Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695–1710 MHz, 1755–1780 MHz and 2155–2180 MHz Bands	)	GN Docket No. 13-185
	)	
Allocation of 3G Spectrum Below 3 GHz	)	ET Docket 00-258
	)	

To: The Commission

Ex Parte Comments of EIBASS

Engineers for the Integrity of Broadcast Auxiliary Services Spectrum (EIBASS) hereby respectfully submits its *ex parte* comments in the above-captioned Notice of Proposed Rulemaking (NPRM) relating to the reallocation of federal spectrum at 1.7, 1.8 and 2.2 GHz to the commercial mobile radio services (CMRS), and to move Department of Defense (DoD) operations currently in the L-band to the S-band at 2,025-2,110 MHz; that is, to the 2 GHz TV Broadcast Auxiliary Services (BAS) band. These *ex parte* comments are in response to a new National Telecommunications and Information Administration (NTIA) web site providing DoD calculations of interference to 2 GHz TV BAS.

I. Web Site Reveals That DoD Has Not Yet Commenced Operation at 2,025–2,110 MHz Using Its High-Power SGLS Uplinks at up to Eleven Sites

1. In the ET Docket 00-258 rulemaking, DoD was granted authority to operate Space Ground Link System (SGLS) uplinks at 2,025–2,110 MHz at up to eleven sites, subject to frequency coordination with local broadcasters. EIBASS calculations find that the DoD uplinks fail to meet the 0.5 dB noise-threshold degradation criteria by more than 20 dB.[1] This should then be causing interference to TV BAS operations in the vicinity of the uplinks; for example, Buckley AFB in Denver; Schriever AFB at Colorado Springs, CO; the Camp Parks Communications Annex in Pleasanton, CA (San Francisco Bay Area); and Naval

[1] See DoD Uplinks Status Report, presented at the 2007 NAB Broadcast Engineering Conference. The URL is http://h-e.com/sites/default/files/sites/default/files/tech_docs/dod_uplinks_v4.pdf .

Satellite Control Network, Laguna Park, CA (Los Angeles area). Yet EIBASS is not aware of any reported interference.

2. The material on the new NTIA web site reveals why: As documented at the attached Figure 1F, "Although the DoD currently has no assignments at these locations [meaning the 11 SGLS uplink sites], some satellites already deployed will use these ground stations as will future DoD satellites." Thus, the 2,025–2,110 MHz uplink use has not yet commenced, and no conclusions about the lack of interference to local TV BAS operations can yet be drawn.

II. DoD-NTIA Calculations Show Massive Interference Areas Even Using Unrealistic Assumptions for the Heights and Gains of ENG-RO Antennas

3. Of equal concern are the calculations of interference to 2 GHz TV BAS operations for greatly expanded DoD S-band use, now revealed on the NTIA web site. The interference areas shown in Figures 1H through 1M are, in EIBASS' view, unacceptable because since they are based on appalling defective assumptions.

4. The defective assumptions are that a to-be-protected electronic news gathering (ENG) receiving antenna height is a mere 2 meters AGL and has a gain of 0 dBi.[2] Antennas for fixed ENG receive-only (ENG-RO) sites are typically hundreds of meters AGL when mounted on towers or at the tops of tall buildings, or hundreds of meters AMSL when installed at available mountaintops. Further, a typical ENG-RO receiving antenna gain is 20 dBi, not 0 dBi.

5. An analysis of the heights and gains of the ENG-RO sites for thirty-five randomly-sampled 2 GHz TV Pickup stations[3] in the Universal Licensing System (ULS) shows that the

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2 See the attached Figure 1G.

3 This search returns 968 TV Pickup licenses with 2 GHz frequencies. The ULS displays ten stations per page, and data for the ENG-RO antenna heights and gains has to be obtained by "drilling down" through the "paths" created for these stations, as a patch to allow entering fixed ENG-RO sites so that they are findable using the ULS point-radius search feature (see RM-11308 for details). Since this is a somewhat tedious process when done manually, the data analysis was limited to every ten ULS pages. One each tenth page, five TV Pickup stations were then randomly selected for data analysis. However, if a randomly selected TV Pickup license showed only 6.1-meter AGL receive site or sites, that license was rejected and another TV Pickup license instead randomly selected. Some of the 6.1-meter AGL licenses had no fixed ENG-RO sites, and so continued to show the legacy generic antenna receive height of 6.1 meters. Some TV Pickup licenses showed one or more added ENG-RO sites, but all of those added sites reported only 6.1-m AGL heights, in which case EIBASS believes that the problem was the licensee not realizing that for ENG-RO sites, the actual receiving antenna height AGL can (and should) be reported. In the case of a TV Pickup station with multiple ENG-RO sites, some of which showed 6.1 m AGL, that height was accepted and used for computing the average height. For

average AGL height is 141 meters, and the average receiving antenna gain is 20dBi. Further, EIBASS believes that even this average height is low, because it likely includes ENG-RO sites on mountaintop sites, that do not need substantial AGL height to achieve good coverage. And, of course, an average height assumption does not protect all. Since information about the heights and gains of TV Pickup station ENG-RO sites is now available in the ULS, DoD interference studies should be based on that data.

6. EIBASS is therefore making this *ex parte* filing to document the unrealistic DoD/NTIA assumptions. EIBASS requests that the Commission confirm that compliance with the new US92 footnote[4] means that interference protection showings by DoD/NTIA must be based on actual parameters for licensed 2 GHz ENG TV Pickup stations in the area. Only if this data is not available should average data for antenna height and gain be used, and then it should be the realistic values reported in the previous paragraph, and not the unrealistic 2 m AGL antenna height and 0 dBi antenna gain.

III. Summary

7. Information available from a newly created NTIA web site reveals that DoD has not yet commenced actually using frequencies in the 2,025–2,110 MHz TV BAS band for its SGLS uplinks; therefore, no claims about the lack of interference to nearby TV BAS operations can or should be made at this time. The interference maps revealed on the

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example, one TV Pickup station had nine ENG-RO sites, with receiving antenna heights ranging from 30.5 m AGL to 434.3 m AGL, plus two sites with 6.1 m AGL receiving antenna heights; the two 6.1-meter AGL antennas were at high-elevation sites, and the low reported AGL heights for those locations is probably valid. EIBASS believes that this sampling gives a reasonably valid result; it certainly demonstrates that a 2 m AGL antenna height and 0 dBi antenna gain are not reasonable values.

[4] US92: In the band 2025-2110 MHz, Federal use of the co-primary fixed and mobile services is restricted to the military services and the following provisions apply:

(a) Federal use shall not cause harmful interference to, nor constrain the deployment and use of the band by, the Television Broadcast Auxiliary Service, the Cable Television Relay Service, or the Local Television Transmission Service. To facilitate compatible operations, coordination is required in accordance with a Memorandum of Understanding between Federal and non-Federal fixed and mobile operations. Non-Federal licensees shall make all reasonable efforts to accommodate military mobile and fixed operations; however, the use of the band 2025-2110 MHz by the non-Federal fixed and mobile services has priority over military fixed and mobile operations.

(b) Military stations should, to the extent practicable, employ frequency agile technologies and techniques, including the capability to tune to other frequencies and the use of a modular retrofit capability, to facilitate sharing of this band with incumbent Federal and non-Federal operations.

NTIA web site regarding expanded DoD-at-2 GHz use are based on unrealistic assumptions for ENG-RO sites, yet even with these low-height, low-gain antenna assumptions the maps show appallingly large interference areas. EIBASS does not see how this material is consistent with DoD's US92 obligations.

List of Figures

8. The following figures or exhibits have been prepared as a part of these GN Docket 13-185 *ex parte* comments:

1. Excerpt of DoD/NTIA interference calculations to 2 GHz TV BAS.

Respectfully submitted,

/s/ Dane E. Ericksen, P.E., CSRTE, 8-VSB, CBNT
EIBASS Co-Chair
Hammett & Edison, Inc., Consulting Engineers
San Francisco, CA

/s/ Richard A. Rudman, CPBE
EIBASS Co-Chair
Remote Possibilities
Santa Paula, CA

May 12, 2014

EIBASS
18755 Park Tree Lane
Sonoma, CA 94128
707/996-5200
dericksen@h-e.com

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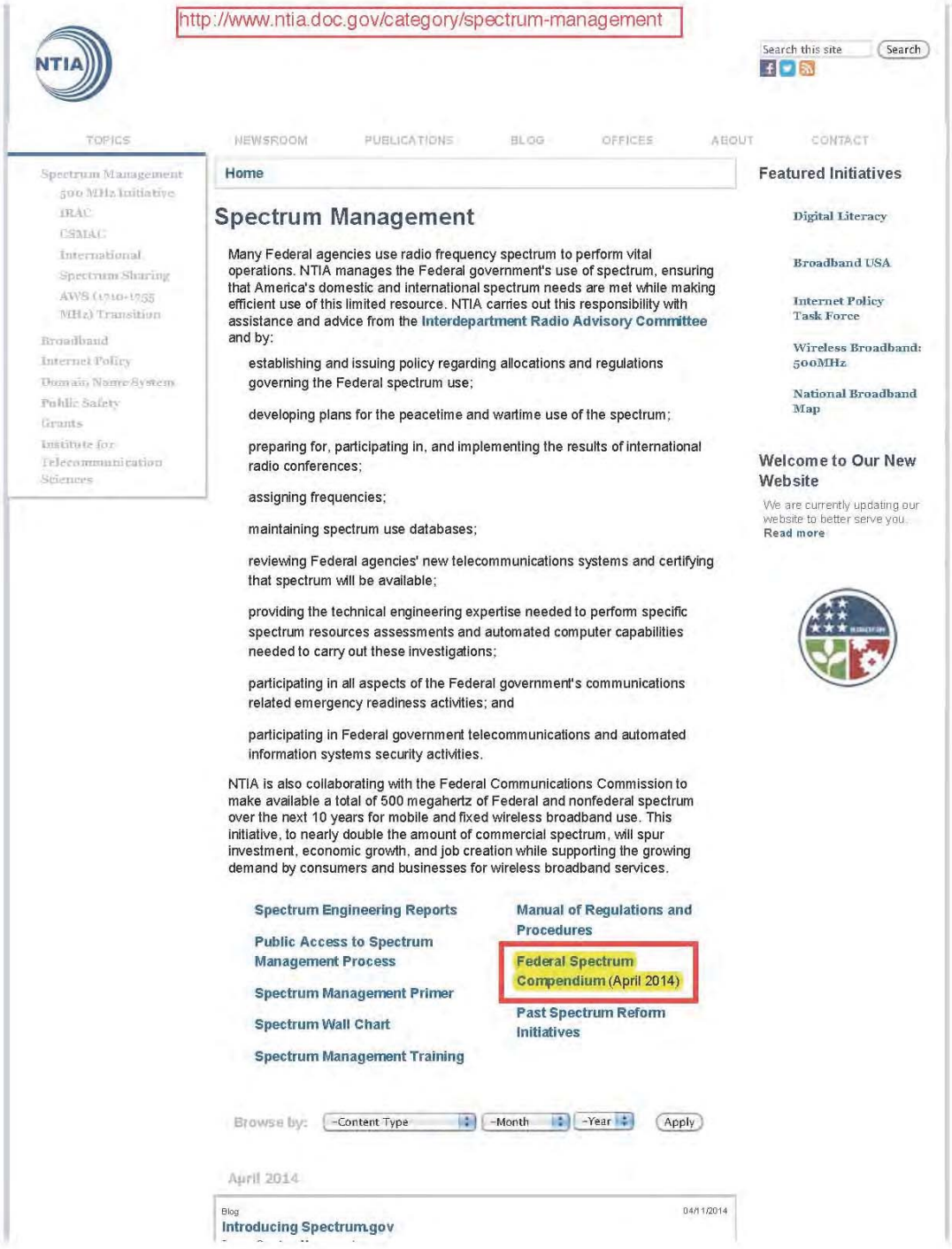

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Federal Government Spectrum Compendium

Topics/Subtopics:

Spectrum Management

Date:

April 11, 2014

Introduction

In order to address the nation's growing interest in and demand for the radio spectrum, NTIA, in consultation with the federal agencies, has developed a compendium of detailed narratives describing federal spectrum uses from 225 MHz to 5 GHz. The narratives at the links below provide information for each frequency band in this range in which the Federal Government has significant operations. In the bands depicted, the federal agencies generally have an exclusive or shared allocation in the U.S. Table of Allocations. However, the federal agencies also operate in some bands allocated on an exclusive basis for non-federal operations in order to perform coordinated operations with non-federal entities or to use commercial services. Summary information on federal spectrum use of other bands may be found in NTIA's Federal Spectrum Use Summary. The narratives below provide comprehensive information for 225 MHz to 5 GHz, the part of the spectrum receiving growing interest and demand for consumer wireless and government applications.

Federal agencies rely on the radio spectrum to perform their essential missions. Agencies use spectrum to support national security, critical defense operations, law enforcement and emergency response, homeland security, transportation safety, scientific research, environmental monitoring, electrical power distribution, and weather prediction. By making this compendium of detailed narratives available to the public, NTIA provides a baseline, band-by-band description portraying how the federal agencies actually use the spectrum. NTIA expects that this new information tool will be a useful resource for understanding federal spectrum uses, giving non-federal stakeholders and technology developers a better sense of the potential opportunities and obstacles for accessing any particular band. NTIA will update the information regularly in response to the changing environment and growing interest.

Information on Federal Spectrum Usage

Each band narrative below presents publicly available information pertaining to the various federal uses, including a quantitative overview and graphical depictions of agency assignments. Each description includes the following five sections:

1. An introduction summarizing the types of federal usage;
2. An excerpt from the U.S. Table of Frequency Allocations showing the current national allocations and the relevant international and national footnotes that may authorize additional uses or impose limits on certain uses;
3. A table listing the number and type of frequency assignments that NTIA has authorized and a pie chart showing the percentage of frequency assignments, by general category;
4. A summary of the major applications and systems using the frequency band or sub-bands; and
5. A description of future uses of the band, where applicable.

Information on Non-Federal Spectrum Use

Information and data on non-federal services and uses that are authorized by the Federal Communications Commission (FCC) is available from the FCC's Spectrum Dashboard (from 225 MHz to 3.7 GHz) and licensing databases.

Go to Federal Government Spectrum Use Reports 225 MHz to 5 GHz

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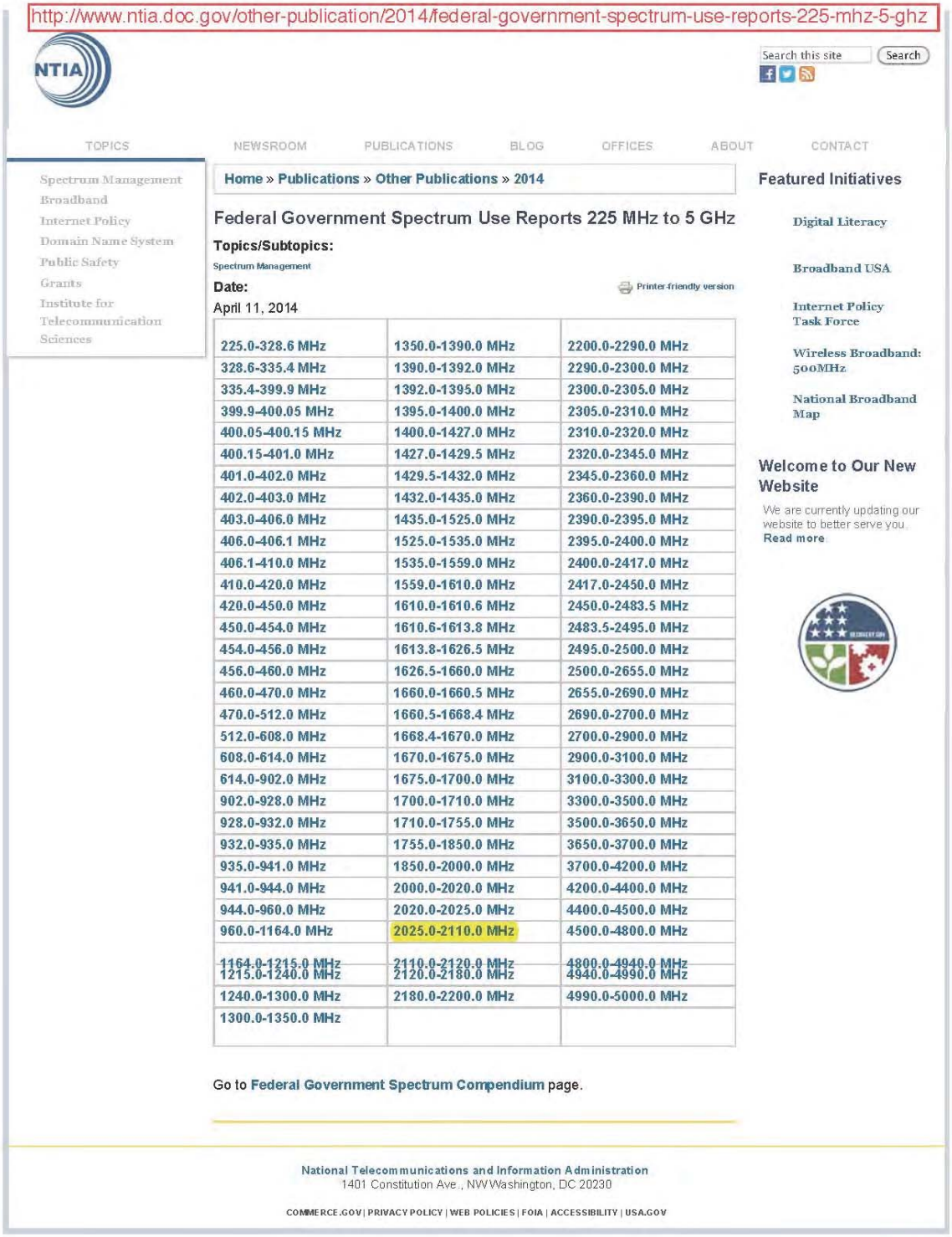

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Federal Government Spectrum Use Reports 225 MHz to 5 GHz

Topics/Subtopics:

Spectrum Management

Date:

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225.0-328.6 MHz	1350.0-1390.0 MHz	2200.0-2290.0 MHz
328.6-335.4 MHz	1390.0-1392.0 MHz	2290.0-2300.0 MHz
335.4-399.9 MHz	1392.0-1395.0 MHz	2300.0-2305.0 MHz
399.9-400.05 MHz	1395.0-1400.0 MHz	2305.0-2310.0 MHz
400.05-400.15 MHz	1400.0-1427.0 MHz	2310.0-2320.0 MHz
400.15-401.0 MHz	1427.0-1429.5 MHz	2320.0-2345.0 MHz
401.0-402.0 MHz	1429.5-1432.0 MHz	2345.0-2360.0 MHz
402.0-403.0 MHz	1432.0-1435.0 MHz	2360.0-2390.0 MHz
403.0-406.0 MHz	1435.0-1525.0 MHz	2390.0-2395.0 MHz
406.0-406.1 MHz	1525.0-1535.0 MHz	2395.0-2400.0 MHz
406.1-410.0 MHz	1535.0-1559.0 MHz	2400.0-2417.0 MHz
410.0-420.0 MHz	1559.0-1610.0 MHz	2417.0-2450.0 MHz
420.0-450.0 MHz	1610.0-1610.6 MHz	2450.0-2483.5 MHz
450.0-454.0 MHz	1610.6-1613.8 MHz	2483.5-2495.0 MHz
454.0-456.0 MHz	1613.8-1626.5 MHz	2495.0-2500.0 MHz
456.0-460.0 MHz	1626.5-1660.0 MHz	2500.0-2655.0 MHz
460.0-470.0 MHz	1660.0-1660.5 MHz	2655.0-2690.0 MHz
470.0-512.0 MHz	1660.5-1668.4 MHz	2690.0-2700.0 MHz
512.0-608.0 MHz	1668.4-1670.0 MHz	2700.0-2900.0 MHz
608.0-614.0 MHz	1670.0-1675.0 MHz	2900.0-3100.0 MHz
614.0-902.0 MHz	1675.0-1700.0 MHz	3100.0-3300.0 MHz
902.0-928.0 MHz	1700.0-1710.0 MHz	3300.0-3500.0 MHz
928.0-932.0 MHz	1710.0-1755.0 MHz	3500.0-3650.0 MHz
932.0-935.0 MHz	1755.0-1850.0 MHz	3650.0-3700.0 MHz
935.0-941.0 MHz	1850.0-2000.0 MHz	3700.0-4200.0 MHz
941.0-944.0 MHz	2000.0-2020.0 MHz	4200.0-4400.0 MHz
944.0-960.0 MHz	2020.0-2025.0 MHz	4400.0-4500.0 MHz
960.0-1164.0 MHz	2025.0-2110.0 MHz	4500.0-4800.0 MHz
1164.0-1215.0 MHz	2110.0-2120.0 MHz	4800.0-4940.0 MHz
1215.0-1240.0 MHz	2120.0-2180.0 MHz	4940.0-4990.0 MHz
1240.0-1300.0 MHz	2180.0-2200.0 MHz	4990.0-5000.0 MHz
1300.0-1350.0 MHz		

Go to Federal Government Spectrum Compendium page.

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http://www.ntia.doc.gov/files/ntia/publications/compendium/2025.00-2110.00_01MAR14.pdf

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2025-2110 MHz

1. Band Introduction

The National Aeronautics and Space Administration (NASA) operates earth stations in this band for tracking and command of manned and unmanned Earth-orbiting satellites and space vehicles either for Earth-to-space links for satellites in all types of orbits or through space-to-space links using the Tracking Data and Relay Satellite System (TDRSS). These earth stations control ninety domestic and international space missions including the Space Shuttle, the Hubble Space Telescope, and the International Space Station.[1] The National Oceanic and Atmospheric Administration (NOAA) operates earth stations in this band to control the Geostationary Operational Environmental Satellite (GOES) and Polar Operational Environmental Satellite (POES) meteorological satellite systems.[2] The data collected by the sensors on the GOES and POES systems are used by the National Weather Service (NWS) for short-term and long-term weather monitoring and forecasts. This is a shared frequency band that is used by non-Federal fixed and transportable Electronic News Gathering (ENG) systems.

2. Allocations

2a. Allocation Table

The frequency allocation table shown below is extracted from the NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management, Chapter 4 – Allocations, Allotments and Plans.

Table of Frequency Allocations

United States Table

Federal	Non-Federal	FCC Rule Part(s)
2025-2110 SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) SPACE RESEARCH (Earth-to-space) (space-to-space) 5.391 5.392 US90 US222 US346 US347 US393	2025-2110 FIXED NG118 MOBILE 5.391 5.392 US90 US222 US346 US347 US393	TV Auxiliary Broadcasting (74F) Cable TV Relay (78) Local TV Transmission (101J)

[1] Information on NASA space missions is available at https://www.spacecomm.nasa.gov/spacecomm/programs/tdrsS/default.cfm

[2] Information on NOAA space systems is available at http://www.economics.noaa.gov/?goal=climate

March 1, 2014

DoD/NTIA Inferterference Calculations

2025 – 2110 MHz

City	State	Latitude	Longitude
FAIRBANKS	AK	645822N	1473004W
FAIRBANKS	AK	645838N	1473054W
FAIRBANKS	AK	645840N	1472940W
GOLDSTONE DSS 16	CA	352030N	1165225W
GOLDSTONE DSS 24	CA	352024N	1165229W
GOLDSTONE DSS 27	CA	351418N	1164636W
RICHMOND	FL	253600N	0802400W
GUAM SEISMIC OBSERVATORY	GUM	133218N	1445442E
AHUA KILAUEA	HI	192256N	1551608W
HAWAII NATIONAL PARK	HI	192524N	1551727W
KAMUELA	HI	200036N	1554006W
SANDHILL KILAUEA	HI	192345N	1551739W
SVALBARD	NOR	781354N	0152440E
WALLOPS	VA	375644N	0752742W
WALLOPS	VA	375648N	0752733W
WALLOPS ISLAND	VA	375644N	0752740W
WALLOPS ISLAND	VA	375645N	0752738W
WALLOPS ISLAND	VA	375645N	0752742W
WALLOPS ISLAND	VA	375645N	0752740W
WALLOPS ISLAND	VA	375647N	0752745W
WALLOPS ISLAND	VA	375647N	0752743W
WALLOPS ISLAND	VA	375647N	0752738W
WALLOPS ISLAND	VA	375648N	0752736W
WALLOPS ISLAND	VA	375648N	0752733W

In accordance with footnote US346 the Department of Defense (DoD) operates earth stations in the 2025-2110 MHz band on a co-primary basis with non-Federal fixed and transportable ENG systems. The earth stations contained in this footnote are shown in Table 3.[5]

Table 3. DoD Earth Station Facilities in the 2025-2110 MHz Band

Facility	Latitude	Longitude
Naval Satellite Control Network, Prospect Harbor, ME	44° 24' 16'' N	068° 00' 46'' W
New Hampshire Tracking Station, New Boston AFS, NH	42° 56' 52'' N	071° 37' 36'' W
Eastern Vehicle Check-out Facility and GPS Ground Control Antenna and Monitoring Station, Cape Canaveral, FL.	28° 29' 09'' N	080° 34' 33'' W

[5] NTIA Manual §4.1.3 at 4-145.

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DoD/NTIA Inferterference Calculations

2025 – 2110 MHz

Buckley Air Force Base, CO	39° 42' 55'' N	104° 46' 36'' W
Colorado Tracking Station, Schriever Air Force Base, CO	38° 48' 21'' N	104° 31' 43'' W
Kirtland Air Force Base, NM	34° 59' 46'' N	106° 30' 28'' W
Camp Parks Communications Annex, Pleasanton, CA	37° 43' 51'' N	121° 52' 50'' W
Naval Satellite Control Network, Laguna Park, CA	34° 06' 31'' N	119° 03' 53'' W
Vandenberg Tracking Station, Vandenberg Air Force Base, CA	34° 49' 21'' N	120° 30' 07'' W
Hawaii Tracking Station, Kaena Point, Oahu, HI	21° 33' 44'' N	158° 14' 31'' W
Guam Tracking Stations, Anderson Air Force Base and Naval CTS, Guam	13° 36' 54'' N	144° 51' 18'' E

The DoD and the Society of Broadcast Engineers have developed a Memorandum of Understanding describing the frequency sharing arrangements between the earth stations and the ENG systems operating in the 2025-2110 MHz band.[6] Although the DoD currently has no assignments at these locations, some satellites already deployed will use these ground stations as will future DoD satellites.

The GMF contains approximately 30 assignments that allow equipment to be used on an experimental basis. However, these assignments are only allowed to operate on a non-interference basis and as such are not included in the following analysis.

The DoD has four assignments under footnote US393 that are allowed to operate on a secondary and coordinated basis. Given the small number and secondary service, these assignments were not considered in the following analysis.

Though the band is allocated to various space service applications for transmissions in the Earth-to-space and space-to-space directions, several geostationary satellites in conjunction with TDRSS operate in the space-to-Earth direction. The frequency assignments for these space applications are permitted on an unprotected non-interference basis. These satellites transmit to ground station receivers located at Merritt Island, FL, Greenbelt, MD, White Sands Missile Range, NM, Finegayan, GUM, and American Samoa and are used for test and simulation associated with tracking and command functions for TDRSS.

4a. Frequency Use

There is a critical relationship between the uplink and downlink frequencies used by the NASA and NOAA satellites. In order to acquire and accurately track orbiting satellites a specific ratio between the uplink and downlink is used that allows precision Doppler tracking of mission range and range rate information. The frequency range corresponding to the 2025-2110 MHz uplink band is the 2200-2290 MHz downlink band.

[6] The ENG operations include systems operating in the Television Broadcast Auxiliary Service, the Cable Television Relay Service, and the Local Television Transmission Service. ENG operations include news vans, and sky traffic aircraft that feed receive sites, which in turn relay the signal to television stations.

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2025 – 2110 MHz

ENG-RO antenna assumed 2 meters AGL and 0 dBi gain. Not realistic. Most ENG-RO sites place the antenna much higher AGL and typically have 20 dBi gain.

4c. Spectrum Contours

The contours below assume a mobile receiver with a 1 MHz bandwidth, a two meter antenna height, and an antenna gain of 0 dBi. The interference criteria used was an increase in the noise floor of the receiver of 1 dB. The thermal noise floor of this ideal receiver would be -114 dBm and therefore, a one dB increase in the noise floor would result in an interference threshold of -120 dBm. Using the recorded power, location, and bandwidth of these earth stations, a terrain dependent propagation model was used to develop spectrum contours that indicate the minimum required separation distance to preclude an increase in the thermal noise floor of the mobile receiver of 1 dB. A 0 dBi sidelobe antenna gain was used for the earth station transmitters in the analysis since the earth stations are uplinks and are pointed upwards the sky and not directly at the horizon. The statistical and environmental parameters used with the terrain profile to calculate the propagation loss and plot the contours are shown in Table 4.

Table 4. Propagation Model Parameters

Parameter	Value
Refractivity	301 N-units
Conductivity	0.005 S/M
Permittivity	15
Humidity	10
Reliability	50 percent
Confidence	50 percent
Radio Climate	Continental Temperate
Antenna Polarization	Vertical
Transmit Antenna Height (terrain elevation and antenna height)	Extracted from Terrain Database and GMF
Receive Antenna Height	2 meters (above ground level)

Contours below also include contours for each transmitting earth station using the maximum power listed in the GMF. In the case of Military Satellite Control Stations listed in Table 3, the contours were generated using a power of 20 kW, 14.5 dBi sidelobe

DoD/NTIA Inferterference Calculations

antenna gain, and a 20 MHz bandwidth.[8] The antenna height was assumed to be 8 meters which is similar to other DoD earth stations.[9]

There are cases where multiple frequency assignments are represented by what appears to be a single contour but is actually a composite of multiple overlapping contours. For example, there are sixty four frequency assignments located at nineteen unique locations on the Wallops Island, VA. earth station contour shown at the bottom of Figure 7.

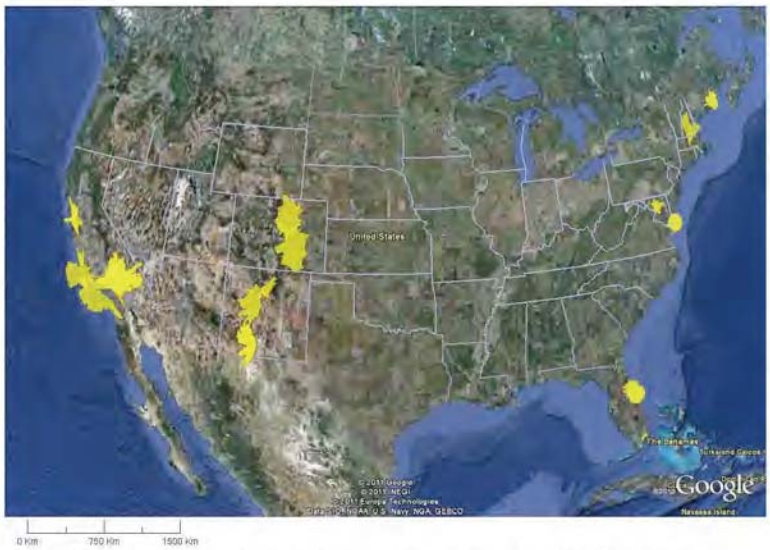

Figure 5. Transmitting Earth Stations – Continental United States

[8] The sidelobe antenna gain is based on a 5-degree elevation angle (θ), and a standard earth-station antenna elevation pattern of. 32-25 Log θ.

[9] The letter D is shown beside the contours to indicate that a DoD earth station from Table 3 is within the contour.

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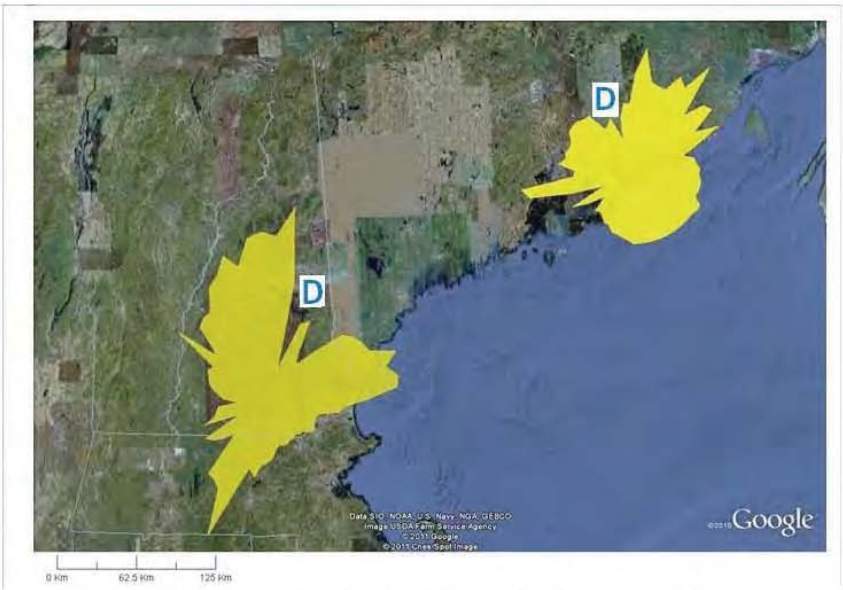

Figure 6. Transmitting Earth Stations - Northeast United States

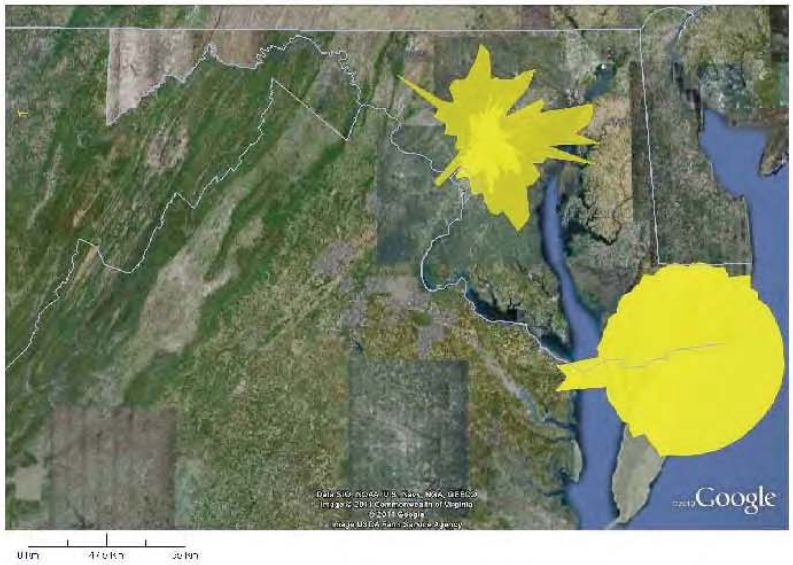

Figure 7. Transmitting Earth Stations – Eastern United States

DoD/NTIA Inferterference Calculations

2025 – 2110 MHz

Figure 8. Transmitting Earth Stations – Southeast United States

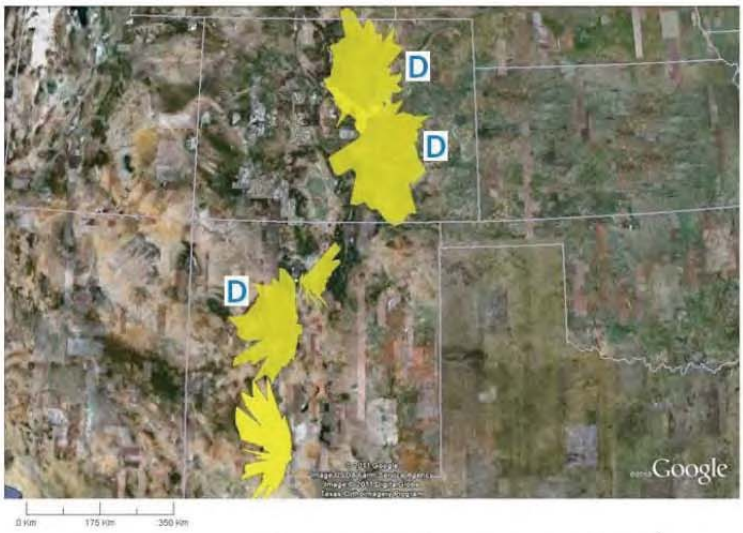

Figure 9. Transmitting Earth Stations – Central United States

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Figure 10. Transmitting Earth Stations – Western United States

Figure 11. Transmitting Earth Stations – Alaska

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Figure 12. Transmitting Earth Stations – Alaska

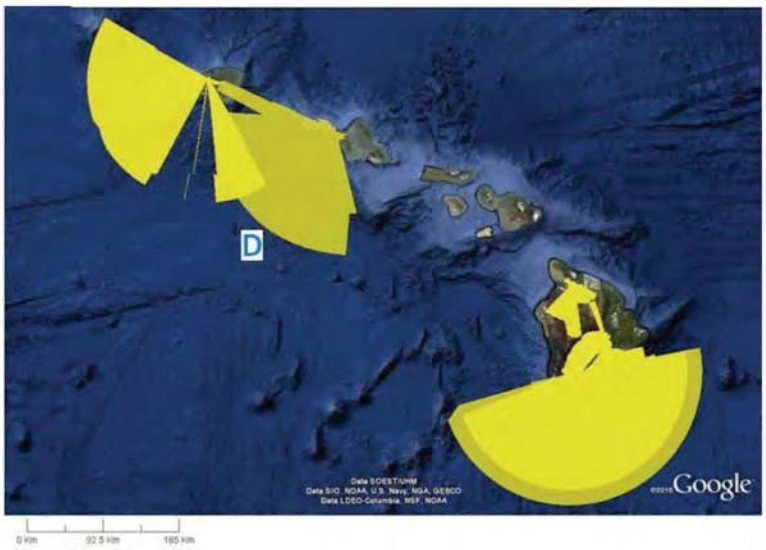

Figure 13. Transmitting Earth Stations – Hawaii

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DoD/NTIA Inferterference Calculations

2025 – 2110 MHz

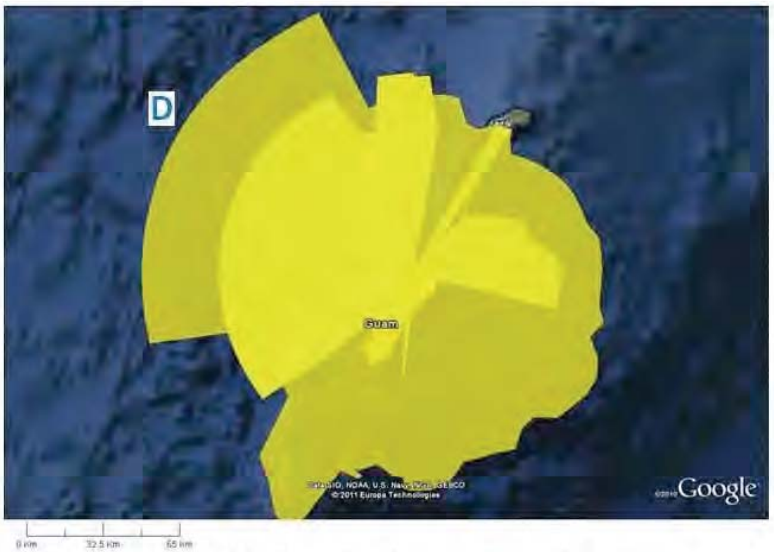

Figure 14. Transmitting Earth Stations - Guam

5. Planned Use

The earth stations operating in the 2025-2110 MHz band provides the primary backbone control link for the civil National Space Program.

Earth stations performing tracking, telemetry, and command functions for Federal space research and meteorological satellites will continue to operate in this band for the foreseeable future.

The earth stations that provide tracking, telemetry, and command for the GOES and POES systems will continue to operate in this band for the foreseeable future.

The TDRSS constellation of satellites and associated ground facilities provide tracking and data acquisition services and will continue to operate in this band for the foreseeable future.

The use of the 2025-2110 MHz band for earth stations that control military satellite systems is expected to increase in the future.