Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

Application of	)	
WORLDVU SATELLITES LIMITED	)	IBFS File Nos. SAT-LOI-20170301-00031 and SAT-AMD-20180104-00004
For Amendment to Petition for Declaratory Ruling Granting Access to the U.S. Market for the OneWeb V-Band System	)	

REPLY OF SPACE EXPLORATION HOLDINGS, LLC

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SUMMARY

In its response, OneWeb reiterates its request that the Commission waive its policies and rules so that OneWeb can double the number of mid-Earth orbit ("MEO") satellites in its proposed V-band constellation – from 1,280 to 2,560 – and lay claim to an additional 16 gigahertz of spectrum for use by every one of those new satellites. On its face, this massive expansion would create substantial radio frequency interference and physical conjunction concerns for competing NGSO systems, inevitably disrupting three ongoing NGSO processing rounds and delaying the deployment of new broadband service. SpaceX, SES/O3b, and Iridium demonstrated that Commission precedent and technological analysis confirm the expected increase in interference stemming from the requested expansion, and therefore asked that the Commission deny the amendment or defer consideration to a later processing round to minimize uncertainty and confusion for all timely applicants so that everyone – including OneWeb – can continue working to deploy without unnecessary delay.

OneWeb neglected in its response to address many of the flaws in its application that the petitioners pointed out. Even where OneWeb does attempt to take on these faults, its responses are inaccurate, irrelevant, and ultimately unpersuasive. For example, OneWeb continues to assert that adding thousands of new satellites using many gigahertz of additional spectrum will help resolve frequency conflicts rather than create them. Yet OneWeb fails to even acknowledge that the Commission's standard for evaluating proposed amendments is whether they create the *potential* for additional interference – which the additional proposed satellites clearly do. OneWeb has failed to alleviate this concern by showing that the anticipated harm to other NGSO systems will not be as extensive as it seems. And, while additional satellites may give OneWeb the

capability to reduce interference during in-line events, that capability is meaningless without a binding commitment that OneWeb actually plans to use that capability to protect other NGSO systems in every instance. Not only has OneWeb failed to make such a commitment, but it continues to push the Commission to undo the responsibilities it currently has to collaborate with other NGSO operators on spectrum sharing. If OneWeb's amendment were handled through a new processing round, the newly-authorized constellation presumptively would be required to work in good faith to protect earlier-filed NGSO systems – just as OneWeb previously maintained that all later-filing applicants should be obliged to do.

The Commission designed its recent processing rounds to establish a clear and consistent sharing environment among timely NGSO applicants to provide a measure of certainty for investment and design, rather than adopting an open-ended requirement to accommodate all future applicants. Yet OneWeb seeks waivers of several Commission rules so that all of its requests would be considered along with properly-filed applications submitted many months ago in three ongoing NGSO satellite-processing rounds. In support of its requested waivers, OneWeb chose only to reiterate the same flawed argument that, by extending the NGSO deployment milestone timeline, the Commission has in some way compelled OneWeb to amend its application and seek a much larger constellation using much more spectrum. OneWeb's request is neither compelled by the Commission's milestone changes, nor would its grant support the Commission's goal of increased broadband competition to close the digital divide. If the waivers were granted, the amendment proposed by OneWeb would run directly counter to the Commission's objectives by disrupting the considerable headway made in ruling on the applications in the current processing rounds, and by requiring those NGSO systems with timely-filed applications to accommodate OneWeb's belated request for dramatically more orbital and spectrum assets.

OneWeb's response also fails to give adequate reason why the Commission should authorize a single entity to own multiple proposed NGSO systems operating in the same band and, in doing so, violate an explicit prohibition to such multiple ownership designed to deter spectrum and orbital hoarding. Moreover, its continued refusal to provide orbital debris mitigation information deprives the Commission of critical inputs necessary to determine the public interest implications of the massive expansion proposed for OneWeb's NGSO constellations. Either of these shortcomings is sufficient to justify dismissal of the amendment.

To be sure, technology and market conditions are constantly evolving in this new era of commercial space, and the Commission is right to create regulatory flexibility for NGSO satellite operators to upgrade their systems correspondingly. This flexibility must be balanced with some measure of structure and process within the Commission's rules so that NGSO operators have sufficient certainty to move forward with the considerable financing, design and construction needed to actually deploy and contribute to the nation's broadband options. OneWeb has proposed dramatic changes to its NGSO system that would have a significant adverse effect on other NGSO systems. It has failed to demonstrate the extraordinary circumstances that the Commission requires to justify a waiver of the rules designed to prevent spectrum speculation, protect the integrity of the NGSO processing round regime, and ensure fair and timely consideration for all qualified applicants. In these circumstances, the Commission should deny the amendment or, if it allows OneWeb to proceed, the Commission should defer its NGSO applications for consideration in follow-on processing rounds.

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REPLY OF SPACE EXPLORATION HOLDINGS, LLC

Through the amendment proposed in this proceeding, WorldVu Satellites Limited ("OneWeb") seeks to double the number of mid-Earth orbit ("MEO") satellites in its proposed V-band constellation from 1,280 to 2,560, and authority for all 2,560 of those MEO satellites to use over 16 gigahertz of additional spectrum in the Ku-, Ka-, and E-bands.[1] As importantly, OneWeb seeks waivers of the Commission's rules so that all of these requests can be considered in three ongoing non-geostationary orbit ("NGSO") satellite processing rounds in which applicants were required to file many months ago. Considering such an amendment in the ongoing NGSO processing rounds, however, would break the cardinal tenets of the Commission's processing round regime, injecting uncertainty into an already challenging spectrum sharing environment, leading to delay in resolving timely-filed NGSO applications, and likely resulting in delayed deployment of much-needed satellite broadband systems. Accordingly, Space Exploration Holdings, LLC ("SpaceX"), SES Americom and O3b Limited ("SES/O3b"), and Iridium

[1] *See* Amendment, IBFS File No. SAT-AMD-20180104-00004 (Jan. 4, 2018) ("OneWeb Amendment").

Constellation LLC ("Iridium") asked the Commission to deny the amendment or, at a minimum, defer consideration to a later processing round.[2] Doing so would allow all NGSO applicants – including OneWeb – to continue to work toward deployment without unnecessary confusion or delay.

OneWeb's response[3] fails to address many of the arguments raised in the petitions and comments. Moreover, even where OneWeb does attempt to take on those arguments, its responses are inaccurate, irrelevant, and ultimately unpersuasive. For example, OneWeb continues to assert that nearly tripling the number of satellites in its MEO constellation will not cause additional interference, but ignores the facts that (1) the Commission's standard for evaluating proposed amendments is whether they create the *potential* for additional interference, (2) the introduction of MEO satellites in the portions of the Ku- and Ka-bands where OneWeb is currently authorized to operate a LEO-only system[4] would add a new layer to an already challenging spectrum sharing environment, and (3) the operation of MEO satellites in those portions of the Ku- and Ka-bands in which OneWeb chose not to file *any* application would inject a completely new system that other NGSO licensees (including SpaceX) would have to consider. Moreover, although additional satellites create the theoretical *capability* to implement satellite diversity in order to avoid interference during in-line events, OneWeb has nowhere committed to use that capability to accommodate other systems in every case, and OneWeb's own statements indicate that it would

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2 *See* Petition to Deny or Defer of Space Exploration Holdings LLC, IBFS File Nos. SAT-LOI-20170301-00031 and SAT-AMD-20180104-00004 (Aug. 6, 2018) ("SpaceX Petition"); Petition to Dismiss or Defer of SES Americom, Inc. and O3b Limited, IBFS File No. SAT-AMD-20180104-00004 (Aug. 6, 2018) ("SES/O3b Petition"); Petition to Deny of Iridium Constellation LLC, IBFS File No. SAT-AMD-20180104-00004 (Aug. 6, 2018) ("Iridium Petition"). The Boeing Company ("Boeing") also filed comments challenging several aspects of OneWeb's modification. *See* Consolidated Comments of The Boeing Company, IBFS File Nos. SAT- MOD-20180319-00022 and SAT-AMD-20180104-00004 (July 30, 2018) ("Boeing Comments").

3 *See* Consolidated Opposition and Reply Comments of OneWeb, IBFS File Nos. SAT-LOI-20170301-00031 and SAT-AMD-20180104-00004 (Aug. 27, 2018) ("OneWeb Opposition").

4 *See WorldVu Satellites Limited*, 32 FCC Rcd. 5366 (2017) ("*OneWeb Authorization*").

be unlikely to do so voluntarily. By contrast, if OneWeb's application were handled through a new processing round, the newly-authorized constellation presumptively would be required to protect earlier-filed NGSO systems[5] – ensuring the result that OneWeb claims to envision and until recently maintained was required of later-filing applicants.

Below, we first identify the many arguments that OneWeb failed to address. Next, we rebut OneWeb's assertion that its amendment is consistent with the Commission's important policies against spectrum speculation and that it therefore either does not violate or somehow justifies a waiver of the Commission's prohibition against one party holding more than one application or authorized-but-unbuilt NGSO system in a given frequency band.[6] We then refute OneWeb's implausible claims that its amendment would not inject uncertainty and delay into the ongoing processing rounds, or that this disruption is somehow "compelled" by the Commission's liberalization of its milestone rules. Lastly, we address the ongoing need for information on OneWeb's orbital debris mitigation plans. As demonstrated below, the Commission's rules, precedent, and the public interest dictate that the Commission should either deny or defer consideration of the amendment.

DISCUSSION

The Commission has made clear that "[t]he purpose of the recent processing rounds was to establish a sharing environment among NGSO systems, to provide a measure of certainty in lieu of adopting an open-ended requirement to accommodate all future applicants."[7] The processing-

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5 *See Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, 32 FCC R cd. 7809, ¶ 61 (2017) ("*NGSO Update Order*").

6 *See* 47 C.F.R. § 25.137(d)(5).

7 *NGSO Update Order*, ¶ 61.

round system is designed to establish "satellite licensees' operating rights clearly and quickly" and ensure "that there is the most efficient use of the satellite spectrum and orbit resources."[8]

OneWeb's requested amendment, which seeks to circumvent the rules governing the processing-round regime, would clearly undermine each of these goals, creating significant uncertainty and impeding the efforts of other NGSO operators to deploy systems capable of providing robust broadband service to customers in underserved and unserved areas of the U.S. and the rest of the world. OneWeb has utterly failed to justify such disruption of the Commission's orderly and expeditious processing of NGSO applications.

I. THE COMMISSION SHOULD REJECT ONEWEB'S AMENDMENT BECAUSE ONEWEB FAILED TO EVEN ADDRESS SEVERAL CRITICAL ISSUES RAISED BY SPACEX AND OTHERS IN THE RECORD

SpaceX and others raised a number of substantial issues that justify the denial or deferral of OneWeb's proposed amendment. OneWeb responded to only some of those challenges. Accordingly, the following issues remain unchallenged:

- OneWeb has consistently claimed that it can deploy the 2,000 satellites in its hybrid LEO/MEO V-band system within the original six-year milestone requirement, yet it has not explained why it failed to include *any* MEO satellites in its original Ku/Ka-band system application or why it failed to file *any* application in the supplemental Ku/Ka-band processing round for spectrum it now seeks to use. These facts directly refute OneWeb's claim that recent Commission rule revisions compelled its belated interest in MEO satellites for those bands.

- In order to avoid the multiple ownership prohibition, OneWeb could seek to *modify* its existing Ku/Ka-band authorization to add MEO satellites and additional frequencies not previously sought. Indeed, the Commission invited just such modification applications when it adopted the new milestone regime – a fact cited by OneWeb as "precisely the catalyst behind the instant Amendment."[9] However, the Commission also clearly stated

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[8] *Amendment of the Commission's Space Station Licensing Rules and Policies*, 18 FCC Rcd. 10760, ¶ 7 (2003) ("*2003 Licensing Reform Order*"). *See also EchoStar Satellite Corp.*, 16 FCC Rcd. 14300, ¶ 5 (IB 2001), *recon. denied*, 17 FCC Rcd. 8305 (IB 2002) (the Commission's NGSO processing round regime was intended to "ensure orderliness, expedition and finality in the licensing process" while also achieving "fairness among applicants and permit[ting] the rapid dispatch of Commission business") ("*EchoStar*")

[9] OneWeb Amendment at 22.

that such applications would kick off new processing rounds.[10] OneWeb has not explained why it has not followed the Commission's direction, or why the Commission should deviate from the course previously prescribed.

- OneWeb has not even attempted to demonstrate that its proposal to employ a novel "reverse band" use of the 71-76 GHz band that is inconsistent with the U.S. and international allocations would not pose an interference risk to other systems operating in conformance with those allocations.[11]

- OneWeb continues to disregard the Commission's requirement that it provide specific information regarding the current status of its national licensing authority's review of its orbital debris mitigation plans.[12] Commission precedent makes clear that the mere assertion that an administration will exert this oversight at some point in the licensing process is not sufficient.

These matters alone should be sufficient to warrant denial or deferral of the amendment. We now proceed to discuss those issues on which OneWeb chose to engage.

II. GRANTING THE AMENDMENT WOULD VIOLATE THE COMMISSION'S RULES TO PREVENT HOARDING ORBITAL AND SPECTRAL ASSETS INCLUDING THE PROHIBITION ON HOLDING MULTIPLE NGSO AUTHORIZATIONS IN THE SAME BAND, AND THERE IS NO BASIS FOR WAIVING THAT PROHIBITION

OneWeb claims that the MEO satellites proposed in this amendment are part of the same satellite system as the Ku/Ka-band LEO-only constellation that the Commission previously authorized. It cites a statement in its V-band application that refers to some "V-band component" of its system to indicate actual plans to deploy V-band on its LEO satellites in addition to the MEO satellites.[13] Even if true, that does not demonstrate that OneWeb ever contemplated a unified constellation that included MEO satellites operating in the Ku- and Ka-bands. Indeed, had this been the case, OneWeb could have proposed those MEO satellites from the beginning, since it has

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[10] *NGSO Update Order*, ¶ 67 n.150 (2017) ("a licensee may request to modify its authorization at any time to deploy additional satellites," and such applications will be treated as "applications filed after a processing round").

[11] *But see* OneWeb Opposition at 15 (asserting that "no commenter has asserted that OneWeb's proposed operations in the E-band will result in harmful interference to future satellite operations"); SES/O3b Petition at 24 (raising questions about "the feasibility of OneWeb's proposed reverse band operations in the 71-76 GHz band").

[12] *Mitigation of Orbital Debris*, 19 FCC Rcd 11567, ¶ 95 (2004).

[13] *See* OneWeb Opposition at 5.

steadfastly maintained that it was capable of launching a hybrid LEO/MEO constellation within the six-year milestone period that formerly applied to NGSO systems.[14] This is the critical overlap that causes the violation of Section 25.137(d)(5).

In their petitions, SpaceX and SES/O3b demonstrated that OneWeb does not treat its various proposed LEO and MEO systems as a single constellation.[15] In response, OneWeb admits that it claimed compliance with applicable Ka-band power flux-density ("PFD") limits based on a calculation that captures only its MEO satellites, without including any LEO satellites in the analysis.[16] Its attempts to explain this approach – and the tacit admission its explanation entails – simply dig a deeper hole.

First, OneWeb contends that it limited its PFD calculations to include only its MEO satellites because it agrees with SpaceX's explanation that the methodology for calculating the PFD limit is not appropriate for NGSO systems with more than 840 satellites.[17] This is a refreshing change of heart, given that OneWeb previously rejected SpaceX's position as "based on dubious technical arguments."[18] OneWeb does not explain the basis for its conversion on this issue.

Next, OneWeb argues that it would have been premature to demonstrate PFD compliance with both the LEO and MEO components because its filing to increase the number of satellites in its LEO component from 720 to 1,980 was still pending at the ITU.[19] That does not explain why

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[14] *See, e.g.*, Petition for Declaratory Ruling, IBFS File No. SAT-LOI-20170301-00031, at 23 (Mar. 1, 2017) (stating that OneWeb "will launch and operate the complete OneWeb V-Band System within six years of grant of this Petition"). The fact that the proposed MEO component would also operate on 12.25 gigahertz of spectrum not licensed to *either* of the LEO components OneWeb has proposed further undermines OneWeb's claims as to its intentions. *See* SpaceX Petition at 9.

[15] *See* SpaceX Petition at 9-10; SES/O3b Petition at 7.

[16] *See* OneWeb Opposition at 6.

[17] *Id.*

[18] *See* Comments of WorldVu Satellites Limited, IBFS File No. SAT-LOA-20161115-00118, at 24 (June 26, 2017).

[19] *See* OneWeb Opposition at 6.

OneWeb did not (1) at least identify the issue for the Commission, (2) perform the calculation using 720 LEO satellites and note that an updated calculation would be forthcoming, or (3) update its filing as required under Section 1.65 of the Commission's rules once processing at the ITU was complete.[20] Instead, OneWeb has allowed its misleading assertion of compliance to remain on the record to this day. Moreover, although OneWeb now admits that a combined LEO/MEO system would exceed the applicable PFD limits, it has not requested a waiver of those limits, which alone would be yet another basis for dismissing its application.[21] OneWeb cannot have it both ways. Either these disparate system proposals are not a single NGSO constellation, or OneWeb has proposed a non-compliant system without requesting a waiver. But either way, the amendment should be dismissed.

As a fallback, OneWeb continues to argue that the Commission should waive the multiple ownership prohibition. It cites the Commission's decision to revise the milestone requirements for NGSO systems as a "special circumstance" that justifies a waiver.[22] SpaceX and SES/O3b cited Commission precedent rejecting the idea that an applicant should be excused from the processing-round rules and cut-off dates merely because it did not have the "foresight" to request resources that would require a waiver in its initial application.[23] As its only response, OneWeb cites a submission filed in an unrelated proceeding by a private party that did not file in support of

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[20] *See* 47 C.F.R. § 1.65 (imposing an obligation on every applicant to ensure the continuing accuracy and completeness of information furnished in a pending application, and requiring prompt submission of corrected information).

[21] *See, e.g.*, Letter to Robert J. Miller from Kathyrn Medley, 25 FCC Rcd. 10714 (2010) (dismissing application for failure to include a waiver request for non-conforming spectrum use).

[22] *See* OneWeb Opposition at 9.

[23] *See* SpaceX Petition at 21-22; SES/O3b Petition at 8-9.

OneWeb's amendment.[24] OneWeb's inability to muster more persuasive authority speaks volumes about the merits of its arguments.

When the Commission adopted its multiple ownership prohibition, it found that the rule would restrain speculation without precluding legitimate applications from consideration, stating that the rule "simply requires satellite operators to prioritize their business plans."[25] The rule achieved the Commission's desired result when OneWeb prioritized systems proposed in its original applications and decided against pursuing other opportunities presented by the Commission's processing rounds. OneWeb's belated change of heart does not change the fact that MEO satellites proposed in the amendment are not part of the LEO-only constellation previously authorized. Accordingly, grant of the amendment would violate the multiple ownership prohibition, and the Commission should deny the application on that basis.

III. IF THE COMMISSION DOES NOT DENY THE AMENDMENT, IT MUST CONSIDER IT AS PART OF A LATER PROCESSING ROUND BECAUSE ONEWEB FAILED TO JUSTIFY CIRCUMVENTION OF THE COMMISSION'S NGSO PROCESSING ROUND "CUT-OFF" RULES

Section 25.116 of the Commission's rules provides that an amendment will be deemed "major" if it changes the proposed frequencies to be used or increase the potential for interference, as OneWeb's amendment clearly does. The rule goes on to state that a pending NGSO application that is amended by such a major amendment after a "cut-off" date for the relevant processing round will be considered to be a newly-filed application, and thus removed from the processing group.[26] Two other rules have a similar effect.[27] Collectively, these rules help ensure that NGSO processing

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[24] *See* OneWeb Opposition at 9 and n.22 (quoting Viasat reply comments).

[25] *2003 Licensing Reform Order*, ¶ 230.

[26] *See* 47 C.F.R. § 25.116(b) and (c).

[27] *See id.* §§ 25.155(b) and 25.157(c).

rounds proceed efficiently and fairly, yielding regulatory certainty for participants so that they can proceed expeditiously with actual deployment of their systems.

OneWeb continues to assert that the Commission should waive these rules on the grounds that (1) the addition of thousands of MEO satellites using over 16 gigahertz of additional spectrum will help resolve frequency conflicts rather than create them, and (2) revision of the NGSO milestone requirements necessitated OneWeb's amendment.[28] Neither argument holds water.

A. Adding More Satellites Will Increase the Potential for Interference to Other NGSO Systems

OneWeb is correct that an NGSO system with more satellites with overlapping coverage will tend to have a greater ability to use satellite diversity to facilitate coordination during in-line interference events.[29] However, OneWeb's attempt to use that observation to support its argument that adding more MEO satellites to its system will not create the potential for more interference is flawed for three interrelated reasons.

First, OneWeb is not writing upon a clean slate here. It already has an authorized Ku/Ka-band system and a pending application for a V-band system, which establish the baseline for the interference environment in those bands.[30] Expanding those systems with 1,280 to 2,560 additional MEO satellites undeniably creates the potential for many more in-line events.[31] Indeed, the analysis submitted by OneWeb illustrates the point. Using a series of assumptions,[32] OneWeb

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28 *See* OneWeb Opposition at 10-11.

29 *See id.* at 11-12.

30 Conversely, before the processing rounds closed, there was no established baseline and every timely application had equal priority. As a result, there is no question about the change in the interference environment, since all applicants are proposing a change – and a system with significant satellite diversity such as that proposed by SpaceX would have much better spectrum sharing characteristics than a system without that capability.

31 *See, e.g.*, Iridium Petition at 7 ("Put simply, the more MEO satellites with which OneWeb's gateways will communicate, the more often Iridium's low-Earth-orbit satellites will pass through the main beam of a OneWeb gateway antenna, resulting in more in-line events.").

32 To be clear, SpaceX does not agree with OneWeb's assumptions and conclusions. In particular, based on reasonable assumptions, SpaceX calculates that 3º is less than one-third of the separation angle likely required to

calculates that another NGSO operator using Ku-band spectrum that had agreed to observe a 3.0º avoidance angle with respect to OneWeb's LEO satellites would need a 6.6º avoidance angle with respect to its MEO satellites to compensate for the higher uplink EIRP levels used to communicate with MEOs.[33] Yet in the absence of this amendment, that NGSO operator would not have to observe *any* avoidance angle for MEO satellites, because OneWeb's existing authorization is for a LEO-only system. The case is even worse in the supplemental Ku/Ka-band spectrum that OneWeb originally decided not to pursue, where licensed NGSO operators would not have to coordinate with OneWeb at all in the absence of this amendment.[34]

This observation is closely related to the second flaw in OneWeb's argument, which is its failure to recognize that the Commission's analysis of whether to allow consideration of an amendment within a current processing round hinges on whether the *potential* for interference would increase.[35] OneWeb compounds that error by criticizing SpaceX and SES/O3b for asserting that interference can be expected to increase as the number of satellites in a constellation increases.[36] Yet SpaceX and SES/O3b are not alone in making the connection between additional satellites and additional interference – rather, the Commission has reached the same conclusion.

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achieve 6% ΔT/T between LEO systems using 0.3 meter antennas, while adding 17 dB more to the uplink EIRP of one system would result in a case where no separation angle would achieve 6% ΔT/T. But for purposes of the discussion above, SpaceX will use the figures submitted by OneWeb.

33 *See* OneWeb Opposition at 13.

34 As explained by SES/O3b, "[w]ithout the Amendment, the proposed OneWeb MEO constellation included zero Ku-, Ka-, or E-band satellites, meaning the risk of interference to other NGSO systems from OneWeb's planned MEO operations in those bands was zero. . . . OneWeb's claim that adding 2560 MEO satellites in these spectrum segments has no effect on the sharing and interference environment for other NGSO systems would be accurate only if the interference risk from those 2560 satellites remained zero, which is obviously not the case." SES/O3b Petition at 14.

35 *See, e.g., Final Analysis Communications Services, Inc.*, 16 FCC Rcd. 21463, ¶ 26 (2001) ("*Final Analysis*") (rejecting the argument that an amendment would not increase interference because it was "based upon [the] erroneous assumption that a major amendment is one that increase actual interference, rather than the *potential* for interference" (emphasis in original)).

36 *See* OneWeb Opposition at 12.

For example, as it stated in *Teledesic* – a case cited by SpaceX but not even mentioned in OneWeb's Opposition:

> A system's orbital configuration can impact its ability to share with other systems and services by affecting the number of active satellites "visible" at a particular location. ***The magnitude of sharing difficulty increases with an increase in the number of active visible satellites in the modified system.*** Thus, a customer using another satellite system will have more difficulty operating with that system if the number of visible satellites in the modified system is increased.[37]

While it is true that an NGSO operator can take other steps to ameliorate the impact of additional satellites,[38] OneWeb has not committed to take any such measures.

Here again, the Commission's analysis in *Teledesic* is instructive. In that case, the Commission approved a proposal under which Teledesic would dramatically decrease the number of satellites in its constellation from 840 to 288 – which would tend to decrease the potential for interference – while also increasing their operating altitude from approximately 700 km to 1400 km – which would tend to increase the potential for interference by extending the area over which each satellite would be visible.[39] It based its approval on an analysis indicating that the proposed changes in orbital configuration would offset such that they would not affect the number of Teledesic satellites visible above the proposed minimum elevation angle at any particular time period throughout the United States.[40] In a separate analysis, the Commission also concluded that

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[37] *Teledesic LLC*, 14 FCC Rcd. 2261, ¶ 13 (IB 1999) ("*Teledesic*") (emphasis added). By contrast, the Commission has found that, even though "a reduction in the number of satellites may give [an NGSO operator] less flexibility to use satellite diversity, the number of potential interference events vis-à-vis other constellations will be reduced and, if no coordination agreement is reached with any of these constellations, the number of times those constellations will be required to reduce spectrum use will be smaller," and thus such an amendment would not be considered major. *O3b Limited*, FCC 18-70, ¶ 39 (rel. June 6, 2018).

[38] *See, e.g.*, *Final Analysis*, ¶¶ 44-45 (allowing proposed increase in downlink power levels where accompanying reduction in the number of transmitters per satellite resulted in a negligible change in total EIRP).

[39] As OneWeb states, there is a "difference in the size of the geographic coverage areas between LEO and MEO satellites, which can be a factor of more than 10 when assuming similar elevation angle constraints." OneWeb Opposition at 14.

[40] *See Teledesic*, ¶ 13.

Teledesic's contemplated increase in the uplink EIRP of earth stations communicating with these satellites to compensate for their higher altitude "will make sharing with other NGSO FSS systems significantly more difficult," and thus "the proposed uplink power increase would in itself, significantly increase interference potential and, thus, we would be compelled to deny it or defer it to the second processing round."[41] Here, OneWeb proposes many more satellites operating at much higher altitudes than previously authorized – two factors the Commission identified as likely to increase the potential for interference.

Third, the ability to avoid interference is not the same as a binding commitment to do so. As SES/O3b points out, OneWeb never states that it "would in fact rely on spectrum diversity to prevent other NGSO operators from experiencing increased interference due to the proposed OneWeb system expansion."[42] Moreover, OneWeb's positions before the Commission demonstrate that it will be unlikely to accommodate other NGSO operators voluntarily, and thus highlight the harm of allowing OneWeb to dramatically expand its constellation within the ongoing processing rounds. For example, even now, OneWeb is trying to convince the Commission to reconsider the recently adopted spectrum sharing mechanism that puts all NGSO systems in a processing round on equal footing, and instead to replace it with a system based on the date of ITU filings – a poor standard for sharing spectrum which conveniently favors OneWeb.[43] This would make the administrative date of ITU filings the driver in spectrum coordination, rather than encouraging technical compatibility or operational flexibility that would lead to more efficient spectrum use and facilitate coordination among NGSO systems. Astonishingly, OneWeb has

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41 *Id.* ¶ 18. The Commission did not have to act on this conclusion because there was no earth station application before it.

42 SES/O3b Petition at 15.

43 *See, e.g.*, Petition for Reconsideration of WorldVu Satellites Limited, IB Docket No. 16-408 (Jan. 17, 2018); Letter from Brian D. Weimer to Marlene H. Dortch, IB Docket No. 16-408 (June 13, 2018).

insisted that other operators should be required to shoulder the burden of preventing interference by essentially designing around OneWeb's system with "non-interfering technologies."[44] These statements hardly foreshadow a willingness to redirect its satellite beams as necessary to protect other participants in the ongoing NGSO processing rounds.[45] However, if OneWeb's application were considered in a new processing round, the rights of existing applicants would presumptively be protected – a requirement that OneWeb could use its new-found satellite diversity to satisfy.[46]

B. The Commission Did Not "Necessitate" the Amendment

As SpaceX and SES/O3b have demonstrated, additional flexibility in the Commission's NGSO deployment milestone rules and OneWeb's desire to expand its network do not qualify as the sort of compulsion that has led the Commission to allow major amendments in the middle of past processing rounds.[47] Nonetheless, OneWeb continues to claim that the Commission's decision to revise its milestone requirements provides the "special circumstances" justifying a

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[44] *See* Opposition and Response of WorldVu Satellites Limited, IBFS File No. SAT-LOI-20160428-00041, at 6, 8 (filed Aug. 25, 2016).

[45] Ironically, prior to this proceeding, OneWeb had maintained that NGSO applicants that file after a cut-off date should not be allowed "to avail themselves of the [spectrum sharing] mechanism on an equal footing with prior processing round licensees and market access grantees. Those later filed systems must commit to avoiding interference to prior processing round participants at such time as those participants have real systems." Comments of OneWeb, IB Docket No. 16-408, at 13 (Feb. 27, 2017).

[46] While Boeing would not defer OneWeb's application to a later processing round, it would achieve much the same result by conditioning any grant on the requirement that OneWeb's additional satellites must protect each of the NGSO systems that are authorized and constructed as a result of the current processing round. *See* Boeing Comments at 7.

[47] *See* SpaceX Petition at 18-23; SES/O3b Petition at 19. OneWeb would like to characterize the milestone revision as a ploy by other NGSO operators to further their own ends. *See* OneWeb Opposition at 16. However, the Commission proposed two different approaches to adding greater flexibility to NGSO milestones. The vast majority of commenters – including many NGSO applicants that did not request milestone waivers – supported additional flexibility, while OneWeb was virtually alone in rejecting it. *See NGSO Update Order*, ¶ 65 (discussing comments). The Commission adopted a milestone regime it determined would be simple, clear, and easy to administer, yet would discourage applicants from seeking authorizations for oversized, unrealistic constellations. *Id.* ¶¶ 66-67. Moreover, NGSO applicants that proposed large constellations requested waivers based on their own particularized circumstances, and were not dependent upon a rule change. As SES/O3b points out, "every other applicant in the V-band and Ku/Ka-band processing rounds was in the same situation as OneWeb, submitting their filings based on the rules in effect at the time without any foreknowledge regarding how the Commission might end up altering its milestone standards." SES/O3b Petition at 20.

waiver because it somehow "necessitated" filing of the amendment.[48] Yet in prior NGSO processing rounds, applicants typically filed before the Commission had adopted *any* service rules – including deployment milestone requirements. Indeed, the adoption of milestone requirements long after the cut-off dates of affected processing rounds has been the norm, not the exception.[49] In each case, after service rules were adopted, the Commission required applicants to file amendments as necessary to conform to the new requirements. Yet we are aware of no case in which an applicant submitted an amendment which was somehow made necessary by the after-the-fact milestone requirements imposed by the Commission – much less *liberalizations* of those requirements. To the contrary, however, in at least one case, the Commission stated that it would consider requests for longer than standard milestones on a case-by-case basis where "an applicant concretely demonstrates that its proposed system's size and/or complexity warrants additional time."[50] Therefore, while there is no precedent for OneWeb's theory that an amendment may be justified by an after-the-fact milestone revision, OneWeb should have been aware of the ample

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48 *See* OneWeb Opposition at 16.

49 *See, e.g., Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands*, 9 FCC Rcd. 5936, ¶¶ 2, 7, 180 (1994) (adopting Big LEO milestone requirements and other service rules on October 14, 1994, three years after the applicable cut-off date of June 3, 1991, allowing 30 days for conforming amendments) ("*Big LEO Order*"); *International Bureau Satellite Policy Branch Information: Cut-off Established for Additional Applications and Letters of Intent in the 12.75-13.25 GHz, 13.75-14.5 GHz, 17.3-17.8 GHz and 10.7-12.7 GHz Frequency Bands*, Public Notice, Report No. SPB-141 (rel. Nov. 2, 1998) (setting Ku-band processing round cut-off date); *The Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ku-Band*, 17 FCC Rcd. 7841, ¶¶ 74, 83 (2002) (adopting Ku-band milestone requirements and other service rules on April 18, 2002, three years after the applicable cut-off date of January 8, 1999, allowing 30 days for conforming amendments); *Satellite Policy Branch Information: Cut-off Established for Additional Applications in the 28.35-28.6 GHz, 29.1-30 GHz, 17.7-18.8 GHz, and 19.3-20.2 GHz Frequency Bands*, Public Notice, 13 FCC Rcd. 8020 (1997) (setting Ka-band processing round cut-off date); *The Establishment of Policies and Service Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ka-Band*, 18 FCC Rcd. 14708, ¶ 53 (2003) (citing *Amendment of the Commission's Space Station Licensing Rules and Policies*, 17 FCC Rcd 3847, ¶¶ 173-208 (2002)) (adopting Ka-band milestone requirements and other service rules on June 18, 2003, more than five years after the applicable cut-off date of December 22, 1997).

50 *Big LEO Order*, ¶ 189.

precedent for a potential Commission waiver of the milestone requirements to accommodate especially large or complex systems.

Here again, OneWeb resorts to citing a private party's reply comments from an unrelated proceeding to support its equitable argument for granting a waiver to allow the amendment to be considered in three ongoing processing rounds.[51] That is a far cry from the Commission's own precedent cited by SpaceX and others in which the Commission rejected attempts to circumvent the processing round regime in order to claim additional spectrum resources.[52] Although OneWeb attempts to distinguish that precedent, its efforts are unavailing. For example, OneWeb tries to distinguish *EchoStar* on the grounds that it involved a GSO processing round.[53] Yet at the time that case was decided – *i.e.*, prior to adoption of the current modified processing round regime – both GSO and NGSO applications were generally handled under the same processing round approach.[54] Moreover, at the time the Commission adopted the current modified processing round regime, it found that "neither our amendment procedure nor our modification procedure require any revision as a result of our decision to modify the processing round procedure for NGSO-like satellite system applications."[55] Thus, pre-2003 GSO processing round cases involving amendments and modifications (such as *EchoStar*) are fully applicable to the current situation. OneWeb also notes that EchoStar filed its request for additional spectrum four years after the

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51 *See* OneWeb Opposition at 16-17.

52 *See* SpaceX Petition at 20-22 (discussing *Starsys Global Positioning, Inc.*, 11 FCC Rcd. 1237 (IB 1995) ("*Starsys*") and *EchoStar*).

53 *See* OneWeb Opposition at 18.

54 *See 2003 Licensing Reform Order*, ¶ 8.

55 *Id.* ¶ 59.

processing round had closed, but does not explain why that makes the case irrelevant to the amendment filed by OneWeb over thirteen months after the relevant filing deadline.[56]

Similarly, OneWeb notes that Starsys, another applicant whose untimely amendment the Commission rightly rejected, submitted an amendment four years after its initial application.[57] But it neglects to mention the more relevant fact that this amendment was submitted just 90 days after the effective date of the Commission's order adopting new service rules – as required under the terms of that order.[58] OneWeb further asserts that the Starsys amendment was "at odds with a spectrum sharing regime that had been agreed to by all processing round applicants,"[59] but in fact that regime was silent on the frequency band at issue and it was not the basis for the Commission's rejection of the amendment.[60] Accordingly, despite OneWeb's efforts to escape their logic, *Starsys* and *EchoStar* remain directly applicable to the case at hand and clearly call for denying or deferring OneWeb's amendment as well.

IV. THE COMMISSION SHOULD NOT MOVE FORWARD IN CONSIDERING ONEWEB'S AMENDMENT BECAUSE ONEWEB'S CONTINUING REFUSAL TO PROVIDE ORBITAL DEBRIS MITIGATION INFORMATION SUBVERTS CRITICAL COMMISSION FUNCTIONS

OneWeb proposes to double the number of MEO satellites in its V-band constellation (from 1,280 to 2,560), which also involves the addition of these 2,560 MEO satellites to its previously-authorized Ku/Ka-band LEO constellation. Yet it has not provided an orbital debris mitigation analysis at any stage of this proceeding, despite many assertions of its interest in a safe space

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56 *See* OneWeb Opposition at 18.

57 *See id.* at 19.

58 *See* 58 Fed. Reg. 68053, 68057-08 (Dec. 23, 1993). Starsys filed its amendment on April 25, 1994. Notably, this was a proceeding in which the Commission created milestones while applications were pending in a processing round, yet no one (including Starsys) cited that as a basis for amendment.

59 *See* OneWeb Opposition at 19.

60 *See Starsys*, ¶¶ 19-20.

environment, and continues to argue that it is not required to do so because its licensing administration (the United Kingdom) will exercise sufficient oversight.

While OneWeb is correct that the Commission's rules excuse non-U.S. licensed satellite applicants from submitting orbital debris information in certain circumstances, the rule is neither absolute nor self-executing. Rather, an applicant is required to "demonstrate[e] that debris mitigation plans for the space station(s) for which U.S. market access is requested are subject to direct and effective regulatory oversight by the national licensing authority."[61] The Commission has clarified that such a demonstration should include information as to the current status of the national licensing authority's review of the applicant's debris mitigation plans.[62] The Commission has also made clear that the mere prospect of regulatory review by another administration at some point in the future is not sufficient, and SpaceX cited cases in which the Commission had dismissed applications as defective for failure to include such orbital debris information.[63] OneWeb does not discuss this precedent in its Opposition.

OneWeb does note that the Commission has granted an amendment to O3b without requiring a supplemental debris mitigation plan, in deference to U.K. regulatory oversight.[64] However, prior to obtaining its space station authorization from the U.K., O3b had provided the Commission with an orbital debris mitigation statement, which it has incorporated by reference into subsequent applications.[65] According to information submitted by OneWeb, the U.K. regulator does not require submission of any information on orbital debris mitigation and post-

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61 47 C.F.R. § 25.114(d)(14)(v).

62 *Mitigation of Orbital Debris*, 19 FCC Rcd 11567, ¶ 95 (2004).

63 *See* SpaceX Petition at 29 (citing cases).

64 *See* OneWeb Opposition at 24.

65 *See, e.g.*, Petition for Declaratory Ruling, IBFS File No. SAT-LOI-20141029-00118, at 13-14 (Oct. 29, 2014).

mission disposal until six months before launch or operation.[66] Given its status as a licensed operator, O3b obviously submitted and the U.K. authorities reviewed such information long ago. Conversely, OneWeb is not yet licensed, and has not indicated that it has provided the U.K. authorities any such information to consider on its proposed expanded MEO constellation, or that its specific debris mitigation plans have been reviewed or approved by U.K. authorities. In these circumstances, OneWeb has failed to make the necessary demonstration of sufficient regulatory oversight.

OneWeb's resolute refusal to provide the required information deprives the Commission of vital inputs to its public interest analysis in this proceeding. The Commission should not continue to process OneWeb's application unless and until OneWeb submits the necessary disclosures with respect to its orbital debris mitigation plans.

CONCLUSION

OneWeb has failed to address many of the legal deficiencies in its amendment application noted by SpaceX and other petitioners. Even where it has tried to respond, OneWeb has made arguments that are inconsistent with the facts, unsupported by the law, and contrary to the Commission's policies. Consideration of the amendment in the ongoing processing rounds would cause delay in resolving timely-filed NGSO applications and inject uncertainty into an already challenging spectrum sharing environment, which would likely result in delayed deployment of much-needed satellite broadband systems. Such a result patently would not promote the public interest. Accordingly, for the reasons stated herein and in SpaceX's Petition, the Commission

[66] *See* Letter from Kalpak S. Gude to Marlene H. Dortch, IBFS File No. SAT-LOI-20160428-00041, Attachment "Revised Guidance for Applicants—Outer Space Act 1986," at 2 (June 24, 2016) ("Applications should be submitted at least six months in advance of any plans for launch or operation.").

should either deny the amendment or, at a minimum, defer consideration of OneWeb's application to a later processing round.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that, on this 12th day of September, 2018, a copy of the foregoing Reply was served by First Class mail upon:

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