HARRIS CORPORATION
Earth Station
Modification Application
MELBOURNE, FL 6.3 M Dish
CALL SIGN: E080145

Description of Application

With this application, Harris Corporation ("Harris") requests modification of its Ku-Band fixed satellite service earth station operated under Call Sign E080145. The purpose of this modification filing is to correct the previous reported Antenna ID, antenna type, and antenna size. This modification also corrects the previously reported site elevation as reflected in the existing authorization. This application further requests authorization to increase the total power, change the emission on the Ku-Band frequency, and operate in the extended Ku-band frequency range between 13.810-14.0 GHz frequencies. All extended Ku-band transmissions will communicate with Telstar 11N, located in the 37.55 W.L. orbital slot.

Harris will operate in the 13.810-14.0 GHz band consistent with footnote US356 of the U.S. Table of Frequency Allocations, 47 C.F.R. §2.106, and Section 25.204(f) of the Commission's rules, 47 C.F.R. §25.204(f), which require fixed-satellite service earth stations operating in the 13.75-14.0 GHz band to have an antenna size of at least 4.5 meters and to operate with an equivalent isotropically radiated power ("EIRP") of between 68 and 85 dBW. Harris's fixed-satellite service earth station is 6.3 meters in diameter, which satisfy the antenna size requirement. Its proposed maximum EIRP per carrier is 75.1 dBW, which is less than the maximum EIRP limit. To the extent that Harris's extended Ku-band operations involve carriers whose operations fall below the minimum required EIRP, Harris will not claim any additional interference protection beyond that which it would otherwise be entitled to claim were it operating at the minimum 68 dBW EIRP limit. Under these circumstances, it is appropriate for the Commission to consider that Harris's minimum EIRP is compliant with Section 25.204(f).

Attached hereto, Harris includes the necessary Exhibit documentation to comply with relevant Commission rules:

-EXHIBIT 1 - Off-Axis EIRP Density Calculations Pursuant to 25.115(h)
-EXHIBIT 2 - Compliance with FCC Report & Order (FCC96-377) for the 13.75 - 14.0 GHz Band
-Radiation Hazard Study
-FAA Exhibit

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EXHIBIT 1
OFF-AXIS EIRP DENSITY CALCULATION PURSUANT TO 25.115(h)

Applicants requesting authority for earth stations that will operate at a power density exceeding the levels in Section 25.212(c), must submit an off-axis EIRP density calculation pursuant to Section 25.115(h) of the Commission's rules in a tabulated format and fall within the applicable off-axis EIRP envelope specified in Section 25.218 of the Commission's rules. The following pages contain the off-axis EIRP density calculation pursuant to Section 25.115(h) of the Commission's rules.

Off-Axis ERIP Density - Plane of Geostationary Orbit

Off-Axis Angle (deg)	Off-Axis ERIP Density (dBW/4kHz)		Off-Axis Angle (deg)	Off-Axis ERIP Density (dBW/4kHz)		Off-Axis Angle (deg)	Off-Axis ERIP Density (dBW/4kHz)
0	44.10		4.5	2.27		9	-5.26
0.1	43.60		4.6	2.03		9.1	-5.38
0.2	36.07		4.7	1.80		9.2	-5.49
0.3	31.67		4.8	1.57		9.3	-5.61
0.4	28.55		4.9	1.35		9.4	-5.73
0.5	26.13		5	1.13		9.5	-5.84
0.6	24.15		5.1	0.91		9.6	-5.96
0.7	22.47		5.2	0.70		9.7	-6.07
0.8	21.02		5.3	0.49		9.8	-6.18
0.9	19.74		5.4	0.29		9.9	-6.29
1	18.60		5.5	0.09		10	-6.40
1.1	17.57		5.6	-0.10		15	-10.80
1.2	16.62		5.7	-0.30		20	-13.93
1.3	15.75		5.8	-0.49		25	-16.35
1.4	14.95		5.9	-0.67		30	-18.33
1.5	14.20		6	-0.85		35	-20.03
1.6	13.50		6.1	-1.03		40	-21.48
1.7	12.84		6.2	-1.21		45	-22.75
1.8	12.22		6.3	-1.38		50	-23.40
1.9	11.63		6.4	-1.55		55	-23.40
2	11.07		6.5	-1.72		60	-23.40
2.1	10.54		6.6	-1.89		65	-23.40
2.2	10.04		6.7	-2.05		70	-23.40
2.3	9.56		6.8	-2.21		75	-23.40
2.4	9.09		6.9	-2.37		80	-23.40
2.5	8.65		7	-2.53		85	-23.40
2.6	8.23		7.1	-2.68		90	-23.40
2.7	7.82		7.2	-2.83		95	-23.40
2.8	7.42		7.3	-2.98		100	-23.40
2.9	7.04		7.4	-3.13		105	-23.40
3	6.67		7.5	-3.28		110	-23.40
3.1	6.32		7.6	-3.42		115	-23.40
3.2	5.97		7.7	-3.56		120	-23.40
3.3	5.64		7.8	-3.70		125	-23.40
3.4	5.31		7.9	-3.84		130	-23.40
3.5	5.00		8	-3.98		135	-23.40
3.6	4.69		8.1	-4.11		140	-23.40
3.7	4.39		8.2	-4.25		145	-23.40
3.8	4.11		8.3	-4.38		150	-23.40
3.9	3.82		8.4	-4.51		155	-23.40
4	3.55		8.5	-4.64		160	-23.40
4.1	3.28		8.6	-4.76		165	-23.40
4.2	3.02		8.7	-4.89		170	-23.40
4.3	2.76		8.8	-5.01		175	-23.40
4.4	2.51		8.9	-5.13		180	-23.40

Table 1

Off-Axis ERIP Density - The Elevation Plane

Off-Axis Angle (deg)	Off-Axis ERIP Density (dBW/4kHz)		Off-Axis Angle (deg)	Off-Axis ERIP Density (dBW/4kHz)		Off-Axis Angle (deg)	Off-Axis ERIP Density (dBW/4kHz)
0	44.10		4.5	2.27		9	-5.26
0.1	43.60		4.6	2.03		9.1	-5.38
0.2	36.07		4.7	1.80		9.2	-5.49
0.3	31.67		4.8	1.57		9.3	-5.61
0.4	28.55		4.9	1.35		9.4	-5.73
0.5	26.13		5	1.13		9.5	-5.84
0.6	24.15		5.1	0.91		9.6	-5.96
0.7	22.47		5.2	0.70		9.7	-6.07
0.8	21.02		5.3	0.49		9.8	-6.18
0.9	19.74		5.4	0.29		9.9	-6.29
1	18.60		5.5	0.09		10	-6.40
1.1	17.57		5.6	-0.10		15	-10.80
1.2	16.62		5.7	-0.30		20	-13.93
1.3	15.75		5.8	-0.49		25	-16.35
1.4	14.95		5.9	-0.67		30	-18.33
1.5	14.20		6	-0.85		35	-20.03
1.6	13.50		6.1	-1.03		40	-21.48
1.7	12.84		6.2	-1.21		45	-22.75
1.8	12.22		6.3	-1.38		50	-23.40
1.9	11.63		6.4	-1.55		55	-23.40
2	11.07		6.5	-1.72		60	-23.40
2.1	10.54		6.6	-1.89		65	-23.40
2.2	10.04		6.7	-2.05		70	-23.40
2.3	9.56		6.8	-2.21		75	-23.40
2.4	9.09		6.9	-2.37		80	-23.40
2.5	8.65		7	-2.53		85	-23.40
2.6	8.23		7.1	-2.68		90	-23.40
2.7	7.82		7.2	-2.83		95	-23.40
2.8	7.42		7.3	-2.98		100	-23.40
2.9	7.04		7.4	-3.13		105	-23.40
3	6.67		7.5	-3.28		110	-23.40
3.1	6.32		7.6	-3.42		115	-23.40
3.2	5.97		7.7	-3.56		120	-23.40
3.3	5.64		7.8	-3.70		125	-23.40
3.4	5.31		7.9	-3.84		130	-23.40
3.5	5.00		8	-3.98		135	-23.40
3.6	4.69		8.1	-4.11		140	-23.40
3.7	4.39		8.2	-4.25		145	-23.40
3.8	4.11		8.3	-4.38		150	-23.40
3.9	3.82		8.4	-4.51		155	-23.40
4	3.55		8.5	-4.64		160	-23.40
4.1	3.28		8.6	-4.76		165	-23.40
4.2	3.02		8.7	-4.89		170	-23.40
4.3	2.76		8.8	-5.01		175	-23.40
4.4	2.51		8.9	-5.13		180	-23.40

Table 2

Off-Axis ERIP Density - Towards the Horizon

Off-Axis Angle (deg)	Off-Axis ERIP Density (dBW/4kHz)		Off-Axis Angle (deg)	Off-Axis ERIP Density (dBW/4kHz)		Off-Axis Angle (deg)	Off-Axis ERIP Density (dBW/4kHz)
0	44.10		4.5	2.27		9	-5.26
0.1	43.60		4.6	2.03		9.1	-5.38
0.2	36.07		4.7	1.80		9.2	-5.49
0.3	31.67		4.8	1.57		9.3	-5.61
0.4	28.55		4.9	1.35		9.4	-5.73
0.5	26.13		5	1.13		9.5	-5.84
0.6	24.15		5.1	0.91		9.6	-5.96
0.7	22.47		5.2	0.70		9.7	-6.07
0.8	21.02		5.3	0.49		9.8	-6.18
0.9	19.74		5.4	0.29		9.9	-6.29
1	18.60		5.5	0.09		10	-6.40
1.1	17.57		5.6	-0.10		15	-10.80
1.2	16.62		5.7	-0.30		20	-13.93
1.3	15.75		5.8	-0.49		25	-16.35
1.4	14.95		5.9	-0.67		30	-18.33
1.5	14.20		6	-0.85		35	-20.03
1.6	13.50		6.1	-1.03		40	-21.48
1.7	12.84		6.2	-1.21		45	-22.75
1.8	12.22		6.3	-1.38		50	-23.40
1.9	11.63		6.4	-1.55		55	-23.40
2	11.07		6.5	-1.72		60	-23.40
2.1	10.54		6.6	-1.89		65	-23.40
2.2	10.04		6.7	-2.05		70	-23.40
2.3	9.56		6.8	-2.21		75	-23.40
2.4	9.09		6.9	-2.37		80	-23.40
2.5	8.65		7	-2.53		85	-23.40
2.6	8.23		7.1	-2.68		90	-23.40
2.7	7.82		7.2	-2.83		95	-23.40
2.8	7.42		7.3	-2.98		100	-23.40
2.9	7.04		7.4	-3.13		105	-23.40
3	6.67		7.5	-3.28		110	-23.40
3.1	6.32		7.6	-3.42		115	-23.40
3.2	5.97		7.7	-3.56		120	-23.40
3.3	5.64		7.8	-3.70		125	-23.40
3.4	5.31		7.9	-3.84		130	-23.40
3.5	5.00		8	-3.98		135	-23.40
3.6	4.69		8.1	-4.11		140	-23.40
3.7	4.39		8.2	-4.25		145	-23.40
3.8	4.11		8.3	-4.38		150	-23.40
3.9	3.82		8.4	-4.51		155	-23.40
4	3.55		8.5	-4.64		160	-23.40
4.1	3.28		8.6	-4.76		165	-23.40
4.2	3.02		8.7	-4.89		170	-23.40
4.3	2.76		8.8	-5.01		175	-23.40
4.4	2.51		8.9	-5.13		180	-23.40

Table 3

Exhibit 2

Harris Corporation
Melbourne, FL
Call Sign: E080145
Vertex Communications 6.3m Satellite Earth Station
Compliance with FCC Report & Order (FCC96-377) for the 13.75 - 14.0 GHz Band Analysis and Calculations

1. Background

This Exhibit is presented to demonstrate the extent to which the Harris Corporation satellite earth station in Melbourne, Florida is in compliance with FCC REPORT & ORDER 96-377. The potential interference from the earth station to US Navy shipboard radiolocation operations (RADAR) and the NASA space research activities in the 13.75 - 14.0 GHz Band is addressed in this exhibit. The parameters for this earth station's operation in the Extended Ku-band are:

Earth Station Characteristics

• Coordinates (NAD83): 28° 05' 23" N, 80° 38' 20" W
• Satellite Location for Earth Station: Telstar 11N at 37.5° W
• Frequency Band: 13.810-14.0 GHz for uplink
• Polarizations: Dual linear, V and H
• Emissions: 1M00G7D to 5M00G7D
• Modulation: Digital
• Maximum Uplink EIRP for Transmit Carrier in Extended Ku-band: 75.1 dBW; 44.1 dBW/4kHz
• Transmit Antenna Characteristics
Antenna Size: Vertex 6.3 meters Cassigrain
Antenna Tx Gain: 57.5 dBi
• Elevation Angle: 32.8° @ 116.7° Az. (Telstar 11N)
• Side Lobe Antenna Gain: 32 - 25*log(θ)

Because the above uplink spectrum is shared with the Federal Government, coordination in this band requires resolution data pertaining to potential interference between the earth stations and both Navy Department and NASA systems. Potential interference from the earth station could impact with the Navy and/or NASA systems in two areas. These areas are noted in FCC Report and Order 96-377 dated September 1996, and consist of (1) Radiolocation and radio navigation, and (2) Data Relay Satellites. Summary of Coordination Issues:
2) Potential Impact to Government Radiolocation (Shipboard Radar)
3) Potential Impact to NASA Data Relay Satellite Systems (TDRSS)

2. Potential Impact to Government Radiolocation (Shipboard Radar)

Radiolocation operations (RADAR) may occur anywhere in the 13.4 - 14 GHz frequency band aboard ocean going United States Navy ships. The Federal Communication Commission (FCC) order 96-377 allocates the top 250 MHz of this 600 MHz band to the

Fixed Satellite Service (FSS) on a co-primary basis with the radiolocation operations and provides for an interference protection level of -167 dBW/m^2/4 kHz. The closest distance to the shoreline from the Harris antenna is approximately 10 km southeast toward the Atlantic Ocean. The calculation of the power spectral density at this distance is given by:

1. Clear Sky EIRP: 75.1 dBW
2. Carrier Bandwidth: 5.0 MHz
3. PD at antenna input: -13.4 dBW/4 kHz
4. Transmit Antenna Gain: 57.5 dBi
5. Antenna Gain Horizon: FCC Reference Pattern
6. Antenna Elevation Angle: 32.0°

The proposed earth station will radiate interference toward the ocean according to its off-axis side-lobe performance. A conservative analysis, using FCC standard reference pattern, results in off-axis antenna gains of –5.6 dBi towards the Atlantic Ocean. The signal density at the shoreline, through free space is:

PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m_2).

= -13.4 dBw/4 kHz + (-5.6 dBi) – 10*log[4Π*(10000m)$_2$]
= -110.0 dBW/m_2/4 kHz + Additional Path Losses (135.24 dB)

The additional free space path loss of a 13.8 GHz signal is 135.24 dB (as calculated by Intelligence Support Group, Inc.) not including absorption loss and earth diffraction loss for the actual path profiles from the proposed earth station to the nearest shoreline in the line of sight. The calculated PFD including additional path losses to the closest shoreline location is –245.0 dBW/m_2/4 kHz. This is 78.0 dB below the –167 dBW/m2/4 kHz interference criteria of R&O 96-377. Therefore, there will be no discernable interference to the US Navy Radar from the Melbourne satellite earth station due to the distance and the terrain blockage between the site and the shore.

3. Potential Impact to NASA's Data Relay Satellite System (TDRSS)

The geographic location of the Melbourne, Florida satellite earth station is outside the 390 km radius coordination contour surrounding NASA's White Sands, New Mexico ground station complex. Therefore, the TDRSS space-to-earth link will not be impacted by the Harris Corporation satellite earth station.
The TDRSS space-to-space link in the 13.772 to 13.778 GHz band is not within the operational frequeny range of the Telstar 11N Extended Ku-band service of 13.81 to 14.00 GHz. Therefore, there will not be interference to the TDRSS space-to-space link.

4. Coordination Issue Result Summary and Conclusions

The results of the analysis and calculations performed in this exhibit indicate that compatible operations between the Melbourne satellite earth station and the US Navy and

NASA earth-to-space and space-to-space systems are expected. Interference into US Navy Radar operations from the Harris Melbourne satellite earth station will not occur, and interference with NASA's TDRSS satellite will also not occur.