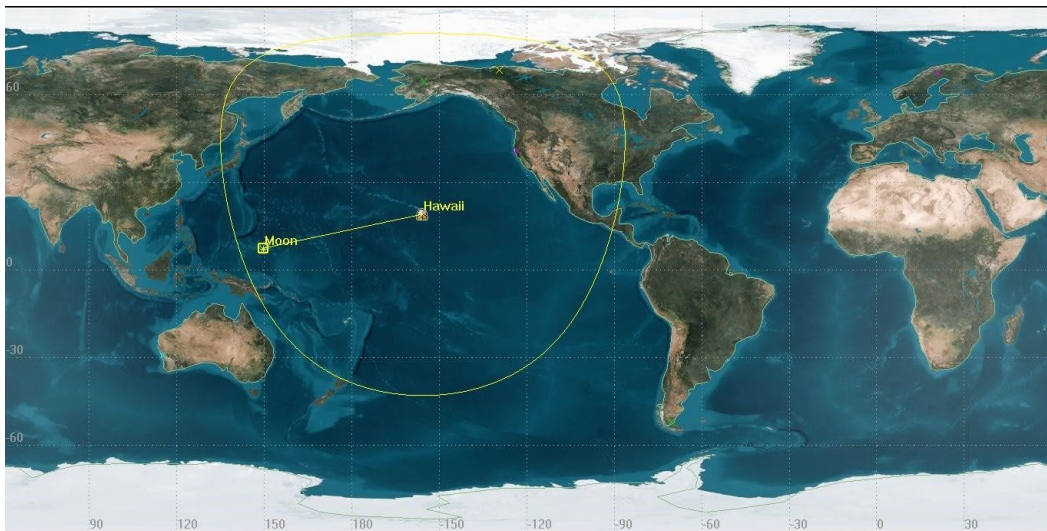


USN support for Chandrayaan-2 Lunar orbiter from Hawaii

By this application, SSC Space US, Inc. dba Universal Space Network (collectively, "USN"),¹ a Delaware corporation, seeks further FCC approval to support Chandrayaan-2, the second lunar mission of the Indian Space Research Organization (ISRO). Chandrayaan-2 is currently orbiting the moon and will explore the polar regions of which this data is essential for the launch of Chandrayaan-3 in June of 2023. This additional science data collection from Hawaii will benefit the near future missions to the moon.

USN is hereby requesting that this STA application be approved as an extension to support for Chandrayaan-2 for a period of 180 days.

The continued support for this STA would be about March 31st, 2023. Support may consist of 2 hours each day when the moon is in view of the earth station.



Chandrayaan-2 typical coverage from Hawaii

¹ 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.

Flux Density impinging on the ground in Hawaii from Chandrayaan-2

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 Chandrayaan-2 is 35.0 dBW. The altitude (and thus the closest distance to earth during an overhead pass) is = 400,000 Km. Converting 35.0 dBW to scalar watts = 3162.3 watts transmitted at 8484.000 MHz (receive frequency granted under SES-STA-20221205-01311).

Thus:

$$\text{Flux density} = 3162.3 \div (4 \pi * 400,000,000 \text{ meters}^2)$$

$$\text{Flux density} = 1.572 \times 10^{-15} \text{ Watts/meter}^2 \text{ or}$$

$$\text{Flux density} = 1.572 \times 10^{-16} \text{ mW/cm}^2$$

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 Chandrayaan-2 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 data collection support for the Chandrayaan-2 spacecraft currently orbiting the Moon, 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 uplink 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 with the NASA Artemis program.

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 Chandrayaan-2. Thus, any information sought by Section 25.114 that is not relevant to the regular 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 Chandrayaan-2 satellite, nor is USN in contractual privity with that operator. Rather, USN has contracted with Swedish Space Corporation, Solna Sweden (SSC) to support the testing in S-Band of the Chandrayaan-2 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 the satellite is orbiting the Moon. 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 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 to conduct the 180 days support of the Chandrayaan-2 satellite.

It is USN’s understanding that Chandrayaan-2 is licensed by ISRO of the country of India. Chandrayaan-2 is spacecraft meant to serve India, with data shared in preparation for future lunar bases 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 Chandrayaan-2 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. Should testing be successful and collected data be valuable to both India and the United States, USN will seek further authorization to support the mission. Given these particular facts, the waiver sought herein is appropriate.

⁵ 47 C.F.R. §25.137(d)(4)

⁶ 47 C.F.R. §2.106

⁷ Previously approved STAs for Universal Space Network SES-STA-20201125-01271, SES-STA-20221205-0131, SES-STA-202101809-00457, SES-STA-20210505-00771, SES-STA-20210809-01353, SES-STA-20220209-00169, SES-STA-20220512-00477, SES-STA-20220916-01009

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

Applicant: Universal Space Network, Inc.
File No.: SES-STA-_____
Call Sign: No Call Sign
Special Temporary Authority ("STA")

Purpose of operation: Lunar science data support for ISRO for Chandrayaan-2 lunar orbiter.

Start Date: March 31, 2023

End Date: September 27, 2023

Site Location: Naalehu, HI

Latitude: 19 deg 00' 49.6" N (NAD-83)
Longitude: 155 deg 39' 46.6" W (NAD-83)

Transmit frequency: 2041.598
Polarization: L, R
Antenna manufacturer: Datron
Antenna Size in meter: 13m
Antenna model: 1453
Antenna Gain Transmit: 46.3 dBi @ 2041 MHz

<u>Frequency Band</u> (MHz)	<u>Emissions</u>	<u>Max.eirp</u> (dBW)	<u>Max.eirp density</u> (dBW/4KHz)
2041.598	1M00G2D	68	50

Satellite: Chandrayaan-2