

Universal Space Network, Inc.

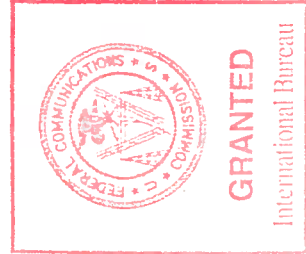
Approved by OMB
3060-0678

APPLICATION FOR EARTH STATION SPECIAL TEMPORARY AUTHORITY

APPLICANT INFORMATION Enter a description of this application to identify it on the main menu:
SpaceIL Lunar Mission

1. Applicant

Name:	Universal Space Network, Inc.	Phone Number:	215-328-9130
DBA Name:		Fax Number:	215-328-9132
Street:	417 Caredean Drive Suite A	E-Mail:	jpgreet@uspacenet.com
City:	Horsham	State:	PA
Country:	USA	Zipcode:	19044
Attention:	Joanne Greet		



File # SES-STA-20180910-02633

Call Sign N/A Grant Date 2/11/2019
(or other identifier)

Term Dates
From 2/13/2019 To: 8/12/2019

Approved: Paul E. Greet

Applicant: Universal Space Network
File No: SES-STA-20180910-02633
Call Sign: None
Special Temporary Authority (STA)

Universal Space Network, LLC (USN) is granted special temporary authority for 180 days, beginning February 13, 2019 to operate its Naalehu, HI fixed earth station to support the Launch and Early Operation Phase (LEOP) and Lunar landing mission of the SpaceIL Israeli lunar mission on center frequencies 2099.500MHz (Earth-to-space) and 2280.000 MHz (space-to-Earth). USN is authorized to support the mission from LEOP thru lunar orbit transfer and to continue support of the lander on the Moon for 6 days.

1. Operations shall be on an unprotected, non-interference basis with respect to other authorized stations, including federal stations.
2. Any future requests or extensions will need to submit applications to the FCC to be re-coordinated with NTIA.
3. Any action taken or expense incurred as a result of operations pursuant to this STA is solely at USN's risk.
4. The 24x7 contact at 215-328-9130 must be available during all operations with the SPACEIL spacecraft

This grant is issued pursuant to Section 0.261 of the Commission's rules on delegated authority, 47 C.F.R. § 0.261, and is effective upon release.



File # SES-STA-20180910-02633

Call Sign W/A Grant Date 2/11/2019
(or other identifier)

Term Dates
From 2/13/2019 To: 8/12/2019

Approved: Paul E. Glab

2. Contact	
Name:	Universal Space Network, Inc. Phone Number: 215-328-9130
Company:	Fax Number: 215-328-9132
Street:	E-Mail: jgreet@uspacenet.com
417 Caredean Drive Suite A	
City: Horsham	State: PA
Country: USA	Zipcode: 19044 -
Attention:	Relationship: Same
(If your application is related to an application filed with the Commission, enter either the file number or the IB Submission ID of the related application. Please enter only one.)	
3. Reference File Number or Submission ID	
4a. Is a fee submitted with this application?	
<input checked="" type="radio"/> If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).	
<input type="radio"/> Governmental Entity <input type="radio"/> Noncommercial educational licensee	
<input type="radio"/> Other (please explain):	
4b. Fee Classification CGX - Fixed Satellite Transmit/Receive Earth Station	
5. Type Request	
<input type="radio"/> Use Prior to Grant <input type="radio"/> Change Station Location <input checked="" type="radio"/> Other	
6. Requested Use Prior Date	
12/19/2018	
7. City Naalehu	
8. Latitude	
(dd mm ss.s h) 19 0 50.3 N	

9. State HI	10. Longitude (dd mm ss.s h) 155 39 46.6 W
11. Please supply any need attachments. Attachment 1: FCC312-B Attachment 2: Waiver-Analysis Attachment 3: Comsearch	
12. Description. (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.) <div style="border: 1px solid black; padding: 5px;">Universal Space Network requests authorization to support the LEOP and Lunar landing mission for the SpaceIL Israeli lunar mission. USN will support the mission from LEOP thru lunar orbit transfer, and continue support of the lander on the Moon for 6 days. USN will support for a total period of 63 days.</div>	
13. By checking Yes, the undersigned certifies that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application"; for these purposes. Yes <input checked="" type="radio"/> No <input type="radio"/>	
14. Name of Person Signing Joanne Greet	15. Title of Person Signing Compliance Manager
WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).	

FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT

The public reporting for this collection of information is estimated to average 2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the required data, and completing and reviewing the collection of information. If you have any comments on this burden estimate, or how we can improve the collection and reduce the burden it causes you, please write to the Federal Communications Commission, AMD-PERM, Paperwork Reduction Project (3060-0678), Washington, DC 20554. We will also accept your comments regarding the Paperwork Reduction Act aspects of this collection via the Internet if you send them to PRA@fcc.gov. PLEASE DO NOT SEND COMPLETED FORMS TO THIS ADDRESS.

Remember – You are not required to respond to a collection of information sponsored by the Federal government, and the government may not conduct or sponsor this collection, unless it displays a currently valid OMB control number or if we fail to provide you with this notice. This collection has been assigned an OMB control number of 3060-0678.

THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, PUBLIC LAW 104-13, OCTOBER 1, 1995, 44 U.S.C. SECTION 3507.

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 SPACEIL Lunar surface landing mission 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 needed Telemetry, Tracking, and Control ("TT&C") during launch and early orbit support ("LEOP") and Lunar support of the SPACEIL spacecraft from launch to Lunar surface landing, 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 and Lunar support for SPACEIL. 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 SPACEIL satellite, 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) and Lunar support in S-Band during the mission.

As evidenced by the Comsearch report attached to this request, USN has coordinated the LEOP of the SPACEIL satellite 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 while the satellite is on the way to Lunar landing. 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 63 days of support of the SPACEIL satellite.

It is USN’s understanding that SPACEIL is licensed by the state of Israel. SPACEIL is a mission inspired by the Google Lunar XPRIZE and is sponsored for educational purposes of Science, Technology, Engineering, and Mathematics (STEM). 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 SPACEIL satellite using its U.S. earth station for a period of 63 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 63 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 of the SPACEIL 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

LEOP support of Spacell lunar mission from USN's Hawaiian ground station

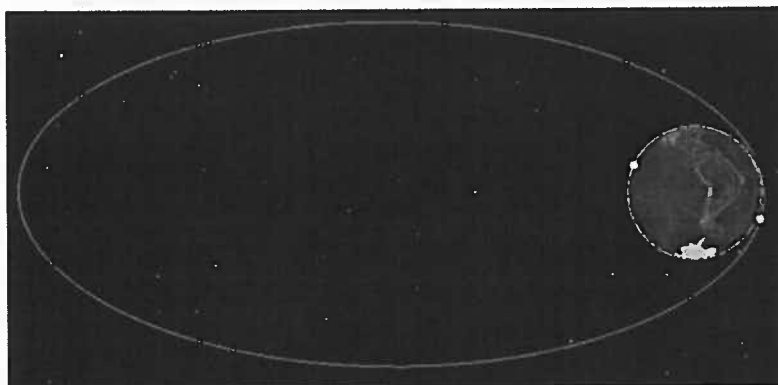
Originally inspired by the Google Lunar XPRIZE, Spacell will softly land a spacecraft on the lunar surface for a period of time and relay high resolution photos to Earth. Spacell is a non-profit organization founded in Israel to inspire young people to pursue Science, Technology, Engineering, and Math (STEM). The mission will launch on a SpaceX Falcon-9 from Florida on December 18th, 2018 at 16:30 UTC as a secondary payload. USN has been contracted to support the mission from USN's Hawaiian ground station from orbital injection thru visibility of spacecraft on the lunar surface for a total nominal mission time of about 63 days.

The mission phases consist of initial Earth orbit for a period of 30 days, followed by a lunar transfer maneuver lasting 6.5 days, followed by Lunar orbit for approximately 20 days mapping the magnetic field, then a Lunar landing in February 2019 for a period of up to 6 days. USN will support the spacecraft during all phases for a period of approximately 63 days depending mission successful operations. The spacecraft operates on the following S-band frequencies.

	Downlink	Uplink
Spacell	2280.000 MHz	2099.500 MHz

Spacecraft injection

The Falcon-9 will initially inject the spacecraft into a highly elliptical orbit for a nominal 30 day period. This orbit will have a super-geosync apogee of about 55,000 Km. Hawaii will conduct pass supports for a nominal 30 minute duration every 4 hours of available visibility. Visibility from Hawaii ranges from 4 hours to 14 hour each day during this phase of the mission. The initial orbit is defined below and the potential USN Hawaii supports.



Initial Orbit Phase

Initial Orbit has been defined with the following state vector:

Epoch Time: 18 Dec 2018 17:52:48 UTC

X: 6189.65 Km

Y: 2913.71 Km

Z: -1651.60 Km

X Velocity: -2.55056 Km/sec

Y Velocity: 8.70091 Km/sec

Z Velocity: -4.49232 Km/sec

Spacell Injection Visibility from USN-Hawaii

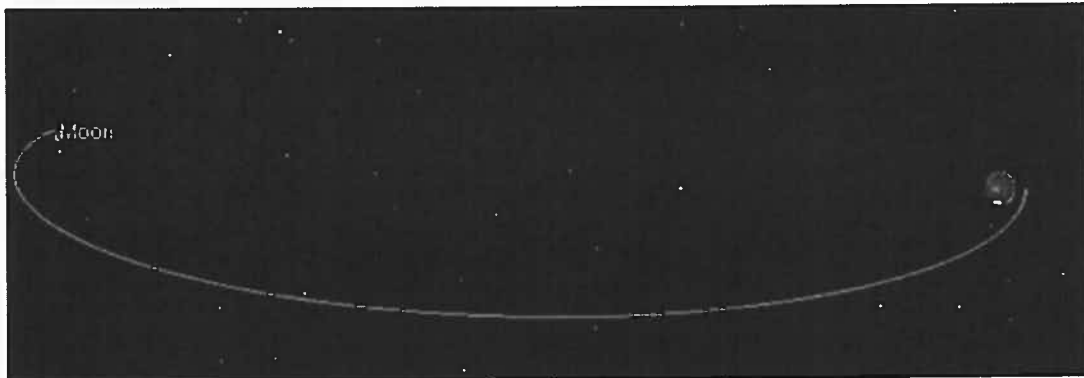
Access	Start Time (UTCG)	Stop Time (UTCG)
1	19 Dec 2018 13:43:57	19 Dec 2018 21:12:03
2	20 Dec 2018 08:51:38	20 Dec 2018 22:30:55
3	21 Dec 2018 10:30:00	21 Dec 2018 23:07:19
4	22 Dec 2018 11:17:21	22 Dec 2018 18:13:17
5	23 Dec 2018 14:47:12	23 Dec 2018 20:31:52
6	24 Dec 2018 09:44:31	24 Dec 2018 21:52:44
7	25 Dec 2018 10:00:46	26 Dec 2018 00:02:35
8	26 Dec 2018 10:47:28	26 Dec 2018 19:11:44
9	27 Dec 2018 15:59:40	27 Dec 2018 19:42:04
10	28 Dec 2018 10:40:18	28 Dec 2018 21:17:01
11	29 Dec 2018 09:28:37	30 Dec 2018 00:57:32
12	30 Dec 2018 10:19:04	30 Dec 2018 20:08:44
13	31 Dec 2018 11:23:56	31 Dec 2018 14:57:24
14	1 Jan 2019 11:37:41	1 Jan 2019 20:41:44
15	2 Jan 2019 08:47:48	2 Jan 2019 22:09:25
16	3 Jan 2019 09:51:13	3 Jan 2019 21:04:54
17	4 Jan 2019 10:43:30	4 Jan 2019 16:05:18
18	5 Jan 2019 12:37:10	5 Jan 2019 20:05:12
19	6 Jan 2019 07:44:51	6 Jan 2019 21:24:03
20	7 Jan 2019 09:23:09	7 Jan 2019 22:00:32
21	8 Jan 2019 10:10:30	8 Jan 2019 17:06:30
22	9 Jan 2019 13:40:25	9 Jan 2019 19:25:01
23	10 Jan 2019 08:37:43	10 Jan 2019 20:45:52
24	11 Jan 2019 08:53:55	11 Jan 2019 22:55:47
25	12 Jan 2019 09:40:37	12 Jan 2019 18:04:57
26	13 Jan 2019 14:52:53	13 Jan 2019 18:35:12
27	14 Jan 2019 09:33:31	14 Jan 2019 20:10:10
28	15 Jan 2019 08:21:46	15 Jan 2019 23:50:44
29	16 Jan 2019 09:12:13	16 Jan 2019 19:01:57
30	17 Jan 2019 10:17:05	17 Jan 2019 13:50:37
31	18 Jan 2019 10:30:54	18 Jan 2019 19:34:53*

*Note that the Lunar transfer orbit burn occurs during this pass and completes at 17:33:25

Lunar Transfer Orbit

The SpacEL lander contains its own booster propulsion system as this is required to softly land on the Moon, as such this booster will also be used to conduct an orbital maneuver burn to place the spacecraft into a heliocentric Lunar transfer orbit. This burn is scheduled to complete at 18 Jan 2019 17:33:25 UTC. The spacecraft traverses towards the Moon for approximately 6.5 days and will then conduct a Lunar orbit injection burn and enter Lunar orbit at 25 Jan 2019 00:13:25 UTC.

The transfer orbit is defined by the STK state vector file:
SIL-00-LunarTransferOrbit.e



Lunar Transfer Orbit

Hawaii will conduct pass supports for a nominal 30 minute duration every 4 hours of available visibility. Visibility from Hawaii ranges from 10 to 11 hours each day during this phase of the mission. The potential USN Hawaii supports are shown below.

Access	Start Time (UTCG)	Stop Time (UTCG)
1	20 Jan 2019 07:42:14	20 Jan 2019 18:38:57
2	21 Jan 2019 08:03:49	21 Jan 2019 19:07:37
3	22 Jan 2019 08:12:07	22 Jan 2019 19:22:04
4	23 Jan 2019 08:17:02	23 Jan 2019 19:31:55
5	24 Jan 2019 08:20:29	24 Jan 2019 19:39:46
6	25 Jan 2019 08:22:46	25 Jan 2019 19:45:33

Lunar Surface Support

USN-Hawaii will support the spacecraft when in view of the Lunar landing location for the duration of the mission as scheduled for periods of 40 minutes duration. Lunar surface support is expect to not exceed 6 days.

Flux Density impinging on the ground in Hawaii from Spacell

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?

The spacecraft has two mission antennas, Low Gain omni (LGTA), and High Gain directional (HGTA). The LGTA will be used exclusively in Earth orbit and has an EIRP of 2.1 dBW. The HGTA has an EIRP of 12.66 dBW and will be deployed at a time the spacecraft is about one third of the way to the moon during the lunar orbit transfer. For worst case analysis the LGTA will have a minimum altitude over Hawaii of 500 Km, and the HGTA will have a minimum altitude of 150,000 Km.

Earth Orbit LGTA:

Converting 2.1 dBW to scalar watts = 1.622 watts transmitted at 2280.0 MHz

Therefore:

$$\text{Flux density} = 1.622 \div (4 \pi * 500,000 \text{ meters}^2)$$

$$\text{Flux density} = 5.163 \times 10^{-13} \text{ Watts/meter}^2$$

Or

$$\text{Flux density} = 5.136 \times 10^{-14} \text{ mW/cm}^2$$

Lunar Transfer, Lunar Orbit, and Lunar Surface HGTA:

Converting 12.66 dBW to scalar watts = 18.450 watts transmitted at 2280.0 MHz

Therefore:

$$\text{Flux density} = 18.45 \div (4 \pi * 150,000,000 \text{ meters}^2)$$

$$\text{Flux density} = 6.525 \times 10^{-17} \text{ Watts/meter}^2$$

Or

$$\text{Flux density} = 6.525 \times 10^{-18} \text{ mW/cm}^2$$

FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for
Universal Space Network, Inc.
NAALEHU, HI
Satellite Earth Station

Prepared By:
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147
July 27, 2018

TABLE OF CONTENTS

1. CONCLUSIONS	3
2. SUMMARY OF RESULTS	4
3. SUPPLEMENTAL SHOWING	5
4. EARTH STATION COORDINATION DATA.....	7
5. CERTIFICATION.....	11

1. CONCLUSIONS

An interference study considering all existing, proposed and prior coordinated microwave facilities within the coordination contours of the proposed earth station demonstrates that this site will operate satisfactorily with the common carrier microwave environment. Further, there will be no restrictions of its operation due to interference considerations.

2. SUMMARY OF RESULTS

A number of great circle interference cases were identified during the interference study of the proposed earth station. Each of the cases, which exceeded the interference objective on a line-of-sight basis, was profiled and the propagation losses estimated using NBS TN101 (Revised) techniques. The losses were found to be sufficient to reduce the signal levels to acceptable magnitudes in every case.

3. SUPPLEMENTAL SHOWING

Pursuant to Part 25.203(c) of the FCC Rules and Regulations, the satellite earth station proposed in this application was coordinated by Comsearch using computer techniques and in accordance with Part 25 of the FCC Rules and Regulations.

Coordination data for this earth station was sent to the below listed carriers with a letter dated 07/17/2018.

Company

3G Wireless, LLC
AERIAL VIDEO SYSTEMS
Alascom Inc
Borgeson, Tom R.
Broadcast Sports Inc.
Casper, John
Chicago Comnet Corp
Citywide News Network, Inc.
Cowboys Stadium LP
CP Communications, LLC
DCI II, INC.
Direct Broadcast Services, Inc.
HF Enterprises, Inc
Hallco Unlimited, Inc.
Hawaii Public Television Foundation
Heiden, William
Im360 Entertainment
Information & Display Systems, Inc.
Information Super Station, LLC
Interlink Network Corp.
International Electronic Information Services, Inc.
International Communications Group, Inc.
KHNL/KGMB License Subsidiary, LLC
KITV, Inc
Loop Inc.
MERCURY COMMUNICATIONS
Microwave Video Systems, LLC
Moreen, Steven K
NEW ENGLAND DIGITAL DISTRIBUTION, INC.
NSM Surveillance
Navajo Communications Company
Onboard Images
Penn Service Microwave Co., Inc.
Plateau Telecommunications, Inc.
Plum TV, LLC
Production & Satellite Services, Inc.
REMOTE FACILITIES CONSULTING SERVICES
RF Central, LLC
RF Film, Inc
Radiofone, Inc.

Randy Hermes Production
Remote Broadcasts, Inc.
Speedshotz, Inc
TTWN Networks, LLC
Unisat, Inc.
United Telephone - Southeast
Vitec Broadcast Services, Inc.
Vyvx, LLC
Westar Satellite Services LP
Winged Vision Inc
Wolfe Air Aviation

4. EARTH STATION COORDINATION DATA

This section presents the data pertinent to frequency coordination of the proposed earth station that was circulated to all carriers within its coordination contours.

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 <http://www.comsearch.com>

Date: 07/27/2018
Job Number: 180717COMSGE29

Administrative Information

Status ENGINEER PROPOSAL
Call Sign NAALEHU
Licensee Code UNSPNE
Licensee Name Universal Space Network, Inc.

Site Information

NAALEHU, HI

Venue Name
Latitude (NAD 83) 19° 0' 50.3" N
Longitude (NAD 83) 155° 39' 46.6" W
Climate Zone C
Rain Zone 4
Ground Elevation (AMSL) 355.09 m / 1165.0 ft

Link Information

Satellite Type Low Earth Orbit
Mode TO - Transmit-Only
Modulation Digital
Minimum Elevation Angle 5.0°
Azimuth Range 0.0° to 360°
Antenna Centerline (AGL) 8.54 m / 28.0 ft

Antenna Information

Transmit - FCC32

Manufacturer Datron
Model 1453
Gain / Diameter 45.9 dBi / 13.0 m
3-dB / 15-dB Beamwidth 0.76° / 1.46°

Max Available RF Power (dBW/4 kHz) -1.1
(dBW/MHz) 22.9

Maximum EIRP (dBW/4 kHz) 44.8
(dBW/MHz) 68.8
(dBW) 68.0

Interference Objectives: Long Term -154.0 dBW/4 kHz 20%
Short Term -131.0 dBW/4 kHz 0.0025%

Frequency Information

Transmit 2.0 GHz

Emission / Frequency Range (MHz) 826KG2D / 2099.5

Max Great Circle Coordination Distance 293.2 km / 182.2 mi
Precipitation Scatter Contour Radius 100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 <http://www.comsearch.com>

Coordination Values		NAALEHU, HI
Licensee Name		Universal Space Network, Inc.
Latitude (NAD 83)		19° 0' 50.3" N
Longitude (NAD 83)		155° 39' 46.6" W
Ground Elevation (AMSL)		355.09 m / 1165.0 ft
Antenna Centerline (AGL)		8.54 m / 28.0 ft
Antenna Model		Datron 13.0 meter
Antenna Mode		Transmit 2.0 GHz
Interference Objectives:	Long Term	-154.0 dBW/4 kHz 20%
	Short Term	-131.0 dBW/4 kHz 0.0025%
Max Available RF Power		-1.1 (dBW/4 kHz)

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Transmit 2.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
0	2.94	76.42	4.50	293.25
5	2.79	74.70	4.50	293.25
10	2.59	73.03	4.50	293.25
15	2.48	71.52	4.50	293.25
20	2.30	70.08	4.50	293.25
25	2.09	68.75	4.50	293.25
30	1.85	67.52	4.50	293.25
35	1.08	65.97	4.50	293.25
40	0.70	64.92	4.50	293.25
45	0.44	64.17	4.50	293.25
50	0.00	63.44	4.50	293.25
55	0.00	63.37	4.50	293.25
60	0.00	63.51	4.50	293.25
65	0.00	63.87	4.50	293.25
70	0.00	64.44	4.50	293.25
75	0.00	65.22	4.50	293.25
80	0.00	66.19	4.50	293.25
85	0.00	67.34	4.50	293.25
90	0.00	68.67	4.50	293.25
95	0.00	70.15	4.50	293.25
100	0.00	71.77	4.50	293.25
105	0.00	73.53	4.50	293.25
110	0.00	75.39	4.50	293.25
115	0.00	77.35	4.50	293.25
120	0.00	79.39	4.50	293.25
125	0.00	81.51	4.50	293.25
130	0.00	83.67	4.50	293.25
135	0.00	85.87	4.50	293.25
140	0.00	88.10	4.50	293.25
145	0.00	90.34	4.50	293.25
150	0.00	92.58	4.50	293.25
155	0.00	94.80	4.50	293.25
160	0.00	96.99	4.50	293.25
165	0.00	99.14	4.50	293.25
170	0.00	101.24	4.50	293.25
175	0.00	103.26	4.50	293.25
180	0.00	105.19	4.50	293.25
185	0.00	107.02	4.50	293.25

COMSEARCH

Earth Station Data Sheet

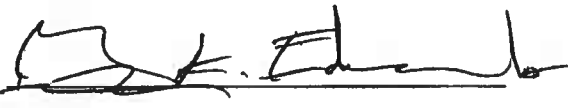
19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 <http://www.comsearch.com>

Coordination Values	NAALEHU, HI
Licensee Name	Universal Space Network, Inc.
Latitude (NAD 83)	19° 0' 50.3" N
Longitude (NAD 83)	155° 39' 46.6" W
Ground Elevation (AMSL)	355.09 m / 1165.0 ft
Antenna Centerline (AGL)	8.54 m / 28.0 ft
Antenna Model	Datron 13.0 meter
Antenna Mode	Transmit 2.0 GHz
Interference Objectives: Long Term	-154.0 dBW/4 kHz 20%
Short Term	-131.0 dBW/4 kHz 0.0025%
Max Available RF Power	-1.1 (dBW/4 kHz)

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Transmit 2.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	108.73	4.50	293.25
195	0.00	110.32	4.50	293.25
200	0.00	111.75	4.50	293.25
205	0.00	113.03	4.50	293.25
210	0.00	114.13	4.50	293.25
215	0.21	114.85	4.50	293.25
220	0.32	115.45	4.50	293.25
225	0.47	115.80	4.50	293.25
230	0.68	115.88	4.50	293.25
235	0.87	115.76	4.50	293.25
240	1.06	115.43	4.50	293.25
245	1.28	114.88	4.50	293.25
250	1.44	114.18	4.50	293.25
255	1.62	113.29	4.50	293.25
260	1.74	112.28	4.50	293.25
265	1.92	111.06	4.50	293.25
270	2.05	109.73	4.50	293.25
275	2.21	108.25	4.50	293.25
280	2.34	106.68	4.50	293.25
285	2.40	105.05	4.50	293.25
290	2.42	103.34	4.50	293.25
295	2.42	101.56	4.50	293.25
300	2.41	99.70	4.50	293.25
305	2.41	97.77	4.50	293.25
310	2.36	95.80	4.50	293.25
315	2.52	93.76	4.50	293.25
320	2.62	91.72	4.50	293.25
325	2.69	89.69	4.50	293.25
330	2.80	87.68	4.50	293.25
335	2.86	85.68	4.50	293.25
340	2.90	83.72	4.50	293.25
345	2.95	81.81	4.50	293.25
350	3.34	80.10	4.50	293.25
355	3.11	78.22	4.50	293.25

5. CERTIFICATION

I HEREBY CERTIFY THAT I AM THE TECHNICALLY QUALIFIED PERSON RESPONSIBLE FOR THE PREPARATION OF THE FREQUENCY COORDINATION DATA CONTAINED IN THIS APPLICATION, THAT I AM FAMILIAR WITH PARTS 101 AND 25 OF THE FCC RULES AND REGULATIONS, THAT I HAVE EITHER PREPARED OR REVIEWED THE FREQUENCY COORDINATION DATA SUBMITTED WITH THIS APPLICATION, AND THAT IT IS COMPLETE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

BY: 

Gary K. Edwards
Senior Manager
COMSEARCH
19700 Janelia Farm Boulevard
Ashburn, VA 20147

DATED: July 27, 2018

FEDERAL COMMUNICATIONS COMMISSION
APPLICATION FOR SATELLITE SPACE AND EARTH STATION AUTHORIZATIONS
Technical and Operational Description
(Place an "X" in one of the blocks below)

License of New Station Registration of new Domestic Receive-Only Station Amendment to a Pending Application Modification of License/Registration Notification of Minor Modification

B1. Location of Earth Station Site. If temporary-fixed, mobile, or VSAT remote facility, specify area of operation and point of contact. If VSAT hub station, give its location. For VSAT networks attach individual Schedule B, Page 1 sheets for each hub station and each remote station. Individually provide the Location, Points of Communications, and Destination Points for each hub and remote station.

B1a. Station Call Sign USHI01	B1b. Site identifier (HUB, REMOTE1, etc.) USHI01	B1c. Telephone Number (808) 929-8069	B1j. Geographic Coordinates N/S, Deg. - Min. - Sec. - E/W Lat. <u>19° 00'</u> <u>50.3" N</u> Lon. <u>155° 39'</u> <u>46.6" W</u>	B1k. Lat./Lon. Coordinates are: <input type="checkbox"/> NAD-27 <input checked="" type="checkbox"/> NAD-83
B1d. Mailing Street Address of Station or Area of Operation 93-1704 South Point Road		B1e. Name of Contact Person Joanne Greet	B1l. Site Elevation (AMSL) 378.0 meters	
B1f. City Naalehu	B1g. County Ka'u	B1h. State HI	B1i. Zip Code 96772-0842	

B2. Points of Communications: List the names and orbit locations of all satellites with which this earth station will communicate. The entry "ALSAT" is sufficient to identify the names and locations of all satellite facilities licensed by the U.S. All non-U.S. licensed satellites must be listed individually.

Satellite Name and Orbit Location	Satellite Name and Orbit Location
SPACEIL - Lunar transfer orbit	

B3. Destination points for communications using non-U.S. licensed satellites. For each non-U.S. licensed satellite facility identified in section B2 above, specify the destination point(s) (countries) where the services will be provided by this earth station via each non-U.S. license satellite system. Use additional sheets as needed.

Satellite Name	List of Destination Points
SPACEIL (Lunar mission)	Israeli (Non US Spacecraft)

**FEDERAL COMMUNICATIONS COMMISSION
APPLICATION FOR SATELLITE SPACE AND EARTH STATION AUTHORIZATIONS
FCC Form 312 - Schedule B: (Technical and Operational Description)**

If VSAT Network, provide the SITE-ID (Item B1b) of the station that B8-B13 are in response to (HUB, REMOTE1, etc.): _____

<p>B8. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurements? If NO, provide as an exhibit, a technical analysis showing compliance with two-degree spacing policy.</p>	<input type="checkbox"/> YES	<input type="checkbox"/> NO	<input type="checkbox"/> N/A												
<p>B9. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non-geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurement?</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO													
<p>B10. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO													
<p align="center">Remote Control Point Location:</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:40%; padding: 2px;"> <p>B10a. Street Address 417 Caredean Drive Suite A</p> </td> <td style="width:20%; padding: 2px;"> <p>B10c. County Montgomery</p> </td> <td style="width:20%; padding: 2px;"> <p>B10.d. State/Country PA</p> </td> <td style="width:20%; padding: 2px;"> <p>B10e. Zip Code 19044</p> </td> </tr> <tr> <td colspan="2" style="padding: 2px;"> <p>B10b. City Horsham</p> </td> <td colspan="2" style="padding: 2px;"> <p>B10g. Call Sign of Control Station (if appropriate)</p> </td> </tr> <tr> <td colspan="2" style="padding: 2px;"> <p>B10f. Telephone Number 215-328-9130</p> </td> <td colspan="2"></td> </tr> </table>				<p>B10a. Street Address 417 Caredean Drive Suite A</p>	<p>B10c. County Montgomery</p>	<p>B10.d. State/Country PA</p>	<p>B10e. Zip Code 19044</p>	<p>B10b. City Horsham</p>		<p>B10g. Call Sign of Control Station (if appropriate)</p>		<p>B10f. Telephone Number 215-328-9130</p>			
<p>B10a. Street Address 417 Caredean Drive Suite A</p>	<p>B10c. County Montgomery</p>	<p>B10.d. State/Country PA</p>	<p>B10e. Zip Code 19044</p>												
<p>B10b. City Horsham</p>		<p>B10g. Call Sign of Control Station (if appropriate)</p>													
<p>B10f. Telephone Number 215-328-9130</p>															
<p>B11. Is frequency coordination required? If YES, attach a frequency coordination report as an exhibit.</p>	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO													
<p>B12. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as an exhibit.</p>	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO													
<p>B13. FAA Notification - (See 47 CFT Part 17 and 47 CFT Part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and/or the FAA's study regarding the potential hazard of the structure to aviation? FAILURE TO COMPLY WITH 47 CFT PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION</p>	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO													