

March 22, 2021

VIA IBFS

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
45 L Street NE
Washington, DC 20554

Re: **SpaceX Services, Inc.**
IBFS File No. SES-STA-INTR2021-00961

Dear Ms. Dortch:

WorldVu Satellites Limited (“OneWeb”) hereby opposes the pending request of SpaceX Services, Inc. (“SpaceX”) for special temporary authority (the “STA Request”) to operate a Ka-band gateway earth station in Litchfield, CT (the “Litchfield Earth Station”). The Litchfield Earth Station is located only 11.7 km from OneWeb’s previously authorized co-frequency earth station located in Southbury, CT—threatening to significantly degrade OneWeb’s gateway operations.¹

Attached hereto are comments previously filed by OneWeb with respect to SpaceX’s pending license application seeking full authorization for the Litchfield Earth Station as well as previous applications for special temporary authority.² To date, the significant interference concerns highlighted in OneWeb’s prior submissions remain unresolved. OneWeb notes that these concerns are equally applicable to SpaceX’s attempt—via the STA Request—to commence gateway operations at the Litchfield Earth Station during the pendency of its license application. As demonstrated in the attached submissions, SpaceX’s proposed operation of the Litchfield Earth Station will cause harmful interference to OneWeb’s ongoing Southbury gateway operations, which include end-to-end testing of the OneWeb network as well as trials conducted by OneWeb partners for U.S. government customers. The Southbury gateway is a key element

¹ See *WorldVu Satellites Limited*, Grant of Authority, IBFS File No. SES-LIC-20180727-02076 (granted Aug. 24, 2020); see also Letter from Brian D. Weimer, Counsel to OneWeb, to Marlene H. Dortch, Secretary, FCC, IBFS File Nos. SES-STA-20210119-00138; SES-STA-20201120-01330; Call Sign E201606 (filed Jan. 29, 2021) (“OneWeb Jan. 29 Letter”).

² See Comments of OneWeb, IBFS File No. SES-LIC-20200410-00399; Call Sign E201606 (filed Nov. 6, 2020); Reply of OneWeb, IBFS File No. SES-LIC-20200410-00399; Call Sign E201606 (filed Dec. 2, 2020); OneWeb Jan. 29 Letter. OneWeb notes that multiple STA requests for the Litchfield Earth Station remain pending at this time.

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of the OneWeb network for existing and future customer demonstrations and for the expected commencement of commercial service later this year.

Additionally, OneWeb notes that Hughes Network Systems (“Hughes”) expressed interference concerns on the Litchfield Earth Station echoing those of OneWeb.³ SpaceX has similarly failed to address Hughes’ concerns.

Accordingly, OneWeb incorporates its submissions by reference and respectfully requests the Commission refrain from any action on the above-captioned application until SpaceX has supplemented the record in this proceeding conclusively demonstrating that the operation of the Litchfield Earth Station will not cause interference to OneWeb’s gateway operations in Southbury, CT.⁴

Very truly yours,

/s/ Brian D. Weimer

Brian D. Weimer
for SHEPPARD, MULLIN, RICHTER & HAMPTON LLP

Enclosure

cc: William Wiltshire, Counsel to SpaceX

³ See Letter from Jennifer A. Manner, Senior Vice President, Regulatory Affairs, Hughes Network Systems, LLC, to Marlene H. Dortch, Secretary, FCC, IBFS File Nos. SES-LIC-20200410-00399; SES-STA-20210119-00138; SES-STA-20201120-01330; Call Sign E201606 (filed Feb. 12, 2021).

⁴ For example, OneWeb agrees with SpaceX’s observation that, “[g]ateway separation is a very effective way to mitigate interference” between satellite operators. See Letter from Gardner Foster, Principal, Satellite Policy, SpaceX, to Marlene H. Dortch, Secretary, FCC, IBFS File No. SAT-MOD-20200417-00037, at 14 (filed Jan. 19, 2021); see *also* Letter from David Goldman, Director of Satellite Policy, SpaceX, to Marlene H. Dortch, Secretary, FCC, IBFS File No. SAT-MOD-20200417-00037, at 20 (filed Feb. 22, 2021).

January 29, 2021

File Number: 48HH-246229

VIA IBFS

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
45 L Street NE
Washington, DC 20554

Re: **SpaceX Services, Inc.**
IBFS File Nos. SES-STA-20210119-00138; SES-STA-20201120-01330

Dear Ms. Dortch:

WorldVu Satellites Limited (“OneWeb”) hereby opposes the pending requests of SpaceX Services, Inc. (“SpaceX”) for special temporary authority (the “STA Requests”) to operate a Ka-band gateway earth station in Litchfield, CT (the “Litchfield Earth Station”). The Litchfield Earth Station is located only 11.7 km from OneWeb’s previously authorized co-frequency earth station located in Southbury, CT—threatening to significantly degrade OneWeb’s gateway operations.¹

Attached hereto are comments and a reply filed by OneWeb with respect to SpaceX’s pending license application seeking full authorization for the Litchfield Earth Station.² To date, the significant interference concerns highlighted in OneWeb’s prior submissions remain unresolved. OneWeb notes that these concerns are equally applicable to SpaceX’s attempt—via the STA Requests—to commence gateway operations at the Litchfield Earth Station during the pendency of its license application. As demonstrated in the attached submissions, SpaceX’s proposed operation of the Litchfield Earth Station will cause harmful interference to OneWeb’s ongoing Southbury gateway operations, which include end-to-end testing of the OneWeb network as well as trials conducted by OneWeb partners for U.S. government customers. The Southbury gateway is a key element of the OneWeb network for existing and future customer demonstrations and for the expected commencement of commercial service later this year.

¹ See *WorldVu Satellites Limited*, Grant of Authority, IBFS File No. SES-LIC-20180727-02076 (granted Aug. 24, 2020).

² See Comments of OneWeb, IBFS File No. SES-LIC-20200410-00399; Call Sign E201606 (filed Nov. 6, 2020); Reply of OneWeb, IBFS File No. SES-LIC-20200410-00399; Call Sign E201606 (filed Dec. 2, 2020).

Ms. Marlene H. Dortch
January 29, 2021
Page 2

Accordingly, OneWeb incorporates these submissions by reference and respectfully requests the Commission refrain from any action on the above-captioned applications until SpaceX has supplemented the record in this proceeding conclusively demonstrating that the operation of the Litchfield Earth Station will not cause interference to OneWeb's gateway operations in Southbury, CT.³

Very truly yours,

/s/ Brian D. Weimer

Brian D. Weimer
for SHEPPARD, MULLIN, RICHTER & HAMPTON LLP

Enclosure

cc: William Wiltshire, Counsel to SpaceX

³ For example, OneWeb agrees with SpaceX's recent observation that, "[g]ateway separation is a very effective way to mitigate interference" between satellite operators. See Letter from Gardner Foster, SpaceX, to Marlene H. Dortch, Secretary, FCC, IBFS File No. SAT-MOD-20200417-00037, at 14 (filed Jan. 19, 2021).

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

In the Matter of)	
)	
SpaceX Services, Inc.)	IBFS File No. SES-LIC-20200410-00399
)	
Application for Earth Station Authorization)	Call Sign E201606

COMMENTS OF ONEWEB

WorldVu Satellites Limited, Debtor-in-Possession (“OneWeb”), pursuant to Section 25.154(a) of the Commission’s rules, hereby submits these comments on the application of SpaceX Services, Inc. (“SpaceX”) for a Ka-band earth station located in Litchfield, CT (the “Litchfield Gateway”).¹ As demonstrated below, grant of the Application would severely degrade the interference environment for OneWeb’s previously authorized co-frequency earth station located in Southbury, CT—only 11.7 km from the proposed Litchfield Gateway.²

Accordingly, the Commission should refrain from any action on the Application until SpaceX has supplemented the record in this proceeding and conclusively demonstrated that the operation of the Litchfield Gateway will not cause interference to OneWeb’s gateway operations from the Southbury Gateway.

¹ See 47 C.F.R. § 25.154(a); see also SpaceX Services, Inc., Application for Gateway Earth Station, IBFS File No. SES-LIC-20200410-00399 (filed Apr. 9, 2020) (the “Application”).

² See *WorldVu Satellites Limited*, Grant of Authority, IBFS File No. SES-LIC-20180727-02076 (granted Aug. 24, 2020) (the “Southbury Gateway”). The Southbury Gateway operates on the same Ka-band frequencies proposed in the Application: the 17.8-18.6 GHz, 18.8-19.3 GHz, 27.5-29.1 GHz, and 29.5-30.0 GHz bands.

I. GRANT OF THE APPLICATION WOULD CAUSE HARMFUL INTERFERENCE TO ONEWEB AND WOULD NOT SERVE THE PUBLIC INTEREST

OneWeb currently plans to operate, at most, six Ka-band earth stations in the United States to provide critical gateway connectivity for its non-geostationary orbit, fixed-satellite system (the “OneWeb System”).³ A brief overview of the timeline with respect to OneWeb and SpaceX’s respective gateway deployments in Connecticut is illustrative:

- As part of the network of ground stations that will provide gateway connectivity for the OneWeb System, in July 2018 OneWeb sought authority for the Southbury Gateway.⁴
- Almost two years later, SpaceX sought authority for the Litchfield Gateway, practically collocated with the Southbury Gateway at a distance of only 11.7 km. The Application is one of the almost 50 applications SpaceX has filed for gateway earth stations in the United States.
- The Commission granted authority for the Southbury Gateway in August 2020 and OneWeb commenced operations shortly thereafter.⁵

OneWeb has assessed the potential impact of the Litchfield Gateway on the Southbury Gateway operations, and has conducted interference analyses of the Interference-to-Noise ratio (“I/N”) values in both the downlink and uplink directions. For the interfering system, OneWeb

³ In addition to the Southbury Gateway, OneWeb also operates gateway earth stations in Talkeetna, AK and Clewiston, FL. *See WorldVu Satellites Limited*, Grant of Authority, IBFS File No. SES-LIC-20180604-01082, (granted Nov. 8, 2019) and *WorldVu Satellites Limited*, Grant of Authority, IBFS File No. SES-LIC-20180727-02075, (granted Nov. 8, 2019). OneWeb also has applications for gateway earth stations in Santa Paula, CA, and South Point, HI, pending before the Commission. *See WorldVu Satellites Limited*, Application for Gateway Earth Station, IBFS File No. SES-LIC-20190422-00538, (filed Apr. 22, 2019) and *WorldVu Satellites Limited*, Application for Gateway Earth Station, IBFS File No. SES-LIC-20191203-01624, (filed Dec. 3, 2019).

⁴ *See* IBFS File No. SES-LIC-20180727-02076.

⁵ *WorldVu Satellites Limited*, Grant of Authority, IBFS File No. SES-LIC-20180727-02076 (granted Aug. 24, 2020).

incorporated the characteristics of the currently authorized SpaceX constellation (Table 1) and the Application:

	Shell 1	Shell 2	Shell 3	Shell 4	Shell 5
Number of planes	72	32	8	5	6
Number of satellites per plane	22	50	50	75	75
Total number of satellites	1584	1600	400	375	450
Altitude	550	1110	1130	1275	1325
Inclination angle (°)	53	53.8	74	81	70
Minimum elevation angle (°)	25	40			
GSO Arc avoidance (°)	22				
Max. Earth station EIRP density (dBW/MHz) ⁶	29.8				

Table 1: SpaceX constellation characteristics

For the victim system, the characteristics of the currently authorized OneWeb constellation (Table 2) and the Southbury Gateway were used.

Number of planes	18
Number of satellites per plane	40
Total number of satellites	720
Altitude (km)	1200
Inclination angle (°)	87.9
Minimum elevation angle (°)	15
GSO Arc avoidance (°)	6

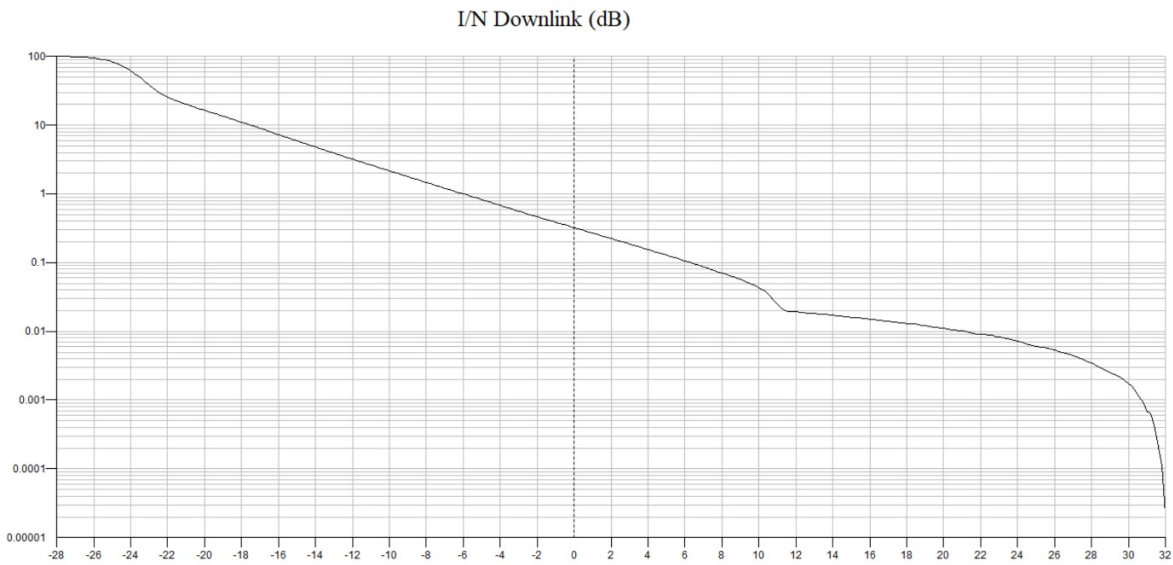
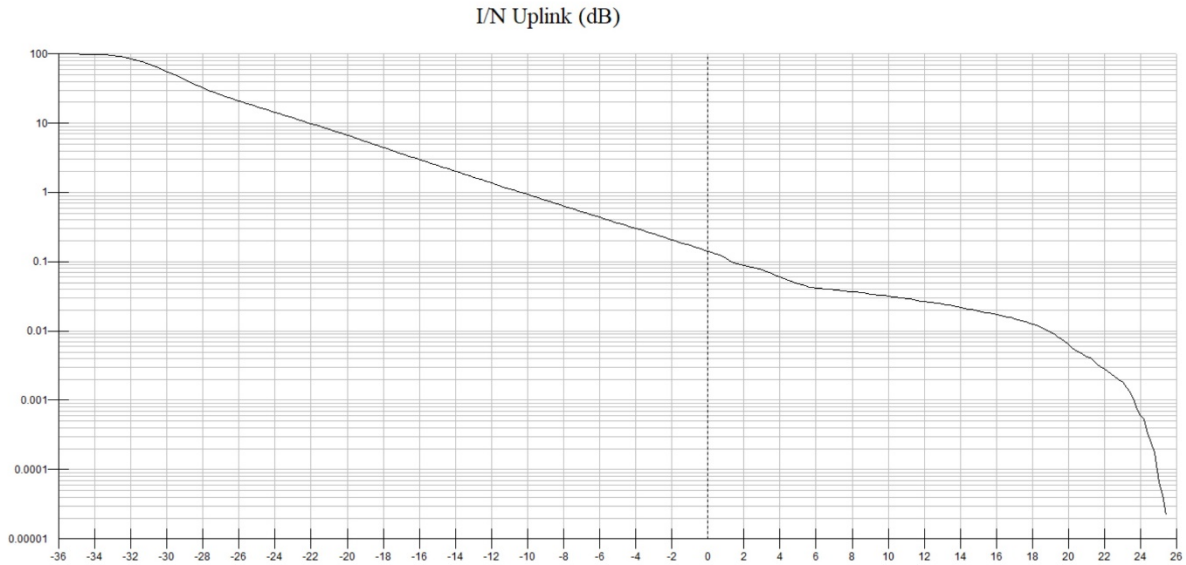
Table 2: OneWeb constellation characteristics

⁶ The Application references a maximum EIRP density of 9.7 dBW/4 kHz, which is equivalent to 33.7 dBW/MHz. *See* Application at 15. However, the Application also references a 3.9 dB reduction in clear sky PFD in the UMFUS compliance showing. *See* Application, Attachment Narrative, Technical Appendix n.16. This value was assumed to occur at the earth station minimum elevation angle at 25-degrees and adjusted for reduced slant path to maintain a constant PFD at the satellite.

A “longest hold” tracking strategy was used for OneWeb and a random tracking strategy was used for SpaceX. The results (presented as a cumulative distribution function of the I/N ratio for varying percentages of time) demonstrate that the OneWeb System will experience significant harmful interference as a direct result of any grant of the Application and operation of the Litchfield Gateway.

In the *uplink direction*, the graph shows that the OneWeb Southbury Gateway will suffer significant harmful interference levels (*e.g.*, an I/N value up to 26 dB) during in-line interference events and a correspondingly severe performance degradation due to prolonged periods of time where the I/N values are positive.

Similarly, in the *downlink direction*, the graph shows that the Southbury Gateway will experience even greater interference levels (*e.g.*, an I/N value of up to 32 dB) during in-line interference events, resulting in a significant performance degradation as a result of prolonged periods of time where I/N values are positive.



Therefore, OneWeb anticipates experiencing very significant, negative operational impacts as a direct result of SpaceX's decision to site a Ka-band gateway earth station in such close proximity to the Southbury Gateway. This siting decision by SpaceX is all the more

surprising to OneWeb because SpaceX was aware of the location of the Southbury Gateway well in advance of filing the Application.⁷

The Commission’s rules require NGSO operators authorized in the same processing round to coordinate their respective satellite systems in good faith.⁸ Similarly, Commission rules underscore the importance of satellite operators minimizing harmful interference to other co-frequency operations when making earth station siting decisions.⁹ This regime stands in stark contrast to SpaceX’s decision to practically collocate one of its approximately 50 gateways with OneWeb’s Southbury Gateway. While OneWeb has been engaged in good faith coordination discussions with SpaceX—including with respect to the Litchfield Gateway—to address these concerning interference issues; the issue remains unresolved to date. Accordingly, any action by the Commission on the Application would be premature and would not serve the public interest absent some form of appropriate mitigation measures undertaken by SpaceX to ensure protection of the Southbury Gateway operations and remedy the consequences of SpaceX’s decision to site its gateway at a distance of only 11.7 km from the Southbury Gateway. As one of only four planned gateway earth stations in the contiguous United States—as opposed to the almost 50 gateway earth station applications filed by SpaceX—OneWeb will rely on the Southbury

⁷ The Southbury Gateway was placed on Public Notice in November 2018. *See Satellite Communications Services Information: Satellite Radio Applications Accepted for Filing*, Public Notice, Report No. SES-02115 (IB Nov. 21, 2018). SpaceX filed untimely comments on the Southbury Gateway application in August 2019. *See* Letter from William Wiltshire, Counsel to SpaceX, to Marlene H. Dortch, Secretary, FCC, IBFS File No. SES-LIC-20180727-02075 *et al.*, (filed Aug. 23, 2019).

⁸ *See* 47 C.F.R. § 25.261(b).

⁹ *See, e.g.*, 47 C.F.R. § 25.203(k) (requiring coordination for gateway earth station operations in shared GSO and NGSO bands); *see also id.* § 25.203(a) (“Sites and frequencies for earth stations ... shall be selected ... in areas where the surrounding terrain and existing frequency usage are such as to minimize the possibility of harmful interference between the sharing services.”).

Gateway as an integral part of the OneWeb System as it restarts its launch program before the end of this year and commences commercial service in 2021.¹⁰ As such, interference-free operation of the Southbury Gateway will remain vital to OneWeb's U.S. operations in the near term.

II. CONCLUSION

For the foregoing reasons, OneWeb respectfully requests the Commission refrain from any action on the Application until SpaceX has supplemented the record in this proceeding conclusively demonstrating that the operation of the Litchfield Gateway will not cause interference to OneWeb's gateway operations from the Southbury Gateway.

Respectfully submitted,

/s/ Brian Weimer

Ruth Pritchard-Kelly
Vice President of Regulatory Affairs

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November 6, 2020

¹⁰ *OneWeb and Arianespace to restart launches in December 2020*, ONEWEB (Sept. 21, 2020), <https://www.oneweb.world/media-center/oneweb-and-arianespace-to-restart-launches-in-december-2020>.

**CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING
INFORMATION**

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in these Comments of OneWeb, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this pleading, and that it is complete and accurate to the best of my knowledge and belief.

Date: November 6, 2020

By /s/ Philippe Secher
Vice President, Spectrum Engineering
OneWeb
195 Wood Lane
London W12 7FQ, UK

CERTIFICATE OF SERVICE

I, Thomas Hastings, hereby certify on this 6th day of November, 2020, that a copy of the foregoing "Comments of OneWeb" is being sent via U.S. mail to the following:

William M. Wiltshire
Paul Caritj
Harris, Wiltshire & Grannis LLP
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Washington, DC 20036

Patricia Cooper
David Goldman
Space Exploration Technologies Corp.
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Suite 475
Washington, DC 20004

Counsel to SpaceX

/s/ Thomas Hastings
Thomas Hastings

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

In the Matter of)	
)	
SpaceX Services, Inc.)	IBFS File No. SES-LIC-20200410-00399
)	
Application for Earth Station Authorization)	Call Sign E201606

REPLY OF ONEWEB

WorldVu Satellites Limited (“OneWeb”), pursuant to Section 25.154(d) of the Commission’s rules, hereby replies to the response filed by SpaceX Services, Inc. (“SpaceX”) in the above-referenced proceeding.¹

The OneWeb Comments demonstrated the significant interference concerns stemming solely from SpaceX’s decision to locate its Litchfield Gateway a mere 11.7 km from OneWeb’s Southbury Gateway.² The SpaceX Response does not even bother to address these well-established concerns and instead offers unsupported allegations that OneWeb is attempting to circumvent the Commission’s spectrum sharing regime for non-geostationary orbit, fixed-

¹ See 47 C.F.R. § 25.154(d). See also SpaceX Services, Inc., Application for Gateway Earth Station, IBFS File No. SES-LIC-20200410-00399 (filed Apr. 9, 2020) (the “Application”); Response of SpaceX Services, Inc., IBFS File No. SES-LIC-20200410-00399 (filed Nov. 19, 2020) (“SpaceX Response”); Comments of OneWeb, IBFS File No. SES-LIC-20200410-00399 (filed Nov. 6, 2020) (“OneWeb Comments”).

² See *WorldVu Satellites Limited*, Grant of Authority, IBFS File No. SES-LIC-20180727-02076 (granted Aug. 24, 2020) (the “Southbury Gateway”). The Southbury Gateway operates on the same Ka-band frequencies proposed in the Application: the 17.8-18.6 GHz, 18.8-19.3 GHz, 27.5-29.1 GHz, and 29.5-30.0 GHz bands.

satellite service systems (“NGSO FSS”).³ SpaceX’s false allegations of anticompetitive behavior by OneWeb constitute a sleight of hand designed to obfuscate the harmful interference likely to occur as a result of the operation of the Litchfield Gateway. Accordingly, OneWeb reiterates its request that the Commission refrain from any action on the Application until SpaceX has taken actions to ensure the operation of the Litchfield Gateway will not cause interference to OneWeb’s operations from the Southbury Gateway.

I. SPACEX’S ANTICOMPETITIVE EARTH STATION SITING DECISIONS THREATEN INTERFERENCE TO ONEWEB’S SOUTHBURY GATEWAY OPERATIONS

In the SpaceX Response, SpaceX attempts to deflect from the serious interference issues caused by its Litchfield Gateway siting decision by alleging that OneWeb’s concerns are grounded in an attempt to “dictate the operations of its competitors” and “harm competition and American consumers by circumventing the [NGSO] spectrum sharing regime...”⁴ As explained below, the only anticompetitive behavior being exhibited here is by SpaceX, *not* OneWeb.

As an initial matter, SpaceX’s allegations that OneWeb’s specific and well-founded interference concerns are an attempt to sidestep the Commission’s general spectrum sharing regime for NGSO FSS systems are highly misleading.⁵ To date, SpaceX has submitted applications and requests for special temporary authority to operate gateway earth stations at approximately 50 locations across the United States.⁶ OneWeb filed comments on only one SpaceX gateway earth station application in the Ka-band: the Litchfield Gateway, because of

³ SpaceX Response at 3–4.

⁴ *Id.* at 4–5.

⁵ *Id.* at 5.

⁶ OneWeb Comments at 2.

SpaceX’s surprising decision to locate this earth station at a distance of only 11.7 km from the Southbury Gateway.

The SpaceX Response focuses solely on unsupported and untrue assertions about OneWeb’s alleged anticompetitive behavior.⁷ Notably, SpaceX does not even attempt to rebut OneWeb’s technical analysis, nor does it explain why the Starlink system design requires SpaceX to practically collocate its Litchfield Gateway with OneWeb’s Southbury Gateway. While SpaceX falsely alleges that OneWeb is attempting to “claim priority for its earth station operations based on filing dates,” the timeline with respect to OneWeb and SpaceX’s respective gateway deployments in Connecticut is instead illustrative of SpaceX’s own anticompetitive behavior.⁸ OneWeb sought authority for the Southbury Gateway in July 2018.⁹ Despite being fully aware of the location of the Southbury Gateway and of the potentially serious interference issues caused by collocation—interference issues SpaceX did not contest in the SpaceX Response—SpaceX decided *almost two years later* to locate its Connecticut gateway earth station at a distance of only 11.7 km from the Southbury Gateway.¹⁰

While OneWeb has been engaged in good faith coordination discussions with SpaceX in compliance with the Commission’s Part 25 rules—including with respect to the Litchfield Gateway—to address these concrete interference issues, the issue remains unresolved to date. Accordingly, any action by the Commission on the Application would be premature and would not serve the public interest, absent some form of appropriate mitigation measures undertaken by

⁷ SpaceX Response at 1, 2, 5.

⁸ *Id.* at 4.

⁹ OneWeb Comments at 2.

¹⁰ *Id.*

SpaceX to remedy the consequences of the anticompetitive decision to practically collocate its gateway with the Southbury Gateway.¹¹ As one of only four planned gateway earth stations in the continental United States, OneWeb will rely on the Southbury Gateway as an integral part of the OneWeb system as it restarts its launch program before the end of this year and commences commercial service in 2021. As such, interference-free operation of the Southbury Gateway remains vital to OneWeb's U.S. operations in the very near term.

II. CONCLUSION

For the foregoing reasons, OneWeb respectfully requests the Commission continue to refrain from any action on the Application until SpaceX has taken actions to ensure the operation of the Litchfield Gateway will not cause interference to OneWeb's gateway operations from the Southbury Gateway.

Respectfully submitted,

/s/ Brian Weimer

Ruth Pritchard-Kelly
Vice President of Regulatory Affairs

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Counsel to OneWeb

December 2, 2020

¹¹ Such measures may include satellite diversity, gateway diversity and/or an adjustment of the transmitted power levels during in-line events.

CERTIFICATE OF SERVICE

I, Thomas Hastings, hereby certify on this 2nd day of December, 2020, that a copy of the foregoing "Reply of OneWeb" is being sent via U.S. mail to the following:

William M. Wiltshire
Paul Caritj
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/s/ Thomas Hastings
Thomas Hastings