Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Streamlining Licensing Procedures for Small Satellites	)	IB Docket No. 18-86
	)	
	)	

REPLY COMMENTS OF ORBCOMM INC.

ORBCOMM Inc. ("ORBCOMM") files these reply comments addressing some of the initial comments on the Commission's proposals to create an alternative set of licensing procedures that an applicant would have the option of utilizing if it was seeking authority to launch and operate a constellation of "small satellites."[1] In its initial comments, ORBCOMM explained that the concept of the option of a streamlined application and licensing procedures for small satellite systems could be beneficial, but only if (1) the parameters for deciding which systems could avail themselves of these new procedures were appropriate, and (2) incumbent licensees (and their customers) were not adversely affected by these "small satellite" systems. After reviewing the other parties' comments, ORBCOMM continues to believe that the path it laid out will best serve the public interest.

Determining Which Applicants Qualify for Streamlined Treatment

ORBCOMM agreed with the *NPRM*'s proposal to limit satellite systems qualifying for the streamlined procedures to ten satellites or fewer, and to prohibit a single company from evading the limits by obtaining licenses for multiple systems. Failing to limit the constellations in this manner runs the risk of greater collision and interference issues, rendering the streamlined treatment inappropriate. SpaceX in

[1] *Streamlining Licensing Procedures for Small Satellites*, FCC 18-44, released April 17, 2018 (hereafter cited as "*NPRM*").

its comments shares ORBCOMM's concerns regarding the risks that arise if applicants can file for multiple ten-satellite constellations.[2]

In contrast, some of the other commenters proposed expanding the number of satellites an applicant could launch beyond the Commission's proposed limit and still receive the benefits of streamlined procedures. The Commercial Smallsat Spectrum Management Association ("CCSMA") agrees with the NPRM's proposal for a ten-satellite limit, but then suggests that there should not be any limit on the number of applications that an entity could file.[3] Likewise, the Commercial Spaceflight Federation ("CSF") argues that there should be no limit on the aggregations of licenses.[4] Boeing suggests an increase in the upper limit to 30 satellites (and to allow "modestly more" upon a showing of good cause).[5] As ORBCOMM explained in its comments, an increase in the number of satellites as suggested by these other parties raises risks of collision or harmful interference that would render streamlined treatment inappropriate.

ORBCOMM in its comments also expressed concern with the NPRM's suggestion that satellites up to 180 kg could be considered small for purposes of streamlined treatment. Boeing and CCSMA, on the other hand, argued that the Commission should allow even larger satellites.[6] However, as ORBCOMM explained in its comments, satellites in the range of 180 kg present heightened risks of harmful interference and collisions. Allowing even larger satellites, particularly combined with the suggestions of greater than ten satellites in a constellation, would

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2 SpaceX Comments at p. 7.

3 CCSMA Comments at p. 8.

4 CSF Comments at pp. 3-4.

5 Boeing Comments at p. 9.

6 Boeing Comments at p. 11; CCSMA Comments at p. 15.

further exacerbate these potential problems, so that the proposed streamlined procedures clearly would not adequately account for such risks.

CCSMA additionally objects to the *NPRM*'s proposed limit of five years for the licensing term and the orbital lifetime of the constellation.[7] CCSMA is concerned that such a limit would effectively foreclose small satellite system operators from taking advantage of most secondary, opportunistic launches. However, as ORBCOMM explained in its comments, there are negative externalities associated with orbit selection, and cost savings to the applicant from these "cheap launches" could end up imposing costs on other satellite systems operators in the form of collision avoidance maneuvers that use fuel and shorten the incumbent operators' constellation lifetimes. Particularly in light of the continuing development of new launch capabilities that will allow small satellite system operators economically to be a primary payload,[8] ORBCOMM does not believe the Commission should relax its proposal for a five-year limit on the orbital lifetime of small satellites seeking to take advantage of the streamlined procedures.

Orbital Debris Mitigation and Space Traffic Management

In its initial comments, ORBCOMM observed that orbital debris mitigation is crucial to preserve the utility of low-Earth orbit, and the recent and planned proliferation of small satellite systems and mega-constellations renders it even more critical going forward. The proposed inclusion of a requirement for orbital debris analyses even under the streamlined procedures is an important way to weed out poorly designed systems. SpaceX shares ORBCOMM's concern,

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[7] CCSMA Comments at pp. 4, 8-9.

[8] *E.g.*, https://www.geospatialworld.net/blogs/isro-market-satellite-launch-vehicle/; https://www.sscspace.com/services/small-satellite-launches/; https://www.space.com/34364-rocket-lab-small-satellite-launch-race.html; https://room.eu.com/article/small-launcher-market-survey.

however, that aggregators can blur the responsibility for ensuring that the regulatory requirements, including providing essential information like Orbital Debris and Assessment Reports ("ODARs"), are properly submitted.[9]

Careful design of the spacecraft and selection of the orbits is necessary, but not sufficient, to minimize the risk of orbital debris. In addition, as the *NPRM* and ORBCOMM recognize, space traffic management will also be critical. The *NPRM* includes several requirements geared towards ensuring that space traffic management can be carried out, including mandating trackability and propulsion (for satellites that will be placed into orbit above 400 km). ORBCOMM in its initial comments suggested that instead of specifying "propulsion," the Commission should require that any spacecraft above 400 km must have sufficient maneuvering capabilities to perform reasonable active measures to avoid in orbit collisions, and to timely and safely de-orbit spacecraft within the five-year period proposed in the *NPRM*. Other commenters shared ORBCOMM's position that applicants be provided some flexibility in incorporating maneuverability, without specifically requiring propulsion.[10]

In contrast, CSF suggests that no propulsion or other maneuverability requirement be imposed on the small satellite system applicants under the rules for streamlined treatment.[11] And

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[9] SpaceX Comments at pp. 15-17. *See also*, CCSMA Comments at p. 18 ("Such detailed [ODAR] analysis, subject to Commission and peer review, is a critical element of ensuring the orbital debris mitigation guidelines are met."). In its initial comments, ORBCOMM explained that one such aggregator -- Spaceflight -- had disclaimed responsibility for performing any analysis of the collision risks for the 90 satellites proposed for deployment on its SHERPA mission. Spaceflight, Response to Informal Comments of ORBCOMM, File No. SAT-STA-20150821-00060, filed May 13, 2016. In another recently-filed STA application contemplating the deployment of 114 satellites on its proposed "SSO-A" mission, Spaceflight unfortunately continues to take this position. File No. SAT-STA-20180523-00042, at Attachment 1.

[10] *E.g.*, Boeing Comments at pp. 11-12; Phase Four Comments at p. 3; University Small-Satellite Researchers Comments at pp. 10-11.

[11] CSF Comments at p. 6.

the University Small-Satellite Researchers urge the Commission not to mandate active de-orbiting within five years, but instead to allow natural decay so long as re-entry will occur within 25 years.[12] ORBCOMM urges the Commission to reject these requests for relaxation of the space traffic management provisions of the *NPRM*. The orbital resource is too valuable to risk any more collisions between spacecraft.

In its comments, CSSMA urges the Commission not to apply these orbital debris and space traffic management requirements solely on small satellite system applicants.[13] ORBCOMM agrees that the Commission needs to update these rules more broadly in light of the mega-constellations that have already begun implementation. Indeed, this is a global issue that needs addressing. But in the meantime, these more targeted reforms geared towards small satellite systems are necessary in order to allow for the streamlined procedures to be utilized without creating unacceptable risks.

Protecting Other Licensees from Harmful Interference

In its initial comments, ORBCOMM expressed concern that any new streamlined licensing policies and procedures adopted pursuant to the NPRM must include sufficient mechanisms to preclude harmful interference to incumbent licensees. ORBCOMM thus urged the Commission to require any new small satellite system applicant to complete spectrum and orbit resource coordination with incumbent operators before any such applicant is authorized to launch or operate any satellites under the streamlined procedures. ORBCOMM was not alone in raising the issue of the risks of harmful interference. Boeing suggested that "First, each Small Commercial Satellite licensee operating in a band allocated to a non-streamlined Part 25 satellite

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[12] University Small-Satellite Researchers Comments at pp. 8-9.

[13] CCSMA Comments at p. 3.

service should be required both to protect the operations of, and accept harmful interference from, all existing and future non-streamlined Part 25 satellite licensees, including operators of GSO and NGSO, FSS, MSS, and EESS satellite systems."[14] Other commenters shared this concern.[15]

The issue of harmful interference is of particular interest to ORBCOMM, because one of the proposals in the *NPRM* contemplates the possibility of allowing small satellite systems to use the 137-138 MHz and 148-150.05 MHz bands in which ORBCOMM operates. In its initial comments, ORBCOMM explained why this NVNG MSS spectrum is likely to be unsuitable for the new small satellite constellations, and why viable sharing with new small satellite systems in these bands without harmful interference to incumbent operations may not be feasible. The other comments do not allay ORBCOMM's concerns.

CSSMA addresses these NVNG MSS bands at some length and urges the Commission to adopt its proposal to allow small satellite system applicants access to this spectrum. But it is not clear the extent to which CSSMA would require that any such small satellite system access protect ORBCOMM from harmful interference. They do indicate in their comments:

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[14] Boeing Comments at p. 6.

[15] *E.g.*, Aviation Spectrum Resources, Inc. Comments at pp. 4-6 (concerned about out-of-band emissions from small sats operating in 137-138 MHz or 148-150.05 MHz bands); Iridium Comments at pp. 9-10 (concerned about interference to its L-Band operations); EchoStar Comments at pp. 5-8 (concerned about interference to GSO FSS operations); ARRL Comments at p 14-18 (concerned about interference to amateur satellite operations). On the other hand, some of the commenters recognized that incumbent satellite system operators could complement the small satellite systems by supporting inter-satellite links with such systems that would allow the small satellite systems to minimize their own gateway networks. *E.g.*, Globalstar Comments at pp. 6-8; Inmarsat Comments at pp. 1-4; Iridium Comments at pp. 10-12. ORBCOMM supports efforts to formulate and implement requisite domestic and international regulatory accommodations to provide suitable additional spectrum for NGSO MSS inter-satellite links, provided that any such accommodations include adequate safeguards to protect incumbent systems from harmful interference.

> The Commission proposes that applicants under the Streamlined Process must be exempt from a processing round and required to (a) ***certify that operations of their satellite will not interfere with those of existing operators,*** (b) certify that it will not unreasonably preclude future operators from utilizing the assigned frequency band(s), and (c) provide a brief narrative description illustrating the methods by which future operators will not be unreasonably precluded. ***CSSMA agrees with this proposal***.[16]

And CSSMA also stated that:

> The Commission also proposes that in bands where Part 25 licenses are authorized pursuant to a processing round the Commission 'anticipates that small satellites authorized on a streamlined basis would be subject to some limitations on a frequency-band specific basis, including, if appropriate, non-interference, non-protected with respect to the Part 25 systems.' ***CSSMA agrees with this approach; such small satellites that were not part of a processing round would be subject to a lower level of spectrum rights compared to satellites that had been through a processing round***.[17]

But elsewhere in its comments, CSSMA contends that the small satellite systems should have co-equal rights to the NVNG MSS bands. CSSMA claims that:

> Under this arrangement [of treating small satellite systems as a non-traditional MSS], however, small satellite operations should have the same status as MSS operations in the particular frequency band. Equal status is possible as small satellite operations will adhere to any applicable limitations on the MSS and can perform the sharing techniques described infra in Section III.C.1 to mitigate interference concerns to other in-band and adjacent-band services with status.[18]

And in Annex 1, CSSMA suggests that the small satellite systems could simply "step into the shoes" of the previously-licensed NVNG MSS satellite systems that were never implemented.[19]

ORBCOMM thus does not know whether its operations – as both an incumbent licensee and a processing round licensee – would be fully protected under CSSMA's approach.

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[16] CSSMA Comments at p. 21 (emphasis added, footnote omitted).

[17] CSSMA Comments at p. 22 (emphasis added, footnote omitted). *See also*, CSSMA Comments at p. 30 ("As discussed above, small satellites under the Streamlined Process that are not subject to a processing round should have a lower level of spectrum rights than satellites that have spectrum allocated via a processing round in the same level of priority").

[18] CSSMA Comments at p. 40.

[19] CSSMA Comments at pp. 61-62.

Assuming that CSSMA's suggestion of fully protecting incumbent operators like ORBCOMM becomes operative, then ORBCOMM believes its concerns can be allayed if the Commission adopts ORBCOMM's proposal to require any new small satellite system applicant to complete spectrum and orbit resource coordination with incumbent operators before any such applicant is authorized to launch or operate any satellites under the streamlined procedures.[20]

In any event, as ORBCOMM explained in its initial comments, it is impossible to dispositively determine the potential for sharing in the abstract. Any such sharing would have to examine specific, concrete proposals, because the technical parameters would greatly affect the likelihood of successful coordination.[21] ORBCOMM is concerned that the CSSMA comments overstate the spectrum that may be available for new MSS systems and understate the inherent complexities of intersystem MSS sharing in the 137-138 MHz band and 148-150.05 MHz band. As a preliminary matter, the "band plan" for the 137-138 MHz band depicted in Figure A1-1 in Annex 1 to the CSSMA comments does not comport with the Commission's record of spectrum assigned to ORBCOMM or other licensees in NVNG MSS licensing proceedings, and fails to include the many spectrum assignments for non-U.S. satellite systems that must be coordinated with under applicable ITU procedures. Additionally, CSSMA's suggestion that intersystem "dynamic sharing" among MSS systems in the 148-150.05 MHz band may be feasible or could

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[20] CSSMA proposes use of a process for coordinating with federal users in parallel with the application review process, rather than waiting until the application has gone on public notice. CSSMA Comments at pp. 23, 38-39. Such a process could be expanded to also include coordination with other incumbent satellite system licensees.

[21] As just one example, it is not clear whether small satellite systems would use these bands for service links, feeder links or telecommand links. The CSSMA Comments at pp. 46, 59, 63 suggest use of the 148-150.05 MHz band for Earth to space command links, but the discussion of sharing using an "honest broker" or DCAAS-like operations (pp. 47 and Annex 1) suggests that the bands could be used for subscriber service links.

somehow be facilitated through the adoption of new rules or policies in the instant rulemaking is at best theoretical and overly optimistic. Among other things, due to the inherent global character of NGSO satellite operations, any consideration of formulating new regulatory measures to facilitate dynamic intersystem NGSO MSS sharing would also likely require modifications to the international radio regulations as well as foreign domestic NGSO licensing regulations. CSSMA's suggestion of an "honest broker" to facilitate dynamic sharing among MSS system operators, although creative, presumes a level of cooperation and mutual interest that unfortunately would likely be difficult if not impossible to effectively implement in the United States, let alone throughout the worldwide NGSO community

Moreover, the CSSMA comments call into question whether the small satellite systems will even be able to make productive use of the 137-138 MHz and 148-150.05 MHz bands. Among other things, CSSMA includes a chart of the typical spectrum demands for the various services provided by small satellite service providers.[22] It appears quite clear that these requirements cannot be suitably satisfied in the 137-138 MHz and 148-150.05 MHz bands for the simple reason that there is a lack of available spectrum for new satellite system entrants due to current coordinated utilization throughout the world. All of which calls into question the wisdom of the Commission's proposal to allow small satellite systems to utilize the 137-138 MHz and 148-150.05 MHz bands.

Conclusion

ORBCOMM in its initial comments supported the Commission's proposal to provide the option of a streamlined application process for "small satellite systems," so long as the criteria for such systems are appropriate. ORBCOMM had suggested some changes to the proposed

[22] CSSMA Comments at pp. 27-28.

rules that would ensure that the benefits of faster and cheaper authorizations would outweigh the costs imposed on incumbent satellite system operators. ORBCOMM also suggested ways to protect the incumbent satellite system operators from harmful interference, and questioned whether allowing small satellite systems to access the NVNG MSS bands makes sense. In any event, if the Commission moves forward to adopt new rules and policies for licensing small satellite systems, any new small satellite system applicant should be required to complete spectrum and orbit resource coordination with incumbent operators before any such applicant is authorized to launch or operate any satellites under the streamlined procedures None of the other initial comments in this proceeding dissuade ORBCOMM from those views, and ORBCOMM continues to believe that its proposed modifications to the *NPRM* will best serve the public interest.

Respectfully submitted,
ORBCOMM Inc.

By: _____/s/_____

Walter H. Sonnenfeldt
Vice President, Regulatory Affairs
395 West Passaic Street, Suite 325
Rochelle Park, New Jersey 07662
Direct Tel: (585) 461-3018
E-Mail: sonnenfeldt.walter@orbcomm.com

Stephen L. Goodman
Stephen L. Goodman PLLC
532 North Pitt Street
Alexandria, Virginia 22314
(202) 607-6756
E-Mail: stephenlgoodman@aol.com

Counsel for ORBCOMM Inc.

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