

54. Adopting a "fraction of the antenna beam width" alternative instead of a fixed value to specify pointing accuracy would lower the required pointing accuracy for small antennas. That is, as an antenna becomes smaller, the beam becomes wider. Thus, if we were to define the required pointing accuracy as a fraction of the beam width, the permitted pointing inaccuracy would be allowed to grow along with the growth in the beam width as the antenna becomes smaller. Presumably, as the beam width grew and the antenna gain decreased, the operator would need to resort to spectrum spreading techniques to complete the link to the VMES hub receiver. We ask if adopting a "fraction of the antenna beam width" approach seems reasonable and, if so, how we should determine the fraction that would apply. Further, should adoption of this approach be limited to peak E.I.R.P.-densities from a single terminal or to the aggregate emissions from multiple, co-frequency terminals? If so, what should that value be? We ask commenters to include technical descriptions and typical link-budgets to indicate the types of modulation and random access techniques, and the types and quality of services, that might be expected to be supplied by very low-gain, broad-beam antennas.

55. ViaSat asks the Commission to tailor its rules to accommodate the development of technologies that would protect adjacent satellites without the need for stringent antenna pointing accuracy, but without mandating any specific technology.<sup>117</sup> ViaSat urges the Commission to propose rules that allow the use of small, low-profile antennas that consumers affordably might install on standard vehicles.<sup>118</sup> We seek technical comments on antenna technologies that would protect adjacent satellites without the need for stringent antenna pointing accuracies. Commenters should submit such information in sufficient technical detail for the Commission to verify the radiation patterns of these antennas and should include suggested rules to ensure the protection of nearby satellite systems. Commenters also should include a typical link-budget to indicate the types of modulation, random access techniques, and types and quality of services that could be expected to be supplied by small, low-profile antennas.

#### b. Aggregate Power-Density Limits and the $10 \cdot \log(N)$ Rule

56. Various parties seek revisions to the ESV power-density limits, as applied to VMES, in order to accommodate VMES networks employing aggregate system power control.<sup>119</sup> For example, Qualcomm states that it supports the proposal by General Dynamics to extend the ESV off-axis emissions rules to cover VMES operations, but urges the Commission to review and revise the  $10 \cdot \log(N)$  factor.<sup>120</sup>

57. The technical rules adopted in the *ESV Report and Order*, including the off-axis E.I.R.P.-density limits, were based, in general, on single channel per carrier ("SCPC") ESV systems that have operated pursuant to STA for several years. The Commission, in its *Sixth Report and Order and Third Further Notice* in its proceeding to streamline the Part 25 rules, modified the E.I.R.P.-density envelope adopted in the *ESV Report and Order* to accommodate CDMA systems by adding the  $10 \cdot \log(N)$  term to

<sup>117</sup> ViaSat at 3, 5-7.

<sup>118</sup> ViaSat at 3. See also ViaSat at 6 (imposing antenna pointing accuracy requirements for systems using spread spectrum/multiple access and central power control would add costs that could make antennas too expensive for broad commercial deployment).

<sup>119</sup> ViaSat at 7; Qualcomm at 4.

<sup>120</sup> Qualcomm at 4. As discussed below, the  $10 \cdot \log(N)$  limit represents the value of ten times the logarithm of the maximum expected number of simultaneous co-frequency, co-transponder transmitters.

section 25.222.<sup>121</sup> Section 25.222 requires CDMA systems to reduce the E.I.R.P.-density of co-frequency earth stations simultaneously transmitting to the same satellite, in order to ensure that the overall system meets, in the aggregate, the E.I.R.P.-density limits established for a single VSAT.<sup>122</sup> If each of the CDMA transmitters has the same E.I.R.P.-density, each transmitter will radiate the maximum VSAT E.I.R.P.-density reduced by a factor of  $10 \cdot \log(N)$ , in dB, where "N" represents the peak number of co-frequency CDMA earth stations simultaneously transmitting in the same satellite receiving beam.<sup>123</sup> ViaSat and Qualcomm state that the section 25.222  $10 \cdot \log(N)$  limit for individual VMES terminals assumes a network of homogeneous transmitters.<sup>124</sup> Qualcomm asserts that requiring each antenna to reduce its input power density equally by a fixed factor of  $10 \cdot \log(N)$  prevents variable data rates (and thus variable power-density systems) from being accommodated unless the system operates with a significant loss of capacity, thereby favoring other techniques, such as Frequency Division Multiple Access ("FDMA").<sup>125</sup> Thus, as noted, they urge the Commission to change the  $10 \cdot \log(N)$  rule, as it would be applied to VMES.<sup>126</sup> The Commission seeks comment on the desirability of adopting rules for variable data rates, and thus variable power-density, spread-spectrum VMES systems. Commenters should address the specific changes to the rules that would be required to allow the efficient use of variable power-density spread-spectrum systems while still ensuring that the systems meet the E.I.R.P.-density envelope in the aggregate. Comments also should address the pros and cons of adopting such rule changes.

### c. Contention Table

58. ViaSat suggests that the Commission seek comment on the desirability of adopting, for VMES, the type of "contention table" proposed for VSATs in the *Sixth Report and Order and Third Further Notice* on Part 25 streamlining.<sup>127</sup> Noting that the *Sixth Report and Order and Third Further Notice* proposes adopting a contention table to deal with multiple access techniques that involve contention protocols, ViaSat suggests that use of a contention table also would allow flexibility for

<sup>121</sup> See *Sixth Report and Order and Third Further Notice*, 20 FCC Rcd at ¶ 63 n.177 (incorporating  $10 \cdot \log(N)$  limit into section 25.222).

<sup>122</sup> See 47 C.F.R. §§ 25.222(a)(1) (applicable to Ku-band ESV CDMA systems), 25.134(g) (applicable to VSAT CDMA systems).

<sup>123</sup> See 47 C.F.R. § 25.222(a)(1).

<sup>124</sup> ViaSat at 7; Qualcomm at 4.

<sup>125</sup> Qualcomm at 4. Qualcomm states that the Commission has licensed networks of technically identical earth stations that are controlled by a single VSAT hub and common access method so long as the aggregate off-axis emissions from such a network do not exceed that which would be produced by a single antenna conforming to section 25.209(a) of the rules. *Id.* Qualcomm observes that, for access methods with emissions that overlap in frequency and time, the Commission's rules require that the input power-density to each antenna be reduced equally by a fixed factor of  $10 \cdot \log(N)$ , where N is the number of simultaneous emissions. *Id.* Qualcomm asserts that the rule is contrary to the Commission's objective of developing rules that are technology neutral. *Id.*

<sup>126</sup> ViaSat at 7; Qualcomm at 4.

<sup>127</sup> ViaSat at 8, citing *Sixth Report and Order and Third Further Notice*, 20 FCC Rcd at 5635-36, ¶ 119. The proposed contention protocol rule for VSATs would apply an aggregate limit on off-axis E.I.R.P.-density for VSAT networks using a contention protocol. *Id.* at 5635. The rule would require VSAT network operators using a contention protocol not to exceed the envelope by more than the allowable increase in aggregate E.I.R.P. set forth in the proposed contention table. *Id.* at 5635-36.

networks using dynamic power control to exceed the E.I.R.P.-density limits for short periods of time as a result of other factors, such as antenna pointing inaccuracies and lags in dynamic power control.<sup>128</sup>

59. Certain multiple access techniques permit users to transmit on a random or near-random basis. As a result, the transmissions from one or more users can overlap, causing "collisions." These multiple access techniques are termed "contention protocols."<sup>129</sup> For these contention protocols, the probability of collisions is determined by the length of the user transmission, the number of transmissions per unit of time, and the number of users transmitting on the same frequency. When collisions occur, the E.I.R.P.-density at the GSO exceeds the E.I.R.P.-density that would be created by a single user. The *Sixth Report and Order and Third Further Notice* proposes that the collisions within a VSAT system be controlled so that the probability of higher levels of E.I.R.P.-density will occur for only brief periods of time.<sup>130</sup>

60. Rather than seeking additional comment on the use of contention tables at this particular time, we propose to await the results of a decision in the Part 25 streamlining proceeding before considering the use of contention tables for VMES operations.

### 3. Data Logging Requirements

61. In the *ESV Report and Order*, the Commission adopted a requirement that ESV operators maintain data logs on the operation of each ESV terminal, to protect FS operations in the C-band.<sup>131</sup> The Commission also placed this requirement on Ku-band ESV operators because of the existence of Federal government receive facilities in portions of the Ku-band and because of the possibility, although unlikely, that an interference situation could occur to other Ku-band systems from Ku-band ESV operations.<sup>132</sup>

62. Under the Commission's rules, Ku-band ESV network operators must maintain information on the satellites that each vessel uses, the operating frequencies and bandwidths used, the time of day, the vessel location in longitude and latitude, the country of registry of each vessel, and a point of contact within the United States with the authority and capability to mute the ESV transmitters.<sup>133</sup> The geo-location information must be recorded at time intervals of no greater than every twenty minutes while the ESV is transmitting.<sup>134</sup> The ESV operator must maintain the information for a year and make it available to appropriate entities within twenty-four hours of request.<sup>135</sup>

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<sup>128</sup> ViaSat at 8.

<sup>129</sup> Contention protocols differ from "reservation protocols" such as TDMA, FDMA, and CDMA, which "reserve" a time slot, frequency or digital code for each transmission in the network. In contention protocols, transmissions from different terminals compete, or "contend," for the same resource, which might be a time slot, frequency or hub receiver.

<sup>130</sup> See *Sixth Report and Order and Third Further Notice*, 20 FCC Rcd at 5635-36, ¶ 119.

<sup>131</sup> *ESV Report and Order*, 20 FCC Rcd at 695-96, ¶ 48.

<sup>132</sup> *Id.* at 721, ¶ 112.

<sup>133</sup> 47 C.F.R. § 25.222(c)(1)-(3).

<sup>134</sup> 47 C.F.R. § 25.222(c)(1).

<sup>135</sup> 47 C.F.R. § 25.222(c)(1).

63. General Dynamics asks the Commission not to apply the ESV data logging requirements to VMES systems.<sup>136</sup> General Dynamics asserts that VMES terminals are less likely to cause interference than existing blanket-licensed VSAT terminals, which General Dynamics characterizes as having less antenna pointing control than VMES and greater likelihood of becoming sources of potential interference.<sup>137</sup> General Dynamics asserts that the remote satellite geo-location capabilities of existing FSS spacecraft operators provide another reason not to ask for detailed logging of VMES operating locations.<sup>138</sup> SES Americom supports not applying the rule to VMES, stating that military applications are likely to be the predominant use of VMES and thus data logging requirements could raise national security concerns.<sup>139</sup> Several commenters, however, oppose eliminating the rule at this time. Qualcomm opposes excluding location logging unless proponents can demonstrate that geo-location tools in general use today reliably can locate earth stations that are in motion.<sup>140</sup> SIA states that it is premature to take a position on the Petition's proposal on data logging, and ViaSat supports the application of the data logging rule to VMES systems.<sup>141</sup>

64. In response to the Petition's suggestion that data logging would not be necessary for VMES, we observe that the existing data logging requirements for ESVs are intended to permit a licensee experiencing any unexpected interference from ESVs to obtain information on the locations of the mobile transmitters that may have been near, or may have transited in the vicinity of, the licensee's facility.<sup>142</sup> The ESV rules apply to both the C-band and Ku-band ESV operations, whereas VMES is proposed solely in the Ku-band. Although the C-band presents greater potential for interference from mobile terminals because of the large number of FS operations, there also exists the potential for interference to Federal government facilities in the conventional and extended Ku-bands. We seek comment on General Dynamics' proposal not to apply data logging requirements to VMES. We observe that, to the extent that Federal government operations are authorized by NTIA consistent with section 305 of the Communications Act, the terms and conditions of that authorization would be the subject of coordination between NTIA and the Commission, and would not necessarily be governed by data logging requirements in the Commission's rules. We also seek comment on how, if at all, the use of VMES terminals in the Ku-band might suggest a different approach from the data logging rule applied to ESV terminals in the Ku-bands.

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<sup>136</sup> Petition at 12-13.

<sup>137</sup> Petition at 12. General Dynamics states that FSS Ku-band transportable satellite news gathering terminals are not subject to data logging requirements, although General Dynamics asserts they have much higher power levels and are much larger potential sources of interference than either VSATs or VMES terminals. Petition at 12-13; November 21 Response to Information Request Attachment at 12.

<sup>138</sup> Petition at 12. See also November 21 Response to Information Request Attachment at 12 (discussing geo-location systems, GPS position logging information, and uplink signal unique identification codes).

<sup>139</sup> SES Americom at 5.

<sup>140</sup> Qualcomm at 6. Qualcomm proposes waiving the requirement for good cause, rather than eliminating the general rule. *Id.* at 6.

<sup>141</sup> SIA at 4-5 (observing that the rule is designed to facilitate the rapid rectification of interference concerns, however unlikely); ViaSat at 8-9 (generally supporting requirement that operator track terminal locations to enforce interference protections).

<sup>142</sup> See *ESV Report and Order*, 20 FCC Rcd at 721, ¶¶ 112-13.

#### 4. Other Operational Requirements

##### a. Section 25.209 Antenna Size Threshold

65. The primary source of interference to earth stations in the conventional Ku-band is downlink interference from the FSS. The ability to avoid interference is based on the antenna beam width and bore-sight alignment with the intended satellite.<sup>143</sup> Thus, small antennas, with their wider main lobes, may be more vulnerable to adjacent satellite interference.<sup>144</sup> Qualcomm asserts that, for a system that employs ultra-small antennas, the operator's acceptance of the risk of adjacent satellite interference should be reflected in a license condition.<sup>145</sup> Qualcomm suggests an amendment to section 25.209 of the Commission's rules that would set a threshold on antenna size, possibly 55 centimeters, above which the allocation would be primary and receive the appropriate interference protection and below which it would be secondary and thus less protected.<sup>146</sup> Qualcomm proposes that the Commission apply this threshold to all categories of service that employ earth stations (FSS, MSS, AMSS, and ESV) in the 11.7-12.2 GHz band.<sup>147</sup>

66. Section 25.209(c) provides that earth station antennas licensed for reception of radio transmissions from a space station in the FSS service are protected from radio interference caused by other space stations 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 relevant antenna performance standards set out in section 25.209.<sup>148</sup> We are concerned that, because of the reduced side-lobe isolation, the use of small antennas could make a VMES receiver more sensitive to interference from other FSS satellites. If we grant primary status to the VMES, this lack of side-lobe isolation could place an undue burden on FSS satellites coordinating at a later time, when compared with receivers using the more traditional FSS antennas. To determine whether a system of small VMES antennas would receive interference protection, Qualcomm asks the Commission to set a threshold size above which the VMES antennas would receive the same kind of protection as earth stations that operate in a service with primary status, and below which the antennas would be required to accept interference. If we adopt a primary status for VMES and apply section 25.209(c), there may be no need for such a rule for VMES earth stations.<sup>149</sup> Additionally, we observe that Qualcomm proposes that the Commission adopt an antenna threshold rule for all categories of service that employ earth stations, including FSS, MSS, AMSS, and ESV stations, in the 11.7-12.2 GHz band. We seek comment on Qualcomm's proposal to amend section 25.209 of the Commission's rules to set a threshold on antenna size, in the 11.7-12.2 GHz band, above which a VMES

<sup>143</sup> See, e.g., Qualcomm at 5.

<sup>144</sup> See, e.g., Qualcomm at 5.

<sup>145</sup> Qualcomm asserts that, independent of whether an antenna is in-motion or stationary, it is the beam width of the antenna that affects the level of interference received from adjacent satellites within the band. Qualcomm at 5.

<sup>146</sup> Qualcomm at 5.

<sup>147</sup> Qualcomm at 5.

<sup>148</sup> 47 C.F.R. § 25.209(a), (c). See also 47 C.F.R. § 25.222((b)(3) (requiring ESV operator certification that antenna conforms to the criteria of § 25.209); proposed § 25.XXX(b)(1)(ii)(same).

<sup>149</sup> In this regard, we seek comment on section 25.XXX(a)(14), which, if adopted, would grant VMES terminals primary receive antenna protection from FSS space stations, only to the extent that the receive antenna complies with the receive antenna protection levels set forth in section 25.209(a)-(b) of the Commission's rules. See Appendix B, section 25.XXX(a)(14). See also 47 C.F.R. § 25.209(a)-(b).

allocation would be primary and receive the appropriate interference protection and below which it would be secondary and thus less protected. What would be an appropriate threshold size and how would this threshold compare with the existing condition in section 25.209(c)? In other respects, Qualcomm's proposal is overly broad for this particular proceeding, in that it proposes that the Commission adopt an antenna threshold rule for all categories of service that employ earth stations, including, in addition to VMES, FSS, MSS, AMSS, and ESV stations, in the 11.7-12.2 GHz band.

**b. Power Densities in Directions Other Than the GSO Plane**

67. ViaSat urges the Commission to seek comment on permitting VMES terminals to operate at greater power densities than the rules currently permit in the NGSO plane.<sup>150</sup> ViaSat states that the commercial success of VMES will depend on using small, low-profile antennas on cars or trucks and that these antennas will emit at higher off-axis power-density levels in the NGSO elevation plane.<sup>151</sup> ViaSat urges the Commission to explore the tradeoffs between relaxing off-axis density limits in the NGSO plane and constraining the types, sizes and costs of antenna technology that might be used to provide VMES.<sup>152</sup>

68. Section 25.222(a)(1) describes the principal ESV E.I.R.P.-density envelope as applying in the plane of the GSO as it appears at the particular earth station location (that is, the plane determined by the focal point of the antenna and the line tangent to the arc of the GSO at the position of the target satellite). VMES antennas, of course, will radiate in all directions, with the majority of the power directed along the antenna main beam. ViaSat's reference to the E.I.R.P.-density limits in "NGSO plane" refers to section 25.222(a)(2) and (a)(4) of the rules, which describes an E.I.R.P.-density envelope "in all other directions" than the GSO orbit.<sup>153</sup> ViaSat states that "[t]here are no commercial NGSO Ku-band systems in operation, and none are planned to be deployed in the foreseeable future."<sup>154</sup>

69. The ESV E.I.R.P. envelope in all directions other than along the GSO starts at an angle of 1.25 degrees from the antenna main lobe.<sup>155</sup> In the *Sixth Report and Order and Third Further Notice*, the Commission revised the start of the antenna gain pattern envelope to three degrees off-axis outside the GSO orbital plane for earth stations operating in the conventional Ku-band. The Commission made this revision to facilitate the development of more advanced elliptical antennas without creating any

<sup>150</sup> ViaSat at 3, 9-10. See also 47 C.F.R. § 25.222(a)(2), (a)(4).

<sup>151</sup> ViaSat at 9.

<sup>152</sup> ViaSat at 9. ViaSat asserts that, without an increased allowance for off-axis power-densities in the NGSO elevation plane, VMES service may be unduly constrained in favor of NGSO systems that never may be deployed. ViaSat at 10.

<sup>153</sup> 47 C.F.R. § 25.222(a)(2), (a)(4).

<sup>154</sup> ViaSat at 9. We note that, on December 21, 2006, the International Bureau authorized Virtual Geosatellite, LLC ("Virtual Geo") to construct a system of eighteen NGSO FSS satellites to operate in a number of frequency bands, including the Ku-band. The Virtual Geo satellites would have operated in highly elliptical inclined orbits. See *Virtual Geo Order* at ¶ 10. In the operational portion of the orbits, the satellites would have had angular separation from the equator of greater than 45 degrees and, therefore, would have had a geographical separation from the GSO satellite orbit. See *Virtual Geo Order* at ¶ 10. On February 5, 2007, Virtual Geo surrendered its NGSO FSS license. See Virtual Geosatellite LLC, SAT-DOA-19990108-00007, Public Notice, Policy Division Information, Actions Taken Report No. SAT-00420, DA 07-617, (Int'l Bur. Feb. 9, 2007).

<sup>155</sup> See 47 C.F.R. § 25.222(a)(2).

additional interference issues.<sup>156</sup> We seek comment on adopting this same three-degree starting angle for VMES antennas. We request comment on the possibility of modifying the current ESV non-GSO plane E.I.R.P.-density envelopes to accommodate small VMES antennas. Commenters should address the potential for interference to and from possible NGSO FSS systems as well as the possible trade-offs between relaxing off-axis E.I.R.P.-density limits in directions away from the GSO plane, and the types, sizes and costs of antenna technology that might be used to provide VMES services under existing versus relaxed power-density limits.

### c. Radiation Hazard Requirements

70. Section 25.222(a)(9) of the rules requires ESVs that exceed the radiation guidelines of section 1.1310 to provide an environmental assessment and a plan for mitigation of radiation exposure to the extent required to meet those guidelines.<sup>157</sup> The mounting of earth stations on vehicles may pose the possibility of human exposure to radiofrequency ("RF") radiation. We ask commenters to describe what radiation hazard concerns may exist, and what steps should be taken to resolve any potential concerns. We ask commenters to discuss how exposure concerns and necessary rules for military applications may differ from VMES use as a general commercial application. We note that General Dynamics proposes that the immediate application for VMES operations would be to serve U.S. military communications test and training needs. We expect that trained personnel operating VMES would take reasonable steps to avoid accidental RF exposure for VMES, as they would for other small aperture antennas, and the nature of the military operations described in the Petition raises little likelihood of exposure of third parties. Nevertheless, the Petition discusses the use of these technologies for commercial markets as well. We direct commenters to section 1.1310 of our rules, which describes the different exposure limits for "general population" and "occupational/controlled" conditions; and we ask commenters to discuss how these rules should be applied to the proposed military and other potential uses for VMES. We seek comment as to whether we should require cautionary labeling for all VMES terminals and whether we should recommend professional installation for subscriber transceiver antennas. In this regard, we direct commenters to section 1.1307(b) of our rules, which requires licensees to perform routine exposure evaluation for all Part 25 transmitters, and to the references to our rules that describe the limits for RF exposure.<sup>158</sup>

### d. Equipment Certification

71. The Communications Act authorizes the Commission to make regulations to ensure that, before an RF device enters the stream of commerce, it complies with the appropriate technical rules to ensure that it will not cause harmful interference.<sup>159</sup> Pursuant to that authority, the Commission has adopted rules to establish the current device authorization policy that is commonly known as our "certification" or "marketing" rules.<sup>160</sup> The rules and requirements vary by device, but today the majority of radio transmitters that "intentionally radiate" radio waves must be certified as compliant with governing rules before being marketed, sold, or imported into the United States. In general, we require

<sup>156</sup> *Sixth Report and Order and Third Further Notice*, 20 FCC Rcd at 5610, ¶¶ 37-38.

<sup>157</sup> 47 C.F.R. §§ 25.222(a)(9), 1.1310.

<sup>158</sup> See 47 C.F.R. §§ 1.1307(b), 1.1310.

<sup>159</sup> 47 U.S.C. § 302.

<sup>160</sup> See 47 C.F.R. §§ 2.1201-2.1207, 2.801 *et seq.*

certification of "portable earth station transceivers" and certain other small-aperture terminals.<sup>161</sup> The Petition and the record to date would seem to suggest that commenters seek to deploy VMES using mobile and/or portable VMES terminals. We would propose to certify VMES terminals pursuant to our Part 2 rules to ensure that they comply with the technical rules adopted for the service. We would make this proposal because of our past use of certification for earth station terminals and because the record to date suggests that VMES, or certain classes or sizes of VMES terminals, may be widely deployed for general public use and potentially might cause interference to space stations. We seek comment on this analysis and on other procedures that commenters may consider warranted. We ask commenters to describe such procedures and explain why they would serve the public interest better than certification.

### 5. Limitations on Use of VMES

72. The comments suggest that the allocation and service rules proposed by General Dynamics potentially could result in terminals small enough, and inexpensive enough, to allow broad commercial use by the general public.<sup>162</sup> This could result in a large number of ultra-small antenna terminals mounted on private vehicles traversing throughout the United States. We are concerned about whether the aggregation of the emissions from these ultra-small terminals may increase the risk of harmful interference to other FSS users. We are concerned that aggregate emissions from a VMES system using ultra-small antennas pointed with an accuracy that is some fraction of the antenna beam width could raise the potential for harmful interference to adjacent satellites, including those farther than six degrees from the target satellite. In this section, we discuss and seek comment on this concern. We also discuss and seek comment on possible rules that would be designed to prevent such potential interference concerns.

73. The Commission's two-degree FSS spacing rules require earth stations to take steps to prevent interference to FSS satellites within six degrees of the target satellite. The use of ultra-small mobile antennas by the general public potentially could expose FSS satellites farther away than six degrees to interference and raises a question about the applicability of the current technical rules to a system using ultra-small mobile antennas.<sup>163</sup> If systems using this size of mobile antenna potentially could expose FSS satellites farther away from the target satellite to the same or higher level of

<sup>161</sup> Portable earth station transceivers are transceivers that are likely to be used within 20 centimeters of the operator's body. See 47 C.F.R. §§ 25.129, 25.149(c) (requiring certification for portable device earth station transceivers and small ancillary terrestrial component handheld terminals).

<sup>162</sup> General Dynamics identifies possible non-military applications for VMES systems, including "satellite news gathering, weather services, mineral/fossil fuel exploration and extraction and large-scale construction projects." Petition at 7. See also November 21 Response to Information Request Attachment at 6 (stating that, following adoption of regulations, General Dynamics envisions that it and other manufacturers will be able to develop new versions of VMES terminals designed for use in less demanding environments than a military off-road environment). ViaSat suggests an even broader application, with the possible use of VMES on cars and trucks using ultra-small antennas. ViaSat at 9. ViaSat states that commercial success depends in part upon the ability to use small, low-profile antennas that can be mounted on standard cars and trucks. ViaSat at 9.

<sup>163</sup> The two-degree FSS spacing rules, initially designed for systems using relatively large earth station antennas that were fixed in place, were not concerned about the accuracy of antenna tracking systems mounted on moving cars or trucks. See generally *Two-Degree Spacing Order*, 54 Rad. Reg. 2d (P&F) 577 (1983), on recon., 99 FCC 2d 737 (1985). The initial two-degree rules, as successfully modified to account for VSATs, ESVs, and AMSS applications, generally have been concerned with the protection of FSS satellites within six degrees of the target satellite. The current two-degree spacing rules limit the E.I.R.P. density radiated from an FSS earth station antenna to the E.I.R.P. density envelope and, with relatively large antennas, this limit will occur somewhere within a degree or two of the main beam of the earth station antenna. For a very small antenna, the limiting E.I.R.P. density may occur farther than six degrees away from the antenna main beam.

interference power than the satellites directly adjacent to the target satellite, this situation would represent a departure from the long-standing assumptions underlying the two-degree spacing environment.

74. We seek comment on whether this scenario is likely and, if so, we ask whether we should adopt rules designed to prevent such potential interference concerns. Should we propose, for example, an E.I.R.P.-density envelope for VMES, or a class of VMES, that is different from the envelope for ESVs that is set out in section 25.222 of the rules? If the VMES pointing restrictions are based upon some fraction of the antenna beam width, as suggested by ViaSat and Qualcomm, should a different E.I.R.P. envelope be applied?<sup>164</sup> Are there other methods by which we might ensure that VMES use of the 14.0-14.5 GHz band would not cause harmful interference to adjacent FSS satellites, including those farther than six degrees from the target satellite?

75. For example, we ask whether we should propose limitations that would allow only government use, such as military testing/training, homeland security, and civil emergency applications, under the assumption that such applications likely would involve somewhat larger and better tracking antennas as well as operator training to mitigate against interference to neighboring satellites, as opposed to those terminals designed for general public use. One means of restricting the use of the band while at the same time granting General Dynamics' proposal would be to limit the use of VMES only to commercial contracts for government uses such as military testing/training, homeland security, and civil emergency applications. The General Dynamics proposal is directed primarily to military testing and training. Including other government applications such as homeland security and civil emergency would add significant utility to Ku-band land mobile applications, while maintaining the population of VMES terminals. We ask for comment on the effects and usefulness of such a limitation.

76. Currently, the FSS Ku-band is used heavily by commercial entities for commercial purposes and is used by the general public to some extent for broadband Internet access. Opening this band to larger numbers of small low-cost systems could make specific interference sources difficult to identify and control. If ultra-small antenna VMES systems with low-cost tracking mechanisms should come into widespread use, it could become difficult, if not impossible, to identify any single source of interference, and correspondingly difficult to ensure an interference-controlled environment for commercial interests using the Ku-band. We observe that, since 1991, the Commission has required satellite uplink transmissions carrying broadband video information to use an automatic transmitter identification system ("ATIS").<sup>165</sup> Under this requirement, parties transmitting video signals to satellites must include information in the transmissions that identifies the source. The Commission adopted this requirement in response to an increase in harmful interference, including intentional interference, to satellite facilities. We ask whether a similar type of identification system should be used with VMES systems. If so, what should the characteristics of the identifying signal be in terms of format, information and structure?

### C. VMES Licensing Considerations

77. In establishing a regulatory framework for VMES, we endeavor to craft rules that will minimize licensees' regulatory burden. Therefore, we invite commenters to identify, either generally or

<sup>164</sup> ViaSat at 6; Qualcomm at 4. See also, *supra*, ¶¶ 52-55.

<sup>165</sup> ATIS transmits an encoded subcarrier message including, at a minimum, the earth station's call sign, a telephone number providing immediate access to someone capable of resolving interference problems, and a unique ten-digit serial number. See *An Automatic Transmitter Identification System for Radio Transmitting Equipment*, First Report and Order, GEN Docket No. 86-337, 5 FCC Rcd 3256 (1990); 47 C.F.R. § 25.281.

in connection with specific proposals, any licensing methods that may simplify and speed the licensing process for VMES, while still addressing our core regulatory concern with avoiding harmful interference.

78. *Blanket licensing.* In connection with ESV and AMSS networks, the Commission has looked to blanket licensing methods to address situations in which a larger number of technically identical user terminals will be deployed.<sup>166</sup> Similarly, if we adopt VMES service and licensing rules, we would propose to provide applicants with the option of seeking a VMES system license (consisting of a hub, located in the United States, and/or blanket earth station license). Whether or not an applicant requests hub authority, we would propose that the system license also would require that the licensee maintain in the United States both a network control and monitoring center and a twenty-four-hours-per-day, seven-days-per-week point of contact. We believe that, by making the VMES system licensee responsible for meeting whatever operational considerations we propose, we would be designing rules intended to enhance the protection of other in-band and out-of-band licensees.

79. We consider blanket licensing for VMES terminals because the number and mobility of VMES locations may make it impractical in many cases to license VMES terminals on a unit-by-unit basis. Under a blanket licensing approach, applicants would be required to file a narrative describing the overall system operations as well as specific information on the antennas, power density, and emission characteristics of each class of earth station comprising the network. We would propose requiring a point of contact to maintain information about the frequencies that the individual vehicles use. After the applicant submits point of contact and other relevant information, the Commission then could issue a blanket authorization for the system.

80. We also seek comment on whether we should provide for the licensing of individual earth stations, using the same technical criteria that are applied to the antennas in a blanket-licensed VMES network. We seek comment on whether there are specific rule provisions that might be required to address such cases.<sup>167</sup> In addition, we invite comment regarding necessary modifications to FCC Form 312 to accommodate applications for VMES systems.<sup>168</sup>

81. *ALSAT authority.* We also seek comment on whether we should authorize Ku-band VMES operators to operate with any U.S.-licensed satellite and non-U.S. satellites on the Permitted Space Station List using the parameters consistent with earth stations, specifically that the VMES terminals comply with the proposed off-axis E.I.R.P. power-density requirements proposed herein (that is, grant VMES operators ALSAT authority).<sup>169</sup> Or, for reasons relating to potential interference to two-degree spaced satellites, should VMES operators be granted authority to access individual satellites only?

<sup>166</sup> *ESV Report and Order*, 20 FCC Rcd 674, 722-23, ¶¶ 114-15; *AMSS NPRM*, 20 FCC Rcd 2906, 2932, ¶¶ 48-49.

<sup>167</sup> Specifically, we seek comment on whether to license VMES terminals on an individual basis pursuant to the proposed off-axis E.I.R.P. requirements discussed above.

<sup>168</sup> Applications for new or modified transmitting and/or receiving earth stations must be filed on FCC Form 312. See 47 C.F.R. §§ 25.130, 25.131.

<sup>169</sup> "ALSAT" means "all U.S.-licensed space stations." It permits an earth station operator providing FSS in the Ku-band to access any U.S. satellite, and any foreign satellite on the Permitted Space Station List, without additional Commission action, provided that those communications are in accordance with the same technical parameters and conditions established in the earth stations' licenses. See *Amendment of the Commission's Regulatory Policies to Allow Non-U.S. Licensed Space Stations to Provide Domestic and International Satellite Service in the United States*, Report and Order, 11 Docket No. 96-111, FCC 99-325, 15 FCC Rcd 7207, 7210-11, ¶ 6, 7215-16, ¶ 19 (1996).

Because ALSAT authority is not available to FSS earth station applicants if their operations must be coordinated with adjacent satellite operators, we would propose that ALSAT authority would not be available to those VMES applicants if their operations must be coordinated with adjacent satellite operators, especially if the VMES terminals exceed the proposed off-axis E.I.R.P.-density requirements. We seek comment on this analysis.

82. *License term.* We seek comment on licensing VMES operations for a term of fifteen years. Other licensed networks of earth stations have fifteen-year license terms.<sup>170</sup> We seek comment on whether there is any reason to diverge from the fifteen-year license terms.

#### IV. CONCLUSION

83. In this NPRM, we seek comment on General Dynamics' proposal that we allocate the conventional Ku-band for use with VMES terminals in the FSS on a primary basis. We also seek comment on service and licensing rules for VMES, possibly modeled on the current ESV rules. The proposed allocation and licensing procedures for Ku-band VMES reflect our interest in providing regulatory certainty to both new and incumbent operators in the Ku-band. The proposals set forth in this *Notice* are designed to: (1) promote efficient use of the spectrum by permitting new uses of the band by VMES terminals, thereby enabling important new communications services to be provided to consumers on board vehicles in motion; (2) protect existing and future FSS licensees and their customers from harmful interference; (3) propose procedures for coordination with existing and future SRS and RAS uses that may be affected by VMES terminals; and (4) establish rules and a regulatory framework that minimize the regulatory burden on VMES licensees to the extent possible. We seek comment on each of the matters set forth above.

#### V. PROCEDURAL MATTERS

##### A. Ex Parte Presentations

84. This proceeding shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's ex parte rules.<sup>171</sup> Persons making oral ex parte presentations are reminded that memoranda summarizing the presentations must contain summaries of the substance of the presentations and not merely a listing of the subjects discussed. More than a one or two sentence description of the views and arguments presented is generally required.<sup>172</sup> Other rules pertaining to oral and written presentations are set forth in Section 1.1206(b) of the Commission's rules as well.

##### B. Initial Regulatory Flexibility Analysis

85. Pursuant to the Regulatory Flexibility Act ("RFA"),<sup>173</sup> the Commission has prepared an Initial Regulatory Flexibility Analysis ("IRFA") of the possible significant economic impact on small entities by the policies and actions considered in this *Notice*. The text of the IRFA is set forth in

<sup>170</sup> See 47 C.F.R. § 25.121.

<sup>171</sup> 47 C.F.R. §§ 1.1200, 1.1206; *Amendment of 47 C.F.R. § 1.1200 et seq. Concerning Ex Parte Presentations in Commission Proceedings*, GC Docket No. 95-21, Report and Order, FCC 97-92, 12 FCC Rcd 7348 (1997).

<sup>172</sup> 47 C.F.R. § 1.1206(b)(2).

<sup>173</sup> See 5 U.S.C. § 603. The RFA, see U.S.C. § 601 *et seq.*, has been amended by the Contract with America Advancement Act of 1996, Pub. L. No. 104-121, 110 Stat. 847 (1996) ("CWAAA"). Title II of the CWAAA is the Small Business Regulatory Enforcement Fairness Act of 1996 ("Small Business Act").

*Appendix C. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the Notice as provided in paragraph 88 below. The Commission will send a copy of the Notice, including the IRFA, to the Chief Counsel for Advocacy of the Small Business Administration.*<sup>174</sup>

### C. Initial Paperwork Reduction Act of 1995 Analysis

86. *Paperwork Reduction Act.* This Notice contains proposed new and modified information collection(s). The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget ("OMB") to comment on the information collection(s) contained in this Notice, as required by the Paperwork Reduction Act of 1995, Public Law No. 104-13. Public and agency comments are due 60 days from date of publication of the Notice in the Federal Register. Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, Public Law No. 107-198, see 44 U.S.C. § 3506(c)(4), we seek specific comment on how we might "further reduce the information collection burden for small business concerns with fewer than 25 employees."

87. A copy of any comments on the information collections contained herein should be submitted to Judy Boley Herman, Federal Communications Commission, Room 1-C804, 445 12th Street, SW, Washington, DC 20554, or via the Internet to [jbHerman@fcc.gov](mailto:jbHerman@fcc.gov) and to Kristy L. LaLonde, OMB Desk Officer, Room 10234 NEOB, 725 17th Street, N.W., Washington, DC 20503, via the Internet to [Kristy\\_L.LaLonde@omb.eop.gov](mailto:Kristy_L.LaLonde@omb.eop.gov), or via fax at 202-395-5167.

### D. Comment Filing Procedures

88. Pursuant to sections 1.415 and 1.419 of the Commission's rules, 47 C.F.R. §§ 1.415, 1.419, interested parties may file comments in response to this Notice no later than on or before 30 days after Federal Register publication. Reply comments to these comments may be filed no later than on or before 45 days after Federal Register publication. All pleadings are to reference IB Docket No. 07-101. Comments may be filed using the Commission's Electronic Comment Filing System ("ECFS") or by filing paper copies. Parties are strongly encouraged to file electronically. See *Electronic Filing of Documents in Rulemaking Proceedings*, 63 Fed. Reg. 24121 (1998).

89. Comments filed through the ECFS can be sent as an electronic file via the Internet to <http://www.fcc.gov/cgb/ecfs/>. Parties should transmit one copy of their comments to the docket in the caption of this rulemaking. In completing the transmittal screen, commenters should include their full name, U.S. Postal Service mailing address, and the applicable docket or rulemaking number. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail comments, commenters should send an e-mail to [ecfs@fcc.gov](mailto:ecfs@fcc.gov) and should include the following words in the body of the message, "get form <your e-mail address>." A sample form and directions will be sent in reply.

90. Parties choosing to file by paper must file an original and four copies of each filing in IB Docket No. 07-101. Filings can be sent by hand or messenger delivery, by commercial overnight courier,

<sup>174</sup> 5 U.S.C. § 603(a).

or by first-class or overnight U.S. Postal Service mail (although we continue to experience delays in receiving U.S. Postal Service mail). If more than one docket or rulemaking number appears in the caption of this proceeding, commenters must submit two additional copies for each additional docket or rulemaking number. The Commission's mail contractor, Vistrionix, Inc., will receive hand-delivered or messenger-delivered paper filings for the Commission's Secretary at 236 Massachusetts Avenue, N.E., Suite 110, Washington, D.C. 20002. The filing hours at this location are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building. Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743. U.S. Postal Service first-class mail, Express Mail, and Priority Mail should be addressed to 445 12<sup>th</sup> Street, S.W., Washington, D.C. 20554. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

91. Comments submitted on diskette should be on a 3.5 inch diskette formatted in an IBM-compatible format using Word for Windows or compatible software. The diskette should be clearly labeled with the commenter's name, proceeding (including the docket number, in this case, IB Docket No. 07-101), type of pleading (comment or reply comment), date of submission, and the name of the electronic file on the diskette. The label should also include the following phrase "Disk Copy - Not an Original." Each diskette should contain only one party's pleadings, preferably in a single electronic file.

92. All parties must file one copy of each pleading electronically or by paper to each of the following: (1) The Commission's duplicating contractor, Best Copy and Printing, Inc., 445 12th Street, S.W., Room CY-B402, Washington, D.C. 20554, telephone (202) 488-5300, facsimile (202) 488-5563, or via e-mail at [FCC@BCPIWEB.COM](mailto:FCC@BCPIWEB.COM); (2) Howard Griboff, International Bureau, 445 12<sup>th</sup> Street, S.W., Washington, D.C. 20554, e-mail [Howard.Griboff@fcc.gov](mailto:Howard.Griboff@fcc.gov); (3) Paul Locke, International Bureau, 445 12<sup>th</sup> Street, S.W., Washington, D.C. 20554, email [Paul.Locke@fcc.gov](mailto:Paul.Locke@fcc.gov); (4) Kathleen Collins, International Bureau, 445 12<sup>th</sup> Street, S.W., Washington, D.C. 20554, email [Kathleen.Collins@fcc.gov](mailto:Kathleen.Collins@fcc.gov).

93. Comments and reply comments and any other filed documents in this matter may be obtained from Best Copy and Printing, Inc., in person at 445 12th Street, S.W., Room CY-B402, Washington, D.C. 20554, via telephone at (202) 488-5300; via facsimile (202) 488-5563, or via e-mail at [FCC@BCPIWEB.COM](mailto:FCC@BCPIWEB.COM). The pleadings also will be available for public inspection and copying during regular business hours in the FCC Reference Information Center, Room CY-A257, 445 Twelfth Street, S.W., Washington, D.C. 20554 and through the ECFS, accessible on the Commission's World Wide Website, [www.fcc.gov](http://www.fcc.gov).

94. Comments and reply comments must include a short and concise summary of the substantive arguments raised in the pleading. Comments and reply comments also must comply with section 1.49 and all other applicable sections of the Commission's rules.<sup>175</sup> All parties are encouraged to utilize a table of contents and to include the name of the filing party and the date of the filing on each page of their submission. We also strongly encourage that parties track the organization set forth in this Notice in order to facilitate our internal review process.

95. Commenters who file information that they believe is proprietary may request confidential treatment pursuant to section 0.459 of the Commission's rules. Commenters should file both their original comments for which they request confidentiality and redacted comments, along with their request for confidential treatment. Commenters should not file proprietary information electronically. See

<sup>175</sup> 47 C.F.R. § 1.49.

*Examination of Current Policy Concerning the Treatment of Confidential Information Submitted to the Commission*, Report and Order, 13 FCC Rcd 24816 (1998), Order on Reconsideration, FCC 99-262, 14 FCC Rcd 20128 (1999). Even if the Commission grants confidential treatment, information that does not fall within a specific exemption pursuant to the Freedom of Information Act ("FOIA") must be publicly disclosed pursuant to an appropriate request. See 47 C.F.R. § 0.461; 5 U.S.C. § 552. We note that the Commission may grant requests for confidential treatment either conditionally or unconditionally. As such, we note that the Commission has the discretion to release information on public interest grounds that does fall within the scope of a FOIA exemption.

#### E. Further Information

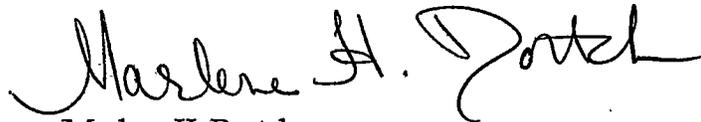
96. For further information regarding this proceeding, contact Paul Locke, Policy Division, International Bureau at (202) 418-0756. Information regarding this proceeding and others may also be found on the Commission's website at [www.fcc.gov](http://www.fcc.gov).

#### VI. ORDERING CLAUSES

97. Accordingly, IT IS ORDERED that, pursuant to the authority contained in sections 1, 4(i), 4(j), 7(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), and 308 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 151, 154(i), 154(j), 157(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), 308, this Notice of Proposed Rulemaking IS ADOPTED.

98. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center SHALL SEND a copy of this Notice of Proposed Rulemaking, including the initial regulatory flexibility analysis, to the Chief Counsel for Advocacy of the Small Business Administration, in accordance with section 603(a) of the Regulatory Flexibility Act, 5 U.S.C. § 601, et seq. (1981).

FEDERAL COMMUNICATIONS COMMISSION



Marlene H. Dortch  
Secretary

## APPENDIX A

## Petition For Rulemaking Commenters

**Parties Filing Comments**  
(7 Commenters)Name of Party

Association of Public Television Stations/Public Broadcasting Service  
AvL Technologies Incorporation  
Maritime Telecommunications Network, Inc.  
QUALCOMM Incorporated  
Satellite Industry Association  
SES Americom, Inc./Americom Government Services  
ViaSat, Inc.

**Parties Filing Reply Comments**  
(1 Reply Commenter)Name of Party

General Dynamics SATCOM Technologies, Inc.

**Parties Filing *Ex Parte* Comments**  
(1 *ex parte*)

General Dynamics SATCOM Technologies, Inc.

**APPENDIX B****Proposed Rules**

For the reasons discussed above, the Federal Communications Commission proposes to amend 47 C.F.R. Parts 2 and 25, as follows:

**PART 2 --FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS;  
GENERAL RULES AND REGULATIONS**

1. The authority citation for Part 2 continues to read as follows:

**AUTHORITY:** 47 U.S.C. §§ 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, 47 C.F.R. § 2.106, is amended as follows:

a. Revise pages 45, 46 and 47.

b. In the list of non-Federal Government footnotes, add footnotes NGxxx and NGyyy in numerical order.

**§ 2.106 Table of Frequency Allocations.**

The revisions and additions read as follows:

\* \* \* \* \*

Region 1 Table		International Table		United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Region 4 Table	Federal Table	Non-Federal Table	
10-10.45 FIXED MOBILE RADIOLOCATION Amateur 5.479	10-10.45 RADIOLOCATION Amateur 5.479 5.480	10-10.45 FIXED MOBILE RADIOLOCATION Amateur 5.479	10-10.45 FIXED MOBILE RADIOLOCATION Amateur 5.479	10-10.45 RADIOLOCATION G32	10-10.45 Radiolocation Amateur	Private Land Mobile (90) Amateur (97)
10.45-10.5 RADIOLOCATION Amateur Amateur-satellite 5.481	5.479 5.480	5.479	5.479	5.479 US58 US108 10.45-10.5 RADIOLOCATION G32	5.479 US58 US108 NG42 10.45-10.5 Radiolocation Amateur Amateur-satellite US58 US108 NG42 NG134	
10.5-10.55 FIXED MOBILE Radiolocation	10.5-10.55 FIXED MOBILE RADIOLOCATION	10.5-10.55 FIXED MOBILE RADIOLOCATION	10.5-10.55 FIXED MOBILE RADIOLOCATION	US58 US108 10.5-10.55 RADIOLOCATION US59	US58 US108 NG42 NG134	Private Land Mobile (90)
10.55-10.6 FIXED MOBILE except aeronautical mobile Radiolocation	10.55-10.6 FIXED MOBILE RADIOLOCATION	10.55-10.6 FIXED MOBILE RADIOLOCATION	10.55-10.6 FIXED MOBILE RADIOLOCATION	US59 10.55-10.6	10.55-10.6 FIXED	Fixed Microwave (101)
10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) Radiolocation 5.149 5.482	10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) Radiolocation 5.149 5.482	10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) Radiolocation 5.149 5.482	10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE except aeronautical mobile RADIO ASTRONOMY SPACE RESEARCH (passive) Radiolocation 5.149 5.482	10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) US265 US277	10.6-10.68 EARTH EXPLORATION-SATELLITE (passive) FIXED US265 SPACE RESEARCH (passive) US277	
10.68-10.7 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340 5.483	10.68-10.7 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246 US355	10.68-10.7 EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY US74 SPACE RESEARCH (passive) US246 US355				
10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A (Earth-to-space) 5.484 MOBILE except aeronautical mobile	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A MOBILE except aeronautical mobile	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A MOBILE except aeronautical mobile	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 5.484A MOBILE except aeronautical mobile	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 US211 US355 NG104 NG182 NGxxx US211	10.7-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.441 US211 US355 NG104 NG182 NGxxx	Satellite Communications (25) Fixed Microwave (101)
11.7-12.1 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE	11.7-12.1 FIXED 5.486 FIXED-SATELLITE (space-to-Earth) 5.484A Mobile except aeronautical mobile 5.485 5.488	11.7-12.1 FIXED 5.486 FIXED-SATELLITE (space-to-Earth) 5.484A Mobile except aeronautical mobile 5.485 5.488	11.7-12.1 FIXED 5.486 FIXED-SATELLITE (space-to-Earth) 5.484A Mobile except aeronautical mobile 5.485 5.488	11.7-12.2 FIXED-SATELLITE (space-to-Earth) 5.484A US211	11.7-12.2 FIXED-SATELLITE (space-to-Earth) NG143 NG145 NG183 NGyyy	Satellite Communications (25)
12.1-12.2 FIXED-SATELLITE (space-to-Earth) 5.484A 5.485 5.488 5.489	5.488 NG184	5.488 NG184				

FIXED MOBILE (101)	BROADCASTING-SATELLITE				
5.487 5.487A 5.492 12.75-12.75 FIXED-SATELLITE (space-to-Earth) Earth) 5.484A (Earth-to-space)	5.487A 5.488 5.492 12.7-12.75 FIXED NG118 FIXED-SATELLITE (Earth-to-space) MOBILE		FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile BROADCASTING 5.484A 5.487 12.5-12.75 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A MOBILE except aeronautical mobile BROADCASTING-SATELLITE 5.493	5.487A 5.488 5.490 5.492 12.7-12.75 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile	Satellite Communications (25) Auxiliary Broadcasting (74) Cable TV Relay (78) Fixed Microwave (101)
5.494 5.495 5.496 12.75-13.25	12.75-13.25 FIXED NG118 FIXED-SATELLITE (Earth-to-space) 5.441 NG104 MOBILE US251 NG53	12.75-13.25 US251		Space research (deep space) (space-to-Earth)	
13.25-13.4 EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL RADIONAVIGATION 5.497 SPACE RESEARCH (active)	13.25-13.4 AERONAUTICAL RADIONAVIGATION 5.497 Earth exploration-satellite (active) Space research (active)	13.25-13.4 EARTH EXPLORATION-SATELLITE (active) AERONAUTICAL RADIONAVIGATION 5.497 SPACE RESEARCH (active) 5.498A			Aviation (87)
5.499 5.500 5.501 5.501B 13.4-13.75 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH 5.501A Standard frequency and time signal-satellite (Earth-to-space)	13.4-13.75 Earth exploration-satellite (active) Radiolocation Space research Standard frequency and time signal-satellite (Earth-to-space)	13.4-13.75 EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION G59 SPACE RESEARCH 5.501A Standard frequency and time signal-satellite (Earth-to-space) 5.501B			Private Land Mobile (90)
5.499 5.500 5.501 5.502 5.503 13.75-14 FIXED-SATELLITE (Earth-to-space) 5.484A RADIOLOCATION Earth exploration-satellite Standard frequency and time signal-satellite (Earth-to-space) Space research	13.75-14 FIXED-SATELLITE (Earth-to-space) US337 Radiolocation Standard frequency and time signal-satellite (Earth-to-space) Space research US356 US357	13.75-14 RADIOLOCATION G59 Standard frequency and time signal-satellite (Earth-to-space) Space research US337 US356 US357 14-14.2 Space research			Satellite Communications (25) Private Land Mobile (90)
5.499 5.500 5.501 5.502 5.503 14-14.25 FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B RADIOLOCATION 5.504 Mobile-satellite (Earth-to-space) 5.504C 5.506A Space research	14-14.2 FIXED-SATELLITE (Earth-to-space) NG183 NGyyy Mobile-satellite (Earth-to-space) Space research				Satellite Communications (25)

International Table		United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table
(See previous page)				
14.25-14.3 FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B RADIONAVIGATION 5.504 Mobile-satellite (Earth-to-space) 5.506A 5.508A Space research 5.502A 5.505 5.508 5.509	14.3-14.4 FIXED-SATELLITE (Earth-to-space) 5.457A 5.484A 5.506 5.506B Mobile-satellite (Earth-to-space) 5.506A Radionavigation-satellite 5.504A	14.3-14.4 FIXED-SATELLITE (Earth-to-space) 5.457A 5.484A 5.506 5.506B Mobile-satellite (Earth-to-space) 5.506A Radionavigation-satellite 5.504A	14.2-14.4 FIXED-SATELLITE (Earth-to-space) NG183 NGyy Mobile-satellite (Earth-to-space)	Satellite Communications (25)
14.4-14.7 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.506A 5.509A Space research (space-to-Earth) 5.504A	14.4-14.47 Fixed Mobile	14.4-14.47 Fixed Mobile	NG184	
14.47-14.5 FIXED FIXED-SATELLITE (Earth-to-space) 5.457A 5.457B 5.484A 5.506 5.506B MOBILE except aeronautical mobile Mobile-satellite (Earth-to-space) 5.504B 5.506A 5.509A Radio astronomy 5.149 5.504A	14.47-14.5 Fixed Mobile	14.47-14.5 Fixed Mobile	14.47-14.5 FIXED-SATELLITE (Earth-to-space) NG183 NGyy Mobile-satellite (Earth-to-space)	
14.5-14.8 FIXED FIXED-SATELLITE (Earth-to-space) 5.510 MOBILE Space research	US203 US342 14.5-14.7145 FIXED. Mobile Space research 14.7145-14.8 MOBILE Fixed Space research	US203 US342 14.5-14.8	US203 US342 14.5-14.8	
14.8-15.35 FIXED MOBILE Space research	14.8-15.1365 MOBILE SPACE RESEARCH Fixed US310 15.1365-15.35 FIXED SPACE RESEARCH Mobile 5.339 US211	14.8-15.1365 MOBILE SPACE RESEARCH Fixed US310 15.1365-15.35 FIXED SPACE RESEARCH Mobile 5.339 US211	14.8-15.1365 US310 15.1365-15.35 5.339 US211	

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## NON-FEDERAL GOVERNMENT (NG) FOOTNOTES

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NGxxx In the bands 10.95-11.2 GHz and 11.45-11.7 GHz (space-to-Earth), Vehicle-Mounted Earth Stations (VMES) as regulated under 47 CFR part 25 may be authorized to communicate with space stations of the fixed-satellite service but must accept interference from stations of the fixed service operating in accordance with the Commission's Rules.

NGyyy In the bands 11.7-12.2 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space), Vehicle-Mounted Earth Stations (VMES) as regulated under 47 CFR part 25 are an application of the fixed-satellite service and may be authorized to communicate with space stations of the fixed-satellite service on a primary basis.

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## PART 25 – SATELLITE COMMUNICATIONS

3. The authority citation for Part 25 continues to read as follows:

Authority: 47 U.S.C. §§ 701-744. Interprets or applies Sections 4, 301, 302, 303, 307, 309 and 332 of the Communications Act, as amended, 47 U.S.C. §§ 154, 301, 302, 303, 307, 309, and 332, unless otherwise noted.

4. Part 25 is amended by adding new Section 25.XXX to the Table of Contents to read as follows:

\*\*\*\*\*

§ 25.XXX Blanket Licensing provisions for Vehicle-Mounted Earth Stations (VMESs) 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) frequency bands and transmitting in the 14.0-14.5 GHz (Earth-to-space) frequency band, operating with Geostationary Satellites in the Fixed-Satellite Service.

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5. Section 25.115 is amended by revising paragraph (a)(2)(iii) to read as follows:

**§ 25.115 Application for earth station authorizations.**

\*\*\*\*\*

(a)(2)(iii) The earth station is not an ESV or a VMES.

\*\*\*\*\*

6. Section 25.130 is amended by revising paragraph (a) to read as follows:

**§ 25.130 Filing requirements for transmitting earth stations.**

(a) Applications for a new or modified transmitting earth station facility shall be submitted on FCC Form 312, and associated Schedule B, accompanied by any required exhibits, except for those earth station applications filed on FCC Form 312EZ pursuant to § 25.115(a). All such earth station license applications must be filed electronically through the International Bureau Filing System (IBFS) in accordance with the applicable provisions of part 1, subpart Y of this chapter. Additional filing requirements for Earth Stations on Vessels are described in §§ 25.221 and 25.222 of this part. Additional filing requirements for Vehicle-Mounted Earth Stations are described in § 25.XXX of this part. In addition, applicants not required to submit applications on Form 312EZ, other than ESV or VMES applicants, must submit the following information to be used as an "informative" in the public notice issued under § 25.151 as an attachment to their application:

\* \* \* \* \*

7. Section 25.132 is amended by revising paragraph (b)(3) to read as follows:

**§ 25.132 Verification of earth station antenna performance standards.**

\* \* \* \* \*

(b)(3) Applicants seeking authority to use an antenna that does not meet the standards set forth in §25.209(a) and (b), pursuant to the procedure set forth in § 25.220 or subject to rules in § 25.XXX, are required to submit a copy of the manufacturer's range test plots of the antenna gain patterns specified in paragraph (b)(1) of this section.

\* \* \* \* \*

8. Section 25.201 is amended by adding the following definition in alphabetical order to read as follows:

**§ 25.201 Definitions.**

\* \* \* \* \*

Vehicle-Mounted Earth Station (VMES). A VMES is an earth station, operating from a motorized vehicle that travels primarily on land, that receives from and transmits to fixed-satellite space stations and operates pursuant to the requirements set out § 25.XXX of this part.

\* \* \* \* \*

9. Section 25.202 is amended by adding paragraph (a)(9) to read as follows:

**§ 25.202 Frequencies, frequency tolerance and emission limitations.**

\* \* \* \* \*

(a)(9) The following frequencies are available for use by Vehicle-Mounted Earth Stations (VMESs):

- 10.95-11.2 GHz (space-to-Earth)
- 11.45-11.7 GHz (space-to-Earth)
- 11.7-12.2 GHz (space-to-Earth)
- 14.0-14.5 GHz (Earth-to-space)

VMESs shall be authorized as set forth in § 25.XXX of this chapter.

\* \* \* \* \*

10. Section 25.203 is amended by revising paragraphs (a), (b), (d) and (k) and the introductory language in paragraph (c) to read as follows:

**§ 25.203 Choice of sites and frequencies.**

(a) Sites and frequencies for earth stations, other than ESVs or VMESs, operating in frequency bands shared with equal rights between terrestrial and space services, shall be selected, to the extent practicable, in areas where the surrounding terrain and existing frequency usage are such as to minimize the possibility of harmful interference between the sharing services.

(b) An applicant for an earth station authorization, other than an ESV or a VMES, in a frequency band shared with equal rights with terrestrial microwave services shall compute the great circle coordination distance contour(s) for the proposed station in accordance with the procedures set forth in § 25.251. The applicant shall submit with the application a map or maps drawn to appropriate scale and in a form suitable for reproduction indicating the location of the proposed station and these contours. These maps, together with the pertinent data on which the computation of these contours is based, including all relevant transmitting and/or receiving parameters of the proposed station that are necessary to assess the likelihood of interference, an appropriately scaled plot of the elevation of the local horizon as a function of azimuth, and the electrical characteristics of the earth station antenna(s), shall be submitted by the applicant in a single exhibit to the application. The coordination distance contour plot(s), horizon elevation plot, and antenna horizon gain plot(s) required by this section may also be submitted in tabular numerical format at 5° azimuthal increments instead of graphical format. At a minimum, this exhibit shall include the information listed in paragraph (c)(2) of this section. An earth station applicant shall also include in the application relevant technical details (both theoretical calculations and/or actual measurements) of any special techniques, such as the use of artificial site shielding, or operating procedures or restrictions at the proposed earth station which are to be employed to reduce the likelihood of interference, or of any particular characteristics of the earth station site which could have an effect on the calculation of the coordination distance.

(c) Prior to the filing of its application, an applicant for operation of an earth station, other than an ESV or a VMES, shall coordinate the proposed frequency usage with existing terrestrial users and with applicants for terrestrial station authorizations with previously filed applications in accordance with the following procedure:

\* \* \* \* \*

(d) An applicant for operation of an earth station, other than an ESV or a VMES, shall also ascertain whether the great circle coordination distance contours and rain scatter coordination distance contours, computed for those values of parameters indicated in § 25.251 (Appendix 7 of the ITU RR) for international coordination, cross the boundaries of another Administration. In this case, the applicant shall furnish the Commission copies of these contours on maps drawn to appropriate scale for use by the Commission in effecting coordination of the proposed earth station with the Administration(s) affected.

\* \* \* \* \*

(k) An applicant for operation of an earth station, other than an ESV or a VMES, that will operate with a geostationary satellite or non-geostationary satellite in a shared frequency band in which the non-geostationary system is (or is proposed to be) licensed for feeder links, shall demonstrate in its applications that its proposed earth station will not cause unacceptable interference to any other satellite network that is authorized to operate in the same frequency band, or certify that the operations of its earth station shall conform to established coordination agreements between the operator(s) of the space station(s) with which the earth station is to communicate and the operator(s) of any other space station licensed to use the band.

11. Section 25.204 is amended by modifying the introduction to paragraph (a) and adding paragraph (j) to read as follows:

**§ 25.204 Power limits.**

(a) In bands shared coequally with terrestrial radio communication services, the equivalent isotropically radiated power transmitted in any direction towards the horizon by an earth station, other than an ESV or a VMES, operating in frequency bands between 1 and 15 GHz, shall not exceed the following limits except as provided for in paragraph (c) of this section:

\*\*\*\*\*

(j) Within 125 km of the Tracking and Data Relay System Satellite (TDRSS) sites identified in § 25.XXX(a)(11) of this chapter, VMES transmissions in the 14.0-14.2 GHz (Earth-to-space) band shall not exceed an EIRP spectral density towards the horizon of 12.5 dBW/MHz, and shall not exceed an EIRP towards the horizon of 16.3 dBW.

12. Section 25.205 is amended by adding paragraph (c) to read as follows:

**§ 25.205 Minimum angle of antenna elevation.**

\*\*\*\*\*

(c) VMESs making a special showing requesting angles of elevation less than 5° measured from the horizontal plane to the direction of maximum radiation pursuant to (a) of this section must still meet the EIRP and EIRP density towards the horizon limits contained in § 25.204(j) of this chapter.

13. Part 25 is amended by adding new Section 25.XXX to read as follows:

**§ 25.XXX Blanket Licensing provisions for Vehicle-Mounted Earth Stations (VMESs) receiving in the 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) frequency bands and transmitting in the 14.0-14.5 GHz (Earth-to-space) frequency band, operating with Geostationary Satellites in the Fixed-Satellite Service.**

(a) All applications for licenses for VMESs 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) frequency bands, and transmitting in the 14.0-14.5 GHz (Earth-to-space) frequency band, to geostationary satellites in the fixed-satellite service shall

provide sufficient data to demonstrate that the VMES operations meet the following criteria, which are ongoing requirements that govern all VMES licensees and operations in these bands:

(1) The off-axis EIRP spectral density for co-polarized signals, emitted from the VMES in the plane of the geostationary satellite orbit as it appears at the particular earth station location (*i.e.*, the plane determined by the focal point of the antenna and the line tangent to the arc of the geostationary satellite orbit at the position of the target satellite), shall not exceed the following values:

$$\begin{array}{ll} 15 - 25\log(\theta) - 10*\log(N) \text{ dBW/4kHz} & \text{for } 1.25^\circ \leq \theta \leq 7.0^\circ \\ -6 - 10*\log(N) \text{ dBW/4kHz} & \text{for } 7.0^\circ < \theta \leq 9.2^\circ \\ 18 - 25\log(\theta) - 10*\log(N) \text{ dBW/4kHz} & \text{for } 9.2^\circ < \theta \leq 48^\circ \\ -24 - 10*\log(N) \text{ dBW/4kHz} & \text{for } 48^\circ < \theta \leq 180^\circ \end{array}$$

where  $\theta$  is the angle in degrees from the axis of the main lobe. For a VMES network using frequency division multiple access (FDMA) or time division multiple access (TDMA) technique, N is equal to one. For a VMES network using code division multiple access (CDMA) technique, N is the maximum number of co-frequency simultaneously transmitting earth stations in the same satellite receiving beam.

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

$$\begin{array}{ll} 18 - 25\log(\theta) - 10*\log(N) \text{ dBW/4kHz} & \text{for } 1.25^\circ \leq \theta \leq 48.0^\circ \\ -24 - 10*\log(N) \text{ dBW/4kHz} & \text{for } 48.0^\circ < \theta \leq 180^\circ \end{array}$$

where  $\theta$  and N are defined as set forth in paragraph (a)(1) of this section.

(3) For  $\theta > 7.0^\circ$ , the values given in paragraphs (a)(1) of this Section may be exceeded by no more than 10% of the sidelobes, provided no individual sidelobe exceeds the criteria given by more than 3 dB.

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

$$\begin{array}{ll} 5 - 25\log(\theta) - 10*\log(N) \text{ dBW/4kHz} & \text{for } 1.8^\circ \leq \theta \leq 7.0^\circ \\ -16 - 10*\log(N) \text{ dBW/4kHz} & \text{for } 7.0^\circ < \theta \leq 9.2^\circ \end{array}$$

where  $\theta$  and N are defined as set forth in paragraph (a)(1) of this section.

(5) For non-circular VMES antennas, the major axis of the antenna will be aligned with the tangent to the geostationary satellite orbital arc at the target satellite point, to the extent required to meet specified off-axis EIRP criteria.

(6) A pointing error of less than  $0.2^\circ$ , between the orbital location of the target satellite and the axis of the main lobe of the VMES antenna.

(7) All emissions from the VMES shall automatically cease 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  $0.5^\circ$ , and transmission will not resume until such angle is less than  $0.2^\circ$ .

(8) There shall be a point of contact in the United States, with phone number and address included with the application, available 24 hours a day, 7 days a week, with authority and ability to cease all emissions from the VMES.

(9) A VMES that exceeds the radiation guidelines of section 1.1310 of this chapter, Radiofrequency radiation exposure limits, must provide, with its environmental assessment, a plan for mitigation of radiation exposure to the extent required to meet those guidelines.

(10) A VMES receiving in the 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) frequency bands, and transmitting in the 14.0-14.5 GHz (Earth-to-space) frequency band shall operate with the following provisions:

(i) 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 year. Records will be recorded at time intervals no greater than every 20 minutes while the VMES is transmitting. The VMES operator will make this data available upon request to a coordinator, fixed-satellite system operator, NTIA, or the Commission within 24 hours of the request.

(ii) VMES operators shall control all VMESs by a Hub earth station located in the United States.

(11) 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 NASA. When NASA seeks to provide similar protection to future TDRSS sites that have been coordinated through the National Telecommunications and Information Administration (NTIA) Interdepartment Radio Advisory Committee (IRAC) Frequency Assignment Subcommittee process, NTIA will notify the Commission that the site is nearing operational status. Upon public notice from the Commission, all Ku-band VMES operators must cease operations in the 14.0-14.2 GHz band within 125 km of the new TDRSS site until they have coordinated with the new site. After coordination, VMES operations will then again be permitted to operate 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.

(12) Operations of VMESs in the 14.47-14.5 GHz (Earth-to-space) frequency band within (1) 45 km of the radio observatory on St. Croix, Virgin Islands (latitude 17° 46' N, longitude 64° 35' W); (2) 125 km of the radio observatory on Mauna Kea, Hawaii (latitude 19° 48' N, longitude 155° 28' W); (3) 90 km of the Arecibo Observatory on Puerto Rico (latitude 18° 20' 46" N, longitude 66° 45' 11" W); and (4) 160 km of the radio observatories listed in US203 as observing in the 14.47-14.5 GHz band are subject to coordination with the National Science Foundation (NSF).

(13) In the 10.95-11.2 GHz (space-to-Earth) and 11.45-11.7 GHz (space-to-Earth) frequency bands, a VMES shall not claim protection from interference from any authorized terrestrial stations to which frequencies are either already assigned, or may be assigned in the future.

(14) VMES antennas licensed for reception of radio transmissions from space stations in the fixed-satellite service 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 for which they have equal status with respect to other fixed-satellite service applications are protected from harmful interference caused by other space stations only to the degree to which an earth station employing an antenna conforming to the referenced patterns defined in § 25.209(a) and (b) of the rules is protected from radio interference.

(b) Applications for VMES operation in the 14.0-14.5 GHz (Earth-to-space) to geostationary satellites in the fixed-satellite service must include, in addition to the particulars of operation identified on Form 312 and associated Schedule B, the following data for each earth station antenna type:

(1)(i) A series of EIRP density charts or tables at the maximum EIRP density listed in Schedule B, calculated for a production earth station antenna, based on measurements taken on a calibrated antenna range at 14.25 GHz, with the off-axis EIRP envelope set forth in paragraphs (a)(1) through (a)(4) of this section superimposed, as follows:

- (i) showing off-axis co-polarized EIRP spectral density in the azimuth plane, at off-axis angles from minus 10° to plus 10° and from minus 180° to plus 180°.
- (ii) showing off-axis co-polarized EIRP spectral density in the elevation plane, at off-axis angles from 0° to plus 30°.
- (iii) showing off-axis cross-polarized EIRP spectral density in the azimuth plane, at off-axis angles from minus 10° to plus 10°.
- (iv) showing off-axis cross-polarized EIRP spectral density in the elevation plane, at off-axis angles from minus 10° to plus 10°;

or

(1)(ii) A certification, in Schedule B, that the VMES antenna conforms to the gain pattern criteria of § 25.209(a) 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) through (a)(4) of this section will be met.

(2) The Multiple Access technique being employed and the value of N.

(3) A certification from the antenna manufacturer countersigned by the applicant that the antenna complies with the requirements in paragraphs (a)(6) and (a)(7) of this section.

(4) The contact information pursuant to paragraph (a)(8) of this section.

(5) The mitigation plan pursuant to paragraph (a)(9) of this section.

(6) Indication of whether the VMES will operate in the regions indicated in paragraph (a)(11) or (a)(12) of this section.

(7) For the hub station, as required pursuant to paragraph (a)(10)(ii) of this section, the call sign for a previously authorized earth station, the call sign of a pending earth station application, or the technical information in Schedule B, pursuant to § 25.115, if the earth station is to be licensed concurrently with the VMES terminals. The call sign of hub station is to be listed in the remote control section of the Form 312 Schedule B.

14. Section 25.271 is amended by revising paragraphs (b) and (f) and the introduction to paragraph (c), to read as follows:

**§ 25.271 Control of transmitting stations.**

\*\*\*\*\*

(b) The licensee of a transmitting earth station, other than an ESV or a VMES, licensed under this part shall ensure that a trained operator is present on the earth station site, or at a designated remote control point for the earth station, at all times that transmissions are being conducted. No operator's license is required for a person to operate or perform maintenance on facilities authorized under this part.

(c) Authority will be granted to operate a transmitting earth station, other than an ESV or a VMES, by remote control only on the conditions that:

\*\*\*\*\*

(f) Rules for control of transmitting ESVs are provided in §§ 25.221 and 25.222 and rules for control of transmitting VMESs are provided in § 25.XXX.

## APPENDIX C

## Initial Regulatory Flexibility Analysis

As required by the Regulatory Flexibility Act of 1980, as amended ("RFA"),<sup>176</sup> the Commission has prepared this present Initial Regulatory Flexibility Analysis ("IRFA") of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in this *Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to the Fixed Satellite Service*, Notice of Proposed Rulemaking ("Notice").<sup>177</sup> Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the *Notice* provided in paragraph 88 of the *Notice*. The Commission will send a copy of the *Notice*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration ("SBA").<sup>178</sup> In addition, the *Notice* and IRFA (or summaries thereof) will be published in the Federal Register.<sup>179</sup>

**A. Need for, and Objectives of, the Proposed Rules**

In this *Notice* the Commission makes proposals and seeks information on measures to provide a level of regulatory certainty to government, space research, radio astronomy, and fixed satellite service operators regarding operations of Vehicle-Mounted Earth Stations ("VMES"). As discussed in greater detail below, the Commission seeks comment on rules and procedures to license VMES for operation in the Ku-band similar to the Commission's current licensing rules for Earth Stations on Vessels ("ESVs") that operate in the Ku-band, with appropriate modifications. The record established in the proceeding will allow the Commission to determine the effect of authorizing VMES terminals and will facilitate the development of any future rules for VMES. Any future rules would be designed to support the deployment of VMES terminals to the benefit of the American public without adversely affecting the operation and continued growth of incumbent radio services. In this regard, the objective is to create a licensing program that ensures incumbent radio services protection against harmful interference.

**B. Legal Basis**

The *Notice* is adopted pursuant to Sections 1, 4(i), 4(j), 7(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), and 308 of the Communications Act of 1934, as amended, 47 U.S.C. Sections 151, 154(i), 154(j), 157(a), 301, 303(c), 303(f), 303(g), 303(r), 303(y), 308.

<sup>176</sup> See 5 U.S.C. § 603. The RFA, see 5 U.S.C. § 601 — 612, has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 ("Small Business Act"), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

<sup>177</sup> See *Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Frequency Bands Allocated to the Fixed Satellite Service*, 18 Docket No. 07-101.

<sup>178</sup> See 5 U.S.C. § 603(a).

<sup>179</sup> See 5 U.S.C. § 603(a).

### C. Description and Estimate of the Number of Small Entities to Which the Proposals Will Apply

The RFA directs agencies to provide a description of and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.<sup>180</sup> The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction."<sup>181</sup> In addition, the term "small business" has the same meaning as the term "small business concern" under the Small Business Act.<sup>182</sup> A small business concern is one that: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.<sup>183</sup> Below, we further describe and estimate the number of small entity licensees that may be affected by the adopted rules.

**Satellite Telecommunications.** The SBA has developed a small business size standard for Satellite Telecommunications Carriers. This category "comprises establishments primarily engaged in providing point-to-point telecommunications services to other establishments in the telecommunications and broadcasting industries by forwarding and receiving communications signals via a system of satellites or reselling satellite telecommunications."<sup>184</sup> According to Census Bureau data for 2002, there were 371 firms in the category that operated for the entire year.<sup>185</sup> Of this total, 307 firms had annual receipts of under \$10 million, 26 firms had annual receipts of \$10 million to \$24,999,990, and 38 firms had annual receipts of \$25 million or more.<sup>186</sup> Thus, under this size standard, the majority of firms can be considered small.

A second category for international service providers, called "Other Telecommunications," "comprises establishments primarily engaged in (1) providing specialized telecommunications applications, such as satellite tracking, communications telemetry, and radar station operations; or (2) providing satellite terminal stations and associated facilities operationally connected with one or more terrestrial communications systems and capable of transmitting telecommunications to or receiving telecommunications from satellite systems."<sup>187</sup> For this category, Census Bureau data for 2002 show that

<sup>180</sup> 5 U.S.C. § 608(b)(3).

<sup>181</sup> *Id.* § 601(6).

<sup>182</sup> 5 U.S.C. § 601(3) (incorporating by reference the definition of "small business concern" in 15 U.S.C. § 632). Pursuant to the RFA, the statutory definition of a small business applies "unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after the opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register." 5 U.S.C. § 601(3).

<sup>183</sup> Small Business Act, 15 U.S.C. § 632 (1996).

<sup>184</sup> U.S. Census Bureau, 2002 North American Industry Classification System (NAICS) Definitions, "517410 Satellite Telecommunications"; <http://www.census.gov/epcd/naics02/def/NDEF517.HTM>.

<sup>185</sup> U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 4, NAICS code 517410 (issued Nov.. 2005).

<sup>186</sup> *Id.*

<sup>187</sup> U.S. Census Bureau, 2002 NAICS Definitions, "517910 Other Telecommunications"; <http://www.census.gov/epcd/naics02/def/NDEF517.HTM>.

there were a total of 332 firms that operated for the entire year.<sup>188</sup> Of this total, 303 firms had annual receipts of under \$10 million, 15 firms had annual receipts of \$10 million to \$24,999,999, and 14 firms had annual receipts of \$25 million or more.<sup>189</sup> Consequently, we estimate that the majority of Other Telecommunications firms are small entities that might be affected by our action.

**Space Stations (Geostationary).** Commission records reveal that there are approximately 15 space station licensees authorized for use in the Ku-band. We do not request nor collect annual revenue information, and thus are unable to estimate of the number of geostationary space stations that would constitute a small business under the SBA definition cited above, or apply any rules providing special consideration for Space Station (Geostationary) licensees that are small businesses.

**Fixed Satellite Transmit/Receive Earth Stations.** Currently there are approximately 2,532 operational fixed-satellite transmit/receive earth stations authorized for use in the Ku-band. The Commission does not request or collect annual revenue information, and thus is unable to estimate the number of earth stations that would constitute a small business under the SBA definition.

**Cellular Licensees.** The SBA has developed a small business size standard for wireless firms within the two broad economic census categories of "Paging"<sup>190</sup> and "Cellular and Other Wireless Telecommunications."<sup>191</sup> Under both categories, the SBA deems a wireless business to be small if it has 1,500 or fewer employees. For the census category of Paging, Census Bureau data for 2002 show that there were 807 firms in this category that operated for the entire year.<sup>192</sup> Of this total, 804 firms had employment of 999 or fewer employees, and three firms had employment of 1,000 employees or more.<sup>193</sup> Thus, under this category and associated small business size standard, the majority of firms can be considered small. For the census category of Cellular and Other Wireless Telecommunications, Census Bureau data for 2002 show that there were 1,397 firms in this category that operated for the entire year.<sup>194</sup> Of this total, 1,378 firms had employment of 999 or fewer employees, and 19 firms had employment of 1,000 employees or more.<sup>195</sup> Thus, under this second category and size standard, the majority of firms can, again, be considered small.

<sup>188</sup> U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 4, NAICS code 517910 (issued Nov. 2005).

<sup>189</sup> *Id.*

<sup>190</sup> 13 C.F.R. § 121.201, NAICS code 517211.

<sup>191</sup> 13 C.F.R. § 121.201, NAICS code 517212.

<sup>192</sup> U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 5, NAICS code 517211 (issued Nov. 2005).

<sup>193</sup> *Id.* The census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "1000 employees or more."

<sup>194</sup> U.S. Census Bureau, 2002 Economic Census, Subject Series: Information, "Establishment and Firm Size (Including Legal Form of Organization)," Table 5, NAICS code 517212 (issued Nov. 2005).

<sup>195</sup> *Id.* The census data do not provide a more precise estimate of the number of firms that have employment of 1,500 or fewer employees; the largest category provided is for firms with "1000 employees or more."

#### **D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements**

The *Notice* seeks comment on whether to expand the applicability of the current ESV rules to VMES. The proposed VMES rules, if adopted, would require satellite telecommunications operators to establish a database for tracking the location of VMES remote earth stations. This database would assist investigations of interference claims. The *Notice* seeks comment on this proposal, including the effectiveness and utility of the proposal, and seeks comment regarding possible alternatives. The proposed rules, if adopted, also would require VMES operators to name a point of contact to maintain information about location and frequencies used by VMES terminals. Such information would assist in investigating interference claims. The Commission does not expect significant costs associated with these proposals, if adopted. Therefore, we do not anticipate that the burden of compliance would be greater for smaller entities.

The *Notice* seeks comment on possible methods for coordinating VMES operations with space research service and radio astronomy operations.

#### **E. Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered**

The RFA requires that, to the extent consistent with the objectives of applicable statutes, the analysis shall discuss significant alternatives such as: (1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage or the rule, or any part thereof, for small entities.<sup>196</sup>

This *Notice* solicits comment on alternatives for more efficient processing of VMES applications and simplification of VMES procedures, for example, by migrating from non-conforming use licensing to a licensing method that would provide for licenses with terms of fifteen years. The *Notice* also seeks comment on streamlining the application process for VMES operations by permitting blanket licensing of multiple VMES terminals in a single application, as an alternative to requiring all VMES terminals to be licensed individually. Adoption of some of these proposals would simplify the application process for VMES and establish licensing terms consistent with other satellite-based services, such as ESV. Thus, adoption of the proposed rules should reduce the costs associated with obtaining and maintaining authority to operate a VMES network.

#### **F. Federal Rules that May Duplicate, Overlap, or Conflict with the Proposed Rules**

None

<sup>196</sup> 5 U.S.C. § 603(c)(1)-(4).