**L3Harris Technologies, Inc.**
**Request for Extension of FCC Special Temporary Authority**
**Temporary-Fixed Transportable C Band Earth Station**


L3Harris Technologies, Inc. ("L3Harris") hereby requests an additional extension of the Special Temporary Authority ("STA") previously granted to L3Harris on August 22, 2022[1] for an additional 30-day period to continue utilizing a 2.4m transmit/receive transportable C-Band terminal using select C band frequencies to a location at the FAA facility located in Collins, OH (I64 BUEC) in order to support FAA Air Traffic Control operations.[2]

Owing to the loss of existing terrestrial telco service to the FAA facility in Collins, OH (I64 BUEC) caused by the facility's telco carrier decommissioning the existing telco service, and subsequent refusal by the provider to extend operational telco service to the FAA facility, the FAA has determined that the risk to the National Air Space due to this decommissioning requires mitigation as an impact could possibly occur when an outage of main and standby equipment or main and secondary lines occurs at any of the several other supporting facilities, thereby possibly jeopardizing the safety of the flying public.

STA was initially requested for 30 days utilizing C-Band spectrum in conjunction with satellite SES2 transponder 21C. On July 20, 2022 L3Harris had filed a request to extend STA for a 180-day period.[3] Because the initial STA grant was scheduled to expire on August 5, 2022, pursuant to Commission guidance an additional 30-day request was made on August 3, 2022 under File No. SES-STA-20220803-00821 to cover STA operations as the July 20, 2022 180-day STA request continued through the 30-day Public Notice period. Because the STA extension under File No. SES-STA-20220803-00821 was scheduled to expire on September 21, 2022, a 30-day extension request was filed on September 20, 2022 under File No. SES-STA-20220920-00980. This additional 30-day request is being filed out of an abundance of caution to cover STA operations until the July 20, 2022 180-day STA request is granted by the Commission. L3Harris notes that the 180-day request has completed the 30-day Public Notice period and is ripe for Commission action.

The C-Band space segment exists within the current operating spectrum of the FAA network of (17) existing remote C-Band sites and is above the FCC mandated 5G spectrum. The allocated bandwidth requested is for a total of less than 200KHz of space segment. Specifically, as noted on the **attached** SES Digital Network Operations correspondence, C band transmission operations would be on 6355.7847 - 6355.8807 and C band receive operations would be on 4130.7847 - 4130.8807. Also attached is the link budget as well as the look angle values of the I64 BUEC site.

L3Harris has completed a frequency coordination study for the FAA I64 BUEC site and has uploaded the coordination to the 180-day request under SES-STA-20220720-00787. For reference the coordination is also included within this filing.

L3Harris submits that a grant of this application will serve the public interest because it will assist the FAA's mission of ensuring flight safety.

---

[1] FCC File No. SES-STA-20220803-00821, *See* FCC Public Notice Report No. SES-02494 rel. August 24, 2022 which was an extension of the STA previously granted under File No. SES-STA-20220630-00716

[2] L3Harris Technologies, Inc. is the prime contractor on the FAA TeleCommunications Infrastructure (FTI) program which carries FAA communications to/from ~5,000 FAA facilities, terrestrially as well via satellite systems

[3] FCC File No. SES-STA-20220720-00787, *See* FCC Public Notice Report No. SES-02485 rel. July 27, 2022

# SES LINK BUDGET ANALYSIS

**PREPARED BY**
<![CDATA[Nick Brown]]>
**DATE**
30-Jun-22
**BUSINESS PARTNER**

**PROJECT**
FTISAT Current Eb/No Readings
**REVISION**
Current Eb/No Readings



| | | |
|---|---|---|
| **Satellite** | | SES-2 |
| **Orbital location** | °E | -87.00 |

| | | |
|---|---|---|
| **Transponder information** | | |
| **Transponder ID** | | 21C |
| Center frequency and polarisation (U/D) | MHz | 6345 VLP / 4120 HLP |
| Bandwidth | MHz | 36.00 |
| Transponder Dlk Saturation EIRP Towards Beam-Peak | dBW | 43.47 |
| Transponder Beam-Peak G/T | dB/K | 3.64 |
| Saturation flux density, Beam-peak | dBW/m² | -90.85 |
| Operational mode | | Multiple Carrier, [IBO: -5.5 dB \| OBO: -4 dB] |
| Inclined (Yes,No) | | No |

| | | |
|---|---|---|
| **AGGREGATE RESOURCE REQUIREMENTS** | | |
| **Capacity Balanced / BW / PWR Limited** | | |
| **Number of carriers in transponder** | | 2 |
| Required bandwidth | MHz | 0.2 |
| Allocated bandwidth | MHz | 0.19 |
| PEB of carriers | MHz | 0.10 |

| | |
|---|---|
| **ANALYSIS HIGHLIGHTS ACROSS ALL SITES IN ANALYSIS** | |
| **Link margin review [over sites]** | |
| Site with highest clear sky link margin | USA-33454 at I64-BUEC >USA-WBN-009 14250.0/11950.0 Woodbine K1 (CSM SES-1) : 0.0 dB |
| Site with lowest clear sky link margin | USA-WBN-004 6175.0/3950.0 Woodbine C5 (CSM, SES-2)>USA-33454 at I64-BUEC : 0.0 dB |
| **Link availability review [over sites]** | |
| Site with highest link availability | - |
| Site with lowest link availability | - |

| | | | |
|---|---|---|---|
| **Calculation type** | | Clear sky only | Clear sky only |
| **Carrier Name** | | **ADS GW I64-BUEC** | **ADS RM I64-BUEC** |
| **Carrier PEB** | MHz | **0.07** | **0.03** |
| **Carrier Predicted Total C/(N+I)** | dB | 9.16 | 9.16 |
| Link total Eb/No | dB | 7.40 | 7.40 |
| Required Eb/No (including implementation and additional margin) | dB | 7.40 | 7.40 |
| **Link closes? [2 out of 2, 100 %]** | | Yes | Yes |
| **Link margin in clear sky (For ACM carriers, residual margin in CS)** | dB | 0.00 | 0.00 |
| **Target Link Availability** | % yr | clear weather only | clear weather only |
| **Achieved Link Availability** | % yr | clear weather only | clear weather only |
| **Availability Requirement Satisfied? [0 out of 2, 0 %]** | | clear weather only | clear weather only |
| **ALC: Is the overdrive limit exceeded ?** | | **Not computed** | **Not computed** |
| **Balanced/Power/Bandwidth limited** | | **BW Lim** | **BW Lim** |
| **Carrier PEB to allocated bandwidth ratio** | | **0.76** | **0.33** |
| **Compliance to SES Coordination constraints** | | No CoCos | No CoCos |
| **Summary of carrier emission levels** | | | |
| Carrier power density at transmit antenna flange | dBW/Hz | -65.54 | -55.00 |
| Carrier Uplink EIRP density | dBW/Hz | -9.55 | -12.71 |
| Carrier power flux spectral density | dBW/m$^2$/Hz | -172.11 | -175.80 |
| Carrier Downlink EIRP density at beam peak | dBW/Hz | -36.31 | -40.00 |

| | | | |
|---|---|---|---|
| **EARTH STATIONS** | | | |
| **Tx earth station ID** | | USA-WBN-004 6175.0/395 | USA-33454 at I64-BUEC |
| Latitude | °N | 39.38 | 41.27 |
| Longitude | °E | -77.08 | -82.47 |
| Antenna diameter | m | 11.10 | 2.40 |
| Skew angle at transmit location | deg. | 11.79 | 5.12 |
| Effective (Refracted) Elevation | deg. | 43.49 | 42.31 |
| Uplink aspect correction | dB | 0.02 | 0.53 |
| **Receive earth station ID** | | USA-33454 at I64-BUEC | USA-WBN-009 14250.0/11950.0 Woodbine K1 (CSM SES-1 |
| Latitude | °N | 41.27 | 39.38 |
| Longitude | °E | -82.47 | -77.08 |
| Antenna diameter | m | 2.40 | 9.20 |
| Skew angle at receive location | deg. | 5.12 | 11.79 |
| Effective (Refracted) Elevation | deg. | 42.31 | 43.49 |
| Effective G/T at the carrier frequency (Clear-Sky) | dB/K | 18.65 | 23.82 |
| Downlink aspect correction | dB | 1.09 | 1.60 |

| | | | |
|---|---|---|---|
| **CARRIER INFORMATION** | | | |
| **Carrier uplink centre frequency** | MHz | 6345.00 | 6345.00 |
| **Carrier downlink centre frequency** | MHz | 4120.00 | 4120.00 |
| **Number of carriers** | | 1.00 | 1.00 |
| **Modem** | | | |
| **Modulation setting name (clear sky)** | | QPSK 0.750 | QPSK 0.750 |
| **Information rate (clear sky)** | Mbps | 0.12 | 0.12 |
| Symbol rate | Msps | 0.08 | 0.08 |
| Aggregate code rate (clear sky) | | 0.75 | 0.75 |
| Noise Bandwidth | MHz | 0.08 | 0.08 |
| Spreading Factor | | 1.00 | 1.00 |
| Allocated bandwidth | MHz | 0.10 | 0.10 |
| Power Equivalent Bandwidth | MHz | 0.07 | 0.03 |

## SES LINK BUDGET ANALYSIS

| | | | |
|---|---|---|---|
| **ACM analysis (constant SR)** | | | |
| Spectral efficiency in clear sky | b/sym | 1.50 | 1.50 |
| Clear sky throughput | Mbps | 0.12 | 0.12 |
| Clear sky achievable modulation setting | | QPSK 0.750 | QPSK 0.750 |
| Is the minimum recommended TPD OBO exceeded ? | | | |
| Under fade: Spectral efficiency at required availability | b/sym | N/A | N/A |
| Under fade: Throughput when meeting the required availability | Mbps | N/A | N/A |
| Under fade : Mod Cod meeting the required availability | | N/A | N/A |
| **LINK BUDGET** | | | |
| **Uplink Calculations** | | | |
| Carrier Input Backoff in clear sky | dB | -32.43 | -36.12 |
| Carrier FD from Uplink E/S | $dBW/m^2$ | -123.24 | -126.42 |
| $C/N_{UP,Thermal}$: Uplink Thermal Noise ratio (clear sky) | dB | 22.62 | 18.94 |
| $C/(N+I)_{UP,\ NO\ ASI}$ : Uplink Thermal Noise and interference ratio prior to ASI (clear sky) | dB | 20.72 | 18.02 |
| **$C/(N+I)_{UP}$ Uplink Thermal Noise and interference ratio (clear sky)** | **dB** | **15.81** | **12.42** |
| Total propagation loss considering uplink rain fade | dB | | |
| $C/(N+I)_{UP}$ Uplink Thermal Noise and Interference ratio (UL under fade) | **dB** | | |
| **Resulting uplink path availability** | **% yr** | **clear weather only** | **clear weather only** |
| **Downlink Calculations** | | | |
| Carrier Downlink EIRP towards Receive E/S | dBW | 11.44 | 7.26 |
| Carrier Downlink EIRP at beam peak | dBW | 12.54 | 8.85 |
| Carrier Output Backoff (clear sky) | dB | -30.93 | -34.62 |
| $C/(N+I)_{DN,\ NO\ ASI}$ : Downlink Thermal Noise and interference ratio prior to ASI (clear sky | dB | 12.52 | 12.49 |
| $C/N_{DN,Thermal}$: Downlink Thermal Noise ratio (clear sky) | dB | 13.53 | 14.54 |
| **$C/(N+I)_{DN}$ Downlink Thermal Noise and interference ratio (clear sky)** | **dB** | **10.22** | **11.94** |
| Total propagation loss considering downlink rain fade | dB | | |
| $C/(N+I)_{DN}$ Downlink Thermal Noise and Interference ratio (DL under fade) | dB | | |
| **Resulting downlink path availability** | **% yr** | **clear weather only** | **clear weather only** |
| **NOISE CONTRIBUTION ANALYSIS** | | | |
| **Limiting factor** | | **Downlink Thermal Noise** | **Uplink Adjacent Satellite Interference** |
| **Total C/(N+I) clear sky** | **dB** | **9.16** | **9.16** |
| **Total Eb/No clear sky** | **dB** | **7.40** | **7.40** |
| Total C/(N+I) (UL fade, DL clear) | dB | | |
| Total C/(N+I) (DL fade, UL clear) | dB | | |
| **Total C/(N+I), excluding ASI, clear sky** | **dB** | **11.91** | **11.42** |
| Required C/N (including implementation and additional margin) | dB | 9.16 | 9.16 |
| Required Eb/No (including implementation and additional margin) | dB | 7.40 | 7.40 |
| **Link margin in clear sky (For ACM carriers, residual margin in CS** | **dB** | **0.00** | **0.00** |
| **POWER DENSITY REVIEW** | | | |
| Carrier power density at antenna flange (clear sky) | dBW/Hz | -65.54 | -55.00 |
| Uplink EIRP density | dBW/Hz | -9.55 | -12.71 |
| Skew angle at transmit location | deg. | 11.79 | 5.12 |
| Uplink off-axis EIRP density at 2 deg. | dBW/Hz | -44.06 | -33.52 |
| Downlink EIRP density at beam peak | dBW/Hz | -36.31 | -40.00 |
| **HPA Sizing** | | | |
| Total number of carriers | | 1.00 | 1.00 |
| Total EIRP required from E/S | dBW | 39.31 | 36.15 |
| UPC Range | dB | 0.00 | 0.00 |
| HPA type/mode | | Not Defined \| Multi Carrier | Not Defined \| Multi Carrier |
| Required backoff | dB | -4.00 | -4.00 |
| Required HPA capability | W | 0.10 | 0.70 |
| **Recommended HPA size (for a single carrier)** | W | HPA type not supplied | HPA type not supplied |
| **Recommended HPA size (to support all carriers)** | W | HPA type not supplied | HPA type not supplied |

Antenna Alignment
Produced using Satmaster Pro
Thursday 30 June 2022

| | |
|---|---|
| Site name | I64-BUEC |
| Satellite name | SES-2 |

| Input Parameters | Value | Units |
|---|---|---|
| Site latitude | 41.268085N | degrees |
| Site longitude | 82.467937W | degrees |
| Satellite longitude | 87.00W | degrees |
| Inclination | 0 | degrees |
| Spot beam polarization cant | 0 | degrees |
| Antenna offset focus angle | 0 | degrees |

| Satellite Look Angles | Value | Units |
|---|---|---|
| Elevation | 42.09 | degrees |
| True azimuth | 186.85 | degrees |
| Azimuth compass bearing | 194.93 | degrees |
| Polarization offset | 5.18 | degrees |
| Path distance to satellite | 37621.00 | km |

| Modified Polar Mount Settings | Value | Units |
|---|---|---|
| Polar axis | 41.96 | degrees |
| Polar elevation | 48.04 | degrees |
| Declination offset | 5.74 | degrees |
| Apex declination | 47.69 | degrees |
| Apex elevation | 42.31 | degrees |

| | | | |
|---|---|---|---|
| **From:** | SES GS | **Email:** | salesengineering@ses-gs.com |
| **To:** | | | |
| **Attention:** | Mike Feustel | **Email:** | Michael.Feustel@L3Harris.com |
| **Control Centre:** | SES Digital Network Operations Centre | **Email:** | dino@ses.com |
| **Our Reference:** | LU/NB/30-Jun-2022/131260 | | |
| **Subject:** | **Line Up and Service Authorisation for <Carrier's Customer Not Available>, Contract# <STN not available>, via SES-2.** | | |
| **Planned Activation Date:** | **30-Jun-2022** | | |

| **Transponder** | **#Carriers** Scheduled |
|---|---|
| 21C | 2 |

**IMPORTANT:** Before activating any carriers please contact the SES Digital Network Operations Centre (DINO) referencing this document for authorisation to radiate.
The DINO can be reached by phone on +352 710 725 333.
This message is valid for 60 days from its issue date. In the event that the carriers listed are not activated within 60 days it will be necessary to contact SES GS Sales Engineering to obtain renewal of authorisation.

The activation of the carriers listed below, in accordance with the reference transmission plan is hereby authorized. All carriers must be activated under the control of the DINO and conform to the parameters in the attached list.
Please note that all transmit earth stations must be registered by SES GS and comply with the Earth Station Performance Requirements prior to service activation.
**The SES satellite access and escalation procedures are to be found on our website under the following link:**
SES Technical Documents
**Best regards**
**Nick Brown**
SES GS

| Satellite | Transponder | Pol. (U/L / D/L) | Carrier ID | Tx. E/S | U/L Freq. (MHz) | D/L Freq. (MHz) | Rx. E/S | U/L EIRP (dBW) | D/L EIRP (dBW) | Carrier Details | Allocated BW (MHz) | Lifecycle State |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Scheduled** | | | | | | | | | | | | |
| SES-2 | 21C | VLP / HLP | CXR-000000097184 | USA-WBN-004 | 6355.7847 | 4130.7847 | USA-33454 | | 12.50 | QPSK \| 115.200 Kb/s \| 0.0768 Turbo \| 0.750 | 0.0960 | Scheduled (GW to ADS) |
| SES-2 | 21C | VLP / HLP | CXR-000000097183 | USA-33454 | 6355.8807 | 4130.8807 | USA-WBN-004 | | 8.90 | QPSK \| 115.200 Kb/s \| 0.0768 Turbo \| 0.750 | 0.0960 | Scheduled (ADS to GW) |

**Polarization Codes:** LHCP = Left Hand Circular; RHCP = Right Hand Circular; VLP = Vertical Linear; HLP = Horizontal Linear

**Carrier Details:** Modulation Type | Data Rate | Symbol Rate, Inner Code Type | Inner Code Rate DVBS2 Mode | Pilots | Frame

| GateWay (Woodbine, MD) IF Frequencies | | |
|---|---|---|
| TX | I64 BUEC | 6355.7847 |
| RX | I64 BUEC | 4130.8807 |

| Temporary Remote (Collins, OH) IF Frequencies | | |
|---|---|---|
| TX | I64 BUEC | 6355.8807 |
| RX | I64 BUEC | 4130.7847 |

**Micronet Communications, Inc.**
812 Lexington Dr
Plano, Texas 75075
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: M2223013 5.93 GHz
Licensee: L3HARRIS TECHNOLOGIES, INC. 

---

Pursuant to Parts 25.203 and 101.103(d) of the FCC Rules and Regulations, a frequency coordination study was conducted by Micronet Communications, Inc. for the following proposed earth station:

I64 BUEC, OH

The results of the study indicate that no unacceptable interference will result with existing, proposed or prior coordinated radio facilities.

Coordination was performed with existing, proposed and prior coordinated carriers within coordination range on the following dates:

08/29/2022 No-impact change notification pursuant to Section 101.103(d)(2)(ix) - No response required.
08/19/2022 Original PCN (Expedited response requested by 09/02/2022) There were no unresolved interference objections.

The attached coordination data was forwarded on the latest date to the following parties within coordination range or their authorized coordination agents:

AGILE NETWORK BUILDERS LLC
AMERICAN ELECTRIC POWER SERVICE CORPORATION
AQ2AT, LLC
BLHC, LLC
BLUELINE COMM
CELLCO PARTNERSHIP
COMMUNITY ISP, INC.
COMSEARCH INC
COUNTY OF SUMMIT, OHIO
DC2A LLC
DTE ELECTRIC COMPANY
EAST OHIO GAS COMPANY
ELECTRIC RAILROAD, LLC
FELHC, INC.
FRONTIER NORTH INC.
FUNDAMENTAL BROADCASTING LLC
GEAUGA, COUNTY OF
GRAND TRUNK WESTERN RAILROAD COMPANY
LAKE COUNTY UTILITIES WWTP
LUCAS, COUNTY OF
METALINK TECHNOLOGIES, INC.
METRO WIRELESS INTERNATIONAL INC.
MICHIGAN, STATE OF
MICRONET COMMUNICATIONS INC
NEW CINGULAR WIRELESS PCS, LLC
NEW LINE NETWORKS LLC
NEW WORLD COMMUNICATIONS OF DETROIT, INC

**Micronet Communications, Inc.**
812 Lexington Dr
Plano, Texas 75075
972-422-7200

SUPPLEMENTAL SHOWING PART 101.103(D)

File Number: M2223013 5.93 GHz
Licensee: L3HARRIS TECHNOLOGIES, INC. 

---

NORFOLK SOUTHERN RAILWAY COMPANY
NORTH COAST WIRELESS COMMUNICATIONS
NOTTHISAGAIN LLC
RADIO DYNAMICS
RADIO ONE, INC.
SW NETWORKS
T-MOBILE LICENSE LLC
THE CITY OF CLEVELAND, OH
W.A.T.C.H. TV COMPANY INC.
WEBLINE HOLDINGS LLC
WIRELESS APPLICATIONS CORP
WORLD CLASS WIRELESS LLC
XIBER, LLC
XWAVE ENGINEERING LLC
ZEN NETWORKS, INC

Respectfully Submitted,

Jeremy B. Lewis

Jeremy Lewis
Systems Engineer

Attached: 1 data sheet

Micronet Communications, Inc.
812 Lexington Dr
Plano, Texas 75075
972-422-7200

File: M2223013

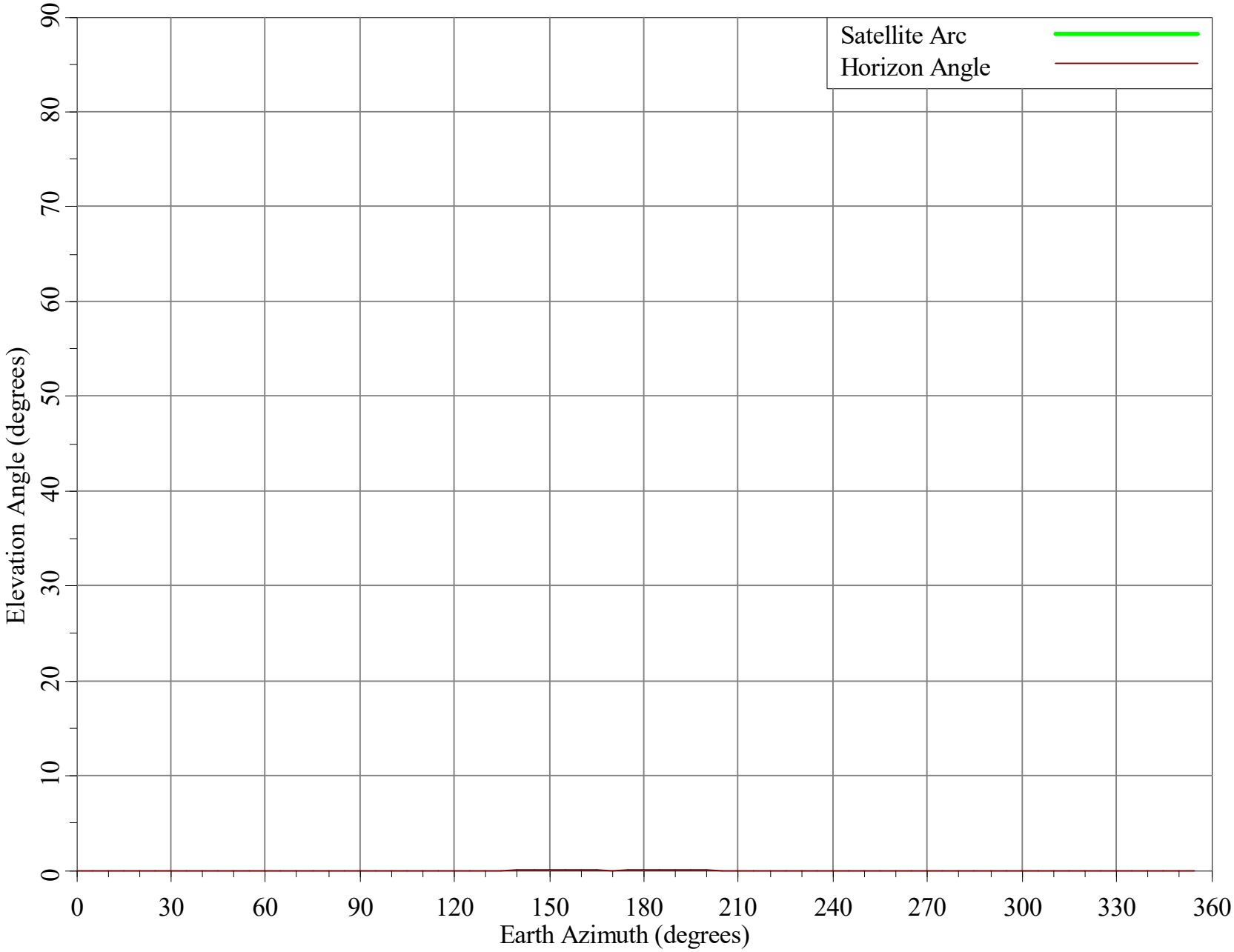
## TECHNICAL CHARACTERISTICS OF TRANSMIT RECEIVE EARTH STATION

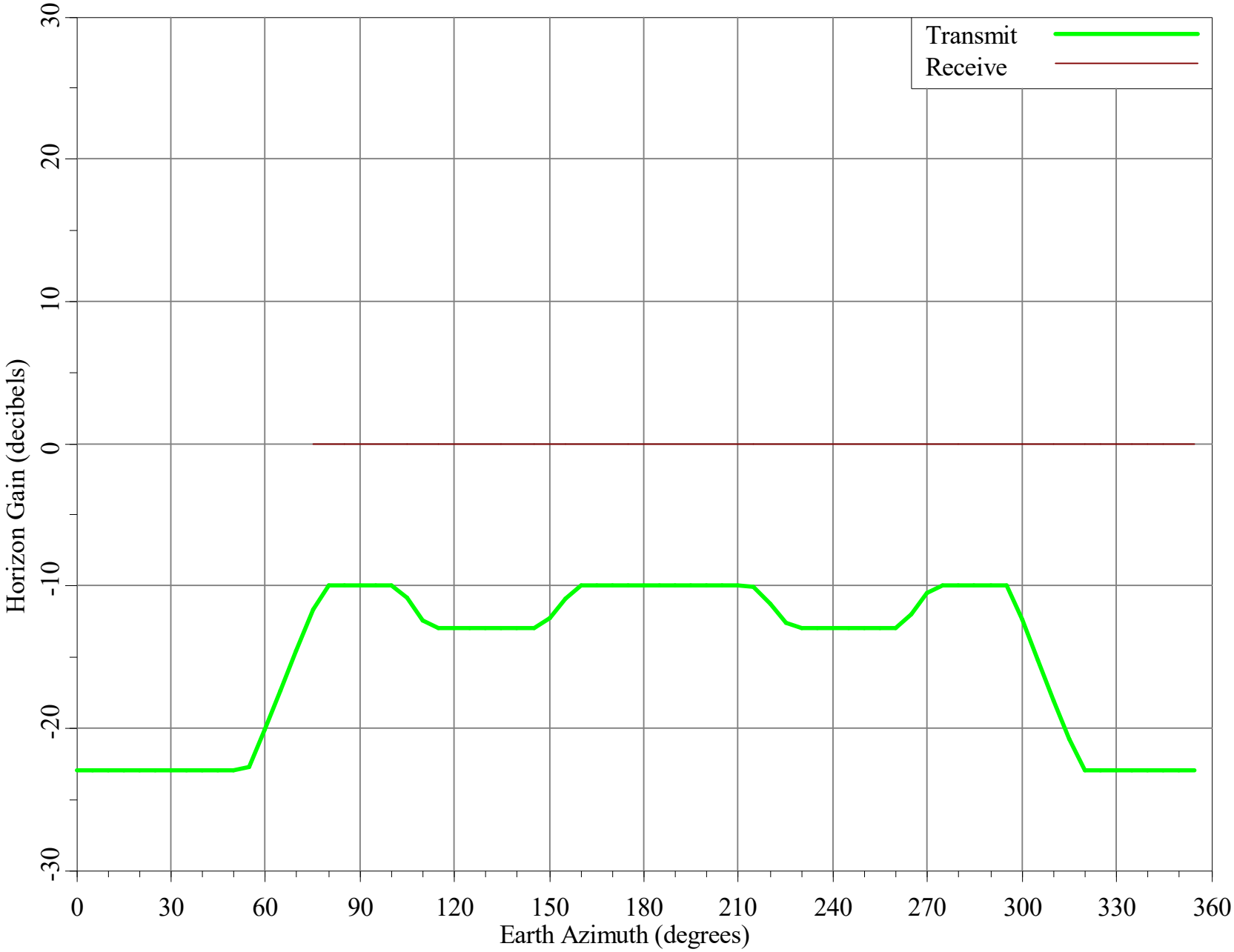
| | | | |
|---|---|---|---|
| Company: | | L3HARRIS TECHNOLOGIES, INC. | |
| Site Name, State: | | I64 BUEC, OH | |
| Call Sign: | | | |
| Latitude | (NAD83) | 41 16 5.1 N | |
| Longitude | (NAD83) | 82 28 4.6 W | |
| Elevation AMSL | (ft/m) | 879.40 | 268.04 |
| Receive Frequency Range | (MHz) | 3700-4200 | |
| Transmit Frequency Range | (MHz) | 5925-6425 | |
| Range of Satellite Orbital Long. | (deg W) | 87.00 | 87.00 |
| Range of Azimuths from North | (deg) | 186.85 | 186.85 |
| Antenna Centerline | (ft/m) | 60.00 | 18.29 |
| Antenna Elevation Angles | (deg) | 42.10 | 42.10 |

| Equipment Parameters | | Receive | Transmit |
|---|---|---|---|
| Antenna Gain, Main Beam | (dbI) | 35.50 | 38.00 |
| 15 DB Half Beamwidth | (deg) | 6.00 | 2.00 |
| Antennas | Receive: HARRIS CORP ST5000-2.4(2.4M) | | |
| | Transmit: HARRIS CORP ST5000-2.4 (2.4M) | | |
| Max Transmitter Power | (dbW/4KHz) | | -11.52 |
| Max EIRP Main Beam | (dbW/4KHz) | | 26.48 |
| Modulation / Emission Designator | DIGITAL | 96K6G7W | |

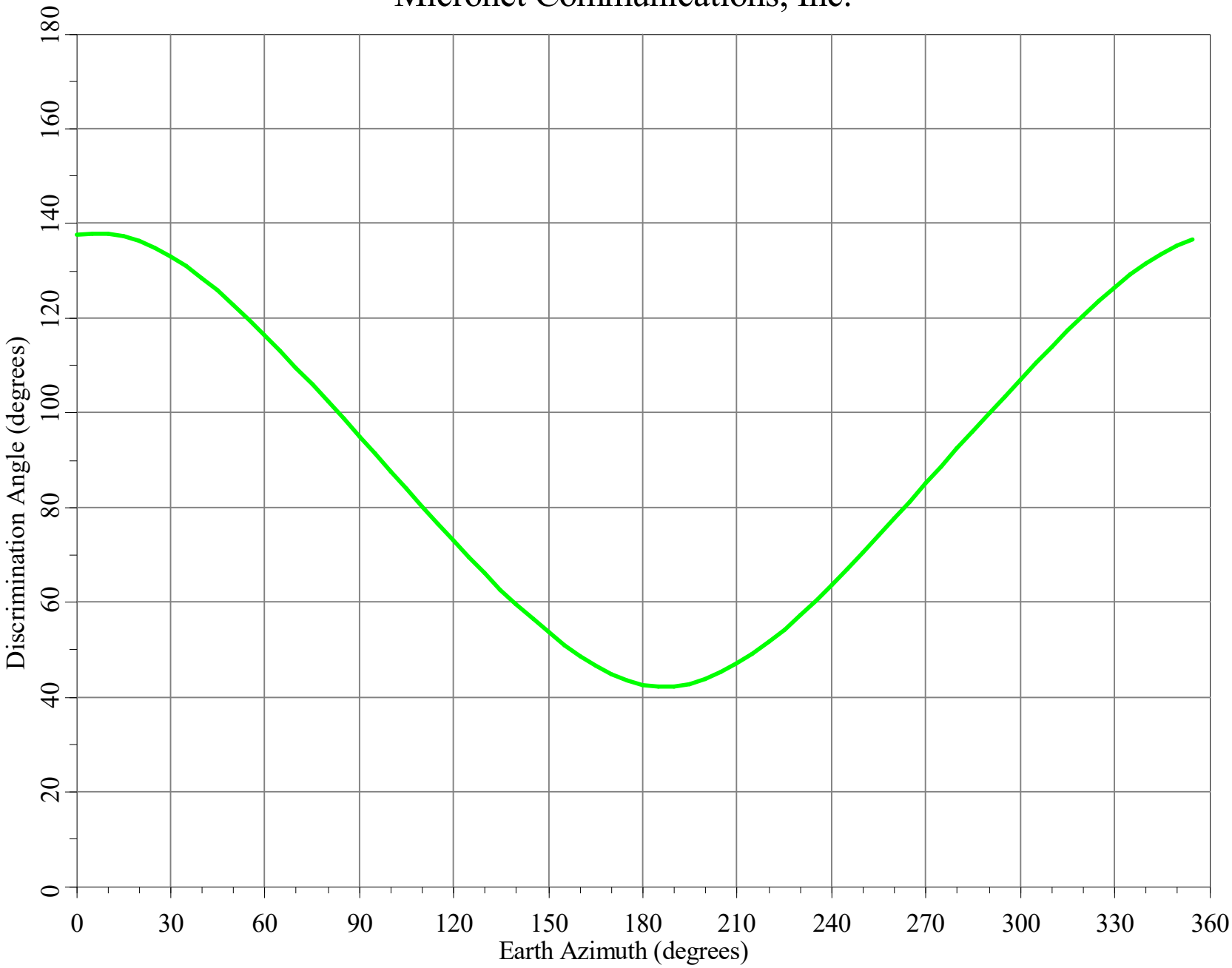
| Coordination Parameters | | Receive | Transmit |
|---|---|---|---|
| Max Greater Circle Distances | (km) | 344.48 | 137.87 |
| Max Rain Scatter Distances | (km) | 452.53 | 100.01 |
| Max Interference Power Long Term | (dbW) | -158.60 | -154.80 |
| Max Interference Power Short Term | (dbW) | -153.90 | -126.80 |
| Rain Zone / Radio Zone | | 2 | A |

# Horizon Angle & Satellite Arc for I64 BUEC, OH
## Micronet Communications, Inc.




Horizon Gain for I64 BUEC, OH
Micronet Communications, Inc.
Transmit
Receive
Horizon Gain (decibels)
30
20
10
0
-10
-20
-30
0
30
60
90
120
150
180
210
240
270
300
330
360
Earth Azimuth (degrees)

# Minimum Discrimination Angles for I64 BUEC, OH
## Micronet Communications, Inc.



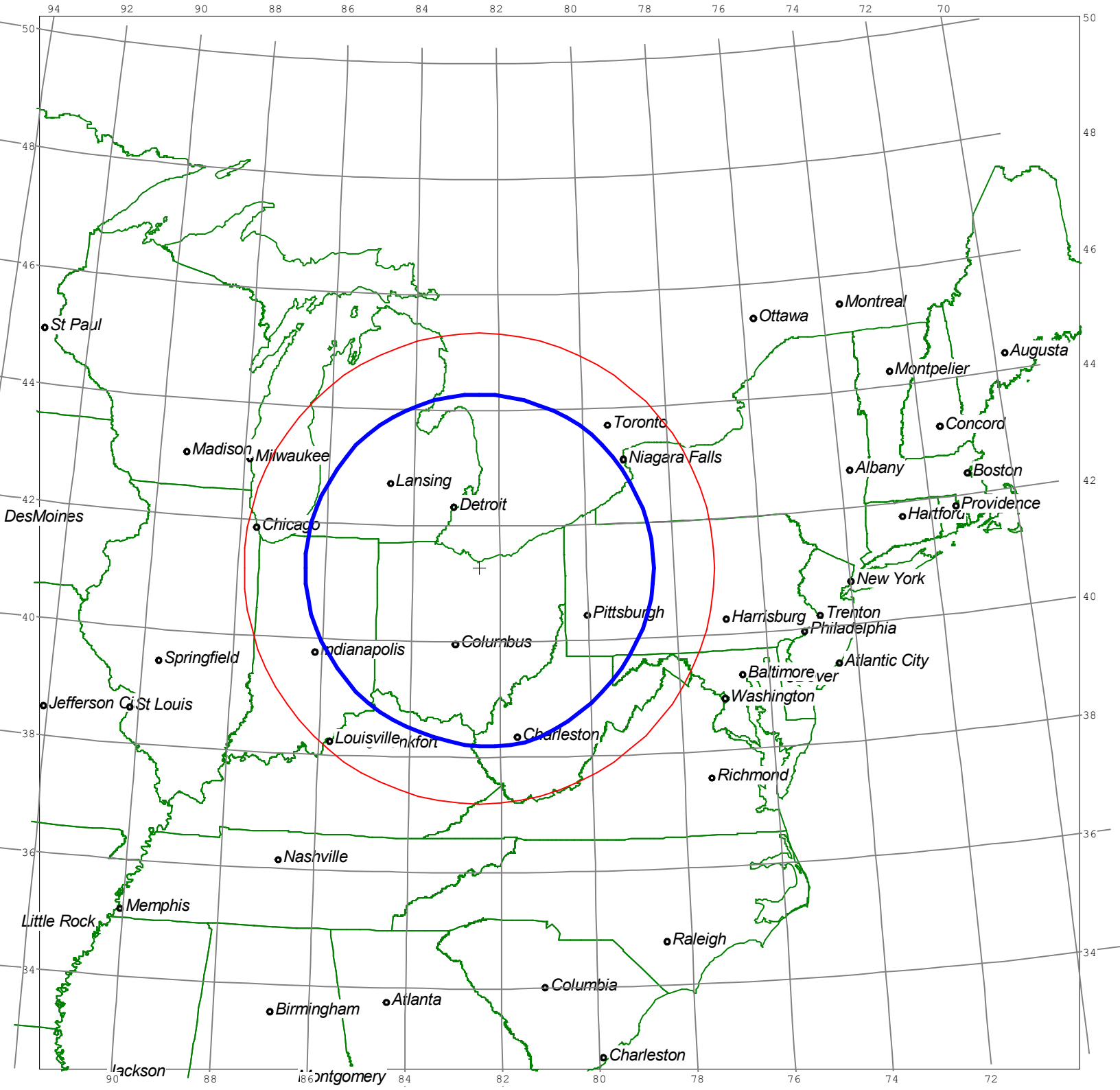
# Final Contour & Rain Scatter
# for I64 BUEC, OH - Transmit


SCALE - 1:10000000  1 inch = 157.8 miles

# Final Contour & Rain Scatter for I64 BUEC, OH - Receive

SCALE - 1:10000000  1 inch = 157.8 miles

Final Contour
Rain Scatter



ANALYSIS OF NON-IONIZING RADIATION
for L3HARRIS TECHNOLOGIES INC.
Site: I64 BUEC State: OH
Latitude: 41 16 5.1 Longitude: 82 28 4.6 (NAD83)
08-29-2022

The Office of Science and Technology Bulletin, No. 65, October 1985 and revised August 1997, specifies that the maximum level of non-ionizing radiation that a person may be exposed to over a six minute period is an average power density equal to 5 mW/cm**2 (five milliwatts per centimeter squared) for a controlled environment. For an uncontrolled environment, the maximum level of non-ionizing radiation that a person may be exposed to over a thirty minute period is an average power density equal to 1 mW/cm**2 (one milliwatt per centimeter squared). It is the purpose of this report to determine the maximum power flux densities of the earth station in the far zone, near zone, transition zone, at the main reflector surface, and between the antenna edge and the ground.

Parameters which were used in the calculations:
==========

Antenna Diameter, (D) = 2.4000 m

Antenna Surface Area (Sa) = pi(D**2)/4 = 4.5239 m**2

Wavelength at 6.1750 GHz (lambda) = 0.0485 m

Transmit Power at Flange (P) = 1.7500 Watts

Antenna Gain at Earth Site (GES) = 38.0000 dBi = 6309.5734
Power Ratio:
AntiLog(GES/10)

pi = 3.1415927

Antenna Aperture Efficiency (n) = 0.6000

## 1. FAR ZONE CALCULATIONS

Distance to the Far Zone (Df) = $\frac{(n)(D^{**}2)}{\text{lambda}}$ = 71.2577 m

Far Zone Power Density (Rf) = $\frac{(GES)(P)}{4*pi*(Df^{**}2)}$ = 0.1730 W/m**2

= 0.0173 mW/cm**2

## 2. NEAR ZONE CALCULATIONS

Power Flux Density is considered to be at a maximum value throughout the entire length of this Zone. The Zone is contained within a cylindrical volume which has the same diameter as the antenna. Beyond the Near Zone, the Power Flux Density will decrease with distance from the Antenna.

Distance to the Near Zone (Dn) = $\frac{D^{**}2}{4*\text{lambda}}$ = 29.6907 m

Near Zone Power Density (Rn) = $\frac{16.0(n)P}{pi(D^{**}2)}$ = 0.9284 W/m**2

= 0.0928 mW/cm**2

## 3. TRANSITION ZONE CALCULATIONS

The Power Density begins to decrease with distance in the Transition Zone. While the Power Density decreases inversely with distance in the Transition Zone, the Power Density decreases inversely with the square of the distance in the Far Zone. Since the maximum Power Density in the Transition Zone will not exceed the Near Zone values, it is not calculated.

## 4. MAIN REFLECTOR ZONE

Main Reflector Power Density = $\frac{2(P)}{Sa}$ = 0.7737 W/m**2

= 0.0774 mW/cm**2

## 5. ZONE BETWEEN THE MAIN REFLECTOR AND THE GROUND

Applying uniform illumination of the Main Reflector Surface:

Main to Ground Power Density = $\frac{P}{Sa}$ = 0.3868 W/m**2

= 0.0387 mW/cm**2

CALCULATED SAFETY MARGINS SUMMARY
AND EVALUATION

Controlled Safety Margin = 5.0 - Calculated Zone Value (mW/cm**2)

| Zones | Safety Margins (mW/cm**2) | Conclusions |
|---|---|---|
| 1. Far Zone | 4.9827 | Complies with ANSI |
| 2. Near Zone | 4.9072 | Complies with ANSI |
| 3. Transition Zone | Rf < Rt < Rn | Complies with ANSI |
| 4. Main Reflector Surface | 4.9226 | Complies with ANSI |
| 5. Main Reflector to Ground | 4.9613 | Complies with ANSI |

Uncontrolled Safety Margin = 1.0 - Calculated Zone Value (mW/cm**2)

| Zones | Safety Margins (mW/cm**2) | Conclusions |
|---|---|---|
| 1. Far Zone | 0.9827 | Complies with ANSI |
| 2. Near Zone | 0.9072 | Complies with ANSI |
| 3. Transition Zone | Rf < Rt < Rn | Complies with ANSI |
| 4. Main Reflector Surface | 0.9226 | Complies with ANSI |
| 5. Main Reflector to Ground | 0.9613 | Complies with ANSI |

## 6. EVALUATION

A. Controlled Environment
B. Uncontrolled Environment
All Zones comply with ANSI Standards.