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September 9, 2015

Ms. Marlene Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Notice of Oral *Ex Parte* Presentation; Application of SpaceX for Experimental Radio Service License, File No. 0356-EX-PL-2015

Dear Ms. Dortch:

In accordance with Section 1.1206 of the Commission's rules, 47 C.F.R. § 1.1206, this letter notifies the Commission that on September 2, 2015, Dick Evans from Intelsat, Humberto Henriques from Telcomm Strategies, and Carl Frank of Wiley Rein, counsel for Intelsat, met with Bruce Romano, Walter Johnson and Nnake Nweke from the Office of Engineering and Technology, and Karl Kensinger, from the International Bureau, to discuss the above-captioned experimental satellite application of SpaceX.

Intelsat emphasized that it does not necessarily oppose the application. Intelsat is aware that SpaceX's grant would be "secondary" to primary licensees, such as Intelsat's geostationary satellites and licensed earth stations. Still, Intelsat must assess the interference potential of the proposed SpaceX system. Based on the public record, Intelsat expressed concern that SpaceX's experimental operations will cause interference to Intelsat's co-frequency geostationary satellites ("GEOs").

First, Intelsat showed that SpaceX has improperly addressed the Ku-band downlink interference. SpaceX claims (Exhibit 2, Rev 2, page 8) that it will not exceed -160 dB(W/m^2)/40kHz for the Ku-band down link. Yet both Article 22 of the ITU Rules and the FCC's own rules are more complex. FCC rule Section 25.208(g) sets forth various single entry epfd values depending on the victim receiver antenna diameter, which are not to be exceeded 99.997% of the time, 99.991% of the time, and so forth, down to -195.45 dB(W/m^2)/40kHz. SpaceX never addresses these epfd values, which makes it impossible to assess victim interference.

Second, in the absence of SpaceX's data, Intelsat did its own calculations. Intelsat believes that, in the worst case, SpaceX satellites could increase GEO earth station receiver noise floor by about 24%. (See attached Intelsat Chart.) That is nearly four times the single-entry coordination trigger used in the ITU Radio Regulations

for co-frequency GSO satellite networks. It also – single-handedly – consumes more than the 20% allowance for multiple entry FSS interference recommended by the ITU-R for victim FSS systems practicing frequency re-use (Rec. ITU-R S.1432)).

Third, Intelsat noted that SpaceX relies on a Ku-band uplink having a transmit earth station discrimination of 30 dB at 12° off-axis. Although Intelsat repeatedly sought the basis of this assumption, which is crucial to the interference analysis, SpaceX never provided it. OET asked whether Intelsat would be satisfied were the FCC to make the 30 dB at 12° off-axis discrimination a condition of any grant, and Intelsat agreed.

Fourth, returning to the downlink, SpaceX possesses the data about its system and epfd over time—but Intelsat noted that SpaceX seems to be trying to place the burden on the GEO operators to run simulation software to calculate epfds. This is not only unfair and inefficient—it is impossible, given that SpaceX hasn't provided the necessary data. Given that, SpaceX should be required (as a minimum) to provide information about where the maximum epfd on the surface of the earth will occur as a function of time.

OET asked Intelsat about its collision avoidance, wanting to understand how Intelsat's electric propulsion LEOP maneuvers differed from traditional orbit raising. The staff also wanted to know what made SpaceX different from prior Part 5 licensed LEO propulsion-less systems, and why any new approach to collision avoidance should be taken in the context of this licensing application. Intelsat responded that the new electric propulsion orbit raising maneuvers take longer to place a satellite on-station at the geostationary orbit. After consulting with Intelsat experts, the difference is as follows: satellites employing electric orbit raising (EOR) separate from the rocket into a GTO (geosynchronous transfer orbit) with a low perigee altitude above the earth (about 250 km for Ariane V launch vehicle).[1] Because of the lower thrust generated by electric propulsion engines, EOR systems take longer – as much as 30 weeks or more—to reach geostationary orbit, where there are fewer propulsion-less systems with which to collide.

[1] Contrary to a response made at the meeting, this separation altitude is not significantly different than the separation altitude of traditional propulsion satellites.

As to the second point, Intelsat noted that the very proliferation of propulsion-less low Earth orbit ("LEO") satellites makes the hazard more serious. Whether or not Intelsat should have opposed previously filed similar applications, there is no need to delay action that would be in the public interest until completion of a full rulemaking—the Commission has the option to make determinations with prospective consequences by rulemaking or adjudication.[2] And despite the fact the LEOP operations are secondary, spacecraft under propulsion control should not have to bear the entire responsibility – and fuel – for collision avoidance. Although Intelsat understands that all licensed spacecraft, even propulsion-less, are in contact with JSpOC, secondary Part 5 experimental spacecraft should bear a greater share of the burden of collision avoidance.[3]

Intelsat, of course, would be pleased to refine its calculations were more information on the public record. Only with the benefit of such additional information would the Commission be able to make a reasoned decision on the record prior to licensing.

Please contact the undersigned with any questions.

Sincerely,

/s/ Carl R. Frank

Carl R. Frank
Counsel for Intelsat

cc: David Den Herder, Counsel for SpaceX

Attachment

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[2] *See SEC v. Chenery Corp*., 332 U.S. 194, 201-03 (1947).

[3] Although OET is well within its authority to act via adjudication, the issues raised by the proliferation of small satellites are of broad concern. Specifically, the Satellite Industry Association, of which Intelsat is a member, has asked the FCC to initiate a rulemaking proceeding regarding the licensing of small satellites, the bulk of which are propulsion-less. *See* SIA Comments, *Comprehensive Review of Licensing and Operating Rules for Satellite Services*, IB No. 12-267, at 5 (filed Jan. 29, 2015).

Space to Earth Example	Slant	Nadir	
SpaceX amplifier output power	4.5	1.5	W
Amplifier output power	6.53	1.76	dBW
Tx out circuit loss	1.5	1.5	dB
Tx antenna gain	27.55	29	dBi
eirp	32.58	29.26	dBW
Bandwidth	85.8	85.8	MHz
eirp density	-46.75	-50.07	dBW/Hz
Path loss	172.52	169.19	dB
Off-axis gain for 12° per 25.209	5.0	5.0	dBi
Interference density at the antenna output	-214.25	-214.24	dBW/Hz
Receive system noise temperature	114	114	K
Noise floor density	-208.03	-208.03	dBW/Hz
I/N	-6.22	-6.21	dB
ΔT/T	23.9	23.9	%