

1 FCC25.226 Form 312 and Schedule B

1.1 Tables

(b)(1)(i) Any VMES applicant filing an application pursuant to paragraph (a)(1) of this section shall file **three tables** showing

1. the **off-axis EIRP level** of the proposed earth station antenna in the direction of the **plane of the GSO**;
2. the **co-polarized EIRP in the elevation plane**, that is, the plane perpendicular to the plane of the GSO; and
3. **cross polarized EIRP**.

Each table shall provide the EIRP level

- at increments of **0.1°** for angles between 0° and 10° off-axis, and
- at increments of **5°** for angles between 10° and 180° off-axis.

(A) For purposes of the **off-axis EIRP table in the plane of the GSO**, the off axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite, and the plane of the GSO is determined by the focal point of the antenna and the line tangent to the arc of the GSO at the orbital position of the target satellite.

(B) For purposes of the **off-axis co-polarized EIRP table in the elevation plane**, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite, and the elevation plane is defined as the plane perpendicular to the plane of the GSO defined in paragraph (b)(1)(i)(A) of this section.

(C) For purposes of the **cross-polarized EIRP table**, the off-axis angle is the angle in degrees from the line connecting the focal point of the antenna to the orbital location of the target satellite and the plane of the GSO as defined in paragraph (b)(1)(i)(A) of this section will be used.

Tables are included in the document:

300_20121019m02v02.4_TabularData

1.2 Gain and PSD Pattern

(b)(1)(C)(ii) A VMES applicant shall include a **certification**, in Schedule B, that

(a) the VMES antenna conforms to the gain pattern criteria of § **25.209** and

(b), that, combined with the maximum input power density calculated from the EIRP density less the antenna gain, which is entered in Schedule B, demonstrates that the off-axis EIRP spectral density envelope set forth in paragraphs (a)(1)(i)(A) through (a)(1)(i)(C) of this section will be met under the assumption that the antenna is pointed at the target satellite.

(a)(1)(i)(A) A VMES system shall not exceed the off-axis EIRP spectral-density limits and conditions defined in paragraphs (a)(1)(i)(A) through (C) of this section.

(A) The off-axis EIRP spectral-density emitted from the VMES, in the plane of the geostationary satellite orbit (GSO) as it appears at the particular earth station location, shall not exceed the following values:

15-10log(N)-25logq dBW/4kHz for $1.5^\circ \leq q \leq 7^\circ$

-6 -10log(N) dBW/4kHz for $7^\circ < q \leq 9.2^\circ$

18 -10log(N)-25log q dBW/4kHz for $9.2^\circ < q \leq 48^\circ$

-24 -10log(N) dBW/4kHz for $48^\circ < q \leq 85^\circ$

-14 -10log(N) dBW/4kHz for $85^\circ < q \leq 180^\circ$

(B) In all directions other than along the GSO, the off-axis EIRP spectral density for co-polarized signals emitted from the VMES shall not exceed the following values:

18-10log(N)-25logq dBW/4kHz for $3.0^\circ \leq q \leq 48^\circ$

-24-10log(N) dBW/4kHz for $48^\circ < q \leq 85^\circ$

-14-10log(N) dBW/4kHz for $85^\circ < q \leq 180^\circ$

(C) In all directions, the off-axis EIRP spectral-density for cross-polarized signals emitted from the VMES shall not exceed the following values:

5-10log(N)-25logq dBW/4kHz for $1.8^\circ \leq q \leq 7.0^\circ$

-6-10log(N) dBW/4kHz for $7.0^\circ < q \leq 9.2^\circ$

47 CFR §25.209

The L3 terminal does not comply with 47 CFR §25.209.

47 CFR §25.226

The L3 terminal is compliant with 47CFR §25.226.

1.3 Value of N

(b)(1)

The VMES applicant also shall provide the value N described in paragraph (a)(1)(i)(A) of this section.

(a)(1)(i)(A) "For VMES networks using multiple co-frequency transmitters that have the same EIRP, N is the maximum expected number of co-frequency simultaneously transmitting VMES earth stations in the same satellite receiving beam."

N=1 for our system.

There will be no simultaneous use of frequency and no CDMA.

1.4 Pointing Error and Mute Provisions

(b)(1)(C)(iii) A VMES applicant proposing to implement a transmitter under paragraph **(a)(1)(ii)(A)** of this section shall provide a **certification from the equipment manufacturer** stating that

- the antenna tracking system will maintain a **pointing error of less than or equal to 0.2°** between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna and that
- the antenna tracking system is capable of ceasing emissions within **100 milliseconds** if the angle between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna **exceeds 0.5°**.

Pointing error data has been provided in

100_20120930m01v07.2_WinT_Technical_Brief

L3 certifies that:

- the antenna tracking system will maintain a **pointing error of less than or equal to 0.2°** between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna and that
- the antenna tracking system is capable of ceasing emissions within **100 milliseconds** if the angle between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna **exceeds 0.5°**.

The L3 antenna autonomously prevents the VMES operator from transmitting in prohibited NASA and NSF geographical locations mandated by the FCC coordination sites listed in 25.226. The L3 software is flexible to accommodate additional/future transmit mute zones mandated by the FCC.

The L3 BUC is autonomously turned off when:

1. L3 GPS indicates that the remote is within the NASA or NSF sites, and
2. VMES transmit frequency is within the prohibited transmit frequency range.

1.5 Geographic Areas

(b)(4) There shall be an exhibit included with the application describing the **geographic area(s)** in which the VMESs will operate.

VMES terminals will operate throughout CONUS.

We also request operation in Alaska and Hawaii.

1.6 Contention Protocol

(b)(5) Any VMES applicant filing for a VMES terminal or system and planning to use a **contention protocol** shall include in its application a certification that will comply with the requirements of paragraph (a)(4) of this section.

(a)(4) An applicant filing to operate a VMES terminal or system and planning to use a **contention protocol** shall certify that its contention protocol use will be reasonable.

The contention protocol use will be reasonable. Please see the following for a detailed analysis:

400_20121103m01v02.2_WinT_ContentionChannel

1.7 Point of Contact

(b)(6) The **point of contact** referred to in paragraph (a)(5) of this section shall be included in the application.

(a)(5) There shall be a **point of contact** in the United States, with phone number and address, available 24 hours a day, seven days a week, with authority and ability to cease all emissions from the VMESs.

Operations (VMES)	Hub Operations
Walter Hojsak or Tom Franey PM WIN-T 6210 Frankford Street, Building 6210 Aberdeen Proving Grounds Maryland 21005 Email: walter.j.hojsak.ctr@mail.mil , walter.tfraney.civ@mail.mil	Walter Hojsak or Tom Franey PM WIN-T 6210 Frankford Street, Building 6210 Aberdeen Proving Grounds Maryland 21005 Email: walter.j.hojsak.ctr@mail.mil , walter.tfraney.civ@mail.mil
Telephone: 443 395 7210, 831 239 3810 (C) 732.532.3017	Telephone: 443 395 7210, 831 239 3810 (C) 732.532.3017
Any changes to these POCs will be provided to the FCC.	Any changes to these POCs will be provided to the FCC.

1.8 Data Logging

(b)(7) Any VMES applicant filing for a VMES terminal or system shall include in its application a certification that will comply with the requirements of paragraph (a)(6) of this section.

(a)(6) For each VMES transmitter, a **record** of the vehicle location (i.e., latitude/longitude), transmit frequency, channel bandwidth and satellite used shall be time annotated and maintained for a period of not less than one (1) year. **Records shall be recorded** at time intervals no greater than every five (5) minutes while the VMES is transmitting. The VMES operator shall make this data available upon request to a coordinator, fixed system operator, fixed-satellite system operator, NTIA, or the Commission within 24 hours of the request.

The L3 system will comply with the FCC25.226 (b)(7) requirements for data logging.

The Army's WIN-T program is a deployable network that utilizes Satcom on The Move terminals (SOTM). This SOTM consist of a 18" VSAT antenna type that may be on a variety vehicles (HMMWV, MRAP etc.). This is a small dish (sub-meter) with low power operating at either Ku or Military Ka bands. Control of this network is through the Army's Network Operations Center.

The WIN-T network uses a centralized Network Management System (NMS). The NMS monitors and controls local and remote components of the system. The NMS will pull information from remote mobile earth stations which contain the MPM-1000 modem, FSS4180 antenna controller, and remote GPS and inertial navigation equipment. The required data logging information will be maintained in the central NMS.

For commercial Ku Band operations, the WIN-T program office will be the centralized repository of the required data. This office will be responsible for gathering and providing all data requested by the FCC. Data may be provided within 24 hours.

In compliance of FCC rules (FCC25.226), the WIN-T system will log time, location, and transmission details that can be made available in support of resolving interference events. This data logging capability and/or reporting to outside parties may be disabled by the system operator should the operator of the system seek and receive a waiver from the FCC of the data logging requirement for national security reasons.

1. The NMS will collect the following data, for a period of not less than one year, for each operational mobile earth station:
 - a. longitude and latitude,
 - b. transmit frequency,
 - c. bandwidth,
 - d. Satellite used.

Once collected the data will be transferred to the WIN-T program office.

2. Records shall be recorded at time intervals no greater than every 5 minutes while the mobile earth station is transmitting.
3. The WIN-T program office shall make data available, within 24 hours of the request, to a coordinator, fixed system operator, fixed-satellite system operator, NTIA, or the Commission.
4. The WIN-T program office shall maintain logs of all alleged incidences of interference, the stations involved, and the outcome of the incident.

The POC within the United States is the WIN-T program office whenever SNE ARMY terminals are in operation. They are:

Walter Hojsak or Tom Franey
PM WIN-T
6210 Frankford Street, Building 6210
Aberdeen Proving Grounds
Maryland 21005
Email: walter.j.hojsak.ctr@mail.mil,
walter.tfraney.civ@mail.mil

Telephone: 443 395 7210, 831 239 3810 (C)
732.532.3017

Any changes to these POCs will be provided to the FCC.

1.9 Radio Frequency Hazard Analysis

(b)(8) All VMES applicants shall submit a **radio frequency hazard analysis** determining via calculation, simulation, or field measurement whether VMES terminals, or classes of terminals, will produce power densities that will exceed the Commission's radio frequency exposure criteria.

VMES applicants with VMES terminals that will exceed the guidelines in § 1.1310 of this chapter for radio frequency radiation exposure shall provide, with their environmental assessment, a plan for mitigation of radiation exposure to the extent required to meet those guidelines.

All VMES licensees shall ensure installation of VMES terminals on vehicles by qualified installers who have an understanding of the antenna's radiation environment and the measures best suited to maximize protection of the general public and persons operating the vehicle and equipment.

A VMES terminal exhibiting radiation exposure levels exceeding 1.0 mW/cm² in accessible areas, such as at the exterior surface of the radome, shall have a **label** attached to the surface of the terminal warning about the radiation hazard and shall include thereon a diagram showing the regions around the terminal where the radiation levels could exceed 1.0 mW/cm².

All VMES licensees shall ensure that a VMES terminal **ceases transmission upon encountering an obstruction** that degrades the VMES downlink signal.

Please see radio frequency hazard analysis report.

1.10 NASA Coordination

(c)

(1) Operations of VMESs in the 14.0–14.2 GHz (Earth-to-space) frequency band within **125 km** of the **NASA** TDRSS facilities on

- Guam (latitude 13°36'55" N, longitude 144°51'22" E) or
- White Sands, New Mexico (latitude 32°20'59" N, longitude 106°36'31" W and latitude 32°32'40" N, longitude 106°36'48" W)

are subject to coordination with the National Aeronautics and Space Administration (NASA) through the National Telecommunications and Information Administration (NTIA) Interdepartmental Radio Advisory Committee (IRAC). Licensees shall notify the International Bureau once they have completed coordination. Upon receipt of such notification from a licensee, the International Bureau will issue a public notice stating that the licensee may commence operations within the coordination zone in 30 days if no party has opposed the operations.

(2) When NTIA seeks to provide similar protection to **future TDRSS** sites that have been coordinated through the IRAC Frequency Assignment Subcommittee process, NTIA will notify the Commission's International Bureau that the site is nearing operational status. Upon public notice from the International Bureau, all Ku-band VMES licensees shall cease operations in the 14.0–14.2 GHz band within **125 km** of the new TDRSS site until the licensees complete coordination with NTIA/IRAC for the new TDRSS facility. Licensees shall notify the International Bureau once they have completed coordination for the new TDRSS site. Upon receipt of such notification from a licensee, the International Bureau will issue a public notice stating that the licensee may commence operations within the coordination zone in 30 days if no party has opposed the operations. The VMES licensee then will be permitted to commence operations in the 14.0–14.2 GHz band within 125 km of the new TDRSS site, subject to any operational constraints developed in the coordination process.

VMES terminals will not operate within 125km of a TDRSS site. Coordination with will be performed if operation closer than 125km is needed.

The L3 BUC is autonomously turned off when:

1. L3 GPS indicates that the remote is within the NASA or NSF sites, and
2. VMES transmit frequency is within the prohibited transmit frequency range.

A **waiver** is requested to not perform coordination unless operation is planned within the specified coordination zone and on the shared frequencies.

1.11 Radio Astronomy Service Protection and NSF Coordination

(d)

(1) Operations of VMESs in the 14.47–14.5 GHz (Earth-to-space) frequency band in the vicinity of radio astronomy service (RAS) observatories observing in the 14.47–14.5 GHz band are subject to coordination with the **National Science Foundation (NSF)**. The appropriate NSF contact point to initiate coordination is Electromagnetic Spectrum Manager, NSF, 4201 Wilson Blvd., Suite 1045, Arlington VA 22203, fax 703–292–9034, e-mail *esm@nsf.gov*. Licensees shall notify the International Bureau once they have completed coordination. Upon receipt of the coordination agreement from a licensee, the International Bureau will issue a public notice stating that the licensee may commence operations within the coordination zone in 30 days if no party has opposed the operations.

(2) Table 1 provides a list of each applicable RAS site, its location, and the applicable coordination zone.

TABLE 1—APPLICABLE RADIO ASTRONOMY SERVICE (RAS) FACILITIES AND ASSOCIATED COORDINATION DISTANCES

Observatory	Latitude (north)	Longitude (west)	Radius (km) of coordination zone
Arecibo, Observatory, Arecibo, PR	18°20'37"	66°45'11"	Island of Puerto Rico.
Green Bank, WV	38°25'59"	79°50'23"	160.
Very Large Array, near Socorro, NM	34°04'44"	107°37'06"	160.
Pisgah Astronomical Research Institute, Rosman, NC	35°11'59"	82°52'19"	160.
U of Michigan Radio Astronomy Observatory, Stinchfield Woods, MI.	42°23'56"	83°56'11"	160.
Very Long Baseline Array (VLBA) stations:			
Owens Valley, CA	37°13'54"	118°16'37"	160*.
Mauna Kea, HI	19°48'05"	155°27'20"	50.
Brewster, WA	48°07'52"	119°41'00"	
Kitt Peak, AZ	31°57'23"	111°36'45"	
Pie Town, NM	34°18'04"	108°07'09"	
Los Alamos, NM	35°46'30"	106°14'44"	
Fort Davis, TX	30°38'06"	103°56'41"	
North Liberty, IA	41°46'17"	91°34'27"	
Hancock, NH	42°56'01"	71°59'12"	
St. Croix, VI	17°45'24"	64°35'01"	

* Owens Valley, CA operates both a VLBA station and single-dish telescopes.

(3) When NTIA seeks to provide similar protection to **future RAS sites** that have been coordinated through the IRAC Frequency Assignment Subcommittee process, NTIA will notify the Commission's International Bureau that the site is nearing operational status. Upon public notice from the International Bureau, all Ku-band VMES licensees shall cease operations in the 14.47–14.5 GHz band within the relevant geographic zone (160 kms for single dish radio observatories and Very Large Array antenna systems and 50 kms for Very Long Baseline Array antenna systems) of the new RAS site until the licensees complete coordination for the new RAS facility. Licensees shall notify the International Bureau once they have completed coordination for the new RAS site and shall submit the coordination agreement to the Commission. Upon receipt of such notification from a licensee, the International Bureau will issue a public notice stating that the licensee may commence operations within the coordination zone in 30 days if no party opposed the operations. The VMES licensee then will be permitted to commence operations in the 14.47–14.5 GHz band within the relevant coordination distance around the new RAS site, subject to any operational constraints developed in the coordination process.

VMES terminals will not operate within the distances specified in 25.226 (d)(2). Coordination will be performed if closer operation needed.

The L3 BUC is autonomously turned off when:

1. L3 GPS indicates that the remote is within the NASA or NSF sites, and
2. VMES transmit frequency is within the prohibited transmit frequency range.

A **waiver** is requested to not perform coordination unless operation is planned within the specified coordination zone and on the shared frequencies.

1.12 Position Location Technology

(e) VMES licensees shall use **Global Positioning Satellite-related** or other similar position location technology to ensure compliance with paragraphs (c) and (d) of this section.

The L3 utilizes GPS for position location, as noted in 25.226 (e) as indicated above.

1.13 Protection

(a)(8) A VMES terminal receiving in the 10.95–11.2 GHz (space-to-Earth), 11.45–11.7 GHz (space-to-Earth) and 11.7–12.2 GHz (space-to-Earth) bands shall receive protection from interference caused by space stations other than the target space station only to the degree to which harmful interference would not be expected to be caused to an earth station employing an antenna conforming to the referenced patterns defined in § 25.209(a) and (b) and stationary at the location at which any interference occurred.

L3 understands and accepts (a)(8) of FCC25.226, as per above.