

**Responses to Federal Communications Commission (“Commission”) OET Questions re. 1538-EX-ST-2024:** Link to narrative: [https://apps.fcc.gov/els/GetAtt.html?id=356374&x=.](https://apps.fcc.gov/els/GetAtt.html?id=356374&x=)

**Responses to correspondence 88060 (August 27, 2024)**

Link to question: [https://apps.fcc.gov/els/GetAtt.html?id=357278&x=.](https://apps.fcc.gov/els/GetAtt.html?id=357278&x=)

**FCC.** Please submit an engineering analysis and explanation of how it would specifically avoid causing harmful interference to the incumbent Upper Microwave Flexible Use Service licensees. There are some UMFUS licensees within the close proximity the proposed location.

Amazon recognizes that the operational trials must not cause harmful interference to authorized facilities throughout the period of operations and are secondary relative to UMFUS operations. Therefore, Amazon has conducted a search for licensed radio stations for which coordination may be needed. Since the farthest point on the Section 25.136(a)(4) power flux density (“PFD”) contour is about 6.4 km, a conservative search within 50 km in the Universal Licensing System (“ULS”) was performed in the requested frequencies 27.5-28.5 GHz and 29.0-30.0 GHz and returned the eight Upper Microwave Flexible Use Service (“UMFUS”) licensees listed in *Table 1*.

Of the returned UMFUS licenses, four licenses belong to Cellco Partnership (WREF902, WREF906, WREF910, WREF918), two are for T-Mobile License LLC (WREG988, WREG991), and two are for Crestone Wireless (WREH817, WREH820). These eight licenses span four counties: Chelan, Douglas, Grant, and Okanogan, WA. As illustrated in *Figure 1*, only WREF918 and WREH820 in Okanogan County overlap with the PFD contour (light green is Okanogan County where WREF918 and WREH820 are licensed).

This response demonstrates that the six UMFUS licenses in Chelan, Douglas, and Grant counties are protected from harmful interference because the UMFUS sites do not overlap with the power flux-density (“PFD”) contour provided in *Figure 1*. Amazon nevertheless understands that its operations must be on a non-interference basis relative to these UMFUS sites.

*Table 1. UMFUS licensees within 50 km of the experimental transmitter.*

<b>Callsign</b>	<b>Operator</b>	<b>Frequency (MHz)</b>	<b>County/ State</b>	<b>Overlaps PFD</b>
<a href="#">WREF902</a>	Cellco Partnership	27500-27925	CHELAN, WA	No
<a href="#">WREF906</a>	Cellco Partnership	27500-27925	DOUGLAS, WA	No
<a href="#">WREF910</a>	Cellco Partnership	27925-28350	GRANT, WA	No
<a href="#">WREF918</a>	Cellco Partnership	27500-27925	OKANOGAN, WA	Yes
<a href="#">WREG988</a>	T-Mobile License LLC	27925-28350	CHELAN, WA	No
<a href="#">WREG991</a>	T-Mobile License LLC	27500-27925	GRANT, WA	No
<a href="#">WREH817</a>	Crestone Wireless	27925-28350	DOUGLAS, WA	No
<a href="#">WREH820</a>	Crestone Wireless	27925-28350	OKANOGAN, WA	Yes

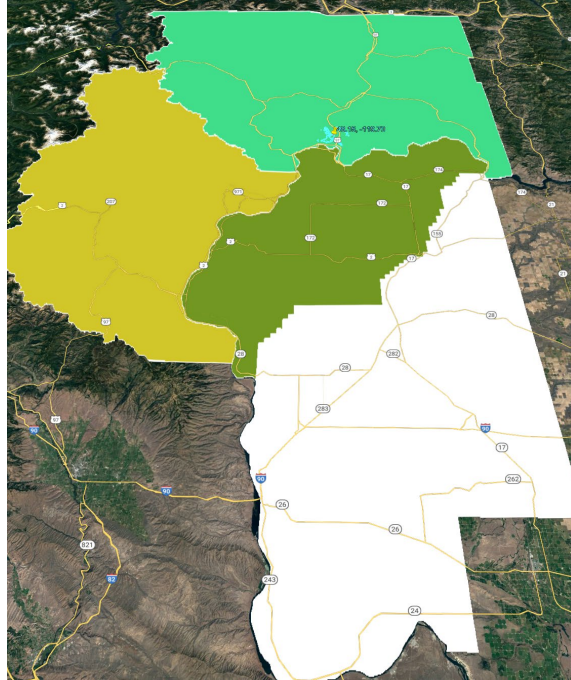


Figure 1. There are eight UMFUS licensees in four counties. The PFD contour (light green on top) is in Okanogan County.

Furthermore, as shown below, Amazon meets the gateway deployment criteria under FCC Rule 25.136(a)(4) for the two remaining sites in Okanogan County, and therefore it “may be authorized to operate without providing interference protection to stations in the Upper Microwave Flexible Use Service.”<sup>1</sup>

Section 25.136(a)(4) of the Commission’s rules outlines how Fixed-Satellite Service (“FSS”) operators may deploy gateways in the 27.5-28.35 GHz band without providing additional interference protection to co-frequency UMFUS licensees.<sup>2</sup> *First*, one U.S. county may not possess more than two other co-frequency FSS earth stations operating in the 27.5-28.35 GHz band.<sup>3</sup> *Second*, the area in which the earth station generates a power flux-density (“PFD”) greater than or equal to  $-77.6 \text{ dBm/m}^2/\text{MHz}$  at 10 meters above ground level (“AGL”), together with the similar area of any other gateway authorized under section 25.136(a)(1)-(4), may not cover more than certain population amounts.<sup>4</sup> *Third*, the  $-77.6 \text{ dBm/m}^2/\text{MHz}$  PFD contour may not contain any major event venue, urban mass transit route, passenger railroad, cruise ship port, or certain types of roads (Interstate, Other Freeways and Expressways, or Other Principal

<sup>1</sup> 47 C.F.R. § 25.136(a).

<sup>2</sup> See 47 C.F.R. § 25.136(a)(4). The Commission has offered additional guidance on how to present section 25.136 showings. See generally *International Bureau Issues Guidance on Siting Methodologies for Earth Stations Seeking to Operate in the 24.75-25.25 GHz, 27.5-28.35 GHz, 37.5-40 GHz, 47.2-48.2 GHz, and 50.4-51.4 GHz Frequency Bands to Demonstrate Compliance with Section 25.136*, Public Notice, 35 FCC Rcd 6347 (IB 2020) (“Guidance”).

<sup>3</sup> See 47 C.F.R. § 25.136(a)(4)(i).

<sup>4</sup> See 47 C.F.R. § 25.136(a)(4)(ii); *id.* at Table 2 to Paragraph (a)(4)(ii) (permitting the PFD contour to cover 0.1 percent of the population in a UMFUS license area with more than 450,000 people; 450 people in a county with 6,000-450,000 people; and 7.5 percent of the population in a county with fewer than 6,000 people).

Arterial).<sup>5</sup> *Fourth*, the FSS operator must have coordinated with existing UMFUS licensees located within a PFD contour greater than or equal to  $-77.6 \text{ dBm/m}^2/\text{MHz}$  at 10 meters above ground level pursuant to section 101.103(d) of the Commission’s rules.<sup>6</sup>

The  $-77.6 \text{ dBm/m}^2/\text{MHz}$  PFD contour, computed based on the International Telecommunications Union Recommendation (“ITU-R”) P.452 propagation model with sparse clutter and other parameters such as the horizon equivalent isotropic radiated power (“EIRP”) of  $-22 \text{ dBW/MHz}$  shown in *Table 2*, is illustrated in *Figure 2* on the left.<sup>7</sup> The PFD contour falls entirely in the Okanogan County, WA as shown in *Figure 2* (left and right).

*Table 2. Amazon experimental earth station parameters.*

Field	Value
County/State	Okanogan, WA
Latitude	48° 8' 45.75" N
Longitude	119° 42' 2.35" W
Simulation Frequency	27.5 GHz
Number of Active Antennas	1
Worst-case Antenna Gain to Horizon	-5.0 dBi
EIRP to Horizon <sup>8</sup>	-22.0 dBW/MHz
Clutter	Sparse

<sup>5</sup> See 47 C.F.R. § 25.136(a)(4)(iii). See also *In the Matter of Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10988, 11031-32, 11085-86 ¶ 131, Appendix B (2017).

<sup>6</sup> See 47 C.F.R. § 25.136(a)(4)(iv).

<sup>7</sup> Recommendation ITU-R P.453-18, *Prediction procedure for the evaluation of interference between stations on the surface of the Earth at frequencies above about 100 MHz* (2023), available at [https://www.itu.int/dms\\_pubrec/itu-r/rec/p/R-REC-P.452-18-202310-I!!PDF-E.pdf](https://www.itu.int/dms_pubrec/itu-r/rec/p/R-REC-P.452-18-202310-I!!PDF-E.pdf).

<sup>8</sup> This figure is based on the antenna operating at the worst case off-axis gain in the direction of an UMFUS receiver 10 meters above ground level (-5.0 dBi).

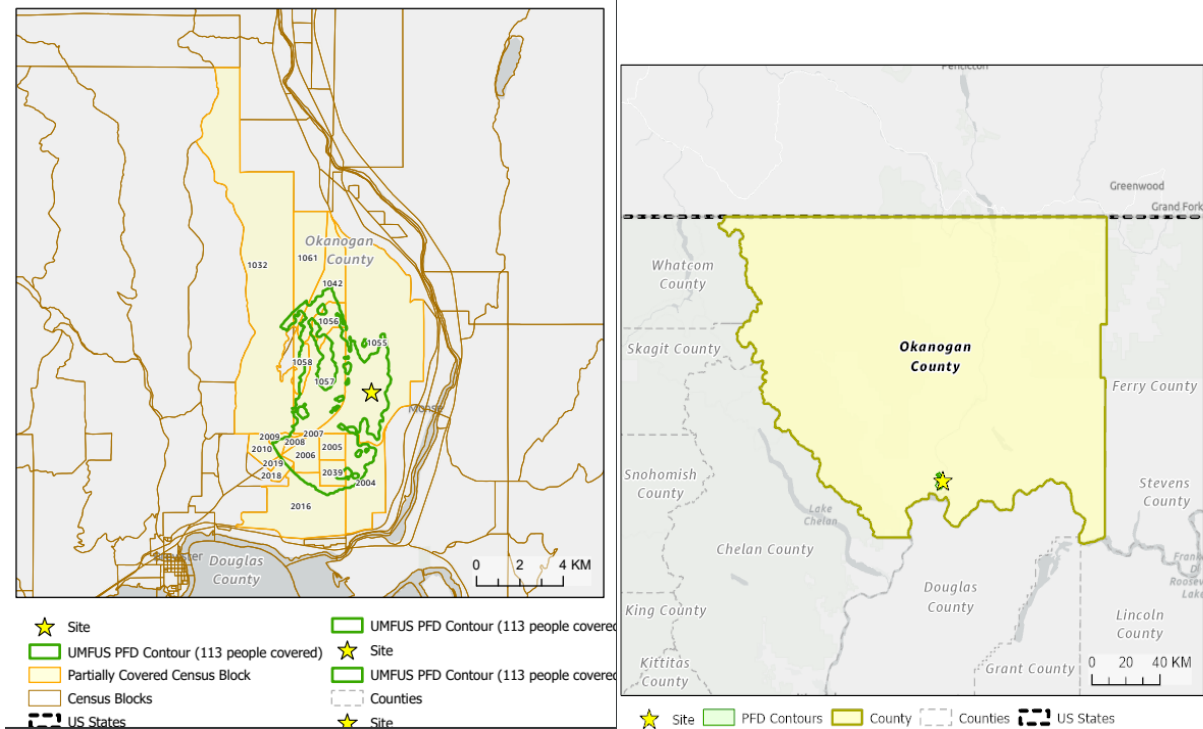


Figure 2. PFD contour around experimental TX with sparse clutter.

The PFD contour impact on the census blocks is depicted in Table 3 where the population of the census block ID, the population, impacted area percentage, and the impacted population are also shown. The population is based on 2020 census data.<sup>9</sup>

Table 3. PFD contour population coverage by census block 2020.

State	County	Block ID	Population	Coverage (%)	Covered Population
WA	Okanogan	530479708001032	157	0.93	1
WA	Okanogan	530479708001042	9	25.24	2
WA	Okanogan	530479708001055	21	28.24	6
WA	Okanogan	530479708001056	15	64.20	10
WA	Okanogan	530479708001057	12	74.45	9
WA	Okanogan	530479708001058	0	43	0
WA	Okanogan	530479708001061	7	3.57	0
WA	Okanogan	530479708002004	37	27.94	10
WA	Okanogan	530479708002005	2	100	2
WA	Okanogan	530479708002006	28	100	28
WA	Okanogan	530479708002007	0	100	0
WA	Okanogan	530479708002008	8	99.7	8
WA	Okanogan	530479708002009	28	48.37	14
WA	Okanogan	530479708002010	4	0.93	0

<sup>9</sup> See Guidance, 35 FCC Rcd at 6350 (determining estimated aggregate population coverage at bullet 2).

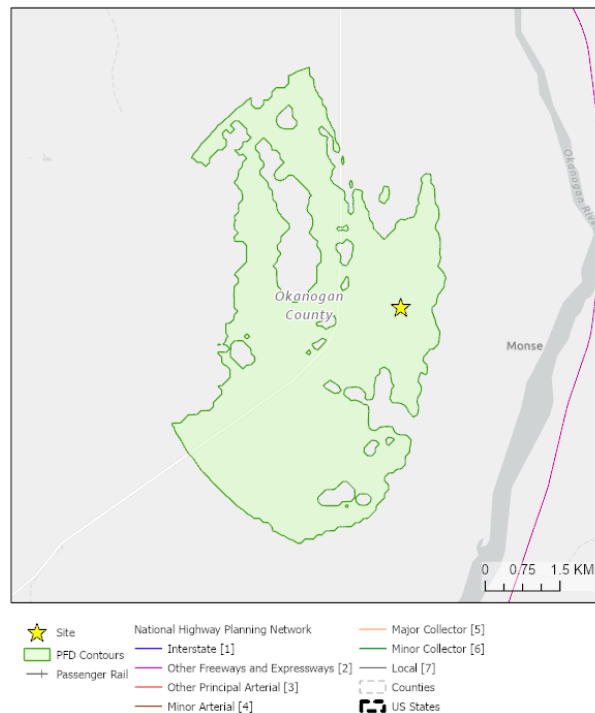
WA	Okanogan	530479708002016	116	8.7	10
WA	Okanogan	530479708002018	18	20.14	4
WA	Okanogan	530479708002019	8	2.6	0
WA	Okanogan	530479708002039	10	90.26	9

The Okanogan County population, allowable population coverage, and covered population are depicted in *Table 4*. The contour covers 113 people of the county’s total population of 42104. The PFD contour does not exceed the section 25.136(a)(4)(ii) aggregate population coverage allowance of 450 people.

Additionally, as shown in *Figure 3*, PFD contour does not intersect with any major venue, urban mass transit routes, passenger railroads, cruise ship ports, interstate, freeways, expressways, or other principle arterial roads., the contour does not contain any major event venue, urban mass transit route, passenger railroad, cruise ship port, Interstate, Freeways, Expressways, or Other Principal Arterial roads.

*Table 4. PFD contour population coverage by county.*

State	County	County Population	Allowable Population Coverage	Covered Population
WA	Okanogan	42104	450	113



*Figure 3. PFD contour does not intersect with any major venue, urban mass transit routes, passenger railroads, cruise ship ports, interstate, freeways, expressways, or other principle arterial roads.*

**Responses to correspondence 88469 (September 13, 2024)**

Link to question: <https://apps.fcc.gov/els/GetAtt.html?id=358706&x=>.

**FCC.** Please provide new Frequency Coordination Report that reflects the updated power levels.

We initiated a Comsearch coordination report on 9/13/2024 and will upload it to the FCC website once the coordination is complete.