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

In the Matter of	)	
	)	
Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions	)	GN Docket No. 12-268

COMMENTS OF CTIA – THE WIRELESS ASSOCIATION®

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I. INTRODUCTION AND SUMMARY

CTIA – The Wireless Association® ("CTIA")[1] hereby submits these comments in response to the Commission's Notice of Proposed Rulemaking ("*NPRM*") seeking comment on various issues related to its first-in-the-world proposed incentive auction to enable the deployment of additional spectrum for mobile broadband services.[2] This proceeding is critical to the future of wireless innovation, as the spectrum crisis facing the wireless industry continues to grow. As the Commission observed in the NPRM, "the United States leads the world in wireless infrastructure and innovation."[3] The U.S. is the first country to have 4G LTE networks at scale, "our mobile applications economy is the envy of the world,"[4] we are the home of the companies that created the leading operating systems, and countless handsets and tablets are launched first in the United States. Yet for the U.S. to maintain its global leadership in the mobile ecosystem,

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1 CTIA – The Wireless Association® is the international organization of the wireless communications industry for both wireless carriers and manufacturers. Membership in the organization includes Commercial Mobile Radio Service ("CMRS") providers and manufacturers, including cellular, Advanced Wireless Service, 700 MHz, broadband PCS, and ESMR, as well as providers and manufacturers of wireless data services and products.

2 *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Notice of Proposed Rulemaking, FCC 12-118 (Sept. 28, 2012) ("*NPRM*").

3 *NPRM* at ¶ 1.

4 *Id.*

the Commission must bring to market additional spectrum – and do so quickly. A successful incentive auction will go a long way toward fulfilling that goal.

CTIA applauds the Commission for undertaking this proceeding, and the well thought out *NPRM* is an important first step toward alleviating the looming spectrum crisis that CTIA has warned policymakers about for the last three years. However, there is much work to be done. CTIA is pleased to offer comment on all aspects of the incentive auctions process, and urges the Commission to adopt policies that promote the auction's success as a partial solution to the spectrum crunch, a once-in-a-lifetime financial opportunity for broadcasters, a source of funding for public safety and the Treasury, and a continuation of the benefits of wireless broadband for consumers, businesses, schools, hospitals, and the U.S. economy. For this to occur, the Commission should focus on five key principles.

First, there is a great and demonstrated need for exclusively licensed, flexible use spectrum for commercial mobile services. By any metric, wireless mobile usage in the United States is skyrocketing and is expected to outpace the supply of available spectrum in the near- to mid-term. While certain innovations such as Wi-Fi offloading or small cell technologies can help make the most of this scarce resource, there is no substitute for licensed, exclusive-use spectrum with flexible service rules to deliver on the incredible benefits of mobile broadband. This regime has fostered innovation and investment in wireless networks and promoted competition. Indeed, the Commission has credited existing exclusive, flexible-use bands as being the most intensively used spectrum and as serving as a "runway" for the launch of innovative services.[5] In developing rules for the incentive auction, the Commission should make the provision of new licensed spectrum its top priority.

[5] Federal Communications Commission, CONNECTING AMERICA: NATIONAL BROADBAND PLAN at 84 (2010) ("National Broadband Plan") ("In the bands below 3.7 GHz, 547 megahertz is

Second, the Commission should develop a band plan that maximizes the amount of licensed spectrum made available without inhibiting or interfering with existing systems. The current analysis suggests that the band plan ultimately chosen by the Commission should maximize the amount of paired, licensed spectrum made available, avoid interference among licensed services, and be flexible enough to accommodate varying amounts and configurations of spectrum relinquished through the incentive auction process. While industry continues to analyze the optimal parameters of the overarching band plan, CTIA provides for the Commission's consideration a number of principles that should be considered in any final band plan.

Third, in accordance with the Spectrum Act, which states that "guard bands shall be no larger than is technically reasonable to prevent harmful interference between licensed services outside the guard bands,"[6] spectrum in the guard bands should be identified for unlicensed use, to the extent technically feasible. As the Commission and others have noted, unlicensed services have played an important role in the provision of wireless broadband service. Enabling unlicensed operation in guard bands will help to make productive use of otherwise unused spectrum.

Fourth, the Commission must adopt transparent processes for both the reverse and forward auction that minimize the complexity borne by participants in either auction. This

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currently licensed as flexible use spectrum that can be used for mobile broadband. Of this amount, the Cellular and PCS bands compose 170 megahertz and represent the most intensively used spectrum today. The majority of the remaining 377 megahertz was auctioned or rebanded within the past six years and is just now coming online for mobile broadband deployment. This latter portion brought more than a three-fold total increase in total spectrum for mobile services and provides a 'runway' for the launch of next-generation mobile broadband services.").

[6] Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6407(b), 126 Stat. 156 (2012) (Spectrum Act).

auction is without precedent, and its successful completion will require careful attention. The Commission can encourage maximum involvement by providing interested parties with as much clarity as possible regarding the auction process, and by making participation as simple as possible.

Fifth, the Commission needs to provide bidders in the forward auction with as much information as possible regarding the spectrum available. Unlike in a traditional spectrum auction, the Commission has proposed that bidders in the forward auction may be bidding on "generic" blocks without certainty as to the specific characteristics of its potential license. While CTIA recognizes the difficulty of making specific information available to forward auction bidders in a timely fashion, CTIA believes it is critical that the Commission provide bidders with as much information as possible, as bidders are more likely to make significant investments when they possess greater information.

Incentive auctions represent a historic opportunity for the Commission, the wireless industry, and the U.S. citizens and businesses that depend upon wireless broadband every day. It is essential that the Commission craft rules that make the most of this potential chance to repurpose significant amounts of new, nationwide spectrum. By adopting a carefully crafted band plan and by enacting rules that encourage all parties to participate, the Commission will ensure that the wireless industry is enabled to continue its unfettered path of innovation and investment, to the great benefit of American consumers and the U.S. economy.

II. INCENTIVE AUCTIONS WILL HELP TO ADDRESS THE REAL AND GROWING SPECTRUM CRISIS FACED BY THE WIRELESS INDUSTRY.

A. Adoption and Usage of Mobile Broadband Networks Continue to Grow at Staggering Rates.

As the Commission correctly observed in the *NPRM*, "usage of [America's] wireless networks is skyrocketing, dramatically increasing demands on both licensed and unlicensed

spectrum—the invisible infrastructure on which all wireless networks depend."[7] A perfect example is the tablet. This category of devices did not exist when CTIA identified "a looming spectrum crisis" several years ago. Now many of these tablets come equipped with CMRS and Wi-Fi capability, dramatically increasing wireless usage across both platforms. In addition, CMRS networks have seen an explosion of uses for "vertical" sectors of our economy: mHealth, mobile education, intelligent transportation, smart grid, inventory control, traffic management and more.[8] As a result, "[o]ur country faces a major challenge to ensure that the speed, capacity, and accessibility of our wireless networks keeps pace with these demands in the years ahead, so the networks can support the critical economic, public safety, health care, and other activities that increasingly rely on them."[9] Incentive auctions, and the additional mobile broadband spectrum they will create, will play a vital role in addressing the current spectrum crunch.

Over the past several years, America's wireless companies have made significant investments in next-generation networks that enable a variety of innovative mobile broadband services. The first Long Term Evolution ("LTE") networks were deployed in the United States in 2010, and the growth of these and other advanced generation wireless networks means "that what was once considered only in the realm of desktop computers – or someone's imagination – is now seamlessly mobile."[10] While these services carry with them significant benefits, the result

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7 *NPRM* at ¶ 1.

8 *See, e.g.*, Letter from Christopher Guttman-McCabe, CTIA – The Wireless Association, to Marlene H. Dortch, FCC, GN Docket Nos. 12-268, 09-51; WT Docket No. 11-186 (Jan. 22, 2013) (including links and QR codes to several CTIA videos, each focused on a subject area benefiting from wireless innovation).

9 *Id.*

10 Verizon Wireless, In Two Years 4G LTE Has Changed the Mobile Lifestyle (Dec. 5, 2012), *available at* http://news.verizonwireless.com/news/2012/12/verizon-wireless-4G-LTE-two-year-anniversary.html.

has been dramatically increased strain on network resources and spectrum in particular. This is because as network speeds increase and innovators develop increasingly advanced devices and applications, the result is greater data consumption by end users.[11]

By any metric, wireless broadband usage in the United States is exploding in popularity. CTIA's recent Semi-Annual Survey revealed that reported wireless traffic in the first half of 2012 totaled 633 billion megabytes (MB), an increase from 526 billion MB in the second half of 2011 and 341 billion MB in the first half of 2011.[12] These findings by CTIA bear out the numerous expert projections regarding mobile data traffic.

- Cisco's Visual Networking Index ("VNI") projects wireless data traffic in 2016 will be 16 times the volume of traffic in 2011, and 100 times the volume of traffic in 2009.[13] This projection involves traffic on licensed spectrum alone, taking into account the off-load of other wireless traffic onto unlicensed spectrum. Thus, Cisco's VNI projections demonstrate the pressure solely on licensed spectrum.[14]

- Nokia Siemens Networks has estimated that by the year 2020, wireless customers globally will be using 1 gigabyte (GB) of data per day.[15]

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[11] In 2011, a 4G connection generated 28 times more traffic on average than a non-4G connection, an ominous statistic in light of the various 4G deployments in progress by carriers throughout the country and the rapid 4G adoption by these carriers' customers. Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011-2016 at 2 (Feb. 14, 2012), *available at* http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf ("2012 Cisco Report").

[12] CTIA Semi-Annual Wireless Survey, *at* http://files.ctia.org/pdf/CTIA_Survey_MY_2012_Graphics-_final.pdf.

[13] *See* VNI Mobile Forecast Highlights, 2011-2016, *at* http://www.cisco.com/web/solutions/sp/vni/vni_mobile_forecast_highlights/index.html#~Country.

[14] *See* Cisco, *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011-2016*, at 12-13 (Feb. 14, 2012) (discussing offload of traffic by dual-mode smartphone owners with Wi-Fi fixed internet access at home). *See also* Cisco, *Cisco Visual Networking Index: Forecast and Methodology, 2011-2016*, at 5 (May 30, 2012) ("The portion of mobile data traffic that has migrated from the fixed network is subtracted from the fixed forecast, and the amount of mobile data traffic offloaded onto the fixed network through dual-mode devices and femtocells is added back to the fixed forecast.").

[15] Sue Marek, "Mobile Broadband Usage Is Skyrocketing-and So Are the Number of Projections," FIERCEWIRELESS (Feb. 27, 2012), *available at*

- Alcatel-Lucent, meanwhile, has predicted 87 times growth of daily traffic on wireless networks in five years.[16] The company expects that 50 percent of that traffic will be on cellular networks, while the remaining 50 percent will be offloaded to Wi-Fi.[17]

- Ericsson data show that, worldwide, mobile data traffic doubled between the third quarter of 2011 and the third quarter of 2012.[18] In addition, Ericsson predicts that mobile data traffic will grow by 12 times between 2012 and 2018.[19]

A major reason why wireless networks have experienced such strain is that consumers increasingly use smartphones, tablets, and other mobile devices to access the Internet, as opposed to personal computers. Recent research has revealed that one-fifth of U.S. homes are now tablet owners, with a smartphone adoption rate of 50 percent.[20] And these devices are increasingly being used in the home as well as while mobile – 85 percent of mobile users use their tablet or smartphone while watching TV at least once per month, with 40 percent doing so daily.[21] With this sharp increase in mobile device adoption and usage, mobile devices are on pace to

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http://www.fiercewireless.com/story/mobile-broadband-usage-skyrocketing-and-so-are-number-projections/2012-02-27.

16 *Id.*

17 *Id.*

18 Press Release, Ericsson, "Ericsson Mobility Report Shows Rapid Smartphone Uptake and Doubling of Mobile Data Traffic" (Nov. 21, 2012), *available at* http://www.ericsson.com/news/1659597.

19 *Id.*

20 http://techcrunch.com/2012/12/05/nielsen-85-percent-of-tablet-and-smartphone-owners-use-devices-as-second-screen-monthly-40-percent-do-so-daily/.

21 *Id.*

outnumber PCs. Forrester's research shows that the global penetration of mobile Internet users will exceed that of PC-based Internet users in 2016.[22]

Given the numerous indicators and projections regarding mobile data usage, the allocation of additional spectrum for wireless broadband is necessary to continue the benefits of mobile broadband growth. Moreover, history has shown that projections regarding mobile Internet data traffic usually lag behind actual usage. For example, Cisco originally predicted in its Visual Networking Index that in 2011, global mobile data traffic would grow by 131 percent.[23] Instead, global mobile data traffic grew by 133 percent, in spite of global economic uncertainties and an increase in the amount of mobile data traffic offloaded to the fixed network.[24] Therefore, the spectrum crunch is likely more dire than even the startling statistics on mobile data usage suggest, and the Commission must take rapid action to make more spectrum available for mobile broadband services.

"Given the numerous indicators and projections regarding mobile data usage, the allocation of additional spectrum for wireless broadband is necessary to continue the benefits of mobile broadband growth. Moreover, history has shown that projections regarding mobile Internet data traffic usually lag behind actual usage."

B. The Commission Must Allocate and Deploy Additional Licensed Mobile Broadband Spectrum.

In the absence of newly-licensed mobile broadband spectrum, America's wireless companies have worked tirelessly to increase their spectral efficiency and manage the

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22 Forrester, "Mobile Internet Users Will Soon Surpass PC Internet Users Globally" (Feb. 21, 2012), *available at* http://blogs.forrester.com/susan_huynh/12-02-21-mobile_internet_users_will_soon_surpass_pc_internet_users_globally.

23 Cisco, *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011-2016*, at 4 (Feb. 14, 2012).

24 *Id.*

burgeoning traffic on their networks. While these steps have helped to manage congestion and improve the end user experience, they are no substitute for additional licensed mobile broadband spectrum and it is imperative that the Commission take actions such as the proposed incentive auction that will make new spectrum available for mobile broadband.

Wireless providers are implementing new, more spectrally efficient technologies in response to the demand for greater mobile broadband capacity and the looming shortage of available licensed mobile broadband spectrum. However, technology alone will not resolve the critical need for more spectrum for the bandwidth-intensive data services that consumers are demanding. As noted above, many wireless carriers have begun to upgrade networks and deploy advanced networks based on technologies such as LTE, HSPA+, and WiMax, which provide users with higher speeds and lower latency. Providers are also using "small cell" technologies including heterogeneous networks ("het-nets"), femtocells, distributed antenna systems ("DAS"), and Wi-Fi offloading to improve network coverage and increase capacity for voice and data traffic. Femtocells are used to expand coverage in localized areas such as homes and other buildings, DAS increase network capacity in localized areas, and Wi-Fi technology is used to offload traffic in user dense locations.[25]

"[T]echnology alone will not resolve the critical need for more spectrum for the bandwidth-intensive data services that consumers are demanding."

Innovative manufacturers have also worked to develop efficient mobile technology. For example, Alcatel-Lucent developed the LightRadio™ wireless network offering spectral and

[25] *See, e.g.*, 4g Americas, *Optimizing the Mobile Application Ecosystem* at 8-9 (2011), *available at* http://www.4gamericas.org/documents/Optimizing%20Mobile%20Application%20Ecosystem%2004.24.11.pdf; 4G Americas, *Mobile Broadband Acceleration in the Americas* at 44-46 (2012), *available at* http://www.4gamericas.org/documents/Broadband%20Acceleration%20in%20the%20Americas-English%20Dec%2012%202012.pdf.

economic efficiency by providing coverage in any location and reducing the total cost of ownership of networks through footprint reduction.[26] Nokia Siemens Networks has developed the Flexi Zone, which is engineered to offload traffic from the macro network to an underlay network, enabling operators to provide a "remarkably rich user experience while offloading unwanted data traffic from their macro and core networks."[27] Qualcomm has developed a "cellular base station smaller than most of today's smartphones" that help to offload data traffic from large cell towers.[28] Such innovative technologies are being deployed and/or investigated by the wireless industry to further bolster their networks in the face of sharply increasing demand.

While Wi-Fi offloading and technologies such as small cells and cell splitting can help address the burgeoning growth of mobile data usage, these technologies alone are not sufficient to address the spectrum crisis. Indeed, when the Commission initially developed its forecast that the broadband spectrum deficit was likely to approach 300 MHz by 2014, the Commission took into account the fact that wireless providers would increase the density of their networks through cell site growth and improvements in technology resulting in increased spectral efficiency.[29] Further, the Commission acknowledged that while 4G technologies have increased spectral efficiency relative to prior generation air interface standards, such gains are likely to become

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[26] Alcatel-Lucent LightRadio, http://www.alcatel-lucent.com/lightradio/.

[27] Nokia Siemens Networks, Flexi Zone, http://www.nokiasiemensnetworks.com/portfolio/solutions/heterogeneous-networks/flexi-zone.

[28] Mike Freeman, "How Qualcomm Wants to Speed Up Your Network," San Diego Union-Tribune (Dec. 12, 2012), *available at* http://www.utsandiego.com/news/2012/dec/12/qualcomm-eyes-cellular-base-stations-homes/.

[29] Federal Communications Commission Omnibus Broadband Initiative, *Mobile Broadband: The Benefits of Additional Spectrum* at 8 (2010).

smaller in the future.[30] In developing this forecast, the Commission repeatedly stressed that its estimate was conservative,[31] finding that "[t]o the extent that this forecast is different than actual use in the future, it is more likely to underestimate future spectrum need than to overestimate it."[32] Given that the market for wireless tablets was much smaller at the time of the 2010 OBI Technical paper, this is likely the case.

For this reason, and as the Commission has acknowledged repeatedly, the allocation and deployment of licensed mobile broadband spectrum must occur for customers to continue enjoying the benefits of mobile broadband. The incentive auctions proposed by the Commission in this proceeding will play a vital role in addressing the spectrum crunch.

C. To The Extent Technically Feasible, and In Compliance With the Spectrum Act, Spectrum Should be Identified for Unlicensed Use in the Guard Bands.

The Spectrum Act stipulates that, "guard bands shall be no larger than is technically reasonable to prevent harmful interference between licensed services outside the guard bands,"[33] and that "[t]he Commission may permit the use of such guard bands for unlicensed use."[34] For the Commission to meet these obligations, it must develop an effective band plan and service rules for the 600 MHz band. In so doing, the Commission will make new unlicensed spectrum available while ensuring that new entrants have access to the most spectrum possible, while safeguarding broadcast incumbents and adjacent band licensees.

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30 *Id.* at 14.

31 *Id.* at 6.

32 *Id.* at 16.

33 Spectrum Act at § 6407 (b).

34 Spectrum Act at § 6407 (c).

D. The Spectrum Act Provides Clear Guidance to the Commission.

When Congress first passed the Spectrum Act, CTIA hailed the event as "a legislative landmark with the potential to reshape mobile broadband and create vast benefits for the American public."[35] It also created vast opportunities and responsibilities for the Commission. As the Commission commences this proceeding, CTIA cautions the Commission of the critical elements of the legislation it must adhere to if it is to lead a successful voluntary incentive auction.

First, CTIA reminds the Commission that Congress has hinged several important policy objectives on the success of the incentive auction. Section 6402 of the Spectrum Act stipulates that proceeds from the incentive auction shall fund the $1,750,000,000 TV Broadcaster Relocation Fund and the Public Safety Trust Fund.[36] Further, for the forward auction to proceed, the amount of the proceeds must be greater than the amount of the proceeds shared with each broadcast licensee in the reverse auction.[37] The Commission can best ensure that the incentive auction raises the necessary revenue by developing an auction framework that maximizes participation by both

"The Commission can best ensure that the incentive auction raises the necessary revenue by developing an auction framework that maximizes participation by both broadcast licensees and potential wireless licensee bidders. This can be achieved through the adoption of transparent processes in both the reverse and forward auction, sufficient information for bidders, and policies that enable participation by as many participants as possible."

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35 Letter from Steve Largent, President and CEO, CTIA – The Wireless Association® to FCC Chairman Julius Genachowski et al. (March 22, 2012), *available at* http://files.ctia.org/pdf/CTIA_Letter_to_FCC_Regarding_Implementation_of_Spectrum_Legislation_FINAL_signature.pdf.

36 Spectrum Act at § 6402.

37 Spectrum Act at § 6403(c).

broadcast licensees and potential wireless licensee bidders. This can be achieved through the adoption of transparent processes in both the reverse and forward auction, sufficient information for bidders, and policies that enable participation by as many participants as possible. Further, maximizing the amount of licensed spectrum made available will result in a more successful forward auction.[38]

Second, the Commission may not complete more than one reverse auction of television broadcast spectrum or repacking of broadcast television licensees under Section 6403.[39] While the Spectrum Act also conferred upon the Commission more general incentive auction authority, the Commission only has one opportunity under Section 6403 to conduct a reverse auction or repacking. Without a doubt, this incentive auction and television repacking is a complicated undertaking, and CTIA appreciates the Commission's recognition that the "novelty and uniqueness of this auction require that all interested parties thoroughly digest and analyze the complex set of issues presented in order to ensure that the auction has the best chance for success."[40] For the Commission to meet its duties under the Spectrum Act, it must make the most of this limited opportunity by developing auction rules that will ensure success.

The passage of the Spectrum Act "was a resounding victory for consumers and the American economy. Making spectrum available will make it possible for America's wireless carriers to offer consumers better, faster, more ubiquitous wireless broadband service. The

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38 CTIA notes that the Commission can work to maximize the amount of licensed spectrum repurposed from broadcasters while still creating "technically reasonable" guard bands that likely can be utilized for unlicensed use.

39 Spectrum Act at § 6403(e).

40 Motion for Extension of Time of CTIA – The Wireless Association and the National Association of Broadcasters, GN Docket No. 12-268 at 2 (filed Nov. 20, 2012); *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Order, DA 12-1916 (Nov. 29, 2012).

release of additional spectrum also will spur the investment and job creation that our economy needs."[41] As the Commission defines its framework for incentive auctions, it must adhere closely to its legislative mandate and, in so doing, will achieve the key principles highlighted by CTIA and others as key to the continuation of the successful mobile broadband ecosystem.

III. THE COMMISSION SHOULD CREATE A BAND PLAN AND FORWARD AUCTION FRAMEWORK THAT MAXIMIZE THE ABILITY OF BIDDERS TO MAKE FORWARD AUCTION DECISIONS.

As the Commission correctly observed in the *NPRM*, the forward auction it will conduct is quite unlike other competitive bidding systems that the Commission has used.[42] 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."[43] This obviously creates great complexities for band planning and competitive bidding. However, for the incentive auction to be successful and to meet the requirements of the Spectrum Act, the Commission must adopt rules that maximize the ability of potential forward auction bidders to make decisions regarding the spectrum made available.

To achieve this important goal, CTIA supports a forward auction design that gives potential bidders as much information and certainty as possible, as this will drive investment and ensure the ultimate success of the incentive auction. CTIA also supports the allocation of 600 MHz spectrum for flexible use by fixed and mobile services. The Commission should adopt a robust and logical band plan for the 600 MHz spectrum that maximizes the amount of licensed

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41 Steve Largent, CTIA Statement of the Passage of the Middle Class Tax Relief and Job Creation Act (Feb. 17, 2012), *available at* http://blog.ctia.org/2012/02/17/ctia-statement-on-the-passage-of-the-temporary-payroll-tax-cut-continuation-act-of-2011/

42 *NPRM* at ¶ 8.

43 *Id.*

spectrum made available, identifies spectrum in the guard bands for unlicensed use to the extent technically feasible, and avoids interference to and from licensed wireless services and adjacent incumbent licensees. Finally, the Commission should adopt technical rules for the 600 MHz spectrum that prevent interference.

A. The Commission's Forward Auction Design Must Ensure Maximum Participation by Providing Bidders as Much Information and Certainty as Possible.

As the Commission noted in the *NPRM*, "[t]he forward auction piece of the broadcast television spectrum incentive auction will differ from the typical spectrum license spectrum auction," as "[t]he licenses available in the forward auction will depend on how much spectrum the reverse auction clears in specific geographic areas."[44] This necessarily requires a close examination of forward auction design to determine how best to provide clarity and certainty to bidders. CTIA stresses that to achieve maximum participation in the forward auction, the Commission must design its forward auction to be as transparent as possible.

In the *NPRM*, the Commission has proposed to auction spectrum in the forward auction in "generic" categories of licenses, rather than by accepting bids for specific blocks.[45] Under this system, bidders would indicate their interest in one or more 5 x 5 megahertz ("MHz") paired blocks of spectrum, without specifying a specific frequency block in an area.[46] CTIA recognizes the unique challenges posed by an auction of this type and is supportive of the Commission's concept of generic blocks, as CTIA believes that a significant structural problem with the 700 MHz auction design was that none of the bands were fungible. So while CTIA supports the

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44 *NPRM* at ¶ 54.

45 *Id.* at ¶ 56.

46 *Id.*

concept of generic blocks, the Commission must carefully study this issue to make sure that offered "generic" licenses are truly fungible. There are many technical and practical issues related to the fungibility of spectrum. These factors include the allowed transmit power, the propagation characteristics at different frequencies, the interference features of spectrum (including issues associated with interference from cross-border licensees in Canada and Mexico), the capabilities of communicating devices, and the application needs, as they all influence the communication capabilities of wireless networks. While the Commission states that it could assign contiguous blocks to bidders that bid for multiple blocks in the same geographic area, the Commission does not provide much information on how other licensee-specific needs could be facilitated through such "generic" bidding.[47]

For this reason, CTIA strongly supports the creation of a spectrum band plan that offers potential bidders as much certainty as possible. When bidding on a "generic" license, a bidder must not end up acquiring spectrum that is more encumbered and thus much less valuable than what that bidder anticipated. The more certainty forward auction participants have on what spectrum allocations they are bidding on, the less risk there will be for potential licensees. This will make bidders more likely to participate in the auction and will ultimately help make the forward auction a success.

B. The Commission Should Add Fixed and Mobile Allocations to the TV Bands.

CTIA echoes the Commission's goal "to adopt a band plan that will provide for flexible use of [the 600 MHz band] for new wireless broadband services while continuing to support existing uses."[48] CTIA therefore supports the Commission's proposal, first made in its *TV*

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47 *Id.* at ¶ 64.

48 *Id.* at ¶ 121.

Spectrum Innovation NPRM,[49] to add new allocations for fixed and mobile services in the entire range of the UHF and VHF bands for non-Federal use, to be co-primary with the allocation for broadcast services.[50]

As CTIA noted in response to the *TV Spectrum Innovation NPRM*, the proposal to adopt fixed and mobile wireless applications for the television broadcast spectrum is a critical first step toward making this spectrum available for new licensed wireless broadband services. As AT&T observed in that proceeding, this step "would provide the Commission with the latitude to facilitate the types of flexible use rules that allow the UHF TV Bands to flow to their most productive use, as dictated by customer demand."[51] Indeed, enhanced flexibility "would spur investment and innovation, thereby maximizing intensive use of spectrum and facilitating increased deployment of wireless broadband services."[52]

CTIA opposes the proposal by some broadcasters to retain some of the UHF and VHF television bands exclusively for broadcast use.[53] For the incentive auction to be successful, the Commission needs maximum flexibility to manage the spectrum in the TV bands. And, as the Commission noted in the *NPRM*, this proposal is infeasible in light of the fact that the amount of broadcast spectrum recovered in any specific geographic area depends on the results of the incentive auction.[54] By prematurely decreeing that fixed and mobile broadband services could

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49 *Innovation in the Broadcast Television Bands: Allocations, Channel Sharing and Improvements to VHF*, Notice of Proposed Rulemaking, FCC 10-196 (2010).

50 *NPRM* at ¶ 119.

51 Comments of AT&T Inc., ET Docket No. 10-235, at 3 (Mar. 18, 2011).

52 Comments of T-Mobile USA, Inc., ET Docket No. 10-235, at 8 (Mar. 18, 2011).

53 *NPRM* at ¶ 121.

54 *Id.*

not be implemented below a certain channel, the Commission would needlessly hamper the incentive auction and could be precluded from creating a band plan that would best meet the key principle of allocating as much wireless broadband spectrum as possible.

C. The Commission Should Adopt a Robust and Logical Band Plan.

Perhaps the most critical issue surrounding the incentive auction process is the development of a new band plan that would maximize the amount of spectrum made available for wireless broadband services, both licensed and unlicensed in the "technically reasonable" guard bands, and allow new commercial wireless broadband systems to be deployed without causing interference to incumbent broadcast operators or other adjacent wireless systems. The *NPRM* presents a variety of conceptual band plans for this spectrum, but none of these proposals appear to provide the fundamental framework needed to meet the goals of all affected stakeholders. As a general matter, the 600 MHz band plan should maximize the amount of spectrum made available for wireless broadband, avoid interference among licensed services, and be flexible enough to accommodate varying amounts and configurations of spectrum relinquished through the incentive auction process.

The Commission's preferred band plan approach uses five MHz blocks, in which the uplink band begins at Channel 51 and extends downward toward Channel 37 depending on the amount of reclaimed spectrum.[55] The downlink band would then begin at Channel 36 and expand downward depending on the amount of reclaimed spectrum.[56] The Commission has proposed to create guard bands at the bottom of both the uplink and downlink bands to prevent

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55 *Id.* at ¶ 126.

56 *Id.*

interference between broadcast and wireless operations.[57] The spectrum between Channel 37 and the guard band at the bottom of the uplink band would be occupied by broadcast television licensees.[58]

In the *NPRM*, the Commission stated its belief that the proposed band plan "balances flexibility with certainty, accommodating varying amounts of available wireless spectrum in different geographic areas rather than requiring that a uniform set of television channels be cleared nationwide."[59] The Commission further noted that in proposing this band plan, it sought to focus on "utility, certainty, interchangeability, quantity, and interoperability."[60] While CTIA concurs with several elements of the Commission's proposed band plan, it believes that others are concerning and need to be closely reviewed. Below, CTIA identifies, based on the analysis to date, key principles that could help define a 600 MHz band plan that would meet the goals of the wireless industry to have certainty, extensive amounts of licensed spectrum, guard bands where unlicensed could likely be made available, and protection for all affected stakeholders from harmful interference.

1. Spectrum Block Size

The Commission has proposed to license the 600 MHz band in 5 MHz "building blocks" instead of 6 MHz blocks. The Commission noted that blocks of this size "can support a variety of wireless broadband technologies" and "optimize efficiency in the rebanded spectrum, allowing wireless spectrum demand in a given market to more closely match the amount of

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57 *Id.*

58 *Id.*

59 *NPRM* at ¶ 124.

60 *Id.* at ¶ 125.

spectrum supplied by participating broadcasters."[61] However, the Commission also sought comment on licensing this spectrum in 6 MHz increments.[62]

CTIA supports the Commission's proposal to license the 600 MHz band in 5 MHz blocks. Specifically, CTIA believes that using 5 MHz building blocks is more in line with other CMRS spectrum allocations. And, as the Commission observed, 6 MHz blocks do not precisely map onto the channel sizes used for most wireless broadband technologies in the market at this time, and could reduce the number of blocks auctioned in some circumstances.[63]

2. Block Configuration

The Commission's proposed band plan "aims to pair spectrum for Frequency Division Duplex ("FDD") operations when possible, but may yield varying amounts of unpaired downlink spectrum blocks in different areas."[64] Given the desirability of paired spectrum, and based on the analysis to date, the Commission should emphasize pairing spectrum bands and should not allocate spectrum for supplemental downlink unless no pairing option is feasible. In this context, paired spectrum is more valuable than unpaired or downlink-only spectrum,[65] and the Commission should attempt to allocate as much as possible. However, CTIA agrees with the

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61 *Id.* at ¶ 128.

62 *Id.* at ¶ 129.

63 *Id.* at ¶ 129.

64 *Id.* at ¶ 131.

65 In the 2 GHz spectrum context, the Brattle Group found that if AWS-3 spectrum was paired with 20 MHz of spectrum in the 2155-2180 MHz band, there would result considerable efficiencies and a valuation of $12 billion for the combined 40 MHz of spectrum. If the AWS-3 spectrum was auctioned unpaired, the Brattle Group predicted that the spectrum would be valued at just $3.6 billion. The Brattle Group, "The Economic Basis of Spectrum Value: Pairing AWS-3 with the 1755 MHz Band is More Valuable than Pairing it with Frequencies from the 1690 MHz Band" at 12 (Apr. 11, 2011), attached to Letter from Coleman Bazelon, The Brattle Group to Marlene H. Dortch, FCC, ET Docket No. 10-123 (Apr. 11, 2011).

Commission that supplemental downlink spectrum would prove useful to wireless licensees where paired spectrum is not available.

CTIA also supports the concept described in the *NPRM* to create band plan "families" with consistent nationwide downlink bandwidth.[66] Such an approach would enable the Commission to have dissimilar amounts of spectrum available in particular markets, but would minimize the effect on mobile device design requirements by ensuring that the downlink spectrum would be consistent nationwide. In addition, CTIA believes that the Commission should give strong consideration to ensuring that a "minimum" amount of spectrum is provided in the top markets for the incentive auction to be successful. To generate sufficient revenues to compensate incumbent broadcasters, while also meeting the other payment requirements of the Spectrum Act, the FCC has a daunting task to ensure that its forward auction generates enough revenue to create a valid auction. CTIA suggests, based on past auction data, that the Commission will need to make every effort to ensure that the top markets have enough spectrum cleared to make the forward auction enticing to prospective wireless bidders.

The Commission has also requested comment on its proposal to locate the uplink block beginning at Channel 51 and the downlink block beginning at Channel 36.[67] CTIA suggests that the Commission should prioritize its clearing efforts on TV spectrum above Channel 37, instead of embarking upon clearing in areas above and below Channel 37. As is described in more detail herein, and based on current analysis, CTIA believes that:

- Spectrum below Channel 37 may suffer from interference concerns and dividing spectrum clearing above and below Channel 37 may lead to a need for more guard bands than might be technically necessary;

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66 *NPRM* at ¶¶ 138-139.

67 *NPRM* at ¶ 135.

- The Commission should strive to make available the maximum possible amount of licensed, paired spectrum above Channel 37 (and below Channel 37 to the extent available and technically feasible) in order to meet the needs of multiple mobile wireless providers;[68]

- These frequencies have particularly strong characteristics that would support mobile broadband, and their use should be maximized to the extent feasible;

- Wireless uplinks would begin in the spectrum directly adjacent to the lower 700 MHz band, beginning at Channel 51 and moving down.[69]

The Commission should also emphasize pairing spectrum bands and should seek to maximize the amount of paired spectrum made available. Where no pairing option is feasible, CTIA supports the use of spectrum for supplemental downlink. Alternatively, to the extent technically feasible and available, this spectrum could be paired with uplink spectrum below Channel 37. Consistent with the Commission's "Down from Channel 51" alternate band plan approach, existing operations in Channel 37 could remain there.[70] CTIA urges the FCC to confirm existing operations in Channel 37 receive no additional interference protections from new entrants than what they currently have from TV broadcasting incumbents.

3. Offering Different Amounts of Spectrum in Different Markets.

There is obviously considerable uncertainty regarding the amount of spectrum that may be made available through the incentive auction, and it is likely that the amount of relinquished TV broadcast spectrum will vary from one geographic area to another. As stated above, the Commission should endeavor to maximize the amount of spectrum that is consistently made

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[68] This proposal is similar to the "Down from Channel 51" alternate band plan proposal articulated by the Commission at paragraphs 178-179. However, CTIA does not believe that downlink spectrum should be split over the TV 37 spectrum as shown in the Commission's proposal.

[69] The Commission should avoid placing wireless uplink operations in the spectrum immediately above Channel 37, which would present interference to existing PCS mobile devices. *See infra,* on discussion of harmonic interference.

[70] *NPRM* at ¶ 179.

available nationwide, especially for downlinks. The Commission's band plan must be flexible enough to accommodate varying amounts of spectrum relinquished from the incentive auction process in different locations, but as noted above, consideration should be given to ensuring that the maximum amount of consistent paired spectrum be made available in the top markets to assure success of the incentive auction.

4. Technical Considerations

As the Commission will not know in advance of the forward and reverse auctions how much spectrum will be available to license for wireless services, it must configure the 600 MHz band in a way that will make the 600 MHz spectrum blocks as similar and technically interchangeable as possible. The Commission has correctly noted certain technical decisions that must be made in developing a band plan for the 600 MHz spectrum. Specifically, the Commission must make determinations regarding guard bands and the duplex gap that will shape spectrum blocks that achieve the Commission's goals that is informed by the interference effects associated with commercial wireless usage of the 600 MHz spectrum.

a. Interference Issues in the 600 MHz Band

Based on the preferred band plan framework presented by the Commission for the 600 MHz band, CTIA is concerned about three different types of potentially harmful interference: (1) co-channel interference from TV stations in neighboring markets into new entrant wireless base station receivers; (2) intermodulation and adjacent channel interference that would be caused by TV stations operating in the duplex gap of 600 MHz operations; and (3) potential interference from harmonics into PCS and BRS/EBS mobile bands if uplinks are permitted in certain portions of the 600 MHz band.

Co-Channel Interference. As CTIA has noted above, the Commission should give strong consideration to ensuring that significant amounts of consistent licensed spectrum is

provided in each of the top markets. A substantial concern associated with not having a minimal amount of consistently cleared spectrum is the risk of harmful co-channel interference that could occur otherwise. As broadcasters have deployed high powered transmitters, with as much as 1 megawatt in operating power, the potential for co-channel interference from these systems if they are not cleared in nearby markets is substantial.

CTIA is encouraged that the "family" of band plans proposal would at least endeavor to have similar spectrum set aside for downlink operations. However, the proposal could lead to spectrum being used by 600 MHz commercial wireless uplink operations in some markets, while being used by high powered TV broadcast stations in nearby adjacent markets. For example, if market A has 50 MHz cleared but market B (only 20 miles away) only has 30 MHz cleared, under the Commission's proposal 20 MHz of spectrum could potentially continue to be used for high powered broadcasting. This would mean that 600 MHz base station receivers in Market A, which would be expecting very low power mobile transmissions, could be overpowered by co-channel, high powered broadcast stations in Market B. Moreover, some of those stations could be in Canada or Mexico, further limiting the FCC's ability to protect new entrant 600 MHz operations. As such, CTIA encourages the Commission, as part of its repacking algorithm, to ensure that such co-channel interference effects are carefully considered and mitigated as part of the clearing process.

Intermodulation and Adjacent Channel Interference. Intermodulation distortion occurs due to the interaction between two radio signals such that each affects the amplitude of the other signal, thereby distorting the received communication. The overall impact of the distortion will be driven by the magnitude of the two signals and it is additive, such that the more frequencies

that are mixed together (and at higher powers), the more interference is generated.[71] The Commission has seen a number of instances where intermodulation effects have caused significant problems. The most glaring of these was in the 800 MHz band, where the Commission took action to re-band the entire band to extricate public safety incumbent operations from commercial wireless transmissions primarily due to intermodulation effects.[72] As the FCC found there, "If the resultant new signal generated in the first stages of the receiver is sufficiently strong, it can effectively block the incoming signal, rendering the radio unusable at that location."[73]

CTIA is concerned, based on current analysis, that the band plan that is preferred by the Commission, with any number of broadcast incumbent stations potentially in the duplex gap, would lead to extensive amounts of intermodulation products and distortion. In light of this significant concern, CTIA would strongly recommend that any Commission band plan for the 600 MHz band attempt to: (1) avoid placing broadcast TV station systems in the duplex gap and (2) attempt to provide spectral separation between TV broadcasters and 600 MHz new entrant operations. These principles would greatly alleviate concerns about harmful adjacent channel interference from broadcast TV operations into 600 MHz systems as well, by ensuring that sufficient guard bands (as discussed in detail below) are provided between high powered broadcast TV transmitters and sensitive 600 MHz receivers.

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71 Intermodulation products are categorized according to "order" and can result from the interaction of two or more frequencies. The greater the number of frequencies involved, the greater the number of intermodulation products generated.

72 *Improving Public Safety Communications in the 800 MHz Band*, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969, ¶ 91 (2004).

73 *Id.*

Harmonics. Radio device components can create harmonic interference, which is a frequency that is an exact multiple of the fundamental operating frequency. For example, the frequency 643 MHz has a harmonic at 1286 MHz (643 times 2 or the second harmonic) and also at 1929 MHz (643 times 3 or the third harmonic) and at 2572 MHz (643 times 4 or the fourth harmonic). While each harmonic gets weaker as compared to the desired signal, the presence of harmonics, especially in a device that receives more than one frequency, can be problematic. As a result, there are potential concerns that if the FCC preferred band plan is adopted, mobile uplink transmissions could occur in the 643-667 MHz band. Mobile transmissions in this band could lead to third harmonics in the PCS band (1910-1990 MHz) and to fourth harmonics in the BRS/EBS band (2500-2690 MHz). CTIA would recommend, therefore, that any Commission adopted band plan attempt to avoid having mobile uplink transmissions in the band 643-667 MHz to avoid any concerns with harmonic interference.

b. Guard Bands

As the Commission stated in the *NPRM*, guard bands must be created to minimize interference between dissimilar adjacent operations.[74] CTIA supports the use of these guard bands for unlicensed operations to the extent technically feasible.

Guard Band Between 600 MHz Uplink and 700 MHz Uplink Spectrum. While the Commission does not propose a guard band between the 600 MHz uplink spectrum and the lower 700 MHz spectrum,[75] CTIA supports the reallocation of Channel 51 to a 6 MHz guard band in any market where this channel is not made available for wireless uplink. Such action

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74 *NPRM* at ¶ 152.

75 *NPRM* at ¶ 154.

will ensure the cessation of broadcast operations in Channel 51 as rapidly as possible and resolve the longstanding interference challenges faced by Lower 700 MHz A Block licensees.

Guard Band Between 600 MHz Operations and Channel 37. The Commission has not previously provided Channel 37 incumbents (radio astronomy and wireless medical telemetry service) any amount of guard band protection from full power TV station operations. As the power levels presented by TV stations (up to 1 megawatt) greatly exceed the transmit levels from both downlink and uplink commercial wireless operations, CTIA does not believe that there should be a need for a guard band between 600 MHz operations and Channel 37 incumbents.

Guard Band Between 600 MHz Downlink and Television. As the Commission observed in the *NPRM*, while there is some degree of harmonization between wireless downlink and broadcast television stations, they are not fully harmonized and a guard band will be necessary to prevent harmful interference to the 600 MHz mobile broadband and digital television services.[76] The Commission has proposed a 6 MHz guard band plus remainder spectrum, where available, and has invited comment on how much guard band would be sufficient to prevent harmful interference.[77] Based on current analysis, the Commission should provide a guard band between a high power broadcaster and mobile downlink that is sufficient to protect the wireless service from interference, which could be larger than the 6 MHz proposed by the FCC.

c. Duplex Gap

CTIA has proposed that, based on analysis to date, any spectrum band plan for the 600 MHz band attempt to maximize the amount of paired spectrum made available above Channel 37

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76 *NPRM* at ¶ 158.

77 *Id.*

(and below Channel 37 to the extent available and technically feasible). Under such a proposal, and based on current analysis, there will still be a need for a "duplex gap" or spacing between uplink and downlink frequencies, of at least 10 MHz, and possibly more. CTIA believes that regardless of the band plan adopted, the Commission should not permit broadcast television stations to operate in the duplex gap, as this would greatly complicate the interference environment in the 600 MHz band, as described above. Indeed, the Commission should prohibit any operations in the duplex gap that would cause harmful interference to wireless systems or otherwise compromise the most effective and efficient use of the 600 MHz band.

5. Channel 51 Early Relocation

In the *NPRM*, the Commission specifically sought comment on what it could do to resolve interference between the Lower 700 MHz A Block and Channel 51.[78] CTIA believes that the Commission can and should take action to resolve this interference challenge in advance of the broadcast incentive auction. CTIA specifically encourages the Commission to promote the expedited relocation of Channel 51 incumbents to alternate channels, which will enable deployment of the A Block and put more spectrum to use.

In March 2011, CTIA and the Rural Cellular Association (now the Competitive Carrier Association) filed with the Commission a Petition for Rulemaking requesting that the Commission initiate a rulemaking aimed at a prohibition of future licensing of broadcast television stations on Channel 51, adopt a freeze on licensing activity for Channel 51 applications, and develop accelerated processes for relocation of Channel 51 licensees that have reached a voluntary agreement with an adjacent wireless licensee to relocate to an alternate

[78] *NPRM* at ¶ 165.

channel.[79] While the Commission has adopted the requested licensing freeze,[80] it has not yet taken action on the other elements of the Petition.

The Petition for Rulemaking noted that when the Commission agreed to consider voluntary agreements to undertake early DTV transitions in 2000, the Commission established a presumption favoring grant of such requests in certain circumstances.[81] Further, the Commission has made certain channel changes effective immediately upon publication in the Federal Register pursuant to its authority under Section 553(d)(3) of the Administrative Procedure Act.[82] Using this authority to make effective changes in allocation that relocate broadcasters off of Channel 51 is just one method by which the Commission can expedite this process and enable rapid clearing of Channel 51 by broadcasters who voluntarily agree to do so.

CTIA once again encourages the Commission to use all of the regulatory tools available to it to accelerate relocation of Channel 51 incumbents to alternate channels, as rapid action in this context will promote numerous Commission policy objectives. In the alternative, as noted above, CTIA strongly urges the Commission to make Channel 51 a guard band as soon as any spectrum is cleared in the TV incentive auction if the spectrum is not to be used for mobile

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79 *See* Petition for Rulemaking and Request for Licensing Freeze by CTIA – The Wireless Association and Rural Cellular Association, RM-11626, at 1 (March 15, 2011). ("Channel 51 Freeze Petition").

80 *Freeze on Applications for Channel 51 Effective Immediately and Sixty (60) Day Amendment Window for Pending Channel 51 Low Power Television, TV Translator and Class A Applications*, Public Notice, 26 FCC Rcd 11409 (MB 2011).

81 Channel 51 Freeze Petition at 21.

82 For example, in January 2010 the Commission made the request of Ketchikan TV, LLC to change channels effective immediately upon Federal Register publication to ensure that the TV station would meet its digital construction deadline of February 17, 2010. *See Amendment of Section 73.622(i), Post-Transition Table of DTV Allotments, Television Broadcast Stations (Anchorage, Alaska)*, Report and Order, DA 10-40, ¶ 4 (Jan. 11, 2010).

uplinks. This action would, at a minimum, help alleviate the interference issues felt by Lower 700 MHz A Block licensees.

D. CTIA Supports the Commission's Proposed Technical Rules.

In the *NPRM*, the Commission proposed a number of technical rules that it hoped would "best achieve our objectives of permitting more flexible use of this spectrum, while at the same time protecting adjacent spectrum users from interference."[83] These technical rules included out-of-band emissions limits, power limits, antenna height restrictions, co-channel interference rules, Canadian and Mexican coordination approaches, and other technical issues.[84] CTIA supports these proposals as consistent with the technical rules applicable to other commercial wireless systems.

IV. THE COMMISSION SHOULD DESIGN A REVERSE AUCTION FRAMEWORK THAT MAXIMIZES BROADCASTER PARTICIPATION.

CTIA supports the Commission's goal "to permit as many broadcasters to participate in the reverse auction as possible consistent with the Spectrum Act and our existing policies and rules."[85] CTIA also agrees with the Expanding Opportunities for Broadcasters Coalition that "the FCC can structure the proposed television spectrum incentive auction to ensure that the agency fulfills its goal of transferring at least 120 MHz of broadcast spectrum for mobile broadband use while also generating billions of dollars to fund a national broadband public safety network."[86] The Commission should design a reverse auction framework that maximizes broadcaster participation so as to produce significant spectrum for wireless use. There are a

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83 *NPRM* at ¶ 185.

84 *Id.* at ¶¶ 186-198.

85 *NPRM* at ¶ 72.

86 Letter from Ari Meltzer, Counsel for the Expanding Opportunities for Broadcasters Coalition, to Marlene H. Dortch, FCC, GN Docket No. 12-268 (Jan. 24, 2013).

number of steps the Commission can take to ensure that as many broadcasters as possible are afforded the opportunity and ability to take part in the reverse auction. The Commission can accomplish this through thoughtful auction design and by making the reverse auction as streamlined and simplified as possible

A. The Commission's Chosen Auction Design Must Provide Clarity to Bidders.

CTIA supports an auction design that provides bidders with clarity at each stage of the process. This will help to encourage participation by both broadcasters and potential bidders in the forward auction. The Commission has requested specific comment on the Paul Milgrom paper "Incentive Auction Rules and Discussion," which proposes a reverse auction with a descending clock format, and a clearing rule for each auction establishing closing conditions and linking the outcomes of the forward and reverse auctions.[87] CTIA does not offer comment on these specific proposals at this time, but urges the Commission to develop an auction design that will maximize participation by broadcasters and therefore enable the maximum amount of spectrum to be made available for wireless broadband.

B. The Commission Should Adopt Reverse Auction Rules That Enable Maximum Broadcaster Participation.

The Commission should also take care to adopt auction rules for the reverse auction that maximize broadcaster participation. One of the steps Congress has taken to promote participation is to provide a variety of bid options, including voluntary channel sharing. CTIA has long been a supporter of voluntary channel sharing by broadcast licensees, and believes this practice has the potential to be a "win-win" for interested broadcasters and the wireless industry. However, the Commission has also expressed concern that channel sharing could raise collusion

[87] *NPRM* at ¶ 36.

and antitrust concerns.[88] The Commission must carefully craft its anti-collusion rules for the incentive auction such that these rules do not impede voluntary channel sharing. In particular, the Commission should allow discussions between broadcasters to continue as long as practical, with a requirement that any agreements reached be provided to the FCC prior to the commencement of the auction. This would contrast with "normal" FCC practices whereby discussions were no longer permitted upon the filing of short-form applications that noted the inclination of a party to participate in an auction. The differences here are three-fold: (1) the "normal" short-form process should not be necessary in this context as the reverse auction participants are already approved Commission licensees for the spectrum that they are seeking payments for, (2) by allowing channel sharing agreements to be reached as long as possible, the Commission will be better positioned to lower relocation cost payments to broadcasters, and (3) the participants in this scenario are bidding to sell their spectrum asset, not buy one. In this context it is completely sensible for the Commission to take a fresh look at anti-collusion rules. Accordingly, CTIA believes that any channel sharing agreements could still be cut-off by the Commission and be required to be filed (such as a week or two prior to the start of the auction) but should otherwise be permitted to be negotiated as long as practical.

The reverse auction process should also be as streamlined and simplified as possible to encourage broadcaster participation. The Commission can do this in a number of ways, but at a minimum the "short-form" process for auction participation in the reverse auction should be made much more simple than in prior auctions. The reverse auction differs from other Commission auctions in that all of the participants already are Commission licensees. For this reason, there should only be a need for parties to identify their interest as well as their

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88 *NPRM* at ¶ 268.

Commission licensed call sign. No additional information, such as ownership information and a showing of qualification, should need to be collected as has been past practice. Moreover, the Commission may wish to consider if any "application" process is necessary at all for the reverse auction but instead only require the filing of any agreements by reverse auction participants.

CTIA supports the Commission's efforts to maximize participation through the establishment of additional bid options for broadcasters. In the *NPRM*, the Commission asked whether it should permit additional bid options, such as allowing a broadcaster to limit bids to a "high VHF channel," move from high VHF to low VHF, reduce their service area or population covered, or accept additional interference.[89] While CTIA supports the Commission's efforts to craft additional attractive alternatives for broadcasters, CTIA also notes that additional bid options could create complexity for potential broadcaster participants. CTIA does not take a position on these additional options at this time, but asks the Commission to carefully consider this issue and strike an appropriate balance between simplicity and ensuring maximum flexibility for broadcasters.

Finally, while CTIA is generally in favor of allowing as many entities as possible to take part in the incentive auction, it supports the Commission's proposal to exclude from the auction those Class A television licensees whose status has been changed from Class A to low power television.[90] As LPTV stations do not have primary licensee status, they should not be eligible to participate in the reverse auction.

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89 *NPRM* at ¶¶ 85-88.

90 *NPRM* at ¶ 75. *See also* Spectrum Act §§ 6001(6) and 6403(b).

V. THE REPACKING PROCESS IS A HIGHLY COMPLEX ONE THAT REQUIRES CAREFUL EVALUATION BY THE COMMISSION.

Repacking, or the reorganization of the broadcast television bands so that those stations remaining on the air after the incentive auction occupy a smaller portion of the UHF band, will be a considerable undertaking for the Commission. As an initial matter, as the *NPRM* notes, the Spectrum Act requires the Commission to "make all reasonable efforts to preserve . . . the coverage area and population served of each broadcast television licensee."[91] CTIA does not believe "reasonable efforts" means that broadcast TV station contours must be exactly the same following repacking, nor does it think such a requirement is even feasible. CTIA believes that the repacking model must not be overly conservative but instead should strike the balance memorialized in the statute. Additionally, CTIA agrees with the Commission that three years is too long to transition the UHF band to wireless use, and the Commission should adopt measures that make the repacking and band transition proceed as quickly as possible.[92] As described herein, the FCC can take action to collect needed data and information from TV incumbents to help guide it in establishing a repacking timeline. CTIA supports the Commission's stated intent to engage stakeholders on issues related to repacking methodologies,[93] and CTIA and its members look forward to evaluating and providing feedback on the Commission's repacking model. CTIA strongly urges the Commission to release its repacking methodology as soon as possible, as it will substantially affect repacking efforts. In the interim, however, CTIA comments more broadly on elements of the repacking process.

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91 Spectrum Act § 6403(b).

92 *NPRM* at ¶ 322.

93 *NPRM* at ¶ 50.

A. The Commission Need Not, And Should Not, Seek to Replicate Precisely Existing Broadcast TV Station Contours.

The Commission has advanced several proposals for how to modify a station's transmission facilities to replicate its existing coverage area.[94] As the Commission observes, this is a highly complex process as changes to remaining stations will impact the interference relationship among them.[95] Further, CTIA notes, and Congress memorialized the notion that changes to a TV station to effectuate repacking may result in a change to a station's coverage area. CTIA supports action to ensure that existing broadcaster coverage is reasonably replicated, but strongly opposes any efforts to precisely replicate coverage. Changes in UHF frequency will necessarily mean that there will be changes in coverage that are unavoidable. For example, due to differences in frequency propagation, a higher UHF channel may lead to less coverage, while a lower UHF channel could increase coverage. While the Commission can and should take "reasonable" steps to ensure licensees can generally replicate their coverage, requiring precision in this area is not required by the Spectrum Act and would greatly complicate the repacking process and would not be successful.

"While the Commission can and should take "reasonable" steps to ensure licensees can generally replicate their coverage, requiring precision in this area is not required by the Spectrum Act and would greatly complicate the repacking process and would not be successful."

B. The Commission Should Expeditiously Seek Out Precise Information on Repacking Costs and Timelines.

CTIA strongly encourages the Commission to seek out precise information from existing licensees to determine the costs and timelines associated with repacking. CTIA believes that

94 *NPRM* at ¶¶ 98-118.

95 *NPRM* at ¶ 97.

requiring broadcasters to submit information to the Commission will be of paramount importance for the repacking effort. This could be accomplished by the Commission through a public notice that requires all, or some identified subset, of existing full power and Class A television stations to provide detailed information about their existing transmit facilities. This information would include the make and model of their transmitter, the ability of the existing transmitter to be re-tuned to a new UHF channel, the antenna make and model, the ability of the existing antenna to broadcast at a new UHF channel, and any other associated technical modifications that would be required to repack the licensee to a new channel. In general, the Commission should poll existing television station licensees that may be subjected to mandatory repacking to determine their ability to re-tune existing facilities to a different UHF channel. The Commission should also consider polling a number of the largest TV equipment manufacturers about the capabilities of RF channel modifications to current TV transmitters and antennas. With this information gathered, the Commission will be well-positioned to determine the costs associated with repacking that can be input into its model to ensure the most effective and cost-effective repacking. Additionally, this information will help guide Commission decision-making concerning the timeframes needed to complete the repacking process – if TV facilities only require minimal changes to modify the RF channel, there should not be a need for a lengthy transition. Without this key data, the Commission will be unable to determine effectively the transition timelines for repacking nor will it be able to optimize the repacking algorithm to minimize disruptions to incumbent TV stations (and minimize relocation costs as well).

C. The Spectrum Act's Requirements for Preservation of Coverage Do Not Extend to LPTV or Translator Stations.

Finally, CTIA supports the Commission's proposal not to protect the coverage of LPTV or translator stations.[96] Instead, pursuant to the Spectrum Act,[97] protection should be limited to full power and Class A stations. LPTV stations are secondary to exclusive licensed operations for interference purposes, and the Spectrum Act's mandate with respect to preservation of coverage does not extend to them.[98]

VI. THERE ARE ADDITIONAL ACTIONS THE COMMISSION SHOULD TAKE TO PROMOTE A SMOOTH AUCTION AND THE MOST EFFICIENT USE OF AUCTIONED SPECTRUM.

A. The Commission Should Extend its Secondary Market Policies to 600 MHz Spectrum.

CTIA supports the Commission's proposals to permit partitioning and disaggregation of the 600 MHz spectrum, and to permit spectrum leasing.[99] As the Commission notes in the *NPRM*, its Part 27 rules permit such secondary market activity, and it is appropriate that the Commission regulate the 600 MHz wireless service consistent with other wireless broadband services.

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96 *NPRM* at ¶ 118.

97 Spectrum Act §§ 6001(6) and 6403(b).

98 *Id.* As CTIA member AT&T previously observed, LPTV stations have always been authorized on a secondary, non-interference basis and there is no basis for LPTV licensees to assume any extensive rights to continued operations. When spectrum was reallocated from TV Channels 60-69 to public safety and commercial wireless services, LPTV licensees were required to either cease operations or otherwise relocate their operations without any reimbursement or protection from the new licensees at the end of the DTV transition. Thus, and as has always been the case, LPTV operations do not have any protection rights nor any assurance that their operations will be protected from any reallocation process initiated by the Commission concerning TV spectrum. Reply Comments of AT&T Inc., ET Docket No. 10-235, at 9-10 (Apr. 25, 2011).

99 *NPRM* ¶¶ 385-391.

CTIA has long supported secondary market policies that enable wireless spectrum to flow to its highest and best use. The Commission's existing secondary market policies are performing quite well in allowing the marketplace to put spectrum in the hands of those who value it most highly. As the Commission observed in the *NPRM*, "allowing such flexibility [with regard to partitioning and disaggregation] could facilitate the efficient use of spectrum by providing licensees with the flexibility to make offerings directly responsive to market demands for particular types of services, increase competition by allowing market entry by new entrants, and expedite provision of services to areas that might not otherwise receive service in the near term."[100] Further, the Commission's leasing policies have brought licensees much-needed flexibility in managing their networks, and have enabled innovative service and market entry by new competitors. The Commission can expect to see similar benefits by applying these policies to 600 MHz spectrum.

B. The Commission Should Adopt Common-Sense Performance Obligations for 600 MHz Spectrum.

For the Commission to "promote the productive use of spectrum, to encourage licensees to provide service to customers in a timely manner, and to promote the provision of innovative services in unserved areas,"[101] the Commission must adopt performance requirements that appropriately balance the need to quickly deploy services with the need to develop reliable, robust, innovative networks in this band. The Commission specifically sought comment on performance requirements, how construction benchmarks should be set, and whether the Commission should mirror the construction requirements of various other spectrum bands.[102] To

100 *NPRM* at ¶ 385.

101 *NPRM* at ¶ 394.

102 *Id.* at ¶¶ 395, 399-401.

be effective, Commission's performance requirements must account for the 600 MHz band environment's unique characteristics. Further, the Commission should reject "use it or share it" requirements.

CTIA stresses that in developing buildout obligations for 600 MHz spectrum, the Commission should also take into account the repacking of broadcast incumbents and the vacation of the newly-licensed channels. Consistent with the Commission's past actions with AWS[103] and 700 MHz[104] spectrum, the Commission should develop its buildout deadlines based on the actual date the television repacking is completed and these bands are cleared.

While CTIA fully supports the goal of identifying spectrum for unlicensed use in the guard bands, CTIA believes that the Commission should reject "use it or share it" requirements proposed by the Commission in the *NPRM*.[105] As discussed above, the Commission has existing

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103 *Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands*, Report and Order, 18 FCC Rcd 25162, ¶ 76 (2003) ("Furthermore, this substantial service standard is particularly appropriate here because the incumbency of federal and other current licensees in these bands would make specific benchmarks for all new licensees inequitable. In contrast, the standard we adopt today provides us with the flexibility to consider the particular circumstances of each licensee and how the level of incumbency has had an impact on a particular licensee's ability to build-out and commence service in its licensed area.").

104 *Service Rules for the 746-764 and 776-794 MHz Bands*, First Report and Order, 15 FCC Rcd 476, ¶ 67 (2000) ("Although we proposed a ten-year license term in the *NPRM*, we are concerned that the continued existence of incumbent broadcasters in the licensed spectrum may retard a licensee's development and use of the spectrum. Thus, we are modifying the license term as it relates to the 747-762 MHz and 777-792 MHz bands, to accommodate licensees' need for additional time to develop and use this spectrum, in light of its continued use by broadcasters until 2006."). When the DTV transition was delayed, the Commission adjusted the license term and construction deadlines for 700 MHz licenses accordingly. *See Implementation of the DTV Delay Act*, Second Report and Order and Notice of Proposed Rulemaking, 24 FCC Rcd 2526, ¶ 39 (2009)(" In this Report and Order, we conform the license period in section 27.13, and construction deadlines provided in section 27.14, to the provisions of section 2(c) of the DTV Delay Act. Section 27.13 of our rules currently provides that the license period for the licenses associated with the 698-763 MHz and 776-793 MHz bands are for a term not to exceed ten years from February 17, 2009, the previous digital television transition date. Section 27.14 of our rules similarly ties the construction benchmarks and associated reporting requirements to February 17, 2009. Accordingly, we modify these dates to implement the 116 day extension required by the DTV Delay Act.").

105 *NPRM* at ¶ 405.

mechanisms to facilitate possible access to this spectrum. Specifically, the Commission asks whether, at the end of a licensee's build-out-term, the Commission should permit unlicensed operation in those geographic areas where the licensee has not yet commenced service.[106] CTIA opposes this proposal, as it would interfere with a licensee's ability to test and build out its network. Before a licensee launches commercial service in a particular geographic area, they must engage in extensive construction and testing of equipment and services. Requiring the licensee to share its spectrum with other uses while in the process of expanding into new geographic areas would undermine or delay the provision of service in these areas. By permitting unlicensed access to exclusively licensed spectrum, the Commission would be creating substantial uncertainty for the licensee as to whether it would be able to clear the band when needed. The result would be a substantially hindered or delayed deployment of service to consumers, an outcome that plainly contravenes the public interest.

To the extent that various entities seek spectrum access for non-licensee operations beyond that which CTIA hopes will be identified in guard bands, the Commission's existing secondary market framework is the more appropriate and equitable means for parties to obtain access to spectrum.[107] Under this framework, the entities seeking opportunistic access would have the consent and agreement of the spectrum licensee, and would negotiate terms that would protect the interests of all parties involved, with clearly defined rights and responsibilities. This

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106 *Id.*

107 47 C.F.R. § 1.9080. The Commission's private commons option provides a cooperative mechanism for licensees or lessees to make licensed spectrum available to users employing advanced technologies in a manner similar to that by which unlicensed users gain access to spectrum to suit their particular needs. This framework eliminates the need to enter into individual spectrum leasing arrangements under the Commission's rules. *Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, Second Report and Order, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking, 19 FCC Rcd 17503, ¶ 92 (2004).

approach is clearly preferable to a "use it or share it" regime that would create a chaotic environment in the already complex 600 MHz band.

C. The Commission Must Act Promptly on International Coordination Issues.

As Congress recognized in the Spectrum Act, the incentive auction will require technical coordination with Canada and Mexico. CTIA recognizes that modification of the 700 MHz band arrangements with Mexico and Canada, or the creation of new arrangements for the 600 MHz band, will be necessary to implement 600 MHz operations in areas along the common border and protect these operations from cross-border interference. CTIA therefore encourages the Commission to promptly commence discussions with the relevant Canadian and Mexican authorities, if it has not already, to develop agreements that will help protect these services from harmful interference.

"Matters of international coordination are familiar to the Commission. Border coordination issues will not and should not serve as a source of delay of the incentive auction, and the Commission should reject all arguments to the contrary."

Matters of international coordination are familiar to the Commission. Border coordination issues will not and should not serve as a source of delay of the incentive auction, and the Commission should reject all arguments to the contrary. As the Commission noted in the *NPRM*, it has had to deal with similar issues in the 700 MHz band,[108] and indeed has addressed border coordination issues in connection with all newly-licensed wireless broadband spectrum. CTIA is confident that the Commission will be able to resolve these issues in a timely manner.

D. The Commission Must Ensure that Wireless Microphones and LPAS Devices Do Not Cause Interference to Licensed Operations in the 600 MHz Band.

As the Commission acknowledges in the *NPRM*, repurposing the 600 MHz band from TV broadcast to commercial wireless services affects reform of the wireless microphone

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108 *NPRM* at ¶ 34.

regulatory framework.[109] Among the lessons learned as part of the digital television ("DTV") transition, the Commission concluded that wireless microphones and other low power auxiliary service ("LPAS") devices in the 700 MHz band "pose a significant threat of interference" to new wireless services entering the band and mandated that such devices be cleared.[110] That risk of interference found in the 700 MHz band applies equally to the 600 MHz spectrum, and the Commission similarly should bar wireless microphones and LPAS devices from spectrum to be repurposed for commercial wireless services. The Commission should expeditiously take concrete steps to ensure that the repurposed spectrum is fully available for mobile broadband and other advanced wireless services.

First, the Commission should prohibit wireless microphones and LPAS devices from operating on spectrum in the 600 MHz band that will be repurposed from broadcast TV to commercial wireless service, consistent with its 2010 decision barring wireless microphones from the 700 MHz band. In 2010, the Commission concluded that wireless microphones and LPAS devices could interfere with commercial base and mobile receivers (and public safety) entering the 700 MHz band and determined that such devices must be cleared from the band. The Commission made clear: "[o]ur primary goal in this proceeding is to clear all wireless microphones from the 700 MHz Band, thereby simplifying the process of making this spectrum fully available for public safety and commercial broadband licensees."[111] That same goal must extend to the 600 MHz band to fulfill the promise of the incentive auction to make this spectrum fully available for mobile broadband innovation and utilization to benefit wireless consumers.

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109 *NPRM* at ¶¶ 221-226.

110 *Revisions to Rules Authorizing the Operation of Low Power Auxiliary Stations in the 698-806 MHz Band*, Report and Order and Further Notice of Proposed Rulemaking, 25 FCC Rcd 643, 663 (2010) ("*Wireless Microphones Order*").

111 *Wireless Microphones Order*, 25 FCC Rcd at 685.

Clearing these devices is necessary to provide prospective bidders with certainty to bid for unencumbered spectrum and for licensees to build out networks and innovate. Moreover, it is fully consistent with the proposal in the *NPRM* to require secondary fixed broadcast auxiliary stations ("BAS") to discontinue operations in the repurposed spectrum and relocate to the repacked TV band or other available frequency bands.[112] Any other result is contrary to Congress' goal that the Incentive Auction should produce fully available spectrum to help keep pace with the ever growing demand for wireless services.

Second, the Commission should establish a process by which wireless microphones and LPAS devices are cleared from the repurposed spectrum no later than the date of the incentive auction. It is incumbent on the Commission to ensure that *all operations* – not just broadcast TV and BAS operations – that currently operate in the 600 MHz band are moved from the repurposed spectrum so that it is fully available for commercial wireless use. In contrast to the 700 MHz band experience, the Commission has the opportunity to proactively address these issues and provide notice to wireless microphone and LPAS device users before the transition takes place and the threat of interference becomes a reality.

Third, the Commission should ban the manufacture, import, sale, lease, offer for sale or lease, or shipment of wireless microphones and LPAS devices in the United States for operation on the 600 MHz band spectrum that will be repurposed for commercial wireless service, just as the Commission did in the 700 MHz band.[113] Consistent with the Commission's decision in the *Wireless Microphones Order*, the prohibition would help mitigate the potential for increased

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112 *See NPRM at* 12432.

113 *See Wireless Microphones Order*, 25 FCC Rcd at 672.

interference to new 600 MHz commercial wireless licensees by decreasing the number of wireless microphones and LPAS devices that may need to be cleared from the band.[114]

Finally, the Commission should adopt CTIA's proposals regarding interference protection in the 700 MHz band, incorporated by reference herein,[115] and extend them to the spectrum that will be repurposed in the 600 MHz band.

The promise of the TV broadcast incentive auction can only be achieved if the 600 MHz band is cleared of operations that will interfere with new mobile broadband services – including wireless microphones and LPAS devices. In this respect, the Commission should follow its 700 MHz blueprint and set a specific date to clear such devices from the repurposed spectrum and take further steps to limit the risk of wireless microphones and LPAS devices interfering with these new 600 MHz commercial wireless services.

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114 *See Wireless Microphones Order*, 25 FCC Rcd at 673.

115 *See, e.g.*, Reply Comments of CTIA, WT Docket Nos. 08-166, 08-167 (Oct. 20, 2008) ("CTIA 2008 Wireless Microphones Reply Comments"); Comments of CTIA, WT Docket Nos. 08-166, 08-167, ET Docket No. 10-24 (Mar. 1, 2010) ("CTIA 2010 Wireless Microphones Comments").

VII. CONCLUSION

The Spectrum Act conferred upon the Commission great responsibility, but also an incredible opportunity to innovate for the benefit of American consumers. CTIA looks forward to being an active participant in this historic process, and urges the Commission to closely consider the proposals raised herein.

Respectfully submitted,

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