

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

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

**COMMENTS OF ORBCOMM INC.**

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## SUMMARY

ORBCOMM has extensive experience dealing with the issues raised in the *NPRM*. ORBCOMM supports the Commission's proposal to offer an alternative application process for small satellite system operators, particularly because a growing number of applicants are improperly attempting to shoe-horn a commercial satellite system into the Commission's experimental licensing program. Providing a streamlined and less expensive alternative for "small satellite systems" makes sense, but only if the parameters for defining a "small satellite system" and the associated prior coordination and licensing policies adequately protect incumbent system operations and are otherwise appropriate.

ORBCOMM believes that the criteria proposed in the *NPRM* require some adjustments to ensure that any streamlined treatment that may be implemented would afford sufficient notice and comment procedures and other essential compliance requirements. ORBCOMM does not object to the proposed limit of ten satellites, but the Commission should clarify that an applicant could not evade the more rigorous review of a conventional application by filing for multiple small satellite system licenses. ORBCOMM also supports the proposals to mitigate orbital debris risks through limits to the constellation lifetime of five years and well-designed satellites. On the other hand, ORBCOMM is concerned that the proposed 180 kg size limit would allow sufficiently powerful satellites to pose a risk of harmful interference such that streamlined processing would be unwarranted. If the proposed Part 25 rule revisions for licensing small satellite systems are judiciously implemented, however, then the proposed streamlined procedures and reduced fees could be appropriate.

ORBCOMM agrees with the Commission's proposals to address frequency and orbit resource sharing, and orbital debris and space traffic management issues, although those issues need to be addressed for all satellite systems, not just the small satellite systems. The current application process, which relies on modeling to predict the risk of orbital collisions, is flawed and subject to manipulation. Given the limits of using models to forecast potential collision risks, ORBCOMM believes it is more important for the Commission to adopt robust space traffic management obligations that would apply to small satellite system operators (as well as all non-geostationary satellite system operators). The Commission should also ensure that its rules complement other Executive agencies' actions regarding space traffic management. ORBCOMM also urges the Commission to adopt its proposals to ensure that all satellites are equipped with sufficiently accurate real-time on-board position location determination and reporting capability, and that collision avoidance and orbital debris mitigation best practices are adequately incorporated by all Commission satellite licensees.

Avoiding harmful interference must also be a critical element of any streamlined procedures. The *NPRM* specifically seeks comment on whether small satellite system applicants should have access to portions of the NVNG MSS spectrum through the streamlined application process. The ORBCOMM System incorporates advanced technologies and operational techniques that make highly efficient use of the limited available authorized VHF spectrum to ensure that its current and projected capacity needs and customer service requirements are fully satisfied. However, there is very little NVNG MSS spectrum to begin with, and there are significant constraints because of sharing with other terrestrial and satellite systems, as well as operational limits on NVNG operations. It is not clear that these bands would be suitable for the contemplated small satellite system services.

Although the Commission did develop rules to allow sharing of the NVNG MSS spectrum amongst multiple Little LEO system, that does not mean that it necessarily will be possible for small satellite systems readily to share the band with ORBCOMM. As an initial matter, the spectrum to be shared by the NVNG systems included additional bands that are not included in the *NPRM*'s proposals,

and the sharing rules that were developed in the first two NVNG MSS processing rounds were system specific. Moreover, it is not possible to 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. At the very least, ORBCOMM urges 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.

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**COMMENTS OF ORBCOMM INC.**

ORBCOMM Inc. (“ORBCOMM”) files these comments addressing 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.”<sup>1</sup> As an incumbent low-Earth orbit satellite service provider that could be impacted by these new satellite systems, ORBCOMM supports the Commission’s efforts to update and streamline its satellite licensing rules to accommodate technological developments in a responsible manner. But ORBCOMM is concerned that some of the Commission’s proposals could unfairly burden the incumbent satellite system operators. The Commission must strike the proper balance between encouraging new entrants and ensuring that incumbent service providers (and their customers) are not harmed. ORBCOMM thus suggests some clarifications and modifications to the proposed rules.

ORBCOMM is a global leader and innovator in the industrial Internet of Things, providing solutions that connect businesses to their remote assets to deliver increased visibility

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<sup>1</sup> *Streamlining Licensing Procedures for Small Satellites*, FCC 18-44, released April 17, 2018 (hereafter cited as “*NPRM*”).

and operational efficiency. ORBCOMM offers a broad set of worldwide asset monitoring and control solutions, including seamless satellite and cellular connectivity, unique hardware and powerful applications, all backed by end-to-end customer support, from installation to deployment to customer care. ORBCOMM operates the ORBCOMM System - a constellation of satellites in the Non-Voice, Non-Geostationary Mobile-Satellite Service (“NVNG MSS”).

ORBCOMM fully appreciates the difficult regulatory hurdles faced by applicants proposing new satellite technologies. ORBCOMM filed its original application and petition for rulemaking to establish the NVNG MSS in 1990. Following those filings, ORBCOMM had to navigate a rulemaking to establish service rules (including use of a negotiated rulemaking procedure), a domestic spectrum allocation rulemaking, a global spectrum allocation (through the World Radiocommunications process) and a contested satellite authorization application proceeding. ORBCOMM did not receive the ORBCOMM System space segment license until 1994.<sup>2</sup> Since the issuance of the ORBCOMM System license, ORBCOMM has filed and prosecuted numerous modifications to that authorization, including those associated with the launch and operation of the ORBCOMM Generation 2 satellites. Additionally, because the ORBCOMM System provides worldwide coverage, ORBCOMM has amassed deep experience in formulating and dealing with international, regional, and foreign domestic regulatory compliance regimes throughout the world. ORBCOMM thus brings the perspective of a company that has painstakingly been through the global non-geostationary satellite regulatory processes for more than 28 years.

Accordingly, as an incumbent satellite system operator with a constellation in low-Earth orbit, ORBCOMM is intimately aware of the complex issues arising from spectrum and orbital

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<sup>2</sup> *Orbital Communications Corporation*, 9 FCC Rcd 6476 (1994).

resource sharing, as well as orbital debris mitigation and space traffic management that are raised in the *NPRM*. In 2016, ORBCOMM filed petitions relating to the applications filed by Planet Labs and Spire (as well as the STA application of Spaceflight), because their proposed non-geostationary satellite constellations specified orbits that would have overlapped with the ORBCOMM System.<sup>3</sup> And in the first and second Little Leo processing rounds, ORBCOMM dealt extensively with complex frequency coordination issues in the context of sharing amongst multiple NVNG MSS low-Earth orbit satellite systems. ORBCOMM's experiences thus provide a unique wealth of knowledge from which it has been able to draw in commenting on the Commission's proposals.

### ***Streamlined Procedures***

The *NPRM* seeks to offer an alternative to the two choices currently confronting applicants desiring to launch and operate a low-Earth orbit satellite system. Presently, such applicants can choose between a full-on commercial satellite license, with the attendant significant burdens and costs, or they can seek an experimental authorization, which carries a filing fee of only \$70, but allows only for limited non-commercial operations and offers no protection from harmful interference. Despite these constraints, the *NPRM* recognizes that a growing number of applicants are improperly attempting to shoe-horn a commercial satellite system into the Commission's experimental licensing program.<sup>4</sup> Providing a streamlined and less expensive alternative for "small satellite systems" makes sense, but only if the parameters for defining and authorizing a "small satellite system" are appropriate.

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<sup>3</sup> Application of Planet Labs Inc., File No. SAT-MOD-20150802-00053; Application of Spire Global, Inc. File No. SAT-LOA-20151123-00078; Application of Spaceflight, Inc., File No. SAT-STA-20150821-00060.

<sup>4</sup> *NPRM* at ¶ 9.

On the other hand, applying a streamlined process to satellite system applications that bypasses protections afforded to the incumbent satellite systems could create significant problems of interference or potential orbital collision hazards if applicants filing the category of applications subject to the streamlined procedures are not specifically required to reach mutually agreed solutions with incumbent licensees that eliminate any such concerns prior to the issuance of new small satellite system licenses. Thus, whether the Commission's proposals for streamlined procedures will serve the public interest hinges on the criteria for determining which systems would be eligible for such treatment, and on ensuring that any streamlined regime that is adopted provides appropriate compliance safeguards. ORBCOMM believes that the criteria proposed in the *NPRM* require some adjustments to ensure that any streamlined treatment that may be implemented would afford sufficient notice and comment procedures and adequate compliance requirements.

The *NPRM* suggests that a small satellite constellation for purposes of streamlined treatment be limited to “no more than ten satellites under a single small satellite license.”<sup>5</sup> ORBCOMM believes this could be a suitable limit to warrant streamline treatment, because a constellation of ten or fewer satellites should present lower risks of intra-system or inter-system collisions, as well as a more reasonable likelihood of manageable spectrum and orbit resource coordination with other systems. However, if any new policies do not properly address aggregation of “small satellite system” licenses which could allow applicants to unfairly game the process and create larger satellite constellations, then the presumed minimization of risk that justifies streamlined treatment would be unwarranted.<sup>6</sup> The Commission should thus clarify that

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<sup>5</sup> *NPRM* at ¶ 27.

<sup>6</sup> The *NPRM*'s proposed application filing fee of \$30,000, when compared with the with



an applicant could not evade the more rigorous review of a conventional application by filing for multiple small satellite system licenses.

A second set of criteria that would identify applications that could take advantage of the streamlined processes concerns orbital debris mitigation issues. The *NPRM* proposes a limit of the on-orbit lifetime of the satellite constellation to five years, and a requirement that the satellites will be disposed of post-mission through atmospheric re-entry.<sup>7</sup> ORBCOMM supports these requirements, because they should help minimize the risk of orbital collisions (and the attendant creation of orbital debris).

The *NPRM* also suggests a size limitation for satellites of 180 kilograms or less.<sup>8</sup> ORBCOMM does have some concerns with this proposal. Satellites of that size suggest a profile that might not create an insignificant risk of orbital collision. More importantly, a 180 kilogram maximum mass threshold also suggests greater potential interference issues. The “communications footprint” of a satellite constellation is a function of radiated power, transmit/receive frequency, antenna pattern, and transmit/receive bandwidth requirements, which are designed to meet the proposed services’ data ex-filtration requirements. A 180 kg satellite can support a power subsystem that can output hundreds of watts of RF power and consume hundreds of megahertz of bandwidth. In contrast, for example, an 18 kg satellite can output tens of watts of RF power and consume tens of megahertz of data for three hours a day. And that difference is magnified to the extent that the small satellite constellations could incorporate up to

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regular low-Earth orbit satellite system filing fee of \$454,705, suggests that 15 planes of ten satellites could obtain streamlined treatment without financial penalty vis-à-vis a non-streamlined conventional application.

<sup>7</sup> *NPRM* at ¶ 28.

<sup>8</sup> *NPRM* at ¶ 32.

ten satellites. Particularly because satellite spectrum is a very limited resource, rather than using a mass benchmark, the Commission should consider establishing a streamlined processing qualification envelope based more concretely on spectrum and orbit utilization.

The *NPRM* proposes a number of streamlined procedures that would apply to small satellite system applications. To the extent the Commission adopts eligibility criteria as ORBCOMM suggests, then the streamlined procedures should help minimize the burdens imposed on applicants while also reducing delays in issuance of authorizations, without undue risks. Assuming that ORBCOMM's recommended changes to the eligibility criteria and processing requirements are adopted, ORBCOMM supports the streamlined application requirements and the use of certifications in lieu of including detailed demonstrations in the applications.<sup>9</sup>

The Commission historically used processing rounds as a means of equitably distributing satellite licenses when the number of applicants exceeds the number of authorizations available. The Commission altered that procedure for Geostationary satellites,<sup>10</sup> but retains processing rounds for non-Geostationary satellite system applications under many circumstances.<sup>11</sup> In lieu of processing rounds for small satellite constellation applications, the *NPRM* proposes to use "first-come, first-served" procedures where the applicant can certify that its entry would not be preclusive and that it would not interfere with incumbent licensees.<sup>12</sup> ORBCOMM agrees that

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<sup>9</sup> *NPRM* at ¶¶ 47-48.

<sup>10</sup> *Amendment of the Commission's Space Station Licensing Rules and Policies*, IB Docket No. 02-34, First Report and Order and Further Notice of Proposed Rulemaking, 18 FCC Rcd 10760 (2003) at ¶¶ 71-159.

<sup>11</sup> 25 C.F.R. § 25.157.

<sup>12</sup> *NPRM* at ¶¶ 43-45.

under these circumstances, the delays and burdens of a processing round could be unnecessary. However, any certification policy must include adequate notice and comment procedures.

The *NPRM* also proposes reducing the regulatory costs of small satellite constellation authorizations by applying reduced application filing fees, and by utilizing a modified surety bond requirement that provides a one-year grace period to encourage prompt launch after authorization.<sup>13</sup> ORBCOMM agrees that the anti-warehousing purpose of the surety bond requirements are not implicated by many non-geostationary satellite systems – including at least a definable subset of the proposed new small satellite constellation category, but only to the extent that such authorizations are non-preclusive. Under these circumstances, imposing the significant costs of a surety bond on small satellite system licensees (or continuing to do so for all other non-geostationary authorizations) may be unnecessary. In that same regard, the Commission should consider a broader streamlining of surety bond requirements for all non-geostationary authorizations in cases where launch and operation are reasonably non-preclusive of other future entrants.

The *NPRM* intends to set the application filing fee at \$30,000 initially, significantly less than the current fee of \$454,705 for non-geostationary satellite system applications. The application filing fees for a category of applications are intended to cover the Commission's costs of processing that category's applications. ORBCOMM is not convinced that the Commission's processing costs are so disproportionately lower for small satellite systems, because many of those costs are not clearly dependent on spectrum or orbit utilization, or on the

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<sup>13</sup> *NPRM* at ¶¶ 76 and 50-52. The Commission is separately reviewing the annual regulatory fees that would be assessed against small satellite constellation operators. *Assessment and Collection of Regulatory Fees for Fiscal Year 2018*, MD Docket No. 18-175, FCC 18-65, released May 22, 2018 at ¶¶ 32-33.

size of the satellites or the constellation. On the other hand, to the extent the Commission commits to re-evaluating the application filing fees once it has gained experience under the new streamlined processing rules, then the use of the significantly lower fee in the interim may be acceptable.<sup>14</sup> ORBCOMM also supports appropriate review and reduction of filing fees for other classes of FCC satellite service license applications, such as modifications, where such action is merited.

### ***Substantive Rules that would Apply to Small Satellite Systems***

In addition to streamlined application procedures, the *NPRM* also proposes to apply several substantive rules to small satellite systems to account for their characteristics. To a great extent, these issues are not unique to “small satellite systems,” but are a microcosm of frequency and orbit resource sharing, and orbital debris and space traffic management issues facing the non-geostationary satellite industry generally. Indeed, considering the large volume of currently proposed mega-constellation deployments, updates to the Commission’s rules more broadly clearly appear to be merited for immediate attention.

Orbital debris mitigation and space traffic management is becoming increasingly critical with more and more satellites being launched into low-Earth orbit. As the Iridium and Cosmos satellites collision made clear, the effects are catastrophic, not only in terms of the destruction of the satellites, but in the creation of a debris cloud that could adversely affect

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<sup>14</sup> The application filing fees were set based on Congress’ estimation of costs, and adjusted to account for inflation, with those fees applied to the general Treasury, so that even if the Commission errs in setting the filing fee, other applicants are not prejudiced. In contrast, for the regulatory fees, under-collecting regulatory fees from one category of satellite licensees would result in over-collecting fees from other categories of satellite licensees, given the way the Commission calculates the regulatory fees to cover its costs. It is thus more important that the Commission ensure that its initial analyses of the annual regulatory fees for the small satellite system licensees be accurate.

numerous other systems. The Commission should seek to improve its rules to prevent any such future collisions, both for small satellite systems as proposed in the *NPRM*, and more broadly. ORBCOMM's recent experiences demonstrate some of the difficulties with the Commission's current rules for assessing collision risk during the application process.

The rules presently require an applicant to include in its application a narrative description of collision avoidance plans:

Where a space station will be launched into a low-Earth orbit that is identical, or very similar, to an orbit used by other space stations, the statement must include an analysis of the potential risk of collision and a description of what measures the space station operator plans to take to avoid in-orbit collisions.<sup>15</sup>

This rule includes somewhat vague terms (“identical, or very similar to”), and the showings depends on the use of models to predict collision. And those models may not be accurate, or are subject to manipulation.

As mentioned previously, just a few years ago ORBCOMM was compelled to file and prosecute petitions relating to applications for two satellite constellations and a Special Temporary Authorization that proposed orbits that overlapped with ORBCOMM's constellation.<sup>16</sup> ORBCOMM's assessment of the collision risk differed significantly from the analyses proffered by the applicants, because ORBCOMM analyzed the odds of a collision amongst all of the satellites in the applicants' constellations, whereas the applicants only calculated the odds of any two satellites colliding. In addition, apparently ORBCOMM used

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<sup>15</sup> 47 C.F.R. § 25.114(d)(14)(iii).

<sup>16</sup> ORBCOMM's satellites are at an altitude of 715 km. The applications sought authority to launch satellites into, *inter alia*, a 720 x 450 km elliptical orbit.

different assumptions with regard to solar flares, which affects the orbital decay of the satellites (and hence the risk of collisions) under the model.

In addition, ORBCOMM discovered that the satellites that those two applicants planned on launching were going to be part of a proposed Spaceflight mission that was going to launch a total of 90 satellites into that 720 x 450 km orbit.<sup>17</sup> However, Spaceflight disclaimed any responsibility for assessing the risk of a collision between all 90 of the satellites proposed to be carried on its mission and the ORBCOMM satellites, nor the risk of collision amongst any of those 90 satellites.<sup>18</sup> Moreover, one of the other applicants attempted to model the risk of an intra-system collision amongst the 90 satellites, but the inputs to the model assumed a random deployment of the 90 satellites, which had the result of skewing the outcome due to the near-infinite number of “random” deployments.<sup>19</sup> Of course, what really matters is the risk of collision for the actual deployment of the constellation of satellites.

Given the limits of using models to forecast potential collision risks, ORBCOMM believes it is more important for the Commission to adopt robust space traffic management obligations that would apply to small satellite system operators (as well as all non-geostationary satellite system operators). The Commission should also ensure that its rules complement other Executive agencies’ actions regarding space traffic management. The Administration recently

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<sup>17</sup> To complicate matters further, those satellites were purportedly authorized by ten different countries: the United States, Brazil, Chile, Finland, France, Slovak Republic, South Korea, Spain, Switzerland and UAE.

<sup>18</sup> Spaceflight, Response to Informal Comments of ORBCOMM, File No. SAT-STA-20150821-00060, filed May 13, 2016.

<sup>19</sup> ORBCOMM, *Ex Parte* Letter – File Nos. SAT-MOD-20150802-00053; SAT-LOA-20151123-00078; SAT-STA-20150821-00060, filed August 9, 2016.

issued Space Policy Directive-3, National Space Traffic Management Policy.<sup>20</sup> While work remains in implementing those new policies, those efforts should help ensure that satellite system operators have access to relevant information, and that they receive timely conjunction warnings. Either through Commission rules, or as a license condition, the Commission should require satellite system licensees to participate in the space traffic management information exchanges that are being developed under these new Administration policies. The NPRM's proposal for trackability of satellites to be authorized under these new procedures<sup>21</sup> is consistent with this principle, so ORBCOMM supports adoption of such a requirement. In addition to requiring licensees to actively participate in collaborative space traffic management, even more importantly, the Commission's rules should be appropriately revised to require that all authorized satellites include sufficiently accurate real-time on-board position location determination and reporting capability (utilizing GPS or similar technology) so that the satellite system operator will have precise ephemeris information that can be readily shared with other effected operators in the event of conjunction events, and appropriately inputted into the space traffic management system being developed under the new Administration policies.

ORBCOMM also urges the Commission to adopt its proposals to ensure that orbital debris mitigation best practices are incorporated into all phases of the applicant's program. The Commission should adopt its proposals to require good spacecraft design principles by only applying streamlined treatment to satellites that will not release operational debris, and that have

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<sup>20</sup> <https://www.whitehouse.gov/presidential-actions/space-policy-directive-3-national-space-traffic-management-policy/>.

<sup>21</sup> *NPRM* at ¶ 38.

minimized the risk of accidental explosions.<sup>22</sup> In addition, the Commission should ensure that in selecting orbits, the applicant affirmatively chooses an orbit that minimizes risks of collision. While opportunistic launches as secondary payloads may be cheaper for the applicant, the costs imposed on others should be factored in as well. These “negative externalities” unquestionably can have real world consequences.

Spacecraft maneuverability is another key factor in ensuring that there can be effective space traffic management and avoidance of in-orbit collisions.<sup>23</sup> Additionally, whether through propulsion systems or some other means, the satellite system operator should be able to act on conjunction warnings. In addition, maneuverability will ensure that timely de-orbiting can occur. Given the still-evolving nature of the recently-adopted space traffic management policies, ORBCOMM believes it may be premature for the Commission to prescribe particular requirements, such as specific propulsion capabilities, at this time. But as a conservative measure for now, ORBCOMM agrees that the proposed 400 km altitude cap for the contemplated new category of small satellite systems seems reasonable. In any event, any contemplated streamlined treatment for small satellite systems operating above 400 km would only be appropriate if the Commission’s rules are modified to require that any such spacecraft 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*.<sup>24</sup>

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<sup>22</sup> *NPRM* at ¶¶ 35-36.

<sup>23</sup> *NPRM* at ¶¶ 33-34.

<sup>24</sup> *NPRM* at ¶ 34.



### *Avoiding Harmful Interference*

The *NPRM* recognizes that a critical issue for both new small satellite system applicants and incumbent satellite system operators is access to spectrum.<sup>25</sup> As a responsible licensee with hundreds of millions of dollars invested in the ORBCOMM System, ORBCOMM fully understands its obligation to coordinate in good faith with other satellite system licensees and applicants to avoid harmful inter-system interference. In the two processing rounds for NVNG MSS, ORBCOMM engaged in extensive spectrum coordination activities, which successfully resulted in spectrum sharing arrangements among multiple applicants. ORBCOMM has also engaged in numerous other successful international, regional, and foreign domestic spectrum coordination undertakings with other space and terrestrial systems over the years.

The *NPRM* specifically seeks comment on whether small satellite system applicants should have access to portions of the NVNG MSS spectrum – the 137-138 MHz and 148-150.05 MHz bands -- through the streamlined application process.<sup>26</sup> ORBCOMM has some concerns with the expanded use of these bands, insofar as this proposal in the *NPRM* appears to be premised on the assumption that sharing of this spectrum can readily be accommodated, because the NVNG rules contemplated multiple Little LEO systems sharing these bands.<sup>27</sup>

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<sup>25</sup> *NPRM* at ¶¶ 55-73.

<sup>26</sup> *NPRM* at ¶¶ 64-67.

<sup>27</sup> *See, NPRM* at ¶ 66:

As these frequency bands were originally considered for use by multiple satellite systems, we request comment generally on whether, and if so, how, small satellite space operations could share this spectrum while protecting ORBCOMM's existing and future MSS operations.

As an initial matter, ORBCOMM observes that there is relatively little spectrum available for MSS in these bands, particularly for the types of operations ORBCOMM anticipates the small satellite services systems will utilize. The ORBCOMM System incorporates advanced technologies and operational techniques that make highly efficient use of the limited available authorized VHF spectrum to ensure that its current and projected capacity needs and customer service requirements are fully satisfied. But there is not much spectrum to begin with in the NVNG MSS bands under review here (only a total of some three MHz), and most of that is only useful for narrowband subscriber uplinks in the 148-150.05 MHz band. Moreover, that spectrum is shared with other satellite systems, as well as terrestrial fixed and mobile service systems with current regulatory provisions requiring that the satellite operations be non-interfering.<sup>28</sup> In addition, satellite operations in this band are currently subject to duty-cycle limits. Critically, there is also a very limited amount of uplink spectrum that can be used for feeder links in the 148-150.05 MHz band.

The other proposed NVNG MSS band addressed in the NPRM – the satellite downlink band (137-138 MHz) – is presently shared between the NVNG MSS service and various operations in other allocated services, thus significantly constraining any capacity for additional NVNG MSS systems' downlink operations. In addition, satellite operations in that band are subject to strict power limits. Thus, successfully coordinating new sharing arrangements in the 137-138 MHz downlink band that would afford sufficient capacity for new satellite system entrants could be extremely difficult to accomplish. So that band, too, may not be well-suited to the potential needs of small satellite systems.

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<sup>28</sup> ORBCOMM shares this spectrum using its Dynamic Channel Activity Assignment System (DCAAS) so that channels not being used by the terrestrial services are dynamically assigned to ORBCOMM's subscribers for their uplink transmissions.

As the NPRM observes, the Commission did develop rules to allow sharing of the NVNG MSS spectrum amongst multiple Little LEO system. However, that does not mean that it necessarily will be possible for small satellite systems readily to share the band with ORBCOMM. As an initial matter, the spectrum to be shared by the NVNG systems included additional bands that are not included in the NPRM's proposals.<sup>29</sup> Moreover, the sharing rules that were developed in the first two NVNG MSS processing rounds were system specific. Indeed, the second processing round rules specified that licenses were to be assigned to System 1, System 2, etc.<sup>30</sup> And those sharing rules were developed over the course of many years, with great effort. Given these factors, it is unlikely that new small satellite system operators could simply "step into the shoes" of the additional NVNG MSS systems that comprised the first two NVNG MSS processing rounds.

Another significant concern ORBCOMM has is the potential burden that would be imposed on it by allowing multiple new small satellite systems to attempt coordination of proposed operations in these bands pursuant to streamlined procedures. In the context of the second processing round, the NVNG satellite system applicants developed a detailed sharing plan based on specific spacecraft and constellation designs, specific spectrum and orbit utilization proposals, and extremely lengthy negotiations. These prior arrangements clearly do not constitute any reasonable foundation whatsoever for accommodating an indeterminate number of new entrants.

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<sup>29</sup> The second round sharing plan incorporated the 400.05-401 MHz band, as well as the potential use of the 455-456 MHz and 459-460 MHz bands.

<sup>30</sup> *Amendment of Part 25 of the Commission's Rules to Establish Rules and Policies Pertaining to the Second Processing Round of the Nonvoice, Non-Geostationary Mobile Satellite Service (Little Leo Service)*, 13 FCC Rcd 9111 (1997).

While it certainly might be possible for ORBCOMM to share the 137-138 MHz and 148-150.05 MHz bands with one or more new small satellite systems, it is by no means a foregone conclusion that this will be feasible. Nor is it possible to 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.

ORBCOMM would need to assess critical factors such as the intended uses (*e.g.*, subscriber links + feeder links, or gateway links only); capacity needs; modulation schemes; use of static versus dynamic channel assignments, etc. At the very least, ORBCOMM urges 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 so as to eliminate risks of harmful interference and orbital collisions.<sup>31</sup>

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<sup>31</sup> For both of the NVNG MSS processing rounds, the Commission required the applicants to resolve sharing issues before any licenses were issued. *Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Non-Voice, Non-Geostationary Mobile-Satellite Service*, 8 FCC Rcd 8450 (1993) at ¶¶ 19-21; *Amendment of Part 25 of the Commission's Rules to Establish Rules and Policies Pertaining to the Second Processing Round of the Non-Voice, Non-Geostationary Mobile Satellite Service*, 13 FCC Rcd 9111 (1997) at ¶ 122. Given the presence of a several incumbent satellite systems and numerous terrestrial systems in multiple countries in these NVNG MSS bands, and the very limited amount of spectrum available, the Commission should not license any new satellite entrant (small satellite system or otherwise) requiring successful prior completion of mutually agreed spectrum and orbit resource coordination. For numerous reasons, not imposing this requirement as a strict licensing precondition would clearly be contrary to the public interest. This situation is thus readily distinguishable from conditions affecting the processing and grant of authorizations in some other satellite services. For example, these requirements are not critical for Exploration Satellite Service systems, where the Commission has routinely licensed these systems to operate concurrently in the much wider X-band (375 MHz of bandwidth) with the expectation that licensees will coordinate with other operators. *E.g.*, *Space Imaging LLC*, 20 FCC Rcd 11964 (2014); *Astrovision International, Inc.*, 15 FCC Rcd 22299, 22303-04 (2000); *Orbital Imaging Corporation*, 14 FCC Rcd 2997, 3000-01 (1999).

### *Conclusion*

ORBCOMM appreciates the Commission's desire to foster new satellite technologies by providing the option of a streamlined application process for "small satellite systems." So long as the criteria for such systems are appropriate, then the benefits of faster and cheaper authorizations should outweigh the costs imposed on incumbent satellite system operators, and also ensure that the rules adopted by the Commission will serve the public interest.

Respectfully submitted,

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