

**LEGAL NARRATIVE AND  
RESPONSE TO QUESTIONS 35:  
WAIVER OF THE RULES**

This application is filed by O3b Limited (“O3b”). As the Commission is aware, O3b will be launching a U.K.-authorized non-geostationary orbit (“NGSO”) Fixed-Satellite Service (“FSS”) system operating in the Ka-band. The first four of the space stations comprising O3b’s NGSO FSS system are scheduled to be launched later this month.<sup>1</sup>

Multiple applications are pending or have been granted for earth stations that will be associated with O3b’s system. In September 2012, the Commission granted O3b a license to operate a gateway in Haleiwa, Hawaii (“O3b Hawaii License”).<sup>2</sup> O3b has filed an application for a license to operate a second gateway in Vernon, Texas,<sup>3</sup> and has requested special temporary authority (“STA”) to operate the second gateway on an interim basis while its license application is pending.<sup>4</sup>

One June 17, 2013, O3b filed an STA seeking to use its Bristow, Virginia earth station (the “Virginia Earth Station”) to support post-launch operations, beginning on June 28, 2013.<sup>5</sup> In this application, O3b seeks regular authority to operate the Virginia Earth Station. The earth station, which is manufactured by General Dynamics SATCOM, has two 2.4m antennas. The Virginia Earth Station will be used primarily for satellite monitoring, network troubleshooting, and customer demonstrations.

**Public Interest Statement**

Soon after launch, the Virginia Earth Station will begin the proposed operations in a closely monitored environment with local control capability. Combining real-time knowledge of the local weather with locally-controlled terminal operations will help O3b’s Network Operations Center and engineering staff identify and resolve space station and system anomalies, particularly important in the early days after O3b’s first launch, but also important as an

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<sup>1</sup> The launch is scheduled for June 24, 2013.

<sup>2</sup> See FCC File No. SES-LIC-20100723-00952 (granted Sep. 25, 2012).

<sup>3</sup> See FCC File No. SES-LIC-20130124-00089.

<sup>4</sup> See FCC File No. SES-STA-20130611-00484.

<sup>5</sup> See FCC File No. SES-STA-20130617-00497.

ongoing capability. O3b will be able to emulate remote ground station conditions, thereby providing a means for isolating issues. O3b also will use the Virginia Earth Station as a test platform for on-satellite certification of various modems and service offerings. Giving O3b these capabilities is unquestionably in the public interest.

### **U.S. Market Access**

Under the Commission's "DISCO II" procedure, a company may obtain U.S. "landing rights" for a non-U.S. licensed space station by filing an initial earth station application that lists the space station as a "point of communication" and demonstrating that the space station meets applicable Commission requirements.<sup>6</sup> O3b provided such a showing as part of its Hawaii and Texas gateway earth station applications. Those showings are hereby incorporated into this application by reference.<sup>7</sup> In September 2012, the Commission found that O3b meets the criteria for U.S. market access when it granted the Hawaii License and associated waivers.

In its DISCO II decision, the Commission adopted requirements that apply once an initial application seeking U.S. market access for a non-U.S. satellite system has been granted. There is no need, the Commission found, for a new DISCO II showing to be made by future earth station applicants requesting authority to communicate with the non-U.S. satellite system.<sup>8</sup> Rather, it is sufficient that any such earth station applicant cite to the initial grant of market access; confirm that there has been no change in the services the satellite system will be used to provide; and represent that there has been no change to the satellite system's operating parameters.<sup>9</sup> Consistent with these requirements, O3b hereby cites to the O3b Hawaii License; confirms that there has been no change in the services its satellite system will be used to provide; and represents that there has been no change to its satellite system's operating parameters.

### **O3b System and Frequency Plan**

The description of the O3b NGSO satellite system submitted with the applications for the Hawaii and Texas licenses are hereby incorporated by reference. O3b proposes to operate its Virginia Earth Station on the same full set of frequencies as were previously licensed at its Hawaii gateway. For ease of

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<sup>6</sup> See *Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States ("DISCO II")*, 15 FCC Rcd 7207, ¶ 5 (1999).

<sup>7</sup> See O3b's Hawaii application, FCC File No. SES-LIC-20100723-00952, narrative at Section V.

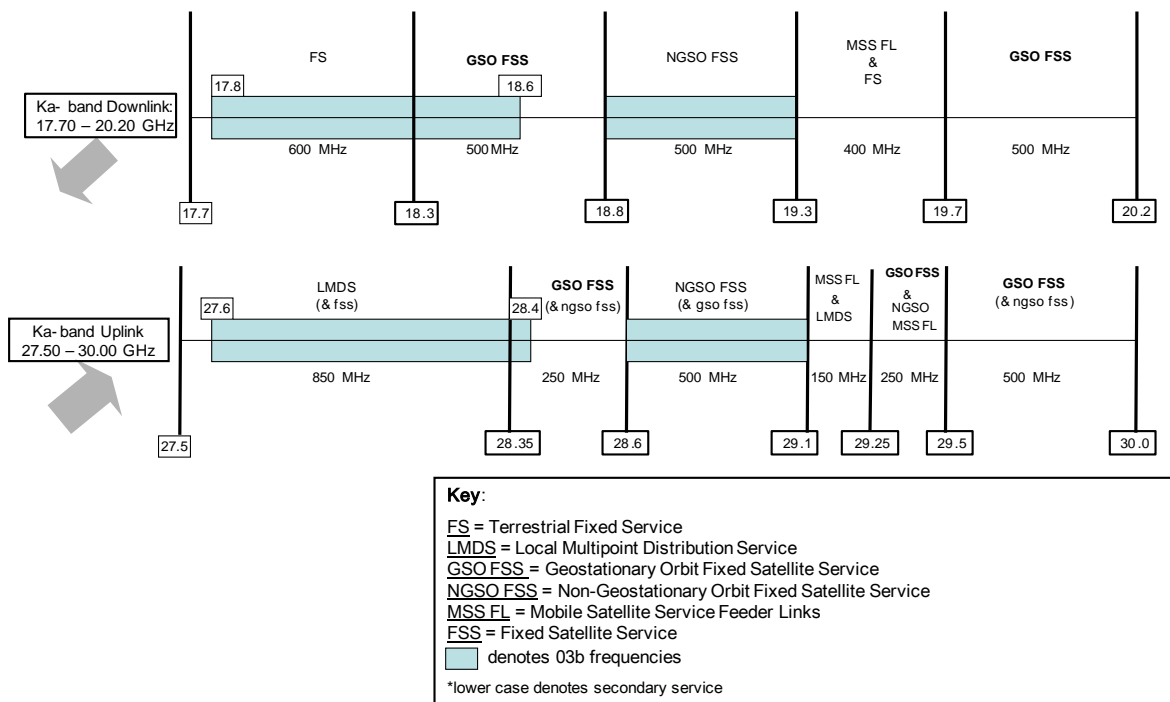
<sup>8</sup> *DISCO II*, 15 FCC Rcd 7207 at ¶ 192.

<sup>9</sup> *Id.*

reference, the O3b frequencies are summarized in the following Table and Figure:

Downlink Frequency	Ka-Band Plan	O3B Proposed Use
17.8-18.3 GHz	FS	Service Links and Gateway Links
18.3-18.6 GHz	GSO FSS down	Service Links and Gateway Links
18.8-19.3 GHz	NGSO FSS down	Service Links, Gateway Links and TT&C <sup>10</sup>
Uplink Frequency	Ka-Band Plan	O3B Proposed Use
27.6-28.35 GHz	LMDS fss (secondary)	Service Links and Gateway Links
28.35-28.4 GHz	GSO FSS up ngso fss up (secondary)	Service Links and Gateway Links
28.6-29.1 GHz	NGSO FSS up gso fss up (secondary)	Service Links, Gateway Links and TT&C <sup>11</sup>

**Figure 1: O3b Proposed Frequency Plan Compared to the U.S. Ka-Band Plan**



<sup>10</sup> O3b will conduct TT&C operations in the band edges just below 19.3 GHz (downlink) and 29.1 GHz (uplink). See 47 C.F.R. § 25.202(g).

<sup>11</sup> *Id.*

### O3b Operations in Shared Bands

Apart from waivers that the Commission already has granted, O3b's proposed Virginia Earth Station operations in shared bands are consistent with the Commission's rules and policies. O3b addresses each of these bands below.

*27.6-28.35 GHz – Secondary uplink band shared with primary terrestrial stations.* The 27.6-28.35 GHz uplink band is allocated to the local multipoint distribution service ("LMDS") on a primary basis. NGSO FSS operations are allocated on a secondary basis in the same band. Accordingly, O3b's proposed secondary operations in this band must not cause harmful interference to primary LMDS stations in the same band.

A Comsearch frequency coordination report is filed with this application. As stated in the report, Comsearch sent prior notification letters to 28 GHz band terrestrial station licensees that are within applicable coordination distances, and none of the licensees objected to O3b's proposed operations.

The Comsearch coordination report demonstrates that O3b can operate its Virginia Earth Station on a secondary basis in this band without causing harmful interference to LMDS licensees. O3b has identified four mitigation techniques that could be used if necessary to avoid interference in the future,<sup>12</sup> which, coupled with terrain path losses, should facilitate secondary operations on a non-harmful interference basis by O3b in the LMDS bands.

*28.35-28.4 GHz – Secondary uplink band shared with primary GSO FSS stations.* In the 28.35-28.4 GHz band, there is a primary allocation for GSO FSS systems and a secondary allocation for NGSO FSS systems. O3b's Virginia Earth Station transmissions in this band will be consistent with their secondary status vis-à-vis GSO FSS transmissions.

The Commission has allowed similar secondary use of frequencies in the Ka-band uplink allocated to GSO FSS on a primary basis where applicants are prepared to accept interference from and can demonstrate that their proposed operations are not likely to cause harmful interference to primary operations.<sup>13</sup> As a secondary user of the 28.35-28.4 GHz band in the United States, O3b makes no claim of protection from interference from U.S.-licensed GSO FSS networks in this band segment. In the 28.35-28.4 GHz band, the ITU has developed uplink equivalent power flux density limits ("EPFD<sub>up</sub>") limits to protect co-frequency

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<sup>12</sup> See O3b's Hawaii application, FCC File No. SES-LIC-20100723-00952, App. B, Section 7.

<sup>13</sup> *Northrop Grumman Space & Missions Systems Corporation*, 24 FCC Rcd 2330, at ¶¶ 72-73 (Int'l Bur. 2009); *contactMEO Communications, LLC*, 21 FCC Rcd 4035, at ¶¶ 23-24, (Int'l Bur., 2006).

GSO FSS operations from unacceptable interference from NGSO FSS systems operating in the same frequencies.<sup>14</sup> Specifically, in accordance with Article 22 of the ITU Radio Regulations, if the applicable EPFD<sub>up</sub> limits are met, the NGSO FSS satellite system is considered to have met its obligations to protect GSO FSS networks from unacceptable interference.

In these bands, transmissions from the Virginia Earth Station to the O3b constellation will meet the applicable ITU EPFD<sub>up</sub> limits. As demonstrated in the *Technical Attachment* that accompanied O3b's Hawaii application, which is hereby incorporated by reference, O3b will satisfy the EPFD<sub>up</sub> limits by controlling the maximum power spectral density into transmitting earth stations as a function of their latitude and their antenna size and off-axis gain towards the GSO. O3b showed that its gateway located at Hawaii operating at its authorized power levels will meet the applicable ITU EPFD<sub>up</sub> limits in all frequency ranges where these limits apply and which overlap those used by the O3b system (*i.e.*, 27.6-28.4 GHz) due to the inherent angular separation between the O3b and geostationary orbits when viewed from the Earth at latitudes away from the equator.<sup>15</sup> The Virginia Earth Station will be operated at the same power levels, but is located further north in latitude than the Hawaii gateway, which means an even greater angular separation between the O3b and geostationary orbits as viewed from the Earth. As a result, compliance with the applicable ITU EPFD<sub>up</sub> limits from the Virginia Earth Station is assured and co-coverage GSO FSS networks will not experience unacceptable interference in the 28.35-28.4 GHz band. In any event, O3b confirms that its operations will be on a secondary basis relative to U.S.-licensed GSO FSS networks in the same band.

*17.8-18.3 GHz – Non-conforming downlink band shared with terrestrial stations – waiver requested to the extent necessary.* The 17.8-18.3 GHz band is allocated on a primary basis to the Fixed Service, and there is no secondary allocation for NGSO FSS in the band. For that reason, in its Hawaii application O3b requested, and the Commission granted, a waiver of the Ka-Band Plan and Section 2.106 of the Commission's rules to permit O3b to operate its NGSO FSS system in the 17.8-18.3 GHz band for downlink operations on a non-conforming, non-interference basis. Such waiver was granted based on a showing that O3b will meet the PFD limits at the Earth's surface prescribed by the ITU for the protection of terrestrial services in this band,<sup>16</sup> and an acknowledgment that, as a

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<sup>14</sup> See ITU Radio Regulations, Article 22. See also O3b's Hawaii application, FCC File No. SES-LIC-20100723-00952, *Technical Attachment* at A.10.1 for a discussion of O3b's compliance with the operational limits in Article 22 of the ITU Radio Regulations.

<sup>15</sup> See O3b's Hawaii application, FCC File No. SES-LIC-20100723-00952, *Technical Attachment* at A.10.1.

<sup>16</sup> See ITU Radio Regulations tbl. 21-4. See also Recommendation ITU-R SF.1483, at 4 ("Extensive studies have provided ample technical justification that the pfd limits of *recommends* 1 are

non-conforming user, O3b must accept interference from FS operations in the band. Additionally, a study of fixed microwave deployments in the vicinity of the proposed Hawaii gateway showed that O3b could operate satisfactorily without interference protection.<sup>17</sup>

To the extent one is required, and for the same reasons, O3b requests a similar waiver of the Ka-Band Plan and Section 2.106 of the Commission's rules to allow its Virginia Earth Station to receive transmissions in the 17.8-18.3 GHz band. The PFD limits at the Earth's surface for the protection of terrestrial fixed services in this band will continue to be met. O3b makes no claim of protection from primary fixed services in this band. O3b is also submitting with this application a coordination study of the 18 GHz band, prepared by Comsearch, for the proposed Virginia Earth Station. The study shows that the Virginia Earth Station can operate satisfactorily in the 18 GHz fixed microwave environment.

*18.3-18.6 GHz – Non-conforming downlink band shared with GSO FSS stations – waiver requested to the extent necessary.* The 18.3-18.6 GHz band is allocated in the United States on a primary basis to GSO FSS. Because the 18.3-18.6 GHz band is not allocated to NGSO FSS downlink transmissions on a primary or secondary basis, O3b proposed in its Hawaii earth station application to use the band on a non-conforming basis – *i.e.*, on a non-harmful interference, non-protected basis relative to any service allocated in that band – and requested a waiver of the Ka-Band Plan and Section 2.106 (footnote NG 164) of the Commission's rules to permit such use.

In support of its waiver request, O3b acknowledged that it has no protection against interference from U.S.-licensed GSO FSS networks in the 18.3-18.6 GHz band and committed to keeping the downlink transmissions in the band from its space stations within the downlink equivalent power flux density ("EPFD<sub>down</sub>") limits developed by the ITU to protect GSO FSS networks from unacceptable interference from NGSO FSS systems operating on the same frequencies.<sup>18</sup> As an example of how these limits can be satisfied, O3b provided

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certainly adequate to protect the FS systems from aggregate interference from the satellites of multiple, co-frequency non-GSO FSS systems operating in the 17.7-19.3 GHz band. Therefore, the pfd limits of *recommends* 1 are acceptable in that they protect the FS systems without unduly constraining the development of non-GSO FSS networks.").

<sup>17</sup> O3b also identified at least three steps that could be undertaken to eliminate or mitigate potential interference if future FS licensees were to establish operations in the vicinity of an O3b gateway earth station. First, O3b could add bandpass filtering to its low noise amplifier assemblies. Second, O3b could modify the timing of satellite handover events such that they occur at higher elevation angles. Third, O3b could work constructively with the FS licensee to explore alternate FS link configurations.

<sup>18</sup> See ITU Radio Regulations, Article 22.

EPFD<sub>down</sub> calculations for transmissions to its Hawaii gateway earth station.<sup>19</sup> O3b also showed how the EPFD<sub>down</sub> limits can be satisfied at all latitudes.

Given that O3b's waiver request covered all latitudes and that the Commission granted the waiver request unconditionally, O3b believes it should be unnecessary to seek an additional waiver for downlink transmissions in the 18.3-18.6 GHz band in connection with its application for a Virginia Earth Station. To the extent necessary, however, O3b requests that an additional waiver be granted. Compliance with the EPFD<sub>down</sub> limits is more easily achieved in the case of transmissions to O3b's Virginia Earth Station than it is in the case of transmissions to O3b's Hawaii earth station. O3b is able to satisfy the limits by taking advantage of the inherent angular separation of the O3b and the GSO orbits when viewed from the surface of the Earth at latitudes away from the equator,<sup>20</sup> and O3b's Virginia Earth Station will be located further from the equator than its Hawaii earth station. The Virginia Earth Station location, therefore, presents an even stronger case for a waiver than the Hawaii location, and the considerations that led the Commission to grant an initial waiver apply with even greater force to a waiver associated with the Virginia location.

### **Other Technical Waivers**

*Geographic coverage.* Section 25.145(c) of the Commission's rules requires Ka-band NGSO systems to provide service coverage (i) to all locations as far north as 70 degrees latitude and as far south as 55 degrees latitude for at least 75% of every 24-hour period and (ii) on a continuous basis throughout the fifty states, Puerto Rico and the U.S. Virgin Islands.<sup>21</sup> In the application for its Hawaii gateway earth station, O3b stated that it cannot satisfy either of these requirements and requested a waiver of these coverage requirements based on various factors.

The Commission has waived Section 25.145(c) for O3b's Hawaii gateway earth station but has reserved judgment as to whether a waiver of Section 25.145(c) is appropriate with respect to O3b's service links.<sup>22</sup> The Commission based the waiver for the Hawaii earth station on the fact that the Hawaii

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<sup>19</sup> See O3b's Hawaii application, FCC File No. SES-LIC-20100723-00952, *Technical Attachment* at A.10.1.

<sup>20</sup> See *id.*

<sup>21</sup> 47 C.F.R. § 25.145(c).

<sup>22</sup> See the license for O3b's Hawaii gateway earth station (E100088, File No. SES-LIC-20100723-00952), issued September 25, 2012, Condition 90044 (grant of Section 25.145(c) waiver for the Hawaii gateway earth station is "without prejudice to action on any waiver request filed in connection with an application to provide additional services to, from, or within the United States.").

authorization “is limited to a single earth station that is providing gateway and TT&C services only.”<sup>23</sup>

It is unclear whether a waiver of the coverage requirements of Section 25.145(c) is needed to add an earth station in Virginia, given that this earth station will be used for (among other things) satellite monitoring and network troubleshooting purposes. Such functions are substantially similar to the TT&C and gateway functions performed by the Hawaii gateway, and for which a waiver already has been granted. To the extent that an additional waiver is required, however, O3b hereby requests one. O3b’s request is supported by good cause. The public interest considerations that led the Commission to grant a waiver of the coverage requirements to permit operation of a gateway in Hawaii also are applicable to operation of a single earth station in Virginia that will be used to identify and resolve space station and system anomalies and to test various modems and service offerings. O3b hereby incorporates by reference the request for a waiver of Section 25.145(c) from its Hawaii application.

*Cross-polarization Isolation and Relief of Pressure Vessels.* In granting the Hawaii License, the Commission found good cause to grant the O3b constellation (1) a waiver of the requirement in Section 25.210(i)(1) for FSS space station antennas to have a minimum cross-polarization isolation of 30 dB in their primary coverage area; and (2) a waiver of that portion of Section 25.283(c) relating to relief of pressure vessels aboard the O3b spacecraft at their end of life. These waiver grants were not limited to the Hawaii License. Accordingly, O3b should not need to request or obtain these waivers again for the spacecraft in the O3b constellation. However, out of an abundance of caution and to the extent necessary, O3b hereby incorporates by reference the waiver requests in its Hawaii application related to Sections 25.210(i)(1) and 25.283(c). For the reasons stated therein, which apply with equal force here, those waivers, if needed again, should be granted in this case as well.

### **Conditions of License**

The Commission attached various conditions to its grant of O3b’s Hawaii application that pertain to operation of the Hawaii gateway earth station. The conditions relate to, among other things, the fact that O3b will be operating the Hawaii earth station on a secondary or non-conforming basis on some frequencies. O3b hereby agrees to operate its Virginia Earth Station in accordance with the same conditions, with one exception.

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<sup>23</sup> *Id.*



The exception is the condition in the Hawaii License relating to the posting of a performance bond. O3b respectfully requests that it not be required to post a second bond to secure the implementation of the O3b satellite system, since it has already posted a bond in connection with the Hawaii License.<sup>24</sup> Indeed, the Commission has previously determined that it would be inappropriate to impose a bond requirement for a foreign-licensed satellite entrant that would have necessitated the posting of a duplicative bond.<sup>25</sup> The same result should obtain here.

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<sup>24</sup> See [http://licensing.fcc.gov/myibfs/download.do?attachment\\_key=972913](http://licensing.fcc.gov/myibfs/download.do?attachment_key=972913).

<sup>25</sup> See *Telesat Canada*, DA 07-118, Order, File No. SAT-PPL-20060516-00061, at ¶ 14 (Jan. 19, 2007) (“We agree with Telesat that it is not necessary to have more than one bond posted with respect to ANIK F3 to fulfill the purposes of the bond requirement.”).

## Conclusion

As demonstrated in this application and in the materials with which this application is associated, and subject to a limited number of waiver requests, the proposed Virginia Earth Station fully complies with the Commission's Part 25 rules. Thus, grant of this earth station application will serve the public interest, convenience and necessity.

Respectfully submitted,

**O3B LIMITED**

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