

August 26, 2020

Doug Young  
Federal Communications Commission  
Office of Engineering and Technology  
445 12th Street, SW  
Washington, DC 20554

**Re: Spire, ELS File No. 0253-EX-CN-2020  
Response to Correspondence Reference No. 56815**

Dear Mr. Young,

You asked how Spire “will avoid interference to Advanced Wireless Service and Broadcast Auxiliary Service licensees and how [Spire] will coordinate with them.” This letter addresses the inquiry.

Spire requested experimental authority for four satellites to operate in the frequency bands 401-402 MHz, 2020-2025 MHz, 2200-2201 MHz, and 8025-8325 MHz for space-to-Earth operations; 402-403 MHz and 2025-2110 MHz for Earth-to-space operations; and 2025-2110 MHz and 2200-2290 MHz for space-to-space operations. Mobile services, like AWS, and fixed services, like BAS, may operate co-channel with Spire only in the frequency bands 2020-2025 MHz and 2025-2110 MHz. For the following reasons, Spire’s proposal will not interfere with co-channel terrestrial services.

**I. 2020-2025 MHz (Space-to-Earth)**

The Commission previously deferred allocating AWS in the frequency band 2020-2025 MHz and has not announced plans for another mobile service to use the band.<sup>1</sup> Searches in the Commission’s Universal Licensing System revealed that no operators have received authority to use the band. As a result, interference from Spire satellites into AWS or another mobile service remains impossible in this band. Because no satellite allocation exists in the band, Spire agrees to operate on a non-interference, non-protected basis similar to the Spire satellites already authorized under Part 25 of the Commission’s rules.<sup>2</sup>

The experimental satellites will complete their mission within three years of their launch in September 2020.<sup>3</sup> Any Commission rulemaking, which will consider allocation changes, and auction

---

<sup>1</sup> See *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, & 2155-2180 MHz Bands*, Report and Order, 29 FCC Rcd 4610 ¶ 59 (2014); *Annual Report on the Status of Spectrum Repurposing*, Department of Commerce at 19 (rel. Aug. 2019), <https://bit.ly/2COWeHI> (“No further action related to this five megahertz, unpaired band has been taken. The FCC is currently considering the next steps to accommodate fixed and mobile broadband services in that band.”).

<sup>2</sup> See, e.g., Stamp Grant, Spire, IBFS File No. SAT-PDR-20190321-00018 (granted Oct. 7, 2019). Since September 2015, Spire satellites have operated in this band with no recorded instances of interference.

<sup>3</sup> Spire has requested only a three-year license term. See Form 442.

of new licenses for the 2020-2025 MHz band will likely not occur in the next three years.<sup>4</sup> If, however, mobile services deploy before Spire's mission finishes, then Spire will cease transmissions where harmful interference occurs and coordinate its operations before recommencing operations.

Harmful interference still remains unlikely because of Spire's limited operations in the band. At any one time, only one Spire satellite may communicate with one of Spire's 11 earth stations in the United States and its territories. A Spire satellite also only transmits when in line of sight of its partner earth station and does not transmit otherwise. The low-duty cycle operations, coupled with Spire's low-power transmissions,<sup>5</sup> ensure limited harmful interference potential, if any.

## II. 2025-2110 MHz (Earth-to-Space and Space-to-Space)

BAS may operate in the frequency band 2025-2110 MHz.

Spire's Earth-to-space operations in this band will not interfere with BAS because Spire does not plan to deploy earth stations in the United States and its territories. If Spire chooses to site earth stations in the band, however, it will apply for the necessary earth station license(s) at the Commission, complete the Comsearch coordination process, and coordinate with BAS, as required.

Spire's space-to-space operations in this band will also not interfere with BAS. Previously submitted power flux density analysis demonstrates Spire's compliance with the PFD limits in ITU Radio Regulations Table 21-4.<sup>6</sup> For your convenience, it is reproduced in an attachment to this letter.<sup>7</sup> In short, Spire's adherence to the limits ensures that BAS will not encounter harmful interference from Spire's space-to-space activities.

Please direct any questions to the undersigned.

Respectfully submitted,

**/s/ Ananda Martin**

Ananda Martin  
General Counsel  
[ananda.martin@spire.com](mailto:ananda.martin@spire.com)  
(415) 356-3400

---

<sup>4</sup> Allocating and auctioning licenses for the Commission's new mobile service, the upper microwave flexible use service, took over four years. See *Use of Spectrum Bands above 24 GHz for Mobile Radio Services*, Notice of Inquiry, 29 FCC Rcd 13020 (2014) (evaluating frequencies that could support UMFUS in 2014); *Auction 101: Spectrum Frontiers – 28 GHz*, FCC, <https://bit.ly/2COXkCX> (last visited Aug. 21, 2020) (commencing the UMFUS license auction in 2018).

<sup>5</sup> Spire satellites transmit using only 1 watt output power and 4 watts effective radiated power. See Form 442.

<sup>6</sup> No PFD limits exist for this band in the Commission's rules. See 47 C.F.R. § 25.208.

<sup>7</sup> Spire's space-to-space center frequencies use the edges of the 2025-2110 MHz band.

**ATTACHMENT**  
**(Excerpt from Narrative in ELS File No. 0253-EX-CN-2020)**

...

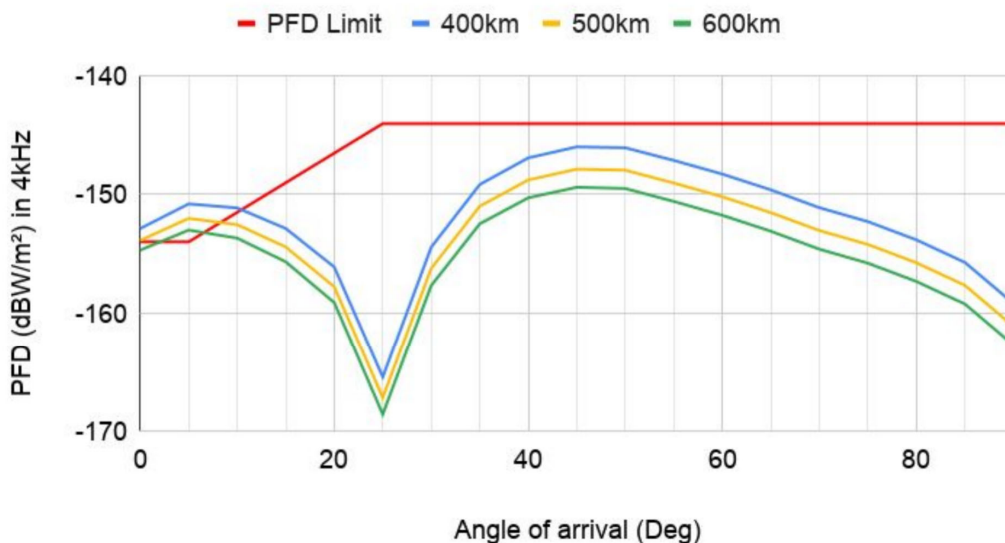
Section 25.208 of the FCC's rules includes no PFD limits for the 2025-2110 MHz and 2200-2290 MHz bands; however, ITU Radio Regulations Table 21-4 contains PFD limits for space-to-space operations in these bands. Table 21-4 states that the PFD at the Earth's surface produced by an EESS space station's emissions in these frequency bands for all conditions and modulation methods shall not exceed the following values:

- -154 dB(W/m<sup>2</sup>) in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;
- $-154 + 0.5(d-5)$  dB(W/m<sup>2</sup>) in any 4 kHz band for angles of arrival d (in degrees) between 5 and 25 degrees above the horizontal plane; and
- -144 dB(W/m<sup>2</sup>) in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.<sup>13</sup> Spire calculated the PFD as follows:  $PFD [dBW/m^2 / 4 \text{ kHz}] = EIRP (dBW) - 11 - 20\log_{10}(D) - 10\log_{10}(BW) + 36$

where EIRP is the Maximum EIRP of the transmission, D is the distance between the satellite and affected surface area in km, and BW is the bandwidth of the transmission in MHz.

The calculations establish that Spire can comply with the applicable limits at all angles of arrival except 0-10 degrees. At these non-compliant angles, Spire will terminate operations to avoid interference concerns.

RF ISL PFD vs Angle of Arrival



...