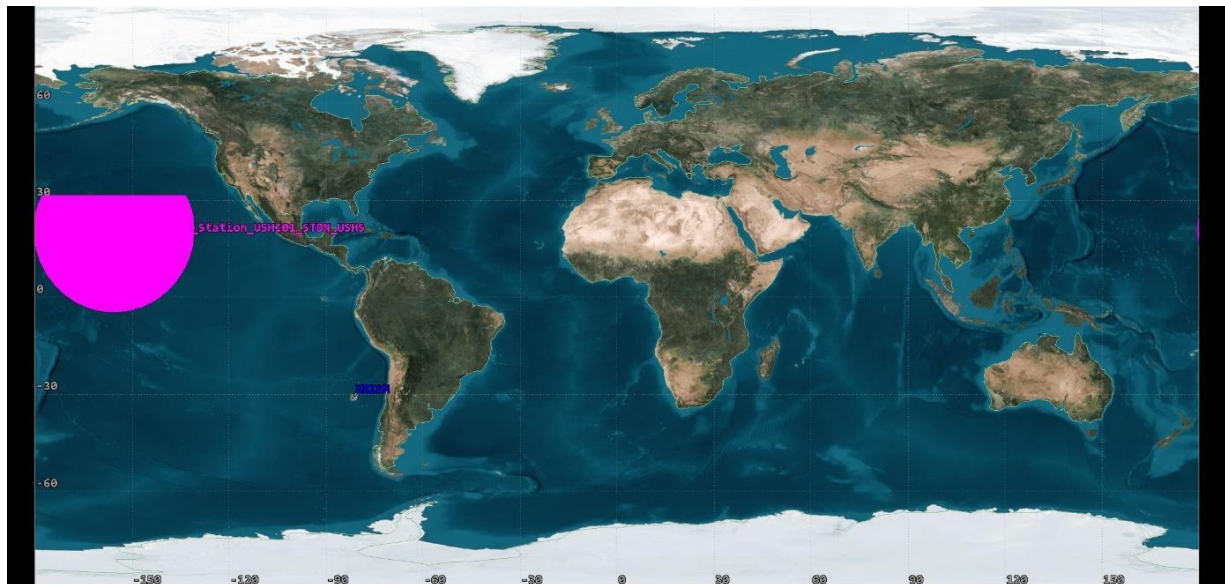


Narrative Waiver Trailor

Narrative

USN Support for XRISM from Hawaii

XRISM is a mission of JAXA. Licensing is needed to commence on Jan. 1st 2027. Planned support from SSC is for a period of 180 days. This is an extension of SES-STA-20260216-00760.



XRISM typical coverage from Hawaii

The below analysis covers all possible visibilities from USN Hawaii. It is expected that a total of 50 passes from the below visibilities will be supported over 180 days. On Apr. 9th 2025, USN submitted an application for a long-term license.

	Downlink	Uplink
XRISM	2280.50 MHz	2099.96 MHz

XRISM

1 99991U 23999A 22164.12500000 .00000000 00000-0 15913-3 0 00074
2 99991 30.9940 26.0226 0014084 241.1468 109.8407 14.98902303144710

XRISM Possible Passes

Access	Start Time (YYYY:MM:DD:MM:SS)	","Stop Time (YYYY:MM:DD:MM:SS)"	Duration (sec)
1	2023:05:12:12:13:27.627	2023:05:12:12:19:34.696	367.069
2	2023:05:12:22:38:30.346	2023:05:12:22:42:16.511	226.165
3	2023:05:13:00:15:45.686	2023:05:13:00:27:48.783	723.097
4	2023:05:13:01:56:45.337	2023:05:13:02:09:52.361	787.024
5	2023:05:13:03:39:16.610	2023:05:13:03:51:26.601	729.992
6	2023:05:13:05:22:06.083	2023:05:13:05:33:38.553	692.47

7	2023:05:13:07:04:07.146	2023:05:13:07:16:33.202	746.055
8	2023:05:13:08:45:39.800	2023:05:13:08:58:55.164	795.364
9	2023:05:13:10:27:56.578	2023:05:13:10:39:35.494	698.916
10	2023:05:13:22:35:06.968	2023:05:13:22:42:59.943	472.975
11	2023:05:14:00:14:06.167	2023:05:14:00:26:45.588	759.421
12	2023:05:14:01:55:36.196	2023:05:14:02:08:32.647	776.45
13	2023:05:14:03:38:20.848	2023:05:14:03:50:11.812	710.964
14	2023:05:14:05:21:00.532	2023:05:14:05:32:39.221	698.689
15	2023:05:14:07:02:48.280	2023:05:14:07:15:33.903	765.624
16	2023:05:14:08:44:24.098	2023:05:14:08:57:34.264	790.165
17	2023:05:14:10:27:12.390	2023:05:14:10:37:35.096	622.707
18	2023:05:14:22:32:41.870	2023:05:14:22:42:41.692	599.822
19	2023:05:15:00:12:36.205	2023:05:15:00:25:34.904	778.699
20	2023:05:15:01:54:32.495	2023:05:15:02:07:12.209	759.714
21	2023:05:15:03:37:24.305	2023:05:15:03:49:00.759	696.454
22	2023:05:15:05:19:50.225	2023:05:15:05:31:42.120	711.895
23	2023:05:15:07:01:28.131	2023:05:15:07:14:30.154	782.023
24	2023:05:15:08:43:12.849	2023:05:15:08:56:04.740	771.891
25	2023:05:15:10:26:49.772	2023:05:15:10:35:13.650	503.878
26	2023:05:15:22:30:39.195	2023:05:15:22:41:59.355	680.16
27	2023:05:16:00:11:14.490	2023:05:16:00:24:19.054	784.564
28	2023:05:16:01:53:32.886	2023:05:16:02:05:52.426	739.54
29	2023:05:16:03:36:25.175	2023:05:16:03:47:53.965	688.79
30	2023:05:16:05:18:35.630	2023:05:16:05:30:45.462	729.832
31	2023:05:16:07:00:08.091	2023:05:16:07:13:20.576	792.485
32	2023:05:16:08:42:08.292	2023:05:16:08:54:25.363	737.071
33	2023:05:16:10:27:16.151	2023:05:16:10:32:05.456	289.304
34	2023:05:16:20:50:53.288	2023:05:16:20:56:14.527	321.239
35	2023:05:16:22:28:50.803	2023:05:16:22:41:02.600	731.797
36	2023:05:17:00:10:00.017	2023:05:17:00:22:59.871	779.854
37	2023:05:17:01:52:35.723	2023:05:17:02:04:34.609	718.886
38	2023:05:17:03:35:22.064	2023:05:17:03:46:51.280	689.216
39	2023:05:17:05:17:17.649	2023:05:17:05:29:47.320	749.671
40	2023:05:17:06:58:49.613	2023:05:17:07:12:04.055	794.442
41	2023:05:17:08:41:13.577	2023:05:17:08:52:34.207	680.63
42	2023:05:17:20:47:55.291	2023:05:17:20:56:29.603	514.313
43	2023:05:17:22:27:13.335	2023:05:17:22:39:56.148	762.813
44	2023:05:18:00:08:51.774	2023:05:18:00:21:38.932	767.158
45	2023:05:18:01:51:39.136	2023:05:18:02:03:19.908	700.773
46	2023:05:18:03:34:14.250	2023:05:18:03:45:51.841	697.591
47	2023:05:18:05:15:57.486	2023:05:18:05:28:45.855	768.369
48	2023:05:18:06:57:34.311	2023:05:18:07:10:39.615	785.304
49	2023:05:18:08:40:33.840	2023:05:18:08:50:27.504	593.664
50	2023:05:18:20:45:37.114	2023:05:18:20:56:01.993	624.879

Flux Density impinging on the ground in Alaska from XRISM

The Flux density is calculated as:

$$flux\ density = EIRP / (4\pi RSE^2)$$

where RSE is the distance from spacecraft to the ground,

and EIRP is the Effective Isotropic Radiated Power of the spacecraft.

Data from the spacecraft vendor indicates that the nominal EIRP of the XRISM spacecraft is -18.9 dBW. The closest distance to earth during an overhead pass is = 550 km.

Converting -18.9 dBW to scalar watts = $10^{-1.89}$ watts transmitted at 2099.96 MHz.

Therefore:

$$\text{flux density} = 10^{-1.89} / (4\pi 550000^2)$$

$$\text{Flux density} = 3.389 \times 10^{-15} \text{ Watts/meter}^2$$

Or

$$\text{Flux density} = 3.389 \times 10^{-16} \text{ mW/cm}^2$$

Inclination: 31 degrees

Apogee: 550 km

Perigee: 550 km

Number of Orbital Planes: 1

Waiver

Exhibit C

PETITION FOR WAIVER OF SECTION 25.137 AND 25.114 AND OF THE U.S. TABLE OF FREQUENCY ALLOCATIONS

I. TO THE EXTENT THEY APPLY, GOOD CAUSE EXISTS FOR A WAIVER OF CERTAIN PORTIONS OF SECTIONS 25.137 AND 25.114

Universal Space Network, Inc. (USN) is provided limited legal and technical information for the XRISM Satellite.¹ Pursuant to Section 25.137 of the Federal Communications Commission's ("Commission" or "FCC") rules, the same technical information required by Section 25.114 for U.S.-licensed space station, and certain legal information, must be submitted by earth station applicants "requesting authority to operate with a non-U.S. licensed space station to serve the United States..."² USN seeks authority to support critical transmission and reception for the XRISM spacecraft, and not commercial service to the United States, and thus believes that Section 25.137 does not apply.

To the extent the Commission determines, however, that USN's request for authority to provide critical spacecraft risk mitigation support on a special temporary basis is a request to serve the United States with a non-U.S.-licensed

satellite, USN respectfully requests a waiver of Sections 25.137 and 25.114 of the Commission's rules, to the extent that USN has not herein provided the information required by these rules. 3 The Commission may grant a waiver for good cause shown.⁴ A waiver is therefore appropriate if special circumstances warrant a deviation from the general rule, and such a deviation will serve the public interest. The US public interest is supported by the sharing of collected data regarding the high-resolution x-ray spectroscopic observations.

In this case, good cause for a waiver of portions of Section 25.114 exists. USN seeks authority to conduct data collection testing support for XRISM. Thus, any information sought by Section 25.114 that is not relevant to the critical support – e.g., antenna patterns, energy and propulsion and orbital debris - USN does not have. In addition, USN would not easily be able to obtain such information because USN is not the operator of the XRISM satellite, nor is USN in contractual privity with that operator. Rather, USN has contracted with Swedish Space Corporation, Solna Sweden (SSC) to support the eclipse event in S-Band of the XRISM satellite.

1 FCC Form 312 Section B

2 47 C.F.R. § 25.137(a)

3 47 C.F.R. §§25.137 and 25.114

4 47 C.F.R. §1.3

Because it is not relevant to the service for which USN seeks authorization, and because obtaining the information would be a hardship, USN seeks a waiver of all the technical and legal information required by Section 25.114, to the extent it is not provided herein. As noted above, USN has provided the required information to the extent that it is relevant to the testing service for which USN seeks authorization.

Good cause also exists to waive portions of Section 25.137, to the extent the information required is not herein provided. Section 25.137 is designed to ensure that “U.S.-licensed satellite systems have effective competitive opportunities to provide analogous services” in other countries. Here, there is no commercial service being provided by the satellite; USN is providing data collection while XRISM performs observations of hot gas plasma wind that blows through the galaxies of the universe.

Thus, the purpose of the information required by Section 25.137 is not implicated here. For example, Section 25.137(d) requires earth station applicants requesting authority to operate with a non-U.S.-licensed space station that is not in orbit and operating to post a bond. 5 The underlying purpose in having to post a bond – i.e., to prevent warehousing of orbital locations by operators seeking to

serve the United States – would not be served by requiring USN to post a bond in order to conduct the 180 days critical support of the XRISM satellite.

It is USN’s understanding that XRISM is licensed by JAXA of the country of Japan. XRISM is spacecraft meant to serve Japan, with data shared in observations by the US. Thus, the purpose of Section 25.137 – to ensure that U.S. satellite operators enjoy “effective competitive opportunities” to serve foreign markets and to prevent warehousing of orbital locations service the United States – will not be undermined by grant of this waiver request.

Finally, USN notes that it expects to communicate with the XRISM satellite using its U.S. earth station for a period of 180 days. Requiring USN to obtain technical and legal information from an unrelated party, where there is no risk of interference. Given these particular facts, the waiver sought herein is appropriate.

I II. GOOD CAUSE EXISTS FOR A WAIVER OF THE UNITED STATES TABLE OF FREQUENCY ALLOCATIONS

USN further requests a waiver of the United States Table of Frequency Allocations ("U.S. Table") as described in section 2.106 of the rules for the frequency bands 2025 – 2110 MHz (Earth-to-Space) and 2200 – 2290 MHz (Space-to-Earth).⁶ Section footnotes allow for non-federal Government use of these bands in the United States on a case-by-case non-interference basis. Such use by USN necessitates a waiver of the U.S. Table.

Good cause exists to grant USN a limited waiver of the U.S. Table to allow critical support for the XRISM satellite. In considering request for case-by-case spectrum uses, the Commission has indicated that it would generally grant such waivers “where there is little potential for interference into any service authorized under the Table of Frequency Allocations and when the case-by-case operator accepts any interference from authorized services.” ⁷ USN will coordinate with other parties operating communication systems in compliance with the Table of Frequency Allocations to ensure that no harmful interference is caused. USN seeks to operate only pursuant to special temporary authorization and thus agrees to accept any interference from authorized services. In summary, USN’s operation on a non-interference, non-protected basis support waiver of the U.S. Table.

5 47 C.F.R. §25.137(d)(4)

6 47 C.F.R. §2.106

7 Previously approved STA's for Universal Space Network SES-STA-20020725-01174; SES-STA-20021112-02008; SES-STA-20040315-00475; SES-STA-20220512-00477

With respect to Space Launch Services

Pursuant to Section 1.3 of the Commission's rules (47 CFR § 1.3), USN respectfully requests a waiver of certain provisions of Part 25 and Part 26 of the Commission's rules to permit the licensing and operation of a satellite earth station using the 2025–2110 MHz and 2200–2290 MHz frequency bands for Part 25, telemetry, tracking, and command (TTC) operations of its low Earth orbit (LEO) satellite constellation.

Under 47 CFR § 1.3, the Commission may waive its rules for good cause shown. USN submits that:

The proposed earth station will support XRISM TT&C operations, which cannot be accommodated in other bands due to technical/operational constraints. Besides these bands have been used in all previous STA applications for this spacecraft, they are also technically suitable due to their propagation characteristics and compatibility with existing ground infrastructure.

These bands have been partially reallocated to space launch services under Part 26. As per 47 CFR § 25 section 2.106, this application would not comply without a waiver due to limitations on non-federal use or non-space launch service in these bands which currently restrict or limit the use of the referenced bands due to the reallocation referenced above.

USN believe this is in the public interest, technically feasible, non-disruptive, promoting scientific research, observations of hot gas plasma wind that blows through the galaxies of the universe.

It is also consistent with the FCC's goals of promoting innovation, efficient use of spectrum and being in line with FCC orders and rulemakings that support flexible use of these bands (e.g., the FCC's 2023 Report and Order on commercial space launch operations 1).

This request is also consistent with prior FCC-authorized STAs, including:

- Lynk Global, Inc. (File No. SES-STA-20220512-00477), which was granted temporary authority for TT&C in both bands;
- Space Telecommunications, Inc. (CTC-0 CubeSat, File Number: 1082-EX-ST-2024) which was granted temporary authority for TT&C in both bands.

- Geometric Energy Corporation, which received STA for TT&C in these bands for a lunar mission via a UK-based earth station

These precedents demonstrate the FCC's established practice of granting temporary, coordinated use of these bands for TT&C under appropriate conditions.

USN request a waiver to permit temporary earth station operations and continued use of the referenced bands for Part 25 TT&C satellite communications. A waiver is necessary due to the relocation of these bands.

Trailer

Summary of Technical Information For Coordination with NTIA/FAS/IRAC

Applicant: Universal Space Network, Inc.

File No.: _____

Call Sign: No Call Sign

Special Temporary Authority ("STA")

Purpose of operation: XRISM will perform spectroscopic observations of hot gas plasma wind.

Start Date: 1 Jan. 2027 End Date: June 30th 2027

Site Location: Naalehu, HI

Latitude: 19 deg 00' 50.056" N (NAD-83)

Longitude: 155 deg 39' 47.884" W (NAD-83)

Transmit frequency: 2099.96 MHz

Polarization: CR

Antenna manufacturer: Datron

Antenna size in meter: 13m

Antenna model: 1453

Antenna Gain Transmit: 46.1 dBi @ 2099.96 MHz

Frequency Band (MHz)	Emissions	Max.EIRP (dBW)	Max.EIRP Density (dBW/4KHz)
2098.96-2100.96	2M00G1D	68	41
2279.30-2281.70	2M40G9W		N/A (receive only)
2279-2282	3M00G1D		N/A (receive only)

Satellite: XRISM