

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:  
Galileo F2 orbit raising

1. Applicant

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



File # SES-STA-20141022-00814

Call Sign Name Grant Date 11-18-14

(or other identifier)

Term Date To: 11-18-14

Approved: *[Signature]*


GRANTED  
International Bureau

Applicant: Universal Space Network, Inc.  
File No: SES-STA-20141022-00814  
Special Temporary Authority (STA)

Universal Space Network, Inc. is granted special temporary authority, beginning November 18, 2014 and ending December 03, 2014, to operate its NAALEHU, HI, 13 meter earth station to assist the European Space Agency (ESA) with the orbit raising operations of the Galileo FOC 1 and FOC 2 space stations under the following conditions:

1. Operations are limited to:
  - a. Earth Station transmits frequency: 2046.051, 2048.887, (2060.181 MHz, emergency use only)
    - i. Polarization: Left and Right hand circular
    - ii. Emission parameters: 200KG2D, 68.0 dBW/carrier, 51 dBW/carrier/4kHz
    - iii. Modulation: 2kbps data PSK onto an 8 kHz subcarrier with 100 kHz ranging tones
    - iv. Antenna azimuth authorized for 0-360 °; antenna elevation authorized for 5-90°
  - b. Earth Station receive frequencies: 2221.995, 2225.024; 2237.250 MHz
2. All transmissions in the band 2200-2290 MHz will comply with national and international power flux-density limits as specified in ITU-R 21.16.
3. Operations shall be on an unprotected, non-interference basis with respect to other authorized stations, including federal stations.
4. This STA is to support the early orbit raising operations of the Galileo FOC 1 and FOC 2 space craft. This STA will expire December 03, 2014. Any future requests or extensions will need to submit applications to the FCC to be re-coordinated with NTIA.
5. Universal Space Network shall be aware that future non-federal launch and early orbit operations will be considered on a case-by-case basis, especially for requests in the band 2200-2290 MHz, and Universal Space network shall have no expectations that future operations will be approved.
6. As soon as possible, USN is required to provide Mr. Jimmy Nguyen ([jimmy.nguyen@us.af.mil](mailto:jimmy.nguyen@us.af.mil), (301-225- 3729), Air Force Spectrum Management Office (AFSMO), Rich Rood ([richard.l.rood@nasa.gov](mailto:richard.l.rood@nasa.gov), 661-276-2138, NASA Dryden SMO), Farzin Manshadi ([farzin.manshadi@jpl.nasa.gov](mailto:farzin.manshadi@jpl.nasa.gov), 818-354-0068, NASA JPL/DSN SMO), Scott Galbraith ([vincent.s.galbraith@nasa.gov](mailto:vincent.s.galbraith@nasa.gov), 301-286-5089, NASA GSFC SMO), Cathy Sham ([catherine.c.sham@nasa.gov](mailto:catherine.c.sham@nasa.gov), 281-483-0124, NASA JSC SMO), Ken Stowe ([ken.stowe@navy.mil](mailto:ken.stowe@navy.mil), NMSC), Johnnie Best ([johnnie.w.best1@navy.mil](mailto:johnnie.w.best1@navy.mil), NMSC), the NOAA Satellite Operations Control Center (SOCC) Shift Supervisor (301) 817-4198 with the LEOP communications plan.
7. The STOP BUZZER POC information, for operations shall be provided to NTIA ([bmitchell@ntia.doc.gov](mailto:bmitchell@ntia.doc.gov)). This phone shall be manned 24/7.

8. Any action taken or expense incurred as a result of operations pursuant to this STA is solely at Universal Space Network, Inc.'s risk.

  
**GRANTED**  
International Bureau

File # SES-STA 20141022-00814  
Call Sign none Grant Date 11-18-14  
(or other identifier)  
From 11-18-14 Term Dates  
To 12-3-14  
Approved: Paul E. [Signature]

**2. Contact**

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

(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 SESSTA2014071000591 or Submission ID

4a. Is a fee submitted with this application?

If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).

Governmental Entity     Noncommercial educational licensee

Other (please explain):

4b. Fee Classification    CGX – Fixed Satellite Transmit/Receive Earth Station

5. Type Request

Use Prior to Grant

Change Station Location

Other

6. Requested Use Prior Date  
11/03/2014

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: FCC 312 form	Attachment 2: Anomally analysis      Attachment 3: coordination report
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.) Due to a launch failure USN is being requested to support some orbit raising maneauvers from Nov 3 - Dec 3, 2014.	
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 &quot;party to the application&quot;; for these purposes.	Yes <input checked="" type="radio"/> No <input type="radio"/>
14. Name of Person Signing Joanne Greet	15. Title of Person Signing Manager, Contract & Compliance
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](mailto: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.**











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

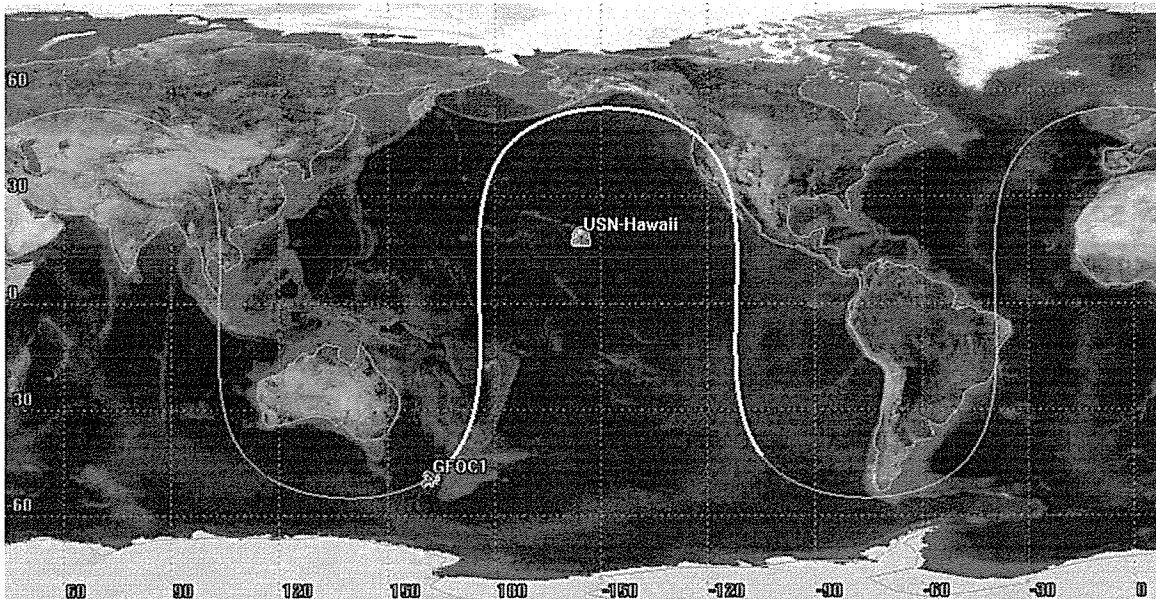
If VSAT Network, provide the SITE-ID (Item B1b) of the station that B8-B13 are in response to (HUB, REMOTE1, etc.): \_\_\_\_\_

<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><b>Remote Control Point Location:</b></p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 40%; padding: 2px;">B10a. Street Address 417 Caredean Drive Suite A</td> <td style="width: 20%; padding: 2px;">B10.d. State/Country PA</td> <td style="width: 40%; padding: 2px;">B10e. Zip Code 19044</td> </tr> <tr> <td style="padding: 2px;">B10b. City Horsham</td> <td style="padding: 2px;">B10c. County Montgomery</td> <td style="padding: 2px;">B10g. Call Sign of Control Station (if appropriate)</td> </tr> <tr> <td style="padding: 2px;">B10f. Telephone Number 215-328-9130</td> <td colspan="2"></td> </tr> </table>				B10a. Street Address 417 Caredean Drive Suite A	B10.d. State/Country PA	B10e. Zip Code 19044	B10b. City Horsham	B10c. County Montgomery	B10g. Call Sign of Control Station (if appropriate)	B10f. Telephone Number 215-328-9130		
B10a. Street Address 417 Caredean Drive Suite A	B10.d. State/Country PA	B10e. Zip Code 19044										
B10b. City Horsham	B10c. County Montgomery	B10g. Call Sign of Control Station (if appropriate)										
B10f. Telephone Number 215-328-9130												
<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><b>B13. FAA Notification - (See 47 CFT Part 17 and 47 CFT Part 25.113(c))</b>  <b>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?</b>  <b>FAILURE TO COMPLY WITH 47 CFT PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION</b></p>												

## LEOP support of Galileo Constellation (FOC1 and FOC2) from USN's Hawaii ground station

Galileo FOC1 and FOC2 are the first and second spacecraft of the "Full Operational Capability" of the Galileo navigation constellation for the EU. The launch consists of 2 spacecraft (FOC1 and FOC2) that will be launched from French Guiana on a Soyuz vehicle on August 21<sup>st</sup>, 2014 at 12:31:13 UTC. USN has been contracted to support the Galileo spacecraft LEOP(s) for a period of up to 14 days.

The spacecraft(s) are a Medium Earth Orbiting (MEO) spacecraft in a high mid-latitude orbit (55 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.



FOC1 and FOC2 nominal orbit and Hawaii coverage

The spacecrafts will be supported from injection and three subsequent orbital maneuvers for spacing of FOC1 and FOC2. The below analysis covers all possible visibilities from USN Hawaii, but not all visibilities will be supported.

## FOC1 and FOC2 injection and coverage of pass #1-3

Both spacecraft are still in same antenna beamwidth after injection for the first several hours and then begin to drift apart. For the first several hours FOC1 and FOC2 are supported by selecting different RF frequencies. Subsequent to the first several hours the spacecraft(s) are supported separately. Post maneuver TLE's and maximum visibilities are shown below for each event and each spacecraft.

	Downlink	Uplink
FOC1	2221.995 MHz	2046.051 MHz
FOC2	2225.024 MHz	2048.887 MHz

### GFOC1-injection

1 99997 51999A 14233.67998611 +.00000000 +00000-9 +69797-3 2 00001  
 2 99997 055.0288 100.8659 0004838 254.7598 347.2647 01.67807170000000

### GFOC2-injection

1 99998 51999B 14233.67998611 +.00000000 +00000-9 +69797-3 2 00002  
 2 99998 055.0288 100.8659 0003707 045.1785 196.8459 01.68014387000000

### FOC1

Access	Start Time (UTCG)	Stop Time (UTCG)
-----	-----	-----
1	21 Aug 2014 18:20:59	22 Aug 2014 06:24:18
2	23 Aug 2014 03:55:09	23 Aug 2014 19:57:46
3	24 Aug 2014 17:45:14	25 Aug 2014 05:45:59

### FOC2

1	21 Aug 2014 18:21:02	22 Aug 2014 06:22:43
2	23 Aug 2014 03:50:28	23 Aug 2014 19:51:40
3	24 Aug 2014 17:38:08	25 Aug 2014 05:36:06

## FOC1 Maneuvers and possible support times pass #4 - 13

### GFOC1-V1

1 99997 51999A 14237.02208681 +.00000000 +00000-9 +69797-3 2 00005  
2 99997 055.0307 100.7748 0005390 259.1868 201.8854 01.67822712000002

No passes visible from this maneuver

### GFOC1-V2

1 99997 51999A 14237.84883218 +.00000000 +00000-9 +69797-3 2 00000  
2 99997 055.0312 100.7528 0005223 261.0177 339.5876 01.67847990000002

Access	Start Time (UTCG)	Stop Time (UTCG)
4	26 Aug 2014 03:09:47	26 Aug 2014 18:30:00

Note that spacecraft stays in view of Hawaii during the maneuver #2 below, therefore this continues to be pass #5.

### GFOC1-V3

1 99997 51999A 14238.77173264 +.00000000 +00000-9 +69797-3 2 00006  
2 99997 055.0318 100.7277 0004761 263.8557 174.4649 01.67858931000008

Access	Start Time (UTCG)	Stop Time (UTCG)
5	26 Aug 2014 18:30:00	26 Aug 2014 19:18:22
6	27 Aug 2014 17:08:21	28 Aug 2014 05:04:27
7	29 Aug 2014 02:17:31	29 Aug 2014 18:38:05
8	30 Aug 2014 16:31:13	31 Aug 2014 04:20:59
9	1 Sep 2014 01:18:12	1 Sep 2014 10:58:21
10	1 Sep 2014 12:22:49	1 Sep 2014 17:57:41
11	2 Sep 2014 09:29:17	2 Sep 2014 10:56:26
12	2 Sep 2014 15:54:11	3 Sep 2014 03:34:58
13	4 Sep 2014 00:08:36	4 Sep 2014 10:16:21

## FOC2 Maneuvers and possible support times pass #4 - 14

### GFOC2-V1

1 99998 51999B 14237.59188542 +.00000000 +00000-9 +69797-3 2 00001  
2 99998 055.0310 100.7594 0039449 266.0046 182.2510 01.69086769000000

Access	Start Time (UTCG)	Stop Time (UTCG)
4	26 Aug 2014 02:42:22	26 Aug 2014 11:47:00

Note that spacecraft stays in view of Hawaii during the maneuver #2 below, therefore this continues to be pass #5.

### GFOC2-V2

1 99998 51999B 14238.49128009 +.00000000 +00000-9 +69797-3 2 00003  
2 99998 055.0316 100.7230 0003340 144.8635 131.0338 01.70208670000000

Access	Start Time (UTCG)	Stop Time (UTCG)
5	26 Aug 2014 11:47:00	26 Aug 2014 18:43:53
6	27 Aug 2014 10:00:48	27 Aug 2014 11:17:38

### GFOC2-V3

1 99998 51999B 14239.47820023 +.00000000 +00000-9 +69797-3 2 00007  
2 99998 055.0371 100.6932 0001961 060.3046 100.4545 01.70341875000009

Access	Start Time (UTCG)	Stop Time (UTCG)
7	27 Aug 2014 16:13:58	28 Aug 2014 03:30:55
8	28 Aug 2014 22:56:26	29 Aug 2014 09:42:52
9	29 Aug 2014 13:21:11	29 Aug 2014 16:23:15
10	30 Aug 2014 07:17:34	30 Aug 2014 12:19:29
11	30 Aug 2014 14:09:21	30 Aug 2014 23:33:31
12	31 Aug 2014 20:01:52	1 Sep 2014 07:42:36
13	2 Sep 2014 05:03:08	2 Sep 2014 20:37:58
14	3 Sep 2014 17:49:43	4 Sep 2014 05:37:35

## Flux Density impinging on the ground in Hawaii from Galileo FOC1 and FOC2

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 FOC spacecraft is -15.5 dBW. The altitude (and thus the closest distance to earth during an overhead pass) is = 23,400 Km.

Converting -15.5 dBW to scalar watts = 0.028 watts transmitted at 2221.9 MHz

Therefore:

$$\text{Flux density} = 0.028 \div (4 \pi * 23,400,000 \text{ meters}^2)$$

$$\text{Flux density} = 4.239 \times 10^{-15} \text{ Watts/meter}^2$$

Or

$$\text{Flux density} = 4.239 \times 10^{-16} \text{ mW/cm}^2$$



# FREQUENCY COORDINATION AND INTERFERENCE ANALYSIS REPORT

Prepared for

**Universal Space Network, Inc.  
Naalehu, Hawaii**

**Satellite Earth Station**

Prepared By:  
COMSEARCH  
19700 Janelia Farm Boulevard  
Ashburn, Virginia 20147  
April 22, 2014

## TABLE OF CONTENTS

1. CONCLUSIONS .....	3
2. SUMMARY OF RESULTS .....	4
3. SUPPLEMENTAL SHOWING .....	5
4. EARTH STATION COORDINATION DATA.....	8
5. CERTIFICATION.....	12

## **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.

The following companies reported potential great circle interference conflicts that did not meet the objectives on a line-of-sight basis. When over-the-horizon losses are considered on the interfering paths, sufficient blockage exists to negate harmful interference from occurring with the transmit-only earth station.

Company

None

No carriers reported potential interference cases.

### 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.

Expedited coordination data for this earth station was sent to the below listed carriers with a letter dated April 7, 2014.

#### Company

3G Wireless, LLC  
AERIAL VIDEO SYSTEMS  
America's Cup Event Authority, LLC  
AT&T California  
Alascom Inc  
Ascent Media Network Services, LLC  
Bellsouth Telecommunications, Inc.  
Borgeson, Tom R.  
Broadcast Sports Inc.  
CNG Communications, Inc.  
Carolina Telephone and Telegraph Co  
Casper, John  
CenturyTel of the Southwest, Inc.  
Chicago Comnet Corp  
Cincinnati Bell Wireless LLC  
Circuit of the Americas, LLC  
Citywide News Network, Inc.  
Cohen, Elana  
Cowboys Stadium LP  
CP Communications, LLC  
DCI II, INC.  
Direct Broadcast Services, Inc.  
Express Lane Traffic LLC  
Fishman Brothers Enterprises  
GOODYEAR TIRE AND RUBBER COMPANY  
GSN New, Inc  
Global Microwave Systems Inc  
HAWAII PUBLIC TELEVISION FOUNDATION  
HF Enterprises, Inc  
Hallco Unlimited, Inc.  
Hawaiian Telcom, Inc.  
Hearst -Argyle Stations, Inc (KITV-TV)  
Heiden, William

Company (Continued)

Illinois Bell Telephone Company  
Indiana Bell Telephone Company  
Information & Display Systems, Inc.  
Information Super Station, LLC  
International Communications Group, Inc.  
KHNL/KGMB License Subsidiary, LLC  
Kentucky RSA #3 Cellular General Partner  
Kentucky RSA #4 Cellular General Partner  
Lancellotti, Inc.  
Lin License Company - Hawaii  
Loop, Inc,  
MERCURY COMMUNICATIONS  
Metro Networks Communications, Inc.  
Metrosat Communications Inc.  
Michigan Bell Telephone Company  
Moreen, Steven K  
NEW ENGLAND DIGITAL DISTRIBUTION, INC.  
NEW ENGLAND SATELLITE SYSTEMS INC  
NSM Surveillance  
Navajo Communications Company  
NorthWest Suburbs Community Access Corp  
Oceanic Time Warner Cable  
Ohio Bell Telephone Company  
On Scene Video Production  
Onboard Images  
Pacific Television Center  
Penn Service Microwave Co., Inc.  
Plateau Telecommunications, Inc.  
Plum TV, LLC  
Production & Satellite Services, Inc.  
Public Television Communications Center  
QUICK LINK CONNECTIONS INC  
Qwest Corporation  
RCC Minnesota Inc. - MN NE ND SD  
REMOTE FACILITIES CONSULTING SERVICES  
RF Central, LLC  
RF Film, Inc  
RF Technology, LLC  
Radiofone, Inc.  
Randy Hermes Production  
Regulus Media Services, Inc.  
Remote Broadcasts, Inc.  
Society of Broadcast Engineers – State of Hawaii Representative  
Southwestern Bell Telephone L.P.  
Speedshotz, Inc  
Steinert, Christine  
Telemovil del Caribe Inc.  
Total RF Marketing Inc  
Unisat, Inc.  
United Telephone - Southeast

Company (Continued)

VERIZON SOUTH INC.  
Verizon California Inc.  
Verizon Maryland, Inc.  
Verizon New England Inc.  
Verizon New Jersey, Inc.  
Verizon New York, Inc.  
Verizon North Inc.  
Verizon Northwest Inc.  
Verizon Pennsylvania, Inc.  
Verizon Virginia, Inc.  
Verizon Washington DC, Inc.  
Village Video Productions Inc  
Vyvx, LLC  
Westar Satellite Services LP  
Western Technical Services  
Wexler Video, Inc.  
Winged Vision Inc  
Wisconsin Bell, 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: 04/22/2014  
Job Number: 140407COMSJC03

---

**Administrative Information**

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

---

**Site Information** **NAALEHU, HAWAII**

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) 378.0 m / 1240.2 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**

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

Max Available RF Power (dBW/4 kHz) 5.1  
(dBW/MHz) 29.1

Maximum EIRP (dBW/4 kHz) 51.0  
(dBW/MHz) 75.0  
(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) 200KG2D / 2046.051  
200KG2D / 2048.887  
200KG2D / 2060.181

Max Great Circle Coordination Distance 760.0 km / 472.2 mi  
Precipitation Scatter Contour Radius 176.0 km / 109.3 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) 378.0 m / 1240.2 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 5.1 (dBW/4 kHz)

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Transmit 2.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
0	2.78	76.33	4.50	365.00
5	2.62	74.59	4.50	374.40
10	2.39	72.89	4.50	388.60
15	2.30	71.39	4.50	394.30
20	2.17	69.98	4.50	403.00
25	2.03	68.70	4.50	412.70
30	1.68	67.37	4.50	439.30
35	0.90	65.80	4.50	517.90
40	0.33	64.56	4.50	619.40
45	0.00	63.74	4.50	760.00
50	0.00	63.44	4.50	760.00
55	0.00	63.37	4.50	760.00
60	0.00	63.51	4.50	760.00
65	0.00	63.87	4.50	760.00
70	0.00	64.44	4.50	760.00
75	0.00	65.22	4.50	760.00
80	0.00	66.19	4.50	760.00
85	0.00	67.34	4.50	760.00
90	0.00	68.67	4.50	760.00
95	0.00	70.15	4.50	760.00
100	0.00	71.77	4.50	760.00
105	0.00	73.53	4.50	760.00
110	0.00	75.39	4.50	760.00
115	0.00	77.35	4.50	760.00
120	0.00	79.39	4.50	760.00
125	0.00	81.51	4.50	760.00
130	0.00	83.67	4.50	760.00
135	0.00	85.87	4.50	760.00
140	0.00	88.10	4.50	760.00
145	0.00	90.34	4.50	760.00
150	0.00	92.58	4.50	760.00
155	0.00	94.80	4.50	760.00
160	0.00	96.99	4.50	760.00
165	0.00	99.14	4.50	760.00
170	0.00	101.24	4.50	760.00
175	0.00	103.26	4.50	760.00
180	0.00	105.19	4.50	760.00

# COMSEARCH

## Earth Station Data Sheet

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

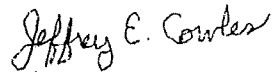
---

<b>Coordination Values</b>	<b>NAALEHU, HI</b>
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)	378.0 m / 1240.2 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	5.1 (dBW/4 kHz)

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Transmit 2.0 GHz	
			Horizon Gain (dBi)	Coordination Distance (km)
185	0.00	107.02	4.50	760.00
190	0.00	108.73	4.50	760.00
195	0.00	110.32	4.50	760.00
200	0.00	111.75	4.50	760.00
205	0.00	113.03	4.50	760.00
210	0.00	114.13	4.50	760.00
215	0.00	115.04	4.50	760.00
220	0.00	115.75	4.50	760.00
225	0.00	116.26	4.50	760.00
230	0.00	116.56	4.50	760.00
235	0.00	116.63	4.50	760.00
240	0.00	116.49	4.50	760.00
245	0.00	116.13	4.50	760.00
250	0.00	115.56	4.50	760.00
255	0.00	114.78	4.50	760.00
260	0.00	113.81	4.50	760.00
265	0.34	112.37	4.50	616.80
270	0.54	110.91	4.50	573.30
275	0.79	109.28	4.50	532.80
280	1.04	107.54	4.50	500.90
285	0.98	105.89	4.50	508.00
290	1.14	104.01	4.50	489.70
295	1.30	102.06	4.50	473.20
300	1.42	100.07	4.50	461.80
305	1.68	97.99	4.50	439.30
310	1.86	95.92	4.50	425.20
315	2.05	93.83	4.50	411.30
320	2.17	91.75	4.50	403.00
325	2.35	89.69	4.50	391.10
330	2.46	87.64	4.50	384.10
335	2.59	85.64	4.50	376.20
340	2.68	83.67	4.50	370.80
345	2.73	81.74	4.50	367.90
350	3.10	80.01	4.50	347.30
355	2.96	78.15	4.50	354.90

## 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.



Jeffrey E. Cowles  
Engineer III, Telecommunications  
COMSEARCH  
19700 Janelia Farm Boulevard  
Ashburn, Va. 20147

DATED: April 22, 2014