



# PUBLIC NOTICE

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## WIRELESS TELECOMMUNICATIONS BUREAU SEEKS TO SUPPLEMENT THE RECORD ON THE 600 MHz BAND PLAN

GN Docket No. 12-268

**Comment Date:** June 14, 2013  
**Reply Comment Date:** June 28, 2013

In the *Broadcast Television Incentive Auction NPRM*, the Commission sought public comment on creating a 600 MHz wireless band plan from the spectrum made available for flexible use through the broadcast television incentive auction.<sup>1</sup> The Commission identified five key policy goals that would provide the framework for adopting a wireless band plan: utility, certainty, interchangeability, quantity and interoperability.<sup>2</sup> The majority of commenters support many features of the proposed band plan framework that aim to achieve these goals,<sup>3</sup> but express a broader range of views on how and where to configure the uplink and downlink blocks in the band plan.<sup>4</sup> To evaluate and quantify the technical tradeoffs associated with configuring the uplink and downlink bands, on May 3, 2013, the Commission hosted a public workshop.<sup>5</sup> At the workshop, stakeholders discussed a variety of technical aspects to consider in creating a 600 MHz wireless band plan, including mobile antenna issues, harmonics interference, intermodulation, and high power services in the duplex gap.<sup>6</sup>

As discussed in the workshop, many stakeholders support the “Down from 51” band plan proposal – or a variation of it – in which the Commission would clear broadcast television channels starting at channel 51 and expand downward: the uplink band would begin at channel 51 (698 MHz), followed by a duplex gap, and then the

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<sup>1</sup> Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, *Notice of Proposed Rulemaking*, 27 FCC Rcd 12357 (2012) (*NPRM*). In response to the *NPRM*, over 400 interested parties filed comments. See GN Docket No. 12-268.

<sup>2</sup> *NPRM*, 27 FCC Rcd at 12401-02, para. 125.

<sup>3</sup> These include auctioning “generic” blocks rather than specific frequency blocks; licensing in five megahertz “building blocks;” offering blocks designated specifically for uplink and for downlink operations; establishing guard bands, where necessary; and prioritizing paired blocks wherever possible. Federal Communications Commission Provides Additional Details about Workshop to Discuss the 600 MHz Band Plan, Public Notice, DA 13-799, at 1 (Apr. 19, 2013) (*600 MHz Band Plan Workshop Public Notice*). See also, GN Docket No. 12-268.

<sup>4</sup> *600 MHz Band Plan Workshop Public Notice* at 1.

<sup>5</sup> *Id.* at 1-2.

<sup>6</sup> A video of the 600 MHz Band Plan workshop is available at: [www.fcc.gov/events/learn-workshop-600-mhz-band-plan](http://www.fcc.gov/events/learn-workshop-600-mhz-band-plan).

downlink band.<sup>7</sup> The workshop made clear that support for a Down from 51 band plan framework is primarily based on concerns over high power services in the duplex gap<sup>8</sup> and antenna design issues.<sup>9</sup>

The Down from 51 proposals in the record generally limit the amount of market variation that can be achieved, however. Specifically, most of these proposals are targeted at repurposing a specific amount of paired spectrum nationwide, and provide limited options for how to offer less spectrum in constrained markets, or additional spectrum in individual markets, and only under certain scenarios.<sup>10</sup> In the *NPRM*, the Commission expressed a strong interest in establishing a band plan framework that is flexible enough to accommodate market variation, *i.e.*, offering varying amounts of spectrum in different geographic locations, depending on the spectrum available.<sup>11</sup> Further, although the majority of commenters argue that the Commission should prioritize offering paired spectrum blocks over unpaired blocks,<sup>12</sup> some variations of the Down from 51 band plan limit the amount of paired spectrum that can be offered.<sup>13</sup> Under the policy framework set forth by the Commission, the Down from 51 approaches in the record appear to favor certainty of the operating environment over the utility of providing the maximum amount of spectrum through flexibility to offer a greater quantity of spectrum in geographic areas where more spectrum is available.

In the *NPRM*, the Commission sought comment on a number of band plan proposals.<sup>14</sup> Emphasizing its goals of “balanc[ing] flexibility with certainty while maximizing the amount of spectrum we can make available for wireless broadband services in each geographic area,” the Commission recognized that other band plans are possible that may achieve the Commission’s goals.<sup>15</sup> Consequently, the Commission sought comment on the band plan approaches described in the *NPRM*, any variations on those approaches, and also invited commenters to propose their own band plans.<sup>16</sup> To advance the Commission’s goal of maintaining flexibility to offer different

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<sup>7</sup> See, e.g., Letter from AT&T Inc., National Association of Broadcasters, T-Mobile, Intel Corporation, Qualcomm, and Verizon Wireless to Gary Epstein and Ruth Milkman, FCC (Jan. 24, 2013); Comments of T-Mobile USA, Inc. at 10-13; Reply Comments of Ericsson at 13-29. See also, *NPRM*, 27 FCC Rcd at 12421, para. 178. Depending on the quantity of spectrum that is repurposed, the downlink band could be situated on both sides of channel 37 (assuming existing channel 37 operations remain on that channel).

<sup>8</sup> A number of commenters assert that putting high power services in the duplex gap will cause unnecessary and strong intermodulation products, which will result in significant interference to mobile broadband units. See, e.g., Comments of Alcatel-Lucent at 14-16; Comments of CTIA – The Wireless Association at 25, 28.

<sup>9</sup> Some commenters raise concerns that a large duplex gap would increase the operating bandwidth the mobile antenna would have to cover, and given current antenna design, it is difficult to cover such a large band with a single antenna in smaller smartphones. See, e.g., Reply Comments of Intel Corporation at 2; Comments of T-Mobile USA, Inc. at 8-9. The Down from 51 band plan framework narrows the duplex gap by reducing the space between the uplink and downlink bands and thereby reducing the total operating bandwidth for a given amount of repurposed spectrum.

<sup>10</sup> See, e.g., Comments of AT&T Inc. at Exh. A p. 29; Comments of Qualcomm Incorporated at 16-20 (accommodating variable uplink spectrum in constrained markets only if there is a sufficient number of low power TV stations to place in the duplex gap).

<sup>11</sup> *NPRM*, 27 FCC Rcd at 12401, para. 123-124. The Commission proposed to accommodate market variation by offering a consistent amount of downlink spectrum nationwide and allowing for variable uplink spectrum, and placing broadcast television stations in the duplex gap in more constrained markets. See, *NPRM*, 27 FCC Rcd at 12406-09, paras. 136-143.

<sup>12</sup> See, e.g., Comments of Competitive Carriers Association at 13; Comments of T-Mobile USA, Inc. at 5-6; Comments of Verizon and Verizon Wireless at 6.

<sup>13</sup> See, e.g., Comments of Qualcomm Incorporated at 4-20.

<sup>14</sup> *NPRM*, 27 FCC Rcd at 12401-12423, paras. 123-184.

<sup>15</sup> *Id.* at 12420, para. 177.

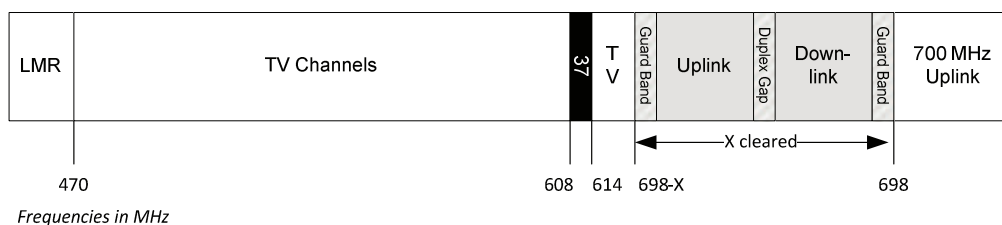
<sup>16</sup> *Id.*

amounts of spectrum in different geographic markets,<sup>17</sup> we seek further comment on how certain Down from 51 band plan approaches can best address the potential for market variation, particularly in markets where available spectrum is constrained. Although the Commission continues to consider all band plan proposals in the record, we seek additional comment on certain variations of the Down from 51 band plan, as described below, to develop a more robust record on these concepts. We invite commenters to discuss the relative merits of all of the band plan proposals and their variations in the record. Further, we also seek comment on which band plan other countries would be most likely to adopt to allow for global harmonization of the 600 MHz spectrum.

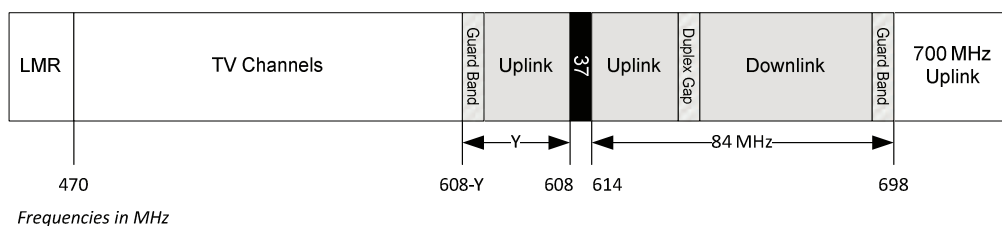
**“Down from 51 Reversed” Band Plan Variation**

We seek comment on a variation of the Down from 51 band plan<sup>18</sup> in which we reverse the configuration of the uplink and downlink blocks (“Down from 51 Reversed”). Under a Down from 51 Reversed band plan, the Commission would clear broadcast television channels starting at channel 51 and expand downward: the downlink band would begin after a guard band at channel 51 (698 MHz),<sup>19</sup> followed by a duplex gap, and then the uplink band. As shown in the diagrams below, the uplink band could extend past channel 37, either nationwide or in certain markets, depending on the amount of repurposed spectrum.

**Down from 51 Reversed, less than 84 MHz cleared**



**Down from 51 Reversed, more than 84 MHz cleared**



<sup>17</sup> See, *NPRM*, 27 FCC Rcd at 12406-09, paras. 136-143. We recognize that some commenters have concerns about accommodating market variation due to the potential for co-channel interference between wireless and broadcast TV operations spaced as close as 200 km apart. See, e.g., Comments of National Association of Broadcasters at 39-45; Letter from Gordon H. Smith, National Association of Broadcasters, to Julius Genachowski, Chairman, FCC (May 10, 2013), at p. 1-2. Nevertheless, even assuming that 200 km is the appropriate separation distance, we observe that the breadth of the continental United States is more than an order of magnitude larger than those distances, which suggests that variable market clearing might still allow for substantially more spectrum to be made available in the incentive auction.

<sup>18</sup> See *NPRM*, 27 FCC Rcd at 12420, paras. 178-179.

<sup>19</sup> Because the lower 700 MHz band is being used for mobile uplink operations while the upper 600 MHz band would be used for downlink operations under this model, we must create a guard band between the two bands to protect against interference. See, *NPRM*, 27 FCC Rcd at 12425, para. 189 n.273.

As discussed in the *NPRM*, the Commission proposed a structure to keep the downlink spectrum band consistent nationwide while allowing variations in the amount of uplink spectrum available in any geographic area to promote interoperability and accommodate market variation.<sup>20</sup> As shown in the diagrams below, by reversing the uplink and downlink bands, the Down from 51 Reversed band plan framework can maintain a uniform downlink band nationwide and allow for market variation in the amount of uplink spectrum offered without placing high power services in the duplex gap.

### Market Variation in Down from 51 Reversed, less than 84 MHz cleared

Standard market plan

LMR	TV Channels	37	T V	GB	Uplink	DG	Down- link	GB	700 MHz Uplink
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Constrained market option A		37		GB	UL	DG	DL	GB	
Constrained market option B		37	37		GB	UL	DG	DL	GB
Constrained market option C		37	37			UL	DG	DL	GB

### Market Variation in Down from 51 Reversed, more than 84 MHz cleared

Standard market plan

LMR	TV Channels	GB	Uplink	37	Uplink	DG	Downlink	GB	700 MHz Uplink
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Constrained market option A		GB	UL	37	UL	DG	DL	GB	
Constrained market option B			GB	37	UL	DG	DL	GB	
Constrained market option C				37	UL	DG	DL	GB	
Constrained market option D			GB	37	UL	DG	DL	GB	
Constrained market option E				37		T V	DL	GB	

We seek comment on the Down from 51 Reversed band plan variation. Are there any special considerations or rules that would be necessary in implementing this approach? We also seek comment on technical issues associated with the Down from 51 Reversed band plan. Specifically, we request comment on how this band plan approach would affect the ability of wireless broadband providers to utilize the 600 MHz band effectively, particularly in terms of network and device design. Further, we seek comment on whether the Down from 51 Reversed approach would provide greater flexibility with respect to market variation than other Down from 51 band plan proposals.<sup>21</sup> We ask commenters to discuss the tradeoffs associated with accommodating market variation under the Down from 51 Reversed band plan and the other band plan proposals in the record.

*Guard Bands.* Like other band plan proposals, in a Down from 51 Reversed band plan, we must implement guard bands to ensure all spectrum blocks are as technically and functionally interchangeable as possible.<sup>22</sup> Specifically, we would need to implement a guard band at the top of the 600 MHz wireless band between the 600 MHz downlink band and the lower 700 MHz uplink band to protect these services from

<sup>20</sup> *NPRM*, 27 FCC Rcd at 12401, para. 124.

<sup>21</sup> *Id.* at 12406-09, paras. 136-143.

<sup>22</sup> *Id.* at 12401-02, para. 125.

interfering with one another.<sup>23</sup> Similarly, we would need to implement a guard band at the lower end of the 600 MHz wireless band between the 600 MHz uplink band and broadcast television stations. We seek comment on the appropriate size of the guard bands under this proposal.

*Channel 37.* Under a Down from 51 Reversed band plan, it is possible that 600 MHz wireless operations could be adjacent to radio astronomy (RA) and wireless medical telemetry services (WMTS) operations in channel 37, conceivably on both sides, if the 600 MHz uplink band extends below channel 37. Would the Down from 51 Reversed band plan require additional measures to protect existing channel 37 operations? If so, how would these measures affect the ability of wireless providers to utilize the adjacent spectrum? We also seek comment on a proposal to apply the spectral mask for TV white space devices to prevent interference and protect existing channel 37 WMTS operations from interference if mobile uplink operations (rather than wireless downlink operations) are on both sides of channel 37.<sup>24</sup> Further, in the event that the Commission can repurpose more than 84 megahertz of spectrum, yielding an uplink band that would extend below channel 37, wireless uplink operations will be both above and below channel 37. If this occurs, the duplex spacing for paired blocks with uplink blocks below channel 37 would be greater than for paired blocks with uplink blocks above channel 37 because wireless operations cannot operate on channel 37. We seek comment on the effects of this variable duplex spacing, and how this affects network and/or device design. We seek comment on other issues relating to existing channel 37 operations under the Down from 51 Reversed band plan approach.

#### **Down from 51 with TV in the Duplex Gap in Constrained Markets**

We also seek comment on how the Commission should address constrained markets where less spectrum is available if it adopts a version of the Down from 51 band plan that has been more generally discussed in the record and the workshop, with the 600 MHz uplink band beginning at channel 51, adjacent to the 700 MHz band uplink band. Specifically, should the Commission place television stations in the duplex gap in more constrained markets?<sup>25</sup> Although we recognize that some commenters have concerns about allowing high power services to operate in the duplex gap,<sup>26</sup> is this less problematic if it occurs only in certain markets? As compared to a Down from 51 Reversed band plan, which alternative would allow the Commission to offer as many paired spectrum blocks as possible? Which band plan approach is preferable if the Commission decides to accommodate market variation?

#### **Down from 51 TDD Approach**

In addition, we seek further comment on using a Down from 51 band plan framework with unpaired TDD blocks (“Down from 51 TDD”).<sup>27</sup> Under a Down from 51 TDD band plan, the band would begin after a guard band at channel 51 (698 MHz) and expand downward, followed by a guard band between wireless operations and

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<sup>23</sup> As discussed in the *NPRM*, we note that the Spectrum Act requires that the “guard bands shall be no larger than is technically reasonable to prevent harmful interference between licensed services outside the guard bands.” *NPRM*, 27 FCC Rcd at 12412, para. 152 *citing* Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6407(b), 125 Stat. 156 (2012).

<sup>24</sup> *See, e.g.*, Comments of Philips Healthcare at 4-6. *See also*, 47 CFR § 15.709(c)(4).

<sup>25</sup> *See, e.g.*, Letter from Trey Hanbury, Hogan Lovells, to Marlene Dortch, Secretary, FCC (Feb. 1, 2013), at Att. p. 14-17 (market variation with high power services between the uplink and downlink bands).

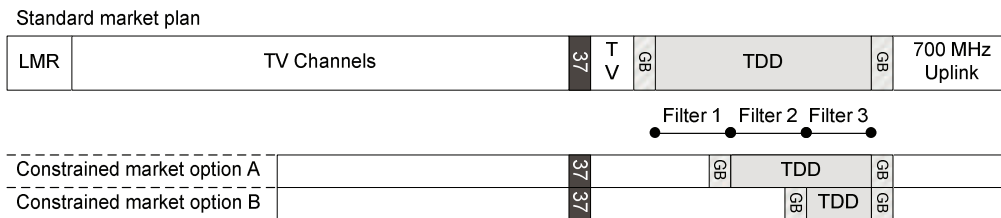
<sup>26</sup> *See, e.g.*, Comments of Alcatel-Lucent at 14-16; Comments of CTIA – The Wireless Association at 25, 28.

<sup>27</sup> *See NPRM*, 27 FCC Rcd at 12423, paras. 183-184.

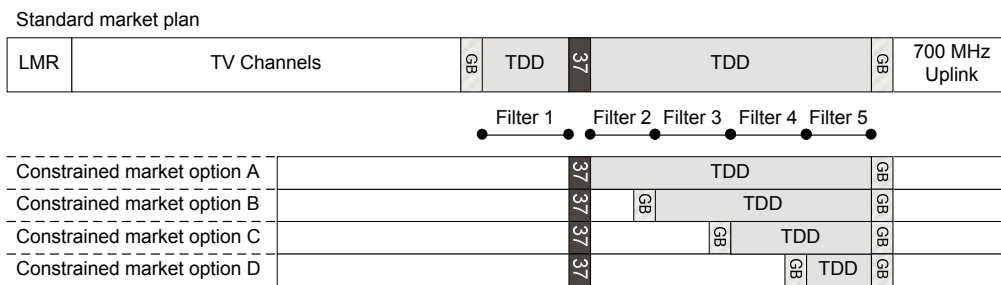
broadcast television operations at the lower edge of the 600 MHz wireless band.<sup>28</sup> As in the other Down from 51 band plan proposals, the band could extend past channel 37, either nationwide or in certain markets, depending on the amount of repurposed spectrum, which may also require the Commission to protect existing channel 37 operations.<sup>29</sup>

Although the Down from 51 TDD band plan would require guard bands at both ends of the 600 MHz wireless band, no duplex gap is necessary. Further, the Down from 51 TDD band plan would allow for market variation without placing television stations in the duplex gap. Although a TDD band plan could not support market variation through variable uplink, it could support market variation through an alternative approach that aligns the amount of repurposed spectrum in constrained markets with the expected filter configurations, as shown below.<sup>30</sup>

**Market Variation in Down from 51 TDD, less than 84 MHz cleared**



**Market Variation in Down from 51 TDD, more than 84 MHz cleared**



We seek additional comment on this Down from 51 TDD band plan. Specifically, we seek comment on the tradeoffs associated with implementing the Down from 51 TDD band plan as compared to the other Down from 51 band plan variations that also accommodate market variation. Which band plan provides the most flexibility while maintaining the best certainty about the operating environment?

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<sup>28</sup> See Comments of Sprint Nextel Corporation at 22, Reply Comments of Ericsson at 27-29.

<sup>29</sup> See, e.g., Comments of Philips Healthcare at 4-6.

<sup>30</sup> See, e.g., Reply Comments of Ericsson at 29 (showing several filters being used to implement a TDD plan).

Interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. When filing comments, please reference **GN Docket No. 12-268**.<sup>31</sup>

Comments may be filed using the Commission's Electronic Comment Filing System (ECFS) or by filing paper copies.<sup>32</sup> Comments filed through the ECFS can be sent as an electronic file via the Internet to <http://www.fcc.gov/cgb/ecfs/>. Generally, only one copy of an electronic submission must be filed. If multiple docket or rulemaking numbers appear in the caption of the proceeding, commenters must transmit one electronic copy of the comments to each docket or rulemaking number referenced in the caption. In completing the transmittal screen, commenters should include their full name, U.S. Postal Service mailing address, and the applicable docket or rulemaking numbers. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail comments, commenters should send an e-mail to [ecfs@fcc.gov](mailto:ecfs@fcc.gov), and should include the following words in the body of the message, "get form." A sample form and directions will be sent in reply. 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, commenters 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 (although we continue to experience delays in receiving U.S. Postal Service mail). Parties are strongly encouraged to file comments electronically using the Commission's ECFS. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission, 445 12th Street, S.W., Washington, D.C. 20554.

- Effective December 28, 2009, 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. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building. The filing hours at this location are 8:00 a.m. to 7:00 p.m.
- 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.

Parties shall also serve one copy with the Commission's copy contractor, Best Copy and Printing, Inc. (BCPI), Portals II, 445 12th Street, S.W., Room CY-B402, Washington, D.C. 20554, (202) 488-5300, or via e-mail to [fcc@bcpiweb.com](mailto:fcc@bcpiweb.com).

Documents in GN Docket No. 12-268 will be available for public inspection and copying during business hours at the FCC Reference Information Center, Portals II, 445 12<sup>th</sup> St. S.W., Room CY-A257, Washington, DC 20554. The documents may also be purchased from BCPI, telephone (202) 488-5300, facsimile (202) 488-5563, TTY (202) 488-5562, e-mail [fcc@bcpiweb.com](mailto:fcc@bcpiweb.com).

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<sup>31</sup> The *NPRM* in this proceeding included an Initial Regulatory Flexibility Analysis (IRFA) pursuant to 5 U.S.C. § 603, exploring the potential impact of the Commission's proposal on small entities. *NPRM*, 27 FCC Rcd at 12523-44. The matters discussed in this notice do not modify in any way the IRFA we previously issued.

<sup>32</sup> See Electronic Filing of Documents in Rulemaking Proceedings, GC Docket No. 97-113, *Report and Order*, 13 FCC Rcd 11322 (1998).

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This matter shall be treated as a “permit-but-disclose” proceeding in accordance with the *ex parte* rules.<sup>33</sup> Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentations must contain summaries of the substance of the presentations and not merely a listing of the subjects discussed. More than a one- or two-sentence description of the views and arguments presented generally is required.<sup>34</sup> Other requirements pertaining to oral and written presentations are set forth in section 1.1206(b) of the rules.<sup>35</sup>

For further information, contact Paul Malmud at 202-418-0006, or via e-mail at [Paul.Malmud@fcc.gov](mailto:Paul.Malmud@fcc.gov).

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<sup>33</sup> *NPRM*, 27 FCC Rcd at 12494-95, paras. 416-417; *see also*, 47 C.F.R. § 1.1200 *et seq.*

<sup>34</sup> *See* 47 C.F.R. § 1.1206(b)(2).

<sup>35</sup> 47 C.F.R. § 1.1206(b).