DETAILED INTERFERENCE ANALYSIS REPORT

Transmit/Receive Earth Station

Prepared For
Harris
(FAA)
Barrow, Alaska
(BRW)

(C-band)
Transmit/Receive Earth Station

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SECTION 1

INTRODUCTION

Transmit/Receive Earth Station

This report presents the results of a detailed interference analysis for the proposed modifications to the C-band transmit/receive earth station location. The site was selected by Harris and is located in Barrow, Alaska (BRW).

The analysis was performed for a 4.5 meter antenna. The long term interference objective at 4 GHz, was -156 dBW/1 MHz, while the 6 GHz long term interference objective was -154 dBW/4 kHz, as specified by the FCC.

The earth station was analyzed for transmission and reception of digital traffic to and from a satellite arc range of 118 to 150 degrees West Longitude. This report assumes that the satellite transponders are numbered 1 through 24, with each transponder having a 36 MHz bandwidth.

This detailed interference analysis is meant to provide an estimate of potential interference at this location, and to recommend a course of future action.

SECTION 2

REPORT CONTENTS AND PROCEDURES

Transmit/Receive Earth Station

This section describes the contents of the report for a proposed C-band transmit/receive earth station.

Section 1 describes the site location, the antenna considered, and the system parameters considered in the detailed interference analysis. The analysis was undertaken to determine the potential for microwave interference for the transmit/receive earth station at the site specified.

Initially, a computer analysis of this site was performed to determine the extent of potential interference on a line-of-sight (LOS) basis. This analysis considers the microwave environment with respect to the earth station and calculates predicted signal levels between these systems. Paths which exceed a given objective level are listed for further analysis. The objective levels present the maximum interference levels allowed between the earth station and the surrounding terrestrial microwave environment for the frequency band of interest.

To further analyze the effect of the predicted interference conflicts, terrain path profiles were prepared for the critical cases. This involves plotting the interference path on topographic maps, typically 7.5 minute series U.S.G.S. maps, to determine the terrain characteristics of the path. Once this has been accomplished, predicted over-the-horizon (O-H) losses are calculated using the techniques of the National Bureau of Standards Technical Note 101 (Revised).

These calculations give the amount of signal attenuation achieved due to terrain blockage.

Section 3 summarizes the results of the site analysis. This summary includes the number of cases that were considered, the interference cases that remain, and the proposed resolution of the interference problems.

Tables 3.1-1 and 3.2-1 list the Great Circle interference cases and the predicted O-H losses calculated on the various 6 and 4 GHz paths, respectively. If multiple analyses are considered, such as changes in satellite arc or antenna, the results are presented in Tables 3.1-1.1, 3.1-1.2, 3.2-1.1 3.2-1.2, etc.....

A brief explanation of the various columns shown in Tables 3.1-1 and 3.2-1 follows:

PATH ID: This is the predicted interference path. The first site listed is the transmitter at 4 GHz or the receiver at 6 GHz.

BAND: This shows the frequency plan of the interfering paths. The 4 GHz paths affect reception of the downlink, while the 6 GHz terrestrial facilities are affected by the uplink. Receivers in the low half of the band (5925 - 6175 MHz), are indicated by 6L.

Receivers in the high half of the band (6175 - 6425 MHz), are indicated by 6H.

DIST: This is the distance from the earth station to the terrestrial station in kilometers.

AZ: This is the azimuth bearing in degrees (taken from True North), from the earth station toward the terrestrial station.

ES DISC: This is the earth station discrimination angle in degrees, towards the involved terrestrial facility.

ES GAIN: This is the gain of the earth station in dBi, at the calculated earth station discrimination angle.

LOS LOSS REQ'D: This is the amount of loss required in dB, on a line-of-sight basis, to meet the interference objective.

O-H LOSS: This is the calculated over-the-horizon (O-H) losses in dB, between the earth station and the involved terrestrial station. The 20 percent column represents losses for the long term objective. The 0.0025 and .01 percent columns present the losses for the short term objective at 6 GHz and 4 GHz, respectively.

REVISED MARGIN: This is the difference between the LOS margin and the predicted O-H losses achieved due to terrain blockage. Sufficient attenuation is calculated for the paths which show the word "CLEAR" in the revised margin. Cases showing a positive revised margin will require additional losses to meet the interference objective.

The information listed at the bottom of the table reflects the antennas, satellite arc, and interference objectives considered for the proposed site.

Section 4 presents conclusions and recommendations. It gives an overall description of the microwave environment and suggests a future course of action.

Table 5.1-1 contains the operational parameters for the proposed earth station. Tables 5.1-2 provides azimuth and elevation data for the geostationary arc, and identifies the locations of particular satellites within that arc.

Figure 5.1-1 indicates the location of the site analyzed. This location should be verified. **If it is not the desired site, Comsearch should be notified immediately so that the precise location can be analyzed.**

Section 6 presents the Great Circle interference cases. This provides a listing of the utilized channels and type of traffic loading for each path.

SECTION 3

SUMMARY AND RESULTS

The detailed interference analysis for the proposed modifications to the earth station site located in Barrow (BRW), Alaska revealed that no potential interference conflicts exist within the coordination contours of the proposed earth station site.

SECTION 4

CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

Based on the results of the detailed interference analysis, no potential interference conflicts exist within the coordination contours of this earth station site.

4.2 Recommendations

It is recommended that Harris/FAA review the operating parameters of the proposed earth station antenna and then proceed with the frequency coordination modification of this earth station site.

Table 5.1-1

SATELLITE EARTH STATION
FREQUENCY COORDINATION DATA
12/20/2018

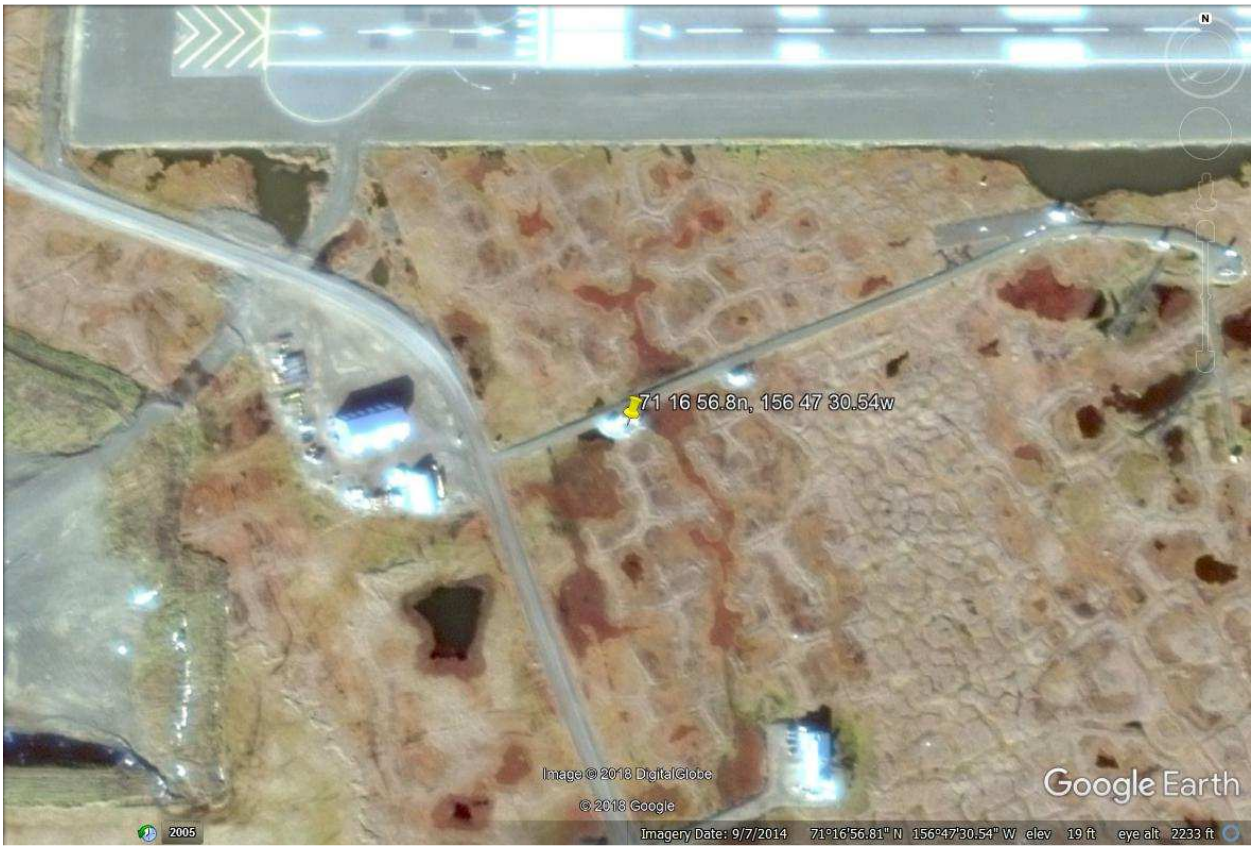
Company		Federal Aviation Administration	
Owner Code		FEDFAA	
Earth Station Name, State		BARROW, AK	
Latitude (DMS) (NAD83)		71 16 56.8 N	
Longitude (DMS) (NAD83)		156 47 30.5 W	
Ground Elevation AMSL (ft/m)		19.36 /	5.90
Antenna Centerline AGL (ft/m)		9.00 /	2.74
Receive Antenna Type:	FCC32	Scientific-Atlanta	
4.0 GHz Gain (dBi) / Diameter (m)		43.3 /	4.5
3 dB / 15 dB Half Beamwidth		0.60 /	1.25
Transmit Antenna Type:	FCC32	Scientific-Atlanta	
6.0 GHz Gain (dBi) / Diameter (m)		46.3 /	4.5
3 dB / 15 dB Half Beamwidth		0.39 /	0.81
Operating Mode		TRANSMIT AND RECEIVE	
Modulation		DIGITAL	
Emission / Receive Band (MHz)	451KG7D	1M05G7D / 3700.0000 -	4200.0000
Emission / Transmit Band (MHz)	451KG7D	1M05G7D / 5925.0000 -	6425.0000
Max. Available RF Power (dBW)/4 kHz)		-13.30	
(dBW)/MHz)		10.70	
Max. EIRP (dBW)/4 kHz)		33.00	
(dBW)/MHz)		57.00	
(dBW)		0.00	
Max. Permissible Interference Power			
4.0 GHz, 20% (dBW/1 MHz)		-156.0	
4.0 GHz, 0.0100% (dBW/1 MHz)		-146.0	
6.0 GHz, 20% (dBW/4 kHz)		-154.0	
6.0 GHz, 0.0025% (dBW/4 kHz)		-131.0	
Range of Satellite Arc (Geostationary)			
Degrees Longitude		115.0 W / 150.0 W	
Azimuth Range (Min/Max)		136.7 / 172.8	
Corresponding Elevation Angles		5.2 / 10.0	
Radio Climate		B	
Rain Zone		2	
Max. Great Circle Coordination Distance (mi./km)			
4.0 GHz		493.1 / 793.5	
6.0 GHz		169.4 / 272.6	
Precipitation Scatter Contour Radius (mi./km)			
4.0 GHz		382.8 / 616.1	
6.0 GHz		62.1 / 100.0	

Earth Station Azimuth and Elevation Table
12/20/2018

Earth Station Name BARROW, AK
Owner Federal Aviation Administration
Latitude (DMS) (NAD83) 71 16 56.8 N
Longitude (DMS) (NAD83) 156 47 30.5 W
Ground Elevation (ft/m) 19.36 / 5.90 Amsl
Antenna Centerline (ft/m) 9.00 / 2.74 Agl
Satellite Arc Range 115.0 W
150.0 W

Satellite Longitude	Azimuth (Degrees)	Elevation (Degrees)	Satellite Name
115.0	136.7	5.2	XM 4
116.0	137.7	5.4	
116.8	138.5	5.6	SATMEX 5
117.0	138.7	5.6	
118.0	139.7	5.8	
119.0	140.7	6.0	
120.0	141.7	6.2	
121.0	142.7	6.4	GALAXY 23
121.0	142.7	6.4	ECHOSTAR 9
122.0	143.7	6.6	
123.0	144.8	6.8	GALAXY 10R
124.0	145.8	7.0	
125.0	146.8	7.2	GALAXY 14
126.0	147.8	7.4	
127.0	148.9	7.5	GALAXY 13
127.0	148.9	7.5	HORIZONS 1
128.0	149.9	7.7	
129.0	150.9	7.9	GALAXY 27
130.0	151.9	8.0	
131.0	153.0	8.2	AMC 11
132.0	154.0	8.3	
133.0	155.0	8.5	GALAXY 15
134.0	156.1	8.6	
135.0	157.1	8.7	AMC 10
136.0	158.2	8.9	
137.0	159.2	9.0	AMC 7
138.0	160.2	9.1	
139.0	161.3	9.2	AMC 8
140.0	162.3	9.3	
141.0	163.4	9.4	
142.0	164.4	9.5	
143.0	165.5	9.6	
144.0	166.5	9.7	
145.0	167.6	9.7	
146.0	168.6	9.8	
147.0	169.7	9.9	
148.0	170.7	9.9	
149.0	171.8	10.0	
150.0	172.8	10.0	

Figure 5.1-1


71 16 56.8n, 156 47 30.54w
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