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FILED ELECTRONICALLY VIA IBFS Mr. Jose P. Albuquerque Chief, Satellite Division International Bureau Federal Communications Commission 445 12th Street, SW Washington, DC 20554

## Re: File No. SAT-LOA-20170508-00071

Dear Mr. Albuquerque:

In the above-referenced Application, Astro Digital U.S., Inc. ("Astro Digital") seeks to operate intersatellite links ("ISLs") between its satellites and the Globalstar system using frequencies in the Big LEO band between 1615 MHz and 1617.775 MHz. Astro Digital's Landmapper NGSO satellites, which would operate below Iridium's satellite constellation, would transmit to Globalstar satellites, which are above the satellites of Iridium Constellation LLC ("Iridium"), meaning these transmissions will pass through the Iridium constellation orbit. The transmissions are non-conforming, because there is no allocation for intersatellite links ("ISLs") for the frequencies between 1615 MHz and 1617.775 MHz.

Iridium filed Comments on September 25, 2017. Iridium noted Astro Digital's Application is incomplete, because it does not address the potential for its ISLs to interfere with Iridium's service links, which operate in the adjacent 1617.775-1626.5 MHz band.

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In its response, Astro Digital asserts several factors "ensure" it will not interfere with Iridium when transmitting to Globalstar satellites:<sup>1</sup> (1) using power control to limit Landmapper transmissions such that they arrive at the Globalstar satellite at a power level similar to transmissions from Globalstar terminals on the Earth's surface, (2) using modems that Astro Digital asserts will suppress adjacent channel out-of-band emissions ("OOBE") by at least 24 to 32 dB more than specified in Recommendation ITU-R M.1343-1,<sup>2</sup> and (3) communicating with Globalstar satellites only "sparingly as a tertiary backup link for telemetry and command."<sup>3</sup>

These factors, which should be conditions to any license granted to Astro Digital, will reduce the potential for harmful interference to Iridium's satellite receivers. Nevertheless, issues remain, including harmful interference issues, that should be addressed.

Astro Digital's proposal to operate ISLs as a non-conforming use is more appropriate for a rulemaking in which the risks and benefits of permitting such operations can be fully weighed. The proposal has broad implications; there is nothing to distinguish Astro Digital operating ISLs in a non-ISL band from any other party operating ISLs in the same or another non-ISL band. Setting a precedent for such operations without the benefit of a well-developed record could have unintended consequences and could undercut domestic and international allocations.

These are classic circumstances for a rulemaking and warrant deferral of action on Astro Digital's ISL proposal. If action is not deferred, however, then two interference issues need to be considered.

First, a crucial element of Astro Digital's response is its assertion that the Landmapper Globalstar modems will suppress adjacent channel OOBE to the levels described above. Astro Digital presents no evidence, however, that the modems actually will operate in such a manner. Given that harmful interference is predicted to occur to Iridium's adjacent channel operations without such OOBE suppression due to

<sup>&</sup>lt;sup>1</sup> See Astro Digital's Consolidated Opposition and Response, SAT–LOA–20170508–00071 (Oct. 11, 2017) ("Astro Digital Response"), at 4-5.

<sup>&</sup>lt;sup>2</sup> We note that Astro Digital incorrectly references Table 8 in Recommendation M.1343-1, *see* Astro Digital Response at 5 n.15, which is for OOBE limits of MSS terminals operating in the 1618.25-1626.5 MHz band. Table 9 is the applicable table of limits, since it is for MSS terminals operating in the 1610-1618.25 MHz band.

<sup>&</sup>lt;sup>3</sup> Astro Digital Response at 4-5.

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the proximity of the Astro Digital and Iridium orbits,<sup>4</sup> Astro Digital should be required to present evidence, capable of verification by Iridium and the Commission, that the modems will perform as promised.

Second, a major premise of Astro Digital's response is that it will only operate its ISLs on frequencies that are below Iridium's. This assumption is in error. On multiple occasions, both to support vital U.S. and allied military requirements overseas<sup>5</sup> and to provide emergency communications services when terrestrial communications have been downed by hurricane and earthquake events,<sup>6</sup> Iridium has been granted special temporary authority ("STA") to operate down to 1616 MHz. During these periods, Astro Digital's ISLs would be co-channel with Iridium's frequencies and would cause harmful interference to Iridium's operations.<sup>7</sup>

Similar events inevitably will arise in the future, and Astro Digital's nonconforming use should not be permitted to stand in the way of these vital operations. Any grant to Astro Digital, therefore, should be conditioned on it temporarily having to cease ISL operations in the Big LEO band above 1616 MHz – which Astro Digital has stated will be used only "sparingly as a tertiary backup link" - during these times of emergency.

<sup>&</sup>lt;sup>4</sup> See Table 1 (attached), Case 2.

<sup>&</sup>lt;sup>5</sup> See Iridium Constellation, LLC, Request for Special Temporary Authority for a Mobile Satellite System in the 1.6 GHz Frequency Band, FCC File No. SAT-STA-20040319-00056, Order, DA 04-1669 at ¶¶ 28-29 (IB 2004); see also FCC File Nos. SAT-STA-20030414-00066, SAT-STA-20030425-00074, SAT-STA-20030502-00077, SAT-STA-20030609-00100, SAT-STA-20031010-00313, SAT-STA-20031113-00327, and SAT-STA-20040506-00091.

<sup>&</sup>lt;sup>6</sup> See Iridium Satellite LLC, Requests for Special Temporary Authority ("STA"), FCC File Nos. SAT-STA-20050901-00171, SAT-STA-20050923-00181 (to support relief efforts in the aftermath of Hurricane Katrina), SAT-STA-20050923-00180 (to support relief efforts in the aftermath of Hurricane Rita), SAT-STA-20100203-00018 (for support of relief efforts in the aftermath of the earthquake in Haiti), SAT-STA-20110311-00052, SAT-STA-20110316-00056, SAT-STA-20110323-00058 (for support of relief efforts in the aftermath of the earthquake in Japan).

<sup>&</sup>lt;sup>7</sup> See Table 1 (attached), Case 1.

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In view of the foregoing, processing of Astro Digital's proposal should be deferred pending the outcome of a rulemaking to examine the use of ISLs in non-ISL bands. If processing is not deferred, then: (1) Astro Digital should be required to present evidence its modems will suppress OOBE by at least 24 dB more than specified in the applicable ITU recommendation; and (2) Astro Digital should have to cease operations in the Big LEO band above 1616 MHz during periods when Iridium is operating in that part of the band pursuant to an STA.

Respectfully submitted,

## IRIDIUM CONSTELLATION LLC

/s/

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## Table 1: Interference analysis of proposed Astro Digital Landmapper satellite emissions into Iridium satellite

Parameter	Value			Units	Comments
Landmapper satellite (Globalstar terminal)					
EIRP	2.86			dBW	From Astro Digital Schedule S Tech Report
Landmapper satellite (Globalstar terminal)					
channel bandwidth	1.23			MHz	From Astro Digital Schedule S Tech Report
Landmapper satellite (Globalstar terminal)					
EIRP density	-58.04			dBW/Hz	From Astro Digital Schedule S Tech Report
	Case 1:	Case 2:	Case 3:		See explanation in main body of text.
	Co-channel	Rec M.1343-	Minimum		
	(no OOBE	1 specified	additional		
	suppression)	OOBE level	OOBE		
			suppression		
			of 24 dB		
			claimed by		
			Astro Digital		
					Calculated; Case 3 suppression level is 24 dB
	0.00	-18.73	-42.73	dBc	down from Case 2
					Calculated (Note: Rec. M.1343-1 Table 9 limit
					specified in dBW/30kHz, which is translated to
OOBE EIRP density	-58.04	-76.77	-100.77	dBW/Hz	dBW/Hz here for Cases 2 & 3)
					Astro Digital Schedule S Tech Report indicates
Minimum separation distance between					Landmapper satellite apogee of 608 km; Iridium
Landmapper and Iridium satellite	172.00			km	orbit altitude of 780 km
Path loss (at 1618 MHz)	141.29			dB	Calculated free space path loss
Iridium satellite antenna gain	23.00			dBi	Typical, varies with spot beam
Received interference power density at					
Iridium satellite	-176.33	-195.06	-219.06	dBW/Hz	Calculated
Iridium satellite noise density	-201.60			dBW/Hz	Iridium satellite noise floor
lo/No	25.27	6.54	-17.46	dB	Calculated
Resulting decrease in Iridium user link margin	25.28	7.41	0.08	dB	Calculated