

APPLICATION FOR EARTH STATION SPECIAL TEMPORARY AUTHORITY

APPLICANT INFORMATION Enter a description of this application to identify it on the main menu:
Galileo FOC2 Anomally STA Request January 2015

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-20141212-00892

Call Sign None Grant Date 2-9-15
(or other identifier)

Term Dates
From 2-9-15 To 2-28-15

Approved: [Signature]

Applicant: Universal Space Network
File No: SES-STA-20141212-00892
Special Temporary Authority (STA)

Universal Space Network Corporation is granted special temporary authority, beginning February 09, 2015 and ending February 28, 2015, 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 2 space stations under the following conditions:

1. Operations are limited to:
 - a. Earth Station transmits frequency: 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: 2225.024; 2237.250 MHz

2. Operations shall be on an unprotected, non-interference basis with respect to other authorized stations, including federal stations.

3. This STA is to support the early orbit raising operations of the Galileo FOC 2 space craft. This STA will expire February 28, 2015. Any future requests or extensions will need to submit applications to the FCC to be re-coordinated with NTIA.

4. 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.


5. As soon as possible, USN is required to provide Mr. Jimmy Nguyen (jimmy.nguyen@us.af.mil, (301-225- 3729), Air Force Spectrum Management Office (AFSMO), Rich Rood (richard.l.rood@nasa.gov, 661-276-2138, NASA Dryden SMO), Farzin Manshadi (farzin.manshadi@jpl.nasa.gov, 818-354-0068, NASA JPL/DSN SMO), Scott Galbraith (vincent.s.galbraith@nasa.gov, 301-286-5089, NASA GSFC SMO), Cathy Sham (catherine.c.sham@nasa.gov, 281-483-0124, NASA JSC SMO), Ken Stowe (ken.stowe@navy.mil, NMSC), Johnnie Best (johnnie.w.best1@navy.mil, NMSC), the NOAA Satellite Operations Control Center (SOCC) Shift Supervisor (301) 817-4198 with the LEOP communications plan.

6. The STOP BUZZER POC information, for operations shall be provided to NTIA (bmitchell@ntia.doc.gov). This phone shall be manned 24/7.

7. All transmissions in the band 2200-2290 MHz will comply with national and international power flux-density limits.

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.

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.

 GRANTED International Bureau	File # <u>SES-STA 20141212-00892</u>
	Call Sign <u>None</u> Grant Date <u>2-9-15</u> (or other identifier)
	From <u>2-9-15</u> Term Dates To: <u>2-28-15</u>
	Approver: <u>[Signature]</u>

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: **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 SESSTA2014102200814 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
01/15/2015

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: STA Approval Attachment 2: Coordination report Attachment 3: Waiver	
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.) Support for the Galileo FOC2 spacecraft due to a launch anomaly. launch failure of the spacecraft and trying to move into a normal orbit. Support request from January 15, 2015 - February 15, 2015	
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 Manager, 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).	

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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 GALILEO (FOC1 and FOC2, first and second spacecraft of the “Full Operational Capability” series) Satellites.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”) of the GALILEO (FOC1 and FOC2) 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.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 GALILEO (FOC1 and FOC2). 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 (FOC1 and FOC2) 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 (FOC1 and FOC2) 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.

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 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.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 14 days of LEOP support of the GALILEO (FOC1 and FOC2) satellite.

It is USN’s understanding that GALILEO (FOC1 and FOC2) is licensed by ESA (European Space Agency). GALILEO (FOC1 and FOC2) are the third and 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 (FOC1 and FOC2) satellite using its U.S. earth station for a period of 14 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 14 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 GALILEO (FOC1 and FOC2) 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."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.

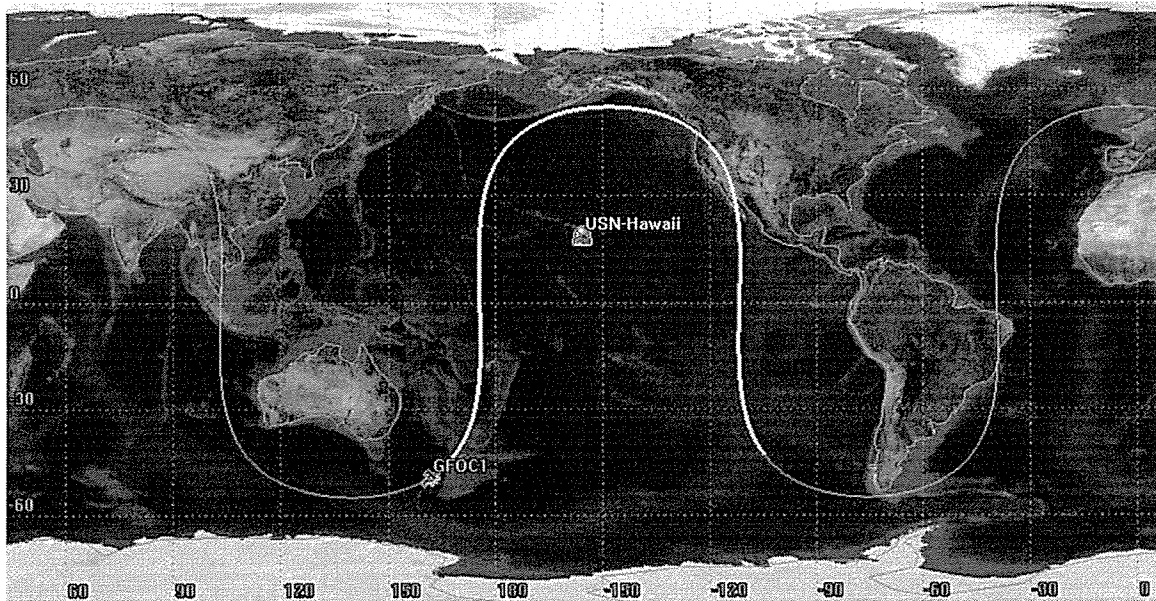
⁶ 47 C.F.R. §2.106

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

LEOP support of 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 21st, 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 01.67807170000005

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:

$$\text{Flux density} = \text{EIRP} \div (4 \pi R_{se}^2)$$

Where R_{se} 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 -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

Therefor:

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

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

Or

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

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

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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

Venue Name NAALEHU, HAWAII
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

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

Transmit

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

Emission / Frequency Range (MHz) **Transmit 2.0 GHz**
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

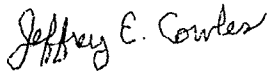
19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5500 <http://www.comsearch.com>

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)
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