

ATTACHMENT 1

APPLICATION FOR GATEWAY EARTH STATION LICENSES

Pursuant to 47 C.F.R. § 25.115, HNS License Sub, LLC (“Hughes”) seeks authority¹ to operate 20 gateway earth stations (listed in Table 1 below) that will communicate with the HNS 95W satellite system.² Each proposed gateway earth station in this application will utilize a 9.2 meter antenna in the 27.5-28.0 GHz, 28.1-28.6 GHz, 40-42 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz frequency bands.

Background. On June 21, 2017, Hughes applied to the Federal Communications Commission (“the Commission”) for a license to operate HNS 95W, a satellite that will operate in the Ka-band (27.5-28.0 GHz and 28.1-28.6 GHz), Q-band (40-42 GHz), and V-band (47.2-50.2 GHz and 50.4-51.4 GHz) frequencies. The HNS 95W satellite system will provide broadband services to consumers across the United States and throughout the Americas.³

Public Interest Benefits. Grant of this application is in the public interest as it will allow Hughes to deploy the gateway earth stations required for the operation of the HNS 95W satellite, replacing the SPACEWAY 3 satellite, which is approaching end of life. The HNS 95W satellite will provide advanced broadband services to enterprises, the government, small businesses, and residential customers across North America. HNS 95W will support a variety of applications, including broadband access, aeronautical services for in-flight connectivity, residential and business VOIP, and next generation communications services, including 5G.

¹ Hughes is contemporaneously submitting separate applications for each earth station. Except for location-specific information, including the height of the antennas, the applications are materially the same.

² See Hughes Application, IBFS File No. SAT-LOA-20170621-00092 (filed June 21, 2017) (hereinafter “Hughes Application”). Hughes may also operate additional network gateway earth stations in other countries, pursuant to appropriate regulatory authorizations.

³ See *id.*

The HNS 95W satellite system will contribute significant additional broadband capacity to the Hughes satellite fleet. HNS 95W, because of its capacity and speed capabilities, will provide a true competitive alternative to aging copper based broadband services, such as DSL, across the country, including in densely populated regions.

The HNS 95W space station is being designed to utilize 20 gateway earth stations. Hughes proposes to locate these gateways at sites distributed throughout the United States that comply with the Commission's 28 GHz siting rules⁴ and have sufficient electrical facilities, reliable fiber-delivered broadband capacity, and ease of access for personnel to provide operational support. Further, the distribution of the gateway earth stations over a wide area facilitates spectrum efficiency by permitting Hughes to use the same set of frequencies in the respective uplink beam and downlink beam for each gateway earth station simultaneously, without causing interference to other gateways. Geographically separated earth stations also enhance reliability by allowing Hughes to shift traffic among the different gateways in the event of a transient service interruption at a particular site.

Proposed Antennas. The proposed gateway earth stations (listed in Table 1 below) are scheduled to be deployed consistent with the deployment milestone requirement for the HNS 95W space station.⁵ The technical data for the 9.2-meter antenna to be used at each gateway earth station is provided in the respective Form 312, Schedule B.

The proposed gateway earth stations will meet the antenna performance masks specified in Section 25.209(a) of the Commission's rules for all of the respective bands. Further, the off-axis EIRP density levels specified in Section 25.138(a) will be met with the antenna types that Hughes is proposing to use in the 28.35-28.6 GHz range.

⁴ 47 C.F.R. § 25.136(a); *see also* Exhibit B.

⁵ *See* Exhibit C (Waiver Requests).

Table 1: Gateway Earth Station Sites

	Sites	Site Contact Information	Antenna Diameter (meters)	Longitude			Latitude		
				Degree	Minutes	Seconds	Degree	Minutes	Seconds
1	Flagstaff, AZ	1677 E. Butler Ave., Flagstaff, AZ 86001 301-428-7205	9.2	111	37	55.4	35	11	26.6
2	Boise, ID	10215 W. Emerald Street, Boise, ID 83704 301-428-7205	9.2	116	18	36.0	43	36	29.2
3	Bend, OR	20845 NE Sockeye Place, Bend, OR 97701 301-428-7205	9.2	121	16	59.3	44	5	9.9
4	North Las Vegas, NV	1 Aerojet Way, North Las Vegas, NV 89030 301-428-7205	9.2	115	7	0.7	36	14	14.2
5	Rapid City, SD	3850 Tower Road, Rapid City, SD 57701 301-428-7205	9.2	103	14	39.1	44	2	51.1
6	Billings, MT	1030 Central Avenue, Billings, MT 59102 301-428-7205	9.2	108	32	29.5	45	46	7.7
7	Missoula, MT	8404 El Way, Suite 1, Missoula, MT 59808 301-428-7205	9.2	114	6	54.1	46	56	11.5
8	Bismarck, ND	4202 Coleman Street, Bismarck, ND 58503 301-428-7205	9.2	100	46	49.1	46	51	6.0
9	North Platte, NE	1003 East State Farm Road, North Platte, NE 69103 301-428-7205	9.2	100	45	10.7	41	5	24.2
10	Tucson, AZ	1135 East Pennsylvania St, Tucson, AZ 85714 301-428-7205	9.2	110	57	16.9	32	10	18.6
11	Cheyenne, WY	530 EchoStar Drive, Cheyenne, WY 82007 301-428-7205	9.2	104	44	8.1	41	7	55.9

		Site Contact Information	Antenna Diameter	Longitude			Latitude		
12	Simi Valley, CA	4514 Ish Drive, Simi Valley, CA 93063 301-428-7205	9.2	118	42	24.8	34	16	7.8
13	Quincy, WA	2200 M St. NE, Quincy, WA 98848 301-428-7205	9.2	119	48	54.2	47	14	52.7
14	Rifle, CO	1248 Railroad Ave, Rifle, CO 81650 301-428-7205	9.2	107	46	56.7	39	32	30.4
15	Lindon, UT	333 S 520 W, Lindon, UT 84042 301-428-7205	9.2	111	43	50.2	40	19	58.1
16	Santa Clara, CA	2050 Martin Avenue, Santa Clara, CA 95050 301-428-7205	9.2	121	57	42.3	37	21	55.5
17	Yuma, AZ	575 South Madison Ave, Yuma, AZ 85634 301-428-7205	9.2	114	37	9.1	32	42	59.4
18	Reno, NV	1 Superloop Circle, Suite 3, McCarren, NV 89434 301-428-7205	9.2	119	28	25.6	39	30	53.1
19	Taos, NM	201 Camino de la Merced, Taos, NM 87571 301-428-7205	9.2	105	35	17.2	36	23	14.6
20	Driggs, ID	1670 N Hwy 33, Driggs, ID 83422 301-428-7205	9.2	111	6	49.5	43	44	53.9

Operating Frequencies. Each gateway earth station will operate in the following frequency bands:

Table 2 - Gateway Beams		
Frequency Band (GHz)	Function	US Assignment
27.5-28.0	Gateway Uplink	UMFUS Primary
28.1-28.35	Gateway Uplink	UMFUS Primary
28.35-28.6	Gateway Uplink	FSS GSO Primary
47.2-50.2	Gateway Uplink	FSS GSO Primary
50.4-51.4	Gateway Uplink	FSS GSO Primary
40.0-42.0	Gateway Downlink	FSS GSO Primary

As noted in Table 2 above, the proposed gateway earth station uplink frequencies include portions of the 27.5-28.35 GHz band, which is allocated to Upper Microwave Flexible Use Service (“UMFUS”) on a primary basis, and to Fixed Satellite Service (“FSS”) on a secondary basis.⁶ Comsearch completed frequency coordination notices for the first sixteen of the proposed locations listed in Table 1. For these sixteen sites, prior notification letters were sent to incumbent licensees in this band, and fifteen of these sites have cleared the coordination process.⁷ Hughes is providing in Exhibit A the respective Comsearch reports.

⁶ See 47 C.F.R. § 25.136.

⁷ Hughes did receive a comment from an LMDS licensee that the proposed locations in Santa Clara, California, is “too close to our customers’ locations.” Hughes is surprised by that comment, as this location is collocated with an existing earth station in the EchoStar XIX satellite network that operates in the 27.5-28.35 GHz band (call sign E150087). Hughes has sought further clarification of this comment in order to resolve the matter. Hughes notes that

For the remaining four sites, Hughes and Comsearch have initiated the coordination process, but the completed coordination reports are not yet available. Hughes will update the applications associated with these four sites to include the coordination reports as the reports become available, which are expected in September 2017.⁸

As shown in attached Exhibit B, each of the proposed locations in Table 1 complies with the rules for siting stations in the 27.5-28.35 GHz band to protect UMFUS licensees.⁹ Eight of the proposed sites are collocated with existing FSS earth stations authorized before July 14, 2016, and should be approved on that basis in order to encourage collocation of gateway earth stations operating in the 27.5-28.35 GHz band to minimize impact on UMFUS operation.¹⁰ The remaining twelve sites comply with the Commission's UMFUS siting rule, 47 C.F.R. § 25.136. Each respective site neither has a -77.6 dBm/m²/MHz contour that neither covers more than the population threshold established in Section 25.136(a)(4)(ii) nor contains any of the geographic restrictions listed in Section 25.136(a)(4)(iii).

the Commission has sought comment on how to encourage the best practice of collocation of earth stations at 27.5-28.35 GHz, and that the practice is encouraged by approving new earth stations collocated with an already authorized earth station in this band as a matter of course. *See infra*, n.10.

⁸ *See* Exhibit C (Waiver Requests). Hughes has notified Comsearch of its intent to use the 40.0-42.0, 47.2-50.2, and 50.4-51.4 GHz bands and requested that Comsearch register those locations for coordination purposes. Because service rules for these bands have largely not yet been established and Hughes is among the first applicants seeking to use these bands, Comsearch maintains no frequency coordination database for the 40.0-42.0, 47.2-50.2, and 50.4-51.4 GHz bands at this time.

⁹ 47 C.F.R. § 25.136(a).

¹⁰ The Commission has sought comment on encouraging best practices for earth station siting, including collocation of earth stations operating in the 27.5-28.35 GHz band. *Public Notice*, "International Bureau Seeks Comment on Implementing Earth Station Siting Methodologies," DA 17-606 (June 21, 2017) ("Public Notice"); *see also Use of Spectrum Bands Above 24 GHz for Mobile Radio Servs.*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 (2016) ("*Spectrum Frontiers Order*"). In order to encourage this best practice, the Commission should approve an application for a new earth station using all or part of the 27.5-28.35 GHz band collocated with an already authorized earth station using all or part of the 27.5-28.35 GHz band because it will a *de minimis* impact on UMFUS operation. This practice creates a significant incentive for FSS operators to collocate their 28 GHz earth stations, which would benefit UMFUS operators by concentrating FSS operations into a single area and leaving the remainder of the county undisturbed. *See* Comments of EchoStar Satellite Operating Corp. and Hughes, GN Docket No. 14-177, IB Docket No. 17-172 (filed July 21, 2017).

With respect to Hughes' use of the Q/V-band for uplinks in the 50.4-51.4 GHz band, according to the Commission's IBFS and ULS databases, there are currently no licensed terrestrial or satellite operations. The Commission has also not established terrestrial or satellite service rules applicable to the 50.4-51.4 GHz band or any inter-service sharing requirements. Nonetheless, Hughes' limited use of these frequencies for a small number of gateway earth stations in areas that meet the Commission's rules in the *Spectrum Frontiers Order* for Ka-band earth stations will create minimal risk of interference with any existing or future terrestrial operations in this band.¹¹ As discussed in Exhibit C (Waiver Requests), Hughes requests waiver of the Commission's rules to the extent necessary to use these frequency bands.¹²

Waiver Requests. As detailed in the attached Exhibit C (Waiver Request), Hughes requests waivers of the following requirements to the extent necessary:

- the requirements under 47 C.F.R. § 25.132(b)(1) with respect to certain measured antenna information that is required to be submitted with applications for FSS earth station applications;
- the requirement under 47 C.F.R. §§ 25.130(b), 25.203, and 25.217(c)(3) and (e) to file a coordination analysis for frequency bands shared between terrestrial and space services (the analysis for each site will be filed as soon as it is available);
- the twelve-month earth station construction and bring-into-use requirement of Section 25.133(a)(1); and
- 47 C.F.R. § 25.202(a) to permit the use of the 50.4 – 51.4 GHz frequency bands.¹³

These waivers are necessary to permit efficient design, construction, and operation of the entire HNS 95W satellite system. Grant of these waivers is in the public interest because they will enable development of an innovative, advanced broadband delivery system that has the potential

¹¹ See *Spectrum Frontiers Order*, ¶45.

¹² See also Narrative, Hughes Application, at 12-13.

¹³ To the extent necessary, Hughes also incorporates by reference, as part of this earth station application, the waiver requests submitted in its space station application for HNS 95W. See, e.g., Hughes Application at 10-17.

to reach millions of consumers across the United States and provide performance to an estimated 5 million customers at estimated download speeds of 100 Mbps or more.

FAA Notification. For all proposed gateway earth station antennas, the Commission's TOWAIR application was used to verify compliance with the limits specified in 47 C.F.R. § 17.7(b). All gateway earth stations passed this verification.¹⁴

Radiation Hazard Analyses. For the proposed antenna type, radiation hazard analyses were conducted using the predictive methodology identified in OET Bulletin 65. The results are provided in Exhibit E (RADHAZ Calculations). The analyses were based on the maximum RF power at the antenna flange of 200 watts for the 9.2 meter antennas. This is the maximum uplink power control power, which will only be used for very short periods of time during rain. During clear-sky operations, RF levels will be significantly lower.

Exhibit E shows that the average exposure levels for the protection of the general public are met in the near field, transition field, far field, and between the reflector and ground. As is typically the case with parabolic antennas, the average exposure level for the protection of the general public is exceeded between the feed horn and the reflector. However, since these large antennas will be mounted on a pedestal, the volume of space between the feed horn and reflector where the limit is exceeded will always be above the head of anyone standing in front of the antenna. To further ensure the protection of the general public, the antenna will be located either behind a fence or on private commercial property with limited access. Technicians responsible for operating these antennas are trained to shut down and secure the transmitter before performing any maintenance work.

¹⁴ See Exhibit D (TOWAIR verification).

Prior Commission denials of authorization, license, or construction permit. The explanation of circumstances required by the instructions to Question 36 of each Form 312 is provided in Exhibit F.

Conclusion. The addition of the HNS 95W satellite and associated gateway earth stations to the Hughes network will greatly enhance broadband connectivity across the continental United States and the Americas. With the advanced and flexible design of this satellite, Hughes will be better able to respond to the rapidly growing needs of its customers and provide a reliable, cost-effective means to support next-generation services, including 5G. This option will be truly competitive in both densely populated areas, offering an alternative to aging DSL infrastructure, and underserved areas, which are difficult or uneconomical to reach by terrestrial means. As the Commission has noted, 34 million Americans live in areas that lack terrestrial fixed, high-speed Internet access.¹⁵ High-speed Internet access is critical to ensuring economic opportunity,¹⁶ and satellites play a crucial role in expanding such opportunities to the millions of American customers who live in areas that lack access to terrestrial high-speed broadband.¹⁷ In addition, Hughes will provide a satellite-delivered broadband platform that will be a solution across the country. For these reasons, grant of this application and deployment of the HNS 95W satellite and associated ground network will ensure that satellite broadband remains an important, competitive platform to deliver advanced broadband services to U.S. customers on a spectrally efficient and cost-effective basis, thereby serving an important public interest.

¹⁵ See *2016 Broadband Progress Report*, 31 FCC Rcd 699 ¶ 79.

¹⁶ Testimony of FCC Chairman Ajit Pai Before the Senate Commerce, Science, and Transportation Committee: Oversight of the Federal Communications Commission, at 1 (Mar. 8, 2017), https://apps.fcc.gov/edocs_public/attachmatch/DOC-343814A1.pdf.

¹⁷ See *Getting Broadband*, FCC, <https://www.fcc.gov/consumers/guides/getting-broadband> (last visited July 11, 2017) (“Satellite broadband . . . is useful for serving remote or sparsely populated areas.”).

Based upon the foregoing, Hughes requests that the Commission grant this application to operate the proposed gateway earth stations. As demonstrated herein, grant of this application is in the public interest, and the proposed operations will not cause any harmful interference.

Respectfully Submitted,

/s/ Jennifer A. Manner

Jennifer A. Manner

Senior Vice President, Regulatory Affairs

Hughes Network Systems, LLC

11717 Exploration Lane

Germantown, MD 20876

(301) 428-5893

Fax (301) 428-2818

jennifer.manner@echostar.com

/s/ Brennan T. Price

Brennan Price

Senior Principal Engineer, Regulatory Affairs

Hughes Network Systems, LLC

11717 Exploration Lane

Germantown, MD 20876

(301) 428-1654

brennan.price@hughes.com