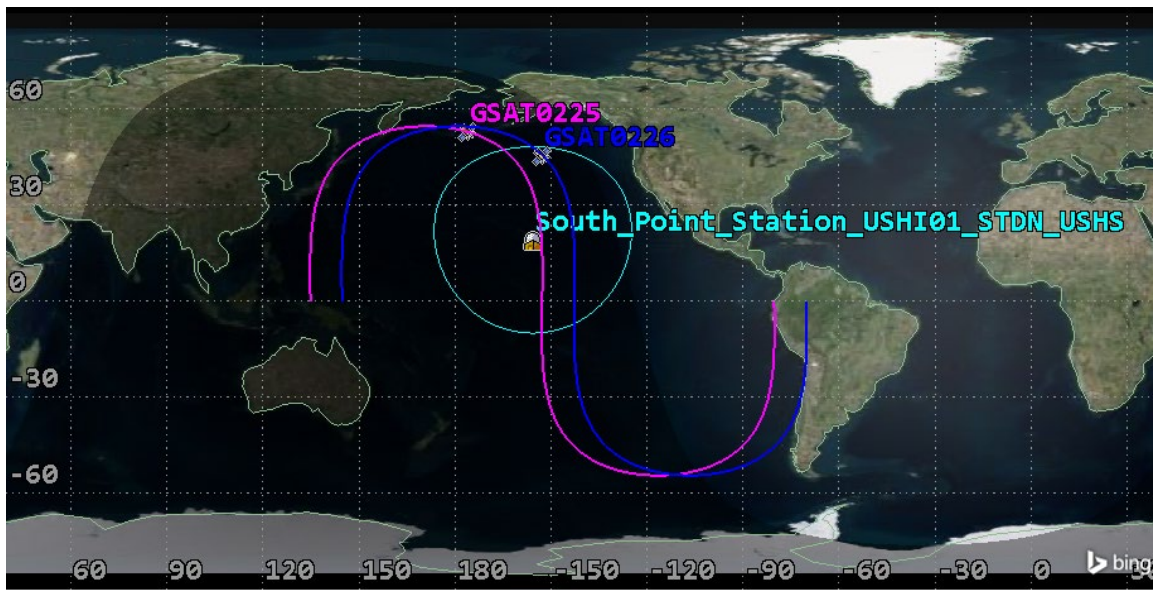


LEOP support of Galileo Constellation Launch Flight #12 from USN's Hawaii ground station

Galileo Flight #12 will launch on or about April 6th, 2022. The launch will continue to build the "Full Operational Capability" in their operation of the Galileo navigation constellation for the EU. USN has been requested to assist with a LEOP campaign using its Hawaiian earth station ranging capability for the F12 launch. The LEOP will be for Galileo spacecraft GSAT0225 and GSAT0226 for a requested period of 30 days beginning on or about April 1, 2022.

The spacecraft(s) are a Medium Earth Orbiting (MEO) spacecraft in a high mid-latitude orbit (56 degrees) with a near circular orbit of altitude of 23400 Km. This orbit allows a nominal 1 visibility over the USN Hawaii station every day. Each spacecraft contact is on the order of 1 to 16 hours.



GSAT0225 and GSAT0226 nominal orbit and Hawaii coverage

The below analysis covers all possible visibilities from USN Hawaii, it is expected that a total of 10 pass from the below visibilities will be supported over 30 days.

	Downlink	Uplink
GSAT0225	2215.811 MHz	2040.399 MHz
GSAT0226	2221.956 MHz	2046.051 MHz

GALILEOSAT25-FM25

1 00000U 00000A 22096.18750000 .00000000 00000+0 00000+0 0 00012
2 0 54.3999 144.1536 0006187 251.5605 355.3859 1.67806377 04

GSAT0225 possible passes

Access	Start Time (YYYY:MM:DD)	Stop Time (YYYY:MM:DD)
1	2022:04:01:20:11:33.413	2022:04:01:21:16:58.269
2	2022:04:02:05:19:16.542	2022:04:02:06:25:46.645
3	2022:04:03:09:42:00.871	2022:04:03:15:47:04.073
4	2022:04:04:19:20:13.328	2022:04:04:21:12:54.299
5	2022:04:06:08:51:35.508	2022:04:06:12:47:06.314
6	2022:04:07:18:36:40.989	2022:04:07:20:59:47.083
7	2022:04:09:08:08:00.614	2022:04:09:12:04:23.431
8	2022:04:10:17:56:19.398	2022:04:10:20:42:18.004
9	2022:04:12:07:28:23.578	2022:04:12:11:27:13.298
10	2022:04:13:17:17:46.563	2022:04:13:20:21:49.605
11	2022:04:15:06:51:28.556	2022:04:15:10:51:29.778
12	2022:04:16:16:40:20.615	2022:04:16:19:58:58.837
13	2022:04:18:06:16:35.155	2022:04:18:10:16:12.453
14	2022:04:19:16:03:38.536	2022:04:19:19:34:06.194
15	2022:04:21:05:43:25.709	2022:04:21:09:41:00.075
16	2022:04:22:15:27:32.135	2022:04:22:19:07:28.072
17	2022:04:24:05:11:54.942	2022:04:24:09:05:48.784
18	2022:04:25:14:51:54.822	2022:04:25:18:39:16.073
19	2022:04:27:04:41:57.165	2022:04:27:08:30:31.958
20	2022:04:28:14:16:34.011	2022:04:28:18:09:32.542
21	2022:04:30:04:13:28.669	2022:04:30:07:54:57.133
22	2022:05:01:13:41:20.156	2022:05:01:17:00:00.000

GALILEOSAT26-FM26

1 00000U 00000B 22096.18750000 .00000000 00000+0 00000+0 0 00034
2 0 54.3999 144.1536 0002243 43.6057 203.3439 1.68014191 06

GSAT0226 possible passes

Access	Start Time (YYYY:MM:DD)	Stop Time (YYYY:MM:DD)
1	2022:04:01:20:40:10.568	2022:04:01:21:01:33.634
2	2022:04:02:05:14:15.722	2022:04:02:06:43:09.437
3	2022:04:03:09:55:44.484	2022:04:03:16:04:09.832
4	2022:04:04:19:24:42.292	2022:04:04:21:12:33.911
5	2022:04:06:08:51:23.902	2022:04:06:12:45:10.908
6	2022:04:07:18:31:37.232	2022:04:07:20:59:03.004
7	2022:04:09:07:59:07.967	2022:04:09:11:55:18.073
8	2022:04:10:17:43:30.704	2022:04:10:20:38:30.265
9	2022:04:12:07:12:51.180	2022:04:12:11:11:38.451
10	2022:04:13:16:57:54.247	2022:04:13:20:13:26.191
11	2022:04:15:06:30:29.023	2022:04:15:10:29:16.760
12	2022:04:16:16:13:44.434	2022:04:16:19:44:50.537
13	2022:04:18:05:51:05.976	2022:04:18:09:47:08.722
14	2022:04:19:15:30:28.093	2022:04:19:19:13:13.761
15	2022:04:21:05:14:22.027	2022:04:21:09:04:50.236
16	2022:04:22:14:47:50.446	2022:04:22:18:38:55.852
17	2022:04:24:04:40:16.325	2022:04:24:08:22:11.866
18	2022:04:25:14:05:38.228	2022:04:25:18:02:05.795
19	2022:04:27:04:08:53.669	2022:04:27:07:38:58.147
20	2022:04:28:13:23:29.247	2022:04:28:17:22:34.423
21	2022:04:30:03:40:28.796	2022:04:30:06:54:42.900
22	2022:05:01:12:40:55.266	2022:05:01:16:39:54.853

Flux Density impinging on the ground in Hawaii from Galileo GSAT225 and GSAT226

The Flux density is calculated as:

$$\text{Flux density} = \text{EIRP} \div (4 \pi Rse^2)$$

Where **Rse** is the distance from spacecraft to the ground

Where **EIRP** is the Effective Isotropic Radiated Power of the spacecraft

Data from the spacecraft vendor indicates that the nominal EIRP of each GSAT spacecraft is -1.10 dBW. Being a near circular orbit, the altitude (and thus the closest distance to earth during an overhead pass) is = 23,400 Km.

Converting -1.10 dBW to scalar watts = 0.776 watts transmitted at 2221.9 MHz

Therefor:

$$\text{Flux density} = 0.776 \div (4 \pi * 23,400,000 \text{ meters}^2)$$

Flux density = 1.127×10^{-16} Watts/meter²

Or

Flux density = 1.127×10^{-17} mW/cm²

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 GALILEO (GSAT225 and GSAT226), the first and second spacecraft of the “Full Operational Capability” series Satellites.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 the needed launch of the Galileo F12 spacecrafts, 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 LEOP 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.

In this case, good cause for a waiver of portions of Section 25.114 exists. USN seeks authority only to conduct LEOP support using GALILEO (GSAT225 and GSAT226). Thus, any information sought by Section 25.114 that is not relevant to the LEOP – 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 GALILEO (GSAT225 and GSAT226) satellites, nor is USN in contractual privity with that operator. Rather, USN has contracted with Swedish Space Corporation, Solna Sweden (SSC) to support LEOP support in S-Band of the satellite.

As evidenced by the Comsearch report attached to this request, USN has coordinated the LEOP using GALILEO (GSAT225 and GSAT226) satellites with potentially affected terrestrial operators. Moreover, as with any STA, USN will conduct the LEOP on an unprotected, non-interference basis to government operations.

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 LEOP 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 service being provided by the satellite; USN is providing TT&C testing. 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 30 days of LEOP testing using GALILEO (GSAT225 and GSAT226) satellites.

It is USN’s understanding that GALILEO (GSAT225 and GSAT226) is licensed by ESA (European Space Agency). GALILEO (GSAT225 and GSAT226) are the 29th and 30th spacecrafts of the European navigation constellation. The spacecraft family is primarily meant to serve the EU. 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 GALILEO (GSAT225 and GSAT226) satellite using its U.S. earth station for a period of 30 days. Requiring USN to obtain technical and legal information from an unrelated party, where there is no risk of interference and the operation will cease within 30 days would pose undue hardship without serving underlying policy objectives. Given these particular facts, the waiver sought herein is appropriate.

⁵ 47 C.F.R. §25.137(d)(4)

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 LEOP support using GALILEO (GSAT225 and GSAT226) satellites. 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.

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