

service allocation is unused, we will limit mobile service use to the mobile except aeronautical mobile service.<sup>133</sup>

51. The Commission has previously reallocated the band 7300-7350 MHz (a WARC-92 HFBC band) to the broadcasting service on a co-primary basis with the fixed service until April 1, 2007, at which time this 50 kilohertz is allocated exclusively for HFBC use.<sup>134</sup> Because the only difference between the reallocation of the band 7300-7350 kHz and the band 7350-7400 kHz is the transition period, we conclude that the reallocation of the band 7300-7400 kHz to the broadcasting service should be shown in a consistent manner. Therefore, we are moving the transition plan for the band 7300-7350 kHz from footnote US366 to new United States footnote US396, which will contain our transition plans for both the band 7300-7350 MHz and the band 7350-7400 kHz. In addition, we will cease the licensing of new non-Federal stations in the fixed and mobile services in the band 7350-7400 kHz on March 29, 2009.

52. With regard to incumbent stations in the fixed or mobile services in the band 7350-7400 kHz, it is not necessary to make special provision for the licensees in the Industrial/Business Radio Pool because most (101 of 102 licenses) are required to operate equipment that is tunable throughout the bands specified for long distance communications. We also decline to make special provision for the three coast stations that are licensed to operate in the band 7350-7400 kHz because these stations can continue to operate on their licensed frequencies on a non-interference, unprotected basis to the HFBC service<sup>135</sup> or these coast station licensees can move their operations to other frequency bands that are allocated to the fixed or mobile services.<sup>136</sup> Our staff has reviewed the current seasonal schedule for the HFBC service. Because of the extremely light use of HFBC spectrum targeting Alaska, we conclude that it is not necessary to place further burdens on the Alaska private-fixed stations, and therefore, will not reallocate the 2.8 kilohertz of spectrum used by these 18 licensees (the sub-band 7368.5-7371.3 kHz).<sup>137</sup> Accordingly, we are adopting new United States footnote US396, which reads as follows:

US396 The band 7300-7400 kHz is allocated exclusively to the broadcasting service in accordance with the schedule specified below, except that the sub-band 7368.5-7371.3 kHz is allocated to the fixed service on an exclusive basis for non-Federal use within the State of Alaska in accordance with 47 C.F.R. § 80.387.

(a) Until March 25, 2007, the band 7300-7350 kHz is allocated to the fixed service on a primary basis and to the mobile except aeronautical mobile service on a secondary basis for Federal and non-Federal use. After March 25, 2007, authority to operate in the band 7300-7350 kHz shall not be extended to new non-Federal stations in the fixed and mobile except aeronautical mobile services. After March 25, 2007,

<sup>133</sup> See para. 47, *supra*, concerning the deletion of the unused aeronautical mobile service allocation in the band 7350-7400 MHz.

<sup>134</sup> In the WARC-92 HFBC bands, the Commission added an entry for the broadcasting service to the U.S. Table, continued to display the entries for incumbent fixed and mobile services in the U.S. Table, and implemented the exclusive broadcasting allocation in footnote US366. We are not displaying the entries for the primary fixed and secondary mobile services in the band 7300-7400 MHz in the U.S. Table. Therefore, the band 7300-7350 kHz has been removed from footnote US366 and it has been added to footnote US396.

<sup>135</sup> That is, these coast station licensees must keep themselves apprised of the HFBC seasonal schedule so that they do not operate on a channel that would cause harmful interference to HFBC programming. These coast station licenses are discussed in para. 27, *supra*.

<sup>136</sup> For example, Section 80.371(b) lists the working frequencies in the frequency range from 4 kHz to 27.5 MHz that are available to public coast stations. See Section 80.373 for private communication frequencies. 47 C.F.R. §§ 80.371(b), 80.373.

<sup>137</sup> It has long been Commission policy to recognize Alaska's unique radiocommunication needs in our Rules. For example, Section 2.102(h) contains the special provisions regarding the use of spectrum allocated to the fixed and land mobile services below 25 MHz. In particular, Section 2.102(h)(1)(ii)(D) states that one of the limited circumstances in which fixed stations may be granted authority to operate on frequencies below 25 MHz is for the provision of communication circuits wholly within the State of Alaska. See para. 26, *supra*.

Federal and non-Federal stations in the fixed and mobile except aeronautical mobile services shall: (1) be limited to communications wholly within the United States and its insular areas; (2) not cause harmful interference to the broadcasting service; (3) be limited to the minimum power needed to achieve communications; and (4) take account of the seasonal use of frequencies by the broadcasting service published in accordance with Article 12 of the ITU *Radio Regulations*.

(b) Until March 29, 2009, the band 7350-7400 kHz is allocated to the fixed service on a primary basis and to the mobile except aeronautical mobile service on a secondary basis for Federal and non-Federal use. After March 29, 2009, authority to operate in the band 7350-7400 kHz shall not be extended to new non-Federal stations in the fixed and mobile except aeronautical mobile services. After March 29, 2009, Federal and non-Federal stations in the fixed and mobile except aeronautical mobile services shall: (1) be limited to communications wholly within the United States and its insular areas; (2) not cause harmful interference to the broadcasting service; (3) be limited to the minimum power needed to achieve communications; and (4) take account of the seasonal use of frequencies by the broadcasting service published in accordance with Article 12 of the ITU *Radio Regulations*.

53. As stated above, it is longstanding Commission policy that, absent any Commission action to the contrary, the operation of stations located in the U.S. Pacific insular areas in Region 3 are governed by the Region 3 Table.<sup>138</sup> Therefore, in accordance with the Region 3 Table, the band 7350-7450 kHz is reallocated to the broadcasting service on a primary basis in the U.S. Pacific insular areas located in Region 3. In accordance with international footnote 5.143A, the band 7350-7450 kHz remains allocated, until March 29, 2009, to the fixed service on a primary basis and to the land mobile service on a secondary basis in the U.S. Pacific insular areas in Region 3.<sup>139</sup> At the end of the WRC-03 transition period (*i.e.*, after March 29, 2009), the band 7350-7450 kHz is allocated exclusively to the broadcasting service in the U.S. Pacific insular areas in Region 3.

54. In order to highlight the WARC-92 and WRC-03 transition plans in Part 90 of the Commission's Rules, we are adding new limitation (88) to the frequency range 2000 to 10,000 kHz in the Public Safety Pool Frequency Table, which will read as follows:<sup>140</sup>

(88) As of March 25, 2007, the FCC will cease to issue licenses for new stations in the fixed and mobile services in the following bands: 5900-5950 kHz, 7300-7350 kHz and 9400-9500 kHz. As of March 29, 2009, the FCC will cease to issue licenses for new stations in the fixed and mobile services in the band 7350-7400 kHz and, in the U.S. Pacific insular areas in Region 3, the band 7400-7450 kHz. Stations licensed as of March 25, 2007 in the bands 5900-5950 kHz, 7300-7350 kHz and 9400-9500 kHz and as of March 29, 2009 for the band 7350-7400 kHz in Region 2 and the band 7350-7450 kHz in Region 3 shall: (1) be limited to communications only within the United States and its insular areas; (2) not cause harmful interference to the broadcasting service; (3) be limited to the minimum power needed to achieve communications; and (4) take account of the seasonal use of frequencies by the broadcasting service published in accordance with Article 12 of the ITU *Radio Regulations*.

55. Likewise, in order to highlight the WARC-92 and WRC-03 transition plans in Industrial/Business Pool Frequency Table in Part 90 of the Commission's Rules, we are adding new limitation (90) to the frequency range 2000 to 25,000 kHz, which will read as follows:<sup>141</sup>

<sup>138</sup> 47 C.F.R. § 2.105(a), note 4.

<sup>139</sup> The staff conducted a geographic license search for Guam, the Northern Mariana Islands, and American Samoa, which are the only Region 3 insular areas that are listed in the ULS. In these insular areas, the only license in the ULS for the band 7350-7450 kHz is call sign WNJP931, which authorizes the use of 7409.5 kHz at two locations on Saipan (Northern Marianas College and Marianas High School).

<sup>140</sup> See Appendix A wherein § 90.20(c)(3) is revised by adding a reference to limitation (88) and new paragraph (d)(88) is added to § 90.20 in order to list new limitation (88).

<sup>141</sup> See Appendix A wherein § 90.35(b)(3) is revised by adding a reference to limitation (90) and new paragraph (c)(90) is added to § 90.35 in order to list new limitation (90).

(90) As of March 25, 2007, the FCC will cease to issue licenses for new stations in the fixed and mobile services in the following bands: 5900-5950 kHz, 7300-7350 kHz, 9400-9500 kHz, 11600-11650 kHz, 12050-12100 kHz, 13800-13870 kHz, and 15600-15800 kHz. As of March 29, 2009, the FCC will cease to issue licenses for new stations in the fixed and mobile services in the band 7350-7400 kHz and, in the U.S. Pacific insular areas in Region 3, the band 7400-7450 kHz. Stations licensed as of March 25, 2007 in the bands 5900-5950 kHz, 7300-7350 kHz, 9400-9500 kHz, 11600-11650 kHz, 12050-12100 kHz, 13800-13870 kHz, and 15600-15800 kHz and as of March 29, 2009 for the band 7350-7400 kHz in Region 2 and the band 7350-7450 kHz in Region 3 shall: (1) be limited to communications only within the United States and its insular areas; (2) not cause harmful interference to the broadcasting service; (3) be limited to the minimum power needed to achieve communications; and (4) take account of the seasonal use of frequencies by the broadcasting service published in accordance with Article 12 of the ITU *Radio Regulations*.

56. Consistent with the *WRC-03 Final Acts*, we are allocating the bands 6765-7000 kHz and 7400-8100 kHz to the mobile except aeronautical mobile (R) service on a primary basis for Federal and non-Federal use.<sup>142</sup> This action grants licensees increased flexibility and is expected to facilitate adaptive techniques, which together with automation techniques, can reduce the burden on the operator while making these mobile service radios more responsive to changing HF propagation conditions.

57. We are adopting WRC-03's phased-in approach for the allocation upgrade in the band 6765-7000 kHz. However, because this spectrum is allocated to the mobile service in the United States (rather than the more limited land mobile service), we are adding a new footnote to the U.S. Table that maintains this secondary mobile service allocation until the end of the transition period, and that otherwise parallels international footnote 5.138A. Accordingly, we adopt footnote US394, which reads as follows:

US394 Until 29 March 2009, the band 6765-7000 kHz is allocated to the fixed service on a primary basis and to the mobile service on a secondary basis. After this date, this band is allocated to the fixed and the mobile except aeronautical mobile (R) services on a primary basis.

58. We are allocating the band 7400-8100 kHz (7450-8100 kHz in the U.S. Pacific insular areas in Region 3) to the mobile except aeronautical mobile (R) service on a primary basis for Federal and non-Federal use and, at the request of NTIA, we are making this allocation upgrade effective as of the effective date of this Report and Order, in lieu of WRC-03's phased-in approach. Doing so will allow for primary mobile use of this band approximately four years earlier than under the phased-in approach. We received no comments opposing this action.

#### B. Service Rule Amendments for International Broadcast Stations

59. *Background.* WRC-03 required that HFBC transmitting stations meet the system specifications contained in Appendix 11 of the ITU *Radio Regulations*.<sup>143</sup> Appendix 11 describes the system specifications for DSB, SSB, and digitally modulated emissions in the HFBC bands. In general, Appendix 11 establishes minimum technical standards that enhance spectrum sharing. We noted, however, that the Commission's Rules for international broadcast stations currently do not provide for SSB or digital operations nor do our Rules for DSB operations mirror the Appendix 11 requirements.

60. WRC-03 resolved that whenever an administration replaces a DSB emission with an emission using digital or SSB modulation techniques, it should ensure that the level of interference is not

<sup>142</sup> Currently, the bands 6765-7000 kHz and 7400-8100 kHz are allocated to the fixed service on a primary basis and to the mobile service on a secondary basis for Federal and non-Federal use. We are upgrading the allocation status of the mobile service from secondary to primary and, consistent with the worldwide allocation, we are prohibiting the use of this spectrum by the aeronautical mobile (R) service.

<sup>143</sup> See *WRC-03 Final Acts*, Article 23, No. 23.12.

greater than that caused by the original DSB emission.<sup>144</sup> WRC-03 also invited administrations to encourage the inclusion of digital modulation capability in all new HFBC transmitters put into service after January 1, 2004.<sup>145</sup>

61. Currently, Section 73.751 of the Commission's Rules states that no international broadcast station will be authorized to install, or be licensed for operation of, transmitter equipment with a rated carrier power of less than 50 kW.<sup>146</sup> The technical basis of this rule is that, given frequency congestion, an international broadcast station using DSB modulation needs to transmit with an output power of at least 50 kW in order to provide a signal that is strong enough to be received with low cost HFBC radios. We have previously waived this Rule in order to authorize licensees to operate SSB transmitters with 50 kW PEP because this power provides approximately the same coverage area (even though this power is equivalent to only 15-20 kW relative to a DSB transmitter). Likewise, one of the advantages of digital transmission is that a lower rated transmitter output power can serve the same geographic area as a higher power analog signal. Staff research indicated that a mean power of 20 kW for digital transmissions would provide approximately the same coverage as the minimum power for DSB transmissions currently provides.

62. *Proposal.* We proposed to update the Commission's Rules for international broadcast stations so that SSB and digital operations can be authorized without the need for a waiver of the rules and so that DSB requirements would match those of the ITU *Radio Regulations*. Specifically, we proposed to add the ITU's RF requirements for DSB, SSB, and digital HFBC systems, which are listed in Appendix 11 of the ITU *Radio Regulations*, to the Commission's Rules so that there would be no ambiguity regarding the rules with which HF broadcasters must comply.<sup>147</sup>

63. We stated that, in conjunction with the adoption of revised international footnote 5.134, the effect of these proposals would be to grant U.S.-licensed international broadcast stations the flexibility to continue to transmit analog DSB signals or to transmit SSB or digital signals, including DRM signals (currently the only ITU-recommended digital standard for use in HFBC bands), which would allow international broadcast stations to provide FM-like sound quality to listeners in foreign countries. Nonetheless, we requested comment on whether the DRM standard should be required for digital transmissions.<sup>148</sup> We observed that the ITU had recently approved the use of the DRM standard for broadcasting use in frequency bands below 30 MHz,<sup>149</sup> that some international broadcasters have begun DRM transmissions; and that broadcasting, unlike many other radiocommunication services, is a mass media service and that for such a service, standards are often useful.<sup>150</sup>

64. We proposed to revise Section 73.751 to codify to 50 kW PEP and 20 kW mean power as the minimum operating powers for SSB and digital systems, respectively.<sup>151</sup> We requested comment on whether digital modulation capability should be required in all new HFBC transmitters.

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<sup>144</sup> See *WRC-03 Final Acts*, Resolution 517 (Rev. WRC-03), *resolves* 3.

<sup>145</sup> See *WRC-03 Final Acts*, Resolution 517.

<sup>146</sup> 47 C.F.R. § 73.751 (Operating power).

<sup>147</sup> *Omnibus NPRM*, 19 FCC Rcd at 6600, para. 18.

<sup>148</sup> *Id* at para. 19.

<sup>149</sup> See Draft New Recommendation ITU-R BS.[Doc.6/379], document 6/BL/3-E, dated August 21, 2003. The DRM standard is more precisely IEC Standard 62272-1, which is available in electronic form at ITU website: [http://www.itu.int/md/choice\\_md.asp?id=R00-WP6E-C-0284!P1!ZIP-E&lang=e&type=sitem](http://www.itu.int/md/choice_md.asp?id=R00-WP6E-C-0284!P1!ZIP-E&lang=e&type=sitem).

<sup>150</sup> *Omnibus NPRM*, 19 FCC Rcd at 6600, para. 19.

<sup>151</sup> *Id* at para. 20.

65. *Comments.* NASB states that it agrees with all of the proposals relating to HF broadcasting, except for the minimum power level for digital transmissions.<sup>152</sup> Specifically, NASB agrees with the system specifications for DSB, SSB, and digital transmissions as indicated in the proposed revision of Section 73.756. NASB does not agree that a mean power of 20 kW for digital transmissions is necessary in order to provide approximately the same coverage as a 50-kW analog transmission.<sup>153</sup> Instead, NASB requests that the Commission adopt a lower minimum power level.<sup>154</sup> NASB emphasizes that in order for digital transmissions to co-exist along with DSB and SSB transmissions in the same frequency bands without undue interference, it will be necessary for the power of the digital transmissions to be several dB lower than that which is currently used for DSB and SSB emissions, *i.e.*, specifically a minimum of 7 dB lower. Accordingly, NASB recommends that the Commission adopt 10 kW as the minimum mean power for digital HFBC transmissions.<sup>155</sup>

66. NASB “believes that the DRM standard should be the required standard for digital transmissions” and states that it is unwise and unnecessary to require inclusion of the capability to offer digital in all new HFBC transmitters because manufacturers already are building in provisions for digital modulation.<sup>156</sup>

67. NASB supports the authorization of SSB and digital transmissions in the HF broadcasting service bands, agrees that U.S.-licensed international broadcast stations should have the flexibility to transmit analog DSB signals, SSB signals or digital signals in all of the frequency ranges allocated to the service, and agrees that SSB transmissions should be authorized with a minimum 50 kW of PEP, because this provides approximately the same coverage area as a 50-kW carrier power for an analog DSB HF transmission.<sup>157</sup>

68. Leggett states that SSB transmissions are generally more efficient than DSB transmissions, and thus, the Commission can authorize a lower minimum power for SSB transmissions.<sup>158</sup> However, Leggett states that the power level selected should be such that the SSB signal would at least be equivalent to a DSB signal over the same signal path from transmitter to listener. Leggett recommends that HFBC broadcasters be allowed to use digital broadcasting technology if they judge that it will be useful, but states that HFBC broadcasters should not be required to purchase transmitters that are digital-capable. Accordingly, Leggett proposes that the Commission should “leave it to the World marketplace to decide when or if international digital broadcasting is a suitable mode.”<sup>159</sup>

<sup>152</sup> See NASB Comments at 3.

<sup>153</sup> NASB asserts that numerous authorities, including the DRM Consortium, have indicated that DRM transmissions should be at least 7 dB below the equivalent analog power. In particular, NASB cites the Broadcasters’ User Manual, which published by the Digital Radio Mondiale (DRM) Consortium, first edition, March 2004, page 47, at chapter 6.4: “Under current coordination procedures, [HF] DRM transmissions may be introduced under similar principles to that in the MW bands. That is the service is first coordinated as if it were an analogue DSB service and then a DRM transmission substituted with a power level at least 7 dB lower than the allowable analogue transmission.” NASB states that 7 dB down from 50 kW would be 9.976 kW (nominally 10 kW), so NASB believes that the minimum power for DRM transmissions should be 10 kW. NASB Comments at 2. In its comments, NASB uses the term average power (not mean power); see note 8, *supra*.

<sup>154</sup> The Commission’s Rules normally limit transmitters to a maximum power, but in the case of the HFBC service, there is no maximum power limit and instead our Rules limit transmitters to a minimum power. See para. 61, *supra*.

<sup>155</sup> See NASB Comments at 2.

<sup>156</sup> *Id.* at 3.

<sup>157</sup> *Id.* at 2.

<sup>158</sup> See Leggett Comments at 5.

<sup>159</sup> *Id.* at 4.

69. BBG supports the HFBC proposals that we made in the *Omnibus NPRM* and NASB's request that we adopt the DRM standard as a requirement for digital HFBC transmission.<sup>160</sup> In this regard, BBG observes that DRM is the only internationally approved standard for digital HFBC transmission and that no other standard is being considered at this time. BBG states that, if the Commission were to adopt the DRM standard, it believes that the digital HFBC transition will be shortened.

70. BBG recommends that the Commission adopt 10 kW mean power as the minimum power level for digital HFBC, and fully supports the views of the NASB in this regard.<sup>161</sup> BBG states that it has extensive testing experience utilizing DRM, and this testing validates the 7 dB provisional planning criteria regarding DRM versus analog DSB transmission. Further, as a DRM consortium member, and using its Morocco transmitting station, BBG provided demonstrations of digital HFBC to the attendees of WRC-03 in Geneva. BBG states that these very successful demonstrations used power levels of 10 kW.

71. BBG recommends that the Commission adopt 50 kW as the minimum peak envelope power for SSB emissions because this power level provides approximately the same coverage area as a DSB signal with 50 kW of carrier power.<sup>162</sup>

72. *Decision.* We are revising the Commission's HFBC service rules to authorize SSB and digital transmissions in the HF bands between 5900 kHz and 26100 kHz that are allocated to the broadcasting service. This action updates the Commission's HFBC rules so that they mirror Appendix 11 of the ITU *Radio Regulations*, which was recently revised at WRC-03. As a result, FCC-licensed international broadcast stations now have the flexibility to continue to transmit DSB signals or to transmit SSB or digital signals. The RF system specifications are shown in Appendix A at Section 73.756 (DSB), Section 73.757 (SSB), and Section 73.758 (digital).

73. We are adopting the DRM standard for digital transmissions in the HFBC bands.<sup>163</sup> We observe that DRM is the world's only non-proprietary,<sup>164</sup> digital system for international broadcasting.<sup>165</sup>

<sup>160</sup> As part of the IRAC coordination process, BBG reviewed the draft Report and Order and provides the following comments. BBG believes that the reorganization of the rule section dealing with the assignment and use of frequencies (Section 73.702) is clearer than that originally proposed in the *Omnibus NPRM* and that the revised rules also correct several errors that became apparent because of the reorganization. Specifically, BBG states that the Commission's revised rules correctly interpret the WRC reallocation decisions and provide a clear and simple means of understanding how the new rules apply. BBG states that this especially applies to the revised rules where the distinction between exclusive allocations (Section 73.702(f)) and co-primary allocations (Section 73.702(g)) are described, and how transitional timeframes (Section 73.702(g)) and Regional requirements (Section 73.702(h)) apply. Along with NASB, BBG strongly supports the proposed system specifications and notes that they are consistent with Appendix 11 of the ITU *Radio Regulations*. BBG also believes that the revised rules are clearer in that the system requirements for DSB, SSB, and digitally modulated emissions have been placed in separate sections (Sections 73.756, 73.757, and 73.758). See BBG Letter at 1.

<sup>161</sup> See BBG Letter at 2.

<sup>162</sup> *Id.*

<sup>163</sup> The DRM homepage is at <http://www.drm.org/>. The U.S. members of DRM are Dolby Laboratories Inc; DRS Broadcast Technology; Harris Broadcast; International Broadcasting Bureau (BBG); Kintronic Laboratories Inc; Sangean America, Inc.; TCI International, Inc; and Texas Instruments. The U.S. associate members of DRM are Dolby Laboratories Licensing Corp.; NASB; and Via Licensing Corp.

<sup>164</sup> Section 4.6.3 of the DRM Broadcaster's User Manual describes Ownership and Protection of DRM Intellectual Property (IP) as follows: "Both DRM Members and non-members own DRM essential patents. DRM required all members holding essential IP to use reasonable endeavors to form a patent-pool. The DRM patent pools (one relating to MPEG 4 audio, and one for everything else) were formed in 2003. Each patent pool in turn is charged with agreeing and putting in place a licensing regime for the exploration of the patents on fair, reasonable and non-discriminatory terms. In practice, the licensing of DRM IP is undertaken by a Licensing Administrator acting

(continued....)

WRC-03 gave approval for DRM use in all the HFBC bands; there are no band restrictions on the use on the use of DRM.<sup>166</sup> Currently, seven international broadcasters are transmitting DRM signals to all or part of the 48 contiguous states.<sup>167</sup> We also observe that there is a datacasting standard for DRM, which will permit FCC-licensed international broadcasters to offer wide-area datacasting as well as high quality audio broadcasting.<sup>168</sup> Other benefits of DRM include: (1) improved audio quality that is near-FM quality sound; (2) many existing DSB transmitters can be easily modified to carry DRM signals; (3) the robustness of the DRM signal can be chosen to match different propagation conditions; and (4) uses the same frequencies and bandwidth as DSB, which simplifies coordination.<sup>169</sup>

74. We are revising Section 73.751 of the Commission's Rules to state that no international broadcast station will be authorized to install, or be licensed for operation of, transmitter equipment with a peak envelope power of less than 50 kW if SSB modulation is used. This action is consistent with Leggett's request that the minimum power level for SSB transmissions be such that the SSB signal would at least be equivalent to a DSB signal over the same signal path from transmitter to listener. In this regard, we note that the International Bureau has previously waived Section 73.751 in order to authorize HFBC licensees to operate SSB transmitters at 50 kW PEP because this power provides approximately the same coverage area as a DSB transmitter with a rated carrier power of 50 kW (even though this power is equivalent to only 15-20 kW relative to a DSB transmitter).

75. We are revising Section 73.751 of the Commission's Rules to state that no international broadcast station will be authorized to install, or be licensed for operation of, transmitter equipment with a mean power of less than 10 kW if digital modulation is used. We take this action at the request of NASB and BBG. In making this decision, our engineering staff has reviewed the DRM Broadcasters' User Manual.<sup>170</sup> The key statement is paraphrased below:

Under current coordination procedures, DRM transmissions are first coordinated as if the service were an analog DSB service and then a DRM transmission is substituted with a power level at least 7 dB lower than the allowable analog transmission.<sup>171</sup>

Our engineering staff had originally recommended a minimum mean power of 20 kW. However, we observe that, using its Morocco transmitting station, "BBG provided demonstrations of digital HFBC to

(...continued from previous page)

on behalf of the patent pool: for DRM this function is currently being undertaken by VIA Licensing; see [www.vialicensing.com](http://www.vialicensing.com)."

<sup>165</sup> In May 2003, the European Telecommunications Standards Institute (ETSI) elevated its September 2001 Technical Specification of the DRM system to a higher level, ETSI Standard. The new document is published as ETSI ES 201 980 V1.2.2 (2003-4), Digital Radio Mondiale (DRM); System Specification. This document is available as a free download from: [http://pda.etsi.org/PDA/home.asp?wki\\_id=E.Mk8LSXqO56EDEBYqe9j](http://pda.etsi.org/PDA/home.asp?wki_id=E.Mk8LSXqO56EDEBYqe9j).

<sup>166</sup> Any scheduled DRM circuit will be coordinated in accordance with Article 12 of the ITU *Radio Regulations* in the same way as for any proposed analog circuit. See DRM Broadcasters' User Manual at Section 3.4.1 (Regulatory Issues).

<sup>167</sup> These international broadcasters are: BBC World Service, Ministry of Information-State of Kuwait, Radio Canada International, Radio Nederland Wereldomroep (Radio Netherlands), Radio Sweden International, TDP Radio, and Vatican Radio. This information came from the previous seasonal schedule (A04) for DRM transmission, which is at: <http://www.hfcc.org/data/A04drm.html>.

<sup>168</sup> In May 2003, ETSI published the datacasting standard for DRM as ETSI TS 101 968 V1.1.1 (2003-04), Digital Radio Mondiale (DRM); Data applications directory.

<sup>169</sup> The technical aspects of the DRM on-air system are described at <http://www.drm.org/system/globtechnical.htm>.

<sup>170</sup> The DRM Broadcasters' User Manual is available as a free download from: <http://www.drm.org/BUM/globbum.htm>.

<sup>171</sup> See DRM Broadcasters' User Manual at Section 6.4 (Regions 1, 2, and 3 – SW/HF Bands).

the attendees of WRC-03 in Geneva. These very successful demonstrations used power levels of 10 kW."<sup>172</sup> After considering these new facts and also recognizing that some international broadcast stations use rhombic antennas that can provide 10-15 dB of gain, we are persuaded to adopt the minimum mean power level that NASB requests.<sup>173</sup>

76. Finally, we agree with NASB and Leggett that it is unnecessary to require that new HFBC transmitters have a digital modulation capability at this time because manufacturers are already building in provisions for digital modulation.

C. SRS and EESS Downlinks at 25.5-27 GHz and ISS at 25.25-27.5 GHz

77. *Background.* The band 25.25-27.5 GHz is allocated to the fixed and mobile services and to the ISS on a co-primary basis throughout the world.<sup>174</sup> ISS use of the 25.25-27.5 GHz band is limited by international footnote 5.536 to SRS and EESS applications and to transmissions of data originating from industrial and medical activities in space.<sup>175</sup> Further, the band 25.5-27 GHz is allocated to the EESS (space-to-Earth) on a primary basis throughout the world. International footnote 5.536A states that administrations installing EESS earth stations cannot claim protection from stations in the fixed and mobile services operated by neighboring administrations.<sup>176</sup>

78. In the United States, the band 25.5-27 GHz is Federal/non-Federal shared spectrum that is primarily used by Federal agencies and the international allocations described above have been implemented in the Federal Table.<sup>177</sup> The National Aeronautics and Space Administration (NASA) has three geostationary Tracking and Data Relay Satellite System (TDRSS) space stations in orbit that currently have the capability to receive transmissions in the band 25.25-27 GHz from low Earth-orbiting satellites.<sup>178</sup> In the future, NASA expects to use TDRSS space stations extensively to satisfy SRS and EESS wide bandwidth data requirements that cannot be satisfied in the band 14.896-15.121 GHz. Additionally, there are currently two new systems under development that will operate in the band 25.5-27 GHz. Specifically, NASA is developing a geostationary Solar Dynamics Observatory (SDO) system that will downlink SRS data to White Sands, New Mexico; and the National Oceanic and Atmospheric Administration (NOAA) is developing a non-geostationary National Polar-orbiting

<sup>172</sup> See BBG Comments at 2.

<sup>173</sup> Our engineering staff also reviewed the A04 schedule for DRM transmissions and found that power varied between 10 kW and 200 kW, except for one station that transmits 500 kW. The staff observed that Radio Netherlands is listed as broadcasting from Bonaire (an island off the coast of Venezuela) to the 48 contiguous States using 10 kW.

<sup>174</sup> The band 27-27.5 GHz is allocated to the fixed-satellite service (FSS) (Earth-to-space) on a primary basis in Regions 2 and 3. Footnote 5.537 states that space services using non-geostationary (NGSO) satellites operating in the ISS in the band 27-27.5 GHz are exempt from the general provision that NGSO satellite systems must not cause unacceptable interference to geostationary-satellite systems in the FSS and the broadcasting-satellite service. 47 C.F.R. § 2.106, footnote 5.537. See *ITU Radio Regulations*, Article 22, No. 22.2. The band 25.25-27 GHz is also allocated to the standard frequency and time signal-satellite (Earth-to-space) on a secondary basis throughout the world.

<sup>175</sup> 47 C.F.R. § 2.106, footnote 5.536.

<sup>176</sup> 47 C.F.R. § 2.106, footnote 5.536A. This footnote also states that EESS earth stations should take into account Recommendation ITU-R SA.1278. In addition, footnote 5.536B states that, in certain countries (including only Brazil in Region 2), EESS earth stations in the band 25.5-27 GHz cannot constrain the use and deployment of stations in the fixed and mobile services. 47 C.F.R. § 2.106, footnote 5.536B.

<sup>177</sup> There is one exception, but it is not at issue in this proceeding. Specifically, the band 27-27.5 GHz is not allocated for FSS uplinks.

<sup>178</sup> TDRSS satellites transmit down to LEO satellites in the band 22.55-23.55 GHz.

Operational Environmental Satellite System (NPOESS) that will downlink EESS data to a limited number of earth stations. Finally, NASA and NOAA expect to build additional wide bandwidth EESS systems in this band.

79. In the non-Federal Table, the band 25.25-27.5 GHz is allocated to the EESS (space-to-space) on a secondary basis and the segment 25.5-27 GHz is allocated to the EESS (space-to-Earth) on a secondary basis, and international footnote 5.536A has been adopted.<sup>179</sup>

80. On April 25, 2003, the President authorized a new national policy that establishes guidance and implementation actions for commercial remote sensing space capabilities.<sup>180</sup> The fundamental goal of this national policy is to “advance and protect U.S. national security and foreign policy interests by maintaining the nation’s leadership in remote sensing space activities, and by sustaining and enhancing the U.S. remote sensing industry.” In support of this goal, the United States Government will rely “to the maximum practical extent on U.S. commercial remote sensing capabilities for filling imagery and geospatial needs for military, intelligence, foreign policy, homeland security, and civil users.” The national policy also states that “U.S. companies are encouraged to build and operate commercial remote sensing space systems whose operational capabilities, products, and services are superior to any current or planned foreign commercial systems.” We observe that first generation commercial remote sensing satellite systems use the band 8025-8400 MHz, but the U.S. commercial remote sensing industry has identified the band 25.5-27 GHz for wider bandwidth operations.

81. Subsequently, WRC-03 allocated the band 25.5-27 GHz for SRS downlinks on a primary basis, added SRS to the list of space radiocommunication services in Article 21 of the ITU *Radio Regulations* that must adhere to maximum power flux-density (pfd) limits (“hard limits”) in the band 25.25-27.5 GHz,<sup>181</sup> and revised footnote 5.536A to apply to both SRS and EESS earth stations. Specifically, WRC-03 revised footnote 5.536A to read as follows:

5.536A Administrations operating earth stations in the Earth exploration-satellite service or the space research service shall not claim protection from stations in the fixed and mobile services operated by other administrations. In addition, earth stations in the Earth exploration-satellite service or in the space research service should be operated taking into account Recommendations ITU-R SA.1278 and ITU-R SA.1625, respectively.

82. *Proposal.* We proposed to change the allocation status of the non-Federal EESS (space-to-Earth) in the band 25.5-27 GHz from a secondary to a primary allocation; to subject non-Federal authorizations to a case-by-case electromagnetic compatibility (EMC) analysis; to require that non-Federal EESS space stations transmitting in the band 25.5-27 GHz meet the pfd limits contained in Article 21 of the ITU *Radio Regulations*; to provide guidance to EESS earth station applicants, such as a

<sup>179</sup> The segment 25.25-27 GHz is allocated to the standard frequency and time signal-satellite (Earth-to-space) on a secondary basis.

<sup>180</sup> See U.S. Commercial Remote Sensing Policy, April 25, 2003 Fact Sheet at <http://www.ostp.gov/html/Fact%20Sheet%20-%20Commercial%20Remote%20Sensing%20Policy%20-%20April%2025%202003.pdf>.

<sup>181</sup> See ITU *Radio Regulations* at Article 21 (Terrestrial and space services sharing frequency bands above 1 GHz), Section V (Limits of power flux-density from space stations), No. 21.16 and Table 21-4. Therefore, the pfd in dB(W/m<sup>2</sup>) for angles of arrival ( $\delta$ ) above the horizontal plane at the Earth’s surface produced by emissions from EESS and SRS space stations in the band 25.5-27 GHz and from ISS space stations in the band 25.25-27.5 GHz for all conditions and for all methods of modulation must not exceed:

$$\begin{array}{ll} -115 & \text{for } 0^\circ \leq \delta \leq 5^\circ \\ -115 + 0.5(\delta - 5) & \text{for } 5^\circ \leq \delta \leq 25^\circ \\ -105 & \text{for } 25^\circ \leq \delta \leq 90^\circ \end{array}$$

These limits relate to the pfd which would be obtained under assumed free-space propagation conditions. The reference bandwidth is 1 MHz. See *WRC-03 Final Acts* at Article 21, Section V, Table 21-4.

methodology for estimating needed separation distances between EESS earth stations and fixed stations; and to warn commercial remote sensing operators not to place their receive earth stations near border areas where possible. At the request of NTIA, we sought comment from potential EESS applicants as to whether additional technical constraints would be helpful in fostering compatibility between Federal and non-Federal systems in the band 25.5-27 GHz.

83. We also proposed to broaden the secondary non-Federal EESS (space-to-space) allocation in the band 25.25-27.5 GHz to a secondary ISS allocation; to limit the use of this ISS allocation to SRS and EESS applications and to transmissions of data originating from industrial and medical activities in space; and to require that non-Federal ISS space stations transmitting in the band 25.25-27.5 GHz meet the pfd limits contained in Article 21 of the ITU *Radio Regulations*. Finally, we proposed to allocate the band 25.5-27 GHz to the SRS (space-to-Earth) on a primary basis for Federal use.

84. *Comments.* Space Imaging LLC (Space Imaging) supports the Commission's proposal to raise the non-Federal EESS downlink allocation in the band 25.5-27 GHz from secondary to primary status.<sup>182</sup> Space Imaging states that the commercial remote-sensing satellite industry will require a primary EESS (space-to-Earth) allocation in the 25.5-27 GHz band in the relatively near future.<sup>183</sup> Regarding whether additional technical constraints are needed to foster Federal/non-Federal compatibility, Space Imaging "urges the Commission to minimize any constraints that might impair the flexibility of the commercial industry to implement future remote-sensing systems in this frequency band."<sup>184</sup>

85. KROHNE, Inc. (Krohne) states that it has incurred significant development costs for the use of frequencies in the band 25.5-27 GHz for their new process level and measuring equipment soon to be released.<sup>185</sup> Krohne requests that the Commission make it clear that by adopting the proposed allocations it is in no way preventing compliant Part 15 operations in this band.

86. In its March 1, 2005 letter, NTIA states that its support for a primary non-Federal EESS allocation is based on non-Federal systems being implemented in such a way as to minimize impact on Federal allocations.<sup>186</sup> In particular, NTIA states that its support is contingent on a United States footnote that requires these non-Federal operations be coordinated with NTIA (through the normal "FAS" process)<sup>187</sup> before the Commission grants a license, e.g., the current process for non-Federal EESS

<sup>182</sup> Space Imaging is the licensee of the IKONOS remote-sensing satellite system, a NGSO satellite system that currently uses X-band spectrum in the 8025-8400 GHz band to downlink remotely-sensed data to earth stations in the United States and other countries.

<sup>183</sup> Space Imaging filed the following additional information: While X-band frequencies at 8025-8400 MHz have been able to accommodate the needs of the remote sensing industry to date, second or third generation satellite systems will demand additional spectrum resources in order to be able to downlink increasing amounts of data at faster rates. The adoption of *U.S. Commercial Remote Sensing Policy (U.S. Policy)* provides added support for a primary non-Federal Government EESS allocation to accommodate the future needs of the commercial remote sensing industry. The *U.S. Policy* demonstrates the vital role the commercial remote sensing industry plays in achieving U.S. Government objectives. The *U.S. Policy* also reflects the increasing reliance the U.S. Government has placed, and will continue to place, on commercial remote sensing satellite systems. As this partnership moves forward, the commercial operators must have access to sufficient primary EESS spectrum to meet the requirements of their U.S. Government customers.

<sup>184</sup> See Space Imaging Comments at 4.

<sup>185</sup> See Krohne Comments at 1.

<sup>186</sup> See NTIA Letter from Fredrick R. Wentland, Associate Administrator, Office of Spectrum Management, NTIA, United States Department of Commerce, to Edmopd J. Thomas, Chief, OET, dated March 1, 2005.

<sup>187</sup> The Frequency Assignment Subcommittee (FAS) is an IRAC subcommittee within NTIA that develops and executes procedures for the assignment and coordination of Federal radio frequencies.

operations in the band 8025-8400 MHz where authorizations are subject to a case-by-case electromagnetic compatibility analysis. In order to facilitate coordination, NTIA requests that applicants submit the following information with their applications to the Commission:

- Calculations showing how the pfd limits contained in Article 21 of the ITU *Radio Regulations* will be met at the surface of the Earth.
- For any earth stations not included in the initial application, the maximum number, the anticipated antenna diameter, and the locations of receiving earth stations that will be required to support the system.
- Information on the satellite transmission technical parameters and planned orbit that will facilitate coordination with Federal allocations. This would include high-gain space station antennas, space station transmissions only within line-of-sight of cooperating earth stations, bandwidth efficient modulation and coding techniques that will minimize the necessary bandwidth required.
- Calculations showing that the pfd at the geostationary orbit from the EESS satellites will be limited to the values indicated in ITU-R SA.1278 to protect TDRSS reception from low Earth-orbiting user spacecraft.

NTIA further states that, while it is not requesting that the above technical parameters be added to Part 25 of the Commission's Rules, non-Federal applicants need to be made aware that without this information, coordination with NTIA will be difficult, if not impossible. For instance, NTIA does not expect that the minimal technical information required by the FAS will be sufficient to accomplish the coordination process. Depending on its review of the application, NTIA states that it may request that the applicant supply additional information. NTIA states that it hopes that the non-Federal applicant in preparing this information will have a better understanding of the complexities of sharing in the band, the importance of the band to Federal users, and how to better engineer their systems in order to facilitate sharing.

87. *Decision.* We are raising the secondary non-Federal EESS downlink allocation in the band 25.5-27 GHz to primary status. We find that this allocation upgrade is necessary to meet the requirements of the commercial remote sensing industry and that it is consistent with the new national policy for commercial remote sensing space capabilities that the President authorized on April 25, 2003.<sup>188</sup> In order to implement this decision, we are revising footnote US258 by including the band 25.5-27 GHz in its text.<sup>189</sup> Accordingly, footnote US258 is revised to read as follows:

US258 In the bands 8025-8400 MHz and 25.5-27 GHz, the Earth exploration-satellite service (space-to-Earth) is allocated on a primary basis for non-Federal use. Authorizations are subject to a case-by-case electromagnetic compatibility analysis.

Consistent with our existing policy for the band 8025-8400 MHz, the Commission will issue licenses for operation in the band 25.5-27 GHz only after coordination under footnote US258 has been completed.

88. By adding the band 25.5-27 GHz to footnote US258, we are also making each non-Federal authorization subject to a case-by-case electromagnetic compatibility (EMC) analysis. Because of existing and planned Federal SRS and EESS requirements in the band 25.5-27 GHz, which are discussed above, we find that it is important that non-Federal EESS downlinks operated in this band be designed to ensure compatibility with Federal systems. We are also adding international footnote 5.536A to the non-Federal Table in the band 25.5-27 GHz. This action provides guidance to earth station applicants, e.g., Annex 1 provides a methodology for estimating needed separation distances between EESS earth

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<sup>188</sup> See para. 80, *supra*.

<sup>189</sup> As is our standard policy, footnote US258 is being added to both the Federal and non-Federal Tables in the band 25.5-27 GHz, and consequently, we are deleting the now superfluous table entry for the secondary EESS downlink allocation from the non-Federal Table.

stations and fixed stations,<sup>190</sup> and alerts commercial remote sensing operators of the EESS downlink allocation's status in border areas (providing notice that, where possible, these operators should consider placing their receive earth stations away from border areas).

89. In order to protect Federal terrestrial receivers, we are requiring that non-Federal EESS space stations transmitting in the band 25.5-27 GHz meet the pfd limits contained in Article 21 of the ITU *Radio Regulations*. We are codifying this requirement by adding these pfd limits to Part 25 of the Commission's Rules. The record does not demonstrate the need for additional technical constraints on EESS applicants, and therefore, we decline to adopt the additional constraints that were suggested by NTIA.

90. We are also broadening the secondary non-Federal EESS (space-to-space) allocation in the band 25.25-27.5 GHz to a secondary ISS allocation. However, we are also adopting international footnote 5.536, which limits the use of this ISS allocation to SRS and EESS applications, and also to transmissions of data originating from industrial and medical activities in space. This restriction is necessary to ensure that this frequency band meets the needs of the scientific community without being overtaken for use by the FSS or mobile-satellite service (MSS). In order to protect Federal terrestrial receivers, we are requiring that non-Federal ISS space stations transmitting in the band 25.25-27.5 GHz meet the pfd limits contained in Article 21 of the ITU *Radio Regulations*. The ISS pfd requirements and the EESS pfd requirements are the same and would be shown once in Part 25 of the Commission's Rules.

91. At NTIA's request, we are allocating the band 25.5-27 GHz to the SRS (space-to-Earth) on a primary basis for Federal use. This action will provide a primary SRS allocation to satisfy Federal requirements for high data rate space science missions.

92. At Krohne's request, we are also clarifying the following point: The allocation changes that we are making today in no way prevent radio frequency devices that operate in accordance with the requirements codified in Part 15 from operating in this spectrum.<sup>191</sup>

#### D. RNSS and the Radiolocation Service

93. In the following paragraphs, we first discuss our RNSS proposals for the bands 1215-1300 MHz and 5000-5030 MHz and then our radiolocation service proposal for the band 2900-3100 MHz. We did not receive any comments on these proposals.

94. *Background.* The band 1164-1300 MHz is allocated to the RNSS (space-to-space) (space-to-Earth) on a primary basis throughout the world. In the United States, only the band 1164-1240 MHz has been implemented, with the entire allocation available for Federal use<sup>192</sup> but with only the segment

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<sup>190</sup> See Recommendation ITU-R SA.1278, Annex 1 titled "Separation distances between EESS earth stations and FS stations around 26 GHz."

<sup>191</sup> We note that among the general conditions of operation for radio frequency (Part 15) devices is the following: Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator. 47 C.F.R. § 15.5(b). The Commission permits unlicensed operations in the band 25.25-27.5 GHz under the provisions of Section 15.209 (Emissions from an intentional radiator shall not exceed 500 microvolts per meter at a measurement distance of 3 meters) and Section 15.231 (periodic operations). 47 C.F.R. § 15.209, 15.231.

<sup>192</sup> The Global Positioning System (GPS) is authorized under the Federal RNSS allocation. These satellites allow anyone with a GPS receiver to determine their precise longitude, latitude, altitude, and time anywhere on the planet. GPS currently uses the RNSS allocations in the bands 1215-1240 MHz and 1559-1610 MHz.

1164-1215 MHz being available for non-Federal use (see footnote US385).<sup>193</sup> At WRC-03, the primary RNSS (space-to-Earth) (space-to-space) allocation in the band 1164-1215 MHz was removed from footnote 5.328A and entered directly into the International Table (table entry).<sup>194</sup> WRC-03 further revised footnote 5.328A to establish conditions for the protection of the aeronautical radionavigation service (ARNS) from RNSS systems operating in the band 1164-1215 MHz.<sup>195</sup>

95. Internationally, the band 5000-5030 MHz is allocated to the RNSS on a co-primary basis with the ARNS, with the segment 5000-5010 MHz limited to RNSS uplinks and the segment 5010-5030 MHz limited to RNSS downlinks and crosslinks.<sup>196</sup> The Commission has not previously considered these RNSS allocations, and thus, the band 5000-5150 MHz is allocated to the ARNS on a primary basis and the Microwave Landing System (MLS) takes precedence over other uses of this spectrum (footnote US370).<sup>197</sup>

96. Prior to WRC-03, the band 2900-3100 MHz was allocated to the radionavigation service on a primary basis and to the radiolocation service on a secondary basis throughout the world and these allocations have been implemented in the United States.<sup>198</sup> This band is primarily used for maritime radars and radar beacons (racons) and radars of this type are required on cargo and passenger ships by international treaty (SOLAS) for safety purposes.<sup>199</sup> The use of the radiolocation service is generally

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<sup>193</sup> The band 1164-1215 MHz was only recently allocated to the RNSS and this allocation is codified in footnote US385, which reads as follows: The band 1164-1215 MHz is also allocated to the radionavigation-satellite service (space-to-Earth, space-to-space) on a primary basis. In this band, stations in the radionavigation-satellite service shall not cause harmful interference to, nor claim protection from, stations of the aeronautical radionavigation service.

<sup>194</sup> WRC-03 also revised footnote 5.329 to establish conditions for the protection of radiodetermination services from RNSS systems in the band 1215-1300 MHz. WRC-03 decided to continue to resolve RNSS intersystem technical compatibility issues on a bilateral basis until January 1, 2005; thereafter, normal coordination procedures would apply. See Appendix A, Section 2.106, footnotes 5.328B and 5.329.

<sup>195</sup> See Appendix A, Section 2.106, footnote 5.328A.

<sup>196</sup> Prior to WRC-03, these RNSS allocations were listed in footnotes 5.443A and 5.443B. At WRC-03, the primary RNSS uplink allocation in the band 5000-5010 MHz was removed from international footnote 5.443A and made a table entry and footnote 5.443A was suppressed. The primary RNSS downlink and crosslink allocations in the band 5010-5030 MHz were removed from international footnote 5.443B and were made table entries. Footnote 5.443B was modified to remove the RNSS allocation and to specify that RNSS systems must comply with the pfd limits in the band 4990-5000 MHz defined in Resolution 741. Those pfd limits are more stringent than the current provisional limit of -171 dB(W/m<sup>2</sup>) in a 10 megahertz band at any RAS site for no more than two percent of the time. Under Resolution 741, the pfd produced in the band 4990-5000 MHz by any GSO RNSS network operating in the band 5010-5030 MHz must not exceed the current limit at all times, that is, no two percent exception. For NGSO RNSS networks, the limit is significantly tightened to -245 dB(W/m<sup>2</sup>) in a 10 megahertz band at any RAS site for no more than two percent of the time.

<sup>197</sup> MLS currently operates only in the segment 5030-5091 MHz. Footnote 5.367 states that the band 5000-5150 MHz is also allocated to the aeronautical mobile-satellite (R) service on a primary basis, but this allocation is unused. In footnote US211, the Commission urges applicants for airborne or space station assignments to take all practicable steps to protect RAS observations in the band 4990-5000 MHz. See 47 C.F.R. § 2.106, footnotes 5.367, 5.444, US211, and US370.

<sup>198</sup> The Commission has previously adopted footnote 5.427, which states the response from radar transponders must not be capable of being confused with the response from radar beacons (racons) and must not cause interference to ship or aeronautical radars in the radionavigation service.

<sup>199</sup> Racons operate in conjunction with maritime radars to provide electronic markers to identify maritime obstructions and navigation points. See <http://www.tscm.com/nebbia4.html>.

limited to the military services.<sup>200</sup> WRC-03 raised the allocation status of the radiolocation service in the band 2900-3100 MHz from secondary to primary and adopted footnote 5.424A, which requires that stations in the radiolocation service not cause harmful interference to, nor claim protection from, radar systems in the radionavigation service.<sup>201</sup>

97. *Proposals.* We proposed to remove the RNSS downlink and crosslink allocations in the band 1164-1215 MHz from footnote US385 and to make them table entries. We also proposed to adopt international footnote 5.328A, which requires that RNSS stations in the band 1164-1215 MHz operate in accordance with Resolution 609 (WRC-03) and that they not claim protection from ARNS in the band 960-1215 MHz. We requested comment on whether the RNSS allocation at 1215-1240 MHz, which is currently limited to Federal use, should be expanded to the full international allocation (1215-1300 MHz) and whether this RNSS allocation should be made available for both Federal and non-Federal use.

98. We proposed to allocate the band 5000-5010 MHz for RNSS uplinks and the band 5010-5030 MHz for RNSS downlinks and crosslinks and consequently to remove the band 5000-5030 MHz from the spectrum in which MLS has precedence over other uses, that is, to replace footnote US370 with international footnote 5.444. We proposed to limit the adjacent band pfd at the Earth's surface from RNSS operations in the band 5010-5030 MHz through the adoption of international footnote 5.443B.<sup>202</sup>

99. At the request of NTIA, we proposed to raise the allocation status of the Federal radiolocation service in the band 2900-3100 MHz from secondary to primary status and to add international footnote 5.424A to the Federal Table to protect important ship navigation systems. We requested comment on whether this upgrade should also apply to the non-Federal radiolocation service.

100. *Decision.* We did not receive any comments that addressed our proposals for the RNSS and the radiolocation service. Accordingly, we are adopting our proposals. First, we are entering "RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space)" in the U.S. Table for the band 1164-1215 MHz.<sup>203</sup> We are adopting international footnote 5.328A, which requires that RNSS stations in the band 1164-1215 MHz operate in accordance with Resolution 609 (WRC-03) and that they not claim protection from ARNS in the band 960-1215 MHz. At the request of NTIA, we are adding footnote G132 to the Federal Table, which reads as follows:<sup>204</sup>

G132 Use of the radionavigation-satellite service in the band 1215-1240 MHz shall be subject to the condition that no harmful interference is caused to, and no protection is claimed from, the radionavigation service authorized under ITU Radio Regulation No. 5.331. Furthermore, the use of the radionavigation-satellite service in the band 1215-1240 MHz shall be subject to the condition that no harmful interference is caused to the radiolocation service. ITU Radio Regulation No. 5.43 shall not apply in respect of the radiolocation service. ITU Resolution 608 (WRC-03) shall apply.

<sup>200</sup> Footnote G56 states that Federal radiolocation in the band 2900-3100 MHz is primarily for the military services; however, limited use is permitted by other Federal agencies for survey operations and in support of experimentation and research programs. Footnote US44 states that the non-Federal radiolocation service may be authorized on the condition that no harmful interference is caused to Federal operations. 47 C.F.R. § 2.106, footnotes US44 and G56.

<sup>201</sup> See Appendix A, Section 2.106, footnote 5.424A.

<sup>202</sup> Footnote 5.443B is shown in para. 102, *infra*.

<sup>203</sup> Previously, the RNSS (space-to-Earth) (space-to-space) allocation was listed in footnote US385. Consequently, footnote US385 is being deleted.

<sup>204</sup> See NTIA recommendations on WRC-03 implementation, Enclosure 1 at Agenda Item 1.15 and Enclosure 2 at p. 59. We note that since the band 1240-1300 MHz is not allocated to the RNSS in the United States, NTIA has created footnote G132, which is based on footnote 5.329, except that footnote G132 applies only to the band 1215-1240 MHz, whereas footnote 5.329 applies to the band 1215-1300 MHz.

101. Because the record indicated no interest on the matter by any party, we decline to expand the RNSS allocation at 1215-1240 MHz, which is currently limited to Federal use, to the band 1215-1300 MHz and to make it available for both Federal and non-Federal use.

102. Second, we are allocating the band 5000-5030 MHz to the RNSS on a primary basis for Federal and non-Federal use and we are limiting the use of the segment 5000-5010 MHz to uplink transmissions and the segment 5010-5030 MHz to downlink and crosslink transmissions. Consequently, we are replacing footnote US370 with international footnote 5.444, thereby removing the band 5000-5030 MHz from the spectrum in which MLS has precedence over other uses. In order to protect MLS operations above 5030 MHz and radio astronomy observations in the band 4990-5000 MHz, we are limiting the adjacent band pfd at the Earth's surface from RNSS operations in the band 5010-5030 MHz through the adoption of international footnote 5.443B, which reads as follows:

5.443B In order not to cause harmful interference to the microwave landing system operating above 5030 MHz, the aggregate power flux-density produced at the Earth's surface in the band 5030-5150 MHz by all the space stations within any radionavigation-satellite service system (space-to-Earth) operating in the band 5010-5030 MHz shall not exceed  $-124.5$  dB(W/m<sup>2</sup>) in a 150 kHz band. In order not to cause harmful interference to the radio astronomy service in the band 4990-5000 MHz, radionavigation-satellite service systems operating in the band 5010-5030 MHz shall comply with the limits in the band 4990-5000 MHz defined in Resolution 741 (WRC-03).

103. Third, at the request of NTIA, we are raising the allocation status of the Federal radiolocation service in the band 2900-3100 MHz to primary and we are adding international footnote 5.424A to the Federal Table in order to protect important ship navigation systems.<sup>205</sup> This allocation upgrade will increase the usefulness of this spectrum without causing any burden on existing operations. In particular, we note that, mainly as a result of newer radar design features that mitigate received radar-to-radar interference, NTIA reports that radionavigation radars operating in the band 2900-3100 MHz have demonstrated compatible operations with radiolocation systems.<sup>206</sup> Because the record indicated no interest on the matter by any party, we decline to upgrade the allocation status of the non-Federal radiolocation service in the band 2900-3100 MHz.

#### E. Allocation Status of the Little LEO Feeder Link Bands

104. *Background.* In 1995, NTIA released its *Spectrum Reallocation Final Report*, wherein the bands 1390-1400 MHz and 1427-1432 MHz (1.4 GHz Bands) were identified for reallocation from Federal use to exclusive non-Federal use.<sup>207</sup> In its spectrum reallocation final plan, NTIA stated that, in order to protect important radio astronomy observations in the band 1400-1427 MHz, non-Federal "airborne and space-to-Earth transmissions [should] be prohibited" in the band 1390-1400 MHz and that such operations should be "avoided" in the band 1427-1432 MHz.<sup>208</sup>

105. In 2001, the Commission reallocated 27 MHz of Government transfer spectrum, including the bands 1390-1392 MHz and 1430-1432 MHz.<sup>209</sup> In that action, the Commission provisionally allocated these bands to the FSS on a primary basis, limited the use of these FSS allocations to feeder

<sup>205</sup> See NTIA recommendations on WRC-03 implementation, Enclosure 1 at Agenda Item 1.17 and Enclosure 2 at p. 20.

<sup>206</sup> See *U.S. Proposal for WRC-03*, Agenda Item 1.17, at pages 60-61.

<sup>207</sup> See *Spectrum Reallocation Final Report - Response to Title VI - Omnibus Budget Reconciliation Act to 1993*, U.S. Department of Commerce, NTIA Special Publication 95-32, February 1995, at page 5-3.

<sup>208</sup> *Id.*

<sup>209</sup> Reallocation of the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands, ET Docket No. 00-221, *Report and Order and Memorandum Opinion and Order*, 17 FCC Rcd 368, at 384-394, paras. 36-60 (2002) (*27 MHz Report and Order*).

links<sup>210</sup> for the Non-Voice NGSO MSS (popularly known as “Little LEOs”), limited the use of the FSS allocation in the band 1390-1392 MHz to Earth-to-space transmissions (Little LEO feeder uplinks), and limited the use of the FSS allocation in the band 1430-1432 MHz to space-to-Earth transmissions (Little LEO feeder downlinks).<sup>211</sup> The Little LEO feeder link allocations were contingent on the adoption of similar international allocations, the completion of spectrum sharing studies, and additional coordination and technical limitations.<sup>212</sup> Footnote US368 incorporates these conditions, which were adopted as part of the *27 MHz Report and Order*.<sup>213</sup>

106. In the *27 MHz Report and Order*, the Commission also allocated the band 1390-1392 MHz to the fixed and mobile except aeronautical mobile services on a co-primary basis with the provisional FSS uplink allocation and decided to license these terrestrial services on an unpaired basis. The Commission maintained the primary land mobile service allocation in the band 1430-1432 MHz, shifted the Wireless Medical Telemetry Service (WMTS) out of this spectrum, except that WMTS operations in seven cities will continue to operate in the segment 1430-1431.5 MHz,<sup>214</sup> and otherwise made this band available for commercial telemetry use, such as meter reading. The secondary fixed service allocation in the band 1430-1432 MHz, which was limited to telemetry uses, was raised to primary status.<sup>215</sup> In making the provisional Little LEO feeder downlink allocation, the Commission stated the following:

We do not believe that the addition of Little LEO feeder downlinks in this band [1430-1432 MHz] will preclude the use of the band by telemetry systems due to the low PFD levels of the satellite signals relative to the power levels of telemetry systems. We are confident that such limits will not preclude satellite earth stations in this band. However, these earth stations may have to locate in rural areas and use large, high

<sup>210</sup> A feeder link is defined as a radio link from an earth station at a given location to a space station, or vice versa, conveying information for a radiocommunication service other than for the FSS. The given location may be at a specified fixed point, or at any fixed point within specified areas. 47 C.F.R. § 2.1.

<sup>211</sup> 17 FCC Rcd at 392 and 393, paras. 50 and 55.

<sup>212</sup> *27 MHz Report and Order*, 17 FCC Rcd 369, 392 at paras. 2 and 52. In the Commission’s Rules, 1.85 megahertz of spectrum has been designated for use by Little LEO downlinks (137-138 MHz and 400.15-401 MHz) and 2.2 megahertz of spectrum has been designated as being available for use by Little LEO uplinks (148-150.05 MHz and 399.9-400.05 MHz). 47 C.F.R. § 25.202(a)(3). This spectrum is to be used for both feeder links and service links (radio links from subscriber units to a space station or vice versa). Accordingly, the provision of separate dedicated feeder link spectrum near 1400 MHz would permit greater service link use.

<sup>213</sup> Footnote US368 reads as follows: “The band 1390-1392 MHz is also allocated to the fixed-satellite service (Earth-to-space) on a primary basis and the band 1430-1432 MHz is also allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to feeder links for the Non-Voice Non-Geostationary Mobile-Satellite Service, and contingent on (1) the completion of sharing studies including the measurement of emissions from equipment that would be employed in operational systems and demonstrations to validate the studies as called for in Resolution 127 (WRC-2000), (2) the adoption of worldwide feeder link allocations at the 2003 World Radiocommunication Conference (WRC-03), and (3) compliance with any technical and operational requirements that may be imposed at WRC-03 to protect passive services in the 1400-1427 MHz band from unwanted emissions associated with such allocations. These allocations become effective upon adoption of worldwide allocations at WRC-03. If no such allocations are adopted by WRC-03, these allocations shall be considered null and void, with no grandfathering of rights. Individual assignments shall be coordinated with the Interdepartmental Radio Advisory Committee’s (IRAC) Frequency Assignment Subcommittee (FAS) (see, for example, Recommendations ITU-R RA.769-1 and ITU R SA.1029-1) to ensure the protection of passive services in the 1400-1427 MHz band. Coordination shall not be completed until the feeder downlink system is tested and certified to be in conformance with the technical and operational requirements for the protection of passive services in the 1400-1427 MHz band. Certification and all supporting documentation shall be submitted to the Commission and FAS prior to launch.”

<sup>214</sup> 47 C.F.R. § 2.106, footnote US350. See para. 155, *infra*, wherein we are amending footnote US350 for purposes of clarity.

<sup>215</sup> The Commission revised footnote US311 to take note of the fact that RAS observations are made in the band 1350-1400 MHz on an unprotected basis at 16 sites. 47 C.F.R. § 2.106, footnote US311.

gain antennas to ensure reception of the satellite signals. Because we anticipate that telemetry operations will be concentrated largely in urban areas, sharing can be readily accomplished.<sup>216</sup>

107. The protection of the passive services in the band 1400-1427 MHz, which lies between the Little LEO feeder link bands, has been one of the Commission's major concerns during its consideration of these FSS allocations.<sup>217</sup> The band 1400-1427 MHz is allocated to the RAS, EESS (passive), and SRS (passive) on a co-primary basis throughout the world, and international footnote 5.340 states that all emissions are prohibited in this spectrum.<sup>218</sup> In the United States, the band 1400-1427 MHz is Federal/non-Federal shared spectrum and the international allocations have been implemented. In order to protect the passive services in the band 1400-1427 MHz, the United States has adopted three footnotes: Footnote US246 states that no station may transmit in the band 1400-1427 MHz; footnote US74 states that the RAS will be protected from "extraband radiation" only to the extent that such radiation exceeds the level permitted for a properly operated station; and footnote US368 requires that Little LEO feeder link licensees comply "with any technical and operational requirements that may be imposed at WRC-03 to protect passive services in the 1400-1427 MHz band from 'unwanted emissions' associated with such allocations."<sup>219</sup>

108. At WRC-03, the United States obtained conditional support for a worldwide secondary allocation for Little LEO feeder links. Specifically, WRC-03 adopted footnote 5.339A, which reads as follows:

5.339A *Additional allocation*: the band 1390-1392 MHz is also allocated to the fixed-satellite service (Earth-to-space) on a secondary basis and the band 1430-1432 MHz is also allocated to the fixed-satellite service (space-to-Earth) on a secondary basis. These allocations are limited to use for feeder links for non-geostationary-satellite networks in the mobile-satellite service with service links below 1 GHz, and Resolution 745 (WRC-03) applies.

In Resolution 745, WRC-03 resolves that the Little LEO feeder link allocations "shall not be used until the completion of ITU-R studies on all identified compatibility issues as shown in Annex 1 of this Resolution and the results of these studies shall be reported to WRC-07 [World Radiocommunication Conference, 2007] and the decisions should be taken by WRC-07 accordingly."<sup>220</sup>

<sup>216</sup> 27 MHz Report and Order, 17 FCC Rcd at 393, para. 56 (internal footnote omitted).

<sup>217</sup> For example, in the 27 MHz Report and Order, the Commission noted that the sharing studies then "underway contemplated a satellite allocation in the 1429-1432 MHz band, but we have limited this allocation to the 1430-1432 MHz band which will provide an additional megahertz of guard band between the downlinks and the EESS and RAS Services." In addition, the Commission observed that the flexible allocation in the band 1390-1392 MHz also allows this spectrum to be used for Little LEO feeder uplinks and that this allocation is consistent with the views expressed by the National Academy of Sciences through the National Research Council's Committee on Radio Frequencies (CORF), which requested that uplink transmissions be limited to spectrum below 1392 MHz. (CORF stated that uplinks should be prohibited above 1392 MHz in order to protect passive sensor operations in the band 1400-1427 MHz, which use ultra-sensitive receivers and high-gain antennas.) 27 MHz Report and Order, 17 FCC Rcd at 390, 392, 393, paras. 47, 52, 55.

<sup>218</sup> 47 C.F.R. § 2.106, footnote 5.340. The band 1400-1427 MHz is allocated to the RAS because the rest frequency of neutral hydrogen (HI) is at 1420.406 MHz and its observation is one of the radio-frequency lines of the greatest importance to radio astronomy. See ITU Handbook on Radio Astronomy, Radiocommunication Bureau, Geneva, 1995 at page 13.

<sup>219</sup> 47 C.F.R. § 2.106, footnotes US74, US246, US368.

<sup>220</sup> See WRC-03 Final Acts at Resolution 745 (Protection of existing services in all Regions from non-geostationary-satellite networks in the fixed-satellite service using the frequency bands around 1.4 GHz on a secondary basis), resolves 1.

109. *Proposal.* We tentatively concluded that WRC-03's decision regarding Little LEO feeder links should be implemented. We proposed to downgrade the provisional Little LEO feeder link allocations in the Table of Frequency Allocations from primary to secondary status, and retain but revise footnote US368 to reflect the actions taken at WRC-03 by requiring the completion of ITU-R studies on all identified compatibility issues as shown in Annex 1 of Resolution 745 (WRC-2003) and to make any use of the worldwide feeder links subject to any further compatibility decisions by WRC-07.

110. *Comments.* Final Analysis Communication Services, Inc. (Final Analysis) opposes the proposal to change the allocation status of the current domestic Little LEO feeder link allocations from co-primary to secondary.<sup>221</sup> Final Analysis argues that the domestic co-primary allocation is effective, based on the meeting of the three contingencies spelled out in footnote US368. Final Analysis states that the first contingency was satisfied when tests, measurements and studies were completed by a U.S. laboratory and submitted in a U.S. document that sought support of WRC-03 Agenda Item 1.16.<sup>222</sup> Final Analysis states that the second contingency was satisfied when the secondary allocation, as specified in footnote 5.339A, was adopted at WRC-03. Final Analysis states that the third contingency was satisfied because the WRC-03 made any Little LEO system filing an application for domestic use of the bands subject to decisions taken at WRC-07, including any provisions to protect other services in the band and passive services in adjacent bands. Final Analysis states that it continues to participate in the ITU-R study groups that support the Little LEO feeder link allocation.

111. Based in its confidence that the required ITU-R studies on compatibility will be completed before WRC-07 and that the international allocations will be changed to primary status, Final Analysis argues that it makes no sense to downgrade the domestic allocations to secondary now only to later reinstate the co-primary status. It also argues that implementing a secondary allocation would not serve the public interest. Final Analysis also claims that the current co-primary allocation ensures that spectrum will be available for all interested users and will permit Little LEO satellite systems to successfully co-exist with terrestrial users in the same band because licensees must coordinate operations and provide sufficient interference protection to both existing and future operations of the allocated services. It also argues that because feeder links are critical to the commercial implementation of Little LEO service, we should maintain the co-primary allocation in the band.<sup>223</sup>

112. Final Analysis does not oppose the proposed revisions to footnote US368, provided that the Commission clarifies that an applicant can apply for and obtain authority for domestic use of these bands on a co-primary basis for Little LEO feeder link operations prior to WRC-07, so long as the requirements of US368 are otherwise met.

113. In its March 8, 2005 letter, NTIA recommends that protection of the passive services in the band 1390-1427 MHz (*i.e.*, the RAS in the band 1390-1427 MHz and the EESS (passive) and SRS (passive) in the band 1400-1427 MHz) from emissions in frequency bands that were part of the Government Transfer Bands reallocated in ET Docket No. 00-221 (1.4 GHz Bands) be more directly

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<sup>221</sup> See Final Analysis Comments at 1. *But see* NTIA Letter, dated October 15, 2004.

<sup>222</sup> Final Analysis says it believes that these study results demonstrated the practicability of attenuating unwanted emissions from Little LEO feeder links in excess of what is required to protect the passive services in the band 1400-1427 MHz. The study results were submitted to WRC-03 within WRC03/38 Addendum 1 and WRC03/38 Addendum 2.

<sup>223</sup> Final Analysis states that feeder link transmissions support data transfers and Tracking, Telemetry & Command (TT&C) functions between earth stations and the satellites, and that sufficient dedicated spectrum in both uplink and downlink directions is vital to ensure proper operation of the satellite constellation and to achieve full system capacity.

addressed.<sup>224</sup> NTIA states that the reallocation of the 1.4 GHz Bands to non-Federal use was predicated on these bands not being used in the future for satellite downlinks or aircraft-to-ground emissions, which have the potential to cause severe interference to the passive services.<sup>225</sup> NTIA recommends that the restrictions on these nearby bands appear in a new United States footnote, which would read as follows: "In the bands 1390-1400 MHz and 1427-1432 MHz airborne and space-to-Earth operations, except for feeder downlinks for the Non-Voice Non-Geostationary Mobile-Satellite Service in the band 1430-1432 MHz (see US368), are prohibited."

114. In light of the specific restrictions embodied in US368, NTIA states that adding a cross reference to footnote US368 in footnote US74 would provide useful information. NTIA also requests that footnote US74 be amended by using the term "unwanted emissions" in used in place of "extraband radiation." NTIA notes that unwanted emissions consist of spurious emissions and out-of-band emissions and that this term is defined in both the ITU *Radio Regulations* and in the Commission's Rules. Because both spurious and out-of-emissions are of concern in the case of footnote US74, NTIA asserts that unwanted emissions would be the proper term to use in footnote US74.

115. *Decision.* WRC-03 allocated spectrum for Little LEO feeder links on a secondary basis throughout the world and resolved that use of these allocations is contingent on the subsequent completion of ITU-R spectrum sharing studies to determine the impact of these NGSO FSS operations on incumbent services, including passive service operations in the adjacent band 1400-1427 MHz. Furthermore, Resolution 745 indicates that any Little LEO use of these bands is subject to additional decisions on compatibility issues that may be adopted at WRC-07.<sup>226</sup> For these reasons, we disagree with Final Analysis that the conditions set forth in footnote US368 have been met. The *27 MHz Report and Order*, which added footnote US368, adopted the conditional co-primary allocation in anticipation of the completion of studies and adoption of a like allocation at WRC-03.<sup>227</sup> By contrast, WRC-03 adopted worldwide secondary allocations for the band, added further conditions on its use, and continued to require studies of the band. These developments were not anticipated by the text of the *27 MHz Report and Order* nor by the terms of footnote US368.<sup>228</sup>

116. Although the decision made at WRC-03 is inconsistent with the provisions outlined in footnote US368, we find it serves the public interest to maintain but revise the conditional allocations to reflect the WRC-03 action. Thus, we adopt our proposal to implement WRC-03's decision regarding Little LEO feeder links. We will require the completion of ITU-R studies on all identified compatibility issues as shown in Annex 1 of Resolution 745 (WRC-2003) and make any use of the worldwide feeder links subject to any further compatibility decisions by WRC-07. Accordingly, we are amending the Table entries for the FSS uplink allocation in the band 1390-1392 MHz and the FSS downlink allocation in the band 1430-1432 MHz to show secondary status in lieu of primary status, and we are revising footnote US368 to read as follows:

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<sup>224</sup> See NTIA Letter from Fredrick R. Wentland, Associate Administrator, Office of Spectrum Management, NTIA, United States Department of Commerce, to Edmond J. Thomas, Chief, OET, dated March 8, 2004.

<sup>225</sup> NTIA states that an exception was made for Little LEO feederlinks on the condition that full protection would be provided (see US368).

<sup>226</sup> WRC03/38, *resolves 2*.

<sup>227</sup> See *27 MHz Report and Order*, 17 FCC Rcd at 369, 392 and 393, paras. 2, 52 and 55 (stating, *e.g.*, that use of the feeder link allocations "is contingent on the adoption of a *similar* international allocation" (emphasis added)).

<sup>228</sup> For example, we do not believe that WRC-03's secondary allocation can be considered similar to the provisional co-primary allocation, nor that the sharing studies can be considered complete in light of ongoing studies in anticipation of WRC-07.

US368 The use of the bands 1390-1392 MHz and 1430-1432 MHz by the fixed-satellite service is limited to feeder links for the Non-Voice Non-Geostationary Mobile-Satellite Service and is contingent on: (1) the completion of ITU-R studies on all identified compatibility issues as shown in Annex 1 of Resolution 745 (WRC-2003); (2) measurement of emissions from equipment that would be employed in operational systems and demonstrations to validate the studies as called for in Resolution 745 (WRC-2003); and (3) compliance with any technical and operational requirements that may be imposed at WRC-07 to protect other services in these bands and passive services in the band 1400-1427 MHz from unwanted emissions. The FCC shall coordinate individual assignments with NTIA (see, for example, Recommendations ITU-R RA.769-2 and ITU-R SA.1029-2) to ensure the protection of passive services in the band 1400-1427 MHz. As part of the coordination requirements, the feeder uplink and downlink systems shall be tested and certified to be in conformance with the technical and operational out-of-band requirements for the protection of passive services in the band 1400-1427 MHz. Certification and all supporting documentation shall be submitted to the FCC at least three months prior to launch.

117. We reject as speculative Final Analysis' assertion that we should maintain a conditional co-primary allocation because WRC-07 may change the secondary international allocation to primary status.<sup>229</sup> We do not believe it serves the public interest to preserve a provisional co-primary allocation in the band that is inconsistent with the WRC-03 decision, particularly because we cannot predict whether the contingencies provided in footnote US368 will be successfully met.<sup>230</sup> Regardless of the provisional allocation afforded to Little LEO use of the band, parties interested in using the frequencies for feeder link operations will have to take into account the unresolved status of the band and potential added expense associated with planning for its use. Alternately, they may continue to use the spectrum that has already been made available for Little LEO feeder and service link operations, and that is free of any contingencies.<sup>231</sup>

118. Finally, we note that the Little LEO feeder links protection requirements for passive services are specified in footnote US368 and that these requirements go beyond the more general protection criteria described in footnote US74. Therefore, in order to ensure that readers of footnote US74 do not overlook the specific restrictions embodied in US368, we are adding a cross reference to footnote US368 in footnote US74. We are also using the term "unwanted emissions" in place of "extraband radiation" in footnote US74.<sup>232</sup> Finally, we are also adding a statement in our Rules that airborne and space-to-Earth operations are prohibited in the Government transfer bands 1390-1400 MHz and 1427-1432 MHz, with the exception of Little LEO feeder downlinks in the band 1430-1432 MHz.<sup>233</sup> This action makes explicit our previous decisions not to allocate additional spectrum in this frequency

<sup>229</sup> Accordingly, we decline at this time to decide whether we would authorize use of these bands prior to WRC-07.

<sup>230</sup> Although Final Analysis describes the burdens associated with operating under a secondary allocation in the band, we note that under the co-primary model, other users face expenses associated with evaluating and planning to co-exist with Little LEO operations that may or may not satisfy the provisions necessary to make use of the band. Moreover, we note that the lack of a specified pfd limit for this band increases the difficulty for other co-primary users, especially medical telemetry operators in the band 1430-1431.5 MHz in the seven cities specified in footnote US350, to plan for effective shared use of this spectrum.

<sup>231</sup> See note 212, *supra*.

<sup>232</sup> In addition to providing consistency by using "unwanted emissions," we note that a definition for "extraband radiation" is not currently provided in our Rules. Unwanted emissions consist of spurious emissions and out-of-band emissions. 47 C.F.R. § 2.1.

<sup>233</sup> The action that we take today is in line with our previous decision for the band 2305-2310 MHz. Specifically, the Commission allocated the band 2305-2310 MHz to the fixed, mobile except aeronautical mobile, and radiolocation services on a primary basis for non-Federal use and to the amateur service on a secondary basis. Nonetheless, the Commission also adopted footnote US338 (which prohibits space-to-Earth operations in the band 2305-2310 MHz) in order to protect NASA's Goldstone deep space facility (which receives in the band 2290-2300 MHz) for the implementation of future space radiocommunication services.

range to airborne or downlink operations and has been requested by NTIA. Accordingly, we are adopting new United States footnote US398, which will read as follows:

US398 In the bands 1390-1400 MHz and 1427-1432 MHz, airborne and space-to-Earth operations, except for feeder downlinks for the Non-Voice Non-Geostationary Mobile-Satellite Service in the band 1430-1432 MHz (see US368), are prohibited.

#### F. Remaining Space Radiocommunication Service Issues

119. *Background.* The remaining space radiocommunication service issues concern a new Federal EESS (active) allocation in the band 432-438 MHz, moving an existing Federal SRS deep space uplink allocation in the band 7145-7190 MHz from a footnote and entering this allocation directly in the Federal Table, and raising the secondary Federal SRS allocation in the band 14.8-15.35 GHz to primary status.

120. In the United States, the band 432-438 MHz is allocated to the radiolocation service on a primary basis for Federal use<sup>234</sup> and to the amateur service on a secondary basis.<sup>235</sup> International footnote 5.282 has been adopted domestically and thus, the amateur-satellite service may operate in the segment 435-438 MHz subject to not causing harmful interference to other services operating in accordance with the International Table. WRC-03 allocated the band 432-438 MHz to the EESS (active) on a secondary basis throughout the world and adopted an international footnote (5.279A) that effectively limits the operational use of 432-438 MHz EESS to areas outside the United States.<sup>236</sup> However, NASA has indicated a need to perform some limited pre-operational testing of its systems within line-of-sight of its U.S. control stations. In order to account for the required use of the EESS allocation in the United States, NTIA recommended that a new United States footnote be adopted.<sup>237</sup>

121. At WRC-03, the SRS deep space uplink allocation in the band 7145-7235 MHz, which previously had been shown in footnote 5.460, was moved up as a table entry.<sup>238</sup> Footnote 5.460 was revised to delete the SRS allocation and to state that geostationary SRS satellites operating in the band 7190-7235 MHz may not claim protection from existing and future stations of the fixed and mobile

<sup>234</sup> The use of the radiolocation service allocation is limited to the military services, except that pulse-ranging and spread spectrum radiolocation systems may be authorized for Federal non-military and non-Federal use on a secondary basis along the shorelines of the 48 contiguous States and Alaska. 47 C.F.R. § 2.106, footnotes G2 and US217.

<sup>235</sup> In the areas listed in footnote US7, special conditions apply to use the amateur service allocation. 47 C.F.R. § 2.106, footnote US7.

<sup>236</sup> Footnote 5.279A reads as follows: *The use of this band by sensors in the Earth exploration-satellite service (active) shall be in accordance with Recommendation ITU-R SA.1260-1. Additionally, the Earth exploration-satellite service (active) in the band 432-438 MHz shall not cause harmful interference to the aeronautical radionavigation service in China. The provisions of this footnote in no way diminish the obligation of the Earth exploration-satellite service (active) to operate as a secondary service in accordance with Nos. 5.29 and 5.30.*

<sup>237</sup> On February 20, 2004, NTIA addressed this EESS allocation in a letter to the Commission. See letter from Fredrick R. Wentland, Associate Administrator, Office of Spectrum Management, NTIA, to Edmond J. Thomas, Chief, OET, dated February 20, 2004.

<sup>238</sup> Prior to WRC-03, the band 7145-7235 MHz was allocated for SRS uplinks on a primary basis by footnote 5.460, which restricted the segment 7145-7190 MHz to deep space use and prohibited deep space communications in the segment 7190-7235 MHz. The band 7125-7235 MHz is allocated to the fixed and mobile services on a primary basis throughout the world. Footnote 5.458 states that passive microwave sensor measurements may be carried out in the band 7125-7235 MHz and that administrations should bear in mind the needs of the EESS (passive) and the SRS (passive) in their future planning of the band 7125-7250 MHz. 47 C.F.R. § 2.106, footnotes 5.458 and 5.460.

services.<sup>239</sup> In the United States, this SRS allocation has been implemented in footnote US252 and its use is limited to Goldstone, California.<sup>240</sup>

122. At WRC-03, the United States requested that the secondary SRS allocation in the band 14.8-15.35 GHz be raised to primary status in order to satisfy requirements for high data rate space science missions, but the Conference was unable to agree to this allocation upgrade because fixed service users were opposed to the change.<sup>241</sup> Notwithstanding this outcome at WRC-03, NTIA recommends that the Federal SRS allocation be raised to primary status because TDRSS<sup>242</sup> and other SRS operations support vital national interests and warrant primary status, and because studies and operational experience undisputedly show that SRS operations can share with existing services.<sup>243</sup> NTIA also recommends that footnote US310 be revised by using a one megahertz reference bandwidth (instead of the current four kilohertz reference bandwidth) and by correspondingly increasing the pfd limit by 24 dB.<sup>244</sup>

123. *Proposal.* We proposed to allocate the band 432-438 MHz to the EESS (active) on a secondary basis for Federal use and to require that space stations operating under this allocation not cause harmful interference to, nor claim protection from, the radiolocation, amateur, and amateur-satellite services in the United States. We proposed to move the SRS deep space uplink allocation currently authorized in footnote US252 to a table entry in the Federal Table for the band 7145-7190 MHz and to make consequential changes to footnotes US252 and US262. We proposed to raise the secondary SRS allocation in the band 14.8-15.35 GHz to primary status for Federal use.<sup>245</sup> We also proposed to update footnote US310 by using a reference bandwidth that is more appropriate for today's digital transmissions.

124. *Comments.* The only comments that we received concerning these space radiocommunication service proposals were from Mr. James Whedbee (Whedbee), an amateur operator, and the ARRL, both of whom support allocating the band 432-438 MHz to the EESS (active) for the limited Federal use that would be authorized under footnote US397.<sup>246</sup> In particular, we note that ARRL states that it enjoys a positive working relationship with NASA that will allow coordination of any EESS (active) testing without interference to ongoing amateur operations in the band 432-438 MHz.<sup>247</sup> ARRL

<sup>239</sup> See Appendix A, Section 2.106, footnote 5.460.

<sup>240</sup> 47 C.F.R. § 2.106, footnote US252.

<sup>241</sup> See *U.S. Proposals for WRC-03*, Proposal C (Agenda Item 1.12), at pages 51-52.

<sup>242</sup> TDRSS, which is a communication signal relay system that provides tracking and data acquisition services between low earth orbiting (LEO) spacecraft and NASA/customer control and/or data processing facilities, is the principle SRS use of the band 14.8-15.35 GHz.

<sup>243</sup> In the United States, the band 14.8-15.35 GHz is primarily allocated for Federal operations with only limited non-Federal use authorized through footnote allocations.

<sup>244</sup> Footnote US310 authorizes non-Federal SRS satellites in low Earth orbit to transmit to TDRSS on a secondary basis in the segment 14.896-15.121 GHz. 47 C.F.R. § 2.106, footnote US310. In its request to NTIA for this change, NASA states that the pfd reference bandwidth listed in footnote US310 should be updated to one megahertz in order to correct an error in the *NTIA Manual* and to more appropriately reflect the change from analog to digital transmissions.

<sup>245</sup> As an exception, we note that footnote 5.339 has previously been added to the Federal and non-Federal Tables, and thus, SRS (passive) use of the segment 15.2-15.35 GHz would be authorized on a secondary basis, irrespective of the primary SRS table entry.

<sup>246</sup> See Whedbee Comments at 1 and ARRL Reply Comments at 2-3.

<sup>247</sup> ARRL states that it believes that NASA is aware of: (1) the extensive use of the 432 MHz band for amateur terrestrial weak-signal communications and for propagation beacons; (2) AMSAT operations in the band 435-438 MHz; and (3) auxiliary links in the band 433-435 MHz.

states that it is confident that it will be able to work with NASA to accommodate its needs while avoiding interference to ongoing amateur operations in the band 432-438 MHz.

125. *Decision.* At the request of NTIA, we are making allocation changes to three frequency bands. First, we are allocating the band 432-438 MHz to the EESS (active) on a secondary basis for Federal use and are requiring that space stations operating under this allocation not cause harmful interference to, nor claim protection from, the radiolocation, amateur, and amateur-satellite services in the United States. This action will permit NASA to perform limited pre-operational testing of its systems within line-of-sight of its U.S. control stations and appears to be feasible given the evidence of NASA's good relations with the amateur community as reflected in the record. Accordingly, we are adopting footnote US397, which reads as follows:

US397 In the band 432-438 MHz, the Earth exploration-satellite service (active) is allocated on a secondary basis for Federal use. Stations in the Earth exploration-satellite service (active) shall not be operated within line-of-sight of United States except for the purpose of short duration pre-operational testing. Operations under this allocation shall not cause harmful interference to, nor claim protection from, any other services allocated in the band 432-438 MHz in the United States, including secondary services and the amateur-satellite service.

126. Second, we are displaying the Federal SRS deep space uplink allocation, which is currently authorized in footnote US252, as a table entry in the Federal Table for the band 7145-7190 MHz.<sup>248</sup> This action clarifies that the band 7145-7190 MHz is allocated to the SRS (deep space) (Earth-to-space) on a primary basis for Federal use and highlights that this SRS uplink use is limited to deep space communications. In addition, we are maintaining the non-Federal SRS deep space uplink allocation as a footnote allocation, are specifying that this unused allocation has secondary status, and are moving this allocation and the Goldstone site restriction to footnote US262.<sup>249</sup> Accordingly, footnotes US252 and US262 are revised to read as follows:

US252 The band 2110-2120 MHz is also allocated to the space research service (deep space) (Earth-to-space) on a primary basis at Goldstone, California.

US262 The band 7145-7190 MHz is also allocated to the space research service (deep space) (Earth-to-space) on a secondary basis for non-Federal use. The use of the bands 7145-7190 MHz and 34.2-34.7 GHz by the space research service (deep space) (Earth-to-space) and of the band 31.8-32.3 GHz by the space research service (deep space) (space-to-Earth) is limited to Goldstone, California.

127. NTIA has recently limited the use of the Federal SRS uplink allocation in the band 7190-7235 MHz by its adoption of footnote G133, which read as follows:<sup>250</sup>

G133 No emissions to deep space shall be effected in the band 7190-7235 MHz. Geostationary satellites in the space research service operating in the band 7190-7235 MHz shall not claim protection from existing and future stations of the fixed and mobile services and No. 5.43A does not apply.

128. Third, we are raising the secondary SRS allocation in the band 14.8-15.35 GHz to primary status for Federal use, except in segment 15.2-15.35 GHz where SRS (passive) operations would continue

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<sup>248</sup> In order to implement this allocation, the band 7125-7190 MHz in the Federal Table is subdivided into the bands 7125-7145 MHz and 7145-7190 MHz.

<sup>249</sup> Currently, footnote US252 applies to both the 2110-2120 MHz and 7145-7190 MHz. As a consequence of moving the SRS uplink allocation for deep space communications in the band 7145-7190 MHz to a table entry in the Federal Table and to footnote US262 for non-Federal use, footnote US252 now applies only to the band 2110-2120 MHz.

<sup>250</sup> We note that footnote G133 is the same as footnote 5.460, except that the now superfluous SRS deep space uplink allocation has been deleted, and this footnote was recently added to the NTIA Manual.

to be authorized on a secondary basis.<sup>251</sup> We find that the United States has developed extensive SRS operations in this band at great expense and these operations merit the protection that a primary allocation provides. We are revising footnote US310 by using a reference bandwidth that is more appropriate for today's digital transmissions than a reference bandwidth based on an analog channel.<sup>252</sup> See Appendix A for footnote US310's revised text.

#### G. ITU Terms and Definitions

129. In order to reflect additions and revisions to the terms and definitions listed in the ITU *Radio Regulations* and in the *WRC-03 Final Acts*, we are amending Section 2.1 of the Commission's Rules<sup>253</sup> to: (1) add definitions for adaptive system, high altitude platform station (HAPS), out-of-band domain of an emission, and spurious domain of an emission; (2) revise the definitions for coordinated universal time (UTC), coordination area, coordination distance, facsimile, geostationary satellite, harmful interference, inclination of an orbit of an earth satellite, telegraphy, and telephony; and (3) make minor editorial modifications to the definitions for administration, broadcasting service, mobile service, permissible interference, power, public correspondence, radio, radiocommunication, safety service, semi-duplex operation, telecommunication, and telegram. In addition, we are correcting a typographical error in the definition for telemetry in Section 2.1 and we are revising the definition for UTC in Section 73.701. The definitions of these terms are shown in Appendix A.

#### H. Editorial Amendments

130. We are also taking this opportunity to make various non-substantive changes to Parts 2, 90, and 97 the Commission's Rules. In Part 2, we are updating and correcting Section 2.1 through Section 2.106.<sup>254</sup> The main effect of these actions is to reflect the *WRC-03 Final Acts* in these rule sections; to use consistent terminology in these rules, e.g., Federal and non-Federal; to remove confusing and unnecessary material from the U.S. Table; and to update the FCC Rule Part cross references. In addition, we are correcting a typographical error in Part 90 and are revising Part 97 to reflect the realignment of allocations above 71 GHz and to make other needed editorial revisions.

131. *Consistent Use of "Federal" and "non-Federal."* As an initial matter, we are adopting a unified terminology for spectrum management purposes throughout our Rules. Regulatory authority for radio spectrum in the United States is bifurcated. The Commission has regulatory authority for all non-Federal radio services, including those operated by State and local government licensees, and NTIA has regulatory authority for all Federal radio services.<sup>255</sup>

132. Historically, the Commission's Rules have stated that radio spectrum was allocated to either "Government" or "non-Government" use exclusively or to shared use.<sup>256</sup> In the *1999 Table Clean-up Order*, the Commission, with the concurrence of NTIA, decided to use the adjectives "Federal Government" and "non-Federal Government" in order to highlight its regulatory authority over State and

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<sup>251</sup> Specifically, because the table entry for the SRS allocation is not limited, the full range of SRS operations (SRS uplinks, SRS downlinks, SRS (active), and SRS (passive)) may operate on a primary basis in the band 14.8-15.35 GHz, except in the segment 15.2-15.35 GHz where footnote 5.339 limits SRS (passive) use to secondary status.

<sup>252</sup> The Commission has never issued a license for SRS use under footnote US310.

<sup>253</sup> 47 C.F.R. § 2.1. Terms and definitions listed in Section 2.1 are the definitive terms and definitions that prevail throughout the Commission's Rules.

<sup>254</sup> 47 C.F.R. §§ 2.1, 2.100-2.106.

<sup>255</sup> 47 C.F.R. § 2.105(a).

<sup>256</sup> 47 C.F.R. § 2.105(b), edition of 1999.