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

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In the Matter of )  
)  
Innovation in the Broadcast Television Bands: )  
Allocations, Channel Sharing and Improvements ) ET Docket No. 10-235  
to VHF )

NOTICE OF PROPOSED RULEMAKING

Adopted: November 30, 2010

Released: November 30, 2010

Comment Date: [45 days after date of publication in the Federal Register]  
Reply Comment Date: [75 days after date of publication in the Federal Register]

By the Commission: Chairman Genachowski, Commissioners Copps, McDowell, Clyburn, and Baker  
issuing separate statements.

I. INTRODUCTION

1. In this Notice, we initiate a process to further our ongoing commitment to addressing America's growing demand for wireless broadband services, spur ongoing innovation and investment in mobile and ensure that America keeps pace with the global wireless revolution, by making a significant amount of new spectrum available for broadband. Through this Notice, we take preliminary steps to enable the repurposing of a portion of the UHF and VHF frequency bands that are currently used by the broadcast television service, which in later actions we expect to make available for flexible use by fixed and mobile wireless communications services, including mobile broadband. At the same time, we recognize that over-the-air TV serves important public interests, and our approach will help preserve this service as a healthy, viable medium. The approach we are proposing is consistent with the goal set forth in the National Broadband Plan (the "Plan")<sup>1</sup> to repurpose up to 120 megahertz from the broadcast television bands for new wireless broadband uses through, in part, voluntary contributions of spectrum to an incentive auction. Reallocation of this spectrum as proposed will provide the necessary flexibility for meeting the requirements of these new applications.

2. The specific bands under consideration are the low VHF spectrum at 54-72 MHz (TV channels 2-4) and 76-88 MHz (TV channels 5 and 6), the high VHF spectrum at 174-216 MHz (TV channels 7-13), and the UHF bands at 470-608 MHz (TV channels 14-36) and 614-698 MHz (TV channels 38-51); for purposes of this Notice, we will refer to this spectrum as the "U/V Bands."<sup>2</sup> This Notice proposes three actions that will establish the underlying regulatory framework to facilitate wireless broadband uses of the U/V Bands, while maintaining current license assignments in the band. First, we

<sup>1</sup> See *Connecting America: The National Broadband Plan*, Federal Communications Commission, Washington, DC (March 2010); available at <http://www.broadband.gov/plan/>. The Plan was developed by the Commission pursuant to the direction of Congress in the American Recovery and Reinvestment Act of 2009 (Recovery Act), see American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009).

<sup>2</sup> The band 608-614 MHz, *i.e.*, TV channel 37, is used for radio astronomy and is not part of the spectrum being considered for reallocation. See 47 C.F.R. § 2.106., US 74 and US 246.

are proposing to add new allocations for fixed and mobile services in the U/V Bands to be co-primary with the existing broadcasting allocation in those bands. The additional allocations would provide the maximum flexibility for planning efforts to increase spectrum available for flexible use, including the possibility of assigning portions of the U/V Bands for new mobile broadband services in the future. Second, we are proposing to establish a framework that, for the first time, permits two or more television stations to share a single six-megahertz channel, thereby fostering efficient use of the U/V Bands. Third, we intend to consider approaches to improve service for television viewers and create additional value for broadcasters by increasing the utility of the VHF bands for the operation of television services.

3. By taking these important steps to facilitate wireless broadband uses in the U/V Bands, this Notice is the first in a series of actions that will allow us to make progress toward our goal of improving efficient use of the bands and enable ongoing innovation and investment through flexible use. We intend to propose further actions consistent with other of the *Plan's* recommendations for the U/V Bands, including, but not limited to, the process of voluntarily returning broadcast licenses to the Commission and the licensing process and service rules for new fixed and mobile wireless communications services. As part of that process, the Commission will address the *Plan's* proposal for channel re-packing, the band plan for recovered spectrum and other related issues and will provide full opportunity for public comment on those issues at that time.

## II. BACKGROUND

4. *The National Broadband Plan.* The *Plan* was issued on March 17, 2010. As required under the Recovery Act, the *Plan* seeks to ensure that every American has access to broadband capability and establishes clear benchmarks for meeting that goal.<sup>3</sup> The *Plan* recommends making 500 megahertz of spectrum between 225 MHz and 3.7 GHz newly available to meet the needs of mobile, fixed and unlicensed wireless broadband in the next 10 years and for providing 300 megahertz of that amount for mobile flexible uses within 5 years,<sup>4</sup> of which up to 120 megahertz would come from the broadcast television bands.<sup>5</sup>

5. *Current Uses of the U/V Bands Spectrum.* The U/V Bands occupy 294 megahertz of spectrum in five frequency bands and are all currently allocated for use by broadcasting services.<sup>6</sup> In addition, the 470-512 MHz band segment is allocated for fixed and land mobile services on a co-primary basis with broadcasting.<sup>7</sup> However, use of the fixed and land mobile services in this band is limited to the geographic areas and purposes stated in footnote NG66 to the Table of Allocations. All five bands currently are allocated principally to broadcast television under Part 73 of the rules.<sup>8</sup> Full power television stations have recently completed a statutorily mandated conversion from analog to digital transmissions. As part of that transition, 108 megahertz of UHF spectrum at 698-806 MHz was recovered for new uses,<sup>9</sup> including fixed, mobile, and broadcasting; a portion of that spectrum has been set aside for

<sup>3</sup> Recovery Act, § 6001(k).

<sup>4</sup> *Id.* at 84. The frequency range between 225 MHz and 3.7 GHz is generally to be considered the most suitable spectrum for mobile communications.

<sup>5</sup> *Id.* at 88.

<sup>6</sup> See 47 C.F.R. § 2.106 (Table of Frequency Allocations); see also 47 C.F.R. § 73.603. The overall VHF and UHF regions occupy the spectrum in the frequency ranges 30 MHz to 300 MHz and 300 MHz to 3000 MHz, respectively.

<sup>7</sup> See 47 C.F.R. § 2.106, footnote NG66.

<sup>8</sup> 47 C.F.R. Part 73. In addition, low power television stations (TV translators and low power TV stations) operate under regulations set forth in Part 74 of the Commission's rules.

<sup>9</sup> See Digital Television and Public Safety Act of 2005 ("DTV Act"), which is Title III of the Deficit Reduction Act of 2005, Pub. L. No. 109-171, 120 Stat. 4 (2006) ("DRA") (codified at 47 U.S.C. §§ 309(j)(14) and 337(e)); see also DTV Delay Act, Pub. L. No. 111-4, 123 Stat. 112 (2009).

public safety uses.<sup>10</sup> Television stations now operate on six-megahertz channels designated 2 to 51 in the five U/V Bands.

6. In addition to full power TV stations, certain other licensed services are permitted to operate in the U/V Bands' TV channels. Class A television stations operate under Subpart J of Part 73 of the rules.<sup>11</sup> Low power TV and TV translator stations are permitted to operate under Subpart G of Part 74 of the rules on a "must protect" basis to full power TV stations and on an equal basis with Class A TV stations, provided they meet technical rules to prevent interference to reception of such stations.<sup>12</sup> Part 74 also allows certain broadcast auxiliary operations on TV channels 14-69 on a secondary basis.<sup>13</sup> In addition, the Part 74 and Part 15 rules permit certain entities to operate wireless microphones and other low power auxiliary transmitters on vacant TV channels on a non-interference basis.<sup>14</sup>

7. Pursuant to the fixed and land mobile allocations in the 470-512 MHz band segment (channels 14-20), licensees in the Private Land Mobile Radio Service (PLMRS) under Part 90 of the rules and in the Commercial Mobile Radio Service (CMRS) under Part 20 of the rules operate in 13 metropolitan areas on one to three six-megahertz channels.<sup>15</sup> These operations are for public safety and related land mobile communications and for CMRS backhaul operations. In addition, under Part 15 of the rules medical telemetry equipment is permitted to operate on an unlicensed basis on any vacant TV channels in the range of channels 7-46, and unlicensed remote control devices are allowed to operate on any TV channels above 70 MHz (*i.e.*, above channel 4), except for channel 37.<sup>16</sup> The Offshore Radiotelephone Service uses channels 15-17 in certain regions along the Gulf of Mexico.<sup>17</sup> In Hawaii, channel 17 is reserved for inter-island communications.<sup>18</sup> However, no active licensees currently use this channel in Hawaii. Finally, the Commission has allowed low power unlicensed devices to operate on

<sup>10</sup> See *Sixth Report and Order* in MM Docket No. 87-268, *supra*; see also, *First Report and Order* in WT Docket No. 99-168, 15 FCC Rcd 476 (2000), *Report and Order* in ET Docket No. 97-157, 12 FCC Rcd 22953 (1998) and *Report and Order* in GN Docket No. 01-74, 17 FCC Rcd 1022 (2002).

<sup>11</sup> See 47 C.F.R. Part 73 Subpart J. Class A TV stations operate at the power levels permitted for low power television stations under Part 74 of the rules, but have certain protection rights with respect to full service analog and digital TV stations that are not available to TV translator and low power stations.

<sup>12</sup> See 47 C.F.R. Part 74 Subpart G. Collectively, Class A, low power TV and TV translator stations are commonly known as "LPTV stations."

<sup>13</sup> See 47 C.F.R. § 74.602(h). This rule section permits TV studio-transmitter links, TV relay stations, and TV translator relay stations to be authorized to operate fixed point-to-point service on UHF TV channels 14-69 on a secondary basis, subject to the provisions in Part 74, subpart G.

<sup>14</sup> See 47 C.F.R. Part 74 Subpart H and Part 15, Subpart C.

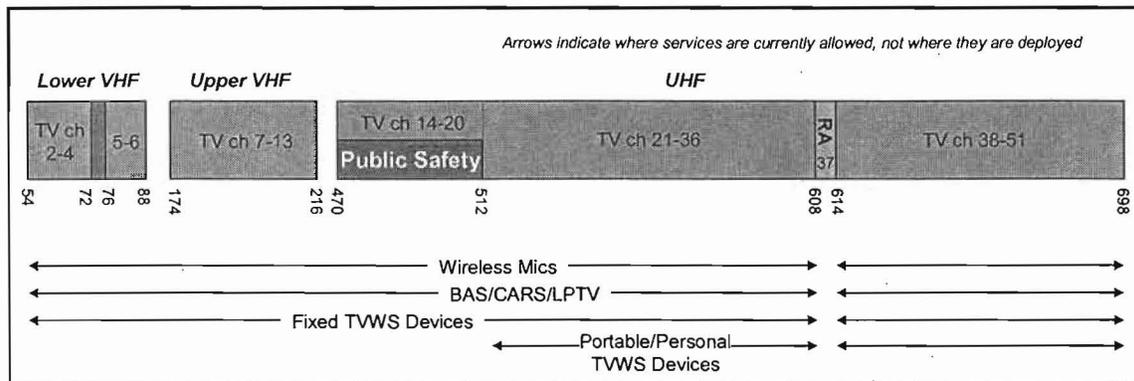
<sup>15</sup> See 47 C.F.R. Part 90 Subpart L and 47 C.F.R. Part 22 Subpart E.

<sup>16</sup> See 47 C.F.R. §§ 15.231, 15.241 and 15.242. Effective October 16, 2002, the Commission ceased granting certifications for new medical telemetry equipment that operates on TV channels, but there is no cutoff on the sale or use of equipment that was certified before that date, see 47 C.F.R. § 15.37(i). To provide spectrum for wireless medical telemetry equipment, the Commission established the Wireless Medical Telemetry Service to operate on a primary basis in 13.5 megahertz of spectrum in three spectrum blocks at 608-614 MHz (TV channel 37, which the WMTS now shares with radio astronomy), 1395-1400 MHz, and 1427-1429.5 MHz. See Amendment of Parts 2 and 95 of the Commission's Rules to Create A Wireless Medical Telemetry Service, *Report and Order*, ET Docket No. 99-255, 15 FCC Rcd 11206 (2000). See also, Amendments to Parts 1, 2, 27, and 90 of the Commission's Rules to License Services in the 216-220 MHz, 1390-1395 MHz, 1427-1429 MHz, 1429-1432 MHz, 1432-1435 MHz, 1670-1675 MHz, and 2385-2390 MHz Government Transfer Bands, WT Docket No. 02-8, *Memorandum Opinion and Order*, 18 FCC Rcd 16920 (2003).

<sup>17</sup> See 47 C.F.R. § 2.106 NG66(b) and 47 C.F.R. § 22.1007.

<sup>18</sup> See 47 C.F.R. § 22.591.

unused channels (white space) in the U/V Bands.<sup>19</sup> The Commission has recently finalized rules for these “TV white space” devices and manufacturers can now begin to market products for this category of devices.<sup>20</sup> The figure below provides a graphical depiction of the current allocations in the U/V Bands.



8. *Broadcast Spectrum Analysis White Paper.* In June, 2010, the third Omnibus Broadband Initiative technical paper was released, entitled, “Spectrum Analysis: Options for Broadcast Spectrum” (the “Technical Paper”).<sup>21</sup> This paper describes the opportunity to create value in the U/V Bands by leveraging their favorable technical characteristics for broadband while maintaining the public benefits of over-the-air television. Specifically, the Technical Paper describes a voluntary, market-based process for repurposing a portion of the U/V Bands by enabling individual stations to participate in an incentive auction, including the ability to set minimum prices on the return of broadcast licenses as a means of providing financial certainty. Stations could choose not to participate, or to participate and maintain a primary stream by sharing a channel; and the Commission would administer the process in a manner that recognizes the public interest benefits of free over-the-air television broadcasts. The Technical Paper observes that over-the-air television continues to serve important functions in our society, and recommends an approach that emphasizes that the voluntary, market-based reallocation be implemented in a way to provide additional options for broadcast licensees to serve their communities. In this regard, it suggests that in providing a potential means of one-time financing and the option to reduce operating expenses, longstanding policy goals for broadcast television will be served, such as localism, viewpoint diversity, and competition.<sup>22</sup>

9. *Broadcast Engineering Forum.* On June 25, 2010, the Commission’s Office of Engineering and Technology held a Broadcast Engineering Forum (the “Forum”) of industry technical experts to discuss several issues pertaining to topics raised in the Technical Paper.<sup>23</sup> The issues discussed at the Forum included: 1) improving efficiency in broadcasting through use of distributed transmission systems (DTS) and cellularized architecture, 2) methodologies for repacking the channels used by stations to increase the efficiency of spectrum use, including possibilities for recovery of channels nationwide, 3)

<sup>19</sup> See *Second Report And Order And Memorandum Opinion And Order* in ET Docket Nos. 04-186 and 02-380, 23 FCC Rcd 16807 (2008).

<sup>20</sup> *Second Memorandum Opinion and Order* in ET Docket Nos. 04-186 and 02-380, adopted and released September 23, 2010, FCC 10-174.

<sup>21</sup> See [http://download.broadband.gov/plan/fcc-omnibus-broadband-initiative-\(obi\)-technical-paper-spectrum-analysis-options-for-broadband-spectrum.pdf](http://download.broadband.gov/plan/fcc-omnibus-broadband-initiative-(obi)-technical-paper-spectrum-analysis-options-for-broadband-spectrum.pdf).

<sup>22</sup> Technical Paper at 30.

<sup>23</sup> Information regarding the *Broadcast Engineering Forum*, including video of its closing session, is available on the Commission’s website at <http://reboot.fcc.gov/workshops/broadcast-engineering-forum>.

improvements in transmission and reception of television signals on VHF channels, and 4) advancements in video compression technology, including use of video compression for stations sharing channels. Separate panels were convened on each of these issues to solicit technical information and input. The reports of each of the four panels, lists of the panel members and other information are available on the Commission's website.<sup>24</sup> This information was used in developing the proposals in this Notice regarding channel sharing by broadcast television licensees and will be used also in preparing future proposals in this proceeding.

10. *Allotment Optimization Model.* As part of its effort to improve the efficiency of U/V Band spectrum use, the Commission has undertaken the development of a model for optimizing the assignment of channels to television stations nationwide. This model, the Allotment Optimization Model (the "AOM" or the "Model"), allows the user to optimize broadcast channel assignments when clearing spectrum for new uses, subject to technical and other constraints. An initial version of this model was used by the staff in developing the spectrum analyses underlying the recommendations for recovery of U/V Bands spectrum set forth in the *Plan* and the Technical Paper. We anticipate that the fully developed model will be completed and validated in the near future for use in subsequent stages of this process to increase the efficient use of the U/V Bands and facilitate ongoing wireless innovation.

### III. DISCUSSION

11. Wireless broadband services are in high demand by the public and that demand is expected to grow significantly in the coming years. As discussed in the *Plan*, we are concerned that the growth of wireless broadband services will be constrained if sufficient spectrum is not made available to enable mobile network expansion and technology upgrades.<sup>25</sup> Without additional spectrum, users of mobile services will be faced with congestion and degraded service, or much higher prices, or both. Specifically, lack of sufficient spectrum will lead to more blocked and/or dropped calls/connections, slower connection rates and significantly higher prices for desirable applications and services. It is essential to our nation's economic future that the demand for a robust mobile broadband infrastructure is met. Given its desirability for use by mobile wireless systems, the UHF spectrum currently occupied by broadcast television, in particular, is one of a number of areas the Commission is looking at to ensure that our spectrum policies address the need for additional spectrum for mobile broadband. For example, we have recently taken actions to make additional spectrum available for mobile broadband services in frequencies currently used by mobile satellite operations and the Wireless Communications Service.<sup>26</sup> We are also working with the National Telecommunications and Information Administration to identify additional spectrum that may be made available for flexible commercial use, including wireless broadband services.<sup>27</sup>

12. We are faced with an important opportunity to provide more flexibility and greater efficiency in use of the U/V bands spectrum. While the ATSC digital television standard used for television

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<sup>24</sup> *Id.*

<sup>25</sup> See *Plan* at 77.

<sup>26</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 (2010); see also *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band*, ET Docket No. 07-293, 25 FCC Rcd 11710 (2010).

<sup>27</sup> See *Plan and Timetable to Make Available 500 Megahertz of Spectrum for Wireless Broadband*, U.S. Department of Commerce, October 2010 and *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*, U.S. Department of Commerce, October 2010.

broadcasting in this country provides for a data rate of 19.4 mbps,<sup>28</sup> that data rate is fixed irrespective of whether it is actually being used for transmission of television programming or other services such that at times a TV channel is essentially idle. For example, if a TV station transmits an HD program that uses an average of 10 mbps and one additional 2.5 mbps video program, approximately 7 mbps of the stations available capacity/bandwidth would be unused. Any applications that use a portion of the capacity of a television signal are constrained to the ATSC transmission system and do not have the option of a radiofrequency return path in the same spectrum. In keeping with our intention to ensure that the spectrum is used as efficiently and effectively as possible, whether in terms of bandwidth or data capacity, we offer the proposals below.

13. This Notice takes the first step towards achieving these important objectives by proposing additional frequency allocations, a framework that will permit two or more television stations to share a single six-megahertz channel, and changes to rules for use of the VHF band to improve its utility for television service. We recognize that broadcast television provides an important service to the public, and our actions in this proceeding will take full account of the vital role played by over-the-air television while increasing the flexible use of spectrum in a manner that meets consumer and business needs. We remain committed to preserving the free, over-the-air broadcast television service and maintaining the diversity of local voices and important informational and entertainment benefits it provides the American public.

14. It is our strong intention to provide for an orderly transition of a portion of the U/V Bands to flexible use, in a manner that will minimize any impact on over-the-air television broadcasting and the consumers it serves, both off-the-air and through multichannel video program distributors. In this regard, broadcast television stations and other primary services operating on the spectrum to be recovered will be co-primary with and be protected from interference from new broadband services for as long as they remain on channels in that spectrum.

15. To facilitate the recovery of underutilized television channels while continuing to maintain existing broadcast television services, we are also proposing in this Notice new rules that would allow a television service licensee to voluntarily reduce its occupation of spectrum by offering to operate on a shared six megahertz channel. Under this provision, all of the stations sharing channels would broadcast their services through the same ATSC digital television signal using that signal's multicasting capabilities. Each licensee would have the same rights and service obligations as a licensee operating from a full channel today, including the right to carriage by cable and satellite providers pursuant to the rules for mandatory carriage or retransmission consent.<sup>29</sup> We believe that channel sharing could be beneficial to certain licensees, particularly those that wish to save on their operating costs or minimize the amount of their investment in spectrum or transmission facilities. In addition, channel sharing could provide an incentive for broadcasters to relinquish spectrum for a portion of the proceeds of the revenues of a U/V Band spectrum auction, subject to Congress providing the Commission the authority to conduct an incentive auction. Further, channel sharing could offer opportunities for broadcasters serving minority, foreign language and niche interests that might have smaller audiences and lower income to operate at reduced cost and thereby improve their viability. In allowing stations to share channels, we note that in some instances changes in the operation of television stations could raise the possibility of interference to radioastronomy operations on channel 37 or to services operating on frequencies immediately above channel 51. It is our intent that any channel or other facilities changes that might be requested as part of sharing agreements not result in increased interference to radioastronomy operations on channel 37 or to operations of other services above channel 51. We request comments on specific steps that could be

<sup>28</sup> Terrestrial digital television broadcasting in the U.S. is transmitted using the Advanced Television Systems Committee's (ATSC) A/53 (video), A/52 (audio) and A/65 (program and system information protocol) standards. See 47 C.F.R. § 73.682(d)

<sup>29</sup> 47 C.F.R. § 76.51-70.

taken as part of the implementation of our sharing rules to mitigate the potential for such interference. We describe our initial proposed rules for channel sharing by television licensees in this Notice. We also are aware that broadcasters have encountered technical issues in using VHF channels to provide satisfactory service to viewers. We intend to consider rule changes and other alternatives for making the VHF channels more desirable for DTV operation. Our proposals for adding new allocations to the U/V bands, channel sharing by television stations and improving television service from VHF channels are discussed below.<sup>30</sup>

#### A. Spectrum Allocations

16. *New Spectrum Allocations.* We are proposing changes to the U.S. Table of Frequency Allocations in Section 2.106 of the rules that would allow us to make a significant portion of the spectrum currently used for broadcast television available for flexible use, including fixed and mobile wireless broadband services.<sup>31</sup> To facilitate repurposing of a portion of the U/V Bands in a later action, we are proposing in this Notice to add allocations for fixed and mobile services in the U/V Bands (excluding channel 37) for non-Federal use, to be co-primary with that for broadcast services.<sup>32</sup> This proposal would also expand the existing land mobile allocation in the areas where PLMRS and CMRS systems operate on specified frequencies in the 470-512 MHz band to be the same more generalized and flexible mobile allocation that would be specified for other frequencies in the U/V Bands.

17. These new allotments would allow us to consider the entire range of the U/V Bands in selecting the specific frequencies to be designated for new licensed and/or unlicensed uses. This approach will provide maximum flexibility in planning for the future assignment of a portion of the U/V Bands for flexible use, including new broadband services. Our goal is to adopt a band plan that will provide for flexible use while continuing to support the needs of the television service. We are not proposing to change or add to the existing allocations for land mobile (medical telemetry and medical telecommand) and radioastronomy that are at 608-614 MHz (at channel 37).<sup>33</sup> We request comment on this proposed plan for adding new allocations to the U/V Bands and invite suggestions for alternative approaches.

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<sup>30</sup> It is important to note the potential effect the proposals outlined in this Notice may have on technical coordination with Canada and Mexico. The current international agreements with Canada and Mexico identify specific technical criteria and specific stations, with acceptable parameters, in a plan of U.S. and foreign assignments that was negotiated with each country. To the extent, future Commission action causes any broadcast station in the border regions to alter its existing station structure, the Commission will need to coordinate these changes with Canada and Mexico. In addition, the current agreements in place only offer protection for the existing primary services in the U/V bands. The Commission would need to reach new coordination agreements with Canada and Mexico to cover implementation of new wireless broadband services in these frequency bands in the border areas.

<sup>31</sup> 47 C.F.R. § 2.106.

<sup>32</sup> The land mobile service is a mobile service between base stations and land mobile stations, or between land mobile stations. A base station is a land station in the land mobile service. A land mobile station is a mobile station in the land mobile service capable of surface movement within the geographical limits of a country or continent. The fixed service is a radiocommunication service between specified fixed points. 47 C.F.R. § 2.1(c).

<sup>33</sup> The operations of land mobile services on channels 14-20 and the Offshore Radiotelephone Service on channels 15-17 in regions along the Gulf of Mexico and the reservation of channel 17 for inter-island communications in Hawaii could be affected by our proposal to recover U/V Bands spectrum if the bands to be recovered encompassed all or portions of channels 14-20. We would address appropriate changes for the Private Land Mobile Service and the Offshore Radiotelephone Service in the event that we were to decide to recover spectrum now used by those services.

## B. Broadcast Television Channel Sharing

18. The *Plan* recommends that, to facilitate the recovery of spectrum, the Commission initiate a rulemaking proceeding to “establish a licensing framework to permit two or more stations to share a six-megahertz channel.”<sup>34</sup> We believe that the option of channel sharing, in addition to aiding in the broadband goals of the *Plan*, could also be beneficial to the television industry and to viewers. Television stations operating on shared channels could use the cost savings and additional income from such arrangements to strengthen their financial condition and to develop new and enhanced programming. Channel sharing could also provide existing small- and minority-owned stations an opportunity to enhance or preserve their local program offerings. We anticipate providing broadcast stations an opportunity to voluntarily elect to share a channel. We therefore seek comment in this proceeding on the development of an appropriate regulatory structure for voluntary television channel sharing that will preserve over-the-air television as a healthy, viable medium going forward, in a way that would benefit consumers overall, while establishing mechanisms to make available additional spectrum for flexible broadband uses.

19. We envision, consistent with the *Plan*, that two stations could generally broadcast one primary HD video stream each over a shared six-megahertz channel or more than two stations broadcasting in SD (not HD) could share a six-megahertz channel.<sup>35</sup> As noted in the *Plan*, “numerous permutations are possible, including dynamic arrangements whereby broadcasters sharing a channel reach agreements to exchange capacity to enable higher or lower transmission bit rates depending on market-driven choices.”<sup>36</sup> In this regard, we observe that at the Broadcast Engineering Forum participants expressed concerns that sharing a single channel would not be practical because it would not provide sufficient transmission capacity for two or more stations to offer the highest quality HD programming simultaneously. Stations were also concerned that channel sharing could impact or eliminate current and future DTV services, such as expansion of high-definition programming and deployment of mobile television service. We intend to consider these issues in this proceeding and welcome comments on these concerns.

20. Other approaches to channel sharing that involve sub-channel services such as mobile broadcast may also be possible. We seek comment on those approaches. The only requirement would be that all stations utilizing a shared channel be required to retain at least enough spectrum to operate one SD channel.<sup>37</sup> We seek comment on this approach and whether stations sharing a single channel will be able to continue to comply with the requirement to operate at least one SD channel.

21. In designing a channel sharing plan that will result in the more efficient use of television spectrum and free channels for flexible use, our goal will be to retain as much of our existing policy framework for allocating, licensing, and operating television stations as possible. Despite sharing a single channel and transmission facility, each station will continue to be licensed and operated separately, have its own call sign and be separately subject to all of the Commission’s obligations, rules, and policies. Each station’s programming obligations will remain the same (e.g., children’s programming, political broadcasting, EAS, indecency), and a station will not be responsible for the programming or violations of any other station sharing its channel. In addition, stations sharing a channel will retain their rights to

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<sup>34</sup> *Plan* at 88.

<sup>35</sup> *Id.*

<sup>36</sup> *Id.* 90. These arrangements could further mitigate any risk to HD signal quality resulting from reduced bandwidth capacity per station.” *Id.* at note 99.

<sup>37</sup> Television stations are required to “transmit at least one over-the-air video broadcast signal provided at no direct charge to viewers.” See *Advanced Television Systems and Their Impact upon the Existing Television Broadcast Service, Fifth Report and Order*, 12 FCC Rcd 12809, 12859 (1997); 47 C.F.R. § 73.624(b) & (c).

mandatory carriage. While the licensees sharing a given channel and facility will independently maintain their own rights and obligations under their respective licenses, we do not envision that channel sharing, from a technological perspective would entail a fixed split of the six-megahertz channel into two three-megahertz blocks. Rather, the capacity of the six-megahertz would be shared and we would leave it up to the licensees to determine the precise manner in which that capacity would be shared. Moreover, we observe that the Commission has licensed spectrum on a shared use basis – with each licensee remaining responsible for its own obligations and holding its own licensed rights – for a variety of services and under a number of different frameworks. For example, during the course of charting out an MSS licensing regime for Big LEO systems, the Commission adopted a plan in which four CDMA systems would each be authorized to operate over 11.35 megahertz of bandwidth in the same 1.6 GHz band, leaving the inter-system coordination to the satellite licensees themselves. Other examples of shared use include certain Part 90 Private Land Mobile Radio Services (where the large number of shared users are coordinated through a system of frequency coordinators), many Part 95 Personal Radio Services (such as the General Mobile Radio Service, where licensees share the same channels through an informal system of cooperation), and the Part 97 Amateur Radio Service (where all frequencies are shared and coordinated by adherence to rules of operation set forth in Part 97). We seek comment on how television broadcast stations can most effectively coordinate their individual rights and responsibilities while operating under the type of sharing arrangement proposed here. Finally, we point out that only where necessary to implement a shared channel licensing scheme will we seek to change our existing policies and rules.

22. We also propose to limit channel sharing to television stations with existing applications, construction permits or licenses as of the date of adoption of this Notice. Our dual intentions in proposing this channel option are to provide 1) a means for stations that may need to be more economically efficient in their operations to share transmission resources and 2) a path for stations to make their spectrum available for new broadband services and continue to operate a broadcast television service. We request comment on this proposal.

### **1. Basic Qualifications for Channel Sharing**

23. Voluntary operation of broadcast stations on shared channels will help to increase the efficient use of the U/V Bands while ensuring that local public interest and service requirements continue to be fulfilled. Since we ultimately seek an appropriate, market-based balance with flexible use in the U/V Bands, we expect that the extent of channel sharing will vary between markets.

#### **a. Commercial and Noncommercial Educational Stations**

24. We seek comment on whether commercial and noncommercial educational (NCE) stations should be permitted to share a single television channel. NCE television stations operate on special reserved channels and are prohibited from airing commercial material.<sup>38</sup> We contemplate that stations that share a channel will continue to be licensed and operated separately, although they will be sharing a single transmitting facility. Therefore, there would be no overlap of programming between a commercial and NCE station. However, we seek comment on whether a commercial station should be permitted to operate on a shared channel reserved for NCE use. We seek to determine how the new “shared” channel might be partitioned or designated to preserve the NCE status while allowing the channel to be shared by a non-NCE entity.

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<sup>38</sup> See 47 U.S.C. § 399B; Revised Program Policies and Reporting Requirements Related to Public TV and Radio Programming, *Notice of Proposed Rulemaking*, 87 FCC 2d 716, 730 (1981) and Reexamination of Comparative Standards for Noncommercial Educational Applicants, *Further Notice of Proposed Rulemaking*, 13 FCC Rcd 21167, n.2 (1998).

**b. Consideration of Service Losses**

25. We seek comment on whether to require that a certain level of television service be preserved in the shared channel environment. Specifically, we seek comment on whether the Commission should consider any prospective loss of television service when determining whether to permit stations to make the modifications to their transmission facilities necessary to achieve channel sharing. Since stations sharing a single television channel must operate from a single transmission facility, changes to one or more of the stations' existing facilities will be necessary for sharing to occur. Such changes could result in a loss of television service to some persons presently able to receive over-the-air signal from one or more of the stations, and could also result in gains to television service.

26. We note that our current policy is to consider losses of service on a case-by-case basis, and we seek comment on continuing that policy in the context of channel sharing arrangements. Although the Commission historically has viewed any loss of service as *prima facie* inconsistent with the public interest, it has been our policy to consider and evaluate any counterbalancing factors an applicant may present to justify service losses.<sup>39</sup> This balancing process, to determine whether the projected loss of service will be outweighed by other factors, involves more than a mere comparison of numbers.<sup>40</sup> The Commission examines the extent of the loss, and whether any "white" or "gray" loss areas will be created.<sup>41</sup> The Commission defines "white area" as an area where the population does not receive any over-the-air television service and "gray area" as one where the population receives only one over-the-air television service.<sup>42</sup> The Commission may also examine whether the loss area is "underserved," *i.e.*, where the population receives less than five other existing services.<sup>43</sup> The Commission may also examine whether the loss involves specialized programming such as that from a network.

27. In terms of counterbalancing factors, the Commission has examined whether gain areas will be created including establishment of first television service, second television service, first network service, etc.<sup>44</sup> However, the mere fact that total gains exceed losses does not, standing alone, constitute an affirmative factor offsetting those losses.<sup>45</sup> The Commission may also consider the availability of other television services in the loss area<sup>46</sup> as well as whether the population which would lose service is outside the station's DMA and is predicted to receive the same network programming from a station in their home DMA. We seek comment on whether to consider these factors in a similar fashion when evaluating losses that result from facility modifications and relocations related to channel sharing.

28. In weighing the public interest benefits that will result from channel sharing, should we consider mitigating circumstances such as the percentage of local cable penetration or satellite use in the loss area? Should sharing stations be allowed to offset otherwise disqualifying service losses by offering to deploy on-channel Digital Transmission Systems (DTS) or other technical measures to restore service

<sup>39</sup> See *Hall v. FCC*, 237 F.2d 567, 572 (D.C.Cir.1956).

<sup>40</sup> See *West Michigan Telecasters, Inc.*, 22 F.C.C.2d 943, *recon. denied*, 26 F.C.C.2d 668 (1970), *aff'd*, 460 F.2d 883 (D.C.Cir.1972).

<sup>41</sup> See *John McCutcheon d/b/a Communications*, 4 FCC Rcd 2079, 2083 n. 3 (1989).

<sup>42</sup> See *Apogee, Inc.*, 99 FCC 2d 979, ¶ 7 (1985).

<sup>43</sup> See *Cambridge and St. Michaels, Maryland*, 19 FCC Rcd 2592 (AD 2004).

<sup>44</sup> See *John McCutcheon d/b/a MCC Communications*, 4 FCC Rcd 2079 (1989) (permitting modification that resulted in first network service to 30,000 persons).

<sup>45</sup> See *Central Coast Television*, 14 FCC 2d 985, 1001 (Rev. Bd. 1968).

<sup>46</sup> See, e.g., *Eagle 22, Ltd.*, 7 FCC Rcd 5295 (1992) (permitting a modification where at least 60 percent of the population in the loss area was within the Grade B contours of between five and 17 full-service stations).

to the loss area?<sup>47</sup>

**c. Other Issues**

29. In addition to the specific areas set forth above, we seek comment on other areas of interest with respect to channel sharing in conjunction with the recommendations of the *Plan*. For instance, what is the impact of channel sharing on the media ownership rules? We contemplate that stations that share a channel will continue to be licensed and operated separately, although they will be sharing a single transmitting facility. What are the implications of channel sharing for the local TV ownership rule, the radio/TV cross-ownership rule and the newspaper/broadcast cross-ownership rule?

**2. Preservation of Must Carry Rights**

30. Full power television broadcast stations, and certain qualified low-power television broadcast stations, have a right to carriage on cable systems that the Supreme Court has recognized as essential to preserving “the widest possible dissemination of information from diverse and antagonistic sources.”<sup>48</sup> Full power broadcasters have similar rights to mandatory carriage on satellite (DBS) systems.<sup>49</sup> The rules proposed in this proceeding are designed to ensure that stations voluntarily electing to share a channel retain their existing rights to mandatory carriage, and we seek comment on such rules.

31. The Communications Act of 1934, as amended, provides for the mandatory carriage, by cable operators and satellite providers, of certain local broadcast signals.<sup>50</sup> The Act and our implementing rules<sup>51</sup> establish slightly different thresholds for carriage, depending on whether the station is full power or low-power, or commercial or noncommercial, and also depending on whether carriage is sought on a cable or DBS system. Stations meeting these thresholds are guaranteed carriage of only a single “primary” stream of programming, and carriage for any additional streams must always be negotiated.<sup>52</sup> It is our intent to adopt a channel sharing framework that will neither increase nor decrease the carriage rights of any broadcaster on any type of system. We anticipate, therefore, that regardless of the number of licensed stations sharing a six-megahertz channel, each would continue to have at least one, but only one, “primary” stream of programming. We seek comment on the specific proposals below and in general on the rules necessary to achieve this result.

32. *Cable Carriage.* A full power commercial station is entitled to carriage on a cable system when it is “licensed and operating on a channel regularly assigned to its community by the Commission,” and that community is within the same DMA as the cable system.<sup>53</sup> A qualified noncommercial educational station (“NCE”), on the other hand, can be considered “local,” and eligible for mandatory

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<sup>47</sup> See Digital Television Distributed Transmission System Technologies, *Report and Order*, 23 FCC Rcd 16731 (2008).

<sup>48</sup> *Turner Broadcasting System, Inc. v. FCC*, 520 U.S. 180, 192-193 (1997) (internal citations and quotations omitted); see also 47 U.S.C. §§ 534 and 535.

<sup>49</sup> 47 U.S.C. §338.

<sup>50</sup> See 47 U.S.C. §§ 338, 534, 535.

<sup>51</sup> *Broadcast Signal Carriage Issues*, 8 FCC Rcd 2965 (1993); see also, *Broadcast Signal Carriage Issues*, 9 FCC Rcd 6723 (1994) and *Implementation of the Satellite Home Viewer Improvement Act of 1999*, Report and Order, 16 FCC Rcd 1918 (2000).

<sup>52</sup> See, *Carriage of Digital Television Broadcast Signals: Amendments to Part 76 of the Commission's Rules*, CS Docket No. 98-120, *Second Report and Order and First Order on Reconsideration*, 20 FCC Rcd 4516 (2005) (reiterating the Commission's rejection of mandatory multicast carriage).

<sup>53</sup> 47 U.S.C. § 534(h)(1)(A).

carriage on a cable system, in one of two ways. It may either be licensed to a principal community within 50 miles of the system's headend, or place a "Grade B" signal<sup>54</sup> over the headend.<sup>55</sup> Under very narrow circumstances, certain low-power broadcasters can also become "qualified" and eligible for must carry.<sup>56</sup> Among the several requirements for reaching "qualified" status with respect to a particular cable operator, the low-power station must be "located no more than 35 miles from the cable system's headend."<sup>57</sup>

33. *DBS Carriage.* A full power station is entitled to request carriage by a DBS provider any time that provider relies on the statutory copyright license<sup>58</sup> to retransmit the signal of any other "local" full power station<sup>59</sup> (i.e., one located in the same DMA<sup>60</sup>). The standards are the same for both commercial and noncommercial broadcasters, and low-power broadcasters do not have DBS carriage rights.<sup>61</sup>

34. *Carriage of Shared Signals.* We seek comment on whether the procedures we propose herein would ensure that a television station operating on a shared channel would continue to be:

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<sup>54</sup> In the digital broadcasting context, the Commission uses the digital noise limited service contour ("NLSC"), set forth in 47 C.F.R. § 73.622(e), in place of the analog Grade B contour, set forth in 47 C.F.R. § 73.683(a). See *In the Matter of 2010 Quadrennial Regulatory Review – Review of the Commission's Broadcast Ownership Rules Adopted Pursuant to Section 202 of the Telecommunications Act of 1996*, Notice of Inquiry, 25 FCC Rcd 6086, 6117 n. 148 (2010) (stating that the Commission developed the digital NLSC to approximate the same probability of service as the Grade B contour and has stated that the two are roughly equivalent). This has been true in both cable proceedings and in other settings (satellite proceedings, ownership proceedings, etc.). See, e.g., *Tennessee Broadcasting Partners, Memorandum Opinion and Order*, 25 FCC Rcd. 4857, 4859 at ¶ 6, footnote 14 (2010) (stating that the Commission has treated a digital station's noise-limited service contour as the functional equivalent of an analog station's Grade B contour). Congress has also acted on the presumption that the two standards are roughly equivalent, in the recently adopted STELA legislation, by adopting parallel definitions for households that are "unserved" by analog (measured by Grade B) or digital (measured by NLSC) broadcasters. 17 U.S.C. § 119(d)(10)(A)(i). The two standards define the noise-limited service contours for the respective analog and digital television transmission systems.

<sup>55</sup> 47 U.S.C. § 535(l)(2).

<sup>56</sup> 47 U.S.C. § 534(h)(2). The Commission's rules implementing this section state that a low-power station becomes qualified for mandatory carriage if the station conforms to the Commission's LPTV rules, broadcasts for at least the minimum number of hours required of commercial broadcast stations by the Commission, and adheres to certain Commission requirements regarding non-entertainment programming and equal employment opportunity. 47 C.F.R. § 76.55(d)(1), (2). However, an LPTV station will not be qualified unless the Commission determines that the provision of programming by such station would address local news and informational needs not being adequately served by full service television stations, because such full service stations are distant from the LPTV station's community of license. 47 C.F.R. § 76.55(d)(2). In addition, the LPTV station must comply with the Commission's interference regulations for LPTV stations; it must be within 35 miles of the cable system's principal headend and deliver to the headend a good quality over-the-air signal; its community of license and the franchise area of the cable system must both have been located outside of the largest 160 Metropolitan Statistical Areas (MSAs) on June 30, 1990, and the population of the LPTV station's community of license on that date must not have exceeded 35,000; and there cannot be any full service television station licensed to any community within the county or other political subdivision (of a State) served by the cable system. 47 CFR § 76.55(d)(3)-(6).

<sup>57</sup> 47 C.F.R. § 76.55(d)(4).

<sup>58</sup> 17 U.S.C. § 122.

<sup>59</sup> 47 U.S.C. § 338(a)(1) (stating that satellite carriers must carry "upon request the signals of all television broadcast stations located within that local market").

<sup>60</sup> 17 U.S.C. § 122(j)(2).

<sup>61</sup> 47 U.S.C. §§ 338(a)(1) and (3).

- “licensed and operating on a channel regularly assigned to its community by the Commission (for purposes of cable carriage of a commercial station)”,<sup>62</sup>
- licensed to a specific “principal community” or configured with technical facilities that have an NLSC that encompasses the cable system’s principal headend (for purposes of cable carriage of a non-commercial station);<sup>63</sup> and
- “located within” a designated market area (for purposes of DBS carriage of commercial and noncommercial stations).<sup>64</sup>

35. *NCE Issues.* We seek comment on whether an NCE television station sharing a channel with a commercial television station could affect the NCE station’s continued eligibility for carriage.<sup>65</sup> This is particularly relevant in the cable context, because, as discussed above, commercial stations and NCEs must meet different criteria in order to be eligible for mandatory carriage. Because we anticipate that sharing stations would continue to be licensed and operated separately, we do not anticipate that an NCE television station would lose its NCE status or eligibility by sharing a channel with a commercial station. We seek comment on this issue.

36. *Technical Issues.* We also seek comment on whether a station sharing a channel with one or more other stations, or the redesignation of a given 6 MHz channel as a “shared” channel, would affect the stations’ ability to request local carriage on cable and DBS systems serving subscribers within the stations’ market. Are there any unique aspects of channel sharing that could prevent a broadcaster, of any type, from achieving the necessary thresholds for mandatory carriage on any cable or DBS system on which it is currently carried? Cable and DBS systems are currently receiving the full 6 MHz signal from broadcasters but only carrying certain streams; would there be any technical differences, from the carrier’s perspective, if two or more of these streams on a shared channel were the “primary” streams of different, individually licensed stations? Are there other technical issues that would be unique to a sharing scenario?

37. *Differing Elections.* Even if a commercial station meets the threshold for carriage, it may elect to pursue retransmission consent agreements with one or more MVPDs.<sup>66</sup> When a station has made such an election, it may not be carried by the MVPD without its consent. We seek comment on how stations’ carriage rights would be affected if one sharing station elects retransmission consent and the other elects must carry. As noted above, we anticipate that each station operating on a shared channel will be licensed and operated as a totally distinct entity with its own “primary” stream of programming, and that the sharing of a channel would not affect a sharing station’s carriage election options or rights. We seek comment on this issue, particularly any technical implications for carrying one stream of a broadcast channel while not carrying another.

38. *Shared signal issues.* There are certain essential issues inherent to sharing a channel that we expect will be resolved by stations sharing a channel. For example, in addition to the threshold requirements discussed above, local stations are only eligible for mandatory carriage if they provide a “good quality signal” of at least -61 dBm to the cable or satellite provider.<sup>67</sup> Failure to provide this signal

<sup>62</sup> 47 U.S.C. § 534(h).

<sup>63</sup> 47 U.S.C. § 535(l)(2); *see also, supra* note [X] (discussing the use of the NLSC in place of Grade B).

<sup>64</sup> 47 U.S.C. § 338(a)(1).

<sup>65</sup> *See supra* ¶¶ 24, 32.

<sup>66</sup> 47 U.S.C. § 325(b); *see also* §(b)(2)(A) (noncommercial stations may not elect retransmission consent).

<sup>67</sup> 47 U.S.C. §§ 338(b), 534(h)(1)(B)(iii). *See also Carriage of Digital Television Broadcast Signals*, First Report and Order and Further Notice of Proposed Rulemaking, 16 FCC Rcd 2598 (2001) (establishing the service level for cable) and *Implementation of the Satellite Home Viewer Improvement Act of 1999: Local Broadcast Signal Carriage Issues and Retransmission Consent Issues*, Second Report and Order, Memorandum Opinion and Order, and Second (continued....)

level would therefore affect the carriage rights of all stations using the same channel. We anticipate that stations will make any necessary changes to their proposed shared transmission facility to ensure continued carriage for sharing stations. We seek comment on what those changes might be, and, in general, what matters must be resolved by the stations themselves to ensure the success of channel sharing.

39. *New Stations.* Currently, licensees of newly operating stations that are otherwise qualified local stations may seek mandatory carriage of such stations, even outside of the standard election cycle.<sup>68</sup> If we permit new stations, or permittees with unbuilt stations, to operate on shared channels, will we need any revisions to our rules in order to ensure that they are eligible to seek mandatory carriage as new stations after they commence broadcasting? We seek comment on this issue.

40. *Low-power Stations.* We are considering allowing LPTV, Class A, and translator stations to operate on shared channels, both among themselves and with full power stations.<sup>69</sup> If we do permit low-power stations to operate on shared channels, we are also proposing to provide that currently qualified low-power stations retain their eligibility for must carry rights, but to create no new rights. We seek comment on these proposals. Are there other issues we should consider with regard to allowing low power stations to channel share?

41. *Other Carriage Issues.* There are a number of other issues that may be relevant to the mandatory carriage of shared signals. For instance, if, as we propose, one stream of each individually licensed station on a single 6 MHz channel will be “primary” for purposes of must carry rights, should sharing broadcasters have any special obligation to identify the “primary” signals at the time they elect carriage?<sup>70</sup> Given the variety of questions that may have some bearing on the development of these rules, we seek comment on any issues pertaining to the mandatory carriage of shared broadcast signals, including those not specifically raised in this Notice.

### C. Improving Reception of VHF TV Service

42. Recognizing that UHF spectrum is highly desirable for flexible use, we are interested in exploring the steps needed to increase the utility of VHF spectrum for television broadcasts. VHF channels have certain characteristics that have posed challenges for their use in providing digital television service. In particular, the propagation characteristics of these channels allow undesired signals and noise to be receivable at relatively farther distances, nearby electrical devices tends to emit noise in this band that can cause interference, and reception of VHF signals requires physically larger antennas that are generally not well suited to the mobile applications expected under flexible use, relative to UHF channels. We recognize that television broadcasters have had some difficulty in ensuring consistent reception of VHF signals, and we seek comment through this Notice on technical changes to Commission rules, broadcast transmission equipment, or television receiver technology, that would improve VHF for television broadcasts, including the costs and benefits associated with such changes. Our intent is to treat stakeholders in a fair and equitable manner through procedures established in later action.

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(...continued from previous page)

Further Notice of Proposed Rulemaking, 23 FCC Rcd 5351 (2008) (adopting identical requirements in the satellite context).

<sup>68</sup> 47 C.F.R. §§ 76.64(f)(5) and 76.66(d)(3); *see supra* ¶[7] for a more general discussion of permitting sharing for new stations.

<sup>69</sup> *See discussion supra* ¶ 22 for a more general discussion of permitting sharing for low-power stations.

<sup>70</sup> *See supra* ¶ 31. Currently, although each broadcaster has only a single “primary” stream of programming that is potentially eligible for mandatory carriage, we do not regulate the manner in which that stream is identified by the broadcaster.

43. *Background.* The VHF TV reception difficulties appear to be most common among consumers who use indoor antennas. Complaints from individuals typically have indicated that a consumer who was previously able to receive a station's analog VHF signal was not able to receive that station's digital VHF signal. Most of these reports involved situations where the consumer was using an indoor antenna. In addition, earlier in the transition process it was recognized that use of the low-VHF channels 2-6 for digital service could be particularly difficult because of the generally higher levels of background noise on those channels.<sup>71</sup>

44. Independent investigations of currently marketed indoor antennas by the consulting engineering firm of Meintel, Sgrignoli and Wallace (MSW) and our Laboratory staff showed large variability in the performance (especially intrinsic gain) of indoor antennas available to consumers, with most antennas receiving fairly well at UHF and the substantial majority not so well to very poor at high-VHF. The MSW study reported net gain in receiving UHF signals that ranged from +21.0 to -6.2 dB relative to a ½-wave dipole antenna, with the great majority above 6 dBd (negative gain indicates that the tested antenna showed performed worse than the reference half-wave dipole). However, the net gain in receiving high VHF signals was generally much lower, with the substantial majority having negative gain ranging down as low as -25.0 dBd; only three of the 10 tested antennas showed positive gain at high-VHF.<sup>72</sup> The study by the FCC Laboratory staff similarly showed reception capabilities at high-VHF channels that were lower than a reference biconical antenna.<sup>73</sup> We note that neither of these studies examined antenna performance in receiving low-VHF signals. Nonetheless, we would expect that because of the need for longer elements to receive longer wavelength low-VHF signals, it is likely that the reception capabilities of an indoor antenna at low-VHF will generally to be less than at high-VHF. We note that many indoor antennas are not marketed for reception of low-VHF channels.

45. As indicated above, the engineers participating in our Broadcast Engineering Forum indicated the view that the options for improving TV service on the VHF channels, especially those in the low-VHF band, are limited. They indicated that while practical power increases could marginally improve reception there are physical and practical limitations to achieving any significant reception improvement.<sup>74</sup> Their general opinion was that the effect of a power increase would not be sufficient to compensate for reception problems caused by the increased RF noise level in the band and physical limitations on the size and efficiency of the transmit and receive antennas.<sup>75</sup> They submitted that VHF power improvement of as much 10 dB would be possible, but difficult, and higher than that would be

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<sup>71</sup> To assist consumers in resolving these and other DTV reception problems, the Commission has prepared and made available several Fact Sheets and Consumer Advisories. See for example "Antennas and Digital Television" and "Troubleshooting Guide for Digital-to-Analog Converter Boxes and Digital Televisions, which are available at <http://www.dtv.gov/publications.html>. In addition, the Association for Maximum Service Television and the Commission have jointly published a tip sheet "Consumer Tips for DTV Reception Problems on VHF TV Channels 2-13" and an advisory "Consumer Advisory: Proper Use of Indoor Antennas for Over-the-Air Television Reception"; these are available at [www.dtv.gov](http://www.dtv.gov) and <http://www.mstv.org/docs>.

<sup>72</sup> See *A Report on Television Indoor Antenna Performance Attributes*, Gary Sgrignoli and Dennis Wallace, Meintel, Sgrignoli and Wallace, LLC, Waldorf, MD, May 8, 2007. The MSW study examined 10 indoor antennas (5 passive and 5 active, i.e., with a pre-amplifier). Three of these antennas performed relatively well in both the high-VHF and UHF bands. Those three antennas provided gain at VHF ranging from +7.2 to +24.3 dB.

<sup>73</sup> See *Investigation of High VHF Band DTV Reception, Report: TR 09-1004*, Thomas W. Philips, Laboratory Division, Office of Engineering and Technology, Federal Communications Commission, August 12, 2009 (revised September 15, 2009). The FCC Laboratory study examined indoor antenna performance and interference from localized noise sources and; it examined the ability of 12 models of indoor antennas to receive local high-VHF signals off-the-air but did not measure their gain.

<sup>74</sup> See VHF Report at Slide 21.

<sup>75</sup> *Id.* at Slide 27.

impractical.<sup>76</sup> The broadcast engineering panel also indicated reducing the spurious and out-of-band emissions from consumers devices might help.

46. *Solutions for VHF Reception Challenges.* It is plain from the channel choices being made by broadcasters that reception problems are posing problems for use of the VHF channels. We are therefore seeking solutions to the VHF digital TV reception difficulties. In this regard, we are considering changes to our DTV operating rules to mitigate or overcome these challenges. We also intend to consider other solutions, including the possibility of indoor antenna performances standards, to make the VHF channels more useful to broadcasters. We also note that we have seen no indications that there are issues with the performance of television receivers, either traditional models with display screens or stand-alone set-top tuners, in receiving VHF channels.

47. *VHF Band Noise/Power Increases.* One of the problems with indoor VHF reception is noise from nearby (typically in the same room) consumer electronics equipment. While it would be desirable to reduce that noise, the rules limiting spurious emissions from unintentional radiators have been crafted to provide protection of licensed services while allowing production of economically viable devices. Further, any more stringent limits we might impose would not reduce emissions from existing products, nor would such limits reduce noise from incidental emitters (electric motors, switches, etc.), atmospheric disturbances and long range propagation effects that occur in the VHF bands (the latter especially at the low-VHF channels).<sup>77</sup> Thus, at least at this time, we do not believe it would be fruitful to attempt to reduce the permitted level of noise in the VHF bands. We request comment on whether there are actions we might take to reduce noise levels in the VHF bands used by the television service.

48. The other approach to overcoming noise is to increase the signal-to-noise ratio (S/N ratio) by raising the transmitted power, *i.e.*, effective radiated power (ERP). A number of stations operating on high-VHF channels have already improved their service by increasing their transmitted power.<sup>78</sup> Those stations received special temporary authorizations from the Commission for power increases that exceed the existing maximum power limits.<sup>79</sup> In each of these cases, either the power increase does not cause increased interference to other stations or the station licensee has negotiated with another station to accept some minimum level of new interference. While we are cognizant of the views regarding the limited expectations from power increases expressed at the Broadcast Engineers' Forum, we nonetheless believe that, as demonstrated by the stations that have already increased their transmitted power, such increases can provide some level of improvement in reception of VHF television service. We therefore believe it may be desirable to amend our rules to increase the maximum allowed ERP for VHF stations at least in Zone I, where the current maximum power levels are relatively low. We are specifically proposing to raise the nominal maximum allowed ERP for low-VHF stations in Zones I to 40 kW and for high-VHF stations in Zone I to 120 kW if the station's antenna height above average terrain is 305 meters or less. At antenna heights above 305 meters, the maximum power for both low-VHF and high-VHF stations would be lower in accordance with the table in the proposed rules in Appendix A. This proposal would effectively increase the maximum power for low-VHF and high-VHF stations in Zone I by 6 dB, a level

<sup>76</sup> *Id.* at Slide 14.

<sup>77</sup> See *First Report and Order* in GEN Docket No. 87-389, 4 FCC Rcd 3493 (1989) at ¶ 75.

<sup>78</sup> See for example, WHAS-TV, Louisville, KY, Ch. 11, BDSTA-20091014AAM; WABC-TV, New York, NY, Ch. 7, BDSTA-20100108ACK; WUSA, Washington, DC, Ch. 9, BDSTA-20091218ACS; WPVI, Philadelphia, PA, Ch. 6, BLDSTA-20090619ABQ; KRCR-TV, Redding, CA, Ch. 7, BDSTA-20090717ABBADD. These stations were previously operating at power levels below the maximum allowed levels.

<sup>79</sup> The maximum transmitted power limits for low-VHF and high-VHF stations are set forth in Sections 73.622(f)(6) and .622(f)(7), respectively, 47 C.F.R. §§ 73.622(f)(6) and (f)(7). §Those limits are nominally: 10 kW (Zone I) and 45 kW (Zones II and III) ERP for low-VHF stations and 30 kW (Zone I) and 160 kW (Zones II and III) ERP for highVHF stations.

consistent with that indicated as achievable by the VHF Reception Panel. We are not proposing to raise the maximum power limits for VHF stations in Zones II and III, as the existing limits still afford those stations the ability to provide stronger signals indoors to consumers who view their signals at locations close to their transmitters. The proposed new maximum power limits for VHF stations would allow such stations to provide signal strengths to areas close to their transmitters, *i.e.*, generally their principle community areas, that are higher by an amount that would help to compensate for some of the higher noise levels that tend to be present where consumers use indoor antennas.

49. Stations requesting power increases under the proposed new limits would be subject to affording protection to other full power television stations from new interference under the existing regime of desired-to-undesired (D/U) signals limits.<sup>80</sup> We believe such an increase would nonetheless allow many VHF stations experiencing difficulties in reaching viewers indoors to raise their signal levels by a reasonable level to overcome localized noise indoors, consistent with maintaining the approximate range of service provided by the existing maximum power limits. We do, however, recognize that higher power operation would increase the service range of VHF stations by as much as 14 km (9 miles). It is not generally our intention to extend the service range of these stations, as such expansions can to some degree limit the potential for introduction of new stations and changes by other co-channel and first-adjacent channel stations by enlarging the service area that must be protected. Nonetheless, we believe the interests of making the VHF channels more useful to stations and consumers outweigh these concerns about limiting opportunities of other stations. We request comment on this proposal and suggestions for alternative approaches, including both power limits and protection of service. In this regard, any increases in VHF power under this proposal by existing stations and new stations that are located within 300 kilometers (183 miles) of our border with Canada or within 400 kilometers (248.5 miles) of our border with Mexico will need to be coordinated with the appropriate foreign administration.

50. We also observe that the provisions governing transmission of television signals in Sections 73.682(a)(14) and 73.625(c) of the rules specify that it shall be standard to employ horizontal polarization. The ERP of a television station is therefore considered to be that of its horizontally polarized component. However, Section 73.682(a)(14) also provides that circular or elliptical polarization may be employed and that, in such cases, transmission of the horizontal and vertical components in time and space quadrature shall be used. Where such polarizations are used, the ERP of the vertically polarized component may not exceed the ERP of the horizontally polarized component. Stations therefore could achieve an increase in signal levels at indoor locations of perhaps 3 dB by using circular polarization. This step could also be combined with an increase in ERP (horizontal ERP) under the proposal to allow higher VHF maximum power levels. We encourage stations to make use of the option to use increased power under the vertical polarization provisions as a means to improve reception of their signals by indoor viewers.

51. A collateral issue that arises in the context of our consideration of increases in the power limits for digital television stations on VHF channels is whether we should also increase the minimum distance requirements for new, post-transition channel allotments with regard to other stations or channel allotments on the same and first-adjacent channels, as specified in Sections 73.616 and 73.623(d) of the rules.<sup>81</sup> Stations on new allotments that operate at the proposed new power limits and are at or close to

<sup>80</sup> The D/U limits for protection of television service are set forth in Section 73.623(c), 47 C.F.R. § 73.623(c).

<sup>81</sup> Section 73.616 sets forth requirements for protection of existing services from interference resulting from digital television stations operating on new channels added to the post-transition DTV Table of Allotments; these provisions invoke the geographic spacing requirements (distance standards) in Section 73.623(d), *see* 47 C.F.R. §§ 73.616(b) and 73.623(d). Specifically, Section 73.616(b) provides, *inter alia*, that “[a] petition to add a new channel to the post-transition DTV Table of Allotments contained in section 73.622(i) of this subpart will not be accepted unless it meets: the DTV-to-DTV geographic spacing requirements in § 73.623(d) with respect to all existing DTV allotments in the post-transition DTV Table ...”

the current minimum distances with regard to other stations could cause more interference to such stations (and vice versa) than would occur under the current power limits. Increasing those distances would resolve the interference concerns but would also tend to limit opportunities for new stations or for stations desiring to change channels (which necessitates modifying the allotment on which they operate). We generally believe it would be desirable to maintain the current distance standards for new and changed allotments in order to avoid further limiting opportunities for new allotments. We therefore are not proposing to change the minimum distance requirements for new and modified allotments.

52. In taking this approach, we observe that the rules require a station that operates on a new allotment that meets the distance standards to protect other co-channel and adjacent channel stations from new interference in accordance with the desired-to-undesired (D/U) ratio interference protection criteria in Section 73.616(e).<sup>82</sup> In describing the services to be protected, this paragraph provides that “[f]or this purpose, the population served by the station receiving additional interference does not include portions of the population within the noise-limited service contour of that station that are predicted to receive interference from the post-transition DTV allotment facilities of the applicant ...” The rules are not specific, however, as to the post-transition DTV allotment facilities of the applicant, that is, the facilities that a station would be allowed under the allotment without concern for new interference. We propose to amend Section 73.616(e) to clarify that the post-transition DTV allotment facilities are the maximum facilities allowed currently under Section 73.622(f). Thus, an applicant for a new station would be allowed to operate up to the current maximum facilities of ERP and antenna height on a new allotment that meets the distance requirements.

53. A station on a new allotment could also operate with facilities that exceed the post-transition allotment facilities if such operation would not cause new interference to other stations as defined under Section 73.616(e). In addition, a licensee could apply to operate a station on a new allotment at facilities that exceed the post-transition allotment facilities (up to the proposed new limits) and could possibly cause new interference to another station by taking steps to avoid such interference. Such steps could include use of a directional antenna and/or location if the station’s transmitter at a site that is different from the site of the allotment (such sites are generally farther from any stations that would otherwise receive interference). We request comment on our plan to maintain the existing distance requirements as we increase the maximum allowed power for digital TV stations on VHF channels and on whether we should alternatively increase the minimum distance requirements to match the changes in the power limits. We also ask parties that advocate that we increase the minimum distance requirements to submit suggestions for new minimum distance standards.<sup>83</sup>

54. *Indoor Antennas.* The antenna used to receive signals is a critical element in the television service path. The antenna component of a TV receive system (which consists of an antenna, connecting cable and receiver) should be able to pick up as much of the available signal energy as possible. If an antenna has a very low ability to receive signals or if the level of the desired signal is low, reception may not be possible.<sup>84</sup> In view of the observed poor high-VHF reception capabilities of the majority of the indoor antennas examined in the two studies mentioned above and the likelihood that the low-VHF performance of those antennas is even poorer, we intend to consider establishing standards to ensure that indoor antennas are effective for low-VHF channel reception. While we have not regulated these

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<sup>82</sup> See 47 C.F.R. § 73.616(e).

<sup>83</sup> We note that the existing minimum distance standards do not provide interference protection that meets the desired-to-undesired signal ratios in Section 73.623(c) and licensees are required to demonstrate that their station will not cause interference in the application process.

<sup>84</sup> We point out that the presence of spurious noise generally does not exacerbate reception difficulties in cases where the antenna used has low gain. In such instances, a low gain antenna will receive less of the energy of both the noise and desired signal.

products previously, we believe that we have authority to set standards to ensure that the performance of indoor antennas is adequate to allow reception of low-VHF channels by TV receive systems under the All Channel Receiver Act, which is codified in Section 303(s) of the Communications Act of 1934, as amended.<sup>85</sup> In this regard, Section 303(s) specifically provides that the Commission shall “[h]ave authority to require that apparatus designed to receive television pictures broadcast simultaneously with sound be capable of *adequately* receiving all frequencies allocated by the Commission to television broadcasting...”<sup>86</sup> Because an antenna capable of adequately picking up low-VHF channels is necessary to allow all-channel reception of over-the-air broadcast signals, we believe that the standards proposed below would further our Section 303(s) mandate. We request comment on our authority to establish standards for the ability of indoor antennas to receive all of the channels allocated for television service.<sup>87</sup>

55. We request comment, information and suggestions regarding the need for, and desirability of, standards for indoor antennas. We are specifically proposing to require that indoor antennas, comply with the industry set standards in ANSI/CEA-2032-A, “Indoor TV Receiving Antenna Performance Standard,” February 2009.<sup>88</sup> The ANSI/CEA-2032-A standard defines test and measurement procedures for determining the performance of indoor TV receiving antennas. Section 3.2.2 of this standard provides that to meet the standard, an antenna must have measured gain that exceeds:

- -12 dBd on all CEA test channels 2, 4, and 6 in the VHF low band
- -8 dBd on all CEA test channels 7, 9, 11 and 13 in the VHF high band and
- -8 dBd on all CEA test channels contained in the UHF band (channels 14-[51])

ANSI/CEA-2032-A further specifies that the test procedures in CEA-744-B are to be employed to measure the antenna performance.<sup>89</sup> It also provides standards for active (amplified) antennas, including gain, intermodulation and spurious emission. Further, it provides for labeling antenna packaging and antennas to indicate the channels or bands of channels for which the antenna meets the specified technical requirements. We observe that the high-VHF and UHF performance levels under this industry-developed standard are well within the capabilities of the antennas tested in the MSW and FCC Laboratory studies of indoor antennas. Under this proposal, all indoor television antennas would be required to meet the ANSI/CEA-2032-A standards for reception of low-VHF, high-VHF and UHF signals. In addition, to ensure compliance with these standards indoor antennas would be subject to the Commission’s “verification” equipment procedure in Part 2 of the rules.<sup>90</sup> This would promote our objective of improving indoor reception in the VHF bands and well as ensure that indoor antennas are able to adequately receive UHF signals. Antennas that are built-in to, or designed for use with, specific devices such as portable television receivers, dongles, laptop computers, and similar TV reception equipment would not be subject to this requirement. Given the findings of the antenna studies by MSW and our Laboratory staff discussed above, we believe that the performance levels set forth in ANSI/CEA-2032-A

<sup>85</sup> 47 U.S.C. 303(s).

<sup>86</sup> All Channel Receiver Act, Pub.L. No. 87-529, 76 Stat. 150, codified at 47 U.S.C. § 303(s) (emphasis added). *See Elec. Indus. Assoc. Consumer Elec. Group v. FCC*, 636 F.2d 689, 694-96 (D.C.Cir. 1980) (discussing Act and its legislative history).

<sup>87</sup> We have seen no indications that there are VHF/UHF performance issues with outdoor antennas that result in consumers not able to receive either VHF or UHF signals. While many outdoor antennas currently on the market are designed for only VHF or only UHF reception, consumers do not seem to have difficulties in identifying and obtaining the outdoor antenna(s) they need to receive the television signals available in their area.

<sup>88</sup> ANSI/CEA-2032-A is available from Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado 80112-5704, <http://global.ihs.com> or e-mail [global@ihs.com](mailto:global@ihs.com).

<sup>89</sup> *See* CEA-744-B, February 2009. This standard is also available from Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado 80112-5704, <http://global.ihs.com> or e-mail [global@ihs.com](mailto:global@ihs.com).

<sup>90</sup> The verification procedure is set forth in Sections 2.951-2.956 of the rules, 47 C.F.R. §§ 2.951-2.956.

are well within the capabilities of currently available consumer grade television receive antennas.

56. We request comment on whether the ANSI/CEA-2032-A performance standards are sufficient to ensure adequate reception of digital television signals at most indoor locations and whether the CEA-744-B measurement procedures are appropriate for determining compliance. We also ask whether there might be other standards or measurement methods that might be more appropriate. Our intent is to ensure that consumers are able to achieve indoor reception of digital television signals, and especially of VHF signals, that is comparable to indoor reception of the signals of the former analog television system. We also ask for comment an alternative approach under which we would require only that manufacturers measure indoor antennas using the CEA-744-B test procedure and comply with the labeling requirements of ANSI/CEA-2032-A. Under this approach, antennas would also be subject to our verification equipment authorization procedure. We invite interested parties to submit comment, information and suggestions for alternative standards regarding all aspects of the indoor antenna issue.

57. *Other Approaches/Solutions for Improving Reception of VHF TV Services.* In addition to power increases for VHF band stations and standards for indoor antennas, we also intend to consider additional options for improving television service in the VHF bands. Interested parties are invited to submit ideas and suggestions for additional measures we could take to improve reception of television signals on VHF channels. We request that parties submit materials information and analyses describing conditions and phenomenon that contribute to VHF reception difficulties and ideas for overcoming or mitigating them.

#### IV. PROCEDURAL MATTERS

58. *Initial Regulatory Flexibility Analysis for the Notice of Proposed Rule Making.* As required by Section 603 of the Regulatory Flexibility Act, 5 U.S.C. § 603, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the proposals suggested in this document. The IRFA is set forth in Appendix B.

59. *Initial Paperwork Reduction Analysis.* The *Notice of Proposed Rule Making* contains proposed new or modified information collection requirements. The Commission, as part of its continuing effort to reduce paperwork burdens, invites the general public and the Office of Management and Budget (OMB) to comment on the information collection requirements contained in this document, as required by the Paperwork Reduction Act of 1995, Public Law 104-13. Public and agency comments are due [X] days after the date of publication in the Federal Register. Comments should address: (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimates; (c) ways to enhance the quality, utility, and clarity of the information collected; and (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology. In addition, pursuant to the Small Business Paperwork Relief Act of 2002,<sup>91</sup> we seek specific comment on how we might "further reduce the information collection burden for small business concerns with fewer than 25 employees."

60. In addition to filing comments with the Secretary, a copy of any comments on the Paperwork Reduction Act information collections requirements contained herein should be submitted to the Federal Communications Commission via email to [PRA@fcc.gov](mailto:PRA@fcc.gov) and to Nicholas A. Fraser, Office of Management and Budget via email to [Nicholas A. Fraser@omb.eop.gov](mailto:Nicholas.A.Fraser@omb.eop.gov) or via fax at (202) 395-5167.

61. *Ex Parte Rules – Permit-But-Disclose Proceeding.* This is a permit-but-disclose notice and comment rulemaking proceeding. Ex parte presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in the Commission's rules. *See generally*

<sup>91</sup> Public Law 107-198, see 44 U.S.C. 3506(c) (4).

47 C.F.R. §§ 1.1202, 1.1203, and 1.1206(a).

62. *Comments.* Pursuant to sections 1.415 and 1.419 of the Commission's rules, 47 CFR §§ 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using: (1) the Commission's Electronic Comment Filing System (ECFS), (2) the Federal Government's eRulemaking Portal, or (3) by filing paper copies. See *Electronic Filing of Documents in Rulemaking Proceedings*, 63 FR 24121 (1998).

- **Electronic Filers:** Comments may be filed electronically using the Internet by accessing the ECFS: <http://fjallfoss.fcc.gov/ecfs2/> or the Federal eRulemaking Portal: <http://www.regulations.gov>.
- **Paper Filers:** Parties who choose to file by paper must file an original and four copies of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12<sup>th</sup> St., SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12<sup>th</sup> Street, SW, Washington DC 20554.

**People with Disabilities:** To request materials in accessible formats for people with disabilities (braille, large print, electronic files, audio format), send an e-mail to [fcc504@fcc.gov](mailto:fcc504@fcc.gov) or call the Consumer & Governmental Affairs Bureau at 202-418-0530 (voice), 202-418-0432 (tty).

63. *Further Information.* For further information, contact, Alan Stillwell of the Office of Engineering and Technology, at (202) 418-2470, or via the Internet at [alan.stillwell@fcc.gov](mailto:alan.stillwell@fcc.gov) or Hugh Van Tuyl Office of the Engineering and Technology, at (202) 418-2472, or via the Internet at [hugh.vantuyl@fcc.gov](mailto:hugh.vantuyl@fcc.gov).

## V. ORDERING CLAUSES

64. IT IS ORDERED that pursuant to Sections 4(i), 301, 302, 303(e), 303(f) and 303(r) of the Communications Act of 1934, as amended, 47 USC Sections 154(i), 301, 302, 303(e), 303(f) and 303(r), this *Notice of Proposed Rule Making* IS ADOPTED.

65. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this *Notice of Proposed Rule Making*, including the Initial Regulatory Flexibility Analysis to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION



Marlene H. Dortch  
Secretary

**APPENDIX A**  
**PROPOSED RULES**

Parts 2, 15, and 73 of Title 47 of the Code of Federal Regulations are proposed to be amended as follows:

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

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

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

2. Section 2.106, the Table of Frequency Allocations, is amended as follows:

a. Pages 19, 20, 24, and 28 are revised.

b. In the list of Non-Federal Government (NG) Footnotes, footnotes NG66 and NG149 are removed.

**§ 2.106 Table of Frequency Allocations.**

The revisions read as follows:

International Table			United States Table		FCC Rule Part(s)
Region 1 Table	Region 2 Table	Region 3 Table	Federal Table	Non-Federal Table	
47-68 BROADCASTING	47-50 FIXED MOBILE	47-50 FIXED MOBILE BROADCASTING  5.162A	47-49.6	47-49.6 LAND MOBILE  NG124	Private Land Mobile (90)
			49.6-50 FIXED MOBILE	49.6-50	
5.162A 5.163 5.164 5.165 5.169 5.171	50-54 AMATEUR  5.162A 5.166 5.167 5.167A 5.168 5.170		50-73	50-54 AMATEUR	Amateur Radio (97)
	54-68 BROADCASTING Fixed Mobile	54-68 FIXED MOBILE BROADCASTING		54-72 FIXED MOBILE BROADCASTING  NG5 NG14 NG115	Broadcast Radio (TV)(73) LPTV, TV Translator/ Booster (74G) Low Power Auxiliary (74H)
	5.172	5.162A			
	68-74.8 FIXED MOBILE except aeronautical Mobile	68-74.8 FIXED MOBILE			
5.173	68-74.8 FIXED MOBILE  5.149 5.176 5.179	72-73 FIXED MOBILE	72-73 FIXED MOBILE	Public Mobile (22) Aviation (87) Private Land Mobile (90) Personal Radio (95)	
73-74.6 RADIO ASTRONOMY		73-74.6 RADIO ASTRONOMY US74			
5.178		US246			
74.6-74.8 FIXED MOBILE	74.6-74.8 FIXED MOBILE		74.6-74.8 FIXED MOBILE	Private Land Mobile (90)	
5.149 5.175 5.177 5.179			US273		
74.8-75.2 AERONAUTICAL RADIONAVIGATION			74.8-75.2 AERONAUTICAL RADIONAVIGATION		Aviation (87)
5.180 5.181			5.180		
75.2-87.5 FIXED MOBILE except aeronautical mobile	75.2-75.4 FIXED MOBILE		75.2-75.4 FIXED MOBILE		Private Land Mobile (90)
	5.179		US273		

5.175 5.179 5.187 87.5-100 BROADCASTING	75.4-76 FIXED MOBILE	75.4-87 FIXED MOBILE	75.4-88	75.4-76 FIXED MOBILE	Public Mobile (22) Aviation (87) Private Land Mobile (90) Personal Radio (95)	
	76-88 BROADCASTING Fixed Mobile	5.182 5.183 5.188 87-100 FIXED MOBILE BROADCASTING		76-88 FIXED MOBILE BROADCASTING	Broadcast Radio (TV)(73) LPTV, TV Translator/ Booster (74G) Low Power Auxiliary (74H)	
	5.185	88-100 BROADCASTING	88-108	88-108 BROADCASTING NG2	Broadcast Radio (FM)(73) FM Translator/Booster (74L)	
	100-108 BROADCASTING		US93	US93 NG5		
5.192 5.194 108-117.975 AERONAUTICAL RADIONAVIGATION			108-117.975 AERONAUTICAL RADIONAVIGATION	Aviation (87)		
5.197 5.197A 117.975-137 AERONAUTICAL MOBILE (R)			US93 US343			
			117.975-121.9375 AERONAUTICAL MOBILE (R)			
			5.111 5.200 US26 US28 US403			
			121.9375-123.0875	121.9375-123.0875 AERONAUTICAL MOBILE		
			US30 US31 US33 US80 US102 US213	US30 US31 US33 US80 US102 US213		
			123.0875-123.5875 AERONAUTICAL MOBILE			
			5.200 US32 US33 US112			
			123.5875-128.8125 AERONAUTICAL MOBILE (R)			
			US26 US403			
			128.8125-132.0125	128.8125-132.0125 AERONAUTICAL MOBILE (R)		
			132.0125-136 AERONAUTICAL MOBILE (R)			
			US26			
		136-137	136-137 AERONAUTICAL MOBILE (R)			
5.111 5.200 5.201 5.202			US244	US244		

174-223 BROADCASTING	174-216 BROADCASTING Fixed Mobile  5.234	174-223 FIXED MOBILE BROADCASTING	174-216	174-216 FIXED MOBILE BROADCASTING  NG5 NG14 NG115	Broadcast Radio (TV)(73) LPTV, TV Translator/Booster (74G) Low Power Auxiliary (74H)
	216-220 FIXED MARITIME MOBILE Radiolocation 5.241		216-217 Fixed Land mobile  US210 US241 G2	216-219 FIXED MOBILE except aeronautical mobile	Maritime (80) Private Land Mobile (90) Personal Radio (95)
	5.242		217-220 Fixed Mobile  US210 US241	US210 US241 NG173  219-220 FIXED MOBILE except aeronautical mobile Amateur NG152	Maritime (80) Private Land Mobile (90) Amateur Radio (97)
	220-225 AMATEUR FIXED MOBILE Radiolocation 5.241		220-222 FIXED LAND MOBILE  US241 US242	US210 US241 NG173	Private Land Mobile (90)
5.235 5.237 5.243 223-230 BROADCASTING Fixed Mobile		5.233 5.238 5.240 5.245 223-230 FIXED MOBILE BROADCASTING AERONAUTICAL RADIONAVIGATION Radiolocation	222-225	222-225 AMATEUR	Amateur Radio (97)
	225-235 FIXED MOBILE	5.250 230-235 FIXED MOBILE AERONAUTICAL RADIONAVIGATION	225-235 FIXED MOBILE	225-235	
5.243 5.246 5.247 230-235 FIXED MOBILE		5.250	G27		
5.247 5.251 5.252 235-267 FIXED MOBILE			235-267 FIXED MOBILE	235-267	
5.111 5.252 5.254 5.256 5.256A			5.111 5.256 G27 G100	5.111 5.256	