

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20554

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In the Matter of: )  
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Expanding the Economic and Innovation ) Docket No. 12-268  
Opportunities of Spectrum Through Incentive )  
Auctions )  
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**COMMENTS OF MOTOROLA MOBILITY LLC**

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## TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY.....	1
II. A BALANCED APPROACH TO SPECTRUM POLICY IS ESSENTIAL TO MEETING INCREASING CONSUMER DEMANDS FOR WIRELESS BROADBAND SERVICES.....	3
III. THE COMMISSION SHOULD DESIGN THE REVERSE AUCTION IN A WAY THAT ENCOURAGES BROAD PARTICIPATION BY TELEVISION BROADCAST LICENSEES.....	6
IV. THE COMMISSION SHOULD MODIFY ITS PROPOSED 600 MHZ BAND PLAN FRAMEWORK.....	8
V. THE COMMISSION SHOULD ADOPT ITS PROPOSALS TO PROMOTE UNLICENSED SPECTRUM AND SHOULD REFRAIN FROM IMPOSING OVERLY PROTECTIVE TECHNICAL STANDARDS THAT HAMPER UNLICENSED USE.....	14
VI. CONCLUSION.....	18

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**I. INTRODUCTION AND SUMMARY**

Motorola Mobility LLC (“Motorola Mobility”) provides these comments in response to the Federal Communications Commission’s proposals to implement an incentive auction program in spectrum now occupied by television broadcast stations.<sup>1</sup> Motorola Mobility is a provider of innovative technologies, products and services that enable a range of broadband communication, information and entertainment experiences. As such, it is directly affected by the Commission’s proposals that will provide more spectrum for wireless broadband connectivity.

Motorola Mobility supports a balanced “all-of-the-above” approach to spectrum policy that can accommodate all potential forms of licensed and unlicensed uses in addressing the spectrum demands currently facing the United States. The Notice of Proposed Rulemaking (“NPRM”) embraces these ideas. Specifically, the NPRM proposes to employ an incentive auction to repurpose the 600 MHz UHF band spectrum currently used for broadcast television

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<sup>1</sup> *In the Matter of Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, Docket No. 12-268, FCC 12-118, ¶ 232 (2012) (“NPRM”).

for wireless communications services.<sup>2</sup> Through this process, the NPRM's proposals also would make available additional spectrum for unlicensed devices and uses. Motorola Mobility endorses this two-pronged approach, which will help address the country's urgent need for additional licensed spectrum in the longer term, and additional unlicensed spectrum in the near term. This approach also will enable wireless service providers, device manufacturers, and entrepreneurs to accommodate the ever-expanding wireless broadband demands of consumers.

However, in order to achieve these benefits, Motorola Mobility believes that the Commission should take three additional steps in this proceeding. First, it should implement an auction process that maximizes the amount of spectrum that can be repurposed for wireless broadband services. Specifically, the FCC should decline to adopt unduly complicated reverse auction rules that may tend to dissuade broadcasters from participating in the auction process and should adopt flexible policies that support spectrum clearing.

Second, the Commission should adopt a band plan for advanced wireless use of the 600 MHz spectrum that is consistent with the NPRM's alternative proposal as opposed to the plan identified as "preferred." Eliminating television broadcast facilities from the spectrum between the uplink and downlink portions of the band plan would simplify the design of 600 MHz wireless devices and eliminate the source of harmful intermodulation products, which would otherwise fall in the device's receive band.

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<sup>2</sup> Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, 125 Stat. 156 (2012). Title VI of the Middle Class Tax Relief and Job Creation Act of 2012, commonly known as the Spectrum Act, addresses spectrum auctions. Section 6403 of the Spectrum Act specifically requires that the Commission conduct an incentive auction of the broadcast television spectrum and includes specific requirements and safeguards for the required auction.

Third, the Commission should promote spectrum for unlicensed uses. The insatiable demand for broadband data by consumers can only be satisfied through a holistic policy framework that encourages the combined efforts of wide-area access provided by wireless carriers as well as robust, small-cell access provided by unlicensed Wi-Fi devices. This coverage/capacity model will become increasingly important as carriers aim to off-load even more traffic to unlicensed networks to ensure the effective delivery of advanced broadband services. In adopting technical standards to protect licensed users from harmful interference, the Commission also should avoid imposing overly protective standards that would only tend to hamstring the unlicensed market by driving up device costs or limiting device functionality.

**II. A BALANCED APPROACH TO SPECTRUM POLICY IS ESSENTIAL TO MEETING INCREASING CONSUMER DEMANDS FOR WIRELESS BROADBAND SERVICES.**

Spectrum is not just the lifeblood of the wireless sector. It is rapidly becoming an essential input for the nation's tech economy. How we allocate spectrum, therefore, is now a matter of economics, innovation and social policy, not just telecom policy.

The near-term imperative driving our nation's spectrum policy is the desire to ensure adequate capacity and coverage for next-generation mobile broadband services. In particular, the "rapid adoption of smartphones and tablet computers, combined with deployment of high-speed 3G and 4G technologies, is driving more intensive use of America's mobile networks," which is creating an urgent need for additional spectrum for wireless broadband.<sup>3</sup> As Chairman

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<sup>3</sup> *Service Rules for Advanced Wireless Service in the 2000-2002 MHz and 2180-2200 MHz Bands*, Notice of Proposed Rulemaking and Notice of Inquiry, FCC 12-32, ¶ 10 (2012).

Genachowski recently observed, “no one can factually dispute that there is a spectrum crunch.”<sup>4</sup> In fact, by 2014, the FCC has forecast that the United States likely will face a spectrum deficit approaching 300 MHz.<sup>5</sup> Motorola Mobility agrees that an urgent need exists for additional spectrum—both licensed and unlicensed—for wireless broadband services, and therefore commends the Commission for aiming to repurpose large swaths of UHF spectrum for wireless services as quickly as possible.<sup>6</sup> However, the “crunch” is not so much a matter of a lack of spectrum supply, but rather an unfortunate result of the difficulty in managing spectrum in ways that will maximize its overall usefulness and efficiency in providing broadband Internet access to consumers.

The benefits of continued wireless broadband innovation and deployment are readily apparent. Chairman Genachowski recently explained that “[w]hether it is GDP, the apps economy or job creation, it is clear that wireless innovation and investment has helped lead us out of economic crisis and into recovery over the past three years.”<sup>7</sup> Recent data highlight the importance of wireless services to Americans. According to a 2012 CTIA report, there are

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<sup>4</sup> Julius Genachowski, Chairman, FCC, Panelist at the Stanford Institute for Economic Policy Research (Sept. 12, 2012), [http://www.youtube.com/watch?v=P4KRktxj9sA&feature=player\\_embedded#t=1621s](http://www.youtube.com/watch?v=P4KRktxj9sA&feature=player_embedded#t=1621s).

<sup>5</sup> FCC Staff Technical Paper, Mobile Broadband: The Benefits of Additional Spectrum, at 26 (Oct. 2010).

<sup>6</sup> The Commission, however, must recognize that the 600 MHz incentive auctions is not a long-term solution to the coming spectrum shortage and that it needs to pursue other options beyond this incentive auction.

<sup>7</sup> Julius Genachowski, Chairman, FCC, Prepared Remarks to International CTIA Wireless 2012, at 2 (May 8, 2012), [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-313945A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-313945A1.pdf).

321.7 million wireless subscriber connections in the United States.<sup>8</sup> Further, the U.S. wireless industry provides approximately 3.8 million direct/indirect jobs, which is 2.6 percent of all U.S. employment.<sup>9</sup> And the U.S. wireless industry is valued at \$195.5 billion – larger than publishing, agriculture, hotels and lodging, air transportation, motion picture and recording, and motor vehicle manufacturing industry segments.<sup>10</sup>

The widespread use of devices that incorporate unlicensed spectrum has played a large role in driving the success of wireless broadband. As the National Broadband Plan correctly notes, Wi-Fi and Bluetooth are particularly important complements to licensed mobile networks.<sup>11</sup> Most smartphones available today feature Wi-Fi, and users increasingly take advantage of this capability where high-speed broadband connectivity is available. According to a recent industry report, the amount of traffic offloaded from cellular networks to Wi-Fi in the United States doubled between 2011 and 2012.<sup>12</sup> And the amount of data traffic from Wi-Fi offload is expected to increase 16-fold between 2011 and 2016, bringing it “about even” with the amount of data traffic generated by devices such as tablets, laptops, eReaders, and handheld

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<sup>8</sup> “Consumer Data Traffic Increased 104 Percent According to CTIA-The Wireless Association® Semi-Annual Survey,” CTIA (Oct. 11, 2012), <http://www.ctia.org/media/press/body.cfm/prid/2216>.

<sup>9</sup> *Id.*

<sup>10</sup> *Id.*

<sup>11</sup> Omnibus Broadband Initiative, Federal Communications Commission, *Connecting America: The National Broadband Plan*, at 77 (2010) (“National Broadband Plan”).

<sup>12</sup> “Wi-Fi Offload Rising Amid Soaring Data Traffic,” Wireless Week (July 23, 2012), <http://www.wirelessweek.com/News/2012/07/technology-WiFi-Offload-Rising-Amid-Soaring-Data-Traffic/>.

gaming consoles.<sup>13</sup> As the Commission explains, the overall economic benefits of unlicensed devices are in the *tens of billions of dollars, if not more*.<sup>14</sup>

Under the circumstances, the Commission should pursue a balanced approach to spectrum policy, which recognizes that users' ever-expanding data demands should be met by a panoply of innovative business models and offerings that can utilize both licensed and unlicensed spectrum inputs.

### **III. THE COMMISSION SHOULD DESIGN THE REVERSE AUCTION IN A WAY THAT ENCOURAGES BROAD PARTICIPATION BY TELEVISION BROADCAST LICENSEES.**

To date, the United States has been unable to match effectively and efficiently ample spectrum supply to booming spectrum demand, which presents both challenges and opportunities. In the context of the incentive auction process, the Commission should seek to clear as much broadcast television spectrum as possible for wireless uses. At the outset, this goal can only be achieved if broadcasters choose willingly to participate in the reverse auction and

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<sup>13</sup> *Id.* This report also predicts that the amount of cellular traffic rerouted over Wi-Fi will reach 8 million gigabytes per month in the United States as “operators like AT&T and Verizon Wireless step up their dependence on the offloading technique.” *Id.* AT&T already operates “an extensive Wi-Fi network comprised of more than 30,000 hotspots,” and Verizon’s recent deal with Cox Communications, Comcast, Time Warner Cable and Bright House Networks “could allow its customers to access the cable provider’s 50,000-strong Wi-Fi hotspot network, dubbed CableWiFi.” *Id.*

<sup>14</sup> While the value of unlicensed devices to the economy is difficult to ascertain with precision, a study by the Stanford Institute for Economic Policy Research and Perspective (“Stanford”) estimates the economic benefits of unlicensed devices overall to be in the tens of billions of dollars, if not more. Stanford also estimates the economic benefits generated by unlicensed broadband devices to be \$16-37 billion per year and growing. *See* NPRM at n. 361 (citing Paul Milgrom, Jonathan Levin, and Assaf Eilat, *The Case for Unlicensed Spectrum*, Stanford Institute for Economic Policy Research, at 16 (October 12, 2011), [http://siepr.stanford.edu/?q=/system/files/shared/pubs/papers/pdf/11-002\\_Paper\\_Milgrom.pdf](http://siepr.stanford.edu/?q=/system/files/shared/pubs/papers/pdf/11-002_Paper_Milgrom.pdf)) (“Stanford Institute Report”). *See also* Efficiency Gains And Consumer Benefits Of Unlicensed Access To The Public Airwaves, Mark Cooper, Silicon Flatirons, University Of Colorado, Boulder, January 2012, <http://www.markcooperresearch.com/SharedSpectrumAnalysis.pdf>.

voluntarily agree to either surrender their license, relocate to a non-UHF channel, or voluntarily share a 6 MHz channel with other broadcast licensee(s).

The decision to participate in the reverse auction should not be made more difficult by unduly complicated auction rules. For example, the NPRM proposes that broadcasters submit a pre-auction application containing multiple filing requirements including a full ownership report as defined in Section 1.2112 of the Commission's rules.<sup>15</sup> Preparation of this application package would be costly and time consuming and could deter some participation. Further, expansive filing requirements also appear to be unnecessary as it is difficult to envision circumstances in which the public interest would be served by disqualifying a broadcast license from participating in the auction. Simplified certifications and notifications should suffice.

The Commission also should adopt policies and rules that support clearing as much UHF television spectrum as possible. While mandatory relocation to low VHF channels is prohibited,<sup>16</sup> the Commission should accept bids for voluntary relocations to those channels. And to encourage relocation to either the low or high VHF channels, the Commission should be flexible when considering requests for waivers of the VHF power and height limits for any winning UHF-to-VHF bidders to address unusual significant coverage issues on their new VHF channels.<sup>17</sup>

At bottom, the Commission should adopt rules and policies that are designed to encourage, rather than thwart, broad participation by television broadcast licensees in the reverse

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<sup>15</sup> NPRM at ¶ 247

<sup>16</sup> Pub. L. No. 112-96, § 6403(b)(3)(A) (“In making any reassignments under paragraph (1)(B)(i), the Commission may not involuntarily reassign a broadcast television licensee—(A) from an ultra high frequency television channel to a very high frequency television channel”).

<sup>17</sup> See NPRM at ¶ 247

auction. Doing so is the only way to ensure that as much broadcast spectrum as possible is made available for wireless broadband and other future uses.

**IV. THE COMMISSION SHOULD MODIFY ITS PROPOSED 600 MHZ BAND PLAN FRAMEWORK.**

The NPRM details the Commission's preferred band plan approach for advanced wireless use of the 600 MHz band.<sup>18</sup> That plan would establish a band edge for the downlink portion of the allocation at 608 MHz and a similar band edge for the uplink portion at 698 MHz. The amount of bandwidth that would be established in each of these two sub-blocks would depend on the amount of spectrum that would be recovered through the reverse auction and repacking processes. The spectrum between the uplink and downlink blocks would continue to be used by any number of high-powered television broadcast stations that would remain in operation. This necessitates establishing guard bands to separate the broadcast and advanced wireless facilities to avoid interference. Under the Commission's proposal, TV channel 37 would continue to be used exclusively by radio astronomy and low power medical telemetry devices and would serve as one of the necessary guard bands.

The NPRM also describes an alternative band plan proposal that would clear broadcast television channels starting at channel 51 and expand downward.<sup>19</sup> Under this proposal, the Commission would organize the cleared spectrum in an uplink portion, a downlink portion, and any necessary guard bands. A duplex gap would be established between the uplink and

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<sup>18</sup> See *id.* at ¶ 126.

<sup>19</sup> *Id.* at ¶ 178.

downlink bands and would not be available for use by licensed wireless broadband operations or broadcast television operations.<sup>20</sup>

As the Commission recognizes, the task of designing a band plan is complicated by the voluntary nature of the incentive auction, which creates much uncertainty regarding the amount of spectrum that will be made available in each geographic region.<sup>21</sup> Under the constraints imposed by the legislation, Motorola Mobility believes that the Commission's alternative proposal – *i.e.*, clearing broadcast operations beginning at TV channel 51 and expanding downward – is a better option than the NPRM's stated preference.

The Commission's alternative proposal offers at least two distinct advantages over its preferred approach. First, not having television broadcast stations operating between the uplink and downlink bands results in a much smaller duplex gap. This would result in a much smaller antenna bandwidth and, therefore, a simplified antenna design. Under the NPRM's preferred approach, it would be difficult to achieve 100-150 MHz antenna bandwidth at this frequency range in a smartphone form factor that provides good radiation efficiency (as frequency decreases, so too does radio efficiency given the same size of device and antenna). The same would be true for antenna decorrelation, which is important for multiple-input, multiple-output ("MIMO") technology required by Long Term Evolution ("LTE") standards.<sup>22</sup>

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<sup>20</sup> *Id.*

<sup>21</sup> *See e.g.*, NPRM at ¶ 123 ("the forward auction's interdependence with the reverse auction and the repacking mean that we will not know in advance the amount of spectrum we can make available in the forward auction, the specific frequencies that will be available and, perhaps, the geographic locations of such frequencies").

<sup>22</sup> Antenna correlation is a measure of similarity of receive channels. To realize the throughput increases allowed by MIMO technology, each input path must be decorrelated from

Second, by removing the television broadcast operations from the spectrum between the uplink and downlink bands, the alternative proposal would eliminate the source of intermodulation products that would otherwise fall into the downlink receive band and therefore interfere with wireless broadband devices. For example, under the NPRM's preferred approach, television broadcast stations operating on channels 38 and 40 would produce intermodulation products at 605 MHz that would be captured by mobile device receivers. Similarly, reverse intermodulation products would be generated by mixing television transmissions and mobile device transmit signals (*e.g.* handsets transmitting at 685.5 MHz would mix with TV channel 42 signals centered at 641 MHz to create inband intermodulation products at 596.5 MHz). These intermodulation products would negatively impact the wireless service because they would occur on-channel and cannot be filtered at the handset. The NPRM's alternative band plan does not create these interference scenarios.

Creating symmetrically sized, paired spectrum blocks for licensed wireless services will simplify the forward auction process. The new band plan, with defined uplink and downlink frequencies, should apply across the entire country regardless of whether some markets are not fully cleared. Under this approach, only one new 3GPP band would need to be profiled, and, the channels eventually could all be cleared. The Commission should not allow frequencies to be used for either uplink or downlink as this would also create new interference scenarios. The continued existence of television broadcast stations on nearby frequencies already provides a complicated operating environment. Allowing the use of Time Division Duplex wireless technology would create even more challenges for manufacturers and operators alike.

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*(footnote cont'd.)*

each other input path. As correlation between these antennas increases, the MIMO throughput gain decreases.

Under the NPRM’s preferred approach, repacked broadcast stations would be permitted to operate within the duplex gap. If that proposal is adopted, the size of the duplex gap would be dependent on the number of broadcast facilities that would be permitted to continue operations within that spectrum plus necessary guard bands. One of the strong advantages of the NPRM’s alternative band plan proposal that avoids placing broadcast facilities within the gap is that the size of the gap would be based solely on what is technically reasonable to prevent intra-service interference to wireless handsets – an outcome consistent with the Spectrum Act.<sup>23</sup> In this regard, current 3GPP specifications for LTE frequency bands under 1 GHz provide for duplex gaps of varying sizes ranging from 10 MHz to 30 MHz, with an average separation of approximately 19 MHz between the base transmit and base receive bands for Frequency Division Duplex (“FDD”) networks.<sup>24</sup>

It is important, however, that the Commission establish a fixed-sized duplex gap and avoid crafting the forward auction in a manner that would enable variably sized duplex gaps in different regions of the country. This would create significant challenges for equipment and chip-set design and negatively affect nationwide interoperability in the band. It is equally important that the Commission permit unlicensed use in the duplex gap, whatever its size and configuration.

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<sup>23</sup> Pub. L. No. 112-96, § 6407(b) (“Such guard bands shall be no larger than is technically reasonable to prevent harmful interference between licensed services outside the guard bands”).

<sup>24</sup> See 3GPP, TS 36.101 “User Equipment (UE) Radio Transmission and Reception,” Release 11, V11.2.0, September 2012 at p. 20. This average separation calculation does not include Band 6, which the 3GPP specifications indicate should not be used. Furthermore, the duplex gap value for certain bands may be impacted by factors other than the availability of cost-effective, production-quality RF technology. Nonetheless, duplex gap values in other LTE bands may be instructive in the Commission’s establishment of a technically reasonable duplex gap in this proceeding.

From a spectrum engineering perspective, it would be highly preferable for the radio astronomy and medical device allocation to be removed from TV channel 37. These services will find the operating environment far more severe as they become sandwiched between advanced mobile networks and high-powered broadcast facilities. If the Commission is able to find a replacement spectrum home for these services, the additional spectrum could be utilized as additional downlink spectrum. The Commission's primary emphasis must be in establishing a fixed allocation for the downlink that is cleared of all broadcast stations nationwide. If even a handful of broadcast stations continue to transmit in the downlink, all wireless handsets operating on this spectrum will need filters to protect against the high-powered transmissions caused by these legacy broadcast stations.

The NPRM seeks comment on the size of the pass band (essentially, the bandwidth of the entire downlink sub-block), noting that this parameter typically reaches 4-6 percent of the pass band center frequency. Motorola Mobility recommends that the Commission should set the maximum around 4 percent for FDD deployment, consistent with 3GPP standards.<sup>25</sup> If the ratio exceeds this limit, a split band (dual duplexer) implementation may be required, which will increase the design complexity as well as device costs.

A critical component of the 600 MHz band plan will be the establishment of guard bands between the licensed uplink and downlink bands and adjacent high powered television broadcast stations. The 6 MHz guard bands proposed by the FCC might be insufficient given the performance limitations of today's filters.<sup>26</sup> Wider guard bands would better mitigate interference from TV broadcast into mobile broadband downlink spectrum (interference into

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<sup>25</sup> See *id.* at ¶ 169.

<sup>26</sup> See *id.* at ¶¶ 156, 158.

mobile device receivers). This point was underscored by comments submitted in the Commission's *Lower 700 MHz Interoperability* proceeding.<sup>27</sup> There, Motorola Mobility discussed the impact of receiver desensitization when operating near a high powered television transmitter and estimated that, with existing commercially available components, mobile devices operating with the benefit of a 6 MHz guard band would still suffer reduced sensitivity when located between 770 meters (best case) to 3.9 kilometers (worst case) of a Channel 51 television transmitter.<sup>28</sup> Having guard bands wider than 6 MHz, preferably around 10 MHz, would help mitigate this source of incompatibility and interference.

Motorola Mobility supports the Commission's proposal to establish 5 MHz "building blocks" that can be aggregated by licensees to form larger blocks in 5 MHz multiples. As the Commission explains, 5 MHz blocks will align with a variety of wireless broadband technologies, including Wideband-Code Division Multiple Access (W-CDMA), High Speed Packet Access (HSPA), and perhaps most importantly LTE (when 5 MHz blocks are aggregated to form 2x10 blocks). The spectrum remaining from creating 5 MHz blocks out of existing 6 MHz television channels should be added to the guard band to provide further protection to advanced wireless services from high powered broadcast facilities.

Finally, the Commission should modify the Table of Allocations and allocate all broadcast television spectrum to fixed and mobile services on a co-primary basis, including TV

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<sup>27</sup> *Promoting Interoperability in the 700 MHz Commercial Spectrum*, WT Docket No. 12-69, Notice of Proposed Rulemaking, FCC 12-31 (rel. Mar. 21, 2012).

<sup>28</sup> Comments of Motorola Mobility, Inc., WT Docket No. 12-69, at 3 (filed June 1, 2012).

channel 37.<sup>29</sup> This will provide maximum flexibility in planning for the future assignment of a portion of the UHF band for new broadband services.

**V. THE COMMISSION SHOULD ADOPT ITS PROPOSALS TO PROMOTE UNLICENSED SPECTRUM AND SHOULD REFRAIN FROM IMPOSING OVERLY PROTECTIVE TECHNICAL STANDARDS THAT HAMPER UNLICENSED USE.**

The National Broadband Plan emphasizes the importance of freeing up new contiguous spectrum for unlicensed use.<sup>30</sup> Specifically, it explains that making a “sufficient portion [of spectrum] available for use exclusively or predominantly by unlicensed devices” will “enable innovators to try new ideas to increase spectrum access and efficiency through unlicensed means, and should enable new unlicensed providers to serve rural and unserved communities.”<sup>31</sup> In the NPRM, the Commission proposes measures that, taken together, would make additional spectrum available for unlicensed uses, including on a uniform nationwide basis.<sup>32</sup> In particular, the Commission proposes to make available for unlicensed use the guard band spectrum in the proposed 600 MHz band plan, the channel 37 spectrum, and two channels currently designated

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<sup>29</sup> As discussed above, the Commission should make every effort to relocate the radio astronomy and wireless medical telemetry services from TV channel 37. A more intensively used UHF-TV band will not be a compatible home for these very low power services.

<sup>30</sup> See National Broadband Plan at p. 94.

<sup>31</sup> *Id.* The Commission noted that such an “approach would represent a departure from the way the FCC has treated most unlicensed operations in the past. Unlicensed operations are typically overlays to licensed bands, with intensive unlicensed use emerging in some bands (e.g., the 2.4 GHz band) over a long period of time.” *Id.*

<sup>32</sup> NPRM at ¶ 232. The proposals in the NPRM could not come at a better time. As the NPRM explains, demand for unlicensed “services and applications continues to grow,” already “exceeding the capacity of existing spectrum in high-demand areas.” *Id.* at ¶ 229.

for wireless microphones (which would become available for white space devices).<sup>33</sup> Motorola Mobility strongly supports these proposals.

As explained above, unlicensed services already are an important part of this nation's communications capabilities, serving to augment the operations of licensed services and to meet the growing needs of a wide variety of wireless applications. Because the support of unlicensed operation by a device is relatively inexpensive, can operate out-of-the box without a license, and offers access to innovative applications that meet various market demands, these services are increasingly popular and economically important for all sectors of the economy. As the Commission explains, these devices "contribute to our economy not only through the sales of unlicensed products themselves, but also through collateral commercial activities that they facilitate."<sup>34</sup> In recent years, unlicensed devices have become an essential component for providing Wi-Fi systems, which offer short-range broadband connectivity solutions for broadband providers, businesses, educational institutions, and consumers.<sup>35</sup> In fact, as noted above, the overall economic benefits of unlicensed devices are in the tens of billions of dollars, if not more. Making additional spectrum available for unlicensed services will lead to enhanced

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<sup>33</sup> In addition, the Commission notes that the television white spaces will continue to be available for unlicensed use in the repacked television band.

<sup>34</sup> NPRM at ¶ 228.

<sup>35</sup> A recent study by Strategy Analytics indicates that 61 percent of households in the United States and 25 percent of households world-wide now have installed Wi-Fi networks. This growth has followed the development of broadband unlicensed industry standards such as the IEEE 802.11 family (which includes Wi-Fi™), IEEE 802.15 Bluetooth®, and IEEE 802.15 ZigBee® that have greatly expanded the number and variety of devices that operate in the 2.4 GHz and 5 GHz industrial, scientific and medical equipment (ISM) bands. These standards have enabled the introduction of a host of new wireless Internet products as well as wireless computer peripherals such as printers, keyboards, wireless headsets and network connections for wireless service devices.

economic and consumer benefits, including greater broadband innovation and increased access for broadband services.

Moreover, that ecosystem of unlicensed broadband devices and networks and applications is already available. Once the Commission adopts the spectrum band plan, innovators large and small quickly can take steps to make full use of the spectrum. By contrast, even with a swift and successful set of reverse and forward auctions, and a timely clearing and construction process, it will be some years before the nation can begin to enjoy the benefits of licensed uses of the broadcast spectrum. So the unlicensed bands will provide more near-term benefits, including the introduction of innovative new business models and network topologies, which wireless providers utilizing licensed bands will be able to adopt and amplify further down the road. As with the carriers' ability to offload enormous amounts of data traffic, and the proliferation of multiple-banded devices, the timing of the use of the licensed and unlicensed bands also is highly complementary.<sup>36</sup>

To protect incumbent broadcast facilities and adjacent band licensed broadband devices and receivers, it is appropriate that new unlicensed services and devices meet reasonable technical standards—power, antenna height and out-of-band emission (“OOBE”) limits—and

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<sup>36</sup> Indeed, the Commission should consider policies that allow carriers and others to make unlicensed use of broadcast spectrum that is recovered through incentive auctions prior to the deployment of new licensed wireless services. Once the auctions are concluded and broadcasters repacked, it could be a number of years before the auction winners complete their network build-out and licensed equipment is available for deployment. Rather than having this spectrum lay fallow and unproductive in the interim period, the spectrum could be added to the pool available for carriers and others to deploy and test various unlicensed devices. This would create more immediate opportunities to use this spectrum for advanced wireless services, including offloading data traffic. Geolocation database techniques would ensure that all primary operations are adequately protected and that the frequencies are removed immediately from unlicensed service once the auction winners inform the Commission that the band is ready to be cleared.

geolocation frequency avoidance techniques. However, in protecting licensed broadband receivers and devices from harmful interference, the Commission must avoid hamstringing the unlicensed device market by establishing unnecessary technical standards that would limit the functionality of devices or impose exorbitant costs. For example, the Commission should revisit its existing 100 mW power limit for personal portable devices (40 mW power limit when operating on channels adjacent to TV broadcast facilities). The Commission also should revise the OOB limits for TV white space devices. The current, conservative OOB limits increase the costs of developing and manufacturing TV white space devices, particularly for consumer applications. By contrast, relaxing these OOB limits would speed deployment of unlicensed products and services while still protecting incumbent and adjacent operations.

## VI. CONCLUSION

The NPRM—which includes proposals to conduct a voluntary incentive auction and to make additional spectrum available for unlicensed use—is a key first step towards fulfilling Congress’s vision of repurposing broadcast spectrum for wireless services. By implementing the NPRM’s proposals with Motorola Mobility’s suggested modifications, the Commission will help ensure continued innovation and competition in the wireless marketplace. The Commission must not, however, rest on its laurels after completing this proceeding. The demand for spectrum will only increase over time, and the FCC must continue to pursue other opportunities for freeing up spectrum for wireless broadband.

Respectfully submitted,  
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