

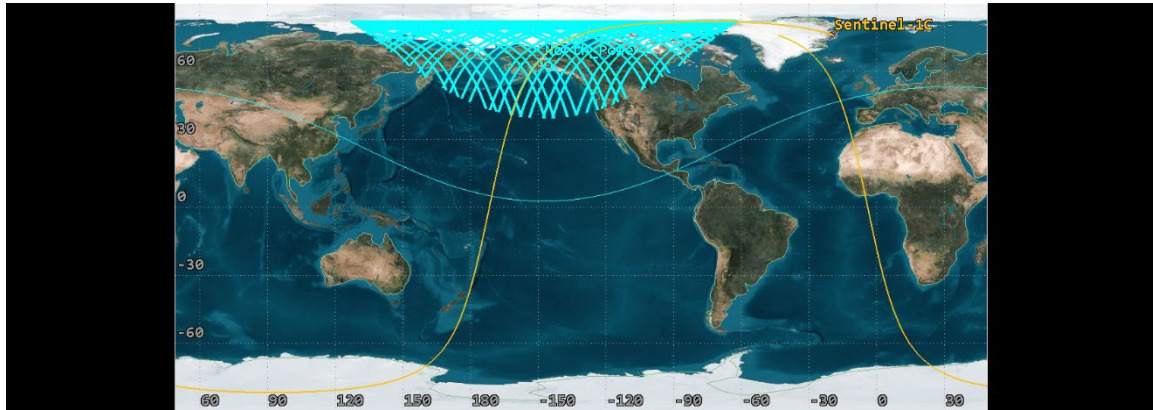
USN LEOP support for Sentinels-1C from Alaska

Sentinels-1C is the newest in a series of ESA sponsored earth observation satellite that will be launched in January 2023 in partnership with NASA but owned by the EU. This LEOP support will begin just after launch on Jan 1st and last from 30 days. The Sentinels-1C spacecraft will be supported by the USN Alaska ground station, which has been fully coordinated by Comsearch/Commscope.

The LEOP support is scheduled to be conducted for a minimum of 30 days. The first 4 days of support opportunities are shown below.

SENT1A

1 39634U 14016A 22334.00000000 .00000000 00000+0 00000+0 0 00013
2 39634 98.1822 339.2000 0001411 81.3331 358.3505 14.59197155461164



USN Alaska coverage of Sentinels-1C (typical coverage each day) LEOP Jan 2023

USN Alaska possible passes for Sentinels-1C 1 Jan – 5 Jan 2023 UTC

Access (min)	Start Time (YYYY:MM:DD)	Stop Time (YYYY:MM:DD)	Duration
1	2023:01:01:17:02:41.673	2023:01:01:17:16:42.436	14.013
2	2023:01:01:18:40:23.306	2023:01:01:18:53:22.695	12.99
3	2023:01:01:20:17:37.938	2023:01:01:20:28:55.031	11.285
4	2023:01:01:21:53:57.839	2023:01:01:22:04:28.190	10.506
5	2023:01:01:23:29:25.822	2023:01:01:23:40:58.368	11.542
6	2023:01:02:01:05:05.307	2023:01:02:01:18:19.213	13.232
7	2023:01:02:02:42:01.476	2023:01:02:02:56:02.976	14.025
8	2023:01:02:04:20:56.851	2023:01:02:04:33:48.614	12.863
9	2023:01:02:06:02:44.719	2023:01:02:06:11:02.731	8.3
10	2023:01:02:12:51:52.918	2023:01:02:12:55:29.685	3.613
11	2023:01:02:14:27:59.571	2023:01:02:14:39:31.152	11.526
12	2023:01:02:16:05:38.841	2023:01:02:16:19:29.341	13.842
13	2023:01:02:17:43:25.830	2023:01:02:17:57:10.871	13.751
14	2023:01:02:19:20:59.320	2023:01:02:19:33:16.138	12.28

15	2023:01:02:20:57:54.257	2023:01:02:21:08:39.434	10.753
16	2023:01:02:22:33:48.183	2023:01:02:22:44:33.048	10.748
17	2023:01:03:00:09:11.579	2023:01:03:00:21:27.731	12.269
18	2023:01:03:01:45:16.704	2023:01:03:01:59:01.099	13.74
19	2023:01:03:03:22:57.935	2023:01:03:03:36:48.047	13.835
20	2023:01:03:05:02:55.676	2023:01:03:05:14:27.345	11.528
21	2023:01:03:06:46:55.910	2023:01:03:06:50:34.707	3.647
22	2023:01:03:13:31:24.254	2023:01:03:13:39:41.754	8.292
23	2023:01:03:15:08:38.249	2023:01:03:15:21:30.226	12.866
24	2023:01:03:16:46:23.893	2023:01:03:17:00:25.977	14.035
25	2023:01:03:18:24:07.724	2023:01:03:18:37:22.388	13.244
26	2023:01:03:20:01:28.737	2023:01:03:20:13:01.926	11.553
27	2023:01:03:21:37:59.211	2023:01:03:21:48:29.703	10.508
28	2023:01:03:23:13:32.623	2023:01:03:23:24:49.281	11.278
29	2023:01:04:00:49:04.953	2023:01:04:01:02:03.717	12.979
30	2023:01:04:02:25:44.993	2023:01:04:02:39:45.260	14.004
31	2023:01:04:04:04:17.798	2023:01:04:04:17:32.023	13.237
32	2023:01:04:05:45:30.085	2023:01:04:05:54:56.633	9.442
33	2023:01:04:14:11:46.486	2023:01:04:14:22:34.404	10.799
34	2023:01:04:15:49:21.246	2023:01:04:16:03:00.571	13.655
35	2023:01:04:17:27:08.569	2023:01:04:17:41:01.949	13.89
36	2023:01:04:19:04:45.782	2023:01:04:19:17:20.226	12.574
37	2023:01:04:20:41:49.225	2023:01:04:20:52:45.539	10.939
38	2023:01:04:22:17:53.210	2023:01:04:22:28:29.986	10.613
39	2023:01:04:23:53:16.827	2023:01:05:00:05:15.338	11.975
40	2023:01:05:01:29:10.460	2023:01:05:01:42:44.263	13.563
41	2023:01:05:03:06:32.892	2023:01:05:03:20:30.337	13.957
42	2023:01:05:04:46:04.548	2023:01:05:04:58:12.880	12.139
43	2023:01:05:06:28:58.524	2023:01:05:06:34:59.797	6.021
44	2023:01:05:13:15:24.153	2023:01:05:13:22:16.488	6.872
45	2023:01:05:14:52:22.274	2023:01:05:15:04:46.618	12.406
46	2023:01:05:16:30:06.055	2023:01:05:16:44:06.217	14.003

Flux Density impinging on the ground in Alaska from Sentinels-1C

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 maximum EIRP of Sentinels-1C is -13.2 dBW. The closest distance to earth during an overhead pass is 684.5 km.

Converting -13.2 dBW to scalar watts = 0.04786 watts transmitted at 2254.100 MHz

Therefor:

$$\text{Flux density} = 0.04786 \div (4 \pi * 684,500^2 \text{ meters}^2)$$

$$\text{Flux density} = 8.129 \times 10^{-15} \text{ Watts/meter}^2$$

Or

$$\text{Flux density} = 8.129 \times 10^{-16} \text{ mW/cm}^2$$

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, Inc. (USN) is provided limited legal and technical information for the Sentinels-1C 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 the Launch and Early Orbit (LEOP) testing for the Sentinels-1C spacecraft to be launched in January 2023, 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.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 for Sentinels-1C. 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 Sentinels-1C satellite, nor is USN in contractual privity with that operator. Rather, USN has contracted with Swedish Space Corporation, Solna Sweden (SSC) to support the LEOP portion in S-Band of the Sentinels-1C satellite.

As evidenced by the Comsearch report attached to this request, USN has coordinated the LEOP of the Sentinels-1C satellite with potentially affected terrestrial operators. Moreover, as with any STA, USN will conduct the test 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 while the satellite is on the way to its low 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.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 LEOP support of the Sentinels-1C satellite.

It is USN’s understanding that Sentinels-1C is licensed by ESA (European Space Agency). Sentinels-1C is a spacecraft 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. 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 Pre-LEOP support of the Sentinels-2A, Sentinels-1A, and Jason-3 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.

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