BEFORE THE
U.S. DEPARTMENT OF COMMERCE
NATIONAL TELECOMMUNICATIONS & INFORMATION ADMINISTRATION
WASHINGTON, D.C. 20230

In re:	)	
	)	
Impact of L-Band MSS 'Direct-to-Device' Operations on GPS	)	Dkt. No. NTIA-2024-0005
	)	

COMMENTS OF AST & SCIENCE, LLC

AST & Science, LLC ("AST SpaceMobile") is on a mission to eliminate the connectivity gaps faced by billions of today's mobile subscribers. To do so, AST SpaceMobile will utilize spectrum already allocated for, and utilized by providers of, space-based communications services. AST SpaceMobile recognizes, however, that its use of this spectrum cannot cause harmful interference to incumbent Global Positioning Systems ("GPS") services. In its December 19, 2024, Request for Comment, the National Telecommunications and Information Administration ("NTIA" or "Administration") seeks input from industry stakeholders and the public on how increased deployment of direct-to-device ("D2D") services operating in the L-band could impact GPS.[1] As AST SpaceMobile explains herein, the two services can successfully co-exist.

I. AST SpaceMobile - Innovating to Connect the Unconnected and Advance the Public Interest.

As the Administration acknowledges, satellite-to-mobile phone connectivity "could provide substantial benefits to the public, including during times of emergency, while also supporting important federal government missions."[2] The digital divide remains a significant

[1] *Impact of L-Band MSS 'Direct-to-Device' Operations on GPS*, 89 Fed. Reg. 105542 (Dec. 27, 2024) ("*D2D RFC*"). In addition to its comments herein, AST SpaceMobile notes that the Administration's concerns regarding harmful interference to GPS are entirely speculative. *See id.* at 105548 (noting there have been space-based communication services operating adjacent to GPS services for over two decades, with no reports of interference during that time).

[2] *Id.* at 105542; *see also AST SpaceMobile Announces FCC Grant of Special Temporary Authority (STA) In the United States with Strategic Partners AT&T and Verizon*, BUSINESSWIRE (Jan. 30, 2025),

challenge, both in the United States and globally.[3] While internet penetration continues to rise, millions, particularly in rural and remote areas, lack access to reliable and affordable broadband. This exclusion hinders economic opportunities, educational advancement, and access to critical information and services. AST SpaceMobile is working to connect the unconnected by developing and deploying D2D technology in the Mobile Satellite Service ("MSS") L-band that allows standard mobile devices to switch seamlessly between terrestrial and space-based networks.[4] With five satellites currently in orbit and more to come, AST SpaceMobile's revolutionary Low-Earth Orbit ("LEO") constellation will support connectivity for partner mobile network operators that collectively service over 2.5 billion cellular customers.[5]

In addition to the clear public interest benefits brought by helping bridge the digital divide, D2D services also advance important U.S. spectrum-based goals, including global leadership in the wireless economy and more intensive use of vital mid-band spectrum. Although GPS services utilizing adjacent L-band spectrum must be protected from harmful interference,[6] NTIA has recognized that spectrum is a limited resource that must be made "available for innovative new

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https://www.businesswire.com/news/home/20250130886840/en/ ("During 2024, AST SpaceMobile secured additional strategic investment from AT&T, Verizon, Google and Vodafone, and new contract awards with the United States Government.").

[3] *See* Thomas F. Gilman, *Department of Commerce* in MANDATE FOR LEADERSHIP: THE CONSERVATIVE PROMISE 663,687-88 (Paul Dans & Steven Groves eds., 2023) (recommending NTIA support the commercial space industry and review broadband programs as widespread infrastructure is needed for 5G adoption in rural and exurban areas, and that it will "be a key factor in the future economic competitiveness for these under-served communities").

[4] *Company*, AST SPACEMOBILE (2025), https://ast-science.com/company/.

[5] *Mobile Network Operators*, AST SPACEMOBILE (2025), https://ast-science.com/company/mobile-network-operators/; *see also* Brendan Carr, *Federal Communications Commission*, in MANDATE FOR LEADERSHIP, *supra* note 3, at 855 (noting that "one of the most significant technological developments of the past few years has been the emergence of a new generation of low-earth orbit satellites," and that "[t]his has the potential to significantly accelerate efforts to end the digital divide").

[6] *See* Intl. Telecomm. Union, Radio Regulations Art. 4.3 (2024) ("Any new assignment…shall be made in such a way as to avoid causing *harmful interference* to services rendered" by other stations) (emphasis added); *compare id.* Art. 1.166-1.168 (defining "interference," "permissible interference," and "accepted interference"); *see also* NAT'L TELECOMM. & INFO. ADMIN., MANUAL OF REGULATIONS FOR FEDERAL RADIOFREQUENCY SPECTRUM MANAGEMENT § 8.2.10(1) (rev. Jan. 2023) ("Priority, unless specifically qualified, is the right to occupy a specific frequency for authorized uses, free of *harmful interference* from stations of other agencies.") (emphasis added).

users and to meet growing demand" so as to "continue our Nation's economic growth, to maintain and improve our global competitiveness, and to support critical public services and missions."[7]

II. D2D Services in the MSS L-Band Can Successfully Co-Exist with GPS.

For decades, MSS operators have deployed or facilitated communications services in the L-band without subjecting GPS to harmful interference.[8] The same will continue to be true as deployment of mobile devices capable of operating on satellite systems in the L-band increases.

The GPS service occupies L-band frequencies from 1559-1610 MHz, with the L1 signal centered at 1575.42 MHz.[9] Frequencies below the GPS range are allocated to MSS downlink (space-to-Earth) operations, while frequencies above the GPS range are allocated to MSS uplink (Earth-to-space) operations.[10]

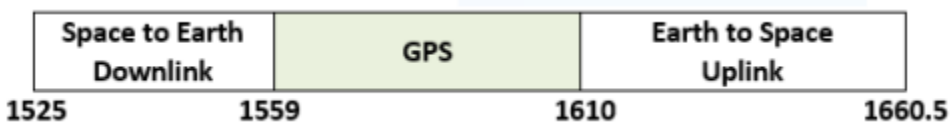

Figure 1: GPS frequencies and the neighboring MSS allocations, with directionality included.

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[7] NATIONAL SPECTRUM STRATEGY 1,3 (2023), https://www.ntia.gov/sites/default/files/publications/national_spectrum_strategy_final.pdf.

[8] Such legacy MSS L-band service providers include Globalstar and Iridium. The Globalstar MSS LEO system entered commercial service in 2000 and uses the 1610-1621.35 MHz (Earth-to-space) frequency band for service uplinks. *See* Globalstar Licensee LLC*, Application for Modification of Non-Geostationary Mobile Satellite Service System Authorization*, ICFS File No. SAT-MOD-20230804-00192, Order and Authorization, DA 24-825 at para. 2-3 (rel. Aug. 16, 2024). The Iridium LEO constellation was licensed in 1995, and uses over sixty satellites to provide services to subscribers. The constellation conducts both MSS service uplink and downlink communications in the 1617.775-1618.725 MHz and 1618.725-1626.5 MHz frequency bands, with the upper range additionally authorized for aeronautical MSS communications in oceanic, polar, and remote regions. *See* Iridium Constellation LLC, *Application for Modification of License to Authorize a Second-Generation NGSO MSS Constellation*, File Nos. SAT-MOD-20131227-00148 & SAT-AMD-20151022-00074, Order and Authorization, 31 FCC Rcd 8675, at paras. 2-5, 45 (rel. Aug. 1, 2016).

[9] D2D RFC at 105542.

[10] 47 C.F.R. § 2.106 (2025).

Regardless of the directionality of D2D transmissions – downlink from satellites to personal mobile devices, or uplink from personal portable devices to space – AST SpaceMobile will ensure that any future L-band D2D services it provides protect GPS from harmful interference.

a. <u>Constellation Design and Technological Innovation Ensure Downlink Protection of GPS Services.</u>

Unlike legacy services, AST SpaceMobile's operations will not pose a risk of downlink signal saturation into GPS receivers operating in the 1525-1610 MHz portion of the L-band. Legacy MSS service providers utilized higher-power terminals that could overload the front-end of a GPS receiver. In contrast, AST SpaceMobile's downlink communications will utilize distant LEO satellites at altitudes above 500 km. Deploying downlink transmitters in space, instead of in the immediate proximity of GPS receivers on the ground, eliminates signal saturation concerns. Additionally, AST SpaceMobile's advanced technology will further reduce any risk of harmful interference in a variety of ways, including:

- ***Superior Beam Control***: AST SpaceMobile's large, phased array antenna design creates highly precise beams with a sharp roll-off, meaning the signal fades quickly outside the target area, reducing the risk of interference.
- ***Clean Signal Emission:*** AST SpaceMobile ensures extremely low adjacent channel leakage (ACLR < -45 dBc) by utilizing advanced digital predistortion technology onboard the satellite.
- ***Filtering Precision:*** Additional filters in the transmission path of the satellite's phased array antenna further suppress emissions in GPS frequency bands.

b. <u>D2D Uplink Communications Will Accomplish Protection of GPS Services.</u>

Not only will AST SpaceMobile's D2D operations provide at least 50 megahertz of guard band to protect the GPS L1 signal, but, even in greater density, they will be more protective of GPS receivers than legacy services. First, planned D2D services will provide connectivity for

standard mobile devices, like cellphones. A simple thought experiment considering the transmit power available to a battery-powered Android or iPhone, compared to bulky, legacy satphones, illustrates that future D2D devices have a reduced potential for interference into GPS receivers. Second, and as the RFC notes, the personal devices utilizing D2D services will need to protect and enable use of D2D and GPS *by the same device*.[11] So as not to cripple the very devices they are intended to enable, D2D services will be designed so as not to cause harmful interference to GPS receives on the very same device, let alone those at great distances from the handset.

NTIA states that "[o]ne of the situations of greatest concern involves the use of such a device while on an airplane given the proximity of the device to GPS receivers and the importance of those receivers to aircraft navigation systems."[12] AST SpaceMobile additionally submits that it is unlikely that users of D2D services aboard aircraft would exist in sufficient density to pose a risk to the aircraft GPS receiver.[13] As noted above, the power levels of personal mobile devices are restricted and already compliant with regulations that limit harmful interference.[14]

III. Conclusion.

The MSS L-band, encompassing an aggregate sixty-eight megahertz of spectrum, represents one of the largest swaths of spectrum below 2 GHz that can accommodate enhanced services without multi-year efforts to rehome or harden incumbent spectrum users. History amply demonstrates that MSS services can successfully co-exist with GPS, and advanced D2D

[11] D2D RFC at 105548.

[12] *Id.* at 105543.

[13] *Id.* at 105543 (question 1(e)).

[14] *See, e.g.,* 47 C.F.R. § 2.106 at US380 (ancillary terrestrial components of non-Federal MSS operations in the 1610-1645.5 MHz and 1646.5-1660.5 MHz may be operated subject to the Commission's rules for ancillary terrestrial components and all applicable conditions and provisions of a MSS authorization); Intl. Telecomm. Union, Radio Regulations Arts. 5.353A, 5.357A , 5.362A (restricting prioritization and operation of MSS services in certain 1 GHz frequency ranges); *id.* Art. 5.364 (setting mobile earth station operating peak e.i.r.p. density in the 1610-1626.5 MHz).

technologies developed by AST SpaceMobile and others further attenuate any concerns regarding harmful interference. Through continued D2D innovation, the digital divide will continue to close and the United States will continue its position as a global leader in spectrum policy.

Respectfully submitted,

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