

Before the  
Federal Communications Commission  
Washington, D.C. 20554

In the Matter of	)	
	)	
Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-2200 MHz Bands	)	WT Docket No. 12-70
	)	
Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz	)	ET Docket No. 10-142
	)	
Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands	)	WT Docket No. 04-356
	)	

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NOTICE OF PROPOSED RULEMAKING AND NOTICE OF INQUIRY

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## I. INTRODUCTION

1. In this *Notice of Proposed Rulemaking*, we propose to increase the Nation's supply of spectrum for mobile broadband by removing unnecessary barriers to flexible use of spectrum currently assigned to the Mobile Satellite Service (MSS) in the 2 GHz band. This proposal would carry out a recommendation in the *National Broadband Plan* that the Commission enable the provision of stand-alone terrestrial services in this spectrum.<sup>1</sup> We do so by proposing service, technical, assignment, and licensing rules for this spectrum. These proposed rules are designed to provide for flexible use of this spectrum, to encourage innovation and investment in mobile broadband, and to provide a stable regulatory environment in which broadband deployment could develop. Additionally, in our *Notice of Inquiry*, we seek comment on potential ways to free up additional valuable spectrum to address the Nation's growing demand for mobile broadband spectrum.

2. With this proceeding we intend to fulfill the Commission's previously stated plan to create a solid and lasting foundation for the provision of terrestrial services in 40 megahertz of spectrum in the 2 GHz band. As indicated in the *National Broadband Plan*, each MSS band is differently situated and therefore merits a band-specific approach to the expansion of terrestrial use.<sup>2</sup> For example, the 2 GHz MSS band, unlike other MSS bands, has terrestrial Fixed and Mobile allocations and is comprised of large, contiguous blocks of spectrum. This *Notice of Proposed Rulemaking* directly follows on the *2 GHz Band Co-Allocation Order*, in which the Commission laid the predicate for full terrestrial use of the 2 GHz MSS band.<sup>3</sup> The *Order* further expressed our intent to provide for additional terrestrial use of the 2 GHz band via rulemaking,<sup>4</sup> and we initiate that rulemaking here. Due to the unique characteristics of each band, we intend to address the Commission's Ancillary Terrestrial Component (ATC) rules for Big LEO and L-band MSS separately.

## II. BACKGROUND

### A. MSS/ATC and the 2 GHz Band

3. In 1997, the Commission reallocated 70 megahertz of spectrum in the 2 GHz band from a Fixed and Mobile allocation that was licensed for fixed microwave use to Mobile Satellite Service (MSS).<sup>5</sup> MSS is a radiocommunication service involving transmission between mobile earth stations and one or more space stations.<sup>6</sup> The Commission intended for MSS to provide communications in areas where it is difficult or impossible to provide communications coverage via terrestrial base stations, such

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<sup>1</sup> See *infra* ¶ 13 below.

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

<sup>3</sup> See Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz, ET Docket No. 10-142, *Report and Order*, 26 FCC Rcd 5710 (2011) (*2 GHz Band Co-Allocation Report and Order*).

<sup>4</sup> See *infra* ¶ 14 below.

<sup>5</sup> Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service, ET Docket No. 95-18, *First Report and Order and Further Notice of Proposed Rule Making*, 12 FCC Rcd 7388, 7391, 7395 ¶¶ 5-6, 14 (1997).

<sup>6</sup> See 47 C.F.R. § 2.1(c).

as remote or rural areas and non-coastal maritime regions, and at times when coverage may be unavailable from terrestrial-based networks, such as during natural disasters.<sup>7</sup>

4. The Commission adopted MSS rules for the 2 GHz band in 2000.<sup>8</sup> In 2001, the International Bureau authorized eight satellite operators to provide MSS in the 2 GHz band.<sup>9</sup> By February 2003, the International Bureau cancelled three MSS authorizations for failure to meet their milestones for system implementation.<sup>10</sup> Contemporaneously, responding to the growth in terrestrial wireless services, the Commission reallocated 30 megahertz of MSS spectrum for terrestrial Fixed and Mobile use and reduced the spectrum allocated to MSS to 40 megahertz.<sup>11</sup>

5. Concurrently with this action, the Commission established ancillary terrestrial component (ATC) rules, which allowed authorized MSS operators to augment their satellite services with terrestrial facilities.<sup>12</sup> ATC consists of terrestrial base stations and mobile terminals that re-use frequencies assigned for MSS operations.<sup>13</sup> To ensure that ATC would be ancillary to the provision of MSS, the Commission determined that ATC authority would be limited to MSS operators who met specific "gating" criteria.<sup>14</sup> The Commission required as a predicate for ATC that an MSS operator provide "substantial satellite service."<sup>15</sup> To meet the substantial service requirement, an MSS operator must provide continuous satellite service in specified geographic areas,<sup>16</sup> maintain one or more spare satellites,<sup>17</sup> and make MSS

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<sup>7</sup> See Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands, IB Docket No. 01-185, ET Docket No. 95-18, *Notice of Proposed Rulemaking*, 16 FCC Rcd 15532, 15532 ¶ 1 (2001).

<sup>8</sup> Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band, IB Docket No. 99-81, *Report and Order*, 15 FCC Rcd 16127 (2000).

<sup>9</sup> Third Report and Analysis of Competitive Market Conditions with Respect to Domestic and International Satellite Communications Services, Report and Analysis of Competitive Market Conditions with Respect to Domestic and International Satellite Communications Services, IB Docket Nos. 09-16, IB Docket No. 10-99, *Third Report*, 26 FCC Rcd 17284, 17310 ¶ 56 (2011) (*Third Satellite Competition Report*).

<sup>10</sup> Mobile Communications Holdings, Inc. and ICO Global Communications (Holdings) Limited for Transfer of Control, *Memorandum Opinion and Order*, 18 FCC Rcd 1094, 1099-1103 ¶¶ 15-24 (2003); Application of Globalstar, L.P. for Modification of License for a Mobile-Satellite Service System in the 2 GHz Band, *Memorandum Opinion and Order*, 18 FCC Rcd 1249, 1251-55 ¶¶ 6-15 (2003).

<sup>11</sup> Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems, ET Docket No. 00-258, IB Docket No. 99-81 RM-9911, RM-9498, RM-10024, *Third Report and Order*, *Third Notice of Proposed Rulemaking and Second Memorandum Opinion and Order*, 18 FCC Rcd 2223, 2238-40 ¶¶ 28-32 (2003) (*AWS Third Report and Order*).

<sup>12</sup> See Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands, IB Docket Nos. 01-185, 02-364, *Report and Order and Notice of Proposed Rulemaking*, 18 FCC Rcd 1962, 1964 ¶ 1 (2003) (*ATC Report and Order*).

<sup>13</sup> See *2 GHz Band Co-Allocation Report and Order*, 26 FCC Rcd at 5711-12 ¶ 5.

<sup>14</sup> *ATC Report and Order*, 18 FCC Rcd at 1990-95, 2068-71 ¶¶ 47-55, 221-26; see *ATC Report and Order*, 18 FCC Rcd at 1999-2011 ¶¶ 66-93 (gating criteria).

<sup>15</sup> *ATC Report and Order*, 18 FCC Rcd at 2001-08 ¶¶ 72-86.

<sup>16</sup> 47 C.F.R. § 25.149(b)(1).

<sup>17</sup> 47 C.F.R. § 25.149(b)(2).

commercially available throughout the required coverage area.<sup>18</sup> The Commission also determined that any ATC operations should be “integrated” with the underlying satellite service.<sup>19</sup> Finally, the Commission mandated that a MSS/ATC operator must satisfy the gating criteria “for each spectrum band in which it wishes to provide ATC.”<sup>20</sup>

6. Notably, the Commission determined that only existing MSS operators would be permitted to receive ATC authority. The Commission found that:

[S]haring between MSS and terrestrial mobile services is neither advisable, nor practical. Revocation of the authority of operational MSS systems and those MSS licenses that have met their implementation milestones in good faith is unreasonable and unwarranted. And our detailed technical analyses demonstrate that a third party cannot operate in the licensed MSS spectrum without compromising the operations of existing and future MSS licensees.<sup>21</sup>

Further, “based on the record and our detailed technical analysis, . . . granting shared usage of the same MSS frequency band to separate MSS and terrestrial operators would likely compromise the effectiveness of both systems.”<sup>22</sup> Therefore, the Commission decided against adopting a licensing framework that would result in an auction to resolve mutually exclusive applications and instead concluded that ATC authority would be granted through a license modification.<sup>23</sup>

7. Despite the efforts of the Commission to promote MSS, another three 2 GHz MSS satellite operators—Boeing, Iridium, and Celsat—surrendered their licenses in early 2005.<sup>24</sup> This left only two satellite operators, DBSD (then known as ICO) and TerreStar (then known as TMI), with spectrum reserved to provide MSS in the 2 GHz band. In December 2005, the Commission reassigned the spectrum formerly assigned to Boeing, Iridium, and Celsat to DBSD and TerreStar.<sup>25</sup> As a result, the two remaining licensees each had access to 20 megahertz of spectrum in the 2 GHz MSS band.<sup>26</sup>

8. DBSD launched its satellite in April 2008 and met its operational milestone in May 2008.<sup>27</sup> TerreStar launched its satellite in July 2009 and met its operational milestone in August 2009.<sup>28</sup>

<sup>18</sup> 47 C.F.R. § 25.149(b)(3).

<sup>19</sup> 47 C.F.R. § 25.149(b)(4); *ATC Report and Order*, 18 FCC Rcd at 2008-09 ¶¶ 87-88; *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands*, IB Docket No. 01-185, *Memorandum Opinion and Order and Second Order on Reconsideration*, 20 FCC Rcd 4616, 4625-26 ¶¶ 24-27 (2005) (*ATC Second Reconsideration Order*).

<sup>20</sup> *ATC Second Reconsideration Order*, 20 FCC Rcd at 4628 ¶ 34.

<sup>21</sup> *ATC Report and Order*, 18 FCC Rcd at 1999 ¶ 65.

<sup>22</sup> *Id.* at 1965 ¶ 2; *see also id.* at 1993 ¶ 52.

<sup>23</sup> *See ATC Report and Order*, 18 FCC Rcd at 2068-69 ¶ 221.

<sup>24</sup> *Third Satellite Competition Report*, 26 FCC Rcd at 17310 ¶ 56.

<sup>25</sup> *See Use of Returned Spectrum in the 2 GHz Mobile Satellite Service Frequency Bands*, IB Docket Nos. 05-220, 05-221, *Order*, 20 FCC Rcd 19696, 19697-98 ¶¶ 2 (2005).

<sup>26</sup> Prior to this action, DBSD and TerreStar shared this spectrum allocation equally with the other MSS operators. *See id.* at 19707 ¶¶ 26 (2005).

<sup>27</sup> *Improving Public Safety Communications in the 800 MHz Band*, WT Docket No. 02-55, ET Docket No. 00-258, ET Docket No. 95-18, *Fifth Report and Order, Eleventh Report and Order, Sixth Report and Order, and Declaratory Ruling*, 25 FCC Rcd 13874, 13877 ¶ 7 (2010) (*2010 BAS Ruling*).

<sup>28</sup> *Id.*

Subsequently, DBSD and TerreStar received ATC authority in 2009 and 2010, respectively.<sup>29</sup> Despite having MSS and MSS/ATC authority and an orbiting satellite, DBSD has yet to offer either commercial satellite or terrestrial service and TerreStar has offered a small amount of satellite service (partnering with AT&T to offer a non-ATC satellite/terrestrial service using AT&T terrestrial spectrum and TerreStar satellite spectrum) but not MSS/ATC service.<sup>30</sup> To date there remains little commercial use of this spectrum for MSS and none for terrestrial (ATC) service.<sup>31</sup>

9. Both TerreStar and DBSD are currently in bankruptcy.<sup>32</sup> In 2011, DISH Network Corporation (DISH) received approval from the United States Bankruptcy Court for the Southern District of New York to acquire both TerreStar and DBSD out of bankruptcy. DISH filed an application with the Commission for approval to transfer control of the TerreStar and DBSD licenses to DISH.<sup>33</sup> Simultaneous with the DISH/DBSD and the DISH/TerreStar transfer of control submissions, DBSD and TerreStar filed requests to modify their respective ATC authority, including for waiver of certain ATC technical and non-technical rules.<sup>34</sup> On March 2, 2012, the International Bureau granted the applications for transfer of control of the DBSD and TerreStar licenses to DISH, denied the non-technical rule waiver requests, and noted that the technical rule waivers would be addressed separately.<sup>35</sup>

#### B. The Growing Spectrum Demands of Mobile Broadband Services

10. The rapid adoption of smartphones and tablet computers, combined with deployment of high-speed 3G and 4G technologies, is driving more intensive use of America's mobile networks. According to Cisco Systems, North American mobile Internet traffic more than doubled in 2011 and is

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<sup>29</sup> New ICO Satellite Services G.P., Application for Blanket Authority to Operate Ancillary Terrestrial Component Base Stations and Dual-mode MSS/ATC Mobile Terminals in the 2 GHz MSS Bands, *Order and Authorization*, 24 FCC Rcd 171 (2009) (*ICO Waiver Order*); TerreStar Networks Inc., Application for Blanket Authority to Operate Ancillary Terrestrial Component Base Stations and Dual-Mode MSS/ATC Mobile Terminals in the 2 GHz MSS Bands, *Order and Authorization*, 25 FCC Rcd 228 (2010) (*TerreStar Waiver Order*).

<sup>30</sup> Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, WT Docket No. 10-133, *Fifteenth Report*, 26 FCC Rcd 9664, 9701 ¶ 38 n.98 (*Fifteenth Mobile Wireless Competition Report*).

<sup>31</sup> See Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz, ET Docket No. 10-142, *Notice of Proposed Rulemaking and Notice of Inquiry*, 25 FCC Rcd 9481, 9483 ¶ 6 (2010) (*MSS Fixed and Mobile Allocation NPRM*) ("The deployment of MSS and ATC in the 2 GHz band has been a slow process."); Connecting America: The National Broadband Plan at 87-88 (2010) (*National Broadband Plan*), available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-296935A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-296935A1.pdf) (last visited Mar. 19, 2012).

<sup>32</sup> See DISH Network Corporation Files to Acquire Control of Licenses and Authorizations Held By New DBSD Satellite Services G.P., Debtor-in-Possession and TerreStar License Inc., Debtor-in-Possession, IB Docket No. 11-150, *Public Notice*, 26 FCC Rcd 13018 (2011) (*DBSD and TerreStar Transfer of Control Public Notice*).

<sup>33</sup> *Id.* at 13020, 13021 (2011).

<sup>34</sup> New DBSD Satellite Service G.P., Debtor-in-Possession, and TerreStar Licensee Inc., Debtor-In-Possession, Request For Rule Waivers And Modified Ancillary Terrestrial Component Authority, IB Docket No. 11-149, *Public Notice*, 26 FCC Rcd 13011 (2011). See 47 C.F.R. §§ 25.149(b)(4), 25.252.

<sup>35</sup> New DBSD Satellite Service G.P., Debtor-in-Possession, and TerreStar Licensee Inc., Debtor-In-Possession, Request for Rule Waivers and Modified Ancillary Terrestrial Component Authority, IB Docket Nos. 11-149, 11-150, *Order*, DA 12-332, ¶¶ 1, 13, 29, 31, 33-34 (Mar. 2, 2012) (*DISH Transfer Order*).

expected to grow over 15-fold in the next five years.<sup>36</sup> This explosive growth is creating an urgent need for more network capacity and, in turn, for suitable spectrum. In a 2010 study, FCC staff concluded that “[e]ven with substantial investment, it is likely that mobile data demand will exhaust spectrum resources within the next five years.”<sup>37</sup> A more recent study by the Council of Economic Advisors (CEA) similarly found that “the spectrum currently allocated to wireless is not sufficient to handle the projected growth in demand, even with technological improvements allowing for more efficient use of existing spectrum and significant investment in new facilities.”<sup>38</sup> The CEA further concluded: “[t]he only feasible way to realize the full potential of wireless broadband is to make new spectrum available for wireless services.”<sup>39</sup>

11. Responding to this demand for additional spectrum, the *National Broadband Plan* recommended the Commission undertake to make 500 megahertz of spectrum available for broadband use within ten years.<sup>40</sup> The *National Broadband Plan* also recommended that 300 megahertz of this spectrum should be made available for mobile use within five years.<sup>41</sup> Similarly, the Administration has also recognized the need to make more spectrum available for broadband. In 2010, the President directed the National Telecommunications and Information Administration (NTIA) to collaborate with the Commission to “make available a total of 500 MHz of Federal and nonfederal spectrum over the next 10 years, suitable for both mobile and fixed wireless broadband use.”<sup>42</sup>

12. The widely-acknowledged need for more broadband spectrum has spurred several initiatives across the U.S. government. The Commission has launched several proceedings to facilitate bringing spectrum suitable for wireless broadband to the commercial marketplace.<sup>43</sup> NTIA undertook a “fast-track” review of several bands that could be reallocated to mobile use,<sup>44</sup> and continues to examine additional bands. Most recently, Congress passed the Middle Class Tax Relief and Job Creation Act of

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<sup>36</sup> Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011-2016 at 7-8 (Feb. 14, 2012), available at [http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white\\_paper\\_c11-520862.html](http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html) (*Cisco Study*) (last visited Mar. 19, 2012); see also *National Broadband Plan* at 76; see also Remarks of Chairman Genachowski, The White House (Apr. 6, 2011), available at <http://www.fcc.gov/document/chairman-discusses-spectrum-needs-white-house-remarks> (last visited Mar. 19, 2012).

<sup>37</sup> Federal Communications Commission, Staff Technical Paper, *Mobile Broadband: The Benefits of Additional Spectrum*, at 26 (Oct. 2010) available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-302324A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-302324A1.pdf) (last visited Mar. 19, 2012).

<sup>38</sup> Council of Economic Advisors, *The Economic Benefits of New Spectrum for Wireless Broadband* at 5 (Feb. 2012), available at <http://www.whitehouse.gov/administration/eop/cea/factsheets-reports> (last visited Mar. 19, 2012).

<sup>39</sup> *Id.*

<sup>40</sup> *National Broadband Plan*, Recommendation 5.8 at 84-85.

<sup>41</sup> *Id.*

<sup>42</sup> Memorandum of June 28, 2010—Unleashing the Wireless Broadband Revolution, 75 Fed. Reg. 38387 (July 1, 2010).

<sup>43</sup> See, e.g., Amendment of Part 27 of the Commission’s Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band, WT Docket No. 07-293, IB Docket No. 95-91, GEN Docket No. 90-357, RM-8610, *Report and Order and Second Report and Order*, 25 FCC Rcd 11710 (2010).

<sup>44</sup> See U.S. Department of Commerce, *An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675-1710 MHz, 1755-1780 MHz, 3500-3650 MHz, and 4200-4220 MHz, 4380-4400 MHz Bands* (Oct. 2010), available at [http://www.ntia.doc.gov/reports/2010/FastTrackEvaluation\\_11152010.pdf](http://www.ntia.doc.gov/reports/2010/FastTrackEvaluation_11152010.pdf) (“*NTIA Fast Track Report*”) (last visited Mar. 19, 2012).

2012, which grants the Commission new authority to conduct “voluntary incentive auctions,” a key pillar of the *National Broadband Plan*’s roadmap to bring more spectrum online for broadband.<sup>45</sup>

### C. Enabling Terrestrial Use of the 2 GHz MSS Band

13. The *National Broadband Plan* also recommended that the FCC “accelerate terrestrial deployment in 90 megahertz” of MSS spectrum.<sup>46</sup> The *National Broadband Plan* proposed different approaches to expanding terrestrial services in different MSS bands.<sup>47</sup> For the 2 GHz MSS band – the focus of this NPRM – the Plan recommended that the “FCC should add a primary ‘mobile’ (terrestrial) allocation to the S-Band, consistent with the international table of allocations, which will provide the option of flexibility to licensees to provide stand-alone terrestrial services using the spectrum.”<sup>48</sup> Additionally, the Plan recommended that “[e]xercise of this option should be conditioned on construction benchmarks, participation in an incentive auction, or other conditions designed to ensure timely utilization of the spectrum for broadband and appropriate consideration for the step-up in the value of the affected spectrum.”<sup>49</sup>

14. In July 2010, the Commission issued a Notice of Proposed Rulemaking proposing to add Fixed and Mobile allocations to the 2000-2020 MHz and 2180-2200 MHz bands.<sup>50</sup> The Commission adopted this proposal in April 2011, thereby establishing the predicate for more flexible use of the band for terrestrial mobile broadband services.<sup>51</sup> The Commission also stated that, “having added co-primary Fixed and Mobile allocations to the 2 GHz band, we anticipate issuing a notice of proposed rulemaking on subjects raised in the MSS NOI, including possible service rule changes that could increase investment and utilization of the band in a manner that further serves the public interest.”<sup>52</sup> The Commission added: “We expect the staff will take advantage of industry technical expertise as it develops options, which may include potential synergies with neighboring bands, to inform our decision making process going forward.”<sup>53</sup>

15. In January, 2011, the International Bureau granted a waiver of the MSS/ATC “integrated services” rule to LightSquared Subsidiary LLC (LightSquared), conditioned on protection of Global Positioning System (GPS) services. This order made clear “that the waiver is predicated on the specific combination of facts and circumstances before us. As such . . . we limit the scope of this conditional waiver to LightSquared in its use of MSS L-band spectrum.” On February 15, 2012, the International

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<sup>45</sup> Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6402.

<sup>46</sup> *National Broadband Plan*, Recommendation 5.8.4 at 87-88.

<sup>47</sup> *Id.* at 88.

<sup>48</sup> *Id.*, Recommendation 5.8.4 at 87-88.

<sup>49</sup> *Id.*

<sup>50</sup> Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz, ET Docket No. 10-142, *Notice of Proposed Rulemaking and Notice of Inquiry*, 25 FCC Rcd 9481 (2010) (*MSS Fixed and Mobile Allocation NPRM*).

<sup>51</sup> *2 GHz Band Co-Allocation Report and Order*, 26 FCC Rcd at 5710 ¶ 2.

<sup>52</sup> *Id.* at 5716 ¶ 13.

<sup>53</sup> *Id.*

Bureau proposed to modify LightSquared's satellite license "to suspend indefinitely LightSquared's underlying ATC authorization, first granted in 2004."<sup>54</sup>

16. In May 2011, the Commission's Spectrum Task Force issued a public notice requesting technical input on approaches to encourage the growth of terrestrial mobile broadband services in the 2 GHz spectrum range that is allocated for fixed and mobile use. Specifically, the Spectrum Task Force sought information on "developing a cohesive approach that maximizes the terrestrial mobile broadband potential of this spectrum."<sup>55</sup> The public notice specifically focused on the 2 GHz MSS band and neighboring Advanced Wireless Services (AWS) blocks, including the AWS-2 Upper "H" block spectrum at 1995-2000 MHz, the AWS-2 paired "J" block spectrum at 2020-2025 MHz and 2175-2180 MHz; and the AWS-3 spectrum at 2155-2175 MHz.<sup>56</sup> In response, several parties offered comments on potential changes to the existing 2 GHz MSS band plan.<sup>57</sup>

### III. NOTICE OF PROPOSED RULEMAKING: AWS-4

17. In this *Notice of Proposed Rulemaking (AWS-4 Notice)*, we build on the Commission's recent actions to enable the provision of terrestrial mobile broadband service in up to 40 megahertz of spectrum in the 2000-2020 MHz and 2180-2200 MHz spectrum bands. We propose terrestrial service rules for these spectrum bands that would generally follow the Commission's Part 27 rules, modified as necessary to account for issues unique to the 2000-2020 MHz and 2180-2200 MHz spectrum bands. Given the proximity of these spectrum bands to spectrum bands previously identified as AWS, in our proposal we refer to these spectrum bands as "AWS-4" or "AWS-4 spectrum."<sup>58</sup> We are mindful that this spectrum is now allocated on a co-primary basis for Mobile Satellite and for terrestrial Fixed and Mobile services and that MSS licensees already have authorizations to provide service in the band. Accordingly, as explained below, we seek comment on a proposal that AWS-4 terrestrial service rules will need to

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<sup>54</sup> International Bureau Invites Comment on NTIA Letter Regarding LightSquared Conditional Waiver, IB Docket No. 11-109, *Public Notice*, DA 12-214 at 4 (Feb. 15, 2012).

<sup>55</sup> Spectrum Task Force Invites Technical Input on Approaches to Maximize Broadband Use of Fixed/Mobile Spectrum Allocations in the 2 GHz Range, ET Docket No. 10-142, WT Docket Nos. 04-356, 07-195, *Public Notice*, 26 FCC Rcd 7587 (2011) (*2 GHz Public Notice*). The Middle Class Tax Relief and Job Creation Act of 2012 contains provisions requiring the FCC to auction some of these blocks by a date certain. See Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6401(b).

<sup>56</sup> *2 GHz Public Notice*.

<sup>57</sup> See, e.g., Comments of TerreStar Networks Inc., ET Docket No. 10-142, WT Docket Nos. 04-356, 07-195, (July 8, 2011);

<sup>58</sup> The 2000-2020 MHz and 2180-2200 MHz bands are the fourth spectrum bands that the Commission is proposing to make available for AWS use. The Commission assigned licenses for the 1710-1755 MHz and 2110-2155 MHz bands (AWS-1) in 2003. Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No. 02-353, *Report and Order*, 18 FCC Rcd 25162 (2003) (*AWS-1 Report and Order*); modified by Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No. 02-353, *Order on Reconsideration*, WT Docket No. 02-353, 20 FCC Rcd 14058 (2005). The Commission proposed licensing as AWS spectrum the following bands: AWS-2 (H block: 1915-1920 MHz and 1995-2000 MHz; and J block: 2020-2025 MHz and 2175-2180 MHz) in 2004; AWS-3 (2155-2180 MHz) in 2007, Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands, WT Docket No. 04-356, Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands, WT Docket No. 02-353, *Notice of Proposed Rulemaking*, 19 FCC Rcd 19263 (2004) (*AWS-2 NPRM*); Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band, WT Docket No. 07-195, *Notice of Proposed Rulemaking*, 22 FCC Rcd 17035 (2007) (*AWS-3 NPRM*), respectively. The Commission has yet to assign licenses for the AWS-2 and AWS-3 bands.

provide for the protection of 2 GHz MSS systems from harmful interference caused by AWS-4 systems.<sup>59</sup> Finally, for each of the issues identified below, we seek comment on the most efficient manner to address the issue. If a party believes any of these issues would be more properly resolved in another Commission proceeding, we request that the party identify those issues and the relevant Commission proceeding.

18. In the sections that follow, we seek comment on a number of parameters governing the licensing, use, and assignment of the spectrum, including their costs and benefits. We ask that commenters take into account only those costs and benefits that directly result from the implementation of the particular rules that could be adopted, including any proposed requirement or potential alternative requirement. Commenters should identify the various costs and benefits associated with a particular proposal. Further, to the extent possible, commenters should provide specific data and information, such as actual or estimated dollar figures for each specific cost or benefit addressed, including a description of how the data or information was calculated or obtained, and any supporting documentation or other evidentiary support.

#### A. AWS-4 Band Plan

19. We begin by proposing a band plan for the AWS-4 spectrum. Establishing the band plan is critical for the use of the spectrum by the existing 2 GHz MSS licensee, by any AWS-4 licensee, and in the event the Commission needs to re-assign spectrum that returns to the Commission. In establishing a band plan, the Commission adopts specific spectrum block(s) and geographic sizes that allow parties seeking licenses to optimize their individual service needs. The Commission also endeavors to permit parties to adjust their licenses through secondary market mechanisms such as combining or alternatively, partitioning and disaggregation, if such fine-tuning is necessary. In this section, we make two overarching proposals to establish the AWS-4 band plan. First, we propose to pair the two AWS-4 spectrum bands. Second, we propose block sizes and a geographic area licensing scheme to define license boundaries.

##### 1. Paired Spectrum (uplink/downlink)

20. As discussed herein, the spectrum in the 2000-2020 MHz and 2180-2200 MHz bands is presently licensed as paired spectrum for mobile satellite use. The 2000-2020 MHz band serves as an uplink band and 2180-2200 MHz band serves as a downlink band.<sup>60</sup> We propose to pair the AWS-4 blocks, consistent with the existing 2 GHz MSS licenses and the Commission's treatment of other bands used for mobile wireless and broadband service, AWS and PCS. We seek comment on this proposal. We also seek comment on whether we should take any action to ensure that equipment for the AWS-4 band is interoperable across both paired blocks.

21. Specifically, we propose to adopt the same uplink and downlink pairing designations for provision of terrestrial service as presently exists for satellite service in this spectrum: 2000-2020 MHz would serve as an uplink band; 2180-2200 MHz would serve as a downlink band. Adopting the same uplink/downlink pairing approach for AWS-4 as for 2 GHz MSS may facilitate the continued use of the

<sup>59</sup> See *infra* Section III.C (Protection of MSS Operations).

<sup>60</sup> The Commission allocated the uplink and downlink bands for the 2 GHz MSS spectrum in a companion item to the Commission's decision to permit MSS providers with the flexibility to integrate ATC into their MSS networks. See *Flexibility for Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Bands and Review of the Spectrum Sharing Plan Among Non-Geostationary Satellite Orbit Mobile Satellite Service Systems in the 1.6/2.4 GHz Bands*, IB Docket Nos. 01-185, 02-364, *Report and Order and Notice of Proposed Rulemaking*, 18 FCC Rcd 11030 n.1 (2003) citing *AWS Third Report and Order*, see also *2 GHz Public Notice* (seeking comment on whether to pair this spectrum and, if so, the appropriate designation of uplink and downlink bands for possible wireless terrestrial use in this spectrum, including on whether to adopt uplink and downlink designations opposite of those currently specified for 2 GHz MSS).

existing satellites for MSS. Figure 1, below, illustrates the existing band plan and Figure 2 illustrates the proposed band plan for AWS-4 spectrum. We seek comment on the above proposals and proposed AWS-4 band plan. We also seek comment on two alternative possibilities, in which the uplink band would be shifted up 5 megahertz to 2005-2025 MHz or up 10 megahertz and compressed to 2010-2025 MHz, as described in paragraphs 42-43, below.

**Figure 1: Existing 2 GHz Band Plan**

PCS (A-G) Downlink	H	J	BAS, CARS, LTTS, EESS, Space Operation	AWS-1 (A-F) Downlink	AWS- 3	J	Fed.	
	1995	2000	2025	2110	2155	2175	2180	2200

Frequencies in MHz

**Figure 2: Proposed AWS-4 Band Plan**

PCS (A-G) Downlink	H	J	BAS, CARS, LTTS, EESS, Space Operation	AWS-1 (A-F) Downlink	AWS- 3	J	Fed.	
	1995	2000	2025	2110	2155	2175	2180	2200

Frequencies in MHz

## 2. Spectrum Block Size

22. We also propose to license the spectrum in paired 10-megahertz blocks for each license area. Currently, the 2 GHz MSS spectrum is assigned as two paired blocks: Block A pairs 2000-2010 MHz with 2190-2200 MHz and Block B pairs 2010-2020 MHz with 2180-2190 MHz. We observe, however, that the 3<sup>rd</sup> Generation Partnership Project (3GPP) standards organization is in the process of examining whether to change the duplex spacing for Band 23, which includes this spectrum, from a spacing that corresponds to the existing duplex spacing to one that would remove the variable duplex spacing.<sup>61</sup> We seek comment on which pairing approach to apply. We ask commenters to discuss the affect the ongoing 3GPP process should have on our decision. In addition, commenters seeking

<sup>61</sup> Compare LTE RF standard for user equipment, 3GPP TS 36.101 R10.5.0, at 26, available at [http://www.3gpp.org/ftp/Specs/archive/36\\_series/36.101/36101-a50.zip](http://www.3gpp.org/ftp/Specs/archive/36_series/36.101/36101-a50.zip) (last visited March 19, 2012) (*LTE RF standard for UE*) with 3GPP RAN Working Group 4 change request, R4-120615, at 1-2, available at ([http://www.3gpp.org/ftp/tsg\\_ran/WG4\\_Radio/TSGR4\\_62/Docs/R4-120615.zip](http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_62/Docs/R4-120615.zip)) (last visited Mar. 19, 2011) and 3GPP RAN Working Group 4 meeting #62 meeting report, R4-12xxxx, at 37-38, available at [http://www.3gpp.org/ftp/tsg\\_ran/WG4\\_Radio/TSGR4\\_62/Report/R4-12xxxx\\_Draft\\_Report\\_RAN4%2362\\_EOM.zip](http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_62/Report/R4-12xxxx_Draft_Report_RAN4%2362_EOM.zip) (last visited Mar. 19, 2011).

alternative spectrum block sizes should support their recommendations with evidence that these alternative schemes will promote greater efficiency and more flexible use of the bands than the proposed approach. Commenters also should discuss and quantify any associated costs or benefits of implementing the proposals discussed above or any alternative schemes.

23. Our proposal to license AWS-4 spectrum in paired 10-megahertz blocks reflects several considerations. First, the MSS band is currently licensed as paired 10-megahertz blocks. Issuing AWS-4 licenses with equivalent bandwidth would facilitate coordination between the two services. Second, establishing paired 10-megahertz blocks strikes a balance between potentially enabling multiple licensees in any given geographical area (*i.e.*, different licensees in each 10 + 10 block pair) and allowing the use of newer high-bandwidth technologies. We seek comment on these approaches.

24. We also seek comment on adopting a flexible paired single block option that, in the event a single licensee holds both the A and B Blocks, would allow that entity to combine them into one paired 20-megahertz block and use these contiguous spectrum blocks seamlessly with flexibility to design its network and respond effectively to any business and technical needs. Alternatively, if we were to adopt a licensing mechanism that allows AWS-4 spectrum licensees to be held by entities other than the existing 2 GHz MSS licensees, we seek comment on whether this spectrum should be licensed in smaller block sizes.

### 3. Geographic Area Licensing

25. We propose to license the AWS-4 band using a geographic area licensing approach, and we seek comment on this proposal. A geographic licensing area approach is well suited for the types of fixed and mobile services that would likely be deployed in this band. Additionally, geographic licensing is consistent with the Commission's licensing approach adopted for the AWS-1 bands, and proposed for both the AWS-2 and the AWS-3 bands.<sup>62</sup> In the event that interested parties do not support geographic licensing for the AWS-4 spectrum, those commenters should explain their position and identify the costs and benefits associated with an alternative licensing proposal and what type of licensing scheme it supports.

26. Assuming that we utilize a geographic area approach for licensing these bands, we must determine the appropriate size(s) of service areas on which licenses should be based. In previous AWS service rule proceedings the Commission has sought to balance policy goals of fostering service to rural areas and tribal lands, and promoting investment in and rapid deployment of new technologies and services consistent with its obligations under Section 309(j) of the Communications Act.<sup>63</sup> To do that, the Commission, among other things, established spectrum blocks in three geographic area sizes.<sup>64</sup> In regard to the AWS-4 spectrum, however, we propose to apply a single size geographic area. We propose that any new AWS-4 licenses should be assigned on an Economic Area (EA) basis.<sup>65</sup> Assigning AWS-4 in EA geographic areas would allow AWS-4 licensees to make adjustments to suit their individual needs. EA license areas are small enough to provide spectrum access opportunities for smaller carriers. EA license areas also nest within and may be aggregated up to larger license areas that have been used by the Commission for other services, such as Major Economic Areas (MEAs) and Regional Economic Area Groupings (REAGs) for those seeking to create larger service areas. Depending on the licensing mechanism we adopt, licensees may aggregate or otherwise adjust their geographic coverage through

<sup>62</sup> See *AWS-1 Report and Order*, 18 FCC Rcd at 25174 ¶ 30 (2003); *AWS-2 NPRM*, 19 FCC Rcd at 19271-72 ¶ 18 (2004); *AWS-3 NPRM*, 22 FCC Rcd at 17050 ¶ 31 (2007).

<sup>63</sup> See, e.g., *AWS-1 Report and Order*, 18 FCC Rcd at 25715-25716 ¶ 35 (2003); see also 47 U.S.C. §309(j).

<sup>64</sup> See *AWS-1 Report and Order*, 18 FCC Rcd at 25716 ¶ 36.

<sup>65</sup> See 47 C.F.R. 27.6.

auction or through secondary markets. We seek comment on this approach. We ask commenters to discuss and quantify the economic, technical, and other public interest considerations of any particular geographic scheme for this particular band, as well as the impact that any such scheme would have on rural service and competition.

27. We also seek comment on including the Gulf of Mexico in our licensing scheme for these bands. We question whether to include it as part of larger service areas, as we did for the Upper 700 MHz band, or whether we should separately license a service area or service areas to cover the Gulf of Mexico. Commenters who advocate a separate service area or areas to cover the Gulf of Mexico should discuss what boundaries should be used, and whether special interference protection criteria or performance requirements are necessary due to the unique radio propagation characteristics and antenna siting challenges that exist for Gulf licensees.

#### **B. Technical Issues**

28. When the Commission adopted the MSS/ATC regime in 2003, it addressed intra-service and adjacent-band interference concerns, and enacted unique MSS/ATC technical rules in Part 25 of the Commission's rules, which did not fully align with the technical rules for similar terrestrial operations in other bands.<sup>66</sup> Subsequently, in addressing requests for ATC authority by the two 2 GHz MSS authorization holders, ICO and TerreStar, the Commission granted them waivers of several of the Part 25 ATC interference rules.<sup>67</sup> In general, these waivers resulted in aligning the terrestrial requirements for the 2 GHz MSS band operators more closely with the Part 27 technical rules that apply to AWS-1 license holders. Based on review of current interference possibilities, we propose an approach that would permit deployment under the current rules and waivers by proposing that the technical rules and license conditions applicable today to the provision of terrestrial services in the 2 GHz MSS bands should generally apply to the AWS-4 bands.

29. In general, our aim in establishing technical rules is to maximize the flexible use of spectrum while appropriately protecting incumbent operations in neighboring bands. The technical rules we propose below are based on the rules for AWS-1 spectrum, with specific additions or modifications designed to protect broadband PCS services operating in the 1930-1995 MHz band, as well as future services operating in the 1995-2000 MHz band, from harmful interference from AWS-4 mobile devices operating in the 2000-2020 MHz band. Any rules would also address protection of Federal operations in the 2200-2290 MHz band from harmful interference from AWS-4 base stations operating in the 2180-2200 MHz band. We also seek comment on whether modifications to these rules might be warranted in order to provide for more flexible use of AWS-4 spectrum, while at the same time protecting other spectrum uses from interference.

##### **1. OOB Limits**

30. In the proposed band plan, AWS-4 spectrum would be issued in paired 10-megahertz blocks, using Economic Area licenses.<sup>68</sup> Therefore, interference must be considered between AWS-4 blocks and adjacent bands, between different blocks within the AWS-4 band, and between different geographic area licenses within the AWS-4 band.

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<sup>66</sup> The ATC interference rules for the 2 GHz MSS band are contained in rule 25.252. See 47 C.F.R. § 25.252; *ATC Report and Order*, 18 FCC Rcd at 2020-2030 ¶¶ 109-127.

<sup>67</sup> See *ICO Waiver Order*, 24 FCC Rcd at 183-197 ¶¶ 35-64, 68-69; *TerreStar Waiver Order*, 25 FCC Rcd at 235-237 ¶¶ 20-27, 239-240 ¶ 33-34.

<sup>68</sup> See *supra* Section III.A (AWS-4 Band Plan).

a. **Interference Between Adjacent Block AWS-4 Licensees**

31. *Emissions limits.* To minimize harmful interference, the Commission's rules often limit the amount of RF power that may be emitted outside of the assigned block of an RF transmitter. The Commission has previously concluded that attenuating base station out-of-band emissions (OOBE) by  $43+10*\log_{10}(P)$  dB at the edge of an assigned block, where P is the transmit power in watts, is appropriate to minimize harmful electromagnetic interference between terrestrial operations in the 2180-2190 MHz and 2190-2200 MHz blocks.<sup>69</sup> Similarly, the Commission has previously found that attenuating terrestrial mobile emissions by  $43+10*\log_{10}(P)$  dB outside the assigned block will minimize interference within the 2000-2020 MHz band.<sup>70</sup> Furthermore, when the Commission created the service rules for AWS-1, it concluded that this level of attenuation is appropriate for protecting wireless systems that will operate in the AWS bands.<sup>71</sup> At the time, the Commission noted that this limit is commonly employed in other wireless services, and it has generally been found to be adequate in preventing adjacent channel interference.<sup>72</sup> This level of attenuation is now established in the Commission's rules for the AWS band, both for both mobile station and base station emissions.<sup>73</sup>

32. *Measurement procedure.* To fully define an emissions limit, the Commission's rules generally specify details of how to measure the power of the emissions, such as the measurement bandwidth. The Part 25 ATC rules determine mobile station compliance with the OOBE limit based on a measurement bandwidth of 1 MHz or greater.<sup>74</sup> For AWS-1, the measurement bandwidth used to determine compliance with this limit for both mobile stations and base stations is generally 1 MHz, with some modification within the first 1 MHz.<sup>75</sup> Previously, the Commission concluded the AWS-1 measurement procedure was also appropriate for mobile stations operating in 2000-2020 MHz.<sup>76</sup> At that time the Commission did not address the measurement procedure for base stations operating in 2180-2200 MHz.<sup>77</sup> However, as mentioned above, in the AWS-1 band this procedure applies to mobile and base transmissions. We believe that it is similarly reasonable to apply this procedure to both mobile and base transmissions in the AWS-4 band.

33. *Proposal.* To address potential harmful electromagnetic interference within the AWS-4 band, we propose that Section 27.53(h) of the Commission's rules, which includes OOBE attenuation of  $43+10*\log_{10}(P)$  dB and the associated measurement procedure, should be expanded to apply to AWS-4 operations in the 2000-2020 MHz and 2180-2200 MHz bands. We seek comment on this proposal.

<sup>69</sup> See *ICO Waiver Order*, 24 FCC Rcd at 187 ¶ 44.

<sup>70</sup> See *id.* at 194 ¶ 62.

<sup>71</sup> *AWS-1 Report and Order*, 18 FCC Rcd at 25198 ¶ 92.

<sup>72</sup> *Id.* at 25198 ¶ 91.

<sup>73</sup> See 47 C.F.R. § 27.53(h). This OOBE limit also applies in the broadband PCS band, see 47 C.F.R. § 24.238.

<sup>74</sup> See 47 C.F.R. § 25.252(c)(4).

<sup>75</sup> See 47 C.F.R. § 27.53(h)(1).

<sup>76</sup> See *ICO Waiver Order*, 24 FCC Rcd at 194-195 ¶¶ 63-64.

<sup>77</sup> This has been noted by DBSD and TerreStar, both of whom suggested that the mobile measurement procedure be used for base stations as well. See *New DBSD Satellite Services G.P., Debtor-in-Possession, Application for Modification of Ancillary Terrestrial Component Authority*, IB Docket No. 11-149, at 8-9 (Aug. 22, 2011); *TerreStar License Inc., Debtor-in-Possession, Application for Modification of Ancillary Terrestrial Component Authority*, IB Docket No. 11-149, at 12 n.23 (Aug. 22, 2011) (*TerreStar Waiver Request*).

Commenters should discuss and quantify the costs and benefits of this proposal and any proposed alternative approaches.

**b. Interference with Services in Adjacent and Other Bands**

34. After considering interference between adjacent blocks within the AWS-4 band in the previous section, we next examine the adjacent and nearly adjacent bands outside the AWS-4 band. In so doing, we seek to establish rules that permit flexible use of the AWS-4 band, while effectively protecting operations in adjacent bands from harmful interference. We begin our examination of adjacent band interference by considering whether attenuation greater than  $43+10*\log_{10}(P)$  dB—a level the Commission frequently applies to adjacent band operations—is needed to prevent harmful electromagnetic interference from the AWS-4 band to other bands.<sup>78</sup>

35. *Interference with operations below 1995 MHz.* The AWS-4 uplink band at 2000-2020 MHz is 5 megahertz from the broadband PCS downlink band at 1930-1995 MHz. To protect PCS mobile receivers from harmful electromagnetic interference from mobile stations transmitting in the 2000-2020 MHz band, the ATC rules specify an attenuation of  $70+10*\log_{10}(P)$  dB below 1995 MHz.<sup>79</sup> We propose that this emission limit should continue to apply to terrestrial operations in the 2000-2020 MHz band, and that a rule should be added to Part 27 that fixed and mobile transmitters operating in 2000-2020 MHz must attenuate emissions below 1995 MHz by  $70+10*\log_{10}(P)$  dB. We further propose that this attenuation should be measured using the existing measurement procedure of Section 27.53(h) discussed above. We seek comment on these proposals. Commenters should discuss and quantify the costs and benefits of this proposal and any proposed alternative approaches.

36. *Interference with operations in 1995-2000 MHz.* The Part 25 ATC technical rules also include a linear interpolation of OBE attenuation between  $70+10*\log_{10}(P)$  dB at 1995 MHz and  $43+10*\log_{10}(P)$  dB at 2000 MHz.<sup>80</sup> However, recently enacted legislation directs the Commission to allocate the 1995-2000 MHz band (AWS-2 Upper H block) for commercial use, and to auction and grant new initial licenses for the use of this spectrum under flexible-use service rules.<sup>81</sup> Given this statutory directive and considering that the 1995-2000 MHz block is adjacent to existing broadband PCS downlink operations, it is likely that this block will be used for terrestrial downlink operations.<sup>82</sup> This will exacerbate the existing potential for harmful interference between downlink operations below 2000 MHz and uplink operations above 2000 MHz. For example, commenters to the *2 GHz Public Notice* have suggested that a guard band of 5 MHz or more would be necessary to prevent interference between

<sup>78</sup> Although the previous section only discussed  $43+10*\log_{10}(P)$  for interference within the band, that attenuation applies to all transmissions outside the assigned block, including emissions in other bands.

<sup>79</sup> See 47 C.F.R. § 25.252(c)(2). This value was not waived or requested to be waived during any of the ATC designation or other MSS/ATC related procedures.

<sup>80</sup> See 47 C.F.R. § 25.252(c)(2).

<sup>81</sup> Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6401(b).

<sup>82</sup> The statute further directs that if the Commission determines that 1995-2000 MHz cannot be used without causing harmful interference to commercial mobile service licensees in the 1930-1995 MHz band then the Commission may not allocate 1995-2000 MHz for commercial use or grant licenses for it by auction. Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6401(b)(4). The statute contains similar provisions for 1915-1920 MHz, which, in 2004 and 2008, the Commission proposed to pair with the 1995-2000 MHz band, and which may interfere with PCS operations in the 1930-1995 MHz band. Nothing in this item is intended to prejudge whether to pair 1995-2000 MHz with 1915-1920 MHz, and we observe that the statute does not require this pairing. For example, 1995-2000 MHz could be auctioned as a downlink expansion band.

downlink operations in 1930-1995 MHz and uplink operations in 2000-2020 MHz.<sup>83</sup> To address this apparent tension, we seek comment on three alternative proposals for OOB limits in 1995-2000 MHz.<sup>84</sup>

37. First, we could maintain the existing linear interpolation. However, this would offer the 1995-2000 MHz block less protection than the existing PCS blocks, which as discussed above is  $70+10*\log_{10}(P)$  dB below the transmit power. In addition, meeting this limit may have a negative impact on mobile transmitters in 2000-2020 MHz, as the mobile station components, such as power amplifiers and filters, may not have sharp enough roll off characteristics to meet this limit when operating in the lower parts of the band, particularly when operating at the maximum power level supported. In this regard, we observe that, in standardizing the 2000-2020 MHz and 2180-2200 MHz bands as Band 23, 3GPP has allowed for up to 12 dB of additional power reduction below the maximum transmit power for mobile stations in 2000-2010 MHz to meet the Commission's current rules.<sup>85</sup> As the mobile transmit power affects the ability of the mobile station to reach the base station, this reduction of power would appear to have a significant impact on cell coverage, uplink throughput, and ultimately the usability of this spectrum.

38. Second, we could require that fixed and mobile transmitters operating in 2000-2020 MHz attenuate emissions below 2000 MHz by  $70+10*\log_{10}(P)$  dB, consistent with the emissions limit below 1995 MHz. We note, however, that this level may be difficult to meet for mobile transmitters in 2000-2020 MHz, as it requires even sharper roll off from mobile stations than the previous alternative.

39. Third, we could require that fixed and mobile transmitters operating in 2000-2020 MHz attenuate emissions below 2000 MHz by  $43+10*\log_{10}(P)$  dB, symmetric with existing limits for PCS emissions in 2000-2020 MHz and broadly consistent with Commission rules as discussed above.<sup>86</sup> In this case, if future service rules for 1995-2000 MHz have the same requirement, then the licensees above and below 2000 MHz would be placed on a more equal footing, and could determine among themselves if there is a need for any stricter limits.

40. We seek comment on each of these alternatives. For each alternative, we ask commenters to address whether the proposal is adequate to protect expected uses of the 1995-2000 MHz band. Commenters should address and quantify the magnitude and effect of any possible harmful

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<sup>83</sup> See e.g., Comments of Ericsson, ET Docket No. 10-142, WT Docket Nos. 04-356, 07-195, at 9 (July 8, 2011) (*Ericsson 2 GHz Public Notice Comments*).

<sup>84</sup> We also observe that future operations in the 1995-2000 MHz band could result in harmful interference into the 2000-2020 MHz band. The Commission has previously, in an open proceeding on AWS-2 spectrum, sought comment on whether base stations transmitting in the 1995-2000 MHz band are likely to cause harmful interference to operations in the 2000-2020 MHz band, and if so, what special measures might be needed to prevent such interference. See *AWS-2 NPRM*, 19 FCC Rcd at 19300 ¶¶ 94-95. Similarly, we note that in the standardization of Band 23 in 3GPP, base station receivers operating in the 2000-2010 MHz band receive a protection level of only -30 dBm/MHz from PCS base stations in the 1930-1995 MHz band (Bands 2 and 25), rather than the common level of -49 dBm/MHz. This indicates both that base stations in the 2000-2010 MHz band may receive high levels of interference from PCS base stations, which may significantly limit their coverage area and throughput, and that it may be difficult to design PCS base stations to meet a tighter limit. See LTE RF standard for base stations, 3GPP TS 36.104, R10.5.0 at 44, available at [http://www.3gpp.org/ftp/Specs/archive/36\\_series/36.104/36104-a50.zip](http://www.3gpp.org/ftp/Specs/archive/36_series/36.104/36104-a50.zip) (last visited Mar. 3, 2012) (*LTE RF standard for BS*). This potential issue and any appropriate limitations on emissions for transmitters in the 1995-2000 MHz band would be addressed in any future service rules for the 1995-2000 MHz band.

<sup>85</sup> Specifically, the standard specifies less than or equal to 12 dB of "A-MPR", additional maximum power reduction, see *LTE RF standard for UE* at 33.

<sup>86</sup> See 47 C.F.R. § 24.238. See *supra* ¶ 31.

interference, such as the impact on link budgets or coverage areas. Commenters should also address the amount of spectrum that may be unusable or partially usable in either band. For each alternative, we also seek comment on the impact on operations in the 2000-2020 MHz band, including whether mobile stations will be able to utilize the entire 2000-2020 MHz band while meeting the proposed limit, and if not, the amount of spectrum that may be unusable or usable only at a reduced power, as well as the extent of any such power reductions.

41. For all three alternatives, we propose that the attenuation should be measured using the existing measurement procedure of Section 27.53(h) discussed above.<sup>87</sup> We seek comment on this proposal.

42. Finally, in the event that the record shows none of these three proposals sufficiently addresses issues of interference with 1995-2000 MHz, we seek comment on two additional proposals. First, we seek comment on an alternative proposal to shift the uplink band up 5 megahertz from 2000-2020 MHz to 2005-2025 MHz, including the lower portion of the AWS-2 "J" Block at 2020-2025 MHz. This concept was part of Ericsson's proposal in its comments in response to the *2 GHz Public Notice*.<sup>88</sup> Would this shift proposal better mitigate interference with the AWS-2 Upper H block and PCS downlink bands, increasing the value of the spectrum for mobile broadband and other uses? Further, would this alternative approach allow for more productive use of the "stranded" lower portion of the AWS-2 J Block (2020-2025 MHz) should the Commission eventually decide to auction the upper portion of the J Block as part of an extended AWS-3 band? Second, we seek comment on an alternative proposal to shift the uplink band up 10 megahertz, while compressing the band from 20 to 15 megahertz, resulting in an uplink band of 2010-2025 MHz. For this alternative, in light of the interference issues that may impact the terrestrial use of 2000-2005 MHz, we seek comment on whether shifting the spectrum to a 15 megahertz band at 2010-2025 MHz would result in the actual loss of spectrum usable for terrestrial broadband service.

43. For both spectrum shift alternatives, we propose that the shift apply to the lower end of the band for both terrestrial and satellite service. Shifting the satellite service out of the 2000-2005 MHz or the 2000-2010 MHz blocks (in a manner consistent with the terrestrial service) would mitigate against the possibility of mobile satellite devices causing harmful interference into the 1995-2000 MHz block. The 2020-2025 MHz block is not presently allocated for satellite service.<sup>89</sup> We do not intend to shift the satellite service into this block. We seek comment on this proposal including its costs and benefits. Lastly, in considering the spectrum shift alternatives, we seek comment on how each might affect all of the applicable proposals contained in this *AWS-4 Notice*, including without limitation the technical protections discussed in this section, the assignment proposals, and relocation and cost sharing proposals discussed below in Sections III.D (Assignment of AWS-4 License(s)) and III.G (Relocation and Cost Sharing).

44. *Interference with operations in 2020-2025 MHz.* The AWS-4 uplink band will be adjacent to the AWS-2 Lower J block, 2020-2025 MHz. Although the Part 25 ATC rules adopted in 2003 originally attenuated the mobile station emissions in this range by a linear interpolation from  $43+10*\log_{10}(P)$  dB at 2020 MHz to  $70+10*\log_{10}(P)$  dB at 2025 MHz,<sup>90</sup> the Commission separately

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<sup>87</sup> 47 C.F.R. § 27.53(h).

<sup>88</sup> *Ericsson 2 GHz Public Notice Comments* at 9.

<sup>89</sup> 47 C.F.R. § 2.106.

<sup>90</sup> See 47 C.F.R. § 25.252(c)(2).

proposed in 2004 to apply a standard of  $43+10*\log_{10}(P)$  to the AWS-2 J block.<sup>91</sup> In 2009, in the *ICO Waiver Order*, the Commission waived the Part 25 ATC rules and instead applied the  $43+10*\log_{10}(P)$  to OOB in 2020-2025 MHz from transmitters operating in 2000-2020 MHz.<sup>92</sup> We propose that no additional attenuation beyond  $43+10*\log_{10}(P)$  dB is needed to protect services in the 2020-2025 MHz band. We seek comment on this approach. Commenters should discuss and quantify the costs and benefits of this proposal and any proposed alternative approaches.

45. *Interference with operations above 2025 MHz.* The AWS-4 uplink band is 5 megahertz from the 2025-2110 MHz band, which includes broadcast auxiliary service (BAS) and cable television service (CARS) operations, as well as certain Federal government operations. Although the ATC rules originally limited the mobile emissions to  $70+10*\log_{10}(P)$  above 2025 MHz,<sup>93</sup> in 2009, the Commission waived the Part 25 ATC rule and instead applied the  $43+10*\log_{10}(P)$  standard.<sup>94</sup> As the interference potential between these bands has not changed significantly since then, we propose that no additional attenuation beyond  $43+10*\log_{10}(P)$  dB is needed to protect operations above 2025 MHz. We seek comment on this approach. Commenters should discuss and quantify the costs and benefits of this proposal and any proposed alternative approaches.

46. *Interference with operations below 2180 MHz.* The AWS-4 downlink band, 2180-2200 MHz, is adjacent to the AWS-2 Upper J block, 2175-2180 MHz, which is itself adjacent to the AWS-3 band, 2155-2175 MHz. The Commission has previously proposed that an attenuation of  $43+10*\log_{10}(P)$  dB is an appropriate base station emission limit to prevent harmful electromagnetic interference in the AWS-2 and AWS-3 bands.<sup>95</sup> As the circumstances have not changed significantly since that attenuation level was proposed, we propose that no additional attenuation beyond  $43+10*\log_{10}(P)$  dB is needed below 2180 MHz. We seek comment on this approach. Commenters should discuss and quantify the costs and benefits of this proposal and any proposed alternative approaches.

47. *Interference with operations above 2200 MHz.* The proposed AWS-4 downlink band, 2180-2200 MHz, is adjacent to Federal operations in 2200-2290 MHz. Federal operations in the band 2200-2290 MHz consist mainly of space, airborne telemetry, and fixed point-to-point microwave radio relay communications. The space communications in the band consist of the tracking, telemetry, scientific data communications, and control of U.S. spacecraft. The band is used by these agencies to operate space research, space operations, and Earth exploration-satellites for space-to-Earth communications, and in the case of NASA for space-to-space communications through their Tracking and Data Relay Satellite System (TDRSS). Federal agencies use this band for research; law enforcement video surveillance; control of robotic systems for explosive neutralization and disposal; and the testing of robotic ground vehicles.<sup>96</sup>

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<sup>91</sup> *AWS-2 NPRM*, 19 FCC Rcd at 19301 ¶ 98.

<sup>92</sup> See *ICO Waiver Order*, 24 FCC Rcd at 193-194 ¶ 61.

<sup>93</sup> See 47 C.F.R. § 25.252(c)(2).

<sup>94</sup> See *ICO Waiver Order*, 24 FCC Rcd at 193-194 ¶ 61.

<sup>95</sup> See, e.g., Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band, Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands, WT Docket No. 07-195, WT Docket No. 04-356, *Further Notice of Proposed Rulemaking*, 23 FCC Rcd 9859, 9860, 9877 ¶ 3, App. A (proposed revision to 27.53(h)(1)) (2008) (*AWS-3 Further Notice*).

<sup>96</sup> An Assessment of the Viability of Accommodating Wireless Broadband in the 1755-1850 MHz Band, U.S. Department of Commerce (forthcoming). The 2200-2290 MHz Band is identified by NTIA as one of the (continued....)

48. The Commission's Part 25 ATC rules require strict emissions limitations (-100.6 dBW / 4 kHz) in the 2180-2200 MHz band, and prohibit the location of base stations within 820 meters of a Federal earth station operating in the 2200-2290 MHz band.<sup>97</sup> In 2009, the Commission waived the Part 25 emissions limit rule for MSS/ATC operator ICO, replacing it with the standard emission limit of  $43+10*\log_{10}(P)$  dB.<sup>98</sup> Specific to emissions limits and restrictions on base station locations with respect to the 2200-2290 MHz band, the waiver order required that ICO follow an operator-to-operator agreement that ICO had reached with several Federal agencies.<sup>99</sup> Finally, TerreStar also requested a waiver of the Part 25 emission limit rules to the extent granted ICO, and is discussing an operator-to-operator agreement with Federal agencies.<sup>100</sup> In summary, as it stands, ATC base stations in the 2190-2200 MHz block must meet -100.6 dBW / 4 kHz in 2200-2290 MHz throughout the licensed areas, while ATC base stations in 2180-2190 MHz must meet the limits set forth in the *ICO-Federal Agreement*. If the Commission adopts the proposals contained in this *AWS-4 Notice*, we expect that licensees will construct extensive cellular systems in this band. We seek comment on whether such deployments would represent a material change in the expected density of deployment in the band. If so, we seek comment on the advantages and disadvantages of such a change.

49. We seek comment on the appropriate emissions limits to protect Federal operations in the 2200-2290 MHz band in light of the current state of affairs. We observe that the emissions limit of -100.6 dBW / 4 kHz EIRP is considerably more stringent than the standard OOB limit of  $43+10*\log_{10}(P)$  dB and may limit flexible use of the AWS-4 band.<sup>101</sup> We seek comment on whether licensees would be able to use their entire spectrum block for commercial terrestrial broadband base stations while meeting this limit, or, if not, how much spectrum would be unusable or usable only at a reduced power level (that is, would effectively become a guard band), as well as the extent of any such power reductions. We also seek comment on whether current, state-of-the-art base station filter design would feasibly be able to meet the OOB limit of -100.6 dBW / 4 kHz in any portion of the 2200-2290 MHz band, and the practicality, including the costs, of commercially deploying such filters. We seek comment on whether any internal guard band would affect the band plan proposal made in the previous section that guard bands would have on the band plan proposal.<sup>102</sup> Finally, we seek comment on whether to carry forward the existing waivers of the Part 25 emissions limits into the Part 27 regime (e.g., pursuant to the Commission's license

(Continued from previous page)

comparable bands into which to relocate some Federal systems from the 1755-1850 MHz band so that band can be used for terrestrial wireless broadband. *Id.* at Sections 3-4, App. D.

<sup>97</sup> See 47 C.F.R. §§ 25.252(a)(1), (a)(6).

<sup>98</sup> See *ICO Waiver Order*, 24 FCC Rcd at 187 ¶ 44.

<sup>99</sup> Letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, National Telecommunications and Information Administration, to Julius Knapp, Chief, Office of Engineering and Technology, Federal Communications Commission, File No. SES-LIC-20071203-01646, SES-AMD-20080118-00075, SES-AMD-20080219-00172, Call Sign: E070272, Attachment at 2 (Jan. 6, 2009). We will refer to the attached Operator-to-Operator Agreement between ICO Global Communications and United States Federal Government Agencies Operating Earth Stations in the 2200-2290 MHz Band as the *ICO-Federal Agreement*.

<sup>100</sup> See, e.g., *TerreStar Waiver Request* at 9 n.21.

<sup>101</sup> The limit of  $43+10*\log_{10}(P)$  means that the transmit power must be -13 dBm/MHz or less. The limit of -100.6 dBW / 4 kHz EIRP, assuming an antenna gain of 17 dBi, is equivalent to -64 dBm/MHz. That is, it represents an additional 51 dB of attenuation.

<sup>102</sup> See *supra* Section III.A (AWS-4 Band Plan).

modification authority under Section 316 of the Communications Act)<sup>103</sup>. Commenters should discuss the costs and benefits of their proposals.

50. We seek comment on whether to prohibit the location of AWS-4 base stations within 820 meters of existing Federal earth stations, consistent with both the current Part 25 rule and the *ICO-Federal Agreement*.<sup>104</sup> Commenters should discuss and quantify the costs and benefits of their proposals.

51. We also seek comment on whether there are any other Part 25 MSS/ATC technical rules that we should incorporate into the AWS-4 technical rules.

52. *Other alternative approaches.* We also seek comment on any other alternative approaches to protecting Federal stations above 2200 MHz while maximizing the usability of AWS-4 spectrum. Commenters should discuss and quantify the costs and benefits of any proposed alternative approaches.

53. *PFD limits for protection of operations above 2200 MHz.* We seek comment on an alternative approach of specifying an aggregate power flux density (PFD) that must be met at the protected site, which would enable the AWS-4 licensee to operate as long as this limit is met. We seek comment on what PFD limit will prevent harmful interference, what methods can be used to determine that such a limit is met (e.g., engineering studies), and the degree to which this approach would increase flexibility in the AWS-4 band while protecting Federal operations in the 2200 MHz band.

54. *Sliding scale for protection of operations above 2200 MHz.* The emissions limit in the *ICO-Federal Agreement* changes from an emissions limit of  $43+10*\log_{10}(P)$  dB of attenuation of the transmit power beyond a specified distance from the protected site to an EIRP limit of -100.6 dBW / 4 kHz within the specified distance. However, the attenuation needed and therefore the necessary emissions limit is a function of the isolation provided by the geographic separation of the protected site and the terrestrial base station, and therefore follows a curve as a function of the distance from the protected site. Therefore, we seek comment on an alternative approach where the OOB limit is an interpolation between  $43+10*\log_{10}(P)$  dB and -100.6 dBW / 4 kHz as a function of distance. In this case it may be necessary for the interpolation to be linear in the logarithm of the distance.<sup>105</sup>

55. *Global Positioning System (GPS).* We note that the MSS/ATC rules contain provisions regarding interference with GPS systems operating at 1559-1610 MHz.<sup>106</sup> We further note that different MSS/ATC bands are differently situated in terms of frequency separation from the GPS band. We request comment on whether any special interference rules protecting GPS are warranted for the 2 GHz band if we implement the AWS-4 proposals. We ask that commenters provide technical analysis supporting their views. We also seek comment on the costs and benefits associated with their proposals.

## 2. Receiver Performance

56. We invite comment on any potential for receiver overload interference between AWS-4 operations and operations above 2200 MHz, below 2180 MHz, above 2020 MHz, and below 2000 MHz. If such a risk exists, we request that parties provide whatever information may be available about the characteristics of the receivers operating in these frequencies, potential solutions to overload interference, and an assessment of the impact this might have on deployment of AWS-4 service. We also invite

<sup>103</sup> See *infra* Section III.D.1 (Section 316 License Modification).

<sup>104</sup> See 47 C.F.R. § 25.252(a)(6).

<sup>105</sup> Propagation path loss is often linear in the log of the distance, rather than linear in the distance itself, so this may be an appropriate interpolation method.

<sup>106</sup> See 47 C.F.R. §§ 252(a)(7), (b)(3).

comment on any other receiver issues that should be considered in this proceeding that could affect the potential for harmful interference and usability of the AWS-4 spectrum.

### 3. Power Limits

57. We seek comment on appropriate power limits for terrestrial operations in the AWS-4 band. Specifically, as described below, we propose to apply existing AWS power limits to the AWS-4 band. We seek comment on this proposal, including the costs and benefits of the proposal.

58. *Base Stations.* The MSS/ATC rules limit ATC base station transmit power to 27 dBW EIRP in 1.23 MHz.<sup>107</sup> The current AWS-1 rules limit base station power in non-rural areas to 1640 watts EIRP for emission bandwidths less than 1 MHz and to 1640 watts per MHz EIRP for emission bandwidths greater than 1 MHz, and double these limits (3280 watts EIRP) in rural areas.<sup>108</sup> The Commission has previously concluded that a power limitation of 32 dBW / MHz EIRP is appropriate for base stations in the 2180-2190 MHz band,<sup>109</sup> and that a power limitation of 32 dBW EIRP is appropriate for base stations in the 2190-2200 MHz band.<sup>110</sup> Although neither of these limits aligns exactly with the AWS-1 rules, the 32 dBW EIRP level was specifically chosen because it approximates the 1640 watt EIRP limit of AWS-1 specified in 27.50(d).<sup>111</sup> The Commission did not consider whether the higher power level of 3280 watts EIRP allowed for rural AWS-1 base stations is appropriate for 2180-2200 MHz.<sup>112</sup> Although not fully aligned with AWS-1, the current power limits are very similar. The 32 dBW EIRP limit is the same as the AWS-1 limit of 1640 watts EIRP for emissions under 1 MHz, but is more burdensome for larger bandwidths. Similarly, the 32 dBW/MHz EIRP limit is the same as the AWS-1 limit of 1640 watts / MHz EIRP for emission over 1 MHz, but is more burdensome for emissions under 1 MHz. Changing both limits to the existing AWS-1 rule of 1640 watts EIRP for emissions less than 1 MHz and 1640 watts/MHz EIRP for emissions over 1 MHz would best allow flexibility for the use of various bandwidths in the AWS-4 spectrum.

59. Furthermore, allowing the increase of these power levels to the current AWS-1 rules of 3280 watts EIRP for emissions less than 1 MHz and 3280 watts/MHz EIRP for emissions over 1 MHz in rural areas may promote the Commission's goals of furthering rural deployment of broadband services. Therefore, we propose that 27.50(d)(1-2), which sets the AWS-1 power limits for base stations, should also apply to AWS-4. We seek comment on this proposal, including the costs and benefits of the proposal.

60. The current AWS-1 rules also require that base stations with transmit power above 1640 watts EIRP and 1640 watts / MHz EIRP must coordinate with licensees in adjacent AWS blocks located within 120 kilometers, BRS licensees in the 2155-2160 MHz band located within 120 kilometers, and satellite entities in the 2025-2110 MHz band.<sup>113</sup> As AWS-4 is not adjacent to the 2155-2160 MHz and 2025-2110 MHz bands, we do not see a need to carry these requirements over to AWS-4. Therefore, we propose only that AWS-4 base stations with transmit power above 1640 watts EIRP and 1640 watts /

<sup>107</sup> See 47 C.F.R. § 25.252(a)(2).

<sup>108</sup> See 47 C.F.R. § 27.50(d).

<sup>109</sup> See *ICO Waiver Order*, 24 FCC Rcd at 188 ¶ 47.

<sup>110</sup> See *TerreStar Waiver Order*, 25 FCC Rcd at 235-236 ¶ 23-24.

<sup>111</sup> See *ICO Waiver Order*, 24 FCC Rcd at 188 ¶ 47; *TerreStar Waiver Order*, 25 FCC Rcd at 236 ¶ 24.

<sup>112</sup> These relaxed limitations for large bandwidths and rural areas were not considered because they were not requested in the waivers, and in some cases not present in the rules at the time of the waiver request.

<sup>113</sup> See 47 C.F.R. § 27.50(d)(3).

MHz EIRP be required to coordinate with users in adjacent AWS blocks located within 120 kilometers. We seek comment on this proposal, including the costs and benefits of the proposal.

61. *Mobile Stations.* The Part 25 ATC rules set a power limit of 1 dBW (1.25 watts) EIRP in a bandwidth of 1.23 MHz for mobiles operating in 2000-2020 MHz.<sup>114</sup> The existing AWS-1 rules set a power limit of 1 watt EIRP for mobiles operating in AWS-1,<sup>115</sup> which is somewhat more restrictive. In the interest of harmonizing the AWS rules, and given the similarity of these two limits, we propose that the more restrictive limit of 27.50(d)(4), which is 1 watt EIRP, should apply to AWS-4. We seek comment on this proposal, including the costs and benefits of the proposal.

#### 4. Antenna Height Restrictions

62. We propose that the flexible antenna height rules that apply to AWS-1 should also apply to AWS-4. We seek comment on this proposal, including the costs and benefits of the proposal.

63. *Base stations.* Specific antenna height restrictions for AWS-1 base stations are not set forth in Part 27 of our rules. However, all Part 27 services are subject to Section 27.56, which prevents antenna heights that would be a hazard to air navigation.<sup>116</sup> Furthermore, the limitations of field strength at the geographical boundary of the license discussed below also effectively limit antenna heights.<sup>117</sup> We propose that no unique antenna height limits are needed for AWS-4 facilities; rather, we believe that the general height restrictions are sufficient. We seek comment on this proposal, including the costs and benefits of the proposal.

64. *Fixed stations.* Section 27.50(d)(4) specifies a height restriction of 10 meters for fixed stations operating in AWS-1 spectrum.<sup>118</sup> Given the similarity of the proposed AWS-4 use to AWS-1 use, we propose that this rule should be expanded to apply to AWS-4, as well. We seek comment on this proposal, including the costs and benefits of the proposal.

#### 5. Co-Channel Interference Among AWS-4 Systems

65. If we ultimately decide to license the AWS-4 bands on the basis of geographic service areas that are less than nationwide, we will have to ensure that such licensees do not cause interference to co-channel systems operating along common geographic borders.<sup>119</sup> The current rules for AWS-1 address the possibility of harmful co-channel interference between geographically adjacent licenses by setting a field strength limit of 47 dB $\mu$ V/m at the edge of the license area.<sup>120</sup> Due to the similarities between AWS-1 and AWS-4 spectrum use, we propose that this same signal strength limit is appropriate for AWS-4, and therefore that Section 27.55(a)(1) should be expanded to include the 2180-2200 MHz band. We seek comment on this proposal, including the costs and benefits of the proposal.

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<sup>114</sup> See 47 C.F.R. § 25.252(b)(1).

<sup>115</sup> See 47 C.F.R. § 27.50(d)(4).

<sup>116</sup> See 47 C.F.R. § 27.56.

<sup>117</sup> See *infra* Section III.B.5 (Co-Channel Interference Among AWS-4 Systems).

<sup>118</sup> 47 C.F.R. § 27.50(d).

<sup>119</sup> If we authorize a single licensee in these bands, it will not be necessary to adopt co-channel interference protection criteria. Our co-channel protection rules would, however, apply to any partitioned portions of a nationwide license. See 47 C.F.R. § 27.55.

<sup>120</sup> See 47 C.F.R. § 27.55(a)(1).

## 6. Canadian and Mexican Coordination

66. Section 27.57(c) of our rules indicates that AWS-1 operations are subject to international agreements with Mexico and Canada.<sup>121</sup> Until such time as any adjusted agreements between the United States, Mexico and/or Canada can be agreed to, operations must not cause harmful interference across the border, consistent with the terms of the agreements currently in force. We note that further modification (of the proposed rules) might be necessary in order to comply with any future agreements with Canada and Mexico regarding the use of these bands. We seek comment on this issue, including the costs and benefits of alternative approaches to this issue.

## 7. Other Technical Issues

67. There are several additional technical rules applicable to all Part 27 services. Specifically, these are: 27.51 Equipment authorization, 27.52 RF safety, 27.54 Frequency stability, 27.56 Antennas structures; air navigation safety, and 27.63 Disturbance of AM broadcast station antenna patterns.<sup>122</sup> As AWS-4 will be a Part 27 service, we propose that all of these rules should apply to all AWS-4 licensees, including licensees who acquire their licenses through partitioning or disaggregation. We seek comment on this approach, including the costs and benefits of this approach.

### C. Protection of MSS Operations

68. We propose to adopt a rule requiring an AWS-4 licensee to protect the incumbent 2 GHz MSS licensee from harmful interference. As set forth above, the 2000-2020 MHz band was allocated to MSS in 1997; fourteen years later the Commission added the current co-primary terrestrial Fixed and Mobile allocations.<sup>123</sup> In adding the co-primary Fixed and Mobile allocations in 2011, the Commission explained that "MSS remains co-primary in the 2 GHz MSS band."<sup>124</sup> The Commission further explained that the addition of the new allocation "will not result in harmful interference, and would not inevitably lead to uses that would result in harmful interference," impliedly because (other than the pre-existing MSS/ATC rules) no terrestrial service rules yet existed for the band.<sup>125</sup> As we are now proposing service rules for the AWS-4 band, we propose to codify the determination that "adding co-primary Fixed and Mobile allocations in this band will not result in harmful interference"<sup>126</sup> by requiring that AWS-4 licensees protect the 2 GHz MSS licensee from harmful interference. We seek comment on this proposal, including the costs and benefits of the proposal.

### D. Assignment of AWS-4 License(s)

69. As discussed above, the Commission concluded in 2003 that it would grant additional ATC authority to the MSS incumbents. The Commission reasoned that separately controlled MSS and terrestrial mobile operations (*i.e.*, two ubiquitous mobile services) in the same band would be "impractical and ill-advised" because the parties would not be able to overcome the technical hurdles to reach a workable sharing arrangement.<sup>127</sup> In particular, the Commission stated:

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<sup>121</sup> 47 C.F.R. § 27.57(c).

<sup>122</sup> 47 C.F.R. §§ 27.51, 27.52, 27.54, 27.56, 27.63.

<sup>123</sup> See *supra* ¶¶ 3, 14.

<sup>124</sup> 2 GHz Band Co-Allocation Order, 26 FCC Rcd at 5715 ¶10.

<sup>125</sup> *Id.* at 5716 ¶ 13.

<sup>126</sup> *Id.*

<sup>127</sup> ATC Report and Order, 18 FCC Rcd at 1991 ¶ 49.

While . . . it may be theoretically possible for two different firms to own and operate the satellite and terrestrial portions of a single system, we believe that, in reality, no two operators are likely to succeed in organizing themselves to manage the highly complex coordination process required between both the MSS and the terrestrial component at the same time in the same band in the same region. To optimally balance the frequency usage of the terrestrial and satellite portions of the system, the ATC portion must be operated in a manner that controls the ATC terminal-to-MSS uplink interface while still providing ATC service.<sup>128</sup>

Based on its technical analyses, the Commission also concluded that “we cannot grant to a third party the right to use licensed MSS spectrum for terrestrial use without impacting the rights of the existing satellite licensees.”<sup>129</sup>

70. In the ATC proceeding, the Commission adopted a blanket authorization process to implement geographic area licensing of ATC base station facilities operating in the U.S. coverage of the MSS space segment, *i.e.*, all 50 states and the U.S. territories and possessions.<sup>130</sup> As noted above, DBSD and TerreStar received ATC authority in 2009 and 2010, respectively,<sup>131</sup> allowing for the deployment of terrestrial base stations and collectively up to three million dual-mode MSS/ATC user terminals in the United States. Thus, in considering the impact that AWS-4 operations would have on the existing 2 GHz MSS licensee, we also consider the impact on the MSS licensee’s significant, albeit ancillary, authority to operate terrestrial stations in the 2 GHz band throughout the nation.

71. Taken together, the above concerns appear to present strong reasons that lead us to propose that AWS-4 licenses in this band should be assigned to the incumbent MSS licensee. First, the complexities of coordination between MSS and terrestrial uses that the Commission identified in 2003 in the *ATC Report and Order* suggest that assignment of terrestrial licenses to an entity other than the incumbent MSS licensee remains impractical. Second, we expect that the interference problems associated with two or more distinct terrestrial licensees in the same band (*i.e.*, distinct co-channel ATC and Part 27 licensees) point to assigning the AWS-4 licenses to the incumbent MSS licensee. Third, we observe that this result would not diminish the MSS licensee’s existing ability to provide terrestrial service in the band.

72. We seek comment on these issues. In particular, commenters should address whether there have been technological advances or other developments since 2003 that would either reinforce or alter these points and provide detailed technical analysis supporting any information provided.<sup>132</sup> Should the record show, contrary to our expectations, that same-band, separate-operator sharing is possible—between AWS-4 licensees and an MSS licensee’s satellite and ATC operations—then we seek comment on alternative approaches to licensing the new service under the Communications Act that would achieve our goal of making additional spectrum available for terrestrial mobile broadband use. In addition, we

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<sup>128</sup> *Id.* at 1993 ¶ 52.

<sup>129</sup> *Id.* at 1973 ¶ 18; *see also supra* ¶ 6.

<sup>130</sup> *ATC Report and Order*, 18 FCC Rcd at 2077 ¶ 240.

<sup>131</sup> *ICO Waiver Order, TerreStar Waiver Order.*

<sup>132</sup> *See generally*, Commission Staff Invites Technical Comment on the Certain Proposals to Permit Flexibility in the Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.4 GHz Band, IB Docket No. 01-185, ET Docket No. 95-18, *Public Notice*, 17 FCC Rcd 4418 (2002).

seek comment on what effect the spectrum shift alternatives proposed above would have on assigning AWS-4 licenses.<sup>133</sup>

73. We further seek comment on the impact, including the quantification of the costs and benefits that any method for assigning licenses would have on innovation, investment, and competition.

#### 1. Section 316 License Modification

74. Based on our expectation that the Commission's earlier technical findings are still sound, and mindful of the 2 GHz MSS license holder's existing rights to operate MSS in the AWS-4 band and our proposal, above, to require protection of MSS uses, we propose to grant terrestrial authority to operate in the AWS-4 band to the current 2 GHz MSS licensee. We believe this would serve the public interest, convenience and necessity by making more spectrum available for broadband use and avoiding harmful electromagnetic interference.

##### a. Legal Authority

75. Under Section 316, the Commission has the authority to modify a station license if "in the judgment of the Commission such action will promote the public interest, convenience, and necessity,"<sup>134</sup> As the D.C. Circuit explained in *California Metro Mobile Communications v. FCC*, "Section 316 grants the Commission broad power to modify licenses; the Commission need only find that the proposed modification serves the public interest, convenience and necessity."<sup>135</sup> For example, in that case, the court found that the Commission's modification served the public interest, even though it was based on an analysis of potential rather than actual interference, and the modification could cause a minor disruption in the licensee's operations.<sup>136</sup> Here, we propose that, once the AWS-4 service rules are effective, we would issue an Order of Proposed Modification, under Section 316 of the Communications Act, to modify the existing 2 GHz MSS licensee's authority to operate in the 2000-2020 MHz and 2180-2200 MHz bands by adding Part 27 terrestrial authority and obligations, which would apply to all the AWS-4 service areas in these bands.<sup>137</sup> We seek comment on this proposed approach, including the costs and benefits of the proposal.

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<sup>133</sup> See *supra* ¶¶ 42-43.

<sup>134</sup> 47 U.S.C. § 316 (a)(1).

<sup>135</sup> *California Metro Mobile Communications v. FCC*, 365 F.3d 38, 45 (D.C. Cir.2004) (*CMCC*). In *CMCC*, the court upheld the authority of the Commission to modify *CMCC*'s license by deleting a frequency, which had the potential to cause interference to an existing licensee. The Commission undertook the action to correct an error of a frequency coordinator, who recommended that the Commission grant *CMCC* a license after the coordinator had incorrectly determined that the requested frequencies would not cause interference to any existing licensee. Among other things, the court found that Section 316 is not unambiguous and therefore deferred to the Commission's interpretation that Section 316 "contains no limitation on the time frame within which it may act to modify a license and that its action under the section is not subject to the limitations on revocation, modification or reconsideration imposed by [s]ection 405." *Id.* at 45 (*citations omitted*).

<sup>136</sup> *CMCC*, 365 F.3d at 46.

<sup>137</sup> For example, if the Commission adopts its current proposal to license the 2000-2020 MHz and 2180-2200 MHz bands in paired 10 + 10 megahertz blocks by EA, the MSS licensee's modified license would include the 352 new service areas (the 176 EAs in each of the paired spectrum blocks). As such, the 2 GHz MSS licensee would have authority nationwide to provide full terrestrial services in the 2000-2020 MHz and 2180-2200 MHz band.

**b. Public Interest Considerations**

76. As noted above, the incumbent MSS licensee holds exclusive authority to operate terrestrial base stations in the AWS-4 band nationwide.<sup>138</sup> And existing Commission rules permit the MSS licensee to enter into spectrum manager leasing arrangements with spectrum lessees.<sup>139</sup> We believe that modifying the 2 GHz MSS licensee's authority as described herein, to have 2 GHz terrestrial operations governed under Part 27, would remove outdated regulatory barriers that have frustrated the Commission's goal of having the 2 GHz band used for terrestrial mobile broadband. Additionally, if the record developed in this proceeding confirms that current technology will not permit separate MSS and terrestrial mobile licensees, the envisioned Section 316 license modification would serve the public interest, convenience and necessity, by: (1) making more spectrum available for broadband use, and (2) avoiding harmful electromagnetic interference. We seek comment on this proposal, including the costs and benefits of the proposal.

77. *Making More Spectrum Available for Broadband Use.* As discussed above, the availability and quality of wireless broadband services will likely become constrained if additional spectrum does not become available to enable network expansion and technology upgrades.<sup>140</sup> This could result in higher prices, poor service quality, an inability for the U.S. to compete effectively on an international basis, depressed demand and, ultimately, a drag on innovation.<sup>141</sup> As noted above, to address the need for broadband spectrum, the Commission has endeavored to promote the use of the 2 GHz MSS band, but there is virtually no current commercial use of this spectrum.<sup>142</sup>

78. We believe that modifying the 2 GHz MSS licensee's authority as described herein would enhance the licensee's ability to offer high-quality, affordable terrestrial wireless broadband services, while retaining the right to offer MSS using the same spectrum; spectrum that is already licensed nationwide on an exclusive, primary basis for MSS. Thus, we propose that authorizing terrestrial operations will provide the 2 GHz MSS licensee with the possibility of achieving greater usage of the 2000-2020 MHz and 2180-2200 MHz bands than are possible under the current regulations. We seek comment on this proposal. We also seek comment on the extent that this proposal would increase innovation and investment in mobile broadband use of this spectrum. Commenters should discuss and quantify the costs and benefits of the proposal.

79. *Eliminating Harmful Interference.* The Commission may also modify licenses to achieve the public interest purpose of avoiding harmful interference.<sup>143</sup> In 2003, the Commission concluded that separately controlled MSS and terrestrial operations (*i.e.*, two ubiquitous mobile services) in the same band would be "impractical and ill-advised" because the parties would not be able to overcome the technical hurdles to reach a workable sharing arrangement.<sup>144</sup> If the record developed in this proceeding confirms that allowing terrestrial operations in the 2000-2020 MHz and 2180-2200 MHz bands independent from the MSS licensee would likely substantially compromise the effectiveness of both the mobile satellite and terrestrial services, we propose that the public interest would be best served by modifying the license to operate in the 2 GHz MSS band, as contemplated herein, rather than making the

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<sup>138</sup> See *supra* ¶ 70.

<sup>139</sup> See 47 C.F.R. § 1.9020 (Spectrum manager leasing arrangements).

<sup>140</sup> See *supra* Section II.B (The Growing Spectrum Demands of Mobile Broadband Services).

<sup>141</sup> See *National Broadband Plan* at 77.

<sup>142</sup> See *supra* ¶ 8.

<sup>143</sup> See *CMCC*, 365 F.3d at 45-46.

<sup>144</sup> *ATC Report and Order*, 18 FCC Rcd at 1991 ¶ 49.

band available for initial terrestrial licenses under a sharing regime with MSS. We seek comment on this proposal and its effect on interference. Commenters should discuss and quantify the costs and benefits of this proposal on eliminating harmful interference.

## 2. Other Assignment Approaches

80. If, contrary to our expectations, the record developed in this proceeding reflects that it is now possible for separately authorized, independent AWS-4 licensees to protect MSS including ATC operations, then we seek comment on other approaches to authorizing terrestrial use, upon creation of the new AWS-4 service. These other approaches may include the assignment of new initial licenses via competitive bidding, if mutually exclusive applications are received, under Section 309(j) of the Communications Act.<sup>145</sup> Commenters should be mindful that existing MSS licensees would still retain MSS licenses and, therefore, any new terrestrial licensees would have to protect the incumbent 2 GHz MSS licensee from harmful interference. Commenters should discuss and quantify and costs and benefits associated with any alternative approaches.

## 3. Applications for Any AWS-4 Licenses Returned to the Commission

81. There is a potential, under proposals discussed herein or otherwise, for AWS-4 licenses to be terminated automatically or otherwise to become a part of the Commission's spectrum inventory.<sup>146</sup> Under such a scenario, we would resolve any mutually exclusive applications for such AWS-4 licenses using competitive bidding. We seek comment on the appropriate competitive bidding procedures below.

## 4. Procedures for Any AWS-4 Licenses Subject to Assignment by Competitive Bidding

82. Some of the scenarios on which we seek comment in this *Notice* could result in the acceptance of mutually exclusive applications for licenses that would be resolved by competitive bidding.<sup>147</sup> Accordingly, we seek comment on a number of proposals relating to competitive bidding for licenses for spectrum in the AWS-4 band.

### a. Application of Part 1 Competitive Bidding Rules

83. We propose that the Commission would conduct any auction for AWS-4 licenses in conformity with the general competitive bidding rules set forth in Part 1, Subpart Q, of the Commission's rules, and substantially consistent with the competitive bidding procedures that have been employed in previous auctions.<sup>148</sup> Specifically, we propose to employ the Part 1 rules governing competitive bidding design, designated entity preferences, unjust enrichment, application and payment procedures, reporting requirements, and the prohibition on certain communications between auction applicants.<sup>149</sup> Under this

<sup>145</sup> 47 U.S.C. §309(j).

<sup>146</sup> See, e.g., *infra* Sections III.E (Performance Requirements) and F.4 (License Term, Renewal Criteria, and Permanent Discontinuance of Operations).

<sup>147</sup> See, e.g., *infra* Sections III.E (Performance Requirements) and F.4 (License Term, Renewal Criteria, and Permanent Discontinuance of Operations).

<sup>148</sup> See 47 C.F.R. §§ 1.2101-1.2114.

<sup>149</sup> See, e.g., Amendment of Part 1 of the Commission's Rules—Competitive Bidding Procedures, WT Docket No. 97-82, *Order, Memorandum Opinion and Order and Notice of Proposed Rule Making*, 12 FCC Rcd 5686 (1997); *Third Report and Order and Second Further Notice of Proposed Rule Making*, 13 FCC Rcd 374 (1997) (*Part I Third Report and Order*); *Order on Reconsideration of the Third Report and Order, Fifth Report and Order, and Fourth Further Notice of Proposed Rule Making*, 15 FCC Rcd 15293 (2000), *aff'd in part and modified in part, Second Order on Reconsideration of the Third Report and Order, and Order on Reconsideration of the Fifth Report and Order*, 18 FCC Rcd 10180 (2003); *Seventh Report and Order*, 16 FCC Rcd 17546 (2001); *Eighth Report and* (continued....)

proposal, such rules would be subject to any modifications that the Commission may adopt for its Part 1 general competitive bidding rules in the future. In addition, consistent with our long-standing approach, auction-specific matters such as the competitive bidding design and mechanisms, as well as minimum opening bids and/or reserve prices, would be determined by the Wireless Telecommunications Bureau pursuant to its delegated authority.<sup>150</sup> We seek comment on this approach, including the costs and benefits of this approach. We also seek comment on whether any of our Part 1 rules would be inappropriate or should be modified for an auction of licenses in the AWS-4 bands.

**b. Small Business Provisions for Terrestrial Geographic Area Licenses**

84. In authorizing the Commission to use competitive bidding, Congress mandated that the Commission “ensure that small businesses, rural telephone companies, and businesses owned by members of minority groups and women are given the opportunity to participate in the provision of spectrum-based services.”<sup>151</sup> In addition, Section 309(j)(3)(B) of the Communications Act provides that, in establishing eligibility criteria and bidding methodologies, the Commission shall promote “economic opportunity and competition . . . by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses, rural telephone companies, and businesses owned by members of minority groups and women.”<sup>152</sup> One of the principal means by which the Commission fulfills this mandate is through the award of bidding credits to small businesses.

85. In the *Competitive Bidding Second Memorandum Opinion and Order*, the Commission stated that it would define eligibility requirements for small businesses on a service-specific basis, taking into account the capital requirements and other characteristics of each particular service in establishing the appropriate threshold.<sup>153</sup> Further, in the *Part 1 Third Report and Order*, the Commission, while standardizing many auction rules, determined that it would continue a service-by-service approach to defining small businesses.<sup>154</sup>

86. In the event that the Commission assigns exclusive geographic area licenses for terrestrial use of the AWS-4 band, we believe that this spectrum would be employed for purposes similar to those

(Continued from previous page)

*Order*, 17 FCC Rcd 2962 (2002); *Second Order on Reconsideration of the Part 1 Fifth Report and Order*, 20 FCC Rcd 1942 (2005); Implementation of the Commercial Spectrum Enhancement Act and Modernization of the Commission’s Competitive Bidding Rules and Procedures, WT Docket 05-211, *Report and Order*, 21 FCC Rcd 891 (2006) (*CSEA/Part 1 Report and Order*), recons. pending; *Second Report and Order and Second Further Notice of Proposed Rule Making*, 21 FCC Rcd 4753 (2006) (*CSEA/Part 1 Designated Entity Second Report and Order and Second FNPRM*), recons. pending; *Order on Reconsideration of the Second Report and Order*, 21 FCC Rcd 6703 (2006) (modified by *Erratum and Notice of Office of Management and Budget Approval of Information Collections*, 21 FCC Rcd 6622 (WTB 2006)), petition for review dismissed sub nom. *Council Tree Communications, Inc. v. FCC*, 503 F.3d 284 (3d Cir. 2007); *Second Order on Reconsideration of the Second Report and Order*, 23 FCC Rcd 5425 (2008), vacated in part, *Council Tree Communications, Inc. v. FCC*, 619 F.3d 235 (3d Cir. 2010); *Order*, FCC 12-12 (Feb. 1, 2012).

<sup>150</sup> See 47 C.F.R. §§ 0.131 (c), 0.331; see also, Amendment of Part 1 of Commission’s Rules – Competitive Bidding Procedures, *Third Report and Order and Second Further Notice of Proposed Rule Making*, WT Docket No. 97-82, 13 FCC Rcd 374, 448-49, 454-55 (1997) (directing the Bureau to seek comment on specific mechanisms relating to auction conduct pursuant to the BBA) (*Part 1 Third Report and Order*).

<sup>151</sup> 47 U.S.C. § 309(j)(4)(D).

<sup>152</sup> 47 U.S.C. § 309(j)(3)(B).

<sup>153</sup> Implementation of Section 309(j) of the Communications Act—Competitive Bidding, PP Docket No. 93-253, *Second Memorandum Opinion and Order*, 9 FCC Rcd 7245, 7269 ¶ 145 (1994) (*Competitive Bidding Second Memorandum Opinion and Order*); 47 C.F.R. § 1.2110(c)(1).

<sup>154</sup> *Part 1 Third Report and Order*, 13 FCC Rcd at 388 ¶ 18; 47 C.F.R. § 1.2110 (c)(1).