause harmful interference to adjacent-band GPS or AMT operations.

- *What would be the maximum unwanted EIRP from a single spot beam, and how does it vary in frequency outside of the 1525-1544 MHz and 1545-1559 MHz bands in both the OOB and spurious domains?*

Space Station transmit chains will employ digital linearizers to linearize the Solid State Power Amplifiers (SSPAs) in the phased array antenna to achieve excellent Adjacent Channel Leakage Ratio (ACLR) and sharp-cutoff filtering to ensure OOBE meets or exceeds the attenuation requirements in FCC §25.202(f).

SkyTerra Next will be designed to provide a 20 dB signal attenuation over the GPS band from the filters after the HPAs on the satellites. As a single satellite includes multiple beams, a single-beam value is irrelevant. The aggregate OOBE PFD on the ground is calculated from the satellites' HPA intermodulation products (IM) power levels that are within the adjacent channels. The RKF analysis evaluates aggregate OOBE PFD at the Earth's surface and confirms more than a 19 dB margin of compliance with interference protection criteria for both terrestrial and aeronautical GPS receivers.

- *What would be the aggregate maximum unwanted EIRP for fully populated spot beams and multiple satellites?*

The RKF analysis calculated aggregate OOBE Spectral PFD levels over all SkyTerra Next satellites in view at the center of every beam covering all of CONUS. The maximum OOBE Signal Strength was for Air Navigation Precision GPS: -171.1 dBW/MHz or -141.1 dBm/MHz. SkyTerra Next's design further incorporates advanced interference management features, including real-time beam steering, adaptive power allocation, digital pre-distortion linearization of high-power amplifiers, and steep out-of-band filtering. These capabilities enable direct interference control.

- *How is the maximum unwanted EIRP impacted by traffic loading within the beams? What is the maximum number of elements in a beam?*

The RKF analysis studied emissions based on a 100% load factor. It is expected that unwanted EIRP will proportionally reduce as a function of lower loading.

- *Is the Advanced Antenna System ("AAS") configured into sub-arrays . . . and if so, how many single 4 dBi elements are in each sub-array?*

Each satellite uses an active direct radiating array with thousands of actively controlled radiating elements.

- *Is Digital Pre-Distortion used, and, if so, is it applied at all times?*

Yes, Digital Pre-Distortion will be used as needed to maximize energy efficiency without compromising signal quality and to minimize out-of-band emissions.

- *Is the AAS operating in a 45-deg cross-polarization configuration?*

SkyTerra Next will be using Horizontal and Vertical Polarization, as stated in the application.

- *Please provide the satellite full off-axis beam pattern. Were emissions from adjacent beams included to provide the aggregate interference analysis provided in the RKF Report?*

Yes, emissions from all beams were included in the analysis.

- *The Parties assume AST measured OOB performance for its satellite antennas, which are deployed with on-orbit satellites that have already been authorized by the FCC for AST's SCS operations. Can these measurements be provided to support the above questions?*

This question reflects a fundamental confusion about what is being proposed. The Commission has designated the L-band for decades as spectrum allocated for MSS use – which is to say, spectrum that can be used to communicate from space with mobile devices. Ligado's modification application thus fits within the MSS rules that have been in place for decades and has nothing to do with SCS or SCS operations. We recognize that AST SpaceMobile is working with other companies to offer an SCS service, but that is completely different from the instant

application. AST SpaceMobile is planning to use the L-band MSS spectrum to provide additional coverage and capacity to complement its use of SCS spectrum.

3. "User equipment emissions"

- *Please provide user equipment ("UE") emission characteristics.*

The Commission's existing MSS rules, in place for decades, authorize D2D operations, and indeed millions of D2D-capable devices today operate in the MSS L-band and Big LEO band. However, the use of unmodified consumer mobile devices as part of AST SpaceMobile's D2D broadband service will have no impact on the operating environment since the Commission's rules ensure that OOBE from low-power D2D devices will be materially lower than emissions from traditional higher-power MSS terminals. Under Part 25, the relevant emission limit is expressed as a relative mask tied to in-band transmit power, rather than as a fixed absolute value. As a result, the lower the in-band power, the lower the absolute OOBE. Section 25.202(f) provides for 25 dB suppression relative to in-band transmit power, which means that a lower-power terminal must satisfy a proportionally lower absolute OOBE level. In practical terms, this means that a 1-watt terminal must meet an absolute OOBE level 100 times lower than a 100-watt terminal. D2D terminals operate at approximately 0.200 watts, whereas typical MSS terminals may transmit at 100 watts or more. Accordingly, D2D terminals are likely to produce adjacent-band emissions that are orders of magnitude lower than those from traditional high-power MSS terminals. From a technical perspective, low-power D2D operations have a reduced impact compared to conventional MSS terminals with respect to adjacent-band emissions.

Again, Ligado is not seeking any change to frequency-division duplex (FDD) operations. The system remains FDD, and underlying 3GPP LTE/5G NR standardized technology utilizes both frequency and time multiple access schemes, meaning two terminals cannot transmit on the same frequency in the same geographic area at the same time.

- *What are the UE characteristics, including the maximum EIRP and EIRP density, antenna gain pattern, and OOBE mask for the range of expected devices?*

SkyTerra Next plans to utilize a range of MSS devices with varying EIRP that will be compliant with 3GPP NTN LTE/5G NR specifications, and will meet all FCC MSS emission requirements. To clarify, 3GPP specifications already incorporate FCC regulatory specifications to ensure devices can legally and safely operate in the United States. For standard 3GPP NTN devices such as handheld smartphones, the typical maximum output power is 23 dBm or 200 milliwatts.

As stated earlier, Ligado is not seeking a waiver of the Commission's established MSS rules. The Commission's existing MSS rules already accommodate D2D operations, and millions of D2D-capable devices are already operating in the MSS L-band today.

- *What would be the maximum number of simultaneously transmitting SkyTerra Next UE within the area of a spot beam?*

As discussed above, the 3GPP technology underlying SkyTerra Next utilizes both frequency and time multiple access, meaning that two terminals cannot transmit on the same frequency in the same geographic area at the same time. Therefore, the maximum number of devices simultaneously transmitting in a spot beam on any specific frequency is 1. Frequencies within the channel are allocated dynamically based on specific traffic requirements.

- *To help calculate aggregate interference from the SkyTerra Next UE, what will be the channelization and frequency domain and/or time domain access scheme used for these devices?*

As noted above, the underlying 3GPP technology utilizes both frequency and time multiple access schemes.

- *When does Ligado expect to submit the corresponding blanket earth station license for the SkyTerra Next UE to allow the Parties and others to review the technical characteristics?*

SkyTerra Next UE will operate under Ligado's existing blanket earth station licenses.[2] Pursuant to the FCC's rules, MSS operators can file a notice to increase the number of devices included in the existing licenses and add SkyTerra Next as a point of communication to its existing license.[3] We will consult with Commission staff but expect it to occur once the SkyTerra Next application has been granted.

* * *

Grant of Ligado's modification application will help supercharge U.S. leadership in the space economy without causing harmful interference to other users. SkyTerra Next is poised to deliver a true space-based mobile broadband service to American consumers which is clearly in the public interest and advances the Commission's goal of ubiquitous connectivity. Please direct any questions to the undersigned.

Respectfully submitted,

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[2] *See* Call Signs E930367, E980179.

[3] *See* 47 C.F.R. §§ 25.118(a), 25.118(g) (permitting these modifications by notice).

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