GreenbergTraurig

January 10, 2025

Via Electronic Filing

Marlene H. Dortch, Secretary
Federal Communications Commission
45 L Street, N.E.
Washington, D.C. 20554

Re: ELS File No. 2053-EX-ST-2024

Supplemental Technical Submission

Dear Ms. Dortch:

On November 14, 2024, AST & Science, LLC ("AST SpaceMobile") requested Special Temporary Authority ("STA") to conduct Supplemental Coverage from Space ("SCS") service link testing using spectrum made available by our partner and mobile network operator, AT&T Mobility Spectrum LLC ("AT&T").[1]

In the instant submission AST SpaceMobile supplements the above-referenced application with the following exhibits:

Exhibit A: PFD contour plots that reaffirm AST SpaceMobile's ability to direct energy away from international borders and demonstrate how AST SpaceMobile will protect Canadian and Mexican cross-border operations from interference.[2]

Exhibit B: A report providing in-depth technical analysis of radio frequency (RF) interference levels originating from an AST satellite orbiting at an altitude of 520 kilometers. The satellite provides coverage to four test areas in the United States: two near the Canadian border and two the near the Mexican border.

Exhibit C: Consent from AT&T authorizing the contemplated tests and elaborating AST

---

[1] *See* ESL File No. 2053-EX-ST-2024, Attachment A to Legal Narrative ("AT&TLicense List") (filed Nov. 14, 2024).

[2] At staff's request, AST SpaceMobile modeled border areas near Buffalo, New York and Brownsville, Texas. AST SpaceMobile generated such contours for hypothetical operations at these locations only.

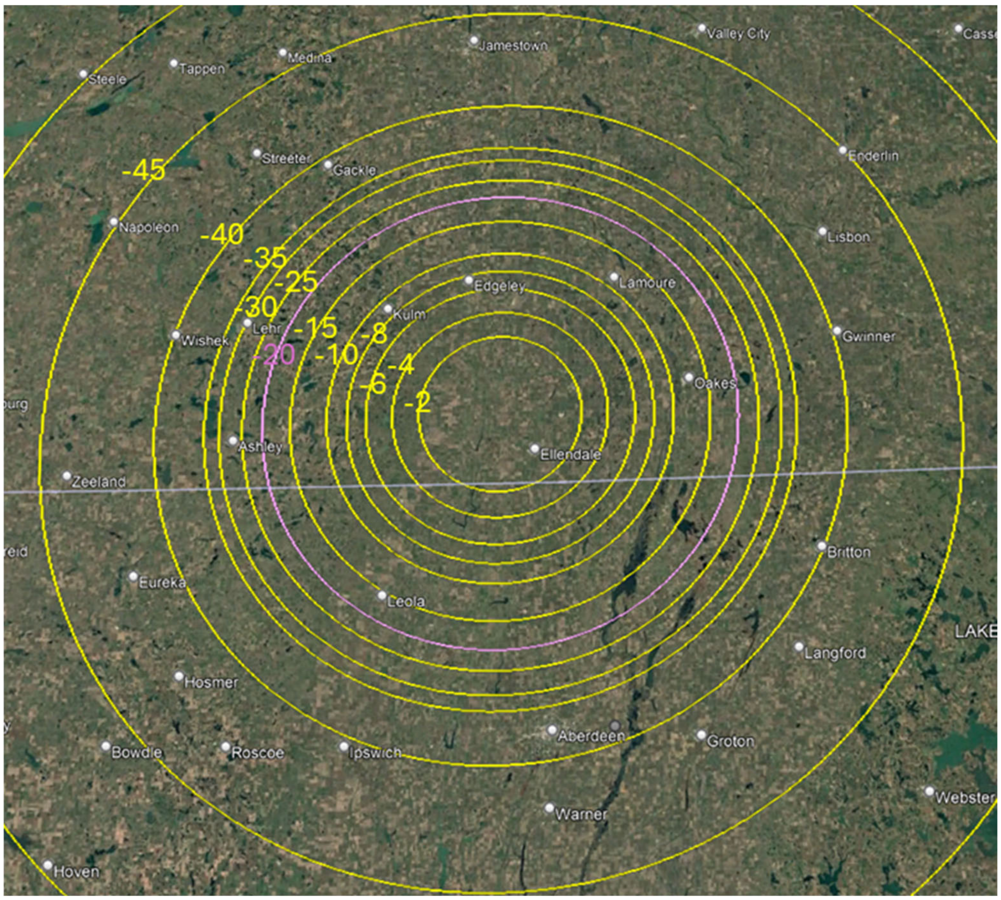
SpaceMobile's obligations concerning tests involving AT&T spectrum resources.

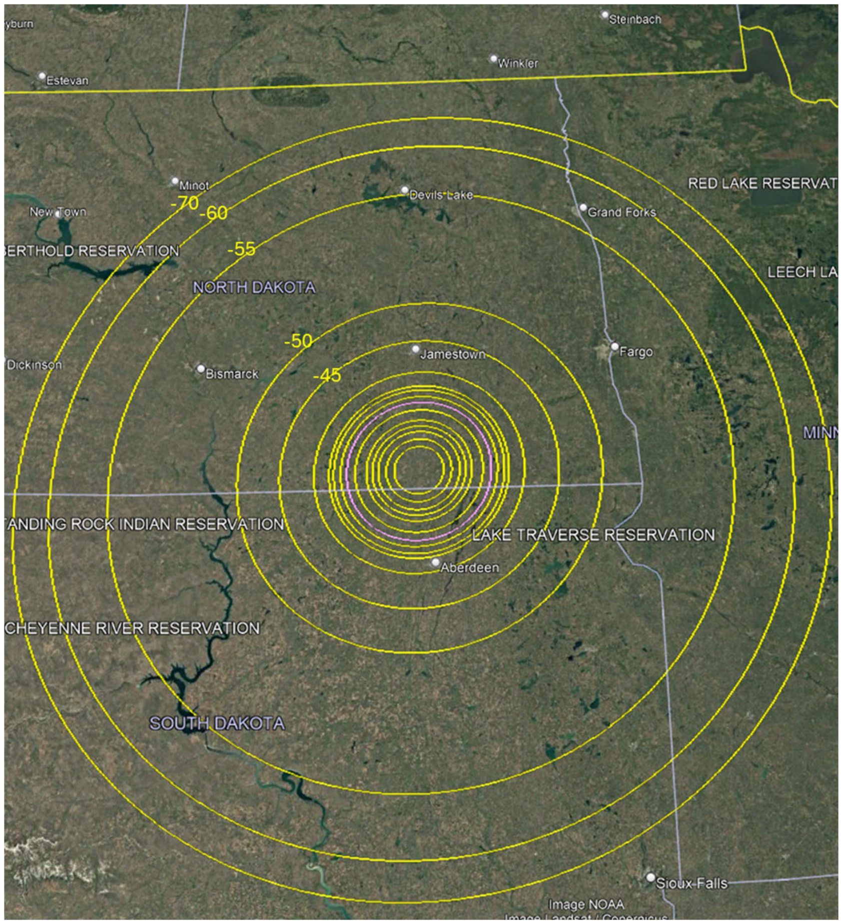
Please feel free to contact the undersigned with any questions.

Respectfully submitted,
/s/
Timothy Bransford
Denise Wood
Counsel for AST SpaceMobile

Case 1-CAN-ND (Center Satellite): PFD Contour Plot with dB roll off from Beam Center (nadir).

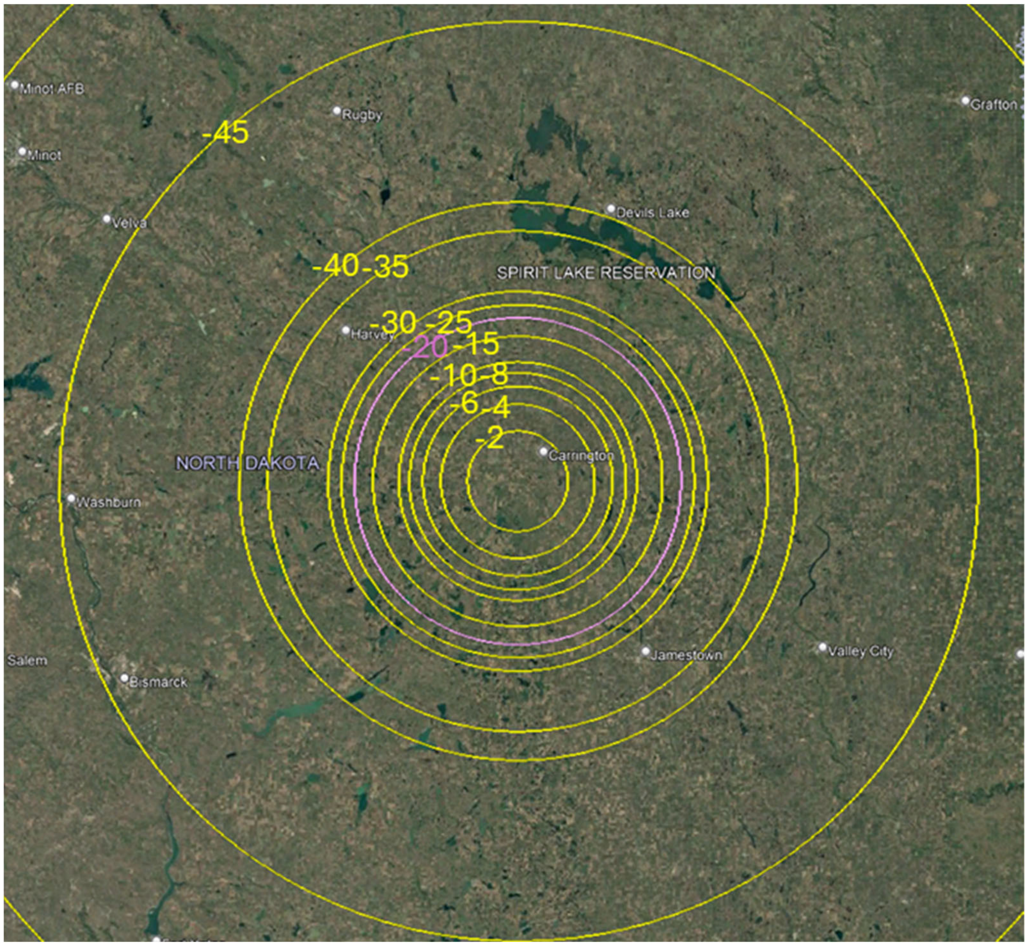
- The peak PFD at the center is -87.4 dBW/m^2
- The peak EIRP at the center is 37.9 dBW

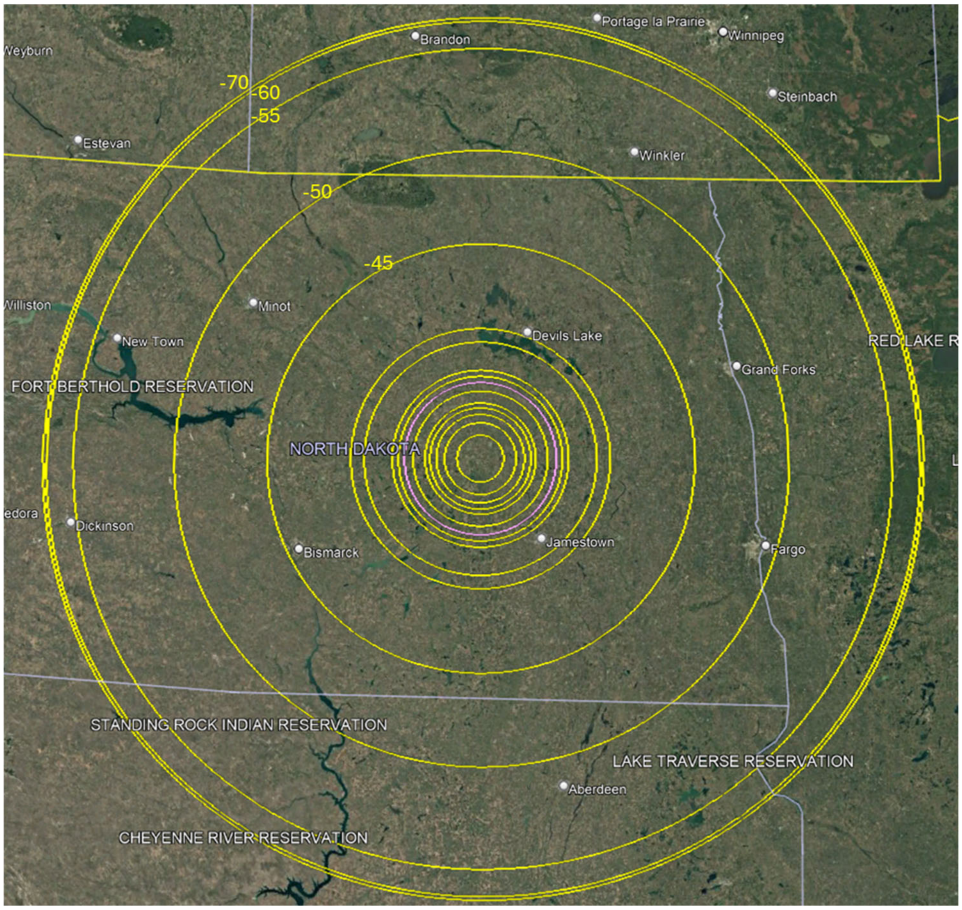



Steinbach
Winkler
Estevan
Minot
New Town
Devils Lake
Grand Forks
RED LAKE RESERVAT
-70
-60
-55
BERTHOLD RESERVATION
NORTH DAKOTA
LEECH LA
-50
-45
Jamestown
Fargo
Dickinson
Bismarck
MINN
TANDING ROCK INDIAN RESERVATION
LAKE TRAVERSE RESERVATION
Aberdeen
CHEYENNE RIVER RESERVATION
SOUTH DAKOTA
Sioux Falls
Image NOAA

Case 2-CAN-ND (Edge Satellite): PFD Contour Plot with dB roll off from Beam Center (nadir).

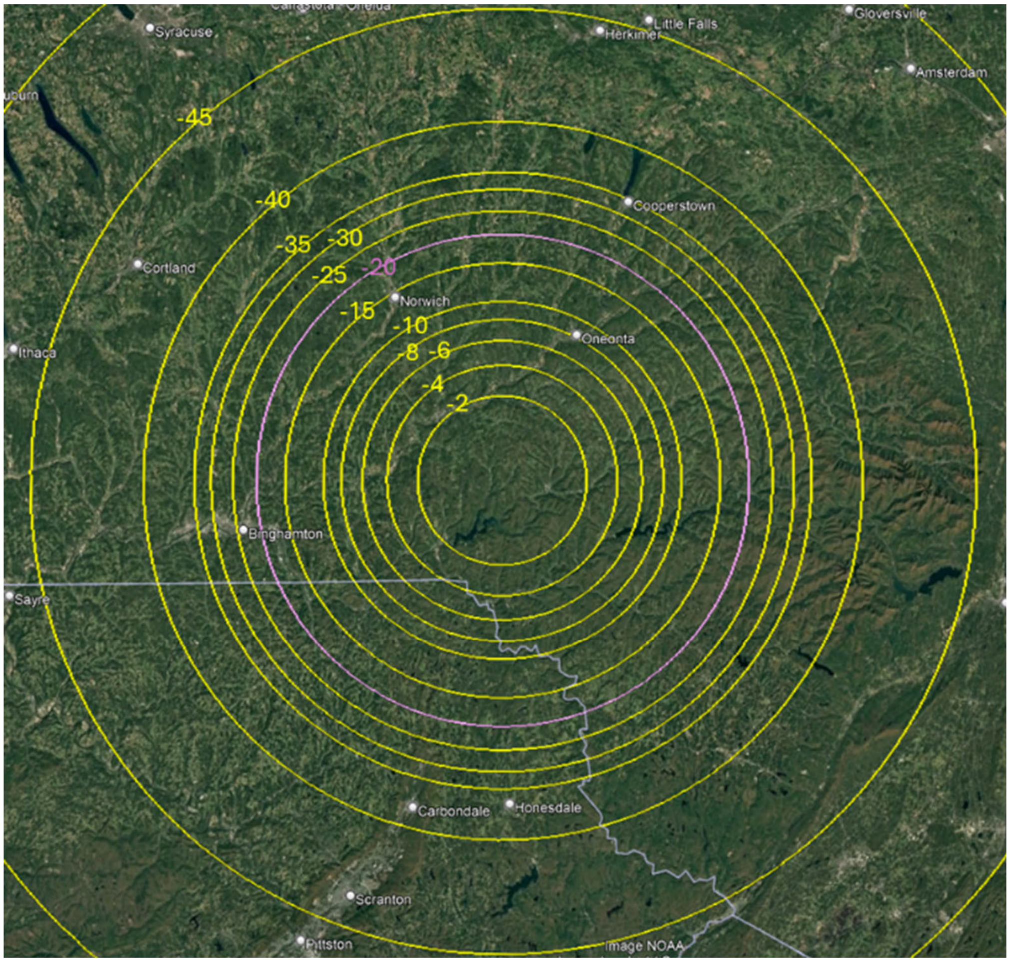
- The peak PFD at the center is -87.4 dBW/m^2
- The peak EIRP at the center is 38.7 dBW

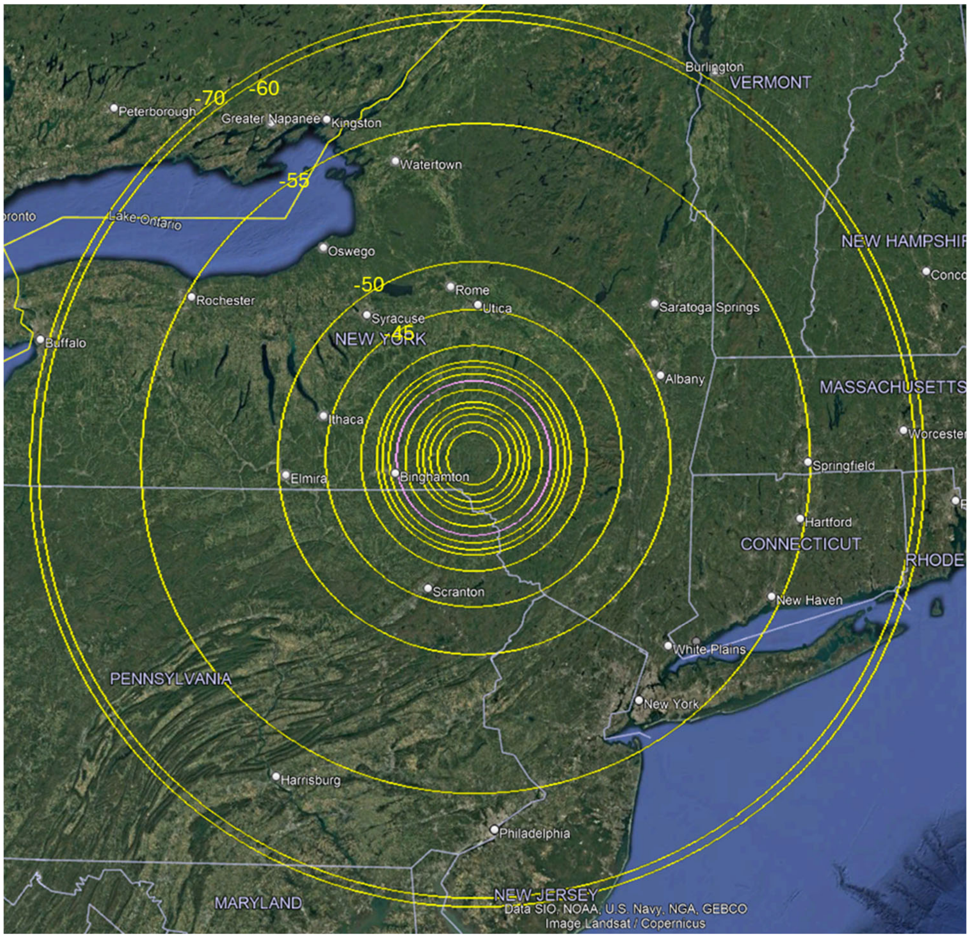



Portage la Prairie
Winnipeg
Brandon
Weyburn
Steinbach
-70
-60
-55
Estevan
Winkler
-50
-45
Williston
Minot
New Town
Devils Lake
RED LAKE R
Grand Forks
FORT BERTHOLD RESERVATION
NORTH DAKOTA
Dickinson
Jamestown
Bismarck
Fargo
STANDING ROCK INDIAN RESERVATION
LAKE TRAVERSE RESERVATION
Aberdeen
CHEYENNE RIVER RESERVATION

Case 1-CAN-NY (Center Satellite): PFD Contour Plot with dB roll off from Beam Center (nadir).

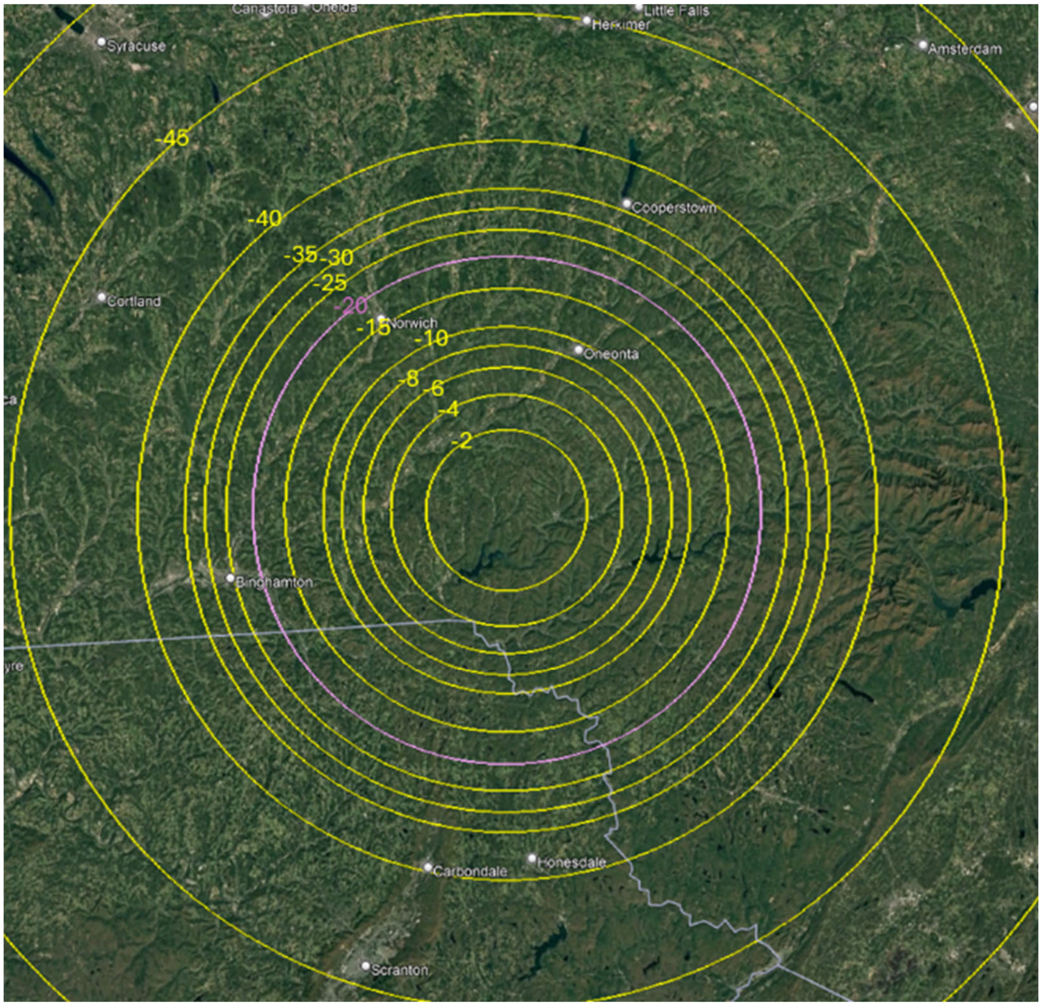
- The peak PFD at the center is -87.4 dBW/m^2
- The peak EIRP at the center is 37.9 dBW

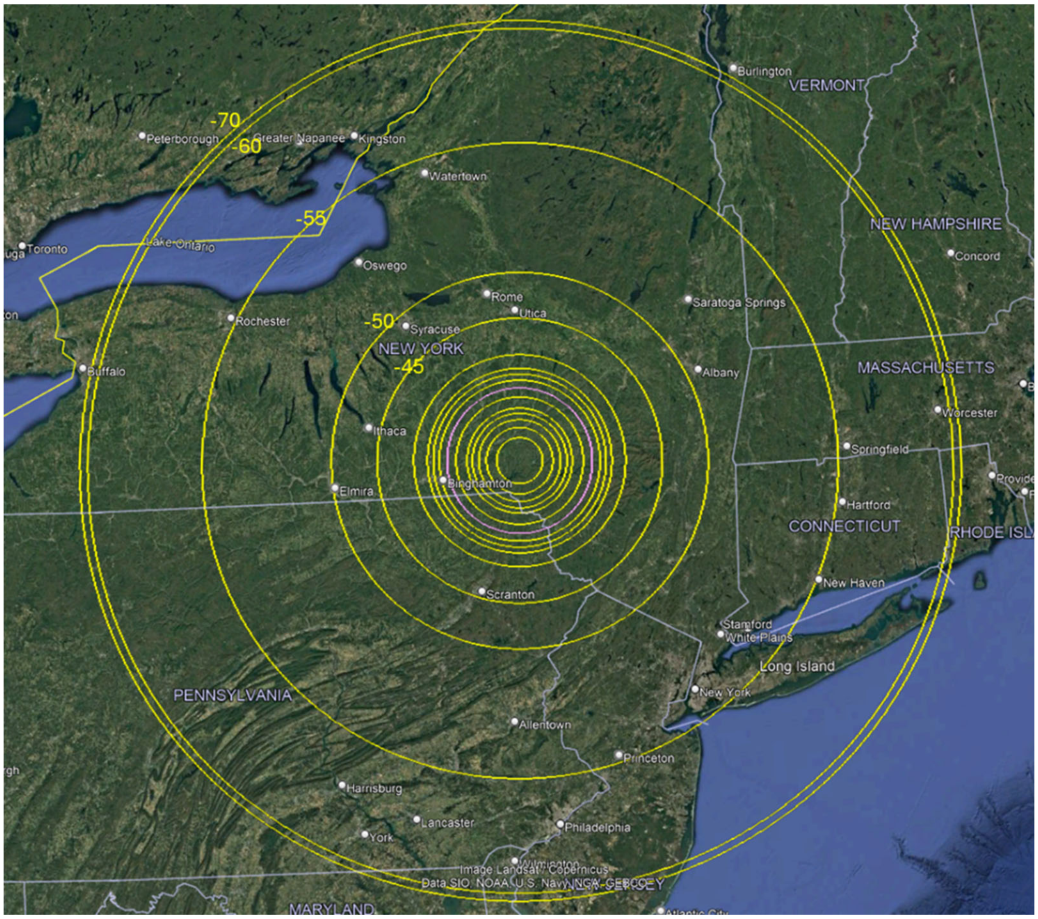



-70
-60
-55
-50
-45
Peterborough
Greater Napanee
Kingston
Burlington
VERMONT
Watertown
Lake Ontario
Oswego
NEW HAMPSHIRE
Rochester
Rome
Utica
Saratoga Springs
Syracuse
NEW YORK
Buffalo
Albany
MASSACHUSETTS
Ithaca
Worcester
Springfield
Elmira
Binghamton
Hartford
CONNECTICUT
Scranton
New Haven
White Plains
PENNSYLVANIA
New York
Harrisburg
Philadelphia
MARYLAND
NEW JERSEY
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

Case 2-CAN-NY (Edge Satellite): PFD Contour Plot with dB roll off from Beam Center (nadir).

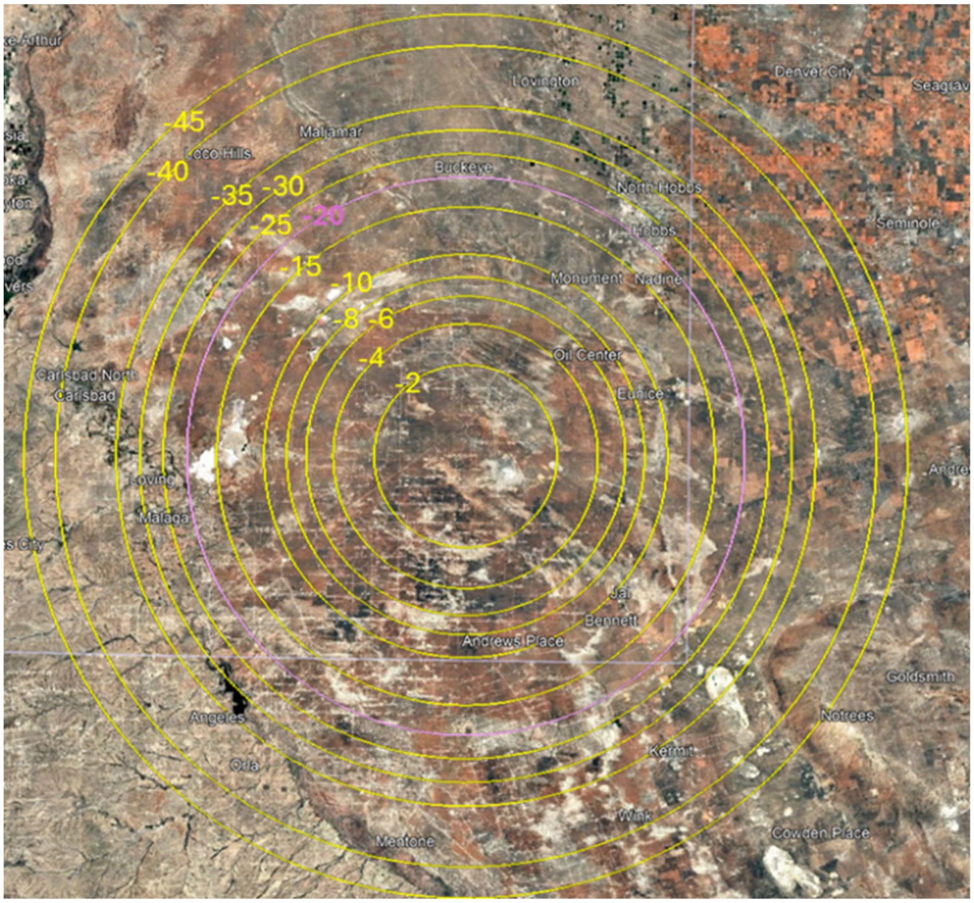
- The peak PFD at the center is -87.4 dBW/m^2
- The peak EIRP at the center is 38.5 dBW

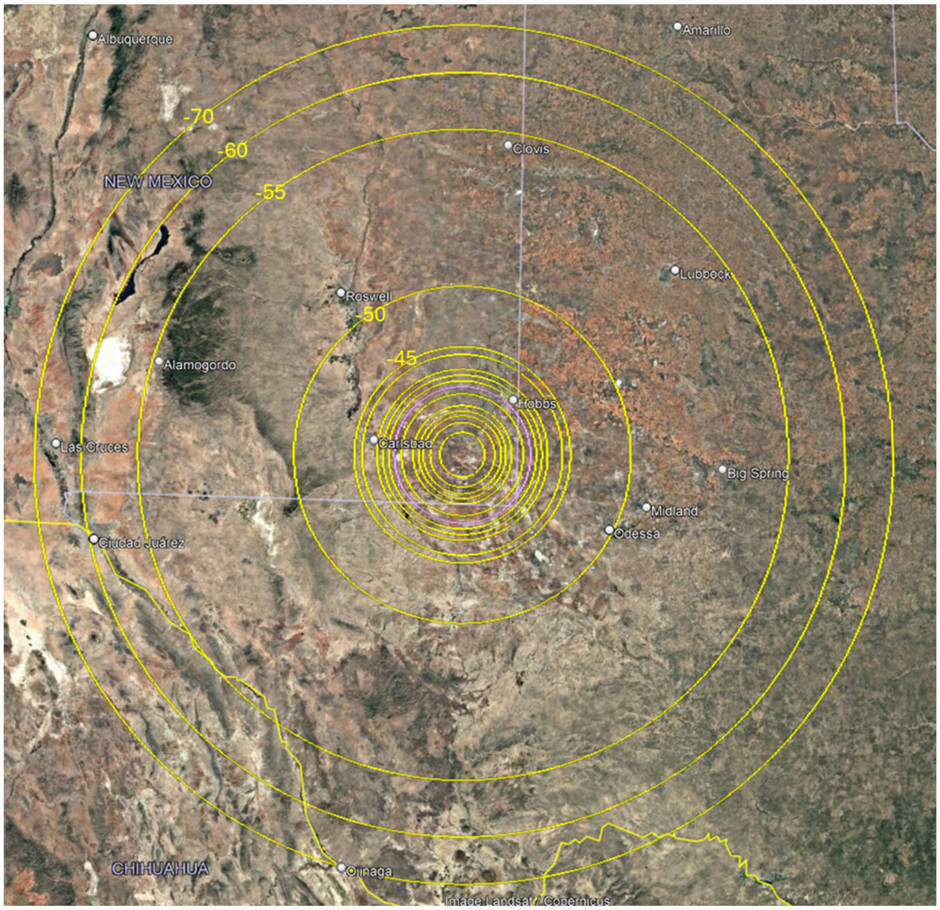



-70
-60
-55
-50
-45
Burlington
VERMONT
Peterborough
Greater Napanee
Kingston
Watertown
NEW HAMPSHIRE
Concord
Toronto
Lake Ontario
Oswego
Rome
Utica
Saratoga Springs
Rochester
Syracuse
NEW YORK
Albany
MASSACHUSETTS
Buffalo
Worcester
Ithaca
Springfield
Elmira
Binghamton
Hartford
CONNECTICUT
RHODE ISL
New Haven
Scranton
Stamford
White Plains
Long Island
PENNSYLVANIA
New York
Allentown
Princeton
Harrisburg
Lancaster
Philadelphia
York
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
MARYLAND

Case 1-MEX-NM (Center Satellite): PFD Contour Plot with dB roll off from Beam Center (nadir).

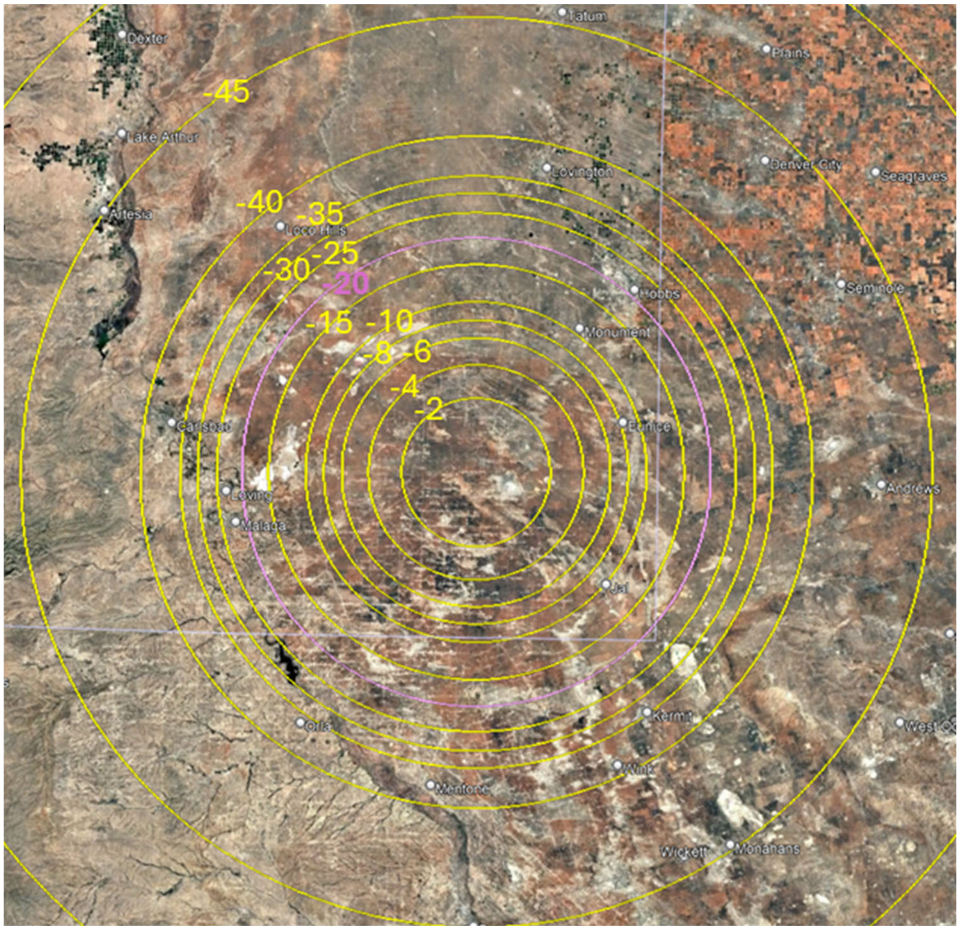
- The peak PFD at the center is -87.4 dBW/m^2
- The peak EIRP at the center is 37.9 dBW

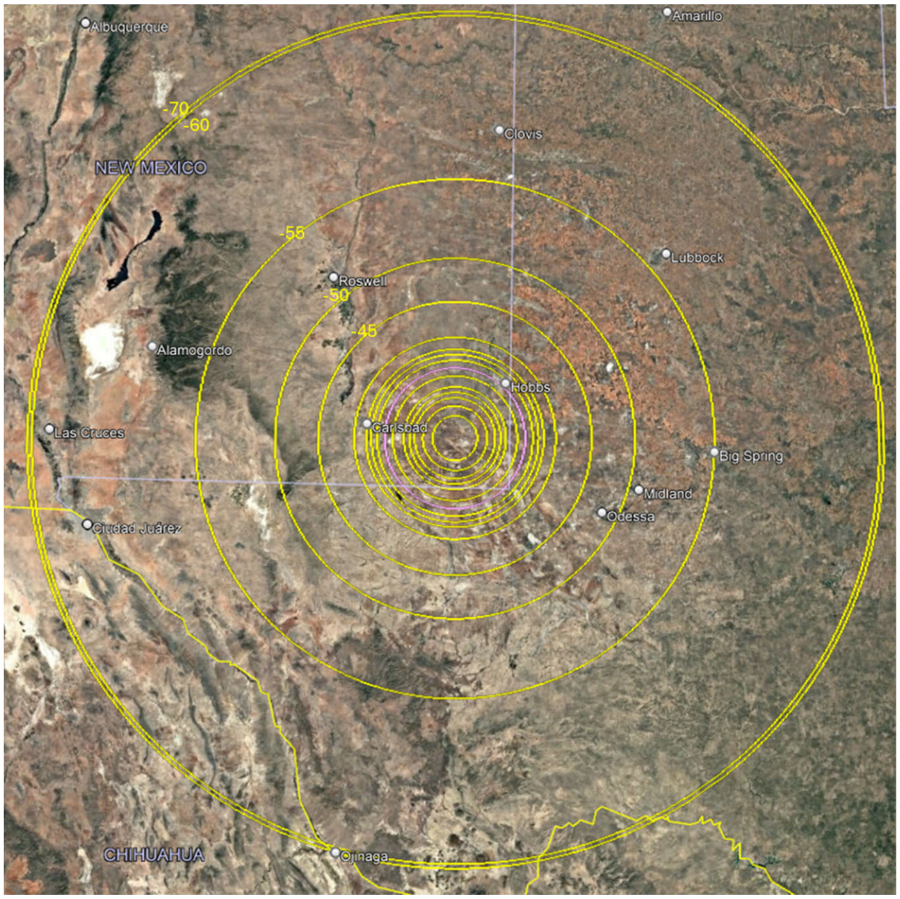



Albuquerque
Amarillo
-70
-60
-55
Clovis
NEW MEXICO
Lubbock
Roswell
-50
Alamogordo
-45
Hobbs
Carlsbad
Las Cruces
Big Spring
Midland
Odessa
Ciudad Juárez
CHIHUAHUA
Ojinaga

Case 2-MEX-NM (Edge Satellite): PFD Contour Plot with dB roll off from Beam Center.

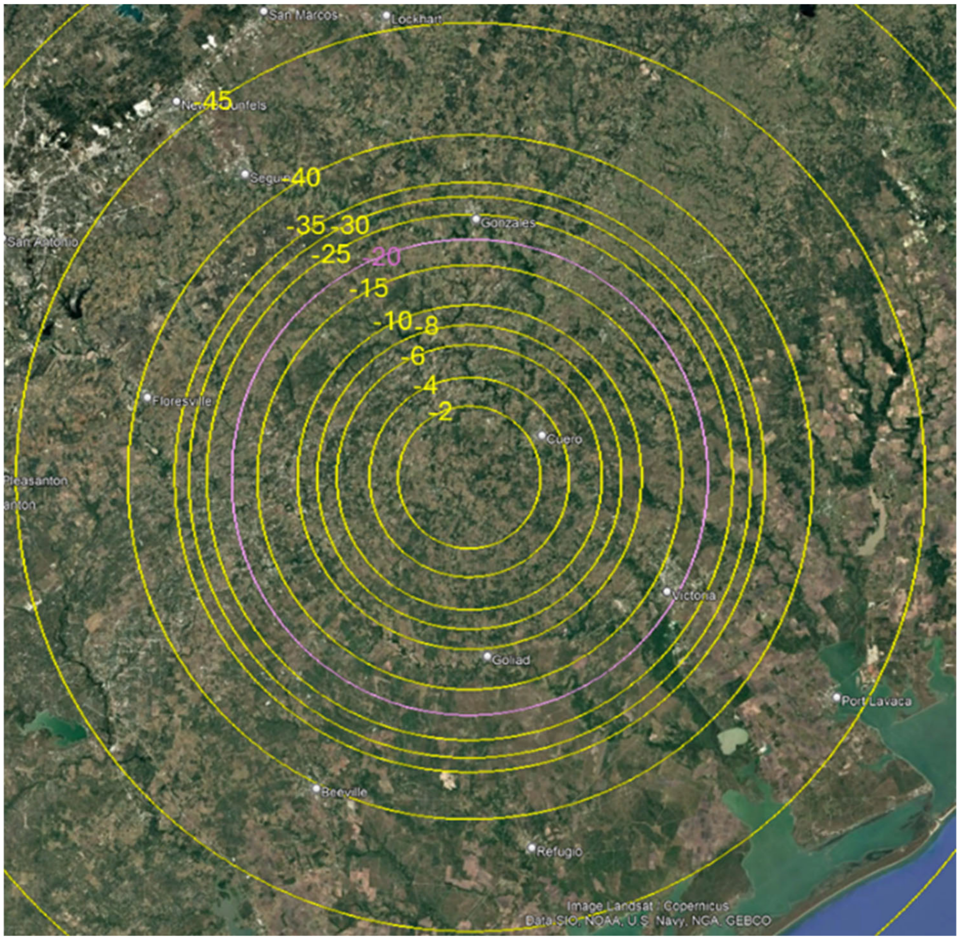
- The peak PFD at the center is -87.4 dBW/m^2
- The peak EIRP at the center is 38.6 dBW

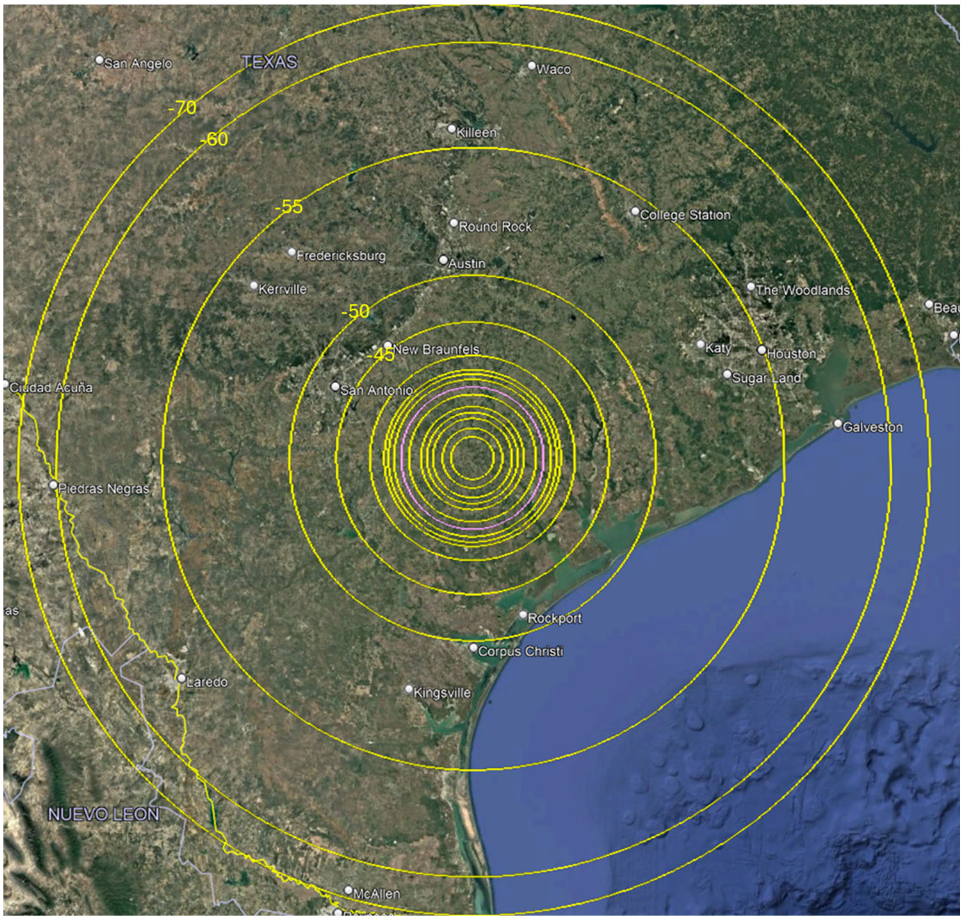



Albuquerque
Amarillo
-70
-60
Clovis
NEW MEXICO
-55
Lubbock
Roswell
-50
-45
Alamogordo
Hobbs
Las Cruces
Carlsbad
Big Spring
Midland
Odessa
Ciudad Juárez
CHIHUAHUA
Ojinaga

Case 1-MEX-TX (Center Satellite): PFD Contour Plot with dB roll off from Beam Center (nadir).

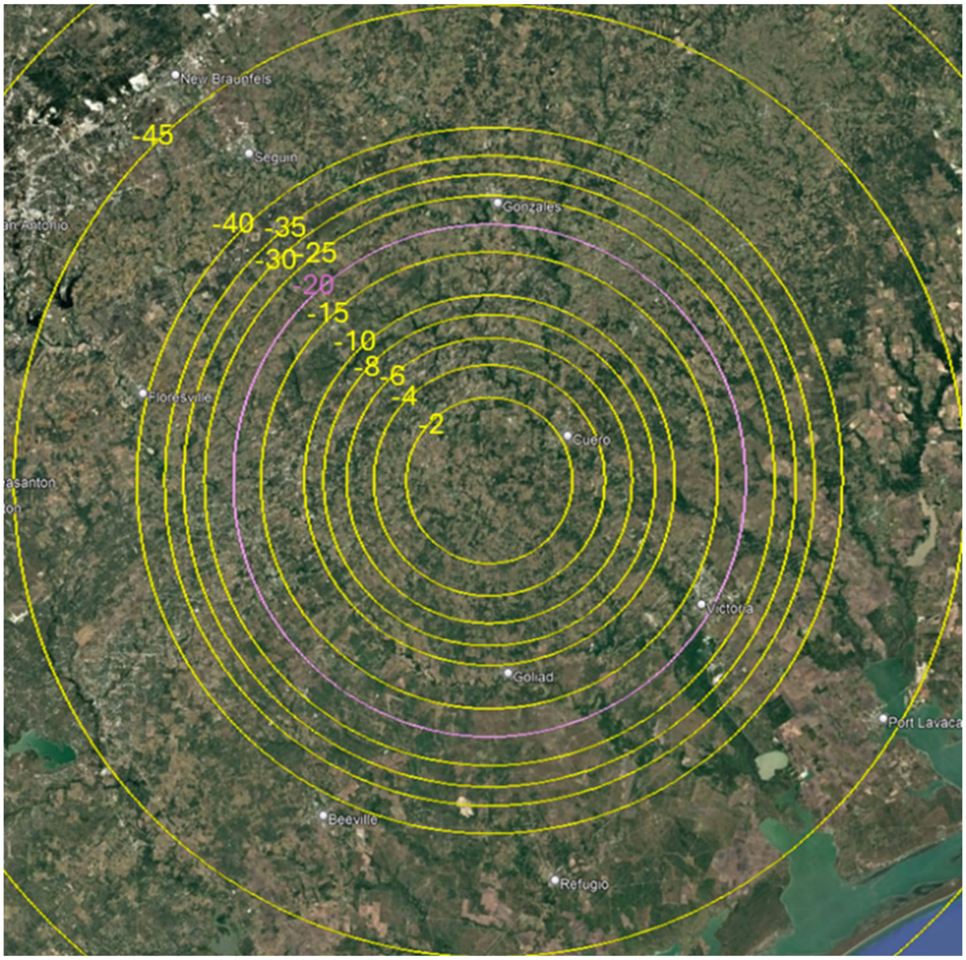
- The peak PFD at the center is -87.4 dBW/m^2
- The peak EIRP at the center is 37.9 dBW

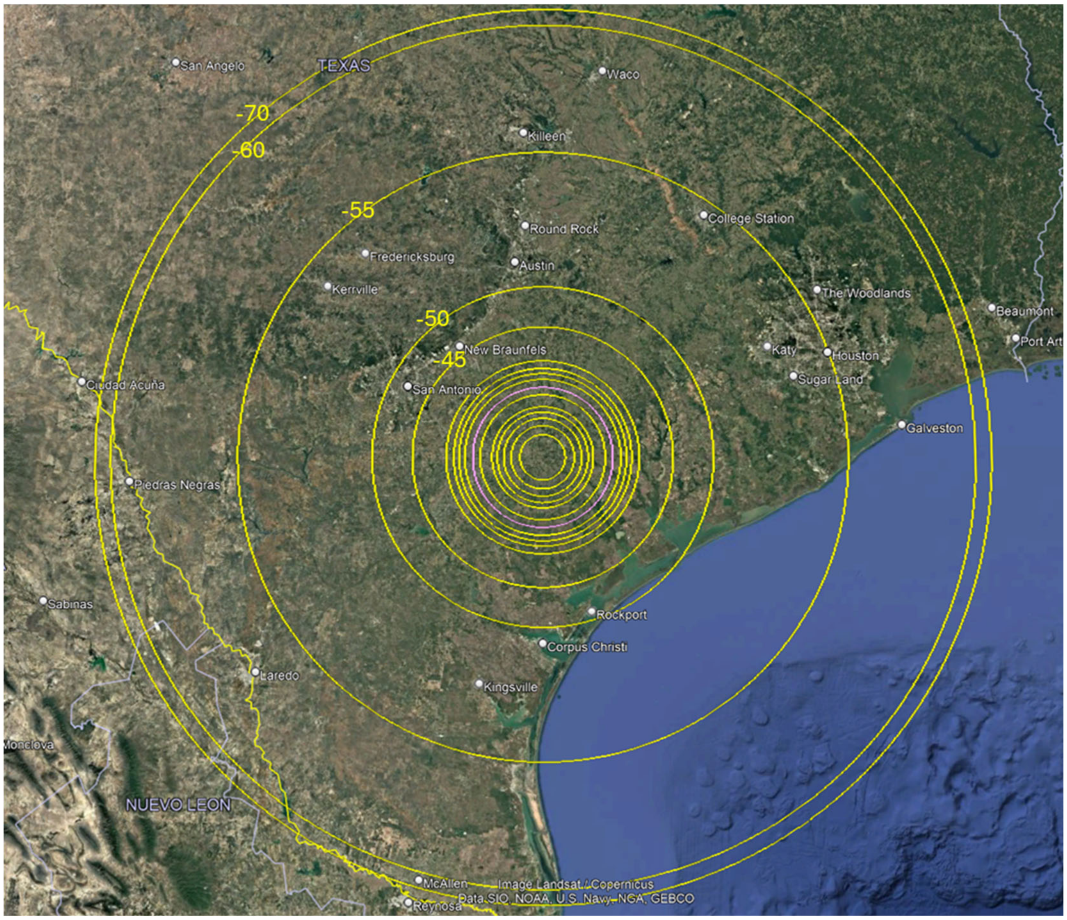



TEXAS
San Angelo
Waco
Killeen
-70
-60
-55
-50
-45
Round Rock
College Station
Fredericksburg
Austin
Kerrville
The Woodlands
New Braunfels
Katy
Houston
Sugar Land
San Antonio
Ciudad Acuña
Galveston
Piedras Negras
Rockport
Corpus Christi
Laredo
Kingsville
NUEVO LEON
McAllen

Case 2-MEX-TX (Edge Satellite): PFD Contour Plot with dB roll off from Beam Center (nadir).

- The peak PFD at the center is -87.4 dBW/m^2
- The peak EIRP at the center is 38.5 dBW




San Angelo
TEXAS
Waco
-70
-60
Killeen
-55
College Station
Round Rock
Fredericksburg
Austin
Kerrville
The Woodlands
Beaumont
-50
Port Art
Katy
Houston
New Braunfels
-45
Sugar Land
Ciudad Acuña
San Antonio
Galveston
Piedras Negras
Sabinas
Rockport
Corpus Christi
Laredo
Kingsville
Monclova
NUEVO LEON
McAllen
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Reynosa

Technical Analysis of RF Interference from an AST Satellite Covering Test Areas in the US at the Border with Canada and Mexico

1. Introduction

This report provides an in-depth technical analysis of radio frequency (RF) interference levels originating from an AST satellite orbiting at an altitude of 520 kilometers. The satellite provides coverage to four test areas in the United States: two near the Canadian border and two the near the Mexican border. In all cases, the satellite provides coverage to 200 active beams. The primary aim of this analysis is to assess whether the satellite's emissions surpass the interference thresholds established by international regulations - 40 dBμV/m in Canada and 37 dBμV/m in Mexico - over a 5 MHz bandwidth. To achieve this, two distinct scenarios were simulated:

- the satellite positioned directly above the coverage area, and
- the satellite located at the outermost edge of the coverage zone, where the elevation angle from a point in the coverage area to the satellite is 40 degrees.

The analysis relies on simulated data based on key assumptions, including satellite RF power output, beam orientation, antenna radiation pattern, and the geographic propagation characteristics of the signal. The findings not only confirm compliance with international interference standards but also offer valuable insights into the behavior of emissions under various operating conditions, enhancing our understanding of RF propagation in different geographic contexts.

2. Methodology

The evaluation was conducted by modeling the RF emissions of the AST satellite, incorporating realistic assumptions about power levels, beam patterns, and signal propagation over large distances. The analysis utilized the following key benchmarks:

- **Test Coverage Area:**
  - CAN-ND: a square area encompassing 200 beams centered at 46.21527°E, 98.71003°W (mostly over North and South Dakota) close to the Canadian border;
  - CAN-NY: a square area encompassing 200 beams centered at 42.15461°E, 75.082585°W (covering all of New York) close to the Canadian border;
  - MEX-NM: a square area encompassing 200 beams centered at 32.55815°E, 102.92465°W (over New Mexico and Texas) close to the Mexican border;
  - MEX-TX: a square area encompassing 200 beams centered at 29.15583°E, 97.453445°W (over Texas) close to the Mexican border.
  - For the CAN-ND and MEX-NM test coverage areas, the 200 beams were chosen from the cells where AT&T and Verizon have license to operate over Band 5 (869-894 MHz). These areas were selected since they are close to the Canadian and Mexican borders with the largest density of such cells to analyze the highest levels of interference. In addition, these areas are chosen with 1 cell away from the border. These cases represent the actual operation.
  - For the CAN-NY and MEX-TX test coverage areas, the 200 beams were selected in a different region using all adjacent cells (in a square) – regardless of the holders of the

corresponding terrestrial licenses. In addition, the cells next to the border are kept active. This would be the worst-case interference scenario, and operationally, the interference will be less since particularly for MEX-TX, many cells will be off.

- **Regulatory-constrained Area:**
  - Canada up to 500 km from the center of the test coverage area above
  - Mexico up to 500 km from the center of the test coverage area above
- **Interference Threshold:**
  - 40 dBµV/m over 5 MHz in Canada
  - 37 dBµV/m over 5 MHz in Mexico
- **EIRP:** Limited to a total of 50.5 dBW on a 5 MHz channel with beam-specific adjustments. This is the highest EIRP in the STA.

The actual AST beam power distribution algorithm was implemented where the satellite beam power is adjusted to achieve C/N of 20 dB in that beam, ensuring realistic simulations for two extreme satellite positions:

- **Case 1 - Satellite Centered Over Coverage Area:** The satellite is directly overhead, distributing power uniformly across the test zone.
- **Case 2 - Satellite at the Edge of Coverage Area:** The satellite is positioned toward the horizon, with beams pointing towards the border.

Terrain and atmospheric effects were assumed to be negligible, and propagation was modeled (as Free Space Path Loss) assuming open geographical features.

3. Assumptions

The analysis adhered to the following assumptions:

- Four test areas are modeled approximating a square containing 200 beams – two next to the Canadian and two next to the Mexican borders
- For two of the test cases, the cells adjacent to the Canadian and Mexican borders are shut off – modeling the actual operation.
- For the other two test cases, the cells adjacent to the Canadian and Mexican borders are kept on.
- The analysis was conducted up to 500 km from the center of the test areas.
- Acceptable RF power in Canada and Mexico was **40 dBµV/m** and **37 dBµV/m** over 5 MHz respectively.
- **Center Case Beam EIRP:**
  - Canadian Border CAN-ND: 37.9 to 39.9 dBW over 5 MHz bandwidth.
  - Canadian Border CAN-NY: 23.5 to 39.6 dBW over 5 MHz bandwidth.
  - Mexican Border MEX-NM: 37.9 to 40.09 dBW over 5 MHz bandwidth.
  - Mexican Border MEX-TX: 23.9 to 39.9 dBW over 5 MHz bandwidth.
- **Edge Case Beam EIRP:**
  - Canadian Border CAN-ND: 37.9 to 41.3 dBW over 5 MHz bandwidth.
  - Canadian Border CAN-NY: 24.9 to 40.9 dBW over 5 MHz bandwidth.
  - Mexican Border MEX-NM: 37.9 to 41.4 dBW over 5 MHz bandwidth.
  - Mexican Border MEX-TX: 24/5 to 40.6 dBW over 5 MHz bandwidth.

The simulation begins with the EIRP for each beam to meet 20 dB C/N. Aggregate interference exceedances are then identified and through an iterative process, EIRP in each beam is reduced or turned off until there are no aggregate interference exceedances.

4. **Results and Analysis**
   a. **Canadian Border:**
      i. **Case 1 CAN-ND and CAN-NY: Satellite Centered Over Coverage Area**

The satellite's beams were centered directly above the test area, uniformly distributing RF power. The simulation modeled the RF field strength in Canada up to 500 km from the center of the test area. Key findings include:

- **Maximum Aggregate RF Field Strength:**
  - **CAN-ND: 24.7 dBµV/m** (well below the 40 dBµV/m threshold)
  - **CAN-NY: 37.0 dBµV/m** (meeting the 40 dBµV/m threshold)

The power distribution illustrated below in Figure 1 and Figure 2 demonstrates the gradual attenuation of signal strength as distance from the coverage center increases for CAN-ND and CAN-NY respectively. Having simulated out to 500 km from the center of the test area demonstrates that there are no interference exceedances for distances beyond 500 km.

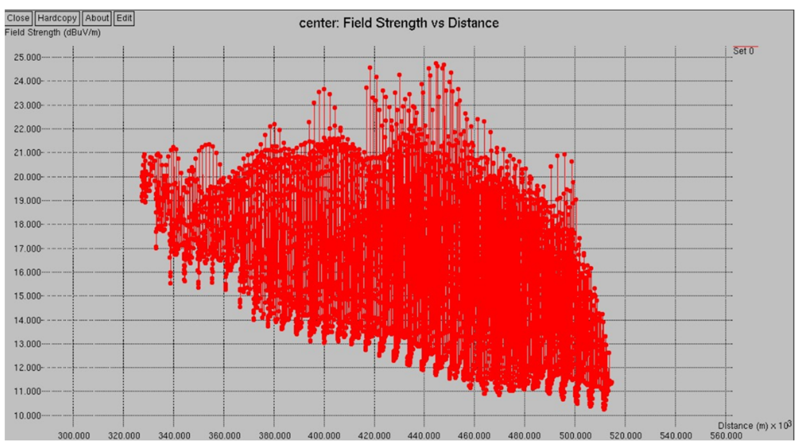


Figure 1- Field Strength vs. Distance for Centered Satellite Position (CAN-ND)

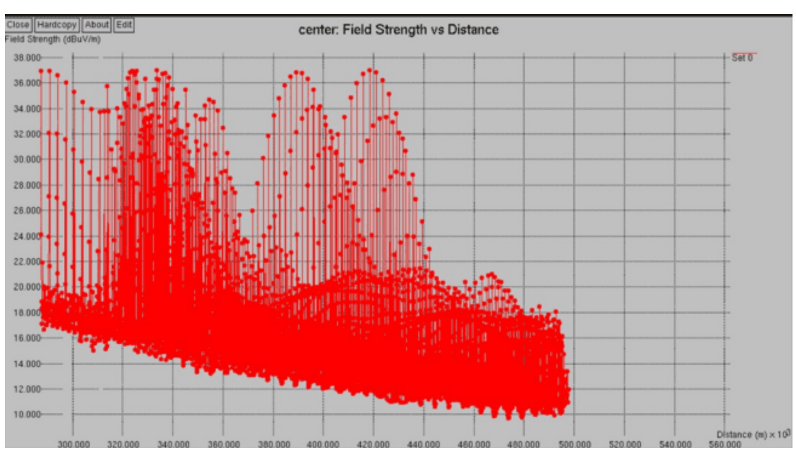


Figure 2 - Field Strength vs. Distance for Centered Satellite Position (CAN-NY)

A geographic visualization of the simulated scenario is shown in Figure 3. The colored area is in Canada up to 500 km from the center of the test area.

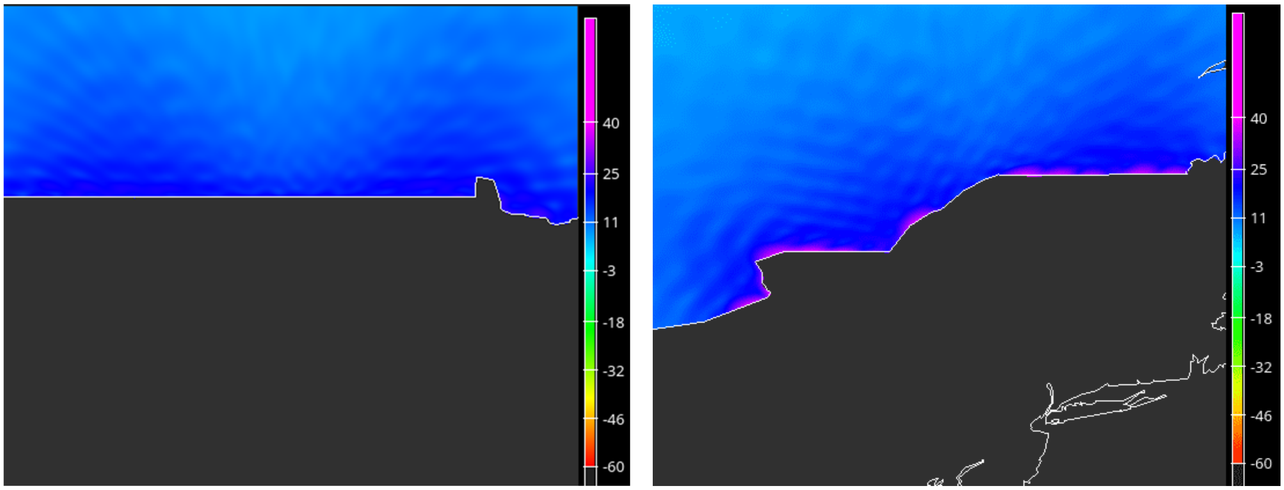


Figure 3 - Field Strength (dBµV/m) Distribution Across the Simulated Border Area for the Centered Satellite Position (Left: CAN-ND, Right: CAN-NY)

Figure 4 below shows the two test areas relative to the Canadian border.

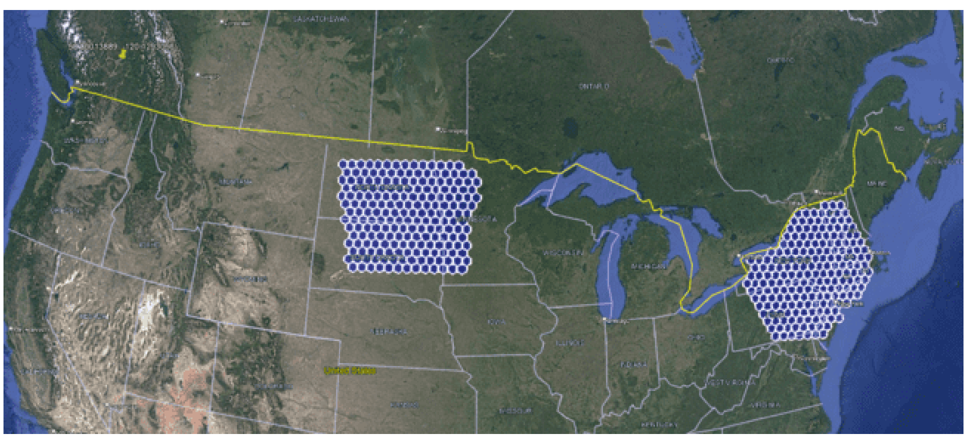


Figure 4 - Map of the two Test Areas Showing Distance to Actual Border (Left: CAN-ND; Right: CAN-NY)

For CAN-ND, the results showed that no reduction in beam EIRP (from what achieves 20 dB C/N in the coverage area) was needed to meet the aggregate interference limits. In fact, the emissions remain well below the acceptable interference limits.

For CAN-NY, as shown in Figure 5 below, the results showed that reduction in beam EIRP (from what achieves 20 dB C/N in the coverage area) was needed in the border beams to meet the aggregate interference limits. Eight of the beams (white cells in Figure 5) required an EIRP reduction of more than 15 dB (to achieve min C/N of 5 dB) and as such they were turned off. No EIRP reduction in EIRP was needed in the remaining (non-border) beams – consistent with the results for CAN-ND.

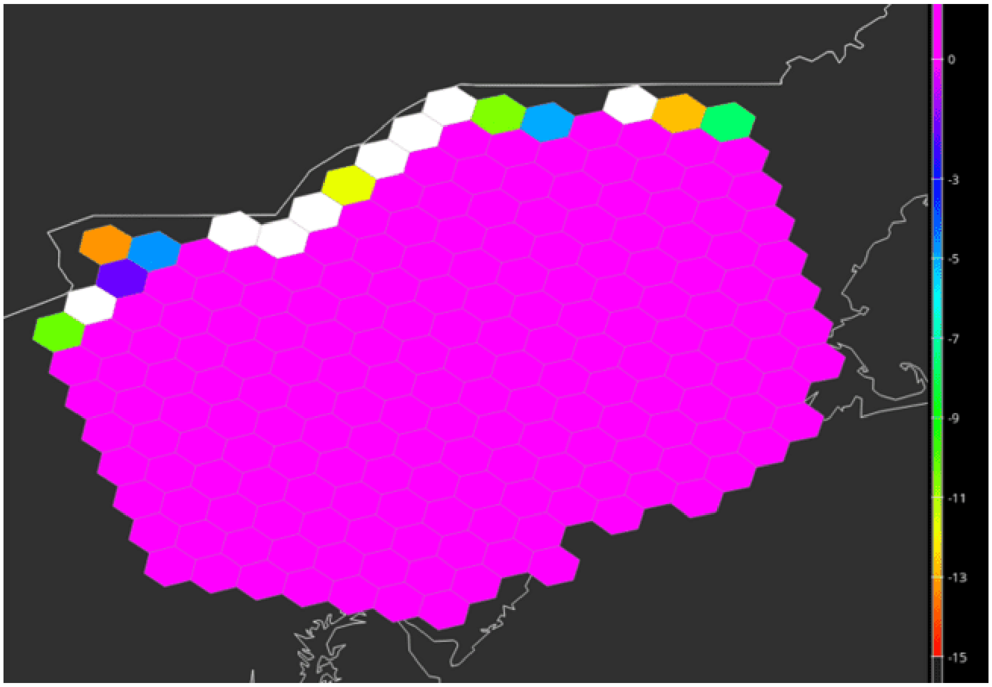


Figure 5 – Map of 200 beams in CAN-NY Test Area showing amount of EIRP reduction (in dB) required in each beam to meet the aggregate interference limits. White cells required more than max allowable EIRP reduction of 15 dB and hence they were shut off. (Case 1 CAN-NY)

Finally, for Case 1 CAN-ND and CAN-NY, the beam pattern (gain in dBi) over the center cell is illustrated below in Figure 6 on top of the cells laid down over the coverage area:

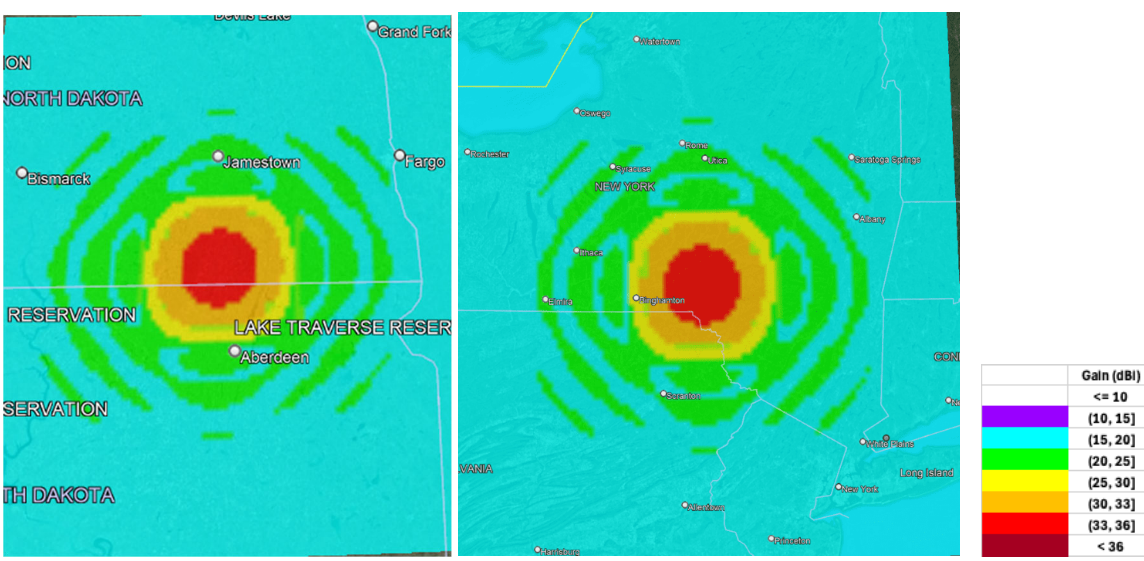


Figure 6 - Beam Pattern over the Center Cell of the Coverage Area (Centered Satellite Position) (Left: CAN-ND; Right: CAN-NY)

ii. Case 2 CAN-ND and CAN-NY: Satellite at Edge of Coverage Area

In this case, the satellite was repositioned at the extreme edge of the test zone, orienting its beams towards the simulated border. The simulation modeled the RF field strength in Canada up to 500 km from the center of the test area. Results showed:

- **Maximum Aggregate RF Field Strength:**
  - **CAN-ND: 34.4 dBµV/m** (below the 40 dBµV/m threshold)
  - **CAN-NY: 37.0 dBµV/m** (below the 40 dBµV/m threshold)

The power distribution in Figure 7 and Figure 8 demonstrates the effect of beam focusing over lower elevation angles, with higher emissions relative to the centered satellite position- for CAN-ND and CAN-NY respectively.

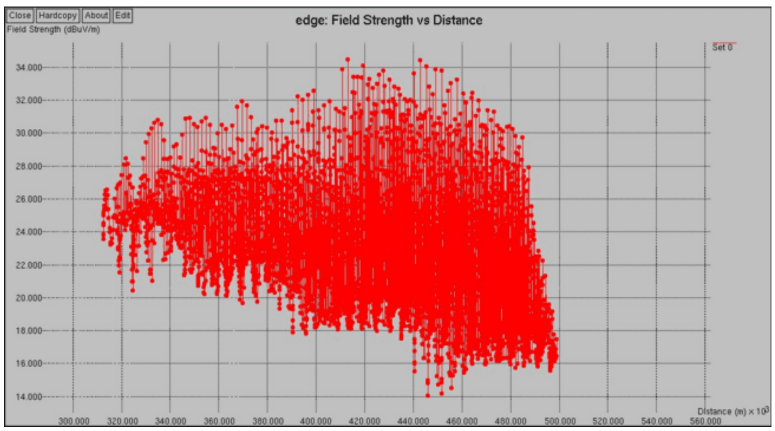


Figure 7 - Field Strength vs. Distance for Edge Satellite Position (CAN-ND)

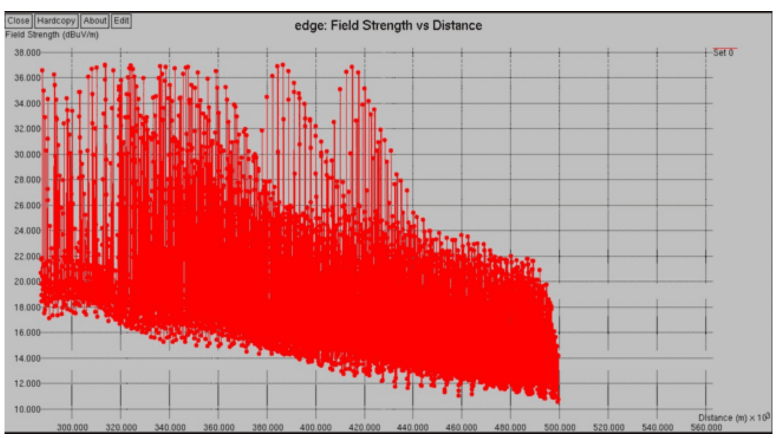


Figure 8 - Field Strength vs. Distance for Edge Satellite Position (CAN-NY)

A geographic illustration (Figure 9) highlights the RF propagation pattern under this scenario, showing power distribution extending towards the simulated border.

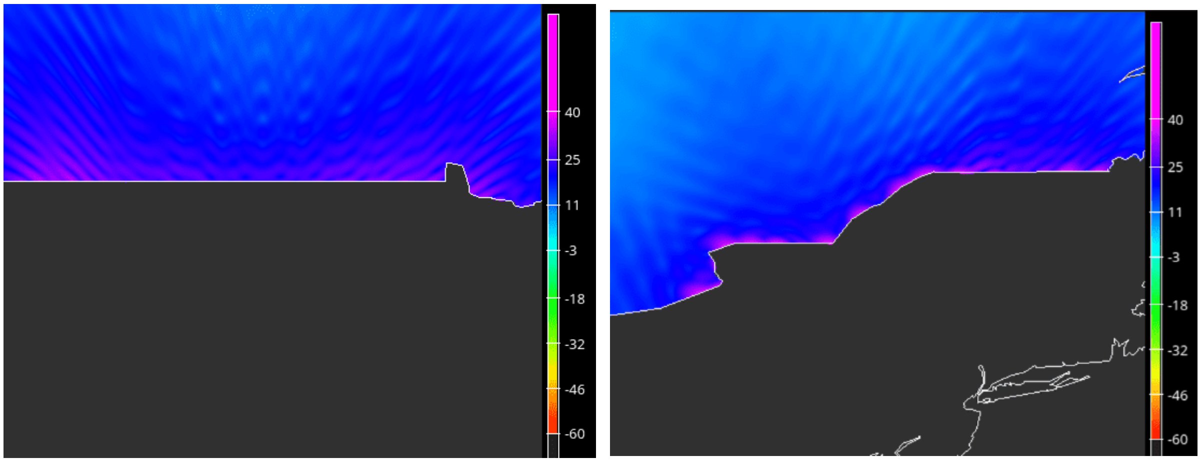


Figure 9 - Field Strength (dBµV/m) Distribution Across the Simulated Border for the Edge Satellite Position (Left: CAN-ND; Right: CAN-NY)

As in Case 1 CAN-ND, the results showed that no reduction in beam EIRP (from what achieves 20 dB C/N in the coverage area) was needed to meet the aggregate interference limits.

For Case 2 CAN-NY, as shown in Figure 10, the results showed that 5 beams needed to be turned off (white beams in Figure 10) and most of the remaining beams next to the border required an EIRP reduction. The remainder beams (not next to the border) did not require any EIRP reduction.

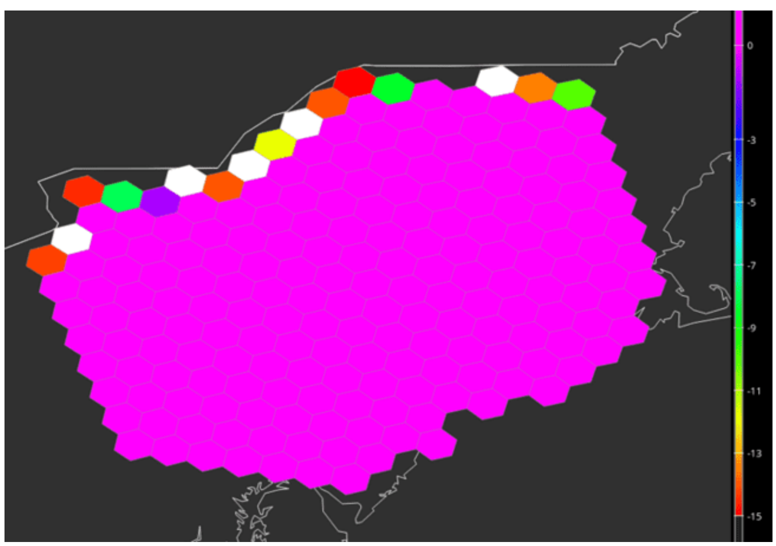


Figure 10 - Map of 200 beams in CAN-NY Test Area showing amount of EIRP reduction (in dB) required in each beam to meet the aggregate interference limits. White cells required more than max allowable EIRP reduction of 15 dB and hence they were shut off. (Case 2 CAN-NY)

Finally, for Case 2 CAN-ND and CAN-NY, the beam pattern (gain in dBi) over the center cell, calculated over the rectangular region (±2.5º longitude and ± 2º latitude) - is illustrated in Figure 11 below on top of the cells laid down over the coverage area:

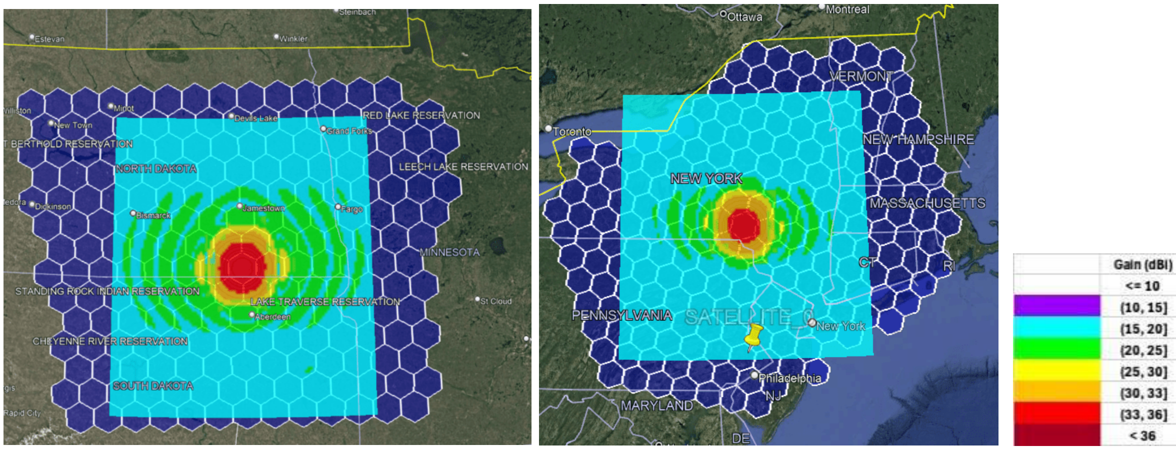


Figure 11 - Beam Pattern over the Center Cell of the Coverage Area (Edge Satellite Position) (Left: CAN-ND; Right: CAN-NY)

b. <u>Mexican Border:</u>

i. <u>Case 1- MEX-NM and MEX-TX: Satellite Centered Over Coverage Area</u>

The satellite's beams were centered directly above the test area, uniformly distributing RF power. The simulation modeled the RF field strength in Mexico up to 500 km from the center of the test area. Key findings include:

- **Maximum Aggregate RF Field Strength:**
  - **MEX-NM: 32.3 dBµV/m** (below the 37 dBµV/m threshold)
  - **MEX-TX: 36.98 dBµV/m** (meeting the 37 dBµV/m threshold)

The power distribution illustrated below in Figure 12 and Figure 13 – for MEX-NM and MEX-TX respectively – demonstrates the gradual attenuation of signal strength as distance from the coverage center increases. Having simulated out to 500 km from the center of the test area demonstrates that there are no interference exceedances for distances beyond 500 km.

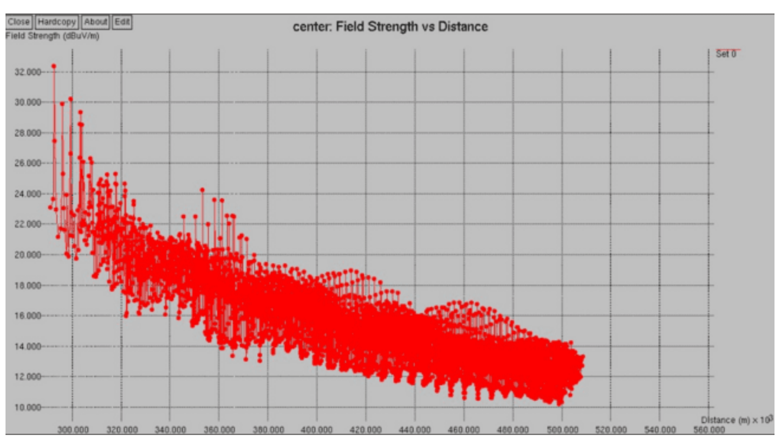


Figure 12 - Field Strength vs. Distance for Centered Satellite Position (MEX-NM)

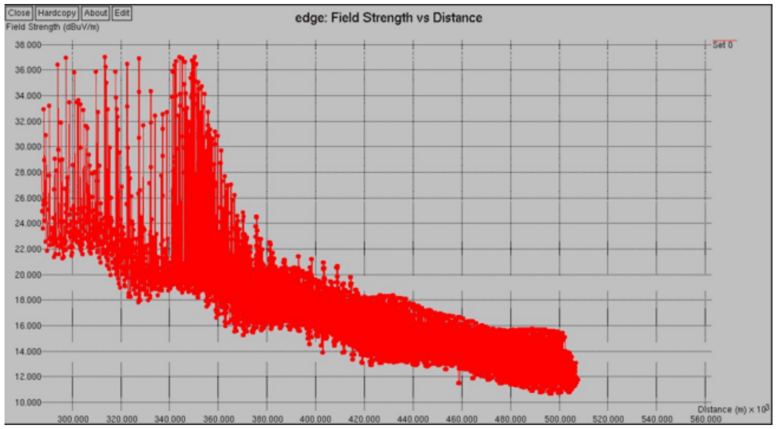


Figure 13 - Field Strength vs. Distance for Centered Satellite Position (MEX-TX)

A geographic visualization of the simulated scenario is shown in Figure 14. The colored area is in Canada up to 500 km from the center of the test area.

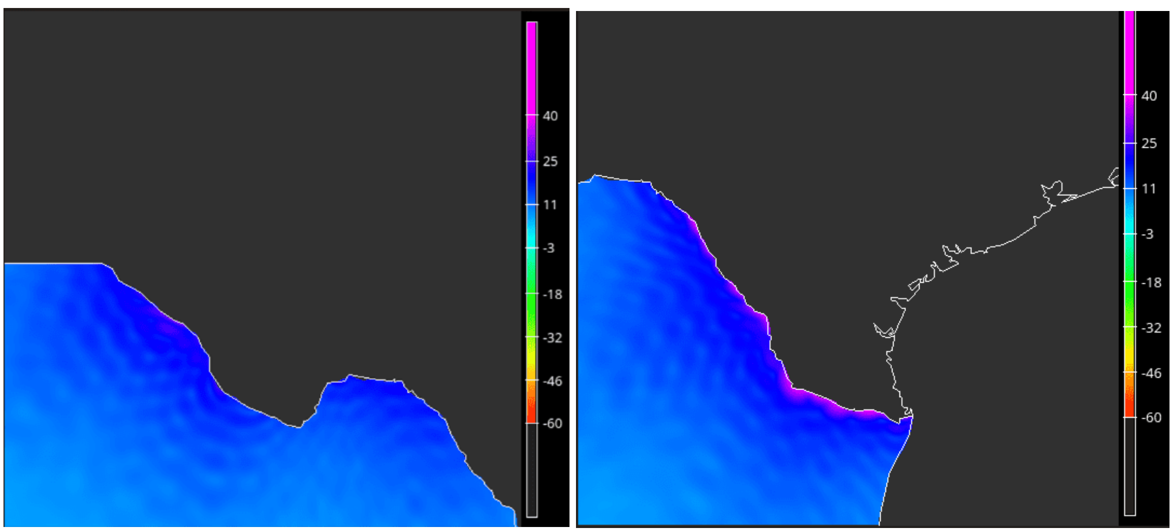


Figure 14 - Field Strength (dBµV/m) Distribution Across the Simulated Border Area for the Centered Satellite Position (Left: MEX-NM; Right; MEX-TX)

Figure 15 below shows the two test areas relative to the Mexican border.

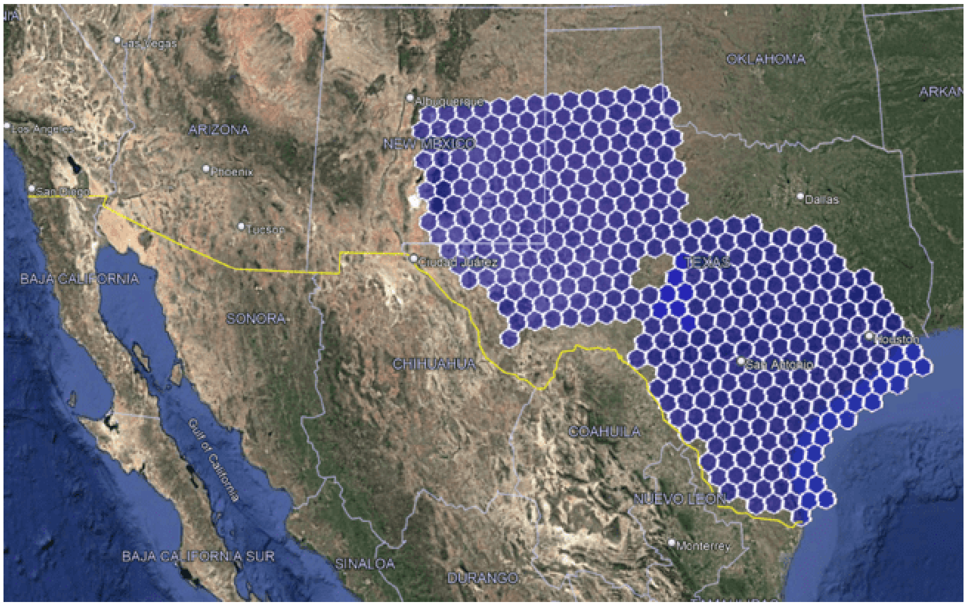


Figure 15 - Map of the Two Test Areas Showing Distance to Actual Border (Left: MEX-NM; Right: MEX-TX)

For Case 1 MEX-NM, the results showed that no reduction in beam EIRP (from what achieves 20 dB C/N in the coverage area) was needed to meet the aggregate interference limits.

For MEX-NY, as shown in Figure 16 below, the results showed that 8 beams needed to be turned off (white beams in Figure 16) and the remaining beams next to the border required an EIRP reduction. The remainder beams (not next to the border) did not require any EIRP reduction.

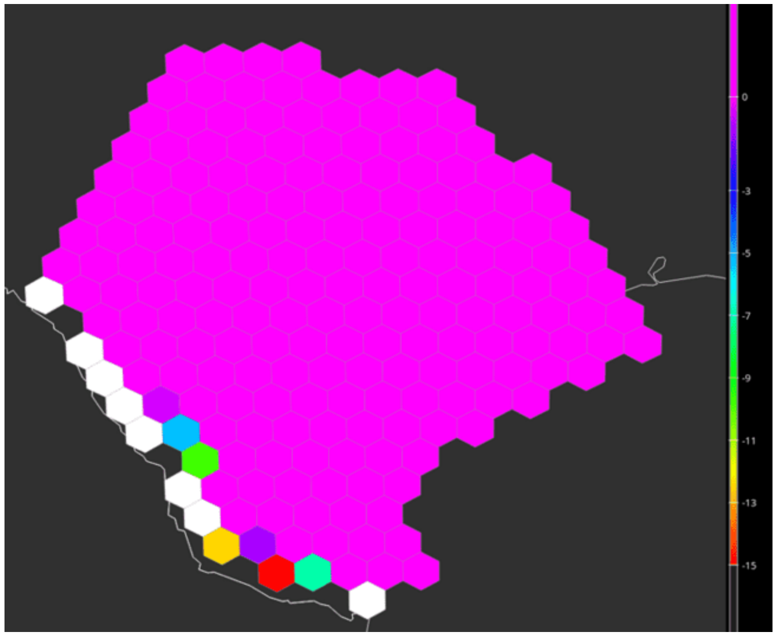


Figure 16 - Map of 200 beams in MEX-TX Test Area showing amount of EIRP reduction (in dB) required in each beam to meet the aggregate interference limits. White cells required more than max allowable EIRP reduction of 15 dB and hence they were shut off. (Case 1 – MEX-TX)

Finally, for Case 1 MEX-NM and MEX-TX, the beam pattern (gain in dBi) over the center cell is illustrated below on top of the cells laid down over the coverage area:

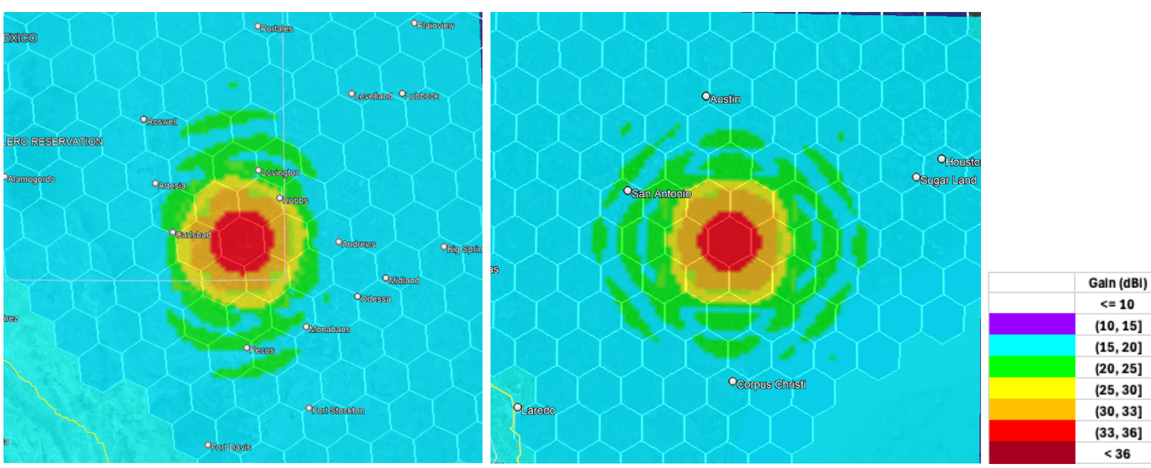


Figure 17 - Beam Pattern over the Center Cell of the Coverage Area (Centered Satellite Position) (Left: MEX-NM; Right: MEX-TX)

ii. Case 2 MEX-NM and MEX-TX: Satellite at Edge of Coverage Area

In this case, the satellite was repositioned at the extreme edge of the test zone, orienting its beams towards the simulated border. The simulation modeled the RF field strength in Mexico up to 500 km from the center of the test area. Results showed:

- **Maximum Aggregate RF Field Strength:**
  - **MEX-NM: 36.9 dBµV/m** (meeting the 37 dBµV/m threshold)
  - **MEX-TX: 36.98 dBµV/m** (meeting the 37 dBµV/m threshold)

The power distribution in Figure 18 and Figure 19 – for MEX-NM and MEX-TX respectively – demonstrates the effect of beam focusing over lower elevation angles, with slightly higher emissions relative to the centered satellite position.

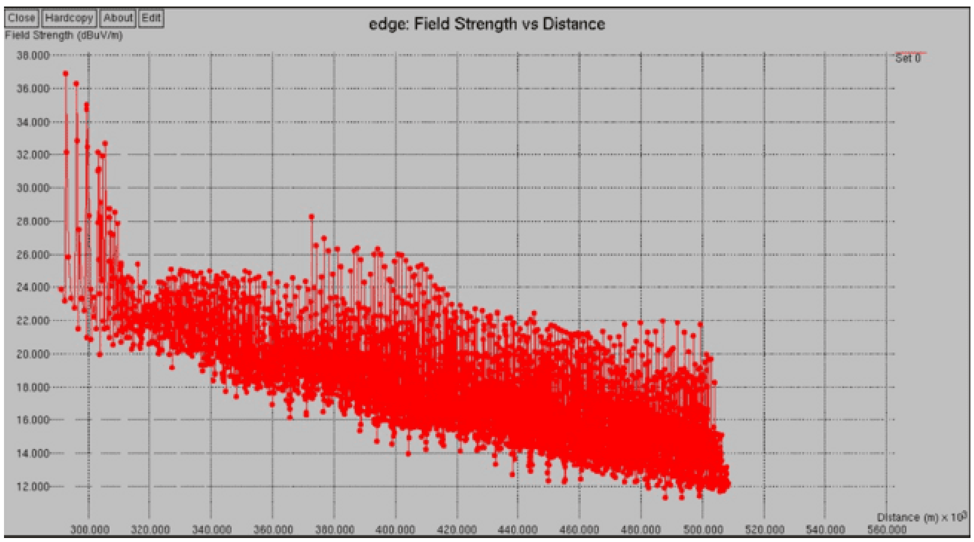


Figure 18 - Field Strength vs. Distance for Edge Satellite Position (MEX-NM)

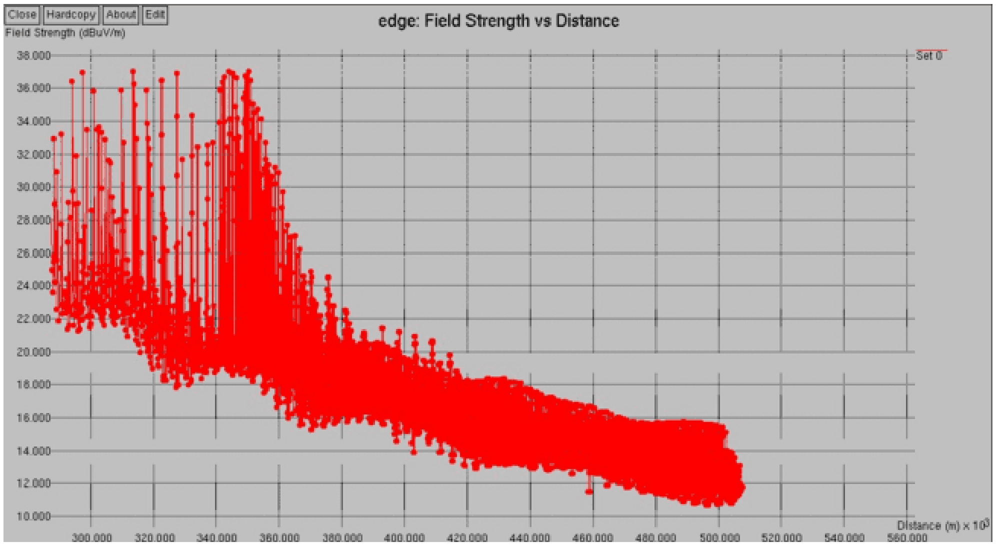


Figure 19 - Field Strength vs. Distance for Edge Satellite Position (MEX-TX)

A geographic illustration (Figure 20) highlights the RF propagation pattern under these scenarios, showing power distribution extending towards the simulated border.

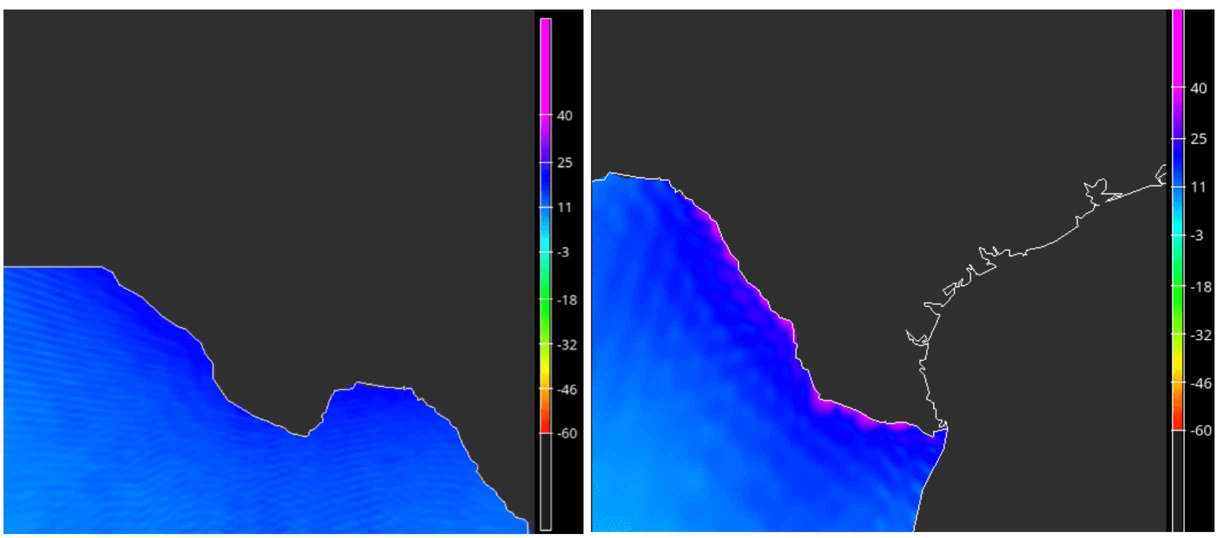


Figure 20 - Field Strength (dBµV/m) Distribution Across the Simulated Border for the Edge Satellite Position (Left: MEX-NM; Right: MEX-TX)

For MEX-NM, as shown in Figure 21 below, the results showed that no reduction in beam EIRP (from what achieves 20 dB C/N in the coverage area) was needed to meet the aggregate interference limits, except for one beam close to the Mexican border by only 3.25 dB. The black hole (4 cells) corresponds to cells that are not licensed by AT&T or Verizon in Band 5.

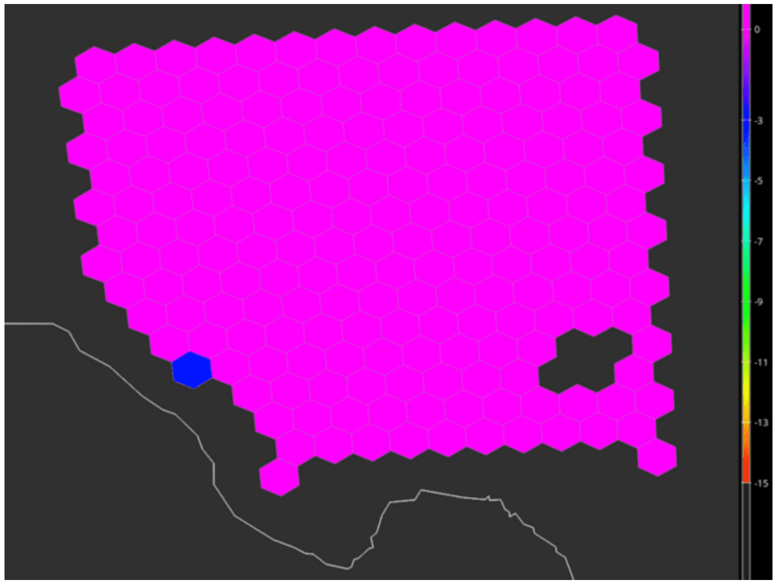


Figure 21 - Amount of EIRP reduction (in dB) required in each beam to meet the aggregate interference limit in Mexico (MEX-NM)

For MEX-TX, as shown in Figure 22 below, the results showed that 8 beams needed to be turned off (white beams in Figure 22). The remaining beams next to the border and even some in the next row required an EIRP reduction. The remainder beams did not require any EIRP reduction.

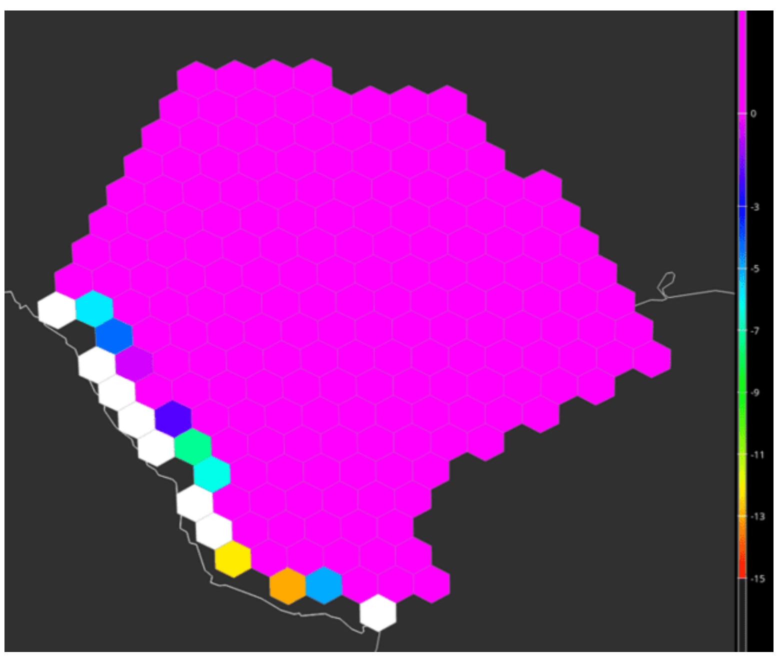


Figure 22 - Map of 200 beams in CAN-NY Test Area showing amount of EIRP reduction (in dB) required in each beam to meet the aggregate interference limits. White cells required more than max allowable EIRP reduction of 15 dB and hence they were shut off. (Case 2 MEX-TX)

Finally, for Case 2 MEX-NM and MEX-TX, the beam pattern (gain in dBi) over the center cell, calculated over the rectangular region (±2.5º longitude and ± 2º latitude) - is illustrated below on top of the cells laid down over the coverage area:

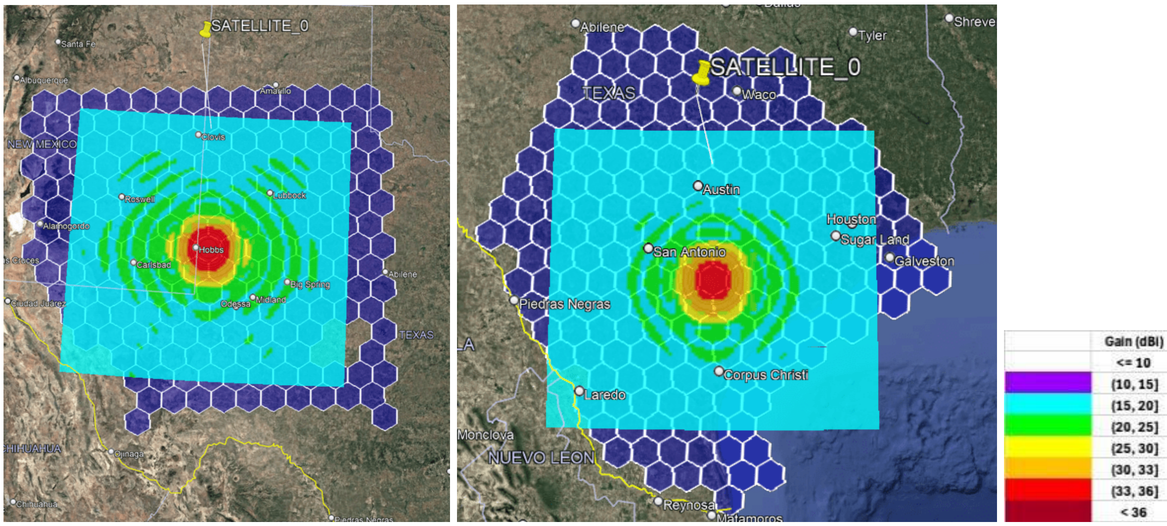


Figure 23 - Beam Pattern over the Center Cell of the Coverage Area (Edge Satellite Position) (Left: MEX-NM; Right: MEX-TX)

5. Conclusion

The technical analysis confirms that RF emissions from the AST satellite covering test areas in the US close to the Canadian and Mexican borders comply with international interference thresholds. Specifically:

1. For **Case 1** (Centered Satellite), emissions measured at most **37.0 dBµV/m** in Canada and **36.98 dBµV/m** in Mexico - over the two test areas.
2. For **Case 2** (Edge Satellite), emissions measured at most **37.0 dBµV/m** in Canada and **36.98 dBµV/m** in Mexico – over the two test areas.

In both scenarios, the RF power levels remained below the **40 dBµV/m threshold** in Canada and **37 dBµV/m threshold** in Mexico. This analysis demonstrates that the AST satellite's beam shaping and radiated power are effectively managed to minimize interference. The findings ensure compliance with international standards while validating the system's operational capabilities for the test areas.

David Pollard
RAN Principal Engineer

AT&T Mobility Services LLC
492 Old Connecticut Path
Framingham, MA 07101
617-416-8057
david.j.pollard @att.com

January 7, 2025

VIA E-MAIL

Christopher Ivory
Chief Commercial Officer, AST & Science LLC
civory@ast-science.com

Re: AST & Science LLC Experimental License – Handset Testing; ELS File No. 2053-EX-ST-2024

Dear Chris,

In response to your request for information regarding AST & Science LLC ("AST SpaceMobile") handset testing authorized by and subject to any limitations and conditions of the experimental license grant for ELS File No. 2053-EX-ST-2024 (the "Experimental License"), AT&T Mobility Spectrum LLC, on behalf of its applicable wireless affiliates (collectively "AT&T"), AST Spacemobile's mobile partner operator, provides the following information:

1. Name, address, and contact information of the mobile partner operator, AT&T, with respect to the subject test:

   David Pollard
   RAN Principal Engineer
   AT&T Mobility Services LLC
   492 Old Connecticut Path
   Framingham, MA 01701
   Phone: 617-416-8057
   david.j.pollard@att.com

2. AT&T consents to use of the following frequencies on spectrum licensed to AT&T as set forth in Attachment A of Exhibit A (Proposed Experiment & Justification for STA) subject to the terms of the Experimental License and to paragraph 32 below:

Subject Test Usage	Frequencies (MHz)
Earth-to-space	704-716
space-to-Earth	734-746
Earth-to-space	824-849
space-to-Earth	869-894

3. Testing under the proposed STA will be itinerant, with AST and AT&T engineers and end users occasionally rotating to new geographic areas, after receiving express written consent from AT&T. AST SpaceMobile will:
   a. seek consent from AT&T by email no less than seven (7) days prior to initiating each iteration of testing in new geographies, using a new or modified test plan or parameters, or on new days/times;
   b. include in each request for consent (i) a basic test plan, with expected test days/times, location/area, parameters (e.g., frequency, channel bandwidth, power, modulation, etc.), units, and other relevant information, and (ii) a stop-buzzer contact;
   c. expeditiously respond to AT&T's requests for further information;

d. comply with any limits upon which AT&T conditions its approval;
e. notify AT&T approximately 24 hours before the consented-to testing begins; and
f. pause testing at AT&T's direction in any particular geographic area and resume such testing only with AT&T's subsequent express written consent.

This consent shall expire upon expiration of the Experimental License, unless extended or terminated by mutual consent of the parties. Please include me as your contact for all AT&T communications for these consents and for testing notices.

1/7/25

David J. Pollard
AT&T Mobility Services, LLC