



# PUBLIC NOTICE

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## COMMENT SOUGHT ON SPECTRUM FOR BROADBAND NBP Public Notice # 6

### PLEADING CYCLE ESTABLISHED

GN Docket Nos. 09-47, 09-51, 09-137

**Comment Date: October 23, 2009**

**Reply Comment Date: November 13, 2009**

In this public notice, we seek focused comment on the sufficiency of current spectrum allocations in spectrum bands, including but not limited to the prime spectrum bands below 3.7 GHz, for purposes of the Commission's development of a National Broadband Plan (Plan) pursuant to the American Recovery and Reinvestment Act of 2009 (Recovery Act), and for related purposes.<sup>1</sup>

In light of the record received in response to the *National Broadband Plan NOI*<sup>2</sup> and the discussions at the workshops that have been held to date,<sup>3</sup> we recognize that we must seek additional, focused comment on certain specific topics. Specifically, participants in the proceeding have raised the issue that the United States will not have sufficient spectrum available to meet demands for wireless broadband in the near future. In this Public Notice, therefore, we seek additional comment on the fundamental question of whether current spectrum allocations, including but not limited to the prime bands below 3.7 GHz, are adequate to support near- and longer-term demands of wireless broadband. We request that commenters responding to this Public Notice provide detailed, fact-based responses and to the extent possible provide quantitative data and analytical justification for their arguments. We note that the Commission has recently issued a Notice of Inquiry on wireless innovation and

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<sup>1</sup> American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009) (Recovery Act); *see also Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act, A National Broadband Plan for Our Future*, GN Docket Nos. 09-137, 09-51, Notice of Inquiry, FCC 09-65 (rel. Aug. 7, 2009) (2009 706 NOI) *Comment Sought on International Comparison and Consumer Survey Requirements in the Broadband Data Improvement Act*, GN Docket No. 09-47, Public Notice, 24 FCC Rcd 3908 (2009).

<sup>2</sup> *A National Broadband Plan for Our Future*, GN Docket No. 09-51, Notice of Inquiry, 24 FCC Rcd 4342 (2009) (*National Broadband Plan NOI*).

<sup>3</sup> *See* FCC, Broadband.gov, Workshops, <http://www.broadband.gov/workshops.html> (last visited Sept. 18, 2009); The FCC and Broadband: The Next 230 Days at 10-13 (July 2, 2009), [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-291879A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-291879A1.pdf).

investment, which asks a number of questions about ways to make more productive use of spectrum.<sup>4</sup> We will review comments in that proceeding in addition to the comments submitted in response to this Public Notice.

## I. BACKGROUND

In response to the *National Broadband Plan NOI*, the Commission received a number of comments. Commenters from across the industry argue that a priority of the Commission should be to make available more spectrum for commercial uses. Some commenters suggest it is the exponential growth in data traffic on mobile broadband networks that makes it imperative the Commission allocate additional spectrum for mobile broadband use.<sup>5</sup> Others state it is the demand from enterprise businesses and critical infrastructure entities that drives the need for additional spectrum.<sup>6</sup> Fixed wireless broadband is often cited as an appropriate and cost-effective means to provide last mile Internet access, particularly in rural areas.<sup>7</sup> Generally, the comments highlight a need for the Commission to explore the possibility of making additional spectrum available for wireless broadband services and to look for ways to use spectrum more efficiently.<sup>8</sup>

Commenters' description of the demand for wireless broadband underlies the present inquiry. CTIA notes that the wireless market in the United States now encompasses over 270 million subscribers.<sup>9</sup> The vast number of mobile devices also place heavy burdens on networks. Motorola notes that more than 78 percent of U.S. wireless consumers have a wireless device that is capable of accessing the Internet, and approximately 40 million American consumers are active users of mobile Internet services—a 75 percent increase from two years ago.<sup>10</sup> According to Wireless Communications Association International (WCAI), a traditional handheld device, with average customer usage patterns, will consume about 30 megabytes of data in a month, a single smart phone consumes 30 times that amount, and a single connected notebook or laptop computer is consuming 450 times that amount.<sup>11</sup> T-Mobile's experience reinforces this theme; customers of T-Mobile's G1 smartphone use 50 times the data of an average T-Mobile customer.<sup>12</sup> Finally, wireless devices are increasingly used to access bandwidth-intensive applications, such as video, Internet gaming, and social networking.<sup>13</sup> WCAI notes that these kinds of mobile data applications require bandwidth between 1 and 5 Mbps, compared to 6 to 12 kbps for a mobile voice call.<sup>14</sup>

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<sup>4</sup> See *Fostering Innovation and Investment in the Wireless Communications Market*, GN Docket No. 09-157, Notice of Inquiry, FCC 09-66 (rel. Aug. 27, 2009).

<sup>5</sup> CTIA Jun. 8, 2009 Comments, GN Docket No. 09-51, at 24–26 (CTIA Comments); T-Mobile Jun. 8, 2009 Comments, GN Docket No. 09-51, at 14 (T-Mobile Comments).

<sup>6</sup> Enterprise Wireless Alliance Comments Jun. 8, 2009 Comments, GN Docket No. 09-51, at 2–3; Motorola Jun. 8, 2009 Comments, GN Docket No. 09-51, at 9 (Motorola Comments).

<sup>7</sup> Wireless Communications Association International Jun. 8, 2009 Comments, GN Docket No. 09-51, at 46 (WCAI Comments).

<sup>8</sup> Cisco Jun. 8, 2009 Comments, GN Docket No. 09-51, at 20.

<sup>9</sup> CTIA Comments at 24–26.

<sup>10</sup> Motorola Comments at 7.

<sup>11</sup> WCAI Comments at 30–31.

<sup>12</sup> T-Mobile Comments at 14.

<sup>13</sup> Motorola Comments at 7.

<sup>14</sup> *Id.*

Several commenters point to a need for additional spectrum. According to CTIA, mobile carriers in the United States operate with just under 450 MHz of spectrum, which CTIA contends compares poorly with many other OECD nations.<sup>15</sup> CTIA further adds there is only 40 MHz of spectrum “in the pipeline” for CMRS providers.<sup>16</sup> WCAI suggests the need for spectrum for fixed wireless broadband could be 150 megahertz.<sup>17</sup> Motorola also contends that available spectrum has not kept up with the explosion in wireless data usage.<sup>18</sup> Several commenters argue that an examination of both federal and non-federal spectrum could offer opportunities to reallocate spectrum for commercial wireless uses to support wireless broadband.<sup>19</sup> IEEE recommends the use of TV spectrum as potential spectrum available for wireless broadband Internet services.<sup>20</sup> UTC/Edison suggests that reallocating the 1.8 GHz band will support the operations, maintenance, and management of the electricity supply.<sup>21</sup> API recommends that critical infrastructure entities receive access to the 700 MHz band.<sup>22</sup> T-Mobile notes that the United States should follow the example of other nations that are making spectrum available for 3G service in the 1.7 to 1.9 GHz bands, 2.5 GHz, and 2.6 GHz bands.<sup>23</sup>

The demand for additional spectrum was echoed during the August 13, 2009 Technology/Wireless Workshop. AT&T stated the demand for data on its wireless networks is exploding at such a rapid rate that technological solutions alone cannot be the answer.<sup>24</sup> The ability of AT&T to handle the 5,000% growth in data usage over the past three years relies upon broad contiguous bands of spectrum.<sup>25</sup> To help support this growth, in 2009 AT&T plans to build add an additional 2,000 cell sites to its networks.<sup>26</sup> Ericsson North America mirrored

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<sup>15</sup> CTIA Comments at 24–26.

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

<sup>17</sup> WCAI Comments at 34.

<sup>18</sup> Motorola Comments at 7.

<sup>19</sup> *See, e.g.*, American Consumer Institute (ACI) Jun. 8, 2009 Comments, GN Docket No. 09-51; Alcatel-Lucent Jun. 8, 2009 Comments, GN Docket No. 09-51; Computer & Communications Industry Association (CCIA) Jun. 8, 2009 Comments, GN Docket No. 09-51; Dell Jun. 8, 2009 Comments, GN Docket No. 09-51; Google Jun. 8, 2009 Comments, GN Docket No. 09-51 (Google Comments); Deborah Rudolph, IEEE-USA Jun. 5, 2009 Comments, GN Docket No. 09-51 (IEEE Comments); Intel Jun. 8, 2009 Comments, GN Docket No. 09-51; Longman Apr. 10, 2009 Comments, GN Docket No. 09-51; Media and Democracy Coalition (MDC) Jun. 8, 2009 Comments, GN Docket No. 09-51; Motorola Comments; Native Public Media and the National Congress of American Indians (NPM & NCAI) Jun. 8, 2009 Joint Comments, GN Docket No. 09-51; New EA Jun. 8, 2009 Comments, GN Docket No. 09-51; Qualcomm Jun. 8, 2009 Comments, GN Docket No. 09-51; Southern Company Services (SCS) Jun. 8, 2009 Comments, GN Docket No. 09-51; Telecommunications Industry Association (TIA) Jun. 5, 2009 Comments, GN Docket No. 09-51; and Wireless Internet Service Providers Association (WISPA) Jun. 8, 2009 Comments, GN Docket No. 09-51.

<sup>20</sup> IEEE Comments at 3.

<sup>21</sup> Utilities Telecom Council and Edison Electric Institute Jun. 8, 2009 Joint Comments, GN Docket No. 09-51, at 7, 10.

<sup>22</sup> American Petroleum Institute Comments at 7 n.8.

<sup>23</sup> T-Mobile at 15–16.

<sup>24</sup> Kris Rinne, AT&T, Remarks at the Wireless Broadband Workshop 5 (Aug. 13, 2009) (transcript available at [http://www.broadband.gov/docs/ws\\_06\\_tech\\_wireless\\_transcript.pdf](http://www.broadband.gov/docs/ws_06_tech_wireless_transcript.pdf) (presentation available at [http://www.broadband.gov/docs/ws\\_technology\\_wireless/ws\\_technology\\_wireless\\_Rinne.pdf](http://www.broadband.gov/docs/ws_technology_wireless/ws_technology_wireless_Rinne.pdf))) (Rinne Remarks).

<sup>25</sup> *Id.* at 6.

<sup>26</sup> *Id.* at 8.

AT&T's comments regarding the impact of the ever increasing quantity of data that flows through wireless networks.<sup>27</sup> According to Ericsson's representative, "[t]he more bandwidth you have available, the higher speeds you can accomplish and you get better efficiency."<sup>28</sup> This view was again echoed when one panelist suggested that a technological limit is approaching, and the only solution is to provide more spectrum.<sup>29</sup> Moreover, Alcatel-Lucent's representative noted that even as the telecommunications industry works to improve spectral efficiency, usage of spectrum is growing at such a rate that without additional large blocks of spectrum the industry will not be able to keep up.<sup>30</sup> Clearwire's representative added that it is critical that in the near future, when individuals will be using applications that require access to and transfer of 10 GB, 15 GB, or even 20 GB of data, download speeds are not diminished to dial-up equivalencies.<sup>31</sup>

Finally, several commenters argue that new rules could allow more efficient use of spectrum. Three commenters argue that throughout the nation, large swaths of spectrum are vacant or unused for the majority of the time.<sup>32</sup> According to New America Foundation, Public Knowledge, and Media Access Project, a 2004 National Science Foundation study found that less than 20 percent of the frequency bands below 3 GHz were in use over the course of a business day.<sup>33</sup> The study also found that the highest occupancy rate on prime spectrum below 3 GHz was just 13 percent in New York City.<sup>34</sup> Google suggests that easing power limits or interference standards in rural areas could aid in the deployment and make wireless broadband more cost-effective.<sup>35</sup>

## II. QUESTIONS

We seek additional information in five areas related to spectrum use, availability, and management:

### 1. What is the ability of current spectrum allocations to support next-generation build-outs and the anticipated surge in demand and throughput requirements?

Several operators have announced plans to deploy next-generation wireless broadband networks in the near term. It is expected that these networks will offer significant improvements in performance over currently deployed wireless broadband networks. We seek further comment on anticipated bandwidth demands that

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<sup>27</sup> See generally Sten Andersson, Ericsson, Remarks at the Wireless Broadband Workshop (Aug. 13, 2009) (transcript available at [http://www.broadband.gov/docs/ws\\_06\\_tech\\_wireless\\_transcript.pdf](http://www.broadband.gov/docs/ws_06_tech_wireless_transcript.pdf) (presentation available at [http://www.broadband.gov/docs/ws\\_technology\\_wireless/ws\\_technology\\_wireless\\_Andersson.pdf](http://www.broadband.gov/docs/ws_technology_wireless/ws_technology_wireless_Andersson.pdf))) (Andersson Remarks).

<sup>28</sup> *Id.* at 11.

<sup>29</sup> Scott Corson, Qualcomm, Remarks at the Wireless Broadband Workshop 17 (Aug. 13, 2009) (transcript available at [http://www.broadband.gov/docs/ws\\_06\\_tech\\_wireless\\_transcript.pdf](http://www.broadband.gov/docs/ws_06_tech_wireless_transcript.pdf) (presentation available at [http://www.broadband.gov/docs/ws\\_technology\\_wireless/ws\\_technology\\_wireless\\_Corson.pdf](http://www.broadband.gov/docs/ws_technology_wireless/ws_technology_wireless_Corson.pdf))).

<sup>30</sup> Tom Anderson, Alcatel-Lucent, Remarks at the Wireless Broadband Workshop 26 (Aug. 13, 2009) (transcript available at [http://www.broadband.gov/docs/ws\\_06\\_tech\\_wireless\\_transcript.pdf](http://www.broadband.gov/docs/ws_06_tech_wireless_transcript.pdf)).

<sup>31</sup> Barry West, Clearwire, Remarks at the Wireless Broadband Workshop 40 (Aug. 13, 2009) (transcript available at [http://www.broadband.gov/docs/ws\\_06\\_tech\\_wireless\\_transcript.pdf](http://www.broadband.gov/docs/ws_06_tech_wireless_transcript.pdf)).

<sup>32</sup> New America Foundation et al. Jun. 8, 2009 Comments, GN Docket No. 09-51, at i.

<sup>33</sup> *Id.* at 16–17.

<sup>34</sup> *Id.*

<sup>35</sup> Google Comments at 14. See also IEEE Comments at 9 (discussing changing Part 15 transmit power restrictions for 5.2 and 5.4 GHz bands).

will be placed on these networks, the ability of these networks to supply capacity to meet this demand, and the economic trade-offs that operators will confront as they attempt to maintain quality of service levels as their customer base and demand grow. Consequently, we seek further information as to:

- a. How should we think about the capacity of existing allocations and their ability to support growth in wireless broadband? Is there enough spectrum to support announced and future network deployments? We specifically request that commenters be specific as to quantitative methods to address this question, including economic, engineering, or other rigorous analytical approaches, and provide the underlying assumptions.
- b. How should we think about the tradeoff between more spectrum and greater investment in network infrastructure as means of adding network capacity? Is there some amount of spectrum below which operators in given areas will not economically be able to provide robust broadband service? Is this amount different in rural, suburban and rural areas?
- c. Do unlicensed devices have adequate access to spectrum that can be used to provide wireless broadband services or as a complement to services provided over licensed spectrum? If not, what spectrum should be made available?
- d. How can we further characterize the impact of a shortage of spectrum available for fixed and mobile wireless services? Please describe and quantify in terms of costs, coverage, quality of service, innovation, and other implications of a spectrum shortage.
- e. Are there specific commercial spectrum bands that are better used as either mobile or fixed wireless broadband? If so, which ones? Which bands might be used to deploy both?
- f. What is the potential impact of more spectrum on increasing competition, the pace and extent of deployment of different services and technologies, and the overall business case? What would be the tangible benefits of 10, 20, 50, or 100 megahertz of additional spectrum?

## **2. What spectrum bands are best positioned to support mobile wireless broadband?**

Spectrum in the United States has been assigned to a variety of services, including commercial mobile radio service, private mobile radio, satellite services, and many other uses that are or could be used for mobile wireless broadband applications. We seek comment on whether enough spectrum is currently allocated for mobile wireless broadband. Consequently, we seek further comment on:

- a. What is the current stock of spectrum available to support mobile wireless broadband? What is the proper methodology to compute this quantity? How should the methodology distinguish between the capacity or viability of different bands to support mobile wireless broadband?
- b. Which other spectrum bands might be most appropriate to repurpose to support mobile wireless broadband? Would these bands support shared use or would they need to be reallocated. What specific mechanisms should be used to facilitate transitions from incumbents?
- c. How would the allocation of different spectrum bands affect an operator's business case to deploy mobile broadband? Are there geographic distinctions to be made between the frequency bands that are most suitable to serve urban vis-à-vis rural and other underserved areas?
- d. Are there bands usable for mobile wireless broadband in other countries that might also be used in the United States? Which bands? What would be the benefit and viability of making these bands available in the United States?
- e. How much spectrum is required to allow mobile wireless access to compete with fixed and/or wired access for large portions of the US population for bandwidth rich applications, such as video streaming and downloading large files?

### **3. What spectrum bands are best positioned to support fixed wireless broadband?**

Spectrum in the United States has been also been assigned to a variety of fixed wireless services, including broadcast broadband access, point-to-point and backhaul services. We seek comment on whether adequate spectrum is currently allocated for fixed wireless broadband. Consequently, we seek further comment on:

- a. What is the current stock of spectrum available to support fixed wireless broadband? What is the proper methodology to compute this quantity? How should the methodology distinguish between different bands and/or uses?
- b. Which spectrum bands are most appropriate to support fixed wireless broadband? Should we distinguish between the spectrum needed for fixed wireless service to businesses and consumers vis a vis backhaul service and other uses within networks? If additional spectrum is required, what specific mechanisms should be used to facilitate transitions from incumbents?
- c. How would the allocation of different spectrum bands affect an operators' business case to deploy fixed broadband? Are there differences in the frequency bands needed to support fixed wireless broadband service for urban vis a vis rural and other underserved areas?
- d. Are there bands usable for fixed wireless broadband in other countries that might also be used in the United States?
- e. How much spectrum is required to allow fixed wireless broadband access to consumers and businesses to compete with wired broadband access for large portions of the US population for bandwidth rich applications, such as video streaming and downloading large files? What would be the impact in speed and depth of rural deployment?

### **4. What are the key issues in moving spectrum allocations toward their highest and best use in the public interest?**

Commenters have noted the low average percentage of use of spectrum in some commonly used commercial bands, which may signify that such spectrum is not being put to its highest and best use in the public interest. Therefore we seek comment on the following:

- a. How should we define and determine the value (*e.g.*, financial, economic, and public interest) of different uses to evaluate whether spectrum usage is maximizing the public interest? How should the Commission define what it means to use spectrum efficiently and productively in the public interest? How would we determine that the public interest would be better served by reallocating spectrum from an existing service to wireless broadband service? How should we think about different types of incentives to licensees to ensure the spectrum allocated to them is used in ways that maximize its public value?
- b. Are some spectrum bands being used more efficiently and productively in the public interest than others? How can this be evaluated?
- c. Are some spectrum bands not being used in the most efficient and productive way in the public interest? How can this be evaluated?
- d. What are the costs of moving current occupants and users of under utilized spectrum bands to other bands, to other technologies or solutions that do not require licensed spectrum, or consolidating use to avail under-utilized spectrum? What are the alternatives and costs of moving current users of under-utilized spectrum to different bands?
- e. What specific steps in overall spectrum management practices, if any, should we consider to ensure spectrum is fully utilized to maximize its total value? For example, should we consider evaluating licenses on their performance in utilizing their allotted spectrum during the renewal process? Should the licensee be compensated in some way for loss of the rights to that spectrum in unserved or underserved areas?

**5. What is the ability of current spectrum allocations to support both the fixed and mobile wireless backhaul market?**

Sufficient backhaul is a key element in the wireless broadband environment. We are cognizant that our questions above related to access to fixed wireless broadband spectrum relate to backhaul. However, commenters in various proceedings have noted a pressing need for additional cost-effective backhaul capacity for both wired and wireless networks and therefore we believe this topics merits special focus. We seek comment on the following:

- a. What spectrum bands are currently being used to provide wireless backhaul to wired or wireless broadband services?
- b. Do current spectrum allocations provide enough capacity for wireless backhaul? Should we expand the amount of licensed spectrum that can be used for middle mile or backhaul links to support broadband connectivity? If so, how should we think about the quantity of spectrum required?
- c. How does the availability of wireless backhaul affect competition among providers of broadband services? Does competition exist among providers of wireless backhaul service? Is backhaul capacity available, but parties are unable to obtain access?
- d. Can new technologies, such as smart antennas, be deployed to improve the efficiency of existing fixed wireless service to help meet the demand for wireless backhaul ?
- e. What processes can be streamlined to facilitate deployment of high capacity microwave links?
- f. Are there any spectrum bands currently used for purposes other than backhaul that can or should be redirected for microwave/backhaul services? What specific mechanisms should be used to facilitate transitions from incumbents?
- g. What recommendations should the National Broadband Plan consider including to address middle mile issues through broader availability of wireless links?

This matter shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules. See 47 C.F.R. §§ 1.1200, 1.1206. 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. See 47 C.F.R. § 1.1206(b). Other rules pertaining to oral and written *ex parte* presentations in permit-but-disclose proceedings are set forth in section 1.1206(b) of the Commission’s rules, 47 C.F.R. § 1.1206(b).

**All comments should refer to GN Docket Nos. 09-47, 09-51, and 09-137. Please title comments and reply comments responsive to this Notice as “Comments (or Reply Comments)—NBP Public Notice # 6.” Further, we strongly encourage parties to develop responses to this Notice that adhere to the organization and structure of the questions in this Notice.**

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.<sup>36</sup> Comments filed through the ECFS can be sent as an electronic file via the Internet to <http://www.fcc.gov/cgb/ecfs/> or the Federal eRulemaking Portal: <http://www.regulations.gov>.<sup>37</sup> Generally, only one copy of an electronic submission must be filed. In completing the transmittal screen, commenters should include their full name, U.S. Postal Service mailing address, and the applicable docket or rulemaking number. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail comments, commenters should send an e-mail to [ecfs@fcc.gov](mailto:ecfs@fcc.gov), and should

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<sup>36</sup> See Electronic Filing of Documents in Rulemaking Proceedings, 63 Fed. Reg. 24121 (1998).

<sup>37</sup> Filers should follow the instructions provided on the Federal eRulemaking Portal website for submitting comments.

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.

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). All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- The Commission’s contractor will receive hand-delivered or messenger-delivered paper filings for the Commission's Secretary at 236 Massachusetts Avenue, N.E., Suite 110, Washington, D.C. 20002. The filing hours at this location are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building.
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For further information about this Public Notice, please contact Charles Mathias at (202) 418-7147.

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