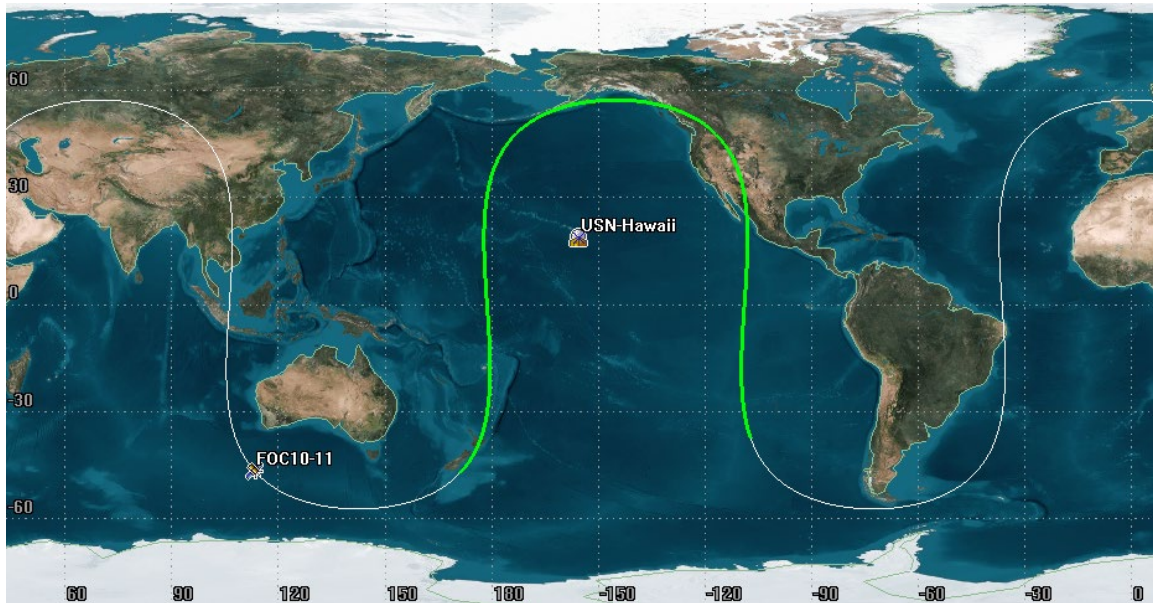


## LEOP support of Galileo Constellation Launch Flight #11 (GSAT0223, and GSAT0224 vehicles) from USN's Hawaii ground station

By this application, SSC Space US, Inc. dba Universal Space Network (collectively, "USN"),<sup>1</sup> a Delaware Corporation, seeks FCC approval to support the Galileo Flight #11 that will place the 23<sup>rd</sup> and 24<sup>th</sup> spacecraft of the "Full Operational Capability" in their operational orbit of the Galileo navigation constellation for the EU. The launch consists of 2 spacecraft that will be launched from French Guiana on November 23, 2021 at 01:07:49 UTC. USN has been contracted to support the Galileo spacecraft LEOP(s) for a period of up to 30 days as the spacecrafts are drifted towards their operational orbit.

The spacecraft(s) are a Medium Earth Orbiting (MEO) spacecraft in a high mid-latitude orbit (57 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.



### GSAT0223, and GSAT0224 nominal orbit and Hawaii coverage

The spacecraft's will be supported from injection and drifting apart for a 30 day period. The below analysis shows the first 20 days of possible visibilities with currently known orbital elements from USN Hawaii, but not all visibilities will be supported. The spacecraft passes below contains the preliminary injection

<sup>1</sup> USN also is engaging counsel to update the entity's FRN information to reflect its corporate name, SSC Space US, Inc., rather than its former and d/b/a name. However, given the pressing nature of this request, this request is being submitted under the entity's current registration.

design and are subject to final injection modifications and potential orbital maneuvers before launch. When such updated orbital elements are available this analysis will be updated.

## Spacecraft injection

Both spacecraft will be visible from Hawaii at the same time for some of each pass, but only one spacecraft will be supported at a time. The spacecraft's are supported by selecting different RF frequencies as shown below.

	Downlink	Uplink
GSAT0223	2234.232 MHz	2057.355 MHz
GSAT0224	2228.094 MHz	2051.703 MHz

### GSAT0223

```
1 99991U 20991A 21327.20808681 +.00000000 00000-0 +00000+0 0 08
2 99991 57.0823 26.6597 0006284 249.0171 352.1184 1.67806163 05
```

### GSAT0224

```
1 99992U 20992A 21327.25707644 +.00000000 00000-0 +00000+0 0 00
2 99992 57.0823 26.6598 0002183 38.0297 203.1057 1.68013974 01
```

## GSAT0223 Injection

Access	Start Time (UTCG)	Stop Time (UTCG)
-----	-----	-----
1	23 Nov 2021 07:18:44	23 Nov 2021 18:43:40
2	24 Nov 2021 16:55:22	25 Nov 2021 00:22:13
3	25 Nov 2021 02:37:42	25 Nov 2021 08:17:37
4	26 Nov 2021 06:44:11	26 Nov 2021 18:04:12
5	27 Nov 2021 16:12:36	27 Nov 2021 23:54:10
6	28 Nov 2021 02:26:38	28 Nov 2021 07:39:54
7	29 Nov 2021 06:10:07	29 Nov 2021 17:22:51
8	30 Nov 2021 15:26:45	30 Nov 2021 23:24:46
9	1 Dec 2021 02:17:21	1 Dec 2021 07:01:57
10	2 Dec 2021 05:36:28	2 Dec 2021 16:38:50
11	3 Dec 2021 14:35:46	3 Dec 2021 22:54:24
12	4 Dec 2021 02:09:41	4 Dec 2021 06:23:27
13	5 Dec 2021 05:03:13	5 Dec 2021 15:50:46
14	6 Dec 2021 13:35:47	6 Dec 2021 22:23:17
15	7 Dec 2021 02:03:46	7 Dec 2021 05:43:58
16	7 Dec 2021 21:41:37	7 Dec 2021 23:27:26
17	8 Dec 2021 04:30:20	8 Dec 2021 14:56:04
18	9 Dec 2021 12:23:29	9 Dec 2021 21:51:33
19	10 Dec 2021 02:00:07	10 Dec 2021 05:02:49
20	10 Dec 2021 20:53:29	10 Dec 2021 23:31:25
21	11 Dec 2021 03:57:52	11 Dec 2021 13:50:37
22	12 Dec 2021 11:11:07	12 Dec 2021 21:19:20

## GSAT0224 Injection

Access	Start Time (UTCG)	Stop Time (UTCG)
1	23 Nov 2021 08:57:01	23 Nov 2021 20:22:22
2	24 Nov 2021 18:41:55	25 Nov 2021 01:01:49
3	25 Nov 2021 02:57:57	25 Nov 2021 09:57:40
4	26 Nov 2021 08:11:59	26 Nov 2021 19:39:37
5	27 Nov 2021 17:55:46	28 Nov 2021 00:41:20
6	28 Nov 2021 02:34:03	28 Nov 2021 09:10:52
7	29 Nov 2021 07:28:27	29 Nov 2021 18:55:36
8	30 Nov 2021 17:08:30	1 Dec 2021 00:15:38
9	1 Dec 2021 02:15:26	1 Dec 2021 08:24:59
10	2 Dec 2021 06:46:05	2 Dec 2021 18:09:55
11	3 Dec 2021 16:19:15	3 Dec 2021 23:45:32
12	4 Dec 2021 02:01:28	4 Dec 2021 07:39:30
13	5 Dec 2021 06:04:38	5 Dec 2021 17:21:54
14	6 Dec 2021 15:26:38	6 Dec 2021 23:12:16
15	7 Dec 2021 01:51:06	7 Dec 2021 06:53:54
16	8 Dec 2021 05:23:58	8 Dec 2021 16:30:23
17	9 Dec 2021 14:27:53	9 Dec 2021 22:36:53
18	10 Dec 2021 01:43:43	10 Dec 2021 06:07:43
19	11 Dec 2021 04:44:00	11 Dec 2021 15:33:11
20	12 Dec 2021 13:16:51	12 Dec 2021 22:00:05

## Flux Density impinging on the ground in Hawaii from Galileo GSAT0223 and GSAT0224

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

Therefore:

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

$$\text{Flux density} = 1.127 \times 10^{-16} \text{ Watts/meter}^2$$

Or

$$\text{Flux density} = 1.127 \times 10^{-17} \text{ mW/cm}^2$$

**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, (USN) is provided limited legal and technical information for the GALILEO (GSAT0223 and GSAT0224), twenty-third and twenty-fourth spacecraft of the “Full Operational Capability” series) Satellites.<sup>1</sup> 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...”<sup>2</sup> USN seeks authority to support the needed Telemetry, Tracking, and Control (“TT&C”) during launch and early orbit support (“LEOP”) of the GALILEO (GSAT0223 and GSAT0224) spacecraft from launch to medium earth orbit, 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 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.<sup>3</sup> The Commission may grant a waiver for good cause shown.<sup>4</sup> 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 for GALILEO (GSAT0223 and GSAT0224). 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 (GSAT0223 and GSAT0224) satellites, nor is USN in contractual privity with that operator. Rather, USN has contracted with Swedish Space Corporation, Solona Sweden (SSC) to support the Launch and Early Orbit (LEOP) portion in S-Band of the satellite prior to its operation.

As evidenced by the Comsearch report attached to this request, USN has coordinated the LEOP of the GALILEO (GSAT0223 and GSAT0224) 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.

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<sup>1</sup> FCC Form 312 Section B

<sup>2</sup> 47 C.F.R. § 25.137(a)

<sup>3</sup> 47 C.F.R. §§25.137 and 25.114

<sup>4</sup> 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 while the satellites are on their way to medium earth orbit. 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.<sup>5</sup> 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 support of the GALILEO (GSAT0223 and GSAT0224) satellites.

It is USN’s understanding that GALILEO (GSAT0223 and GSAT0224) is licensed by ESA (European Space Agency). GALILEO (GSAT0223 and GSAT0224) are the twenty-third and twenty-fourth spacecraft 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 (GSAT0223 and GSAT0224) 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.

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<sup>5</sup> 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).<sup>6</sup> 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 of the GALILEO (GSAT0223 and GSAT0224) 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."<sup>7</sup> 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.

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<sup>6</sup> 47 C.F.R. §2.106

<sup>7</sup> Previously approved STA's for Universal Space Network SES-STA-20020725-01174; SES-STA-20021112-02008; SES-STA-20040315-00475