Ka-Band Earth Station – 16 US Locations

Frequency Coordination Report

28 GHz

Prepared on Behalf of
Hughes Network
Systems Limited

December 5, 2014

COMSEARCH®
A CommScope Company

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1. Summary of Results

On behalf of Hughes Network Systems, Comsearch performed a coordination notice for all existing and proposed terrestrial licenses within the respective coordination contours of sixteen proposed Ka-Band earth stations, located throughout the United States, all of which will transmit at 28 GHz[1]. Prior-notification letters were sent to the licensees and a copy of the notification data is provided in section eighteen of this report. The earth station coordination was finalized on December 5, 2014.

No objections were received from any of the incumbent 28 GHz licensees. Our notification to the LMDS incumbents was performed under the assumption that the earth station would be operating on a secondary basis to LMDS Block A operations and a contact at Hughes Network Systems has been provided in case any concerns may arise in the future.

2. Albuquerque, New Mexico

28 GHz Common Carrier and LTTS Coordination

In accordance with FCC Rules and Regulations, the Ka-Band earth station in Albuquerque, New Mexico was prior-coordinated by Comsearch. A notification letter and datasheet for this earth station were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in Albuquerque, New Mexico were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

[1] The proposed earth stations will operate in the 27.5 – 28.4 GHz portion of the Ka-Band.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensee on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Nextlink/XO	BTA008[2]	Albuquerque, NM

No objections were received from the LMDS incumbent.

[2] The proposed earth station will be located inside BTA008.

3. Amarillo, Texas

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Amarillo, Texas were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in Amarillo, Texas were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
2 Lightspeed	BTA013[3]	Amarillo, TX
Plateau	BTA087	Clovis, NM
Plateau	BTA264	Lubbock, TX

No objections were received from the LMDS incumbents.

4. Billings, Montana

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Billings, Montana were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

[3] The proposed earth station will be located inside BTA013.

A notification letter and datasheet for the Ka-Band earth station in Billings, Montana were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

The proposed earth station will operate on frequencies that overlap Block A of 28 GHz LMDS services. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

No active LMDS services were found within the coordination contour of the Billings, Montana earth station.

5. Bismarck, North Dakota

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Bismarck, North Dakota were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in Bismarck, North Dakota were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

The proposed earth station will operate on frequencies that overlap Block A of 28 GHz LMDS services. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

No active LMDS services were found within the coordination contour of the Bismarck, North Dakota earth station.

6. Boise, Idaho

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Boise, Idaho were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in Boise, Idaho were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

The proposed earth station will operate on frequencies that overlap Block A of 28 GHz LMDS services. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

No active LMDS services were found within the coordination contour of the Boise, Idaho earth station.

7. Duluth, Minnesota

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Duluth, Minnesota were sent to the following 28 GHz common carrier fixed microwave licensees on November 2, 2014. These licensees are authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide or statewide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US
Wisconsin Bell Telephone Company	Statewide: Wisconsin

A notification letter and datasheet for the Ka-Band earth station in Duluth, Minnesota were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensee on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Nextlink/XO	BTA298	Minneapolis-St. Paul, MN

No objections were received from the LMDS incumbent.

8. Gilbert, Arizona

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Gilbert, Arizona were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in Gilbert, Arizona were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Alta Wireless	BTA347[4]	Phoenix, AZ
Nextlink/XO[5]	BTA347	Phoenix, AZ
Nextlink/XO	BTA447	Tucson, AZ

No objections were received from the LMDS incumbents.

9. Missoula, Montana

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Missoula, Montana were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in Missoula, Montana were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

[4] The proposed earth station will be located inside BTA347.

[5] Nextlink Wireless / XO is leasing LMDS spectrum from Alta Wireless in the Phoenix, Arizona Basic Trading Area (BTA).

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensee on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Glaicercom	BTA224	Kalispell, MT

No objections were received from the LMDS incumbent.

10. North Las Vegas, Nevada

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in North Las Vegas, Nevada were sent to the following 28 GHz common carrier fixed microwave licensees on November 2, 2014. These licensees are authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide or statewide basis.

Licensee	Authorized Geographic Area
M.U.T. Licensing	Statewide: California
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in North Las Vegas, Nevada were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Nextlink/XO	BTA245[6]	Las Vegas, NV
Nextlink/XO	BTA262	Los Angeles, CA
T-Mobile[7]	BTA262	Los Angeles, CA
TelePacific Communications[8]	BTA262	Los Angeles, CA

No objections were received from the LMDS incumbents.

[6] The proposed earth station will be located inside BTA245.

[7] T-Mobile has acquired LMDS spectrum from Nextlink Wireless / XO in the Los Angeles, California Basic Trading Area (BTA).

[8] TelePacific Communications is leasing LMDS spectrum from Nextlink Wireless / XO in the Los Angeles, California BTA.

11. North Platte, Nebraska

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in North Platte, Nebraska were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in North Platte, Nebraska were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

The proposed earth station will operate on frequencies that overlap Block A of 28 GHz LMDS services. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

No active LMDS services were found within the coordination contour of the North Platte, Nebraska earth station.

12. Omaha, Nebraska

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Omaha, Nebraska were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in Omaha, Nebraska were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Nextlink/XO	BTA111	Des Moines, IA
Nextlink/XO	BTA332[9]	Omaha, NE
Venture Wireless	BTA421	Sioux City, IA

No objections were received from the LMDS incumbents.

13. Roseburg, Oregon

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet the Ka-Band earth station in Roseburg, Oregon were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in Roseburg, Oregon were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

[9] The proposed earth station will be located inside BTA332.

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensee on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
BroadBand One of California	BTA097	Coos Bay-North Bend, OR

No objections were received from the LMDS incumbent.

14. Salt Lake City, Utah

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Salt Lake City, Utah were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in Salt Lake City, Utah were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Straight Path Spectrum	BTA365	Provo-Orem, UT
Vivint Wireless[10]	BTA365	Provo-Orem, UT
Straight Path Spectrum	BTA399[11]	Salt Lake City-Ogden, UT
Vivint Wireless[12]	BTA399	Salt Lake City-Ogden, UT

No objections were received from the LMDS incumbents.

[10] Vivint Wireless is leasing LMDS spectrum from Straight Path Spectrum in the Provo-Orem, Utah Basic Trading Area (BTA).

[11] The proposed earth station will be located inside BTA399.

[12] Vivint Wireless is leasing LMDS spectrum from Straight Path Spectrum in the Salt Lake City-Ogden, Utah BTA.

15. San Diego, California

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in San Diego, California were sent to the following 28 GHz common carrier fixed microwave licensees on November 2, 2014. These licensees are authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide or statewide basis.

Licensee	Authorized Geographic Area
M.U.T. Licensing	Statewide: California
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in San Diego, California were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Nextlink/XO	BTA262	Los Angeles, CA
T-Mobile[13]	BTA262	Los Angeles, CA
TelePacific Communications[14]	BTA262	Los Angeles, CA
Towerstream Corporation[15]	BTA262	Los Angeles, CA
Alta Wireless	BTA402[16]	San Diego, CA
Nextlink/XO[17]	BTA402	San Diego, CA

No objections were received from the LMDS incumbents.

[13] T-Mobile has acquired LMDS spectrum from Nextlink Wireless / XO in the Los Angeles, California Basic Trading Area (BTA).

[14] TelePacific Communications is leasing LMDS spectrum from Nextlink Wireless / XO in the Los Angeles, California BTA.

[15] Towerstream Corporation is leasing LMDS spectrum from Nextlink Wireless / XO in the Los Angeles, California BTA.

[16] The proposed earth station will be located inside BTA402.

[17] Nextlink Wireless / XO is leasing LMDS spectrum from Alta Wireless in the San Diego, California BTA.

16. San Jose, California

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in San Jose, California were sent to the following 28 GHz common carrier fixed microwave licensees on November 2, 2014. These licensees are authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide or statewide basis.

Licensee	Authorized Geographic Area
M.U.T. Licensing	Statewide: California
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in San Jose, California were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensees on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Straight Path Spectrum	BTA303	Modesto, CA
Nextlink/XO	BTA389	Sacramento, CA
T-Mobile[18]	BTA389	Sacramento, CA
BroadBand One of California	BTA397	Salinas-Monterey, CA
Straight Path Spectrum	BTA404[19]	San Francisco-Oakland-San Jose, CA
T-Mobile[20]	BTA404	San Francisco-Oakland-San Jose, CA
TelePacific Communications[21]	BTA404	San Francisco-Oakland-San Jose, CA
BroadBand One of California	BTA434	Stockton, CA

No objections were received from the LMDS incumbents.

17. Seattle, Washington

28 GHz Common Carrier and LTTS Coordination

A notification letter and datasheet for the Ka-Band earth station in Seattle, Washington were sent to the following 28 GHz common carrier fixed microwave licensee on November 2, 2014.

[18] T-Mobile has acquired LMDS spectrum from Nextlink Wireless / XO in the Sacramento, California Basic Trading Area (BTA).

[19] The proposed earth station will be located inside BTA404.

[20] T-Mobile has acquired LMDS spectrum from Straight Path Spectrum in the San Francisco-Oakland-San Jose, California BTA.

[21] TelePacific Communications is leasing LMDS spectrum from Straight Path Spectrum in the San Francisco-Oakland-San Jose, California BTA.

This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Verizon	Continental US

A notification letter and datasheet for the Ka-Band earth station in Seattle, Washington were also sent to the following 28 GHz local television transmission licensee on November 2, 2014. This licensee is authorized to operate temporary fixed operations from 27.5 to 29.5 GHz on a nationwide basis.

Licensee	Authorized Geographic Area
Information Super Station, LLC	Continental US

No objections were received from the common carrier or local television transmission service incumbents.

28 GHz LMDS Coordination

A Notification letter was sent to the following 28 GHz LMDS licensee on November 2, 2014. The proposed earth station will operate on frequencies that overlap Block A of the LMDS service. The total frequency allocation for Block A of the LMDS spectrum appears below.

Block A: 27.500-28.350 GHz
29.100-29.250 GHz
31.075-31.225 GHz

Licensee	Market	Market Name
Nextlink/XO	BTA413[22]	Seattle-Tacoma, WA

No objections were received from the LMDS incumbent.

[22] The proposed earth station will be located inside BTA413.

18. Earth Station Coordination Data

This section presents the data pertinent to the proposed Ka-Band earth station in Riverside, CA. This data was circulated to all incumbent licensees in the shared 28 GHz frequency ranges.

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/03/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — ALBUQUERQUE, NM

Venue Name	
Latitude (NAD 83)	35° 5' 32.3" N
Longitude (NAD 83)	106° 39' 10.8" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	1511.4 m / 4958.7 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	163.5° to 163.5°
Corresponding Elevation Angles	48.0° / 48.0°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		8.1 meter
Gain / Diameter		65.3 dBi / 8.1 m
3-dB / 15-dB Beamwidth		0.10° / 0.23°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	27.3
	(dBW/MHz)	51.3
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**ALBUQUERQUE, NM**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	35° 5' 32.3" N
Longitude (NAD 83)	106° 39' 10.8" W
Ground Elevation (AMSL)	1511.4 m / 4958.7 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-38.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	129.95	-10.00	100.00
5	0.00	128.55	-10.00	100.00
10	0.00	126.83	-10.00	100.00
15	0.00	124.83	-10.00	100.00
20	0.00	122.58	-10.00	100.00
25	0.00	120.11	-10.00	100.00
30	0.24	117.60	-10.00	100.00
35	0.34	114.82	-10.00	100.00
40	0.42	111.89	-10.00	100.00
45	0.48	108.83	-10.00	100.00
50	0.54	105.67	-10.00	100.00
55	0.56	102.42	-10.00	100.00
60	0.66	99.12	-10.00	100.00
65	0.79	95.78	-10.00	100.00
70	0.83	92.39	-10.00	100.00
75	1.00	88.99	-10.00	100.00
80	1.05	85.58	-10.00	100.00
85	1.08	82.18	-10.00	100.00
90	1.08	78.82	-10.00	100.00
95	1.24	75.46	-10.00	100.00
100	1.30	72.18	-10.00	100.00
105	1.28	69.01	-10.00	100.00
110	1.18	65.98	-10.00	100.00
115	1.12	63.06	-10.00	100.00
120	1.11	60.27	-10.00	100.00
125	1.14	57.63	-10.00	100.00
130	1.15	55.21	-10.00	100.00
135	1.08	53.09	-10.00	100.00
140	1.02	51.24	-10.00	100.00
145	0.98	49.69	-10.00	100.00
150	1.00	48.42	-10.00	100.00
155	0.86	47.68	-9.96	100.00
160	0.80	47.25	-9.86	100.00
165	0.71	47.26	-9.86	100.00
170	0.40	47.89	-10.00	100.00
175	0.00	48.98	-10.00	100.00
180	0.00	50.05	-10.00	100.00
185	0.00	51.45	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**ALBUQUERQUE, NM**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	35° 5' 32.3" N
Longitude (NAD 83)	106° 39' 10.8" W
Ground Elevation (AMSL)	1511.4 m / 4958.7 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-38.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	53.17	-10.00	100.00
195	0.00	55.17	-10.00	100.00
200	0.00	57.42	-10.00	100.00
205	0.00	59.89	-10.00	100.00
210	0.00	62.54	-10.00	100.00
215	0.00	65.35	-10.00	100.00
220	0.00	68.29	-10.00	100.00
225	0.00	71.35	-10.00	100.00
230	0.00	74.50	-10.00	100.00
235	0.00	77.72	-10.00	100.00
240	0.23	80.95	-10.00	100.00
245	0.28	84.27	-10.00	100.00
250	0.35	87.63	-10.00	100.00
255	0.39	91.00	-10.00	100.00
260	0.45	94.37	-10.00	100.00
265	0.65	97.75	-10.00	100.00
270	0.58	101.08	-10.00	100.00
275	0.59	104.36	-10.00	100.00
280	0.54	107.56	-10.00	100.00
285	0.57	110.70	-10.00	100.00
290	0.81	113.85	-10.00	100.00
295	0.54	116.63	-10.00	100.00
300	0.50	119.36	-10.00	100.00
305	0.78	122.13	-10.00	100.00
310	0.68	124.44	-10.00	100.00
315	0.54	126.48	-10.00	100.00
320	0.31	128.15	-10.00	100.00
325	0.31	129.70	-10.00	100.00
330	0.30	130.91	-10.00	100.00
335	0.28	131.75	-10.00	100.00
340	0.00	131.95	-10.00	100.00
345	0.00	132.03	-10.00	100.00
350	0.00	131.71	-10.00	100.00
355	0.00	131.02	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/06/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — AMARILLO, TX

Venue Name	
Latitude (NAD 83)	35° 12' 16.6" N
Longitude (NAD 83)	101° 49' 55.2" W
Climate Zone	A
Rain Zone	2
Ground Elevation (AMSL)	1117.11 m / 3665.1 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	171.7° to 171.7°
Corresponding Elevation Angles	48.8° / 48.8°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		8.1 meter
Gain / Diameter		65.3 dBi / 8.1 m
3-dB / 15-dB Beamwidth		0.10° / 0.23°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	27.3
	(dBW/MHz)	51.3
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**AMARILLO, TX**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	35° 12' 16.6" N
Longitude (NAD 83)	101° 49' 55.2" W
Ground Elevation (AMSL)	1117.11 m / 3665.1 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-38.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	130.68	-10.00	100.00
5	0.00	129.87	-10.00	100.00
10	0.00	128.71	-10.00	100.00
15	0.00	127.22	-10.00	100.00
20	0.00	125.44	-10.00	100.00
25	0.00	123.39	-10.00	100.00
30	0.00	121.11	-10.00	100.00
35	0.00	118.63	-10.00	100.00
40	0.00	115.97	-10.00	100.00
45	0.00	113.16	-10.00	100.00
50	0.00	110.23	-10.00	100.00
55	0.00	107.19	-10.00	100.00
60	0.00	104.07	-10.00	100.00
65	0.00	100.89	-10.00	100.00
70	0.00	97.65	-10.00	100.00
75	0.00	94.38	-10.00	100.00
80	0.00	91.09	-10.00	100.00
85	0.00	87.80	-10.00	100.00
90	0.00	84.52	-10.00	100.00
95	0.00	81.26	-10.00	100.00
100	0.00	78.04	-10.00	100.00
105	0.00	74.87	-10.00	100.00
110	0.00	71.78	-10.00	100.00
115	0.00	68.77	-10.00	100.00
120	0.00	65.88	-10.00	100.00
125	0.00	63.12	-10.00	100.00
130	0.00	60.52	-10.00	100.00
135	0.00	58.10	-10.00	100.00
140	0.00	55.89	-10.00	100.00
145	0.00	53.93	-10.00	100.00
150	0.00	52.24	-10.00	100.00
155	0.00	50.86	-10.00	100.00
160	0.00	49.82	-10.00	100.00
165	0.00	49.13	-10.00	100.00
170	0.00	48.81	-10.00	100.00
175	0.00	48.88	-10.00	100.00
180	0.00	49.32	-10.00	100.00
185	0.00	50.13	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**AMARILLO, TX**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	35° 12' 16.6" N
Longitude (NAD 83)	101° 49' 55.2" W
Ground Elevation (AMSL)	1117.11 m / 3665.1 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-38.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	51.29	-10.00	100.00
195	0.00	52.78	-10.00	100.00
200	0.00	54.56	-10.00	100.00
205	0.00	56.61	-10.00	100.00
210	0.00	58.89	-10.00	100.00
215	0.00	61.37	-10.00	100.00
220	0.00	64.03	-10.00	100.00
225	0.00	66.84	-10.00	100.00
230	0.00	69.77	-10.00	100.00
235	0.00	72.81	-10.00	100.00
240	0.00	75.93	-10.00	100.00
245	0.00	79.11	-10.00	100.00
250	0.00	82.35	-10.00	100.00
255	0.00	85.62	-10.00	100.00
260	0.00	88.91	-10.00	100.00
265	0.00	92.20	-10.00	100.00
270	0.00	95.48	-10.00	100.00
275	0.00	98.74	-10.00	100.00
280	0.00	101.96	-10.00	100.00
285	0.00	105.13	-10.00	100.00
290	0.00	108.22	-10.00	100.00
295	0.00	111.23	-10.00	100.00
300	0.00	114.12	-10.00	100.00
305	0.00	116.88	-10.00	100.00
310	0.00	119.48	-10.00	100.00
315	0.00	121.90	-10.00	100.00
320	0.00	124.11	-10.00	100.00
325	0.00	126.07	-10.00	100.00
330	0.00	127.76	-10.00	100.00
335	0.00	129.14	-10.00	100.00
340	0.00	130.18	-10.00	100.00
345	0.00	130.87	-10.00	100.00
350	0.00	131.19	-10.00	100.00
355	0.00	131.12	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/03/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — BILLINGS, MT

Venue Name	
Latitude (NAD 83)	45° 46' 6.9" N
Longitude (NAD 83)	108° 32' 27.6" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	961.89 m / 3155.8 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	164.1° to 164.1°
Corresponding Elevation Angles	36.1° / 36.1°
Antenna Centerline (AGL)	3.66 m / 12.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		5.6 Meter
Gain / Diameter		62.0 dBi / 5.6 m
3-dB / 15-dB Beamwidth		0.14° / 0.32°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	24.0
	(dBW/MHz)	48.0
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BILLINGS, MT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	45° 46' 6.9" N
Longitude (NAD 83)	108° 32' 27.6" W
Ground Elevation (AMSL)	961.89 m / 3155.8 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-38.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	1.93	142.73	-10.00	100.00
5	1.86	140.56	-10.00	100.00
10	1.75	137.96	-10.00	100.00
15	1.64	135.03	-10.00	100.00
20	1.57	131.86	-10.00	100.00
25	1.50	128.47	-10.00	100.00
30	1.44	124.92	-10.00	100.00
35	1.34	121.21	-10.00	100.00
40	1.16	117.36	-10.00	100.00
45	0.94	113.43	-10.00	100.00
50	0.93	109.50	-10.00	100.00
55	0.00	105.33	-10.00	100.00
60	0.00	101.35	-10.00	100.00
65	0.00	97.34	-10.00	100.00
70	0.52	93.33	-10.00	100.00
75	0.76	89.26	-10.00	100.00
80	1.29	85.16	-10.00	100.00
85	1.43	81.05	-10.00	100.00
90	1.26	77.00	-10.00	100.00
95	1.36	72.95	-10.00	100.00
100	1.33	68.97	-10.00	100.00
105	0.98	65.16	-10.00	100.00
110	0.53	61.51	-10.00	100.00
115	0.74	57.72	-10.00	100.00
120	0.67	54.18	-10.00	100.00
125	0.93	50.62	-10.00	100.00
130	0.84	47.45	-9.91	100.00
135	1.12	44.27	-9.15	100.00
140	1.37	41.39	-8.42	100.00
145	1.72	38.75	-7.71	100.00
150	1.48	37.04	-7.22	100.00
155	1.26	35.86	-6.87	100.00
160	0.91	35.39	-6.72	100.00
165	0.79	35.32	-6.70	100.00
170	0.89	35.63	-6.80	100.00
175	0.85	36.69	-7.11	100.00
180	0.90	38.19	-7.55	100.00
185	0.88	40.25	-8.12	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BILLINGS, MT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	45° 46' 6.9" N
Longitude (NAD 83)	108° 32' 27.6" W
Ground Elevation (AMSL)	961.89 m / 3155.8 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-38.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.98	42.62	-8.74	100.00
195	0.76	45.57	-9.47	100.00
200	0.56	48.77	-10.00	100.00
205	0.65	51.99	-10.00	100.00
210	0.00	55.79	-10.00	100.00
215	0.00	59.37	-10.00	100.00
220	0.00	63.07	-10.00	100.00
225	0.00	66.86	-10.00	100.00
230	0.00	70.74	-10.00	100.00
235	0.00	74.67	-10.00	100.00
240	0.00	78.65	-10.00	100.00
245	0.30	82.63	-10.00	100.00
250	0.33	86.68	-10.00	100.00
255	0.36	90.73	-10.00	100.00
260	0.41	94.79	-10.00	100.00
265	0.46	98.84	-10.00	100.00
270	0.52	102.88	-10.00	100.00
275	0.55	106.88	-10.00	100.00
280	0.55	110.82	-10.00	100.00
285	0.57	114.71	-10.00	100.00
290	0.58	118.51	-10.00	100.00
295	0.61	122.22	-10.00	100.00
300	1.33	126.15	-10.00	100.00
305	1.55	129.73	-10.00	100.00
310	1.65	133.07	-10.00	100.00
315	1.69	136.13	-10.00	100.00
320	1.73	138.90	-10.00	100.00
325	1.92	141.43	-10.00	100.00
330	1.91	143.35	-10.00	100.00
335	1.89	144.75	-10.00	100.00
340	1.95	145.64	-10.00	100.00
345	2.01	145.90	-10.00	100.00
350	1.98	145.44	-10.00	100.00
355	1.98	144.39	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/06/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — BISMARK, ND

Venue Name	
Latitude (NAD 83)	46° 51' 5.7" N
Longitude (NAD 83)	100° 46' 48.7" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	581.61 m / 1908.2 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	174.8° to 174.8°
Corresponding Elevation Angles	36.0° / 36.0°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		8.1 meter
Gain / Diameter		65.3 dBi / 8.1 m
3-dB / 15-dB Beamwidth		0.10° / 0.23°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	27.3
	(dBW/MHz)	51.3
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BISMARK, ND**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	46° 51' 5.7" N
Longitude (NAD 83)	100° 46' 48.7" W
Ground Elevation (AMSL)	581.61 m / 1908.2 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	143.68	-10.00	100.00
5	0.00	142.77	-10.00	100.00
10	0.00	141.33	-10.00	100.00
15	0.00	139.41	-10.00	100.00
20	0.00	137.07	-10.00	100.00
25	0.00	134.38	-10.00	100.00
30	0.00	131.40	-10.00	100.00
35	0.00	128.18	-10.00	100.00
40	0.00	124.77	-10.00	100.00
45	0.00	121.21	-10.00	100.00
50	0.00	117.52	-10.00	100.00
55	0.00	113.73	-10.00	100.00
60	0.00	109.86	-10.00	100.00
65	0.00	105.93	-10.00	100.00
70	0.00	101.95	-10.00	100.00
75	0.00	97.94	-10.00	100.00
80	0.00	93.90	-10.00	100.00
85	0.00	89.86	-10.00	100.00
90	0.00	85.82	-10.00	100.00
95	0.00	81.79	-10.00	100.00
100	0.00	77.78	-10.00	100.00
105	0.00	73.80	-10.00	100.00
110	0.00	69.87	-10.00	100.00
115	0.00	66.01	-10.00	100.00
120	0.00	62.23	-10.00	100.00
125	0.00	58.54	-10.00	100.00
130	0.00	54.99	-10.00	100.00
135	0.00	51.59	-10.00	100.00
140	0.00	48.39	-10.00	100.00
145	0.00	45.43	-9.43	100.00
150	0.00	42.76	-8.78	100.00
155	0.00	40.45	-8.17	100.00
160	0.00	38.55	-7.65	100.00
165	0.00	37.15	-7.25	100.00
170	0.00	36.28	-6.99	100.00
175	0.00	36.01	-6.91	100.00
180	0.00	36.32	-7.01	100.00
185	0.00	37.23	-7.27	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BISMARK, ND**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	46° 51' 5.7" N
Longitude (NAD 83)	100° 46' 48.7" W
Ground Elevation (AMSL)	581.61 m / 1908.2 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	38.67	-7.68	100.00
195	0.00	40.59	-8.21	100.00
200	0.00	42.93	-8.82	100.00
205	0.00	45.62	-9.48	100.00
210	0.00	48.60	-10.00	100.00
215	0.00	51.82	-10.00	100.00
220	0.00	55.23	-10.00	100.00
225	0.00	58.79	-10.00	100.00
230	0.00	62.48	-10.00	100.00
235	0.00	66.27	-10.00	100.00
240	0.00	70.14	-10.00	100.00
245	0.00	74.07	-10.00	100.00
250	0.00	78.05	-10.00	100.00
255	0.00	82.06	-10.00	100.00
260	0.24	86.08	-10.00	100.00
265	0.00	90.14	-10.00	100.00
270	0.33	94.20	-10.00	100.00
275	0.47	98.26	-10.00	100.00
280	0.42	102.29	-10.00	100.00
285	0.44	106.29	-10.00	100.00
290	0.38	110.23	-10.00	100.00
295	0.00	113.99	-10.00	100.00
300	0.00	117.77	-10.00	100.00
305	0.00	121.46	-10.00	100.00
310	0.00	125.01	-10.00	100.00
315	0.00	128.41	-10.00	100.00
320	0.00	131.61	-10.00	100.00
325	0.00	134.57	-10.00	100.00
330	0.20	137.40	-10.00	100.00
335	0.00	139.55	-10.00	100.00
340	0.00	141.45	-10.00	100.00
345	0.00	142.85	-10.00	100.00
350	0.00	143.72	-10.00	100.00
355	0.00	143.99	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/06/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — BOISE, ID

Venue Name	
Latitude (NAD 83)	43° 36' 27.7" N
Longitude (NAD 83)	116° 18' 36.0" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	811.45 m / 2662.3 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	153.1° to 153.1°
Corresponding Elevation Angles	36.1° / 36.1°
Antenna Centerline (AGL)	3.66 m / 12.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		5.6 Meter
Gain / Diameter		62.0 dBi / 5.6 m
3-dB / 15-dB Beamwidth		0.14° / 0.32°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	24.0
	(dBW/MHz)	48.0
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BOISE, ID**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	43° 36' 27.7" N
Longitude (NAD 83)	116° 18' 36.0" W
Ground Elevation (AMSL)	811.45 m / 2662.3 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	136.10	-10.00	100.00
5	0.00	133.30	-10.00	100.00
10	0.00	130.24	-10.00	100.00
15	0.00	126.96	-10.00	100.00
20	0.00	123.50	-10.00	100.00
25	0.00	119.89	-10.00	100.00
30	0.00	116.17	-10.00	100.00
35	0.00	112.35	-10.00	100.00
40	0.00	108.46	-10.00	100.00
45	0.00	104.52	-10.00	100.00
50	0.00	100.53	-10.00	100.00
55	0.00	96.52	-10.00	100.00
60	0.00	92.48	-10.00	100.00
65	0.00	88.44	-10.00	100.00
70	0.00	84.41	-10.00	100.00
75	0.00	80.38	-10.00	100.00
80	0.00	76.39	-10.00	100.00
85	0.00	72.43	-10.00	100.00
90	0.00	68.53	-10.00	100.00
95	0.20	64.63	-10.00	100.00
100	0.25	60.85	-10.00	100.00
105	0.67	57.01	-10.00	100.00
110	0.69	53.45	-10.00	100.00
115	0.91	49.95	-10.00	100.00
120	1.04	46.68	-9.73	100.00
125	0.99	43.78	-9.03	100.00
130	1.23	40.97	-8.31	100.00
135	1.30	38.67	-7.68	100.00
140	1.28	36.89	-7.17	100.00
145	1.28	35.61	-6.79	100.00
150	1.24	34.97	-6.59	100.00
155	1.52	34.62	-6.48	100.00
160	1.62	35.07	-6.62	100.00
165	1.65	36.20	-6.97	100.00
170	1.65	37.91	-7.47	100.00
175	1.62	40.11	-8.08	100.00
180	1.61	42.69	-8.76	100.00
185	1.60	45.61	-9.48	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**BOISE, ID**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	43° 36' 27.7" N
Longitude (NAD 83)	116° 18' 36.0" W
Ground Elevation (AMSL)	811.45 m / 2662.3 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	1.59	48.79	-10.00	100.00
195	1.50	52.23	-10.00	100.00
200	1.37	55.85	-10.00	100.00
205	1.25	59.59	-10.00	100.00
210	1.11	63.44	-10.00	100.00
215	1.04	67.34	-10.00	100.00
220	0.94	71.31	-10.00	100.00
225	0.91	75.31	-10.00	100.00
230	0.74	79.37	-10.00	100.00
235	0.52	83.44	-10.00	100.00
240	0.37	87.51	-10.00	100.00
245	0.22	91.56	-10.00	100.00
250	0.00	95.59	-10.00	100.00
255	0.00	99.62	-10.00	100.00
260	0.00	103.61	-10.00	100.00
265	0.00	107.57	-10.00	100.00
270	0.00	111.47	-10.00	100.00
275	0.00	115.30	-10.00	100.00
280	0.00	119.05	-10.00	100.00
285	0.00	122.68	-10.00	100.00
290	0.00	126.18	-10.00	100.00
295	0.00	129.51	-10.00	100.00
300	0.00	132.63	-10.00	100.00
305	0.00	135.48	-10.00	100.00
310	0.00	138.03	-10.00	100.00
315	0.00	140.20	-10.00	100.00
320	0.00	141.92	-10.00	100.00
325	0.00	143.14	-10.00	100.00
330	0.00	143.80	-10.00	100.00
335	0.00	143.87	-10.00	100.00
340	0.00	143.34	-10.00	100.00
345	0.00	142.25	-10.00	100.00
350	0.00	140.63	-10.00	100.00
355	0.00	138.56	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/24/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — DULUTH, MN

Venue Name	
Latitude (NAD 83)	46° 49' 33.6" N
Longitude (NAD 83)	92° 7' 49.8" W
Climate Zone	A
Rain Zone	2
Ground Elevation (AMSL)	414.31 m / 1359.3 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	186.7° to 186.7°
Corresponding Elevation Angles	35.9° / 35.9°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		8.1 meter
Gain / Diameter		65.3 dBi / 8.1 m
3-dB / 15-dB Beamwidth		0.10° / 0.23°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	27.3
	(dBW/MHz)	51.3
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**DULUTH, MN**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	46° 49' 33.6" N
Longitude (NAD 83)	92° 7' 49.8" W
Ground Elevation (AMSL)	414.31 m / 1359.3 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.38	143.90	-10.00	100.00
5	0.37	144.39	-10.00	100.00
10	0.36	144.28	-10.00	100.00
15	0.00	143.22	-10.00	100.00
20	0.29	142.24	-10.00	100.00
25	0.52	140.66	-10.00	100.00
30	0.40	138.33	-10.00	100.00
35	0.00	135.44	-10.00	100.00
40	0.29	132.75	-10.00	100.00
45	0.44	129.68	-10.00	100.00
50	0.00	126.07	-10.00	100.00
55	0.00	122.56	-10.00	100.00
60	0.00	118.90	-10.00	100.00
65	0.00	115.15	-10.00	100.00
70	0.00	111.30	-10.00	100.00
75	0.00	107.39	-10.00	100.00
80	0.00	103.42	-10.00	100.00
85	0.00	99.42	-10.00	100.00
90	0.00	95.39	-10.00	100.00
95	0.00	91.34	-10.00	100.00
100	0.00	87.30	-10.00	100.00
105	0.00	83.26	-10.00	100.00
110	0.00	79.23	-10.00	100.00
115	0.00	75.24	-10.00	100.00
120	0.00	71.29	-10.00	100.00
125	0.00	67.40	-10.00	100.00
130	0.00	63.58	-10.00	100.00
135	0.00	59.86	-10.00	100.00
140	0.00	56.25	-10.00	100.00
145	0.00	52.78	-10.00	100.00
150	0.00	49.50	-10.00	100.00
155	0.00	46.44	-9.67	100.00
160	0.00	43.66	-9.00	100.00
165	0.00	41.20	-8.37	100.00
170	0.00	39.14	-7.82	100.00
175	0.00	37.55	-7.36	100.00
180	0.00	36.48	-7.05	100.00
185	0.00	35.98	-6.90	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**DULUTH, MN**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	46° 49' 33.6" N
Longitude (NAD 83)	92° 7' 49.8" W
Ground Elevation (AMSL)	414.31 m / 1359.3 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.36	35.72	-6.82	100.00
195	0.59	36.20	-6.97	100.00
200	0.78	37.31	-7.30	100.00
205	0.81	39.09	-7.80	100.00
210	0.75	41.39	-8.42	100.00
215	0.67	44.06	-9.10	100.00
220	0.45	47.14	-9.84	100.00
225	0.39	50.35	-10.00	100.00
230	0.34	53.75	-10.00	100.00
235	0.28	57.31	-10.00	100.00
240	0.33	60.96	-10.00	100.00
245	0.44	64.71	-10.00	100.00
250	0.45	68.57	-10.00	100.00
255	0.37	72.53	-10.00	100.00
260	0.42	76.51	-10.00	100.00
265	0.31	80.55	-10.00	100.00
270	0.23	84.60	-10.00	100.00
275	0.27	88.65	-10.00	100.00
280	0.24	92.71	-10.00	100.00
285	0.25	96.76	-10.00	100.00
290	0.00	100.77	-10.00	100.00
295	0.00	104.76	-10.00	100.00
300	0.00	108.71	-10.00	100.00
305	0.23	112.67	-10.00	100.00
310	0.33	116.54	-10.00	100.00
315	0.64	120.41	-10.00	100.00
320	0.62	124.05	-10.00	100.00
325	0.61	127.55	-10.00	100.00
330	0.44	130.77	-10.00	100.00
335	0.43	133.86	-10.00	100.00
340	0.56	136.77	-10.00	100.00
345	0.63	139.32	-10.00	100.00
350	0.51	141.31	-10.00	100.00
355	0.46	142.89	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/24/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — GILBERT, AZ

Venue Name	
Latitude (NAD 83)	33° 21' 55.8" N
Longitude (NAD 83)	111° 48' 50.4" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	372.13 m / 1220.9 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	154.3° to 154.3°
Corresponding Elevation Angles	48.0° / 48.0°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		8.1 meter
Gain / Diameter		65.3 dBi / 8.1 m
3-dB / 15-dB Beamwidth		0.10° / 0.23°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	27.3
	(dBW/MHz)	51.3
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**GILBERT, AZ**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	33° 21' 55.8" N
Longitude (NAD 83)	111° 48' 50.4" W
Ground Elevation (AMSL)	372.13 m / 1220.9 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	127.05	-10.00	100.00
5	0.00	125.10	-10.00	100.00
10	0.00	122.89	-10.00	100.00
15	0.00	120.47	-10.00	100.00
20	0.00	117.85	-10.00	100.00
25	0.00	115.07	-10.00	100.00
30	0.00	112.15	-10.00	100.00
35	0.00	109.11	-10.00	100.00
40	0.00	105.98	-10.00	100.00
45	0.00	102.78	-10.00	100.00
50	0.00	99.52	-10.00	100.00
55	0.00	96.22	-10.00	100.00
60	0.00	92.89	-10.00	100.00
65	0.00	89.55	-10.00	100.00
70	0.00	86.21	-10.00	100.00
75	0.00	82.88	-10.00	100.00
80	0.00	79.59	-10.00	100.00
85	0.00	76.34	-10.00	100.00
90	0.00	73.16	-10.00	100.00
95	0.00	70.05	-10.00	100.00
100	0.00	67.05	-10.00	100.00
105	0.00	64.16	-10.00	100.00
110	0.00	61.42	-10.00	100.00
115	0.00	58.85	-10.00	100.00
120	0.00	56.48	-10.00	100.00
125	0.00	54.34	-10.00	100.00
130	0.00	52.46	-10.00	100.00
135	0.00	50.88	-10.00	100.00
140	0.00	49.62	-10.00	100.00
145	0.00	48.72	-10.00	100.00
150	0.00	48.19	-10.00	100.00
155	0.00	48.05	-10.00	100.00
160	0.00	48.29	-10.00	100.00
165	0.00	48.93	-10.00	100.00
170	0.00	49.93	-10.00	100.00
175	0.00	51.28	-10.00	100.00
180	0.00	52.95	-10.00	100.00
185	0.00	54.90	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**GILBERT, AZ**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	33° 21' 55.8" N
Longitude (NAD 83)	111° 48' 50.4" W
Ground Elevation (AMSL)	372.13 m / 1220.9 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	57.11	-10.00	100.00
195	0.00	59.53	-10.00	100.00
200	0.00	62.15	-10.00	100.00
205	0.00	64.93	-10.00	100.00
210	0.00	67.85	-10.00	100.00
215	0.00	70.89	-10.00	100.00
220	0.00	74.02	-10.00	100.00
225	0.00	77.22	-10.00	100.00
230	0.00	80.48	-10.00	100.00
235	0.00	83.78	-10.00	100.00
240	0.00	87.11	-10.00	100.00
245	0.00	90.45	-10.00	100.00
250	0.00	93.79	-10.00	100.00
255	0.00	97.12	-10.00	100.00
260	0.00	100.41	-10.00	100.00
265	0.00	103.66	-10.00	100.00
270	0.00	106.84	-10.00	100.00
275	0.00	109.95	-10.00	100.00
280	0.00	112.95	-10.00	100.00
285	0.00	115.84	-10.00	100.00
290	0.00	118.58	-10.00	100.00
295	0.00	121.15	-10.00	100.00
300	0.00	123.52	-10.00	100.00
305	0.00	125.66	-10.00	100.00
310	0.00	127.54	-10.00	100.00
315	0.00	129.12	-10.00	100.00
320	0.00	130.38	-10.00	100.00
325	0.00	131.28	-10.00	100.00
330	0.00	131.81	-10.00	100.00
335	0.00	131.95	-10.00	100.00
340	0.00	131.71	-10.00	100.00
345	0.00	131.07	-10.00	100.00
350	0.00	130.07	-10.00	100.00
355	0.00	128.72	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/24/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — MISSOULA, MT

Venue Name	
Latitude (NAD 83)	46° 56' 9.9" N
Longitude (NAD 83)	114° 7' 1.2" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	972.83 m / 3191.7 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	157.1° to 157.1°
Corresponding Elevation Angles	33.5° / 33.5°
Antenna Centerline (AGL)	3.66 m / 12.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		5.6 Meter
Gain / Diameter		62.0 dBi / 5.6 m
3-dB / 15-dB Beamwidth		0.14° / 0.32°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	24.0
	(dBW/MHz)	48.0
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**MISSOULA, MT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	46° 56' 9.9" N
Longitude (NAD 83)	114° 7' 1.2" W
Ground Elevation (AMSL)	972.83 m / 3191.7 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	2.31	142.03	-10.00	100.00
5	2.49	139.28	-10.00	100.00
10	2.83	136.27	-10.00	100.00
15	3.05	132.90	-10.00	100.00
20	2.98	129.17	-10.00	100.00
25	3.29	125.45	-10.00	100.00
30	3.48	121.53	-10.00	100.00
35	3.38	117.40	-10.00	100.00
40	2.92	113.13	-10.00	100.00
45	3.01	108.96	-10.00	100.00
50	3.16	104.74	-10.00	100.00
55	2.75	100.42	-10.00	100.00
60	2.52	96.12	-10.00	100.00
65	3.36	91.86	-10.00	100.00
70	3.29	87.53	-10.00	100.00
75	3.76	83.18	-10.00	100.00
80	3.96	78.84	-10.00	100.00
85	3.28	74.64	-10.00	100.00
90	2.96	70.46	-10.00	100.00
95	2.41	66.41	-10.00	100.00
100	2.27	62.36	-10.00	100.00
105	2.05	58.43	-10.00	100.00
110	0.81	55.08	-10.00	100.00
115	0.31	51.64	-10.00	100.00
120	0.00	48.34	-10.00	100.00
125	0.00	45.08	-9.35	100.00
130	0.00	42.09	-8.60	100.00
135	0.00	39.43	-7.89	100.00
140	0.00	37.16	-7.25	100.00
145	0.00	35.38	-6.72	100.00
150	0.00	34.16	-6.34	100.00
155	0.00	33.55	-6.14	100.00
160	0.00	33.60	-6.16	100.00
165	0.00	34.29	-6.38	100.00
170	0.00	35.60	-6.79	100.00
175	0.00	37.46	-7.34	100.00
180	0.00	39.78	-7.99	100.00
185	0.00	42.49	-8.71	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**MISSOULA, MT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	46° 56' 9.9" N
Longitude (NAD 83)	114° 7' 1.2" W
Ground Elevation (AMSL)	972.83 m / 3191.7 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	1.39	44.64	-9.24	100.00
195	1.42	48.00	-10.00	100.00
200	1.64	51.49	-10.00	100.00
205	1.99	55.10	-10.00	100.00
210	2.69	58.76	-10.00	100.00
215	2.50	62.86	-10.00	100.00
220	2.31	67.02	-10.00	100.00
225	2.50	71.15	-10.00	100.00
230	1.46	75.53	-10.00	100.00
235	2.77	79.58	-10.00	100.00
240	1.14	83.97	-10.00	100.00
245	1.61	88.18	-10.00	100.00
250	1.91	92.43	-10.00	100.00
255	1.25	96.64	-10.00	100.00
260	1.44	100.87	-10.00	100.00
265	0.21	104.85	-10.00	100.00
270	0.93	109.11	-10.00	100.00
275	1.01	113.21	-10.00	100.00
280	0.61	117.10	-10.00	100.00
285	0.00	120.78	-10.00	100.00
290	0.22	124.66	-10.00	100.00
295	0.28	128.34	-10.00	100.00
300	0.38	131.89	-10.00	100.00
305	0.53	135.27	-10.00	100.00
310	0.63	138.37	-10.00	100.00
315	0.69	141.13	-10.00	100.00
320	0.74	143.48	-10.00	100.00
325	1.04	145.59	-10.00	100.00
330	1.08	146.90	-10.00	100.00
335	1.57	148.01	-10.00	100.00
340	1.99	148.39	-10.00	100.00
345	2.48	148.10	-10.00	100.00
350	1.32	145.62	-10.00	100.00
355	1.73	144.03	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/24/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — N LAS VEGAS, NV

Venue Name	
Latitude (NAD 83)	36° 14' 11.0" N
Longitude (NAD 83)	115° 7' 2.6" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	585.8 m / 1921.9 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	151.0° to 151.0°
Corresponding Elevation Angles	43.8° / 43.8°
Antenna Centerline (AGL)	3.66 m / 12.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		5.6 Meter
Gain / Diameter		62.0 dBi / 5.6 m
3-dB / 15-dB Beamwidth		0.14° / 0.32°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	24.0
	(dBW/MHz)	48.0
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**N LAS VEGAS, NV**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	36° 14' 11.0" N
Longitude (NAD 83)	115° 7' 2.6" W
Ground Elevation (AMSL)	585.8 m / 1921.9 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.65	129.68	-10.00	100.00
5	0.68	127.27	-10.00	100.00
10	0.70	124.61	-10.00	100.00
15	0.71	121.72	-10.00	100.00
20	0.69	118.65	-10.00	100.00
25	0.65	115.42	-10.00	100.00
30	0.57	112.07	-10.00	100.00
35	0.49	108.63	-10.00	100.00
40	0.40	105.12	-10.00	100.00
45	0.31	101.57	-10.00	100.00
50	0.24	97.98	-10.00	100.00
55	0.00	94.36	-10.00	100.00
60	0.00	90.75	-10.00	100.00
65	0.00	87.14	-10.00	100.00
70	0.00	83.54	-10.00	100.00
75	0.00	79.97	-10.00	100.00
80	0.00	76.43	-10.00	100.00
85	0.00	72.95	-10.00	100.00
90	0.00	69.54	-10.00	100.00
95	0.00	66.21	-10.00	100.00
100	0.00	63.00	-10.00	100.00
105	0.00	59.92	-10.00	100.00
110	0.00	57.00	-10.00	100.00
115	0.00	54.28	-10.00	100.00
120	0.00	51.79	-10.00	100.00
125	0.00	49.56	-10.00	100.00
130	0.00	47.63	-9.95	100.00
135	0.00	46.06	-9.58	100.00
140	0.00	44.88	-9.30	100.00
145	0.00	44.11	-9.11	100.00
150	0.00	43.79	-9.03	100.00
155	0.00	43.92	-9.07	100.00
160	0.00	44.51	-9.21	100.00
165	0.00	45.52	-9.46	100.00
170	0.00	46.94	-9.79	100.00
175	0.00	48.72	-10.00	100.00
180	0.00	50.82	-10.00	100.00
185	0.00	53.21	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**N LAS VEGAS, NV**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	36° 14' 11.0" N
Longitude (NAD 83)	115° 7' 2.6" W
Ground Elevation (AMSL)	585.8 m / 1921.9 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	55.85	-10.00	100.00
195	0.00	58.69	-10.00	100.00
200	0.00	61.70	-10.00	100.00
205	0.24	64.76	-10.00	100.00
210	0.27	68.04	-10.00	100.00
215	0.43	71.39	-10.00	100.00
220	0.56	74.84	-10.00	100.00
225	0.59	78.38	-10.00	100.00
230	0.58	81.98	-10.00	100.00
235	0.80	85.59	-10.00	100.00
240	0.79	89.24	-10.00	100.00
245	0.87	92.90	-10.00	100.00
250	0.89	96.55	-10.00	100.00
255	0.86	100.18	-10.00	100.00
260	0.86	103.77	-10.00	100.00
265	0.80	107.28	-10.00	100.00
270	0.74	110.73	-10.00	100.00
275	0.70	114.08	-10.00	100.00
280	0.67	117.33	-10.00	100.00
285	0.68	120.46	-10.00	100.00
290	0.71	123.44	-10.00	100.00
295	0.72	126.21	-10.00	100.00
300	0.71	128.75	-10.00	100.00
305	0.70	131.02	-10.00	100.00
310	0.73	133.00	-10.00	100.00
315	0.72	134.60	-10.00	100.00
320	0.68	135.78	-10.00	100.00
325	0.67	136.55	-10.00	100.00
330	0.66	136.87	-10.00	100.00
335	0.62	136.69	-10.00	100.00
340	0.53	136.01	-10.00	100.00
345	0.52	134.97	-10.00	100.00
350	0.58	133.58	-10.00	100.00
355	0.63	131.81	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/24/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — NORTH PLATTE, NE

Venue Name	
Latitude (NAD 83)	41° 5' 26.9" N
Longitude (NAD 83)	100° 45' 10.8" W
Climate Zone	A
Rain Zone	2
Ground Elevation (AMSL)	858.01 m / 2815.0 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	174.3° to 174.3°
Corresponding Elevation Angles	42.4° / 42.4°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		8.1 meter
Gain / Diameter		65.3 dBi / 8.1 m
3-dB / 15-dB Beamwidth		0.10° / 0.23°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	27.3
	(dBW/MHz)	51.3
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**NORTH PLATTE, NE**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	41° 5' 26.9" N
Longitude (NAD 83)	100° 45' 10.8" W
Ground Elevation (AMSL)	858.01 m / 2815.0 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	137.34	-10.00	100.00
5	0.00	136.57	-10.00	100.00
10	0.00	135.35	-10.00	100.00
15	0.00	133.73	-10.00	100.00
20	0.00	131.75	-10.00	100.00
25	0.00	129.45	-10.00	100.00
30	0.00	126.88	-10.00	100.00
35	0.00	124.08	-10.00	100.00
40	0.00	121.08	-10.00	100.00
45	0.00	117.91	-10.00	100.00
50	0.00	114.61	-10.00	100.00
55	0.00	111.20	-10.00	100.00
60	0.00	107.71	-10.00	100.00
65	0.00	104.14	-10.00	100.00
70	0.00	100.52	-10.00	100.00
75	0.00	96.86	-10.00	100.00
80	0.00	93.18	-10.00	100.00
85	0.00	89.49	-10.00	100.00
90	0.00	85.79	-10.00	100.00
95	0.00	82.12	-10.00	100.00
100	0.00	78.47	-10.00	100.00
105	0.00	74.86	-10.00	100.00
110	0.22	71.24	-10.00	100.00
115	0.39	67.69	-10.00	100.00
120	0.52	64.23	-10.00	100.00
125	0.84	60.77	-10.00	100.00
130	0.84	57.60	-10.00	100.00
135	0.91	54.54	-10.00	100.00
140	0.83	51.80	-10.00	100.00
145	1.28	48.90	-10.00	100.00
150	1.29	46.60	-9.71	100.00
155	1.64	44.33	-9.17	100.00
160	1.40	42.96	-8.83	100.00
165	1.53	41.69	-8.50	100.00
170	1.88	40.67	-8.23	100.00
175	1.63	40.72	-8.25	100.00
180	1.73	40.95	-8.31	100.00
185	1.49	42.00	-8.58	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**NORTH PLATTE, NE**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	41° 5' 26.9" N
Longitude (NAD 83)	100° 45' 10.8" W
Ground Elevation (AMSL)	858.01 m / 2815.0 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	1.60	43.17	-8.88	100.00
195	1.76	44.74	-9.27	100.00
200	1.95	46.67	-9.73	100.00
205	2.16	48.94	-10.00	100.00
210	1.82	51.89	-10.00	100.00
215	1.66	54.91	-10.00	100.00
220	1.52	58.10	-10.00	100.00
225	1.31	61.46	-10.00	100.00
230	1.00	64.97	-10.00	100.00
235	0.85	68.50	-10.00	100.00
240	0.74	72.08	-10.00	100.00
245	0.53	75.74	-10.00	100.00
250	0.52	79.39	-10.00	100.00
255	0.40	83.09	-10.00	100.00
260	0.28	86.81	-10.00	100.00
265	0.25	90.52	-10.00	100.00
270	0.00	94.21	-10.00	100.00
275	0.00	97.88	-10.00	100.00
280	0.00	101.53	-10.00	100.00
285	0.00	105.14	-10.00	100.00
290	0.00	108.69	-10.00	100.00
295	0.00	112.16	-10.00	100.00
300	0.00	115.54	-10.00	100.00
305	0.00	118.81	-10.00	100.00
310	0.00	121.93	-10.00	100.00
315	0.00	124.88	-10.00	100.00
320	0.00	127.62	-10.00	100.00
325	0.00	130.12	-10.00	100.00
330	0.00	132.34	-10.00	100.00
335	0.00	134.22	-10.00	100.00
340	0.00	135.73	-10.00	100.00
345	0.00	136.83	-10.00	100.00
350	0.00	137.47	-10.00	100.00
355	0.00	137.64	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/03/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — OMAHA, NE

Venue Name	
Latitude (NAD 83)	41° 15' 51.5" N
Longitude (NAD 83)	96° 3' 32.8" W
Climate Zone	A
Rain Zone	2
Ground Elevation (AMSL)	354.11 m / 1161.8 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	181.4° to 181.4°
Corresponding Elevation Angles	42.3° / 42.3°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		13.2 Meter
Gain / Diameter		68.8 dBi / 13.2 m
3-dB / 15-dB Beamwidth		0.07° / 0.15°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	30.8
	(dBW/MHz)	54.8
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**OMAHA, NE**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	41° 15' 51.5" N
Longitude (NAD 83)	96° 3' 32.8" W
Ground Elevation (AMSL)	354.11 m / 1161.8 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 13.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-38.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	137.67	-10.00	100.00
5	0.00	137.57	-10.00	100.00
10	0.00	136.99	-10.00	100.00
15	0.84	136.75	-10.00	100.00
20	1.12	135.51	-10.00	100.00
25	1.80	134.17	-10.00	100.00
30	2.15	132.16	-10.00	100.00
35	2.79	129.99	-10.00	100.00
40	2.87	127.14	-10.00	100.00
45	2.92	124.05	-10.00	100.00
50	2.92	120.76	-10.00	100.00
55	2.93	117.32	-10.00	100.00
60	2.80	113.72	-10.00	100.00
65	2.66	110.04	-10.00	100.00
70	2.63	106.33	-10.00	100.00
75	2.30	102.51	-10.00	100.00
80	2.15	98.71	-10.00	100.00
85	1.99	94.89	-10.00	100.00
90	1.90	91.08	-10.00	100.00
95	1.85	87.28	-10.00	100.00
100	1.78	83.49	-10.00	100.00
105	1.65	79.74	-10.00	100.00
110	1.35	76.08	-10.00	100.00
115	1.37	72.41	-10.00	100.00
120	1.10	68.91	-10.00	100.00
125	1.16	65.39	-10.00	100.00
130	1.44	61.87	-10.00	100.00
135	1.70	58.44	-10.00	100.00
140	1.96	55.14	-10.00	100.00
145	1.97	52.17	-10.00	100.00
150	2.36	49.14	-10.00	100.00
155	2.30	46.69	-9.73	100.00
160	2.32	44.50	-9.21	100.00
165	2.23	42.78	-8.78	100.00
170	2.33	41.31	-8.40	100.00
175	2.27	40.46	-8.18	100.00
180	2.00	40.33	-8.14	100.00
185	1.78	40.66	-8.23	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**OMAHA, NE**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	41° 15' 51.5" N
Longitude (NAD 83)	96° 3' 32.8" W
Ground Elevation (AMSL)	354.11 m / 1161.8 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 13.2 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-38.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	1.48	41.56	-8.47	100.00
195	1.15	42.96	-8.83	100.00
200	0.94	44.65	-9.25	100.00
205	0.56	46.86	-9.77	100.00
210	0.39	49.19	-10.00	100.00
215	0.40	51.68	-10.00	100.00
220	0.00	54.68	-10.00	100.00
225	0.35	57.40	-10.00	100.00
230	0.52	60.44	-10.00	100.00
235	0.44	63.76	-10.00	100.00
240	0.40	67.17	-10.00	100.00
245	0.47	70.64	-10.00	100.00
250	0.43	74.22	-10.00	100.00
255	0.39	77.86	-10.00	100.00
260	0.44	81.52	-10.00	100.00
265	0.68	85.20	-10.00	100.00
270	0.84	88.93	-10.00	100.00
275	0.79	92.68	-10.00	100.00
280	0.72	96.40	-10.00	100.00
285	0.55	100.08	-10.00	100.00
290	0.00	103.63	-10.00	100.00
295	0.25	107.28	-10.00	100.00
300	0.40	110.85	-10.00	100.00
305	0.56	114.37	-10.00	100.00
310	0.46	117.68	-10.00	100.00
315	0.30	120.81	-10.00	100.00
320	0.25	123.83	-10.00	100.00
325	0.21	126.66	-10.00	100.00
330	0.00	129.13	-10.00	100.00
335	0.25	131.68	-10.00	100.00
340	0.00	133.51	-10.00	100.00
345	0.00	135.18	-10.00	100.00
350	0.00	136.46	-10.00	100.00
355	0.00	137.30	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/24/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — ROSEBURG, OR

Venue Name	
Latitude (NAD 83)	43° 12' 40.3" N
Longitude (NAD 83)	123° 20' 49.5" W
Climate Zone	A
Rain Zone	3
Ground Elevation (AMSL)	137.87 m / 452.3 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	144.1° to 144.1°
Corresponding Elevation Angles	33.5° / 33.5°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		8.1 meter
Gain / Diameter		65.3 dBi / 8.1 m
3-dB / 15-dB Beamwidth		0.10° / 0.23°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	27.3
	(dBW/MHz)	51.3
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	101.3 km / 62.9 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**ROSEBURG, OR**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	43° 12' 40.3" N
Longitude (NAD 83)	123° 20' 49.5" W
Ground Elevation (AMSL)	137.87 m / 452.3 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-38.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	3.88	134.76	-10.00	100.00
5	4.58	131.42	-10.00	100.00
10	3.25	126.96	-10.00	100.00
15	4.65	123.54	-10.00	100.00
20	4.11	119.25	-10.00	100.00
25	3.16	114.83	-10.00	100.00
30	3.93	110.81	-10.00	100.00
35	4.60	106.66	-10.00	100.00
40	5.33	102.42	-10.00	100.00
45	5.10	98.02	-10.00	100.00
50	4.21	93.59	-10.00	100.00
55	3.86	89.24	-10.00	100.00
60	3.15	84.93	-10.00	100.00
65	2.63	80.68	-10.00	100.00
70	3.21	76.34	-10.00	100.00
75	2.12	72.30	-10.00	100.00
80	1.39	68.31	-10.00	100.00
85	1.17	64.31	-10.00	100.00
90	1.93	60.06	-10.00	100.00
95	2.53	55.88	-10.00	100.00
100	2.69	51.95	-10.00	100.00
105	3.16	47.99	-10.00	100.00
110	3.61	44.16	-9.13	100.00
115	4.70	40.07	-8.07	100.00
120	6.91	35.32	-6.70	100.00
125	7.54	31.87	-5.59	100.00
130	7.50	29.38	-4.70	100.00
135	6.71	28.23	-4.27	100.00
140	6.82	27.01	-3.79	100.00
145	6.43	27.11	-3.83	100.00
150	6.95	27.18	-3.86	100.00
155	7.57	28.01	-4.18	100.00
160	6.24	31.27	-5.38	100.00
165	5.27	34.62	-6.48	100.00
170	4.29	38.28	-7.57	100.00
175	3.40	42.08	-8.60	100.00
180	2.58	45.98	-9.57	100.00
185	3.68	49.02	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**ROSEBURG, OR**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	43° 12' 40.3" N
Longitude (NAD 83)	123° 20' 49.5" W
Ground Elevation (AMSL)	137.87 m / 452.3 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-38.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	4.06	52.69	-10.00	100.00
195	2.70	57.19	-10.00	100.00
200	2.08	61.41	-10.00	100.00
205	0.51	65.92	-10.00	100.00
210	1.23	69.79	-10.00	100.00
215	1.80	73.82	-10.00	100.00
220	2.00	78.00	-10.00	100.00
225	2.34	82.20	-10.00	100.00
230	3.42	86.43	-10.00	100.00
235	5.17	90.77	-10.00	100.00
240	6.47	95.23	-10.00	100.00
245	6.94	99.71	-10.00	100.36
250	6.91	104.16	-10.00	100.20
255	6.82	108.56	-10.00	100.00
260	6.61	112.90	-10.00	100.00
265	7.12	117.36	-10.00	101.27
270	6.80	121.56	-10.00	100.00
275	3.75	124.61	-10.00	100.00
280	1.90	127.67	-10.00	100.00
285	1.50	131.12	-10.00	100.00
290	1.47	134.55	-10.00	100.00
295	1.28	137.62	-10.00	100.00
300	0.40	139.84	-10.00	100.00
305	0.54	142.42	-10.00	100.00
310	0.77	144.64	-10.00	100.00
315	1.55	146.87	-10.00	100.00
320	1.42	147.65	-10.00	100.00
325	2.23	148.68	-10.00	100.00
330	2.12	148.10	-10.00	100.00
335	2.30	147.11	-10.00	100.00
340	2.55	145.54	-10.00	100.00
345	2.10	142.86	-10.00	100.00
350	2.09	140.14	-10.00	100.00
355	3.31	137.87	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/24/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — SALT LAKE CT, UT

Venue Name	
Latitude (NAD 83)	40° 19' 57.0" N
Longitude (NAD 83)	111° 43' 40.8" W
Climate Zone	A
Rain Zone	5
Ground Elevation (AMSL)	1404.22 m / 4607.0 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	157.9° to 157.9°
Corresponding Elevation Angles	40.9° / 40.9°
Antenna Centerline (AGL)	3.66 m / 12.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		5.6 Meter
Gain / Diameter		62.0 dBi / 5.6 m
3-dB / 15-dB Beamwidth		0.14° / 0.32°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	24.0
	(dBW/MHz)	48.0
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	118.2 km / 73.4 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**SALT LAKE CT, UT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	40° 19' 57.0" N
Longitude (NAD 83)	111° 43' 40.8" W
Ground Elevation (AMSL)	1404.22 m / 4607.0 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	3.98	137.76	-10.00	100.00
5	6.33	137.11	-10.00	100.00
10	8.15	135.41	-10.00	106.46
15	8.64	132.39	-10.00	108.62
20	6.73	127.85	-10.00	100.00
25	6.68	124.24	-10.00	100.00
30	7.51	120.84	-10.00	103.27
35	7.71	117.02	-10.00	104.31
40	8.10	113.15	-10.00	106.24
45	8.70	109.22	-10.00	108.89
50	9.00	105.12	-10.00	110.18
55	10.97	101.15	-10.00	118.16
60	9.39	96.72	-10.00	111.91
65	7.92	92.43	-10.00	105.36
70	7.07	88.26	-10.00	101.02
75	6.13	84.17	-10.00	100.00
80	5.97	80.11	-10.00	100.00
85	4.97	76.23	-10.00	100.00
90	3.99	72.50	-10.00	100.00
95	3.30	68.85	-10.00	100.00
100	2.93	65.25	-10.00	100.00
105	2.86	61.65	-10.00	100.00
110	2.80	58.18	-10.00	100.00
115	2.64	54.91	-10.00	100.00
120	2.52	51.81	-10.00	100.00
125	2.51	48.87	-10.00	100.00
130	2.52	46.18	-9.61	100.00
135	2.52	43.80	-9.04	100.00
140	2.18	42.09	-8.60	100.00
145	2.12	40.59	-8.21	100.00
150	1.80	39.80	-8.00	100.00
155	1.49	39.54	-7.93	100.00
160	1.10	39.88	-8.02	100.00
165	0.92	40.54	-8.20	100.00
170	0.62	41.80	-8.53	100.00
175	0.29	43.52	-8.97	100.00
180	0.00	45.58	-9.47	100.00
185	0.00	47.74	-9.97	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**SALT LAKE CT, UT**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	40° 19' 57.0" N
Longitude (NAD 83)	111° 43' 40.8" W
Ground Elevation (AMSL)	1404.22 m / 4607.0 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.00	50.21	-10.00	100.00
195	0.00	52.95	-10.00	100.00
200	0.00	55.91	-10.00	100.00
205	0.00	59.06	-10.00	100.00
210	0.00	62.35	-10.00	100.00
215	0.00	65.78	-10.00	100.00
220	0.00	69.30	-10.00	100.00
225	0.00	72.91	-10.00	100.00
230	0.00	76.58	-10.00	100.00
235	0.00	80.29	-10.00	100.00
240	0.00	84.04	-10.00	100.00
245	0.00	87.81	-10.00	100.00
250	0.00	91.59	-10.00	100.00
255	0.00	95.36	-10.00	100.00
260	0.00	99.11	-10.00	100.00
265	0.00	102.83	-10.00	100.00
270	0.00	106.51	-10.00	100.00
275	0.00	110.13	-10.00	100.00
280	0.00	113.67	-10.00	100.00
285	0.00	117.11	-10.00	100.00
290	0.00	120.43	-10.00	100.00
295	0.00	123.60	-10.00	100.00
300	0.00	126.59	-10.00	100.00
305	0.00	129.37	-10.00	100.00
310	0.00	131.88	-10.00	100.00
315	0.00	134.10	-10.00	100.00
320	0.00	135.96	-10.00	100.00
325	0.00	137.42	-10.00	100.00
330	0.30	138.73	-10.00	100.00
335	0.32	139.30	-10.00	100.00
340	0.34	139.35	-10.00	100.00
345	0.39	138.94	-10.00	100.00
350	0.88	138.45	-10.00	100.00
355	1.97	138.00	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/24/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — SAN DIEGO, CA

Venue Name	
Latitude (NAD 83)	32° 59' 19.7" N
Longitude (NAD 83)	117° 4' 24.6" W
Climate Zone	A
Rain Zone	4
Ground Elevation (AMSL)	209.83 m / 688.4 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	146.1° to 146.1°
Corresponding Elevation Angles	45.9° / 45.9°
Antenna Centerline (AGL)	3.66 m / 12.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		5.6 Meter
Gain / Diameter		62.0 dBi / 5.6 m
3-dB / 15-dB Beamwidth		0.14° / 0.32°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	24.0
	(dBW/MHz)	48.0
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	104.3 km / 64.8 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**SAN DIEGO, CA**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	32° 59' 19.7" N
Longitude (NAD 83)	117° 4' 24.6" W
Ground Elevation (AMSL)	209.83 m / 688.4 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	4.64	128.59	-10.00	100.00
5	4.51	125.71	-10.00	100.00
10	4.40	122.65	-10.00	100.00
15	4.18	119.38	-10.00	100.00
20	3.50	115.79	-10.00	100.00
25	2.65	112.11	-10.00	100.00
30	2.64	108.70	-10.00	100.00
35	2.26	105.11	-10.00	100.00
40	2.14	101.57	-10.00	100.00
45	2.73	98.09	-10.00	100.00
50	2.75	94.47	-10.00	100.00
55	2.70	90.83	-10.00	100.00
60	2.62	87.19	-10.00	100.00
65	3.18	83.50	-10.00	100.00
70	2.85	79.92	-10.00	100.00
75	2.83	76.35	-10.00	100.00
80	2.18	73.01	-10.00	100.00
85	2.93	69.33	-10.00	100.00
90	2.87	65.98	-10.00	100.00
95	2.91	62.70	-10.00	100.00
100	1.90	60.13	-10.00	100.00
105	1.53	57.46	-10.00	100.00
110	1.14	55.04	-10.00	100.00
115	0.48	53.11	-10.00	100.00
120	0.33	51.10	-10.00	100.00
125	0.40	49.22	-10.00	100.00
130	0.46	47.66	-9.95	100.00
135	0.66	46.34	-9.65	100.00
140	0.67	45.61	-9.48	100.00
145	0.62	45.34	-9.41	100.00
150	0.48	45.60	-9.47	100.00
155	0.51	46.11	-9.59	100.00
160	0.35	47.21	-9.85	100.00
165	0.28	48.60	-10.00	100.00
170	0.38	50.19	-10.00	100.00
175	0.69	51.94	-10.00	100.00
180	1.12	53.92	-10.00	100.00
185	1.94	55.94	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**SAN DIEGO, CA**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	32° 59' 19.7" N
Longitude (NAD 83)	117° 4' 24.6" W
Ground Elevation (AMSL)	209.83 m / 688.4 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	2.29	58.56	-10.00	100.00
195	2.00	61.73	-10.00	100.00
200	1.61	65.06	-10.00	100.00
205	0.98	68.54	-10.00	100.00
210	1.14	71.79	-10.00	100.00
215	1.26	75.15	-10.00	100.00
220	2.34	78.39	-10.00	100.00
225	2.46	81.95	-10.00	100.00
230	2.62	85.54	-10.00	100.00
235	3.04	89.17	-10.00	100.00
240	3.11	92.83	-10.00	100.00
245	3.20	96.50	-10.00	100.00
250	4.81	100.40	-10.00	100.00
255	5.67	104.28	-10.00	100.00
260	5.98	108.06	-10.00	100.00
265	6.07	111.75	-10.00	100.00
270	6.18	115.36	-10.00	100.00
275	6.24	118.87	-10.00	100.00
280	6.24	122.21	-10.00	100.00
285	6.27	125.43	-10.00	100.00
290	6.69	128.71	-10.00	100.00
295	6.58	131.44	-10.00	100.00
300	6.41	133.81	-10.00	100.00
305	7.33	136.79	-10.00	102.37
310	7.34	138.65	-10.00	102.40
315	7.51	140.23	-10.00	103.29
320	7.62	141.26	-10.00	103.83
325	7.71	141.75	-10.00	104.29
330	6.49	140.38	-10.00	100.00
335	5.76	139.01	-10.00	100.00
340	6.07	138.17	-10.00	100.00
345	5.46	136.03	-10.00	100.00
350	5.04	133.72	-10.00	100.00
355	4.98	131.40	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/24/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — SAN JOSE, CA

Venue Name	
Latitude (NAD 83)	37° 21' 54.7" N
Longitude (NAD 83)	121° 57' 39.6" W
Climate Zone	A
Rain Zone	4
Ground Elevation (AMSL)	16.15 m / 53.0 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	142.5° to 142.5°
Corresponding Elevation Angles	39.4° / 39.4°
Antenna Centerline (AGL)	3.66 m / 12.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		5.6 Meter
Gain / Diameter		62.0 dBi / 5.6 m
3-dB / 15-dB Beamwidth		0.14° / 0.32°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	24.0
	(dBW/MHz)	48.0
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	100.0 km / 62.1 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**SAN JOSE, CA**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	37° 21' 54.7" N
Longitude (NAD 83)	121° 57' 39.6" W
Ground Elevation (AMSL)	16.15 m / 53.0 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.00	127.83	-10.00	100.00
5	0.00	124.75	-10.00	100.00
10	0.00	121.49	-10.00	100.00
15	0.00	118.08	-10.00	100.00
20	0.00	114.55	-10.00	100.00
25	0.00	110.92	-10.00	100.00
30	0.00	107.21	-10.00	100.00
35	0.00	103.45	-10.00	100.00
40	0.00	99.64	-10.00	100.00
45	0.00	95.80	-10.00	100.00
50	0.00	91.94	-10.00	100.00
55	0.00	88.08	-10.00	100.00
60	0.00	84.22	-10.00	100.00
65	0.00	80.38	-10.00	100.00
70	0.00	76.57	-10.00	100.00
75	0.00	72.81	-10.00	100.00
80	0.00	69.10	-10.00	100.00
85	0.00	65.47	-10.00	100.00
90	0.00	61.94	-10.00	100.00
95	0.46	58.30	-10.00	100.00
100	0.70	54.87	-10.00	100.00
105	1.01	51.55	-10.00	100.00
110	1.23	48.47	-10.00	100.00
115	1.42	45.64	-9.48	100.00
120	1.62	43.09	-8.86	100.00
125	1.79	40.93	-8.30	100.00
130	0.00	41.02	-8.32	100.00
135	0.00	39.98	-8.05	100.00
140	0.00	39.46	-7.90	100.00
145	0.00	39.45	-7.90	100.00
150	1.24	38.77	-7.71	100.00
155	1.16	39.92	-8.03	100.00
160	0.26	42.28	-8.65	100.00
165	0.25	44.22	-9.14	100.00
170	0.25	46.52	-9.69	100.00
175	0.25	49.14	-10.00	100.00
180	0.25	52.01	-10.00	100.00
185	0.27	55.10	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**SAN JOSE, CA**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	37° 21' 54.7" N
Longitude (NAD 83)	121° 57' 39.6" W
Ground Elevation (AMSL)	16.15 m / 53.0 ft
Antenna Centerline (AGL)	3.66 m / 12.0 ft
Antenna Model	General Dynamics 5.6 Meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	0.30	58.36	-10.00	100.00
195	0.32	61.78	-10.00	100.00
200	0.34	65.33	-10.00	100.00
205	0.35	68.97	-10.00	100.00
210	0.35	72.70	-10.00	100.00
215	0.38	76.48	-10.00	100.00
220	0.36	80.31	-10.00	100.00
225	0.34	84.17	-10.00	100.00
230	0.34	88.05	-10.00	100.00
235	0.37	91.93	-10.00	100.00
240	0.38	95.81	-10.00	100.00
245	0.37	99.67	-10.00	100.00
250	0.33	103.49	-10.00	100.00
255	0.29	107.27	-10.00	100.00
260	0.37	111.01	-10.00	100.00
265	0.53	114.72	-10.00	100.00
270	0.00	118.06	-10.00	100.00
275	0.00	121.47	-10.00	100.00
280	0.00	124.73	-10.00	100.00
285	0.00	127.81	-10.00	100.00
290	0.21	130.82	-10.00	100.00
295	0.82	133.90	-10.00	100.00
300	0.75	136.19	-10.00	100.00
305	0.00	137.48	-10.00	100.00
310	0.00	138.98	-10.00	100.00
315	0.00	140.02	-10.00	100.00
320	0.00	140.54	-10.00	100.00
325	0.00	140.55	-10.00	100.00
330	0.00	140.02	-10.00	100.00
335	0.00	138.99	-10.00	100.00
340	0.00	137.49	-10.00	100.00
345	0.00	135.57	-10.00	100.00
350	0.00	133.29	-10.00	100.00
355	0.00	130.69	-10.00	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Date:	10/24/2014
Job Number:	<PCNJobCode>

Administrative Information

Status	ENGINEER PROPOSAL
Call Sign	<PCNCallSign>
Licensee Code	HUNESY
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED

Site Information — SEATTLE, WA

Venue Name	
Latitude (NAD 83)	47° 29' 33.0" N
Longitude (NAD 83)	122° 17' 42.0" W
Climate Zone	A
Rain Zone	3
Ground Elevation (AMSL)	54.47 m / 178.7 ft

Link Information

Satellite Type	Geostationary
Mode	TO - Transmit-Only
Modulation	Digital
Satellite Arc	97° W to 97° West Longitude
Azimuth Range	147.3° to 147.3°
Corresponding Elevation Angles	30.1° / 30.1°
Antenna Centerline (AGL)	5.49 m / 18.0 ft

Antenna Information — Transmit - FCC32

Manufacturer		General Dynamics
Model		8.1 meter
Gain / Diameter		65.3 dBi / 8.1 m
3-dB / 15-dB Beamwidth		0.10° / 0.23°
Max Available RF Power	(dBW/4 kHz)	-38.0
	(dBW/MHz)	-14.0
Maximum EIRP	(dBW/4 kHz)	27.3
	(dBW/MHz)	51.3
Interference Objectives:	Long Term	-151.0 dBW/4 kHz 20%
	Short Term	-128.0 dBW/4 kHz 0.0025%

Frequency Information — Transmit 28.0 GHz

Emission / Frequency Range (MHz)	250MG7D / 27500.0 - 28350.0
Max Great Circle Coordination Distance	109.4 km / 68.0 mi
Precipitation Scatter Contour Radius	100.0 km / 62.1 mi

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**SEATTLE, WA**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	47° 29' 33.0" N
Longitude (NAD 83)	122° 17' 42.0" W
Ground Elevation (AMSL)	54.47 m / 178.7 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
0	0.21	136.85	-10.00	100.00
5	0.22	133.32	-10.00	100.00
10	0.21	129.59	-10.00	100.00
15	0.31	125.75	-10.00	100.00
20	0.27	121.73	-10.00	100.00
25	0.00	117.56	-10.00	100.00
30	0.00	113.40	-10.00	100.00
35	0.00	109.19	-10.00	100.00
40	0.24	104.97	-10.00	100.00
45	0.32	100.69	-10.00	100.00
50	0.57	96.38	-10.00	100.00
55	1.03	92.04	-10.00	100.00
60	1.40	87.67	-10.00	100.00
65	1.39	83.29	-10.00	100.00
70	1.36	78.93	-10.00	100.00
75	1.23	74.60	-10.00	100.00
80	1.26	70.28	-10.00	100.00
85	1.19	66.03	-10.00	100.00
90	1.20	61.82	-10.00	100.00
95	1.05	57.73	-10.00	100.00
100	1.25	53.61	-10.00	100.00
105	0.56	50.00	-10.00	100.00
110	0.52	46.28	-9.63	100.00
115	0.30	42.87	-8.80	100.00
120	0.00	39.81	-8.00	100.00
125	0.00	36.88	-7.17	100.00
130	0.00	34.36	-6.40	100.00
135	0.31	32.07	-5.65	100.00
140	0.51	30.44	-5.09	100.00
145	0.69	29.54	-4.76	100.00
150	0.77	29.48	-4.74	100.00
155	1.03	30.02	-4.93	100.00
160	1.36	31.22	-5.36	100.00
165	1.93	32.89	-5.93	100.00
170	2.28	35.33	-6.70	100.00
175	3.35	37.75	-7.42	100.00
180	3.94	40.94	-8.30	100.00
185	4.70	44.37	-9.18	100.00

COMSEARCH

Earth Station Data Sheet

19700 Janelia Farm Boulevard, Ashburn, VA 20147
(703)726-5662 http://www.comsearch.com

Coordination Values	**SEATTLE, WA**
Licensee Name	HUGHES NETWORK SYSTEMS LIMITED
Latitude (NAD 83)	47° 29' 33.0" N
Longitude (NAD 83)	122° 17' 42.0" W
Ground Elevation (AMSL)	54.47 m / 178.7 ft
Antenna Centerline (AGL)	5.49 m / 18.0 ft
Antenna Model	General Dynamics 8.1 meter
Antenna Mode	Transmit 28.0 GHz
Interference Objectives: Long Term	-151.0 dBW/4 kHz 20%
Short Term	-128.0 dBW/4 kHz 0.0025%
Max Available RF Power	-35.0 (dBW/4 kHz)

Transmit 28.0 GHz

Azimuth (°)	Horizon Elevation (°)	Antenna Discrimination (°)	Horizon Gain (dBi)	Coordination Distance (km)
190	5.39	48.10	-10.00	100.00
195	5.97	52.09	-10.00	100.00
200	6.18	56.34	-10.00	100.00
205	6.72	60.60	-10.00	100.00
210	7.07	65.00	-10.00	101.03
215	7.48	69.47	-10.00	103.10
220	8.04	73.97	-10.00	105.96
225	8.19	78.57	-10.00	106.65
230	8.27	83.19	-10.00	107.00
235	8.41	87.83	-10.00	107.62
240	8.55	92.47	-10.00	108.22
245	8.69	97.13	-10.00	108.85
250	8.82	101.78	-10.00	109.42
255	8.38	106.37	-10.00	107.49
260	8.19	110.94	-10.00	106.63
265	8.17	115.50	-10.00	106.56
270	8.14	120.02	-10.00	106.40
275	7.96	124.46	-10.00	105.60
280	7.62	128.75	-10.00	103.82
285	7.39	132.97	-10.00	102.66
290	7.05	137.00	-10.00	100.90
295	6.38	140.65	-10.00	100.00
300	5.70	143.97	-10.00	100.00
305	4.83	146.74	-10.00	100.00
310	4.40	149.30	-10.00	100.00
315	3.41	150.75	-10.00	100.00
320	2.67	151.64	-10.00	100.00
325	2.03	151.80	-10.00	100.00
330	1.10	150.85	-10.00	100.00
335	0.00	148.99	-10.00	100.00
340	0.00	147.54	-10.00	100.00
345	0.00	145.49	-10.00	100.00
350	0.00	142.94	-10.00	100.00
355	0.40	140.27	-10.00	100.00

19. Contact Information

For questions or information regarding the 28 GHz Frequency Coordination Report, please contact:

Contact person:	Joanna Lynch
Title:	Manager, Spectrum & Data Solutions
Company:	Comsearch
Address:	19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone:	703-726-5711
Fax:	703-726-5599
Email:	jlynch@comsearch.com
Web site:	www.comsearch.com