

## REQUEST FOR WAIVER OF SECTION 25.209(h)

In this application, SpaceX seeks authority to operate a gateway earth station using the 10.7-12.7 GHz (downlink) and 14.0-14.5 GHz (uplink) bands. This is one of six gateway sites that SpaceX will use to deliver broadband data between the first-generation satellites of its non-geostationary orbit fixed-satellite service (“NGSO FSS”) system and terrestrial Internet exchange points. Subsequent satellites will use Ka-band spectrum for gateway operations, allowing SpaceX to phase out the use of these Ku-band gateways over time.

Section 25.209(h) of the Commission’s rules specifies performance standards for transmitting antennas in a gateway earth station communicating with NGSO FSS satellites in the 10.7-11.7 GHz and 14.4-14.5 GHz bands.<sup>1</sup> However, in the nearly two decades since that standard was adopted, Commission actions and technological developments have both progressed in ways that negate the assumptions that underlie that requirement. For example, the Commission recently decided to permit blanket licensing of NGSO FSS earth stations in the 10.7-11.7 GHz band on a secondary basis to the terrestrial Fixed Service (“FS”).<sup>2</sup> If necessary, SpaceX is willing to operate its gateway earth station on the same secondary basis in this band.

Thus, enforcement of the rule in this context would (1) unnecessarily increase the cost of gateway earth stations to make them comply with the gateway rules, and (2) throw in clear relief the inconsistency between strict antenna gain requirements for gateways without any corresponding limits for blanket-licensed earth stations operating in the same bands. At the same time, waiver of the rule would, at most, expose other licensees to levels of interference from

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<sup>1</sup> See 47 C.F.R. § 25.209(h). For this purpose, the Commission defines “NGSO FSS gateway earth station” as an earth station or complex of multiple earth station antennas that supports the routing and switching functions of an NGSO FSS system and that does not originate or terminate communications traffic *Id.* at § 25.103.

<sup>2</sup> See *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, 32 FCC Rcd. 7809, ¶ 25 (2017) (“*NGSO Update Order*”); 47 C.F.R. 25.115(f)(2).

SpaceX earth stations that the Commission has already deemed acceptable when generated by the far more numerous earth stations used for service to consumers in these same bands. Accordingly, and as discussed further below, SpaceX submits that there is good cause for the Commission to waive Section 25.209(h) in this case.

## **BACKGROUND**

The Commission adopted the performance standard for NGSO FSS gateway earth stations operating in a portion of the Ku-band nearly two decades ago.<sup>3</sup> The Commission explained at the time that it had decided to permit NGSO FSS providers to operate in certain segments of the Ku-band and adopted a number of technical rules “to ensure that NGSO FSS operations do not cause unacceptable interference to existing users and do not unduly constrain future growth of incumbent services.”<sup>4</sup> For example, the Commission imposed limits on downlink power flux-density (“PFD”) levels to protect terrestrial FS systems, and equivalent power flux-density (“EPFD”) limits to protect geostationary orbit satellite systems.<sup>5</sup>

The antenna performance requirements for NGSO earth stations adopted in that order were incorporated into Section 25.209 of the Commission’s rules, which imposes reference antenna pattern requirements for certain satellite earth stations operating in the Ku-band. Most of these relate to earth stations communicating with GSO systems, as Section 25.209 was originally

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<sup>3</sup> *See Amendment of Parts 2 and 25 of the Commission’s Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, 16 FCC Rcd. 4096 (2000) (“*Ku-band NGSO FSS Service Rules Order*”).

<sup>4</sup> *Id.* ¶ 10.

<sup>5</sup> *See id.* ¶¶ 38-42, 77, 151, and 231.

developed to facilitate GSO-to-GSO sharing where a constant level of interference is present.<sup>6</sup> The only part of the rule that applies to NGSO antennas is found in Section 25.209(h).

The performance requirements for NGSO FSS gateway antennas in the 10.7-11.7 GHz and 14.4-14.5 GHz bands, however, are more restrictive than those applicable to Ku-band GSO earth stations under Section 25.209(a)(2). The Commission's decision to adopt these restrictive gain limits was premised on the idea that encouraging the use of higher performance earth station antennas would maximize inter-system sharing and efficient use of spectrum.<sup>7</sup> For example, it concluded that "tighter patterns will reduce separation distances between gateway earth stations and terrestrial stations for certain azimuths around the gateway station,"<sup>8</sup> thereby facilitating coordination between satellite and terrestrial FS systems and limiting the zone of protection around each gateway.

However, over the intervening decades, the Commission has repeatedly declined to adopt similar antenna reference patterns for NGSO FSS user terminals.<sup>9</sup> In doing so, it has found "little evidence that imposing such an antenna reference pattern on NGSO FSS user Earth stations would significantly improve [spectrum] sharing."<sup>10</sup> Indeed, the Commission recently confirmed that it "has not yet determined what off-axis gain envelopes might be appropriate for earth stations

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<sup>6</sup> See *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range*, 16 FCC Rcd. 4096, ¶ 81 (2000) ("Ku-Band NGSO Order").

<sup>7</sup> See *Ku-band NGSO FSS Service Rules Order*, ¶¶ 241-43.

<sup>8</sup> *Id.* ¶ 243.

<sup>9</sup> See, e.g., *NGSO Update Order*, ¶¶ 54-55 and n.121.

<sup>10</sup> *Establishment of Policies and Rules for the Non-Geostationary Satellite Orbit, Fixed Satellite Service in the Ku-Band*, 17 FCC Rcd. 7841, ¶ 60 (2002) ("Ku-Band NGSO Sharing Order").

operating with NGSO FSS space stations, either to facilitate NGSO-to-NGSO or NGSO-to-GSO interference protection.”<sup>11</sup>

## DISCUSSION

Pursuant to Section 1.3 of the Commission’s rules, the Commission may waive its rules for good cause shown.<sup>12</sup> “Waiver is appropriate if special circumstances warrant a deviation from the general rule and such deviation would better serve the public interest than would strict adherence to the general rule,” including “more effective implementation of overall policy.”<sup>13</sup> In determining whether waiver is appropriate, the Commission should “take into account considerations of hardship, equity, or more effective implementation of overall policy.”<sup>14</sup> Below, we discuss the two portions of the band in which the gateway standard applies to demonstrate that waiver would better serve the public interest.

### ***A. 10.7-11.7 GHz Band***

The 10.7-11.7 GHz band is allocated to FSS and FS on a co-primary basis, with NGSO FSS earth stations using this spectrum to *receive* signals from satellites. These receiving earth stations cannot cause harmful interference to any other spectrum user in this downlink band, and SpaceX satellites will transmit at PFD levels that the Commission has determined will not cause harmful interference to terrestrial systems. However, co-primary services are typically required to coordinate their operations before deploying new stations, which would then entitle a deployed earth station to protection that could hamper further terrestrial deployment, especially if the earth

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<sup>11</sup> *Comprehensive Review of Licensing and Operating Rules for Satellite Services*, 30 FCC Rcd. 14713, ¶ 213 (2015). See also *NGSO Update Order*, ¶¶ 54-55 and n.121 (2017) (declining to adopt NGSO earth station antenna performance standards).

<sup>12</sup> 47 C.F.R. § 1.3. See also *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969), *cert. denied*, 409 U.S. 1027 (1972); *Northeast Cellular Telephone Co., LP v. FCC*, 897 F.2d 1164 (D.C. Cir. 1990).

<sup>13</sup> *GE American Communications, Inc.*, 16 FCC Rcd. 11038, ¶ 9 (Int’l Bur. 2001).

<sup>14</sup> *WAIT Radio*, 418 F.2d at 1159.

stations were very numerous or used an antenna that made it unduly vulnerable to interference. On this basis, the Commission concluded that deployment of service links in the 10.7-11.7 GHz band could inhibit future terrestrial deployment, and thus limited use of the band to gateways only.<sup>15</sup> With that limitation, it found that it could “permit deployment of NGSO FSS gateway earth stations in the proposed bands and also protect the continued use and growth of those bands by terrestrial operations.”<sup>16</sup> The Commission also established coordination requirements for these gateway earth stations.<sup>17</sup>

In its recent proceeding to update the rules for licensing NGSO systems, however, the Commission revisited its gateway-only limitation on the use of the 10.7-11.7 GHz band and revised its rules in two important ways. First, consistent with its treatment of other bands shared on an equal basis with the FS, it changed the limitation to apply to “individually licensed earth stations” rather than “gateways” – a clearer formulation that “strikes a better balance between the two services than a strict limitation to gateways.”<sup>18</sup> In order to obtain such an individual license, an earth station operator must complete the coordination process, after which it may claim interference protection going forward. Second, the Commission decided to permit blanket licensing of NGSO FSS earth stations in the 10.7-11.7 GHz band on a secondary basis to the FS.<sup>19</sup> The Commission found that, in the event of harmful interference to earth stations, NGSO operators could employ shielding or switch to alternative spectrum not shared with the FS, such as the adjacent 11.7-12.2 GHz band.<sup>20</sup>

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<sup>15</sup> *Ku-Band NGSO FSS Service Rules Order*, ¶ 29.

<sup>16</sup> *Id.* ¶ 29.

<sup>17</sup> *Id.* ¶¶ 50-52.

<sup>18</sup> *See NGSO Update Order*, ¶ 24.

<sup>19</sup> *Id.* ¶ 25; 47 C.F.R. 25.115(f)(2).

<sup>20</sup> *NGSO Update Order*, ¶ 25.

By rescinding the gateway-only limitation in this band, the Commission has now undercut the rationale for an antenna performance requirement applicable only to gateways, in the event that a licensee was willing to operate on an unprotected basis with respect to FS systems in the 10.7-11.7 GHz band. Indeed, an NGSO FSS operator could deploy any number of non-gateway antennas in the band on a secondary basis without meeting the requirements of Section 25.209(h).

The antennas covered by this application illustrate the lack of fit between the rule and SpaceX's deployment. Although it has completed the required coordination process, SpaceX is willing to forego the protections afforded by individually coordinating and licensing its earth stations. Therefore, there is no basis for applying a rule designed for a case involving individually-licensed earth stations and an applicant seeking interference protection through individual coordination. Moreover, as the Commission found, there is "little evidence" that imposing an antenna reference pattern on blanket-licensed NGSO FSS earth stations would significantly improve spectrum sharing.<sup>21</sup> In these circumstances, the public interest would be better served by waiving Section 25.209(h).

#### ***B. 14.4-14.5 GHz Band***

The entire 14.0-14.5 GHz band that the proposed earth stations would use for uplink transmissions is allocated to FSS on a primary basis. Various portions of the band are also allocated to other services on a secondary basis.<sup>22</sup> After evaluating the evidence, the Commission found that imposing EPFD<sub>up</sub> limits would allow NGSO and GSO satellite systems to share the band, and that permitting deployment of both NGSO FSS gateways and user terminals would not create an unacceptable interference risk to incumbent secondary users throughout the band.<sup>23</sup>

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<sup>21</sup> See *Ku-Band NGSO Sharing Order*, ¶ 60.

<sup>22</sup> See *Ku-band NGSO FSS Service Rules Order*, ¶¶ 148, 229.

<sup>23</sup> *Id.* ¶¶ 151, 231.

Nonetheless, the Commission adopted antenna performance requirements for gateways in the 14.4-14.5 GHz portion of the band.

Here again, this standard would apply to the relatively few antennas used by NGSO FSS operators as gateways but not to the much more numerous antennas used for service direct to customers. Moreover, the standard applies only to 100 MHz of the spectrum in this uplink band, leaving gateway operations in the other 400 MHz unaffected. The Commission has already found that deployment of ubiquitous NGSO FSS earth stations would not create an unacceptable interference risk to secondary users of the band. Accordingly, it is hard to see how imposing a performance standard on a very small subset of earth stations in only a portion of the band would be justified to facilitate spectrum sharing. The public interest would be better served by waiving Section 25.209(h) to give SpaceX the flexibility to deploy the first phase of its NGSO system rapidly and efficiently so that it can help to close the digital divide as soon as possible.