

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

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

**REPLY COMMENTS OF
THE NATIONAL ASSOCIATION OF BROADCASTERS AND
THE ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC.**

Jane E. Mago
Jerianne Timmerman
Scott Goodwin
Lynn Claudy
Kelly Williams
NATIONAL ASSOCIATION OF
BROADCASTERS
1771 N Street, NW
Washington, D.C. 20036
(202) 429-5430

David L. Donovan
Victor Tawil
Bruce Franca
ASSOCIATION FOR MAXIMUM
SERVICE TELEVISION, INC.
4100 Wisconsin Avenue, NW
Washington, D.C. 20016
(202) 966-1956

Jonathan D. Blake
Jennifer A. Johnson
Eve R. Pogoriler
Covington & Burling LLP
1201 Pennsylvania Avenue, N.W.
Washington, D.C. 20004-2401
(202) 662-6000
Their Counsel

April 25, 2011

TABLE OF CONTENTS

I. THE COMMENTS SHOW STRONG SUPPORT FOR THE ROADMAP PROPOSED BY NAB AND MSTV. 2

II. WIRELESS INDUSTRY FILINGS CONTAIN SERIOUS FLAWS. 9

 A. Wireless Industry Commenters Disparage Broadcasting, Which Provides Vital Services To All Americans. 9

 B. Wireless Industry Commenters Fail To Take Into Account Broadcast Innovations..... 12

 C. Wireless Industry Commenters Make Unrealistic Assumptions About The Amount Of Spectrum That Can Be Reallocated From Broadcasting To Wireless And Unjustifiably Rely On The CTIA/CEA White Paper..... 15

 D. Wireless Industry Commenters Fail Adequately To Consider The Adverse Impact Of Repacking On The Public’s Broadcast Service And The Public’s Investment In Digital Receivers. 18

 E. Wireless Commenters’ Repetitive And Erroneous Support Of Cellularization Should Be Disregarded 19

III. RECENT MARKETPLACE DEVELOPMENTS BEAR IMPORTANTLY ON THIS PROCEEDING AND THE COMMISSION’S BROADBAND GOALS. 22

 A. Technological And Other Improvements Can Be Used To Increase Network Capacity. 22

 B. The Proposed AT&T/T-Mobile Merger Implicates The Commission’s Broadband Goals..... 26

IV. THE THREE SPECIFIC ISSUES ADDRESSED BY THE NPRM SHOULD NOT BE DECIDED IN A VACUUM..... 29

V. CONCLUSION..... 30

EXECUTIVE SUMMARY

This is an exciting time for television broadcasting. The initial comments in this proceeding show that:

- Broadcasters are enthusiastic about continuing to provide valuable and irreplaceable service to the American public.
- Broadcasters are rolling out innovative new services such as mobile DTV, which provides a spectrally-efficient means of providing local news, emergency information, sports, network, syndicated, and other programming to consumers on-the-go and which acts as a competitive offering in the mobile video marketplace;
- Broadcasters are exploring other technological innovations that could further enhance broadcasting's complementary role in the nation's communications ecosystem; and
- The public's reliance on over-the-air television, however delivered to the viewer, is increasing and will continue to increase.

The broadcast industry commenters expressed not just excitement for the future of broadcasting, but also concern: concern that their ability to innovate will be cut off; concern that their viewers' service will be disrupted—or permanently lost—due to reallocation or repacking; and concern that important issues, implications, and alternatives will be overlooked. In particular, broadcasters stress that the Commission must take into account recent marketplace developments that bear importantly on this proceeding, including the increasing recognition (as demonstrated in an attached study) that a host of technological and other alternatives exist for addressing wireless networks' localized capacity issues without nationwide, disruptive spectrum reallocations. These concerns are not assuaged by the comments filed by members of the wireless industry, which fail to recognize broadcasting's value and potential and which downplay the negative and possibly severe consequences of certain proposals (such as significant spectrum reallocation and repacking) on the public's television service.

Broadcasters' services and aspirations are not at odds with the goal of expanding access to broadband. The Commission can and should move forward in a manner that helps to strengthen our communications ecosystem by facilitating growth and innovation in both wireless broadband *and* broadcasting. We have proposed a roadmap for doing so, and we reiterate our commitment to playing a constructive role in this challenging—but worthwhile—process.

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

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

**REPLY COMMENTS OF
THE NATIONAL ASSOCIATION OF BROADCASTERS AND
THE ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC.**

The National Association of Broadcasters (“NAB”)¹ and the Association for Maximum Service Television, Inc. (“MSTV”)² respond here to the initial comments in this proceeding.³ These comments showed broad support for the principles and recommendations embodied in the five-part roadmap that we outlined in our initial comments. Many initial comments discussed the need for the Commission to address not just the three proposals described in the NPRM but also the complex, interrelated issues implicated by proposals for the spectrum reallocations proposed in the NPRM. The roadmap that we proposed provides a framework for addressing these issues, including recent marketplace developments that bear importantly on this proceeding. We also respond here to certain comments filed by members of

¹ NAB is a nonprofit trade association that advocates on behalf of local radio and television stations and broadcast networks before Congress, the Federal Communications Commission and other federal agencies, and the Courts.

² MSTV is a nonprofit trade association of local broadcast television stations committed to achieving and maintaining the highest technical quality for the local broadcast system.

³ *Innovation in the Broadcast Television Bands: Allocations, Channel Sharing and Improvements to VHF*, Notice of Proposed Rulemaking, ET Docket No. 10-235, 25 FCC Rcd. 16,498 (Nov. 30, 2010) (“NPRM”).

the wireless industry. Those comments underestimate the importance of broadcast service to the American public, overlook exciting new innovations in broadcasting—including mobile DTV, which offers a competitive and efficient way to provide video programming to consumers—and downplay the harms that repacking and certain other proposals would cause.

I. THE COMMENTS SHOW STRONG SUPPORT FOR THE ROADMAP PROPOSED BY NAB AND MSTV.

In our comments, we pledged to “work with policymakers to fashion a comprehensive plan for promoting the best possible broadcast and broadband systems for all Americans.” In accordance with this commitment, we proposed a five-part roadmap that would permit the Commission and the public to evaluate not just the three discrete proposals made in the NPRM, but also numerous other integrally related issues on a holistic basis. These steps are necessary to achieve a robust communications ecosystem that best serves the public interest—*i.e.*, one that facilitates growth and innovation in both wireless broadband *and* broadcasting. There was strong support for the five components of the roadmap that our initial comments offered for consideration.

Assessment of the Wireless Industry’s Capability to Deploy Resources More Effectively. The first step of the proposed roadmap is for the Commission to assess the capability of technological breakthroughs to enhance the efficiency of the wireless industry’s use of existing spectrum, including an assessment of the role of complementary and spectrally-efficient technologies such as mobile DTV. Several commenters supported this recommendation.⁴ As explained in detail in Section III, such an assessment is more important than ever, given recent

⁴ See, e.g., LIN Television Corp. (“LIN”) Comments at 4 (noting that the Commission has not tested any of the National Broadband Plan’s “assumptions about the capacity of already allocated spectrum to support future mobile broadband growth” and suggesting that the Commission undertake a “careful assessment of the capacity of existing allocations”).

developments in the marketplace. Analysis of recent projections from Cisco indicates that growth rates in mobile data will fall by 60%-80% over the coming years.⁵ Such growth rates are in line with “what wired networks have been handling” for almost a decade, and are “manageable” if needed “network upgrades” are planned and implemented—simply put, “the numbers certainly don’t suggest a ‘crisis.’”⁶ In fact, a study attached to these reply comments demonstrates that there is a wide range of technological and other options to address wireless network capacity concerns and that the “current rush to reallocate [spectrum] is not necessary.”⁷ Moreover, the availability of channel-bonding innovations contradicts the argument that a wholesale spectrum reallocation is necessary and suggests instead that interleaved spectrum allocation also should be explored.⁸ Clearly, as discussed in greater detail below, the Commission must consider growing evidence and marketplace changes showing that there are

⁵ David Burstein, “Cisco: U.S. Mobile Data Growth Falling 60-80%,” *Fast Net News* (Mar. 29, 2011), available at <http://www.fastnetnews.com/a-wireless-cloud/61-w/4040-cisco-us-mobile-data-growth-falling-60-80>. Burstein’s report is based on Cisco, *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2010–2015*, at Table 9, App’x A (North America), (Feb. 1, 2011), available at http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html.

⁶ Burstein, *supra* note 5.

⁷ Onyeije Consulting LLC, “Solving the Capacity Crunch: Options for Enhancing Data Capacity on Wireless Networks” (April 2011) (“*Solving the Capacity Crunch*”), at i (Attachment A to reply comments).

⁸ See Lynnette Luna, “Carrier Aggregation: How AT&T Will Use Qualcomm’s MediaFLO Spectrum To Double LTE Speeds,” *FierceBroadbandWireless* (March 31, 2011), available at <http://www.fiercebroadbandwireless.com/special-reports/carrier-aggregation-how-att-will-use-qualcomms-mediaflo-spectrum-double-lte> (explaining how carriers such as AT&T may use non-contiguous spectrum to double network speeds).

“numerous” and “meaningful” alternatives to addressing capacity constraints that do not place a “disproportionate emphasis on spectrum reallocation.”⁹

Spectrum Inventory and Usage Studies. The second proposed step is for the Commission to undertake a comprehensive inventory of spectrum availability, including a survey of spectrum utilization (not just licensing, build-out, or partial operations),¹⁰ as well as to seek and receive public comment on the spectrum surveys undertaken by NTIA and other government agencies pursuant to the President’s memorandum of June 28, 2010.¹¹ There was broad support in the initial comments for this proposal as well. As Belo Corp. noted, “[w]ithout first determining whether other idle or underutilized spectrum is available for commercial use, the Commission risks needlessly compromising or otherwise interfering with the critically important benefits free, over-the-air broadcasting affords consumers.”¹² Likewise, Capitol Broadcasting

⁹ *Solving the Capacity Crunch*, *supra* note 7, at i-ii, 6-15. In addition, we note that the Commission recently has issued rules concerning sharing of the broadcast television band with unlicensed devices. *Unlicensed Operations in the TV Broadcast Bands*, Second Report and Order and Memorandum Opinion and Order, ET Docket Nos. 04-186 and 02-380, 23 FCC Rcd. 16,807 (Nov. 14, 2008); *Unlicensed Operations in the TV Broadcast Bands*, Second Memorandum Opinion and Order, ET Docket Nos. 04-186 and 02-380, 25 FCC Rcd. 18,661 (Sept. 23, 2010). However, wireless carriers appear reluctant to contemplate sharing their spectrum bands in order to improve spectrum efficiency. See AT&T Reply Comments, Promoting More Efficient Use of Spectrum Through Dynamic Spectrum Use Technologies, ET Docket No. 10-237 (Mar. 28, 2011), at 3-5; CTIA Reply Comments, Promoting More Efficient Use of Spectrum Through Dynamic Spectrum Use Technologies, ET Docket No. 10-237 (Mar. 28, 2011), at 8-13; Verizon Reply Comments, Promoting More Efficient Use of Spectrum Through Dynamic Spectrum Use Technologies, ET Docket No. 10-237 (Mar. 28, 2011), at 1-6.

¹⁰ As shown below, the wireless carriers unquestionably have access to large amounts of unused or under-used spectrum for at least the near-term.

¹¹ Pres. Barack Obama, “Memorandum: Unleashing the Wireless Broadband Revolution,” 75 FED. REG. 38,387 (July 1, 2010).

¹² Belo Corp. (“Belo”) Comments at 3; see also Sinclair Broadcast Group, Inc. (“Sinclair”) Comments at 10; University of North Carolina (“UNC-TV”) Comments at 6-7 (“[A] full spectrum inventory is the necessary precursor of any rational plan to reallocate spectrum for wireless broadband use, and the Plan’s and Notice’s conclusions that 120 MHz of television (continued...)”).

pointed out that “more than two-thirds of available mobile broadband spectrum is not yet fully utilized.”¹³ Indeed, it is not just broadcasters that are calling for such spectrum inventory/usage studies.¹⁴

As noted in “Solving the Capacity Crunch,” carriers have been slow to deploy much of their current spectrum holdings, and while these “and many other bands [are] underutilized, the claims of immediate crisis are significantly overstated.”¹⁵ A spectrum inventory “is a diagnostic tool and as such it should logically come before any reallocation proceeding.”¹⁶ Several spectrum sources are more readily and promptly available than broadcast spectrum, and without the accompanying harms to American viewers.¹⁷ NTIA already has identified 115 MHz of spectrum under its jurisdiction that could be made available for wireless broadband use within five years.¹⁸ Notably, out of the current 547 MHz of spectrum allocated to wireless, 377 MHz has not been fully deployed.¹⁹ In addition, recent developments show that

spectrum must be reclaimed from broadcasters and reallocated to broadband inverts the analysis.”); Capitol Broadcasting Co. (“Capitol”) Comments at 7.

¹³ Capitol Comments at 3.

¹⁴ See, e.g., Google Inc. Comments, Promoting More Efficient Use of Spectrum Through Dynamic Spectrum Use Technologies, ET Docket No. 10-237 (Feb. 28, 2011), at 5-7 (calling “[a] comprehensive inventory of Federal and non-Federal spectrum usage” a “necessary step.”).

¹⁵ *Solving the Capacity Crunch*, supra note 7, at 16.

¹⁶ *Id.* at 18.

¹⁷ These spectrum sources include AWS-3 block spectrum (2155-2175 MHz), H block spectrum (1915-1920 MHz and 1995-2000 MHz), J block spectrum (2020-2025 MHz and 2175-2180 MHz), and 700 MHz D block spectrum (758-763 MHz and 788-793 MHz). *Id.* at 19-20.

¹⁸ Department of Commerce, “An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675-1710 MHz, 1755-1780 MHz, 3500-3650 MHz, and 4200-4220 MHz, 4380-4400 MHz Bands” (Oct. 2010), available at http://www.ntia.doc.gov/reports/2010/FastTrackEvaluation_11152010.pdf.

¹⁹ See OBI Technical Paper No. 6, *Mobile Broadband: The Benefits of Additional Spectrum* (Oct. 21, 2010), at 15-16. See also Spencer Ante & Amy Schatz, “Skepticism Greets AT&T Theory: Telecom Giant Says T-Mobile Deal Will Improve Network Quality, But Experts See Other (continued...)”

carriers could be making more effective use of their existing spectrum in the near to immediate future, as described in more detail in Section III(A). Accordingly, there is sufficient time for the Commission to conduct a thorough spectrum inventory and usage studies, with input from the public.

Assessment of the Harms of Reallocating Spectrum from Broadcasting to Wireless Services. Third, we recommend that the Commission weigh the public policy harms—including with respect to diversity and competition—of reallocating spectrum currently licensed to the public’s free, over-the-air broadcast television service to a very small number of subscription wireless operators. The Commission should consider harms to broadcasters who wish to continue to broadcast, innovate and enrich their services to the public (without the disruption, service losses and other harms that would result from spectrum reallocation and repacking, without burdensome spectrum fees, and without impairment to their ability to innovate in the future). Moreover, for broadcasters who might be interested in surrendering some or all of their channel capacity, the Commission should ensure that this is done on a truly voluntary basis, and not coerced by the prospect of service losses or new spectrum fees.²⁰

Options,” *Wall Street Journal* (Apr. 4, 2011) (“Some companies are sitting on swaths of spectrum that they aren’t using. Comcast Corp. and other cable operators paid \$2.4 billion to buy valuable airwaves licenses in New York, Chicago, Los Angeles and other large markets in 2006. The companies aren’t using the airwaves now. Wireless broadband provider Clearwire Corp. said it explored selling some of its large 4G spectrum holdings to raise money for its operations.”).

²⁰ See, e.g., Belo Comments at 15; Association of Public Television Stations, National Public Radio, the Public Broadcasting Service, and the Corporation for Public Broadcasting Comments at 9 (“Among other important considerations, incentive auctions must be *entirely voluntary*.”) (emphasis added); Pearl Mobile Comments at 10 (“Channel sharing is voluntary if it is the result of an agreement independently and privately entered into by participating stations, in which the decision to engage in the agreement is wholly independent of any government action. If, for example, a new spectrum fee were to be imposed on broadcasters who do not enter into a channel sharing arrangement, the resulting channel sharing would not be genuinely voluntary.”).

Exploration of Other Means of Expanding Broadband Access. Our fourth recommendation is that the Commission explore other means of expanding broadband access, such as flexible spectrum usage rights and secondary spectrum markets. A considerable number of commenters noted the public interest advantages of giving incumbent licensees, including broadcast licensees, opportunity to deploy their existing spectrum flexibly, arguing that reliance on the dynamics of the private market can result in a quicker, less costly, and more efficient process.²¹ This option deserves careful assessment in the context of the holistic approach that numerous initial comments urged upon the Commission.²² Indeed, the Commission itself already has acknowledged that its own regulatory restrictions have “limited [broadcasters’] flexibility to evolve their business model or industry structure over time in response to changing consumer preferences and habits.”²³

Comprehensive and Holistic Approach. Fifth, we recommend that the Commission evaluate comprehensively and holistically all relevant issues. The Commission should make public, and solicit and consider comment on, closely related issues and proposals

²¹ See, e.g., Broadcaster Coalition Comments at 3 (“We ask the FCC to allow all broadcasters the opportunity to provide broadband services with the freedom to implement contemporary technologies on their existing licenses to better serve the public.”); LIN Comments at 2-3; Sinclair Comments at 11 (“If a spectrum crisis truly exists, the FCC should immediately unleash television spectrum from outdated regulations that restrict the spectrum to 20th Century technical standards. Broadcasters . . . should be free, like other spectrum users, to avail themselves of technological advances without waiting decades for the government to define an opportunity and slowly implement a response.”); Local Television Broadcasters Comments at iii; Open Mobile Video Coalition (“OMVC”) Comments at 12-13; and WatchTV, Inc. Comments at 2.

²² See *infra* notes 24-25 and accompanying text. See also *Solving the Capacity Crunch*, *supra* note 7, at 18, 21-22 (explaining that economists and policy analysts increasingly have come to agree that flexible rights for licensees, coupled with a vibrant secondary market for these rights, are the most efficient ways to repurpose spectrum).

²³ OBI Technical Paper No. 3, *Spectrum Analysis: Options for Broadcast Spectrum* (June 2010), at 10.

before it acts on the three issues targeted for discussion by this NPRM. Numerous commenters similarly pointed out that the NPRM in this proceeding does not address issues of this nature, such as the auction process, repacking, interference protection, integrity of coverage areas, spectrum fees, Canadian and Mexican border issues, and protection of Class A, LPTV, and translator services. For example, ION pointed out that “[a]ssessing the ultimate benefit or harm from any particular spectrum plan implementation will depend on the answers to many important questions not asked in the Notice,”²⁴ and Univision noted that the NPRM’s “proposals will not be implemented in a vacuum, and their ultimate benefit (or harm) will depend upon the answers to the more important questions *not* asked in the NPRM, but which presumably will be the subject of one or more future inquiries.”²⁵

As part of this process, the Commission should release its Allotment Optimization Model, which it has indicated will be used to design a repacking plan, and the results of its spectrum studies using this model. The Commission has been promising for some time to release this model, which is critical to assessing the potential harms of repacking – loss of the public’s over-the-air services due to reduced coverage areas, increased interference and various facility changes. Broadcasters understandably wish to review and test this model so they can evaluate the extent to which repacking will impact the public’s service and broadcasters’ coverage.

²⁴ ION Media Networks Inc. (“ION”) Comments at 4-5.

²⁵ Univision Communications, Inc. (“Univision”) Comments at 6-7. *See also* Cox Media Group, Inc. (“Cox”) Comments at 14 (“[I]t is imperative that the Commission take a holistic approach to defining the problem and devising potential solutions.”); Belo Comments at 3 (“Belo urges the Commission to take a comprehensive approach to spectrum allocation: assessing all possible sources of spectrum, evaluating the costs and benefits of each potential use of the nation’s spectrum, and allocating spectrum in a manner that will maximize the public benefit.”).

II. WIRELESS INDUSTRY FILINGS CONTAIN SERIOUS FLAWS.

Television broadcasting plays a unique, critical, and often life-saving role in providing Americans with ubiquitous access to news and information. Local broadcasting is a trusted—and vital—source of local journalism, emergency information, and other valuable programming, from sports and weather to public affairs and entertainment programming. Nevertheless, certain wireless industry commenters disparage the role of television broadcasting, including the increasing—not decreasing—importance of over-the-air service to consumers. They also ignore the fact that broadcasters continue to innovate and evolve. Promising developments in broadcasting should be encouraged, not stymied. Wireless commenters also do not provide realistic assessments of the consequences of repacking the broadcast band or of the amount of spectrum that could be reallocated for wireless uses from such a process.

A. Wireless Industry Commenters Disparage Broadcasting, Which Provides Vital Services To All Americans.

A handful of comments from members of the wireless industry disparage the value of broadcast service.²⁶ But, numerous other comments pointed out the irreplaceable societal benefits of local television, including local journalism, coverage of breaking news events and emergencies, coverage of public affairs issues and elections, and free, universal service.²⁷

²⁶ *See, e.g.*, Cablevision Systems Corp. (“Cablevision”) Comments at 2; CTIA-The Wireless Association (“CTIA”) Comments at 17; Ericsson Comments at 2. When it comes to retransmission consent disputes, however, Cablevision treats broadcast programming as “must-have” content. *See, e.g.*, Cablevision Comments, Petition for Rulemaking to Amend the Commission’s Rules Governing Retransmission Consent, MB Docket No. 10-71 (May 18, 2010), at n.2, n.5, n.9, n.33, and n.47 (citing characterizations of broadcast programming as “must-have”).

²⁷ *See* Belo Corp. Comments at 2; Block Communications, Inc. (“Block”) Comments at 5; Broadcaster Coalition Comments at 1-2; Capitol Comments at 9; Cohen, Dippell, and Everist Comments at 4-5; Harris Corp. (“Harris”) Comments at 6-8; Local Television Broadcasters Comments at 12-13; NAB/MSTV Comments at 2-3; Univision Comments at 1.

An expansive rebuttal of the wireless industry’s disparagement of the public’s broadcast service is not necessary here. But three points should be emphasized.

First, virtually *all* Americans obtain their *local* news from local broadcast stations. The fact that some receive it through over-the-air antennas, some receive it through retransmissions by cable, satellite, or telco systems, and some receive it via the Internet is irrelevant. This news and other local content is developed and created by local broadcast stations.²⁸ None of the comments challenges that point. At a time when newspapers’ workforces are shrinking, local broadcast news is more important than ever.²⁹ Spectrum is the cornerstone of existing and future broadcast services and ensures that broadcasters’ localized services—including vital local emergency information—will be available to everybody in the community.

Second, contrary to CTIA’s comments,³⁰ the public’s reliance on the over-the-air transmission service is increasing. In 2010, the number of *exclusively* over-the-air households increased to 14.7%.³¹ Of course, the number of households that utilize over-the-air service is far greater.³² In certain markets and in certain groups, reliance on over-the-air television is much higher. As Univision points out, “the most rapidly growing segment of the U.S. population [the

²⁸ There are only a few dozen local cable news channels, a high percentage of which are owned, operated, and programmed, in whole or in part, by broadcasters.

²⁹ See NAB Comments, Examination of the Future of Media and Information Needs of Communities in a Digital Age, GN Docket No. 10-25, at 2-8 and 14-16 (May 7, 2010) (“*NAB Future of Media Comments*”).

³⁰ CTIA cites a 2009 statement made by Blair Levin at the Progress & Freedom Foundation indicating that the number of people who use over-the-air broadcasting has decreased by 56 percent in the last ten years. See CTIA Comments at 7, n.19 and accompanying text.

³¹ See ION Comments at 9, citing an analysis by Citigroup analysts Jason Bazinet and Michael Rollins.

³² Because of the cost and inconvenience of connecting every television set to MVPD service, many households that subscribe to an MVPD service also include additional over-the-air receivers.

Hispanic population] relies heavily on over the air television.”³³ Broadcasters increasingly are using their multicast capability to provide programming targeted to minority groups.³⁴ And 100% of mobile DTV consumers will rely on over-the-air service.³⁵

Third, there is no evidence in this record or anywhere else of which we are aware that other local media are capable of or are replacing local broadcasters in their role of providing critical local reporting services.³⁶ In fact, the most promising new source of and outlet for local journalism is mobile DTV, which very efficiently builds on broadcasters’ existing technical and physical infrastructure.³⁷

³³ Univision Comments at 1-3. According to the Pew Research Center, not only is local television news “the top source of news for Americans,” it is particularly important for African-Americans, women and older Americans. Pew Research Center, “Understanding the Participatory News Consumer: How Internet and Cell Phone Users Have Turned News Into A Social Experience” (Mar. 1, 2010), at 11.

³⁴ See Justin Nielson, “TV Stations Multiplatform Analysis ’11 Update: Multicasting Expands Programming Options, Mobile DTV Goes Live,” *Broadcast Investor (SNL Kagan)* (Jan. 27, 2011) (noting that “[a]s of the end of 2010, [the] percentage of commercial multicasting stations has increased to 71%... doubling the channel options for viewers with 1,240 additional digital channels, of which 142 are Spanish-language network affiliates”). See also Jon Lafayette, “EXCLUSIVE: Bounce TV, New Broadcast Net Aimed at African Americans, To Launch in Fall,” *Broadcasting & Cable* (Apr. 3, 2011) (discussing recent creation of Bounce TV, a new multicast network aimed at serving African American audiences). One of Bounce TV’s executives noted that “the more than 14 million African American TV households have just a few dedicated cable channels – and no over-the-air networks.... Bounce TV will fill the need for an over-the-air television network exclusively for African Americans.” *Id.*

³⁵ See Pearl Mobile DTV Company, LLC (“Pearl Mobile”) Comments at 9.

³⁶ See *NAB Future of Media Comments*, *supra* note 29.

³⁷ See Pearl Mobile Comments at 6-8 (“Mobile DTV provides a spectrally efficient means of helping to meet the demand for high-bandwidth content and services on mobile devices . . . [and] it also can be seamlessly integrated into the converged media environment that consumers expect on their mobile and handheld devices.”).

B. Wireless Industry Commenters Fail To Take Into Account Broadcast Innovations.

There is a clear consensus in the broadcast industry's comments that broadcasters are innovating and desire to continue doing so in the future, to the public's benefit. This proceeding—the very title of which refers to “Innovation in the Broadcast Bands”—provides an important forum for discussing those innovations, many of which are ignored by wireless industry commenters and, to a substantial extent, by the NPRM itself.

Broadcasters are continuing to roll out mobile DTV service in many markets in the near-term.³⁸ Mobile DTV is a spectrally-efficient means of providing popular local news and other popular video content to consumers, including emergency information when cellular networks go down.³⁹ It permits instantaneous video updates to be provided to millions of viewers without consuming any additional bandwidth. This was nowhere more evident than after the recent earthquake and tsunami in Japan, where the over-the-air broadcast service and its ability to reach mobile devices became an important lifeline of news and emergency information for citizens.⁴⁰

The wireless industry comments do not take into account broadcast innovations that benefit consumers, including but not limited to mobile DTV. A robust, vibrant broadcast

³⁸ See OMVC Comments at 5; Pearl Mobile Comments at 1 and 6; Harris Comments at 12-13; See also Winslow, George, “MCV Announces Plans for 12 Additional Markets,” *Broadcasting & Cable*, April 18, 2011, available at http://www.broadcastingcable.com/article/466957-MCV_Announced_Plans_for_12_Additional_Markets.php.

³⁹ See Cox Comments at 4 (“Indeed, in local emergencies, as wireless telephone networks fail, a mobile DTV connection could be the only way that people can obtain the critical, life-saving information they need.”).

⁴⁰ Michael Plugh, “What I Left Behind In Japan,” *Salon.com* (March 22, 2011), available at http://www.salon.com/life/feature/2011/03/22/japan_i_left_behind/index.html. See also “PBS EAS Pilot Project to Include Mobile DTV,” *Television Broadcast*, April 13, 2011, available at <http://www.televisionbroadcast.com/article/119054>.

service benefits the public by providing a competitive, free alternative to expensive MVPD services. In the near future, it also will offer a competitive service to mobile video offerings. Congress and the FCC have long placed a high value on promoting competition in the video marketplace.⁴¹ Spectrum reallocation and other proposals such as repacking and channel sharing have the potential to impair broadcasters' ability to innovate, to compete, and to offer a range of over-the-air services, including multicasting, high-definition programming and mobile DTV, denying consumers the benefit of these services. Broadcasters' free, over-the-air offerings ensure that American consumers are not forced to use MVPD services for news, sports, emergency information, and entertainment programming, and indeed an increasing number of consumers are "cutting the cord" and cancelling expensive MVPD subscriptions.⁴² The Convergence Consulting Group estimates that 2.07 million U.S. television subscribers will have "cut the cord" between 2008 and the end of this year.⁴³ Reducing the spectrum available for mobile DTV service will diminish competition in the mobile video marketplace and the diversity

⁴¹ "Our public interest evaluation necessarily encompasses the 'broad aims of the Communications Act,' which include, among other things, a deeply rooted preference for preserving and enhancing competition in relevant markets . . ." *Applications of Comcast Corporation, General Electric Company, and NBC Universal, Inc.*, Memorandum Opinion and Order, MB Docket No. 10-56, FCC 11-4 (Jan. 20, 2011), at para. 20 (citations omitted).

⁴² See James Gallagher, "Cutting the Cable TV Cord," *STLToday* (Mar. 30, 2011), available at http://www.stltoday.com/business/local/article_f588c958-d382-580e-a142-df273a5d3cfb.html; Todd Spangler, "Survey: 7% of Pay-TV Subs Pondering Pulling the Plug," *Multichannel News* (April 5, 2011) (Consumer Reports survey found that 7% of current pay-TV subscribers are considering canceling their service). See also Implementation of Section 3 of the Cable Television Consumer Protection and Competition Act of 1992, *Report on Cable Industry Prices*, MM Docket No. 92-266, DA 11-284, at para. 2 (Feb. 14, 2011) (noting that the average monthly price of expanded basic service increased by 5.9% for the 12 months ending January 1, 2009, while the Consumer Price Index increased just 0.1% over the same period). From 1995-2009, prices have increased at a 6.3% compound annual rate, while general inflation has increased at a 2.4% compound annual rate. *Id.* at para. 34.

⁴³ Don Reisinger, "Study: More TV Viewers in U.S. 'Cutting the Cord,'" *CNET News* (Apr. 6, 2011), available at http://news.cnet.com/8301-13506_3-20051202-17.html. Between 2008 and 2009, 550,000 households cut the cord, and one million households did so in 2010.

of services available to American viewers, and deprive them of the efficiencies of the mobile DTV architecture for delivering programming and emergency information.⁴⁴

Other comments raise legitimate concerns that neither the Commission nor the wireless industry has sufficiently considered other avenues of broadcast evolution and future innovation. Several initial comments demonstrated that broadcasters are, in fact, exploring new technologies and services.⁴⁵ Innovation in broadcasting, including integration of broadcast and broadband services, will help spur local economies by providing local advertising platforms.⁴⁶

⁴⁴ See Tom Wheeler, “Broadband Plan Is Big Opportunity For TV,” *TVNewsCheck* (Apr. 8, 2010), available at <http://www.tvnewscheck.com/article/2010/04/08/41308/broadband-plan-is-big-opportunity-for-tv> (“Broadcasting’s one-to-many architecture is simply the most efficient means of delivering the commonly used content that makes up the fat part of the long tail [B]roadcasting is also the most efficient means of powering the next generation of wirelessly delivered apps such as newspapers, eBooks and digital signage The economics of such new mobile-delivered services requires the efficiency of feed-once, then deliver-to-all, rather than the serial one-at-a-time delivery of the current mobile infrastructure.”).

⁴⁵ For example, Sinclair and others cite the capabilities of orthogonal frequency-division multiplexing (“OFDM”) technologies. Sinclair Comments at 14; see also CMMB America, LLC (“CMMB America”) Comments at 6 (“The benefits of an OFDM-based solution have been proven beyond doubt”); Local Television Broadcasters Comments at 29 (noting broadcast industry exploration of “the potential of new or alternative transmission standards, including OFDM and advanced codecs that would further transform the possible uses of broadcast television spectrum.”); Advanced Television Systems Committee (“ATSC”) Ex Parte Notice and Presentation in ET Docket No. 10-235 (filed March 29, 2011).

⁴⁶ According to a recent SNL Kagan analysis, the total number of “digital channels” being provided by local commercial stations rose to more than 2,500 in 2010, representing “more than double the over-the-air broadcast content options available prior to 2008.” The same analysis noted that 2010 was a “groundbreaking” year for mobile DTV, as broadcasters completed successful consumer market trials in Washington, DC, Seattle and Atlanta. While it is difficult to predict precisely how these emerging platforms will impact the \$50 billion broadcast TV advertising market, it is clear that these new platforms will provide more and potentially more economical opportunities for local businesses and advertisers of all kinds (including political candidates) to reach local audiences. Broadcasters are also leveraging their local expertise on the Web. According to SNL Kagan, more than 95% of full-power commercial TV stations operate a local website, with more than 88% streaming video content, nearly 79% providing local news and weather video updates, and nearly two thirds providing a local classified ads section, again offering new opportunities for local advertisers. Nielson, “TV Stations Multiplatform Analysis ’11 Update,” *supra* note 34.

The Commission should not proceed on a course now that precludes the investigation, development, and roll-out of promising technologies in the future, nor should it advance one service (wireless) at the cost of harming another service important to the public (broadcasting). Continuing innovations are necessary for a vibrant broadcast service in the long-term as well as for providing an innovative and competitive service for consumers, one which helps to provide a check on the prices of competing pay services. The public deserves creative and open-minded thinking about alternatives before irreparable spectrum decisions are made.

C. Wireless Industry Commenters Make Unrealistic Assumptions About The Amount Of Spectrum That Can Be Reallocated From Broadcasting To Wireless And Unjustifiably Rely On The CTIA/CEA White Paper.

CEA and CTIA support proposals to reallocate up to 120 megahertz of spectrum from broadcasters to the wireless industry, asserting that only a few broadcasters and only those in the top 30 markets would be required to surrender their channels in order to free up a 120 megahertz contiguous, nationwide spectrum block.⁴⁷ Their comments cite their recent White Paper on this subject.⁴⁸ Other wireless industry commenters also rely on the CTIA/CEA White Paper,⁴⁹ which was defective in several important respects.

At the public session of the Broadcast Engineering Forum hosted by the FCC on June 25, 2010, engineers and technical experts explained that even under certain flexible

⁴⁷ CTIA Comments at 10; Consumer Electronics Association (“CEA”) Comments at 8-9.

⁴⁸ CTIA & CEA, “Broadcast Spectrum Incentive Auctions White Paper” at 5 (Feb. 15, 2011), available at http://www.cesweb.org/shared_files/edm/Press/Spectrum_Whitepaper_FINAL.pdf (“CTIA/CEA White Paper”). See *id.* at 2 (“in the Continental United States outside the Top-30 markets, no stations will need to exit their over-the-air channels. Within the Top-30 markets, some mechanism, such as incentive auctions, will be needed to clear sufficient spectrum. In the majority of those Top-30 markets, only a handful of stations will need to be addressed, and that could possibly be accomplished through channel sharing or other mechanisms”).

⁴⁹ See, e.g., Ericsson Comments at 2 n.6, 4 n.10.

assumptions (including an assumption that minimum distance separations would be reduced), hundreds of stations would be required to go off-the-air or share channels (and hundreds more be subjected to repacking) to free up 120 megahertz of broadcast television spectrum. In fact, these industry studies show that in several markets *all* stations would be required to share channels.⁵⁰

Clearly, contrary to the CTIA/CEA White Paper, more than a “handful”⁵¹ of stations would be required to exit broadcasting or share channels in the major markets to reclaim 120 MHz of spectrum. Indeed, CTIA/CEA’s description of their analysis shows this to be the case. For example, CTIA/CEA assume that in the New York market, which currently has 27 channels occupied by full power and Class A stations, only 10 channels would be available for television use after a repacking.⁵² Moreover, the White Paper’s cost projections appear to be overly optimistic, given that the costs of relocating and repacking stations may be quite high (in some markets, all stations may be required to move to new channels).⁵³ For these reasons, we

⁵⁰ See “Panel for Methodology on Repacking” Presentation, *available at* <http://reboot.fcc.gov/workshops/broadcast-engineering-forum>, at slides 9-12 (showing that in many markets, two stations would be required to share a single 6 MHz channel).

⁵¹ *CTIA/CEA White Paper*, *supra* note 48, at 2.

⁵² The CTIA/CEA White Paper assumes that “13 channels were generally deemed available in a market, with four in the upper VHF band and nine in the UHF band. That number was decreased in the markets where Public Safety/Land Mobile sharing was designated” *Id.* at 13. The New York market uses three TV channels for Public Safety/Land Mobile sharing. See 47 C.F.R. § 73.623(e).

⁵³ See Testimony of Robert Good, Assistant General Manager, Director of Operations, and Chief Engineer, WGAL-TV, Lancaster, PA, before the House Subcommittee on Communications and Technology, Hearing on “Using Spectrum to Advance Public Safety, Promote Broadband, Create Jobs, and Reduce the Deficit” (Apr. 12, 2011), (estimating that it would cost \$1 million to \$1.5 million to relocate a station moving from a UHF channel to another UHF channel and could cost in excess of \$4 million to relocate a station from a UHF channel to a high VHF channel).

appreciate recent statements by Commission staff that the Commission will not seek to reallocate 120 megahertz of broadcast spectrum at all costs.⁵⁴

The CTIA/CEA White Paper also presumes, unrealistically, that some stations will voluntarily move to low VHF or will be forced to relocate to the high VHF band.⁵⁵ As the Commission recognized in the NPRM,⁵⁶ the challenges for digital broadcasting in the VHF spectrum band are not limited to the low VHF band. For this reason, Commission staff, in outlining preliminary ideas on how a repacking might work, have made clear that they do not anticipate any forced relocation of broadcasters to the VHF band.⁵⁷ The CTIA/CEA White Paper's assumption that stations can and should be required to move to the high VHF band is another serious defect that causes it to arrive at unrealistic conclusions concerning the amount of spectrum that a repacking would yield.

In addition, the Commission has yet to consider seriously the services provided to the American public by translator stations.⁵⁸ Many viewers receive the programming of full-power broadcast stations through the signals of low-power translators, both in rural and in urban areas, where VHF stations often rely on UHF translators to fill in gaps in coverage. As part of

⁵⁴ See William Lake, Chief, Media Bureau, "Incentive Auctions: New Options for Broadcasters" (March 2011), available at <http://iowabroadcasters.com/resource/tvweb311.pdf> ("*Incentive Auctions Presentation*"); Rebecca Hanson, Senior Advisor, Broadcast Spectrum, Media Bureau, Presentation to the Federal Communications Bar Association, "Overview of Spectrum Allocation and the FCC's National Broadband Plan" (Mar. 30, 2011).

⁵⁵ See *CTIA/CEA White Paper*, *supra* note 48 at 7, 13, and 16 (describing moves to low VHF as optional).

⁵⁶ See NPRM at paras. 42-45.

⁵⁷ See, e.g., *Incentive Auctions Presentation supra* note 54, at slides 6 and 9.

⁵⁸ See e.g., National Translator Association Comments; UNC-TV Comments at 3 (noting that it uses dozens of translators to provide service in areas of North Carolina, where rugged terrain compromises the over-the-air service provided by UNC-TV's full-power stations); ZGS Communications, Inc. Comments.

any holistic discussion about the reallocation of spectrum utilized by television broadcasting, the Commission must address the serious issues relating to translator service, upon which television viewers across the nation rely.⁵⁹

D. Wireless Industry Commenters Fail Adequately To Consider The Adverse Impact Of Repacking On The Public's Broadcast Service And The Public's Investment In Digital Receivers.

CTIA incorrectly asserts that repacking should have no impact “from a consumer’s standpoint” other than the need to perform a one-time re-scan when stations change channels.⁶⁰ The fact is that repacking broadcast spectrum has the potential to harm, and in many cases wholly disenfranchise, numerous consumers. As broadcasters learned from the digital television transition, changes to a station’s channel, site, power level, and/or tower height all can affect the public’s ability to receive that station’s signal and could increase interference to reception of stations operating on the same or adjacent channels in the same geographic region. Moreover, in markets where one or more stations move from the UHF to VHF spectrum bands, consumers that own UHF-only antennas will need to purchase new antennas with VHF reception capability. These inevitable disruptions occurred over and over again during the digital transition, despite the best efforts of an exemplary public/private partnership. So concerned were Congress, the FCC and the nation about such disruptions that the first bill enacted by the new Congress in 2009 was to postpone the transition by four months to deal with these issues.⁶¹

⁵⁹ We further note that Congress has directed the FCC to create 175 new full-power television allotments (*see* 47 U.S.C. § 336(f)(6)(B)), which the Commission has recognized that it has not yet done. *See Advanced Television Systems and Their Impact Upon the Existing Television Broadcast Service*, Memorandum Opinion and Order on Reconsideration of the Seventh Report and Order, MB Docket No. 87-268, 23 FCC Rcd. 4,220 (2008), at n. 73.

⁶⁰ CTIA Comments at 10.

⁶¹ *See* DTV Delay Act, Pub. L. No. 111-4, 123 Stat. 112 (2009).

Congress and the FCC took these steps because of the real, destructive and widespread impact of repacking on consumers. It cannot be wished away in this context.

E. Wireless Commenters' Repetitive And Erroneous Support Of Cellularization Should Be Disregarded

In their initial comments in this proceeding, both CTIA and Ericsson argue that converting the existing television architecture to a cellular architecture will greatly reduce the spectrum needed to maintain over-the-air television service.⁶² As we have explained in other proceedings, and as we discuss below, converting the existing model for broadcast television distribution to one requiring dozens, or perhaps hundreds, of low-power towers *per station* would be cost prohibitive, present numerous engineering problems, and pose a serious administrative challenge. Contrary to CTIA's and Ericsson's assertions, cellularization will not save or reduce the amount of spectrum needed by the public's television service, nor would it benefit consumers. Furthermore, both CTIA's arguments and Ericsson's cellularization study rely on severely flawed assumptions.

CTIA argues that a "transition" from "the current high power/high tower broadcast architecture into low power networks of distributed transmitters" could "eliminate extensive co-channel and adjacent channel separation requirements and permit currently unused spectrum to be used for wireless broadband services."⁶³ In support, CTIA cites comments it filed with CEA in response to NBP Public Notice #26 in late 2009.⁶⁴ NAB and MSTV previously and thoroughly refuted the findings of the CTIA/CEA submission in the comments we filed last

⁶² See CTIA Comments at 1-17; Ericsson Comments.

⁶³ CTIA Comments at 16-17.

⁶⁴ See Comments of CTIA & CEA, NBP Public Notice #26, Uses of Spectrum, White Paper Proposal: Exploring a Path for Next Gen Television and Next Gen Wireless Broadband Spectrum, GN Docket No. 09-47 (Dec. 22, 2009) ("*CTIA/CEA DTS Proposal*").

year.⁶⁵ We noted then that the CTIA/CEA proposal faced serious, and probably fatal, engineering and financial challenges that made such a “transition” infeasible. We explained, for example, that an interference-free single frequency network (SFN), as CTIA proposed, would require perfect synchronization and perfect functionality at all times, and that such perfection is unattainable in the real world because of “radio propagation effects and tower siting problems.”⁶⁶ The end result of these problems would be that for some viewers the use of SFN technology would result in interference and loss of service rather than service improvement.⁶⁷ While a single frequency network is useful in limited circumstances, such as to provide fill-in service, its practicability and desirability as a system-wide substitute for high-power ATSC would be severely limited because of the unavoidable interference and coverage gaps.⁶⁸

We also noted that CTIA/CEA’s cost estimate to replace existing TV architecture with a cellularized structure—less than \$2 billion—was computed inaccurately by “orders of magnitude.” First, CTIA/CEA based their calculation on an average deployment of 15 to 20 SFN transmitters *per market*, rather than per station, as would be required at the least.⁶⁹ Second, to replicate a station’s existing service area, each of its 15-20 transmitters would need to cover

⁶⁵ See Reply Comments of MSTV and NAB, NBP Public Notice #30, GN Docket Nos. 09-47, 09-51, 09-137 (Jan. 27, 2010) (“*MSTV/NAB DTS Reply*”), attached hereto as Attachment B.

⁶⁶ *Id.* at 5.

⁶⁷ *Id.*

⁶⁸ *Id.* See also *id.* at 9-10 (“Given the distance separation and the overlap in service areas, stations in Baltimore and Washington are effectively precluded from using the same or adjacent channels As a result, in the New York-Philadelphia, Boston-Providence, Baltimore-Annapolis-Washington markets, and in other congested metropolitan markets throughout the country, different channels would be required for almost all stations, even if separation distances were drastically reduced The Commission consequently would be unable to reclaim the amounts of contiguous spectrum claimed by CTIA/CEA.”).

⁶⁹ *CTIA/CEA DTS Proposal*, *supra* note 64, at 24.

1,500 square kilometers or more and would require substantial power. This model is inconsistent with the low-power architecture CTIA and CEA claim would eliminate or substantially reduce the separation distances necessary for substantially greater channel re-use. With a commensurate reduction in power per transmitter comes an exponential increase in the number of transmitters needed to replicate existing coverage areas—and an exponential increase in costs. We estimated that, to achieve the proper low-power model and to maintain good quality signals to all viewers, each station would need to employ more than 300 transmitters, for a total of several thousand per television market.⁷⁰ The final price tag would be enormous—\$100 billion or more—a cost even large wireless companies would balk at covering and that would be passed on to consumers.

Ericsson, likewise, makes fatal flaws in its study in support of a cellular architecture for broadcasting. Ericsson admits that “technical and economic obstacles ... would have to be overcome” to implement a cellularized TV architecture, but, even with that caveat, it drastically underestimates the spectrum required to provide today’s digital television service.⁷¹ To achieve these spectrum savings, Ericsson makes a number of erroneous assumptions. First, it assumes that every broadcaster can provide the same quality of service using almost 40% less bit capacity than can be transmitted today using the ATSC standard. Next, it miscalculates the number of full power TV stations in a market. For example, the number of television stations Ericsson assumes in its study is 45% less than the actual number present in Los Angeles and 35% less than the actual number of stations in New York. These errors seriously undermine its argument that broadcasters could offer the same service they do today on less than one-third of

⁷⁰ *MSTV/NAB DTS Reply, supra* note 65, at 7-8.

⁷¹ *See* Ericsson Comments at 4 (asserting that broadcast services could be provided in just 84 MHz of spectrum).

their current spectrum. Moreover, Ericsson assumes that every over-the-air viewer will be required to use a high-gain 30-foot outdoor antenna, and that broadcast operations will require between 625 and 2500 base stations per market, a number that, as we have shown above, is both cost-prohibitive and impractical from an engineering perspective. For all these reasons, the Commission need not and should not give further consideration to converting the entire existing television architecture to a cellularized architecture.

III. RECENT MARKETPLACE DEVELOPMENTS BEAR IMPORTANTLY ON THIS PROCEEDING AND THE COMMISSION'S BROADBAND GOALS.

A. Technological And Other Improvements Can Be Used To Increase Network Capacity.

As shown in the “Solving the Capacity Crunch” analysis appended to these reply comments, there are many ways to address the capacity issues facing wireless networks without reallocating broadcast spectrum.⁷² This analysis shows that, “[o]ver the past four decades, spectrum reuse strategies have been over 60 times more useful in increasing data capacity when compared to spectrum assignments.”⁷³ As described in more detail in the attached analysis, wireless carriers can deploy a range of techniques to address capacity concerns, including:

- upgrading network technology to improve spectral efficiency;
- migrating voice traffic to Internet Protocol;
- adopting network management practices (with respect to pricing and usage) to reduce network congestion;
- leveraging consumer infrastructure, such as femtocells and wi-fi;

⁷² *Solving the Capacity Crunch*, *supra* note 7, at Section II.

⁷³ *Id.* at i.

- increasing capacity through the use of smart antennas, picocells, modernized network architecture, Distributed Antenna Systems, upgraded backhaul, sectorization, and cell splitting;
- using packet prioritization;
- employing caching;
- utilizing channel bonding;
- developing bandwidth sensitive applications; and⁷⁴
- optimizing popular applications for bandwidth-constrained networks.⁷⁵

Recent commentary on channel bonding from wireless industry executives is illustrative of the capability of modern techniques to improve network capacity.⁷⁶ AT&T reportedly “hopes to double the speeds of its planned LTE network by essentially gluing together” spectrum holdings using “carrier aggregation technology.”⁷⁷ The benefits of “bonding non-contiguous spectrum into a single, wider channel” are “huge,”⁷⁸ and the carrier aggregation technology “can be deployed in spectrum swathes as small as 1.4 MHz all the way up to 20

⁷⁴ *Id.* at i-ii and Section II. The attached paper also points out that the FCC can take concrete actions to help relieve network congestion and make better use of spectrum, including reclaiming spectrum from speculators and warehouseers; increasing licensee flexibility and promoting secondary spectrum markets; considering receiver standards; and promptly licensing the spectrum languishing in its “pipeline” and the underutilized spectrum previously identified by NTIA. *See id.* at iii and Sections II.B, III.

⁷⁵ *See* “Smartphone Efficiency Report” by Rysavy Research, Jan. 25, 2011, which states at 3: “Applications that are designed specifically for bandwidth-constrained networks can consume significantly less data than those that are not.” In comparing iPhone, Android and Blackberry platforms for Web browsing, the report found, at 12, that “for Web browsing, Blackberry was on average 2.1 times more efficient than iPhone iOS and Android across the test sites measured. For the email configurations tested, Blackberry on average across all the message types, was 4.5 times more efficient than Android and 11.4 times more efficient than iPhone iOS.”

⁷⁶ *See* Luna, *supra* note 8.

⁷⁷ *Id.*

⁷⁸ *Id.*

MHz.”⁷⁹ These developments are simply illustrative of the kinds of techniques that the wireless industry could use to address capacity demands. Indeed, a wireless industry executive has stated that “wireless operators could double the amount of capacity they supply with current spectrum by investing more in new wireless equipment on existing cell towers.”⁸⁰

The Commission should consider – and to the extent possible promote – these alternatives to a nationwide spectrum reallocation. Not only can they be deployed more effectively and with less disruption than a massive spectrum reallocation, but growth rates in mobile data are projected to fall by 60% to 80% over the coming years.⁸¹ As the smartphone market approaches a saturation point, “[t]he growth is clearly not exponential, and a simple projection of [Cisco’s] data takes the rate closer to 30% for 2016-2017.”⁸² The necessity of large-scale nationwide spectrum reallocation to deal with mobile data growth rates therefore now appears more questionable than ever. In fact, these recent projections showing large drops in mobile data growth rates only underscore the unreliability of previous analysis used to justify recommendations for significant spectrum reallocation.⁸³

⁷⁹ *Id.*

⁸⁰ Ante & Schatz, *supra* note 19 (citing wireless executive’s statement that “the capacity of cell towers can still be substantially increased with a reasonable investment”).

⁸¹ *See* Cisco, *supra* note 5, at Table 9 (North America), App’x A.

⁸² Burstein, *supra* note 5. *See also* Jonathan Healey, “Spectrum Crisis? What Spectrum Crisis?,” *Los Angeles Times* (Apr. 1, 2011) (“A new projection by networking equipment kingpin Cisco predicts that demand for mobile bandwidth will increase at a slower and slower rate in the coming years, as the penetration of smartphones slows. That makes sense Once everyone has an iPhone, an Android phone or the equivalent, much of the growth goes away.”).

⁸³ The attached report specifically shows that the analysis of data demand growth and the need for additional mobile broadband spectrum in the FCC’s OBI Technical Paper No. 6 is “inaccurate and incomplete.” *Solving the Capacity Crunch* at Section I.C. (explaining the errors in analysis, reliance on suspect data, erroneous assumptions and other flaws in the OBI Paper). These problems with OBI Technical Paper No. 6 are significant because, in this paper, the Commission attempted to provide “technical analysis to validate the need for additional mobile (continued...) ”

Indeed, executives from Verizon, AT&T, Sprint, and T-Mobile have recognized that the wireless industry may not need nearly as much spectrum as some have claimed.⁸⁴ The Chief Technology Officer of Verizon Wireless recently reported that the company “is comfortable with its spectrum position. ‘There are a number of different things we can do to conserve the air link and make backhaul more efficient.’”⁸⁵ Further, Clearwire has so much excess spectrum capacity that it is seeking to sell portions of its spectrum holdings.⁸⁶ Thus, the available data and evidence demonstrates that “[w]ireless carriers do not suffer from a nationwide spectrum crisis; they face a capacity crunch in a limited number of locations,” which can be addressed through numerous available techniques and without an unnecessary “rush to reallocate.”⁸⁷

Finally, we note that an undue focus on spectrum reallocation “for generating capacity exacerbates existing powerful disincentives for carriers to address capacity shortfalls through technology and infrastructure investment.”⁸⁸ In contrast, policies that promote network infrastructure investments (rather than making yet more spectrum assignments to the same entities) will not only encourage efficient use of spectrum and “help avoid congestion issues,”

broadband spectrum in the near-term.” FCC, OBI Technical Paper No. 6, *Mobile Broadband: The Benefits of Additional Spectrum* (Oct. 2010), at 2.

⁸⁴ See *Solving the Capacity Crunch*, *supra* note 7, at 6-7 (citing statements from all these companies).

⁸⁵ See Luna, *supra* note 8.

⁸⁶ See *Solving the Capacity Crunch*, *supra* note 7, at 7.

⁸⁷ *Id.* at i-ii.

⁸⁸ *Id.* at 8 (explaining that, *inter alia*, lobbying government for more spectrum may be easier than investing in and developing new technologies and that “‘ownership’ of spectrum is concomitant with exclusivity” and acquiring more of it makes that spectrum unavailable “to others that might compete”).

but also “serve to enhance the competitive landscape for wireless broadband services.”⁸⁹ And clearly, consumers will benefit from the resulting improvements in wireless networks and more competitive wireless service offerings.

B. The Proposed AT&T/T-Mobile Merger Implicates The Commission’s Broadband Goals.

On March 20, AT&T announced that it intends to buy T-Mobile, a transaction which if approved would combine the second- and fourth-largest wireless carriers in the country. The combination of these carriers—including the combination of their spectrum assets—implicates this proceeding, any prospective spectrum auction, and the Commission’s broadband goals in several ways.

First, the transaction bears importantly on the widely-debated issue of the wireless industry’s real spectrum needs. As a result of the transaction, AT&T would need less or perhaps even no additional spectrum; T-Mobile would, of course, need no new spectrum; and other carriers would have access to new spectrum that AT&T will have to spin off because the Department of Justice or the Commission or both will require them to do so as a condition for approving the transaction.⁹⁰ Moreover, the number of carriers also was an important factor in the

⁸⁹ *Id.* A recent story in Communications Daily quoted Milo Medin, vice president of access services for Google, who said that the recent spectrum crunch “has been propelled almost with a giddiness about revenue that makes policy a second fiddle.” He also noted that encouraging new technologies like micro and femto cells is important to increase capacity of wireless networks, saying, “[y]ou can get more capacity out of spectrum by taking one base station and splitting into several base stations.” “Issa Ties Support of Spectrum Auctions to Rollback of Net Neutrality,” Communications Daily (April 19, 2011), at 1.

⁹⁰ See David Burstein, “70-90% of AT&T Spectrum Capacity Unused,” *Fast Net News* (Mar.ch 22, 2011), available at <http://www.fastnetnews.com/a-wireless-cloud/61-w/4193-70-90-of-atat-spectrum-capacity-unused> (describing AT&T and T-Mobile’s spectrum holdings and estimating that carriers currently use only 10-30% of their spectrum’s capacity). AT&T has stated that, as a result of the merger, it “will immediately gain cell sites equivalent to what would have taken on average five years to build without the transaction, and double that in some markets,” and that (continued...)

International Telecommunication Union (“ITU”) spectrum demand projection methodology, upon which CTIA and others in the wireless industry have relied.⁹¹ A single carrier with a given amount of spectrum can handle more traffic than two carriers each of which has half of that spectrum.⁹² Efficiency gains due to the combination of AT&T and T-Mobile’s spectrum may greatly reduce the spectrum required to serve their combined customer base. In the top 30 markets—the markets where CTIA and CEA believe that broadcasters would be required to surrender their channels in order to free up a 120 megahertz contiguous, nationwide spectrum block—both AT&T and T-Mobile currently have substantial spectrum holdings.⁹³

Second, the transaction bears on public policy assessments, because the wireless industry, already highly concentrated and lacking in diversity, would, as a result of the merger, become even more concentrated and even less diverse.⁹⁴ Thus, it will be even more important for the Commission to facilitate the competitive mobile video offerings that broadcasters are launching nationwide.

the “combination will increase” its “network density by approximately 30 percent in some of its most populated areas.” “AT&T to Acquire T-Mobile USA from Deutsche Telekom,” *available at* <http://www.mobilizeeverything.com/home.php>.

⁹¹ That analysis was flawed in numerous respects. *See* NAB and MSTV, “Broadcasting and the Broadband Future: A Proposed Framework For Discussion” (“Broadcasting and the Broadband Future”), GN Docket Nos. 09-47, 09-137, and 09-51 (Dec. 22, 2009), at Attachment A, 11-17. Nevertheless, the National Broadband Plan cited the ITU projection in its discussion of spectrum needs forecasts. *See* National Broadband Plan at 84.

⁹² General queuing theory supports the argument that the larger the block of spectrum that is aggregated, the more efficient the wireless communication network (*i.e.* the more traffic per MHz it can handle). In addition, combining two networks into one would eliminate the overhead spectrum needed for the second carrier’s network.

⁹³ *See* “AT&T/T-Mobile: Spectrum and Coverage Maps,” *FierceMobileContent*, AT&T and T-Mobile Overlap map, *available at* <http://www.fiercemobilecontent.com/pages/attt-mobile-spectrum-and-coverage-maps>.

⁹⁴ Commissioner Copps has pointed out that AT&T’s and Verizon’s combined share of the wireless spectrum market would be about 80%. *See* Sara Jerome, “Copps: AT&T Merger a ‘Steeper Climb’ than Comcast/NBCU,” *The Hill* (Mar. 31, 2011).

Third, this transaction would affect any prospective auction of broadcast television spectrum by eliminating one major bidder and reducing the role of another. Thus, the CTIA/CEA White Paper's projected auction yield of \$33-\$34 billion⁹⁵ (which, as noted below, is seriously flawed) would need to be substantially discounted if the proposed AT&T/T-Mobile merger is approved. According to independent analysts at Stifel Nicolas, "If these two companies can satisfy much of their spectrum needs by joining forces, it would reduce some of the demand for new spectrum and possibly lower auction revenue estimates."⁹⁶ In any event, CTIA/CEA's analysis of projected auction yields already has been shown to be based on faulty assumptions and flawed data.⁹⁷ The Communications Act, moreover, prohibits the Commission from basing a decision to reallocate broadcast or any other spectrum on projected auction revenues. *See* 47 U.S.C. § 309(j)(7)(A) ("In making a decision . . . to assign a band of frequencies to a use for which licenses or permits will be issued . . . the Commission may not base a finding of public interest, convenience, and necessity on the expectation of Federal revenues from the use of a system of competitive bidding under this subsection.")⁹⁸

⁹⁵ *See CTIA/CEA White Paper, supra* note 48, at 7 (estimating net auction proceeds of \$33 billion – \$34 billion).

⁹⁶ Rebecca Arbogast & David Kaut, "AT&T/T-Mobile Deal Tough, But Not Unthinkable and AT&T Benefits for Even Trying," *Stifel Nicolas* (Mar. 21, 2011), at 2.

⁹⁷ *See* Jeffrey A. Eisenach, Navigant Economics, "Revenues From A Possible Spectrum Incentive Auction: Why The CTIA/CEA Estimate Is Not Reliable," (Mar. 31, 2011), at 1-2, *available at* <http://ssrn.com/abstract=1800132> (explaining why the revenues that might be produced from auction of broadcast spectrum are at present "unknowable with any degree of precision" and why CTIA/CEA's "estimate, in particular, is not reliable").

⁹⁸ As the New Jersey Division of Rate Counsel points out, the Commission's spectrum policy decisions should be driven by public interest criteria, not the spectrum's market value. *See* New Jersey Division of Rate Counsel Comments at 9.

IV. THE THREE SPECIFIC ISSUES ADDRESSED BY THE NPRM SHOULD NOT BE DECIDED IN A VACUUM.

The Co-Primary Proposal. The wide disparities in how various commenters interpreted the Commission’s proposals on spectrum reallocation and co-primary status show that the proposals lack clarity. For example, LIN stated that “[t]he NPRM’s questions about co-primary allocations are too abstract to allow for informed comment,”⁹⁹ and OMVC discussed the lack of definition in the proposal, citing ambiguity in the NPRM and alternative ways in which it could be interpreted.¹⁰⁰ The Commission should provide clear specifics about these proposals and invite a new round of comments before making decisions on these and related issues.

The Channel-Sharing Proposal. The comments also illustrate the complexity of channel-sharing, the need to afford wide scope for private-market negotiations between the participating stations, and the need to make clear that a station entering into a channel-sharing arrangement would remain a separately licensed entity and retain all rights and protections afforded to any broadcast television licensee, whether it is the sole occupant of a channel or operating on a shared-channel basis.¹⁰¹

The VHF Proposal. The initial comments in this proceeding agree that the NPRM’s proposals for improving VHF reception would have limited efficacy. For example, LIN explains, “[p]ower increases will help only marginally, and only in isolated cases; as often as a power increase helps one station, it harms an adjacent station. VHF optimization is not

⁹⁹ LIN Comments at ii.

¹⁰⁰ See OMVC Comments at 12-15.

¹⁰¹ See, e.g., Association of Public Television Stations *et al.* Comments at 8-13; Belo Comments at 12-13; ION Comments at 6-7; LeSEA Broadcasting Comments at 6; Local Television Broadcasters Comments at 18-22; National Religious Broadcasters Comments at 8-9; Sinclair Comments at 7-8; Smartcomm Comments at 4; UNC-TV Comments at 7-11; Univision Comments at 8-9.

likely to be accomplished by rule changes.”¹⁰² Similarly, based on its post-transition VHF operations, Belo explains that its “experience indicates that by allowing VHF stations to further increase power, the Commission might improve reception but, as a practical matter, it is unlikely that stations could implement power increases that would put VHF stations on parity with UHF stations in all parts of their respective markets, and such improvements involve major costs”¹⁰³ and in many cases major harms. In light of the challenges to improving VHF reception, we support an approach that emphasizes consumer education, one aspect of which might entail the imposition of mandatory labeling requirements for antennas.¹⁰⁴

V. CONCLUSION

The FCC repeatedly has stated that its process in examining proposals to expand broadband access has been and will be “data-driven.”¹⁰⁵ NAB and MSTV agree that data-driven analyses are appropriate (specifically, in connection with the first and third steps specified by our

¹⁰² LIN Comments at 13.

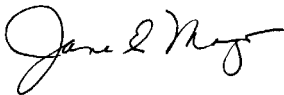
¹⁰³ Belo Comments at 14-15; *see also* Capitol Comments at 16 (“The Commission has already obtained substantial evidence that its attempts in the Notice to rehabilitate the VHF spectrum, particularly the low VHF band, cannot succeed as a scientific and engineering matter.”); Cox Comments at 4, 24 (“Cox welcomes Commission efforts to improve DTV reception in the VHF band, but is skeptical that much, if anything, can be done.”); Sinclair Comments at 9 (“With more stations re-packed into the VHF bands (as envisioned by the NPRM), the noisy, unreliable environment for VHF broadcasting will only deteriorate further and will stifle the ability of broadcasters to successfully deploy Mobile DTV to more fully serve the needs of the American public.”).

¹⁰⁴ *See* NAB/MSTV Comments at 22-23 (also supporting a uniform measurement procedure and standardized metrics for claiming adequate performance in the different TV frequency bands).

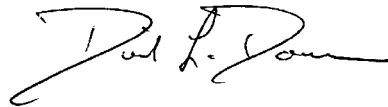
¹⁰⁵ *See, e.g., Connecting America: The National Broadband Plan* (2010), at 35; OBI Technical Paper No. 3, *Spectrum Analysis: Options for Broadcast Spectrum* (June 2010), at 34; OBI Technical Paper No. 1, *The Broadband Availability Gap*, (April 2010), at 1; Julius Genachowski, Remarks as Prepared for Delivery, “The Cloud: Unleashing Global Opportunities,” Aspen Idea Project, Brussels, Belgium (Mar. 24, 2011), at 5; Julius Genachowski, Message to National Cable & Telecommunications Association (May 13, 2010), *available at* <http://blog.broadband.gov/?entryId=435957>.

roadmap). In addition, the Commission must ask the right questions—questions about numerous interrelated and complex issues. The NPRM at issue here makes a start, but as the initial round of comments has demonstrated, the three issues it focused on cannot be resolved appropriately without the Commission’s asking for and considering comment on various other critical issues that were identified in the first round of comments. The Commission’s decision-making also should be accompanied by a careful and open-minded evaluation of alternatives. We submit that the approach summarized here is necessary to achieve the Commission’s goal of promoting the best possible broadcast and broadband systems for all Americans.

Respectfully submitted,



Jane E. Mago
Jerianne Timmerman
Scott Goodwin
Lynn Claudy
Kelly Williams
NATIONAL ASSOCIATION OF
BROADCASTERS
1771 N Street, NW
Washington, D.C. 20036
(202) 429-5430



David L. Donovan
Victor Tawil
Bruce Franca
ASSOCIATION FOR MAXIMUM
SERVICE TELEVISION, INC.
4100 Wisconsin Avenue, NW
Washington, D.C. 20016
(202) 966-1956

/s/ _____
Jonathan D. Blake
Jennifer A. Johnson
Eve R. Pogoriler
Covington & Burling LLP
1201 Pennsylvania Avenue, N.W.
Washington, D.C. 20004-2401
(202) 662-6000
Their Counsel

April 25, 2011

Attachment A

“Solving the Capacity Crunch: Options for Enhancing Data Capacity on Wireless Networks”
Onyeije Consulting LLC
April 2011

SOLVING THE CAPACITY CRUNCH

Options for Enhancing Data Capacity on Wireless Networks

Onyeije Consulting LLC
2000 N. 14th Street ■ Suite 600 ■ Arlington, VA 22201
www.onyeije.com

© April 2011

EXECUTIVE SUMMARY

Is massive spectrum reallocation urgently needed to address the capacity concerns of wireless carriers? The simple answer is no.

Many wireless carriers and their trade associations argue that the FCC must make hundreds of megahertz of spectrum available for wireless broadband in order to keep pace with customers' growing mobile data demands. But this is not so. Capacity problems can be addressed in numerous ways that do not involve spectrum. So while additional spectrum is a tool that can help relieve congestion on mobile networks, the current rush to reallocate is not necessary.

At some point in this policy debate, the word "capacity" began to be used nearly synonymously with the word "spectrum." The conflation of these terms has led to a disproportionate emphasis on spectrum reallocation as a solution to capacity constraints although it is merely one method of achieving that result. Indeed, additional spectrum is not the most effective alternative for increasing data capacity. Over the past four decades, spectrum reuse strategies have been over 60 times more useful in increasing data capacity when compared to spectrum assignments. Greater spectral reuse is an available and effective means of addressing wireless congestion, particularly when combined with a variety of other non-spectrum alternatives. So if numerous alternatives exist, is there really a spectrum *crisis*? The answer is self-evident.

The counterfactual "spectrum crisis" claim is particularly troubling because it is now being used to justify radical spectrum policy that could cause significant disruption for consumers. Fueled by statements in the National Broadband Plan prepared at the FCC, many are accepting the premise that federal government intervention is necessary to address an impending "spectrum crisis." There is ample evidence to the contrary.

This paper analyzes widely available public data and demonstrates that the "spectrum crisis" is factually revisionist. Wireless carriers do not suffer from a nationwide spectrum crisis; they face a capacity crunch in a limited number of locations. And there are a variety of tools at carriers' disposal for addressing capacity concerns. However, policymakers have not adequately explored these tools. As such, this paper demonstrates the need for a more comprehensive, quantitative and data-driven analysis of capacity-generating techniques that do not simply conform to foregone conclusions about the need for widespread spectrum reallocation.

- Section I establishes that claims of a "spectrum crisis" lack a convincing factual basis.
- Section II details some of the actions that carriers and the FCC can take to enhance the capacity of wireless networks.
- Section III demonstrates that several near-term spectrum sources exist.

➤ **THERE IS SCANT EVIDENCE SUPPORTING THE ALLEGED "SPECTRUM CRISIS."**

The factual basis for the "spectrum crisis" claim is underwhelming. For example, the answer to the fundamental question of how much spectrum mobile carriers need remains uncertain. It appears that the notion of a need for large-scale spectrum reallocation to address a shortage of mobile spectrum is based on questionable assumptions designed to achieve a

particular result. Tellingly, the central justification to reallocate significant amounts of spectrum came several months *after* the release of the FCC’s National Broadband Plan. Even then, key pieces of data contradicting the Commission’s conclusion were not analyzed in the FCC’s technical paper.

➤ **CARRIERS AND THE COMMISSION HAVE VARIOUS, MEANINGFUL ALTERNATIVES TO ENHANCE NETWORK CAPACITY.**

Many parties overstate the extent of the capacity problem, on the one hand, and understate the availability of solutions, on the other hand. These parties fail to recognize the unrelenting pace of wireless innovation. The “spectrum crisis” is premised on false assumptions about the wireless industry’s technological stagnation. In fact, wireless innovations are not a thing of the past, and the free market is as robust as ever—providing carriers with various options to address capacity concerns:

- Deploying innovative network technology upgrades that will promote spectral efficiency;
- Establishing pricing and other fair-use policies to lessen network congestion;
- Migrating voice traffic to Internet Protocol;
- Leveraging consumer infrastructure such as femtocells and wi-fi;
- Investing in infrastructure to enhance capacity through the deployment of Multi-Antenna Signal Processing (smart antennas), picocells, modernizing network architecture, Distributed Antenna Systems, upgraded backhaul, sectorization and cell splitting;
- Prioritizing latency sensitive data packets;
- Employing caching;
- Utilizing channel bonding; and
- Encouraging the development of bandwidth sensitive applications and devices.

In addition, the FCC can take concrete actions, within its current mandate and existing authority, that will not skew market forces and will help relieve network congestion and make better use of spectrum, including:

- Reclaiming hundreds of megahertz of spectrum from speculators and warehouseers;
- Concluding and publicly releasing a comprehensive spectrum inventory;
- Increasing licensee flexibility; and
- Establishing receiver standards.

➤ **OTHER SPECTRUM SOURCES SHOULD BE MADE AVAILABLE.**

Spectrum is a valued natural resource. Thus, the FCC should rapidly move spectrum into productive commercial use by:

- Licensing unassigned spectrum bands languishing in the Commission’s “pipeline;”
- Reallocating government spectrum identified by the National Telecommunications and Information Administration (NTIA) as suitable for commercial use; and
- Improving the secondary market for spectrum.

The Executive Summary of the National Broadband Plan explains that: “The plan is in beta, and always will be. Like the Internet itself, the plan will always be changing—adjusting to new developments in technologies and markets, reflecting new realities, and evolving to realize the unforeseen opportunities of a particular time.” Thus, the time has come for the Commission to take an in depth and impartial look at quantifying the impact of non-spectral solutions on the capacity constraints of wireless networks and determine whether that data should alter the Plan’s recommendations. While this paper provides numerous capacity-enhancing alternatives, several more exist. Many of these techniques individually have a significant impact on network congestion. The cumulative effect of these solutions will easily meet demands on wireless network capacity. Therefore, the Commission should fully examine all of the alternatives that will lead to greater wireless capacity and be cautious as it examines reallocation as a policy solution. Spectrum is not the cure all for data capacity needs and impulsive regulatory action will only yield unintended (and likely irreversible) consequences.

* * *

TABLE OF CONTENTS

I.	A “SPECTRUM CRISIS” IS NOT SUPPORTED BY THE FACTS	1
A.	A “Crisis” with Great Timing	1
B.	The Amount of Spectrum that Mobile Carriers Claim to Require Is Little More than a Wish List	2
C.	The Analysis Underpinning the FCC’s Technical Paper on the “Spectrum Crisis” Presents an Inaccurate and Incomplete Picture	3
II.	THERE ARE NUMEROUS ALTERNATIVES THAT WOULD BOOST WIRELESS NETWORK CAPACITY	6
A.	Before Claiming a “Spectrum Crisis” Exists, Carriers Should Leverage Available Marketplace Solutions	7
1.	<i>Upgrading Network Technology</i>	9
2.	<i>Adopting Fair Use Policies</i>	9
3.	<i>Migrating Voice to Internet Protocol</i>	10
4.	<i>Leveraging Consumer Infrastructure</i>	10
5.	<i>Enhancing Carrier Infrastructure</i>	11
6.	<i>Packet Prioritization</i>	13
7.	<i>Caching</i>	14
8.	<i>Channel Bonding</i>	14
9.	<i>Encouraging the Development of Bandwidth-Sensitive Applications and Devices</i>	14
B.	The Commission Itself Must Take a More Active Role in Promoting Efficient and Intensive Use of Spectrum.....	15
1.	<i>Far Too Much of the Nation’s Spectrum Is Either Underutilized or Occupied by Spectrum Warehouse</i>	16
2.	<i>The FCC Should Complete and Publicly Release a Comprehensive Spectrum Inventory Before Taking Unprecedented Regulatory Actions</i>	17
3.	<i>The FCC Should Increase Licensee Flexibility</i>	18
4.	<i>The Commission Should Adopt Receiver Standards</i>	19
III.	OTHER SOURCES OF SPECTRUM ARE MORE READILY AVAILABLE	19
A.	The Commission Should Immediately Address a Significant Portion of the Spectrum Demand Equation by Assigning Spectrum that Is Languishing in Its “Pipeline”	19
B.	The FCC Should Immediately License Underutilized Spectrum Previously Identified by NTIA..	20
C.	The Commission Should Help Facilitate the Success of the Secondary Market.....	21
IV.	CONCLUSION	23

I. A “SPECTRUM CRISIS” IS NOT SUPPORTED BY THE FACTS

As John F. Kennedy famously explained, “When written in Chinese, the word ‘crisis’ is composed of two characters—one represents danger and the other represents opportunity.” The purported solution of reallocating large swaths of spectrum presents an opportunity for wireless carriers to gain access to long-coveted spectrum. After all, there is nothing like a “crisis” to help one obtain what would ordinarily be out of reach. However, this supposed “crisis” also presents the significant dangers of uninformed regulatory action, market disruption and unintended consequences.

A. A “Crisis” with Great Timing

The so-called “spectrum crisis” has its roots in the aftermath of the American Recovery and Reinvestment Act of 2009 (Recovery Act).¹ As part of the Recovery Act, the FCC was required to “analyze mechanisms for ensuring broadband access by all people of the United States; provide a detailed strategy for achieving affordability and maximum usage; and include a plan for use of broadband to advance national purposes such as education, health care, energy, and public safety.”²

With passage of the Recovery Act, wireless carriers advanced a spectrum reallocation agenda at the FCC by claiming that increasing wireless congestion had resulted in a “looming spectrum crisis” that must be cured by significantly increasing the amount of spectrum available for mobile broadband.³ This lobbying effort was belied by the fact that most of the major carriers had yet to make full use of portions of prior spectrum assignments, including most of the 150 MHz auctioned by the FCC in 2006 and 2008, and those that had started had not completed their build out.

In response to the Recovery Act, on March 16, 2010, the FCC released “Connecting America: The National Broadband Plan” (Broadband Plan or Plan), which concludes that an additional 500 MHz of spectrum should be made available for mobile broadband within the next 10 years, with 300 MHz to be made available between 225 MHz and 3.7 GHz within the next five years.⁴ Central to reaching the five-year goal of the Plan was a proposal to reallocate 120 MHz of Ultra High Frequency (UHF) spectrum from television broadcasting to wireless broadband.⁵

The Broadband Plan itself did little to justify the conclusion that the reallocation was necessary. The Plan initially cited forecasts submitted by just three entities (Cisco Systems, Coda Research, and Yankee Group) predicting increases in future traffic as evidence of the impending “spectrum crisis.”⁶ It was not until October of 2010, some seven months after release of the Broadband Plan, that the FCC issued a report purporting to explain the Plan’s claim that additional mobile broadband spectrum was desperately needed.⁷ (See section 1.C below discussing the flaws in the FCC’s technical analysis and the unreliable nature of some of its source data.) Thus, this policy decision appears to have been made in a classic cart-before-the-horse way. And it is all the more alarming that wireless carriers and the FCC appear to have discounted all the evidence that contradicts the “impending spectrum crisis” conclusion.⁸ This paper demonstrates the need for a more comprehensive, quantitative and data-driven analysis on capacity-generating techniques that do not simply conform to foregone conclusions about the need for widespread spectrum reallocation.

B. The Amount of Spectrum that Mobile Carriers Claim to Require Is Little More than a Wish List

There is no denying that the corporate imperative of mobile wireless carriers is to obtain as much spectrum as they can. However, the fact that wireless carriers cannot find a unified voice on the amount and timing of their spectrum needs suggests that this advocacy is more strategic gamesmanship than factual reality.

It is clear that CTIA and its members were overreaching in claiming that mobile innovation hinged on that industry acquiring an additional 800 MHz of spectrum in six years.⁹ Simply put, the wireless industry attempted to dress up a “want” as a “need.” In this case, the amount of spectrum requested by the wireless industry was so far out of bounds that the Broadband Plan, without explanation, concluded that the Commission should make 40 percent less spectrum available and do so at a significantly slower pace, adding an additional four years. One would imagine that were the “spectrum crisis” real and were it truly “vital for [the wireless] industry to secure at least 800 MHz of additional spectrum within the next six years,”¹⁰ the Commission’s significant downward revision of the request would lead to loud protests in the form of angry op-eds and a push for a legislative fix. Instead, the wireless industry welcomed it with open arms.¹¹ And why not? CTIA appears to have deployed the old strategy that “if you shoot for the moon and miss you will be among the stars.” As explained below, the figures presented by the National Broadband Plan are similarly overstated as they fail to measure meaningfully several capacity management alternatives.

Spectrum management should not be driven by demands like a proverbial Christmas wish list. Any parent will confirm that wants do not rise to the level of needs, much less crises.

The debate concerning the “need” for 800 MHz of spectrum has nearly drowned out the real question—whether a spectrum-centric solution should be the immediate focus to address wireless broadband capacity needs. Spectrum and capacity are not synonymous terms. While mobile carriers are concerned about capacity shortfalls in a limited number of locations, these concerns should not and cannot be addressed with a singular focus on spectrum. Instead, technological advances and localized solutions represent the best long-term solutions to address capacity constraints.

A decade ago, CTIA petitioned the FCC to stop granting spectrum to the mobile satellite services industry and reallocate existing MSS spectrum “to more efficient users of spectrum.”¹² With striking similarity to the current debate, then CTIA CEO Tom Wheeler stated “The question is: Will we have the concrete on which the new information superhighway rides?” He then continued, “I’m sad to say that it is an issue very much in doubt. There is no single issue more important than whether or not there is sufficient spectrum for wireless data. It’s half time, and we’re down a bunch.”¹³ As it turned out, no reallocation occurred, MSS providers obtained more spectrum, the information superhighway did not experience a “concrete crisis,” and Lightsquared, an MSS licensee, now seeks to deploy a spectrally efficient 4G network that “represents more than \$7 billion of new investment, with the potential to create more than 100,000 new private-sector jobs within five years.”¹⁴ This history illustrates that aggressive reallocation demands by the wireless industry that would hobble the maturation/evolution of other services must be questioned by regulators.

The true need for additional spectrum to address capacity needs is unknown because neither advocates for spectrum reallocation nor the FCC have attempted to quantify comprehensively the impact of non-spectrum alternatives. This paper respectfully submits that the Commission should take a step back, fully document the impact of non-spectrum alternatives on wireless data capacity and then focus its efforts on solutions that will have the most meaningful effect on increasing wireless capacity.

AN INSATIABLE DESIRE TO DISPLACE OTHER SPECTRUM LICENSEES

THEN — MSS. *“The question is: Will we have the concrete on which the new information superhighway rides? I’m sad to say that it is an issue very much in doubt. There is no single issue more important than whether or not there is sufficient spectrum for wireless data. It’s half time, and we’re down a bunch.”* CTIA CEO Tom Wheeler (2001).

NOW — Broadcasters. *“It is vital for our industry to secure at least 800 MHz of additional spectrum by 2015 at the very latest. Wireless spectrum is our industry’s backbone and it is what allows us to continue to innovate and create new mobile apps, products and services. Without this additional spectrum, our industry will cease to provide U.S. consumers with the most innovative and most competitive mobile offerings.”* CTIA CEO Steve Largent (2009).

C. The Analysis Underpinning the FCC’s Technical Paper on the “Spectrum Crisis” Presents an Inaccurate and Incomplete Picture

OBI Technical Paper No. 6 attempts to provide “technical analysis to validate the need for additional mobile broadband spectrum in the near-term.”¹⁵ The report includes a significant disclaimer upfront: “The goal of this analysis is not to reach definitive numeric findings of spectrum need and economic benefit, but to make a reasonable demonstration that mobile data demand is likely to exceed capacity under current spectrum availability in the near-term.”¹⁶ While the Commission explains that “the inherent uncertainty of any forecast of the future” precludes a definitive numeric finding, it is the weaknesses in the OBI methodology that makes it an inappropriate tool for making long-term decisions about reallocating spectrum.

Foremost, the use of an incremental analysis skews the data in favor of the paper’s ultimate conclusion. Incremental analysis is a short-term decision-making technique used to determine the cost difference between alternatives. The OBI paper does not adequately examine the cost benefit of several alternative solutions for meeting capacity demands, including many that were discussed in the

National Broadband Plan. These include the use of femtocells, prioritization, caching, channel bonding, the effect of increased allocation transparency, deployments on spectrum currently in the FCC pipeline, improvements in the secondary spectrum marketplace, and deployments that leverage unused spectrum that is identified and made available following a comprehensive spectrum inventory—all of which could significantly impact how much new spectrum is needed. Thus, by ignoring key issues that drive data demand and supply, the OBI paper is skewed toward a pre-ordained decision. Its conclusions are therefore biased and unreliable.

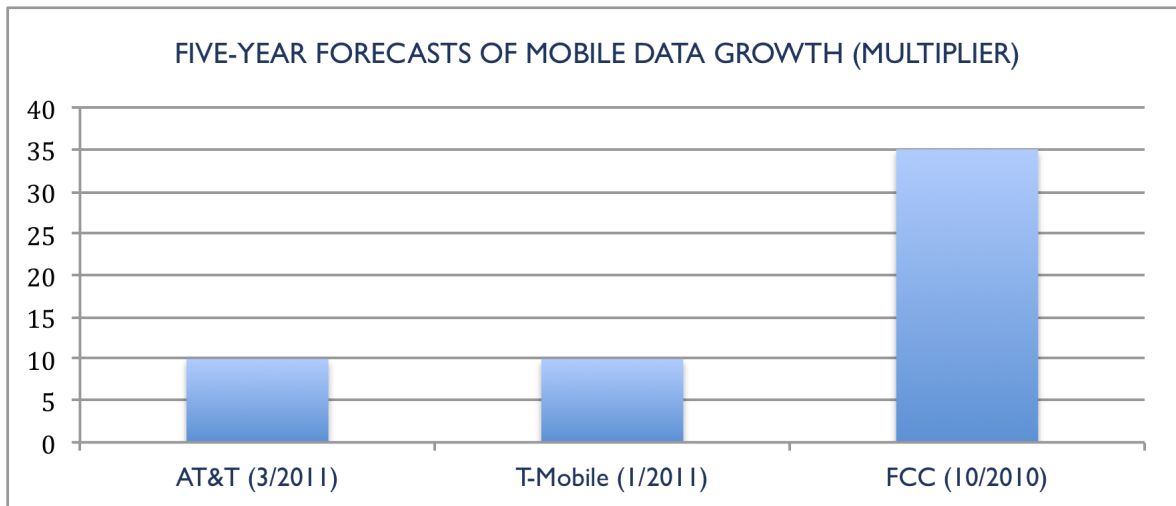
Second, in those instances where the paper acknowledges that certain factors will result in a downward adjustment to its ultimate conclusion, such adjustments appear to be overly modest.¹⁷ For example, the paper concludes that in the face of significant data growth, carriers will respond with a mere 7% compound annual growth rate in the number of deployed cell sites.¹⁸ In addition, the report concludes that it will take five years for spectral efficiency to double.¹⁹ This, however, would represent a significant and perhaps unprecedented throttling of air-interface spectral-efficiency improvements, as it is estimated that the “rate of improvement in use of the radio spectrum for personal communications has been essentially uniform for 104 years” with “efficiency doubling every two-and-a-half years.”²⁰ In addition, despite the substantial efficiency gains that Long Term Evolution (LTE) will bring to the handling of voice traffic (as explained below), OBI Technical Paper No. 6 concludes that the amount of spectrum required to provide voice services will remain completely unchanged for the next five years.²¹

AT&T predicts 8-10 times of data growth between 2010 and 2015 and T-Mobile forecasts that data will have 10 times of growth in 5 years. Yet, the Commission's assessment that 275 MHz of spectrum is needed to meet mobile data demand is premised on data growth of 35 times between 2009 and 2014.

Third, the Paper relies on suspect data. In arriving at its conclusion, OBI Technical Paper No. 6 relies heavily on forecast data from Cisco that is both wildly optimistic about data growth and unscientific. In a blog entry entitled, *Should a Sales Brochure Underlie US Spectrum Policy?*, Steven Crowley states that “[t]here is overlap between the people who prepare the forecast and the people responsible for marketing Cisco’s line of core-network hardware to service providers. The forecast is used to help sell that hardware. Put simply, it’s a sales brochure.”²²

In contrast, the Yankee Group’s forecast of mobile data traffic by 2014 is approximately half that of Cisco. And the Yankee Group forecast (the most conservative estimate relied on by the Commission in the Paper) is considerably higher than forecasts recently released by both AT&T²³ and T-Mobile.²⁴ AT&T predicts 8-10 times of data growth between 2010 and 2015 and T-Mobile forecasts that data will have 10 times of growth in 5 years.²⁵ Yet, the Commission’s assessment that 275 MHz of spectrum is needed to meet mobile data demand is premised on data growth of 35 times between 2009 and 2014.²⁶

FIGURE I: Data Growth Disparity



Fourth, the Commission’s study incorrectly assumes that all future cell sites will be deployed for the purpose of adding capacity. Such an assumption is inconsistent with the fact that a significant portion of current cell sites were deployed simply for coverage in rural and suburban areas and are unlikely to require additional spectrum in the future due to flat demand and gains obtained through the deployment of spectrally efficient technologies. Recent commentary assesses the impact of this methodological error and concludes:

- “The FCC’s *own analysis* shows that the incremental spectrum demand by 2014 is reduced from 275MHz to between 117MHz and 227MHz;”
- “The cost of deploying extra cell sites to serve this demand (the FCC’s definition of ‘economic value,’ assuming a cost of \$550K per cell site) is reduced from \$120B to between \$33B and \$85B;”
- “Only 60K-155K additional cell sites are needed to meet demand, compared to the 99K that the FCC’s model estimates will be deployed anyway in the next 5 years;” and
- To meet demand “[t]he annual growth in the number of base stations would increase from 7% ... to between 10% and 15% ... which is not significantly out of line with the 12% growth in base stations that occurred in 2009, according to the FCC’s own figures.”²⁷

Finally, there has not been critical examination of the assumptions that go into the forecasts upon which OBI Paper No. 6 relies. In particular, the paper appears to be premised on the highly suspect assumption that the high demand curve for mobile data will not slow. While smartphone growth is significantly increasing now, it will no doubt plateau and slow. It has been widely accepted for decades that the process of technological adoption over time is typically illustrated as a classic normal

distribution or “bell curve” where a phase of rapid adoption ends in slowed adoption as the product matures or new technologies emerge.²⁸

As recently reported, Cisco now projects that U.S. mobile growth will drop by more than half by 2015.²⁹ As Dave Burstein, Editor of DSL Prime, explains: “The growth is clearly not exponential.”³⁰ Mr. Burstein went on to say “Every CFO and engineer has to plan carefully for the network upgrades needed, but the numbers certainly don’t suggest a ‘crisis.’”³¹ Jon Healey of the Los Angeles Times Editorial Board similarly explains that “Much of the growth in the demand for bandwidth has come from two parallel forces: a new type of smartphone (epitomized by the iPhone) encourages people to make more use of the mobile Web, and more people are switching from conventional mobile phones to these new smartphones. Once everyone has an iPhone, an Android phone or the equivalent, much of the growth goes away.”³² AP Technology writer Peter Svensson echoes this concern and explains “AT&T’s own figures indicate that growth is slowing down now that smartphones are already in many hands.”³³ Thus, the assumption that data demand will continue to grow unabated is deeply flawed.

II. THERE ARE NUMEROUS ALTERNATIVES THAT WOULD BOOST WIRELESS NETWORK CAPACITY

The official wireless industry position is that FCC regulatory involvement inhibits the “virtuous cycle” of innovation and competition: “the FCC appears focused on micromanaging the wireless industry, which will erode this virtuous cycle that benefits America’s wireless consumers.”³⁴ That is why it is puzzling that the “spectrum crisis” argument is built on the flawed premise of the wireless industry’s technological stagnation³⁵ and the necessity of regulatory intervention.³⁶ In essence, CTIA and its members are now claiming that market forces and innovation are insufficient to address the growth of mobile data services and that the FCC must step in to correct this market failure. By simultaneously decrying government interference generally yet calling for it to “solve” this “crisis,” the wireless industry is demonstrating that more spectrum is a want, not a need.

When pressed by investment analysts and shareholders, the mobile wireless industry is less sanguine about whether the “spectrum crisis” is real. In an April 2010 interview, Verizon CEO Ivan Seidenberg answered a question about the reallocation of broadcasters’ spectrum by stating “Confiscating the

“There is a host of ways to tackle the growth that is coming. It’s not just all about spectrum. It’s clearly part of the story, but we are less worried about that in the near term.” T-Mobile Chief Technology Officer, Neville Ray (Jan. 18, 2011)

[TV] spectrum and repurposing for other things, I’m not sure I buy into the idea that that’s a good thing to do” and adding “I think the market’s going to settle this.”³⁷ Other carriers appear to agree.

Sprint has stated that estimates of a spectrum shortage “may overstate the true need for more spectrum allocations” because “advances in technology can effectively help increase spectrum supply, thereby moderating the need for new allocations.”³⁸

Similarly, T-Mobile’s Chief Technology Officer, Neville Ray, has

stated, “[t]here is a host of ways to tackle the growth that is coming. It’s not just all about spectrum. It’s clearly part of the story, but we are less worried about that in the near term.”³⁹ Mr. Ray also noted “[w]e have gone from a world where devices were ahead of the network to a world where the network is ahead of the device.”⁴⁰ And with the recent announcement that AT&T seeks to purchase T-Mobile, AT&T claims that the transaction would quickly provide “the spectrum and network efficiencies necessary ... to address impending spectrum exhaust in key markets.”⁴¹

In addition, those closely watching the market do not appear convinced of a demonstrated need for additional spectrum. Notably, an exhaustive 52-page international study conducted by Merrill Lynch's global equity research team in February of 2010 concludes that there is no overwhelming need for additional spectrum assignments and “reject[s] the carrier capex bear case (i.e., that mobile data growth and capex will outstrip carrier revenues).”⁴²

Moreover, there is marketplace evidence that mobile data demands cannot be addressed simply through the acquisition of more and more spectrum. Clearwire's financial statements contend that it has the “largest spectrum position of any wireless service provider in the United States, with holdings exceeding more than 46 billion MHz-POPs.”⁴³ The company claims to hold “approximately 140 MHz of spectrum on average across its national spectrum footprint and approximately 160 MHz of spectrum on average in the largest 100 markets in the United States.”⁴⁴ Indeed, Clearwire has so much excess spectrum that it is attempting to sell portions of its spectrum holdings in order to finance and expand its network. Although Clearwire has an enviable spectrum position and has tacitly recognized that it has more spectrum than it needs, it appears that customers have been experiencing problems with the network's ability to adequately handle data traffic. Recently, 15 Clearwire customers initiated a class action law suit over the company's data throttling practices, accusing Clearwire of not delivering advertised “high-speed Internet” services to customers and charging them termination fees when they cancel because of poor service.⁴⁵ Clearwire's experience vividly demonstrates the importance of network investment to address growing data demand.

Rather than take a myopic view of spectrum needs, the Commission should recognize that radio network throughput is a function of a variety of factors including spectral efficiency, available spectrum and spectrum reuse. As explained below, the real choice here is between throwing more spectrum at the perceived problem, with the potential of unintended consequences, and insisting that carriers use a myriad of proven tools to address capacity concerns before reallocating large swaths of spectrum.

A. Before Claiming a “Spectrum Crisis” Exists, Carriers Should Leverage Available Marketplace Solutions

Cellular systems are designed so that each cell uses radio frequencies only within its boundaries. Thus, frequency reuse allows for the repeated use of the same spectrum across a cellular system, with little potential for interference. The reuse of frequencies is what enables a cellular system to increase capacity and handle a large number of calls with a limited amount of radio spectrum. Thus, the magic of cellularized systems is not so much the spectrum itself (as many have led us to believe) but the underlying engineering that makes efficient use of the spectrum.

According to wireless pioneer Martin Cooper, spectrum reuse has been over 60 times more effective than additional spectrum assignments in increasing data capacity.

It is difficult to overstate the importance of frequency reuse. Wireless pioneer Martin Cooper, who led the team at Motorola that developed the first handheld mobile phone, calculates that frequency reuse is responsible for a “sixteen hundred times improvement” in spectral efficiency in the last 45 years while additional spectrum assignments in the same time frame has improved spectral efficiency by a factor of “25 times.”⁴⁶ Put another way, spectrum reuse has been over 60 times more effective than additional spectrum assignments in increasing data capacity. Moreover, network density is a key benefit touted

by AT&T concerning its proposed acquisition of T-Mobile: “[a]t closing, AT&T will immediately gain cell sites equivalent to what would have taken on average five years to build without the transaction, and double that in some markets. The combination will increase AT&T’s network density by approximately 30% in some of its most populated areas, while avoiding the need to construct additional cell towers.”⁴⁷

Recent analyses, however, appear to discount the “host of ways” that carriers have to “tackle the growth that is coming.”⁴⁸ The National Broadband Plan contends that “[i]n the absence of sufficient spectrum, network providers *must* turn to costly alternatives, such as cell splitting, often with diminishing returns.”⁴⁹ In addition to failing to recognize the extraordinary effectiveness of frequency reuse,⁵⁰ the assertion is inaccurate—there are numerous less costly demand management approaches, as explained below. Moreover, the undue concern with the expense of certain infrastructure investments places the Commission in the inappropriate role of a central planner that determines the best manner in which private industry should allocate resources.

In addition, a focus on spectrum reallocation alternatives for generating capacity exacerbates existing powerful disincentives for carriers to address capacity shortfalls through technology and infrastructure investment. The Economist describes one of these powerful disincentives as follows:

The cheapest way to increase capacity is to add more spectrum or to move a network to a lower frequency, which allows radio waves to penetrate walls more easily. So operators tend to lobby governments for more and better spectrum before investing in expensive kit.⁵¹

While the Economist suggests that adding spectrum is the cheapest way to add capacity, it may be more accurate to say it is the easiest way to accomplish that goal. Additional spectrum does not require development of new technology (for which the carriers are dependent on a limited number of manufacturers who have little motivation to invest large amounts of money to create new technology that will reduce the market for their products). In addition, technologies that result in more capacity per base station and per cell means fewer base stations and fewer cells and new deployment strategies.

Yet another reason carriers opt for more spectrum, consciously or not, is that “ownership” of spectrum is concomitant with exclusivity. When one acquires exclusive rights to spectrum, that spectrum is not available to others that might compete.⁵² Thus, policy that rewards or encourages network infrastructure investments (rather than continuous additional spectrum assignments to the same entities) will help avoid congestion issues and, at the same time, serve to enhance the competitive landscape for wireless broadband services.

The “spectrum crisis” argument gives little, if any, credit to the pace of wireless innovation. But, wireless network improvements in recent years demonstrate that technology does not stand still. There is no reason to expect that the trend of wireless innovation will dissipate or even slow.

The Commission should recognize these disincentives as it moves forward on the Broadband Plan—public policy is not served by reallocating hundreds of megahertz of spectrum to make it cheaper and easier for wireless carriers to preserve high profit margins, rather than make additional investments in their networks. Moreover, as CTIA explains, the predominant factor leading to data demands

outpacing supply is *localized* congestion.⁵³ Therefore, any analysis of the “spectrum crisis” should weigh the relative cost/benefit of localized solutions, as discussed below.

1. Upgrading Network Technology

The “spectrum crisis” argument gives little, if any, credit to the unrelenting pace of wireless innovation. In fact, wireless network improvements in recent years demonstrate that technology does not stand still. There is no reason to expect that the trend of wireless innovation will dissipate or even slow. A review of the advances in spectral efficiency bears this out.

- First-generation cellular services using the AMPS standard had limited spectral efficiency.
- 2.75G networks almost *doubled* first generation efficiency using GSM+EDGE technology.
- 3G networks nearly *quadrupled* 2.75G efficiency using CDMA2000 1x EV-DO Rev. A.
- 3.5G networks employing HSDPA *more than doubled* 3G efficiency.⁵⁴

Most wireless operators have widely deployed 3G networks and are implementing upgrades along the 3GPP High Speed Packet Access (HSPA) Evolution path,⁵⁵ particularly in urban coverage areas. Within the 3G upgrade path, upgrade costs can be very low for carriers that have relatively current equipment, enabling software or card upgrades. AT&T and Verizon Wireless are migrating directly to the highly spectrally efficient fourth generation LTE technology. LTE has received considerable attention because it allows a peak download speed of 100 megabits per second (Mbps) on mobile phones and is spectrally efficient, resulting in significant capacity gains. Assuming spectral efficiency advances stay on their current trajectory, there will be significant (and to-date insufficiently examined) capacity gains for mobile carriers.

2. Adopting Fair Use Policies

Unlike voice services, wireless data usage is marked by a small percentage of users generating disproportionate amounts of traffic. AT&T estimates that 3% of their smartphone users generate nearly 40% of total smartphone data traffic.⁵⁶ Much of the extreme data use involves video and streaming audio, which are both data intensive.

While unlimited data plans on mobile phones were once the standard, there is now more focus on using pricing as a network management tool. As AT&T Operations President John Stankey put it, “I don't think you can have an unlimited model forever with a scarce resource. More people get drunk at an open bar than a cash bar.”⁵⁷ In the past year, AT&T and Virgin Mobile abandoned unlimited data plans. In 2010, T-Mobile announced that it would employ data throttling and slow the download speeds of customers that use more than five GB of data each month.⁵⁸ And Bloomberg reported on March 1, 2011 that “Verizon Communications Inc. will stop offering unlimited data plans for Apple Inc.’s iPhone as soon as this summer and switch to a tiered pricing offering that can generate more revenue and hold the heaviest users in check.”⁵⁹ Usage-based smartphone data plans substantially reduce per-user data traffic. As a result, data growth is likely to slow over time. And companies, including Cisco, are marketing products to carriers to help make tiered data plans easier to implement and help carriers “increase the monetization of their networks.”⁶⁰ Despite these

developments, many of the projections underpinning the “spectrum crisis” claim fail to take into consideration that fair use policies are increasingly serving as a network management tool.

3. *Migrating Voice to Internet Protocol*

Voice traffic remains a disproportionate user of network capacity, largely because it is handled much less efficiently than data. By some estimates, data traffic is handled 10 times more efficiently than voice.⁶¹ Thus, carriers will obtain dramatic efficiency gains by migrating voice traffic from circuit-switched to packet-based/VoIP. Notably, LTE does not support existing circuit-switched voice and SMS services. While VoIP has become more popular over mobile data networks via over-the-top services like Skype, no operator has deployed a carrier-grade VoIP service to replace 2G circuit-switched voice services. This will soon change. Forbes reports that Verizon is aiming to offer Voice over LTE or VoLTE in 2012 and AT&T will do so in 2013.⁶² VoLTE is the new name of One Voice, an initiative made up of dozens of vendor and service provider supporters seeking to back a common standard for voice over LTE. With a voice over LTE standard in place, LTE systems will see significant reductions in spectrum needs.

4. *Leveraging Consumer Infrastructure*

To date, the spectrum crisis debate has not sufficiently analyzed how carriers’ ability to leverage consumer infrastructure will impact spectrum needs. Currently, carriers leverage consumer assets through traffic diversion to femtocells and by offloading mobile Internet traffic onto wi-fi. Cisco explains that “Globally, 31 percent of smartphone traffic was offloaded onto the fixed network through dual-mode or femtocell in 2010.”⁶³ With more and more carriers adopting these techniques, it is likely that the percentage of mobile data that is diverted will grow significantly.

- **Femtocells:** A femtocell is a small cellular base station typically designed for use in a home or business. The devices connect to the service provider’s network via broadband and allow mobile operators to make improvements to both coverage and capacity, especially indoors. Femtocells also reduce both capital expenditures and operating expenses because, among other things, backhaul is done over a consumer’s broadband connection. T-Mobile recently announced plans to offer a femtocell device in 2011.⁶⁴ With this announcement, all the major wireless companies have adopted this strategy, as AT&T,⁶⁵ Sprint,⁶⁶ and Verizon⁶⁷ already provide femtocell service to consumers. It is likely that femtocell use will grow considerably in the future because approximately 70 percent of mobile device usage is indoors.⁶⁸ During the Mobile World Congress in Barcelona in February 2011, Simon Saunders, Chairman of the Femto Forum highlighted the likely growth of femto cells by explaining that a year ago “all commercial deployments of femtocells were residential, but now about one-third are corporate.”⁶⁹
- **Wi-fi:** Another consumer-driven response to alleviate strain on wireless networks is the offloading of mobile Internet traffic onto wi-fi hot spots. In order to fully leverage this network management technique, AT&T has become the largest wi-fi hot-spot provider in the world, with more than 24,000 wi-fi locations nationwide.⁷⁰ AT&T has also purchased service providers like Wayport and is investing in its own outdoor wi-fi networks, including one

located in Times Square.⁷¹ In addition, AT&T encourages greater wi-fi use by waiving a \$2.95 wi-fi charge for two hours for customers at McDonalds' 11,000 restaurants and at other popular locations like Starbucks and Barnes & Noble.⁷² Device manufacturers have also responded to the carriers' desire to leverage wi-fi-capable devices. It is estimated that nearly four in five smartphone devices *already* contain wi-fi chipsets.⁷³ Therefore, while these devices are touted as contributing significantly to the surge in data usage, they are being deployed with a built-in solution to help manage demand. As Mark Lowenstein noted in *BusinessWeek*: "Two years ago, all carriers thought wi-fi was a threat, now it's a lifeline."⁷⁴ And while wi-fi is already playing a significant role in managing wireless network capacity needs,⁷⁵ this proven solution is absent from the "spectrum crisis" debate, and is not even mentioned in the Commission's technical analysis.

5. **Enhancing Carrier Infrastructure**

At least part of the capacity crunch is temporary: before the sizable increase in data demand, some carriers had underinvested in their networks, but now many are adding more backhaul and optimizing their networks for data.⁷⁶ Also, many carriers are moving from lower capacity 3G networks to 4G networks that are more efficient and cheaper to operate. There are many available network investments that address congestion. In fact, James Taiclet, Chief Executive Officer of American Tower Corp., a large independent owner and operator of cell sites, has indicated that "AT&T and other wireless operators could double the amount of capacity they supply with current spectrum by investing more in new wireless equipment on existing cell towers."⁷⁷ Mr. Taiclet, whose company operates around 38,000 towers, notes that "our tower sites are about 50% loaded on average," and in big cities such as New York and Boston, "tower sites are loaded 60% to 75% on average."⁷⁸

*"AT&T and other wireless operators could double the amount of capacity they supply with current spectrum by investing more in new wireless equipment on existing cell towers."
Wall Street Journal (April 4, 2011)
(quoting American Tower CEO James Taiclet).*

- **Multi-Antenna Signal Processing:** In conventional wireless communications, a single antenna is used at the source, and another single antenna is used at the destination. Such systems are vulnerable to problems caused by multipath effects. Multipath effects occur when an electromagnetic field is met with obstructions such as hills, canyons, buildings, and utility wires, and wavefronts are scattered and take many paths to reach the destination. The late arrival of scattered portions of the signal causes problems such as fading, cut-out and intermittent reception, reduction in data speed, and an increase in the number of errors. Multi-Antenna Signal Processing (MAS), commonly referred to as smart antennas, uses an array of antennas and enormous processing power at each base station site to concentrate the transmitted signal directly to the user handset antenna and perform the ask and listen process in a similarly concentrated matter. Further, MAS technology avoids transmitting energy to other receivers in the same cell and avoids listening to other handsets in that cell. As a result, it is possible to use the same radio channel (*i.e.* same frequency and time slot) several times more efficiently within the cell than with other technologies. MAS technology is

commercially available and has been used in hundreds of thousands of base stations deployed in 20 countries for over 10 years.⁷⁹

- **Picocells:** A picocell is a small cellular base station typically covering a small area, such as an office or, more recently, a single aircraft. In wireless networks, picocells are typically used to extend coverage to indoor areas where outdoor signals do not sufficiently reach, or to add network capacity in areas with concentrated phone usage, such as train stations. Picocells can even be deployed in areas with limited space, for example, lampposts. And even while the first long-term evolution macrocells had yet to go live in the US, vendors were “already hard at work on the pico- and femtocells that will eventually augment those wide-area 4G networks.”⁸⁰
- **Modernized Network Architecture:** Alcatel Lucent has gone beyond the picocell and has created a brand new network architecture based on small cubes that can fit in the palm of your hand. Alcatel Lucent's architecture, known as lightRadio, which recently won first place for its category in the CTIA Emerging Technology Awards,⁸¹ “will quickly expand network capacity, lower operating costs, reduce energy consumption and bring connectivity to everyone around the world.”⁸² lightRadio departs from antiquated network designs by breaking the base station into its component elements and distributing its intelligence throughout the network. lightRadio is small enough to be deployed virtually anywhere, which allows it to benefit greatly from its independence from tower infrastructure as “roughly half of the power from cell towers' base stations is lost before it makes its way up to the antennas at the top of the tower.”⁸³ In addition, the antennas' directional beams can be shifted to maximize their potential, based on live data. It is estimated that the smart technology and power efficiency of lightRadio “can help cut carriers' operating costs in half.”⁸⁴ And the best is likely yet to come. As the saying goes “competition breeds innovation.” It is doubtful that competitors will sit idly by and let Alcatel Lucent redesign the network architecture for wireless broadband without developing other bandwidth-boosting alternatives.
- **Distributed Antenna Systems:** A Distributed Antenna System, or DAS, is a network of smaller, spatially separated antenna nodes connected to the communications network.⁸⁵ In essence, a single antenna radiating at high power is replaced by a group of low-power antennas to cover the same area. DAS networks are effective in areas with difficult topography, structural impediments, or in locations where it is not optimal to build a traditional macro cell. The benefits of DAS were recently explained by Michael Schweder, President of New Jersey AT&T, when AT&T announced that it had expanded its mobile broadband coverage at the host stadium of the 2014 Superbowl—New Meadowlands Stadium in East Rutherford, New Jersey: “We've significantly ramped up our wireless investments to enable an experience that offers New Jersey consumers better speed, reliability and availability where they need it the most.”⁸⁶ AT&T is demonstrating that it can execute on enhancing capacity (without additional spectrum) even in a challenging RF environment where ten of thousands of people are congregated for several hours in a limited geographic area. In fact, the AT&T press release points to more and more targeted infrastructure investments as “AT&T will focus on continuing to enhance its wireless network forecasting capabilities to

better predict usage trends and build network capacity to always stay one step ahead of customer need.”⁸⁷

- **Upgraded Backhaul:** Backhaul refers to transporting traffic between distributed sites and more centralized points of presence. Throughout the United States, wireless operators are beginning to migrate their base stations away from copper transport to fiber-based transport. Fiber-based transport provides a natural, scalable migration path and provides wireless operators with greatly enhanced service reliability and congestion management. As *Wireless Week* explains, “demand for mobile data has been a boon to backhaul providers that are doing a brisk business helping carriers solve the capacity crunch.”⁸⁸ This trend, however, is not factored into recent “spectrum crisis” analyses or the Commission’s technical rationale.
- **Sectorization:** Another way to increase subscriber capacity of a wireless network is to replace the omni-directional antenna at each base station with several (usually three or six) sector antennas with 120 or 60-degree openings. Each sector can be considered a new cell, with its own channel set of frequency channels. The use of directional sector antennas allows denser frequency reuse. In addition, sectorization is less expensive than cell splitting because it does not require the acquisition of new base station sites.
- **Cell Splitting:** Cell splitting is required when there is demand for greater capacity than an individual cell can offer. The cell size is reduced to cover a smaller area and the number of cell sites is increased. Cell splitting is perhaps the most expensive means of capacity creation because it requires significant infrastructure and planning approvals. However, several factors are leading to decreased costs: (1) urban/suburban sites can be located on rooftops, rather than towers; (2) radio equipment has become much smaller than in the past, with simpler requirements for enclosures and support, power and installation; and (3) new sites are increasingly shared, either under carrier network sharing agreements or through third party tower companies.

6. Packet Prioritization

Congestion can be effectively addressed by managing the inspection and prioritization of packets at critical points in the network. Routers generally inspect and forward packets practically instantaneously. But when a router is inundated, data packets are temporarily queued in the router’s memory. If the memory becomes full, the router “drops” some of the packets. And if the sending computer doesn’t get a timely response, it attempts to resend the data. This process consumes capacity and deteriorates quality of service because some data (for example video) is particularly sensitive to these delays. In such situations, carriers may prioritize the packets and allow latency-sensitive data to get to the head of the queue. In the extreme case, packet prioritization can save lives: “in wireless networks in the absence of network management, bandwidth intensive applications and other spectrum uses would have the potential to prevent or degrade the use of the voice service that consumers rely upon – and in the case of E-911, rely upon in emergency situations.”⁸⁹ But, in reality, wireless carriers have significant degrees of freedom to employ packet prioritization. While the FCC has determined that entities providing fixed broadband Internet access services “shall not unreasonably discriminate in transmitting lawful network traffic over a consumer’s broadband Internet

access service,”⁹⁰ no such provision applies to wireless carriers. And it is now evident that “service providers are beginning to adopt more sophisticated and varied traffic management strategies.”⁹¹

7. Caching

Edge caching is the temporary storage of frequently accessed data on servers that are located close to end users. By moving content closer to consumers, edge caching helps service providers avoid the latency that occurs as packets traverse longer distances across the network. Caching works particularly well with content that uses a significant amount of bandwidth and does not change frequently, for example, a popular YouTube video like “Baby” by Justin Bieber, which recently became the first YouTube video to earn a half billion views.⁹² Employing edge caching lightens network traffic and improves end user performance. Caching is a familiar concept as corporate intranets and computer operating systems boost performance by utilizing basic caching techniques.

In a related development, on February 15, 2011, IEEE announced that the IEEE Standards Association (IEEE-SA) Standards Board approved the development of draft standard IEEE P2200 – Standard Protocol for Stream Management in Media Client Devices.⁹³ IEEE P2200 will enable the delivery of rich media content such as high-definition or 3D video, games, music, books, and magazines to portable devices by preemptively leveraging local storage and intelligent content caching. The High Quality Mobile Experience (HQME) Steering Committee explains that an open HQME standard “would alleviate the growing demand on the network”⁹⁴ and accelerates delivery to mobile devices. This, of course, would be welcome news to consumers: the HQME website invites consumers to “consider a mobile experience with virtually no time lost to buffering or loading.”⁹⁵

8. Channel Bonding

Channel bonding is a technique that uses noncontiguous spectrum channels in a contiguous manner. For example, with channel bonding, four MHz HSPA channels (5 MHz each) can be utilized in a manner similar to a full 20MHz channel. This places downward pressure on spectrum requirements because channel bonding increases the usefulness of slivers of spectrum and avoids the difficult (and expensive) task of amassing large swaths of contiguous spectrum. Moreover, channel bonding boosts data output. When Nokia Siemens Networks demonstrated channel-bonding of an 800MHz channel and a 2.6GHz channel, the result was a 90% increase in data rates and propagation characteristics of the more desirable 800MHz channel.⁹⁶

9. Encouraging the Development of Bandwidth-Sensitive Applications and Devices

Carriers often portray themselves as victims of the applications running on their networks. However, there is a new trend to actively manage the bandwidth consumption of mobile applications. Forbes reports: “AT&T has begun notifying developers when their applications hog bandwidth. The carrier has a team that runs software programs to check the efficiency of the applications that run on its network, . . . If an app takes up, say, two times more bits than it needs to, the developer gets a call and advice on how to revise it.”⁹⁷ Rysavy Research explains: “applications that are designed specifically for bandwidth-constrained networks can consume significantly less data than those that are not.”⁹⁸

Similarly, devices that are designed with bandwidth conservation in mind use much less data. Rysavy Research demonstrates that there is an urgent need to ensure that devices that access wireless networks do so efficiently. In a recent white paper, Rysavy Research explains that with “a 1024 byte message with no attachment, BlackBerry communicated a total of 1251 bytes whereas iPhone iOS communicated 39625. This represents a 39625 divided by 1251, or 31.7 times efficiency advantage of BlackBerry over iPhone.”⁹⁹ This means that retrieving a simple attachment-free email message takes almost 32X as much data across the network when using an iPhone as compared to a Blackberry. In addition, the Rysavy Research Paper documents several other examples of inefficiency at the device level.¹⁰⁰ So while there has been significant public discussion about the “bandwidth-intensive” nature of smartphones driving the “spectrum crisis,” Rysavy Research demonstrates that a significant portion of those bandwidth needs are the result of devices that are not optimized for a capacity-constrained data channel.

Addressing excessive bandwidth consumption at its source will no doubt have a positive impact on relieving network congestion.



B. The Commission Itself Must Take a More Active Role in Promoting Efficient and Intensive Use of Spectrum

The Commission has a statutory obligation to promote the efficient and intensive use of the electromagnetic spectrum.¹⁰¹ This is hardly a congressional afterthought, as the provision was incorporated into the legislation that granted the FCC its auction authority. While there is no one

definition of ‘intensive’ use, clearly dormant spectrum fails any variant of the definition. As explained below, the Commission should expeditiously conclude its spectrum inventory and determine how these national assets can be put to better use.

I. *Far Too Much of the Nation’s Spectrum Is Either Underutilized or Occupied by Spectrum Warehouse*s

There are two factors that significantly impact the intensive and efficient use of spectrum. First, there are many underused bands. In a 2005 National Science Foundation spectrum usage study conducted in New York City over several months¹⁰² (including the summer of 2004 when the Republican National Convention was in town) researchers noted that, on average, only about 5.2 percent of the available spectrum from 30 MHz to 3000 MHz was being used at any given time. And, at peak times, the total spectrum usage in New York City was just 13 percent. The Commission should make the investment in compiling better data by committing to analyze the actual level of spectrum usage. As Google has recommended: “the Commission should acknowledge that any discussion of promoting wireless innovation and investment must begin with accurate data about the current extent of spectrum utilization.”¹⁰³

Second, there are many bands in which the licensees are warehousing rather than building systems to service consumers. In Auction 66 for AWS-I licenses, “Verizon Wireless spent \$2.8 billion for (unused) AWS licenses”; “AT&T (then Cingular) spent \$1.3 billion for AWS frequencies”; and “cable operators spent \$2.4 billion for (currently unused) AWS licenses.”¹⁰⁴ These bidding groups account for \$6.5 billion in unused AWS-I spectrum. Worse still, it is estimated that carriers are collectively sitting on \$15 billion in spectrum licenses, with AT&T alone warehousing licenses worth \$10 billion.¹⁰⁵ In fact, 70-90% of AT&T’s spectrum capacity is unused.¹⁰⁶ Verizon Wireless is on record at the Commission that it “does not plan to deploy its Lower A Block spectrum in the near term.”¹⁰⁷ Elsewhere, Clearwire is now looking to make billions off undeveloped spectrum licenses after obtaining leases covering 85% of the 2.5 GHz band.¹⁰⁸ Undeployed spectrum has a profound impact on the overall capacity of wireless networks.

The slow pace of deployment on these spectrum bands is inconsistent with the spirit of 47 U.S.C. § 309(j)(4)(B), which was implemented to prevent stockpiling or warehousing of spectrum by licensees or permittees.¹⁰⁹ Build out requirements must be more closely related to the commercial reality of how long it takes to commence wireless operations in order to avoid situations where spectrum assets are not aggressively deployed. With the bands identified above and many other bands underutilized, the claims of immediate crisis are significantly overstated. Thus, there is no need to rush to oust current licensees (e.g., broadcasters) from spectrum without a full understanding of the extent of underutilized spectrum.

The fact that there is no “crisis” for more spectrum can also be seen in public statements of certain wireless licensees. After the AWS-1 auction, Brian Roberts, CEO of Comcast, summed up his deployment plans by stating, “I don’t think we have to rush out and do something. I think there’s

BIDDING VS. BUILDING

- *“I don’t think we have to rush out and do something. I think there’s optionality for anyone that owns facilities.” — Brian Roberts, CEO of Comcast (summing up his deployment plans following the AWS-1 auction).*
- *Time Warner Cable’s Chief Operations Officer, Rob Marcus, was quoted in the January 28, 2011 edition of Communications Daily as stating that his company “has no plans to sell, lease or use its AWS spectrum licenses.”*
- *On a November 2010 earnings call with investment analysts, Dish Network CEO Charlie Ergen indicated, “one of the better things we did was that we resisted the temptation to go out and try to build [the spectrum] out and spend more money on build out before we know where we want to go.” He also explained the value of speculating on spectrum without a business plan: “if we can figure out a way to use it, that’s good. If we can’t somebody else will own it.”*

optionality for anyone that owns facilities.”¹¹⁰ More recently, Time Warner Cable’s Chief Operations Officer, Rob Marcus, was quoted in the January 28, 2011 edition of Communications Daily as stating that his company “has no plans to sell, lease or use its AWS spectrum licenses.”¹¹¹ Dish Network CEO Charlie Ergen indicated on a November 2010 earnings call with investment analysts that “one of the better things we did was that we resisted the temptation to go out and try to build [the

spectrum] out and spend more money on build out before we know where we want to go.” He also explained the value of speculating on spectrum without a business plan: “if we can figure out a way to use it, that’s good. If we can’t somebody else will own it.”¹¹²

2. The FCC Should Complete and Publicly Release a Comprehensive Spectrum Inventory Before Taking Unprecedented Regulatory Actions

There has been considerable FCC and congressional attention focused on the concept of a spectrum inventory. There can be little doubt that the FCC cannot, at the same time, promote “efficient and intensive use of the electromagnetic spectrum” and remain unaware of the full extent of spectrum utilization.

On July 14, 2010, FCC Chairman Julius Genachowski sent a letter to Senator John Rockefeller, Chairman of the Senate Commerce Committee, publicly announcing that such an inventory is underway.¹¹³ In light of the longstanding calls for an inventory, it is a widely recognized hope that the FCC will complete and publicly release a comprehensive inventory in the near term, which should include data and measurement of actual spectrum use. And although Chairman Genachowski has indicated that the

“While an inventory of both federal and non-federal spectrum would not answer all of our questions, it would provide decision makers at the FCC, NTIA and Congress a clearer, more detailed and up-to-date understanding of how spectrum is currently being used and by whom—data essential to sound policy decisions and spectrum management.” Senator Olympia Snowe (2011).

Commission has concluded a “baseline” inventory,¹¹⁴ much remains unknown about the breadth of that process. For example, does the baseline FCC inventory include frequencies between 300 Megahertz and 6.5 Gigahertz, as does the pending Reforming Airwaves by Developing Incentives and Opportunistic Sharing (RADIOS) Act, introduced by Senators Kerry and Snowe on March 2, 2011?¹¹⁵ Does the baseline inventory include as detailed an inquiry as proposed in the RADIOS Act? Notably,

the RADIOS Act requires additional studies beyond the inventory, including a spectrum survey/ measurement study that looks at spectrum occupancy and use.¹¹⁶

While it is commendable that the FCC has produced the Spectrum Dashboard and License View, these tools are much more limited than the spectrum inventory proposed in the RADIOS Act. Moreover, the Commission’s Spectrum Dashboard, by its own terms, “does not constitute the official licensing records for the Commission”¹¹⁷ and “the FCC makes no representations regarding the accuracy or completeness of the information maintained in the Spectrum Dashboard.”¹¹⁸ The Commission’s disclaimer that the Spectrum Dashboard is designed for “informational purposes” and that users of License View “are cautioned that this system does not necessarily constitute the

The Commission’s Spectrum Dashboard, by its own terms, “does not constitute the official licensing records for the Commission” and “the FCC makes no representations regarding the accuracy or completeness of the information maintained in the Spectrum Dashboard.” The Commission’s disclaimer that the Spectrum Dashboard is designed for “informational purposes” and that users of License View “are cautioned that this system does not necessarily constitute the complete record” demonstrates the need for an official spectrum inventory done in a comprehensive manner.

complete record”¹¹⁹ demonstrates the need for an official spectrum inventory done in a comprehensive manner.

Senator Olympia Snowe recently reiterated to the Commission the importance of using the spectrum inventory as a mechanism for analyzing the need for additional regulatory interventions: “While an inventory of both federal and non-federal spectrum would not answer all of our questions, it would provide decision makers at the FCC, NTIA and Congress a clearer, more detailed and up-to-

date understanding of how spectrum is currently being used and by whom—data essential to sound policy decisions and spectrum management.”¹²⁰ The spectrum inventory is a diagnostic tool and as such it should logically come before any reallocation proceeding. The breadth of the undertaking represented by the National Broadband Plan militates against a rush to “treatment” without adequate diagnosis. Regulatory action that precedes the spectrum inventory’s granular data would likely lead to uninformed, premature, and wasteful decision-making. In fact, CTIA supports the concept of a comprehensive spectrum inventory and previously described it as a “good first step.”¹²¹

3. The FCC Should Increase Licensee Flexibility

FCC licensees should have the flexibility to innovate and respond to market demands and technological breakthroughs. In fact, licensee flexibility is a theme in the National Broadband Plan: “Flexibility of use enables markets in spectrum, allowing innovation and capital formation to occur with greater efficiency. More flexible spectrum rights will help ensure that spectrum moves to more productive uses, including mobile broadband, through voluntary market mechanisms.”¹²² But the concept of flexible use must go beyond these statements. As former FCC Chairman Reed Hundt stated, “As discussed in virtually all FCC statements, but only put into practice in certain circumstances, the FCC should not place artificial use restrictions on the licensees. Licensees should be allowed to compete to provide whatever service they think will serve consumer demand provided that they do not cause undue interference to other spectrum users.”¹²³ As the Commission has acknowledged the importance of flexibility, it should examine the extent to which additional licensee flexibility would impact spectrum availability.

Granting spectrum licensees broad flexibility would allow the marketplace to respond to the needs of wireless carriers. Wireless carriers, for example, could then more easily enter into lease agreements with other licensees for use of their spectrum to provide mobile broadband.¹²⁴ Indeed, as economists and policy analysts have increasingly come to agree, flexible rights for spectrum licensees, coupled with a vibrant secondary market for those rights, are the most efficient ways to repurpose spectrum (rather than any form of administrative reallocation).¹²⁵ The Commission should explore ways to reduce restrictions on licensee flexibility as another method of ensuring that spectrum is put to its most productive use.

4. The Commission Should Adopt Receiver Standards

Historically, the Commission has regulated the interfering potential of transmitters in order to avoid unacceptable levels of radio interference.¹²⁶ Increasingly, however, interference occurs due to inadequate receiver performance rather than the function of transmitters.¹²⁷ Nevertheless, the Commission has generally not adopted minimum receiver standards in order to help define when an entity is entitled to protection from interference. In contrast, the National Telecommunications and Information Administration has established “receiver standards for most Federal users of the radio spectrum.”¹²⁸ Recently, NTIA urged the Commission to look closely at receiver standards as part of its inquiry on dynamic spectrum use technologies.¹²⁹

Receiver standards are needed for commercial networks to ensure the intensive use of spectrum. Without standards, the nation’s spectrum resources are wasted due to protracted rulemakings whenever parties seek to introduce services in a band adjacent to incumbent operations due to concerns about harmful interference. As IEEE explained to the Commission last year: “there is no controversy that the AWS-3 band (2155-2175 MHz) is vacant, yet commercial access to this band has been blocked for several years because of harmful interference [claims] and the lack of definitive findings on the issue: various sides have offered different criteria for defining harmful interference.”¹³⁰ Similarly, in 2011, receiver standards have again been a source of significant debate following the Commission’s evaluation of Lightsquared’s conditional request for waiver of the Ancillary Terrestrial Component rules.¹³¹ And while the Commission has recently concluded that “responsibility for protecting services rests not only on new entrants but also on incumbent users themselves, who must use receivers that reasonably discriminate against reception of signals outside their allocated spectrum,”¹³² adopting rules to that effect is the best means of ensuring intense use of the nation’s spectrum assets.

III. OTHER SOURCES OF SPECTRUM ARE MORE READILY AVAILABLE

A. The Commission Should Immediately Address a Significant Portion of the Spectrum Demand Equation by Assigning Spectrum that Is Languishing in Its “Pipeline”

The FCC has spent considerable time and energy focusing on external solutions (reallocation of spectrum from one industry segment to another) to the supposed “spectrum crisis.” But, it must also be diligent in taking actions that only it can perform—licensing spectrum bands that have been

languishing for years at the Commission. While the National Broadband Plan and the “Broadband Action Agenda” pledged to issue orders in 2010 related to several unassigned bands, that did not occur.¹³³

- ❖ **AWS-3 block spectrum at 2155-2175 MHz** — The FCC designated this spectrum block for Advanced Wireless Services in 2005, ordered the relocation of incumbents in 2006, issued a Notice of Proposed Rulemaking in 2007 and sought comment on draft service rules in a Further Notice of Proposed Rulemaking in 2008. The FCC, however, did not fulfill its pledge to issue final service rules in 2010.¹³⁴
- ❖ **H block spectrum at 1915-1920 MHz and 1995-2000 MHz and J block spectrum at 2020-2025 MHz and 2175-2180 MHz** — In 2004, the FCC designated these blocks for broadband and advanced wireless services and initiated a rulemaking proceeding on service rules. The FCC issued a Further Notice in 2008 to refresh the record. The FCC, however, did not fulfill its pledge to issue service rules in 2010.
- ❖ **700 MHz D block at 758-763 MHz and 788-793 MHz** — The FCC unsuccessfully attempted to auction this spectrum block in 2008, in an attempt to form a public/private partnership with the licensee of the adjacent public safety block and create a nationwide public safety broadband network. The FCC sought comment on potential modifications to the D block rules in 2008. However, the Commission did not fulfill its pledge to issue service rules in 2010.

Therefore, in each of these three unassigned spectrum bands, the FCC failed to complete its work on longstanding proceedings with mature records developed over a number of years. The fact that these bands still remain unassigned demonstrates that there are no pressing exigencies that should prevent the FCC from fully examining non-spectrum capacity-generating alternatives (as suggested in Section II.A above) or concluding a comprehensive spectrum inventory (as suggested in Section II.B above) before pressing ahead with reallocation and other spectrum management decisions that would greatly benefit from this additional relevant data.

The FCC has spent considerable time and energy focusing on external solutions to the supposed “spectrum crisis.” But it must also be diligent in taking actions that only it can perform—licensing spectrum bands that have been languishing for years at the Commission. While the National Broadband Plan and the “Broadband Action Agenda” pledged to issue orders in 2010 related to several unassigned spectrum bands, that did not occur.

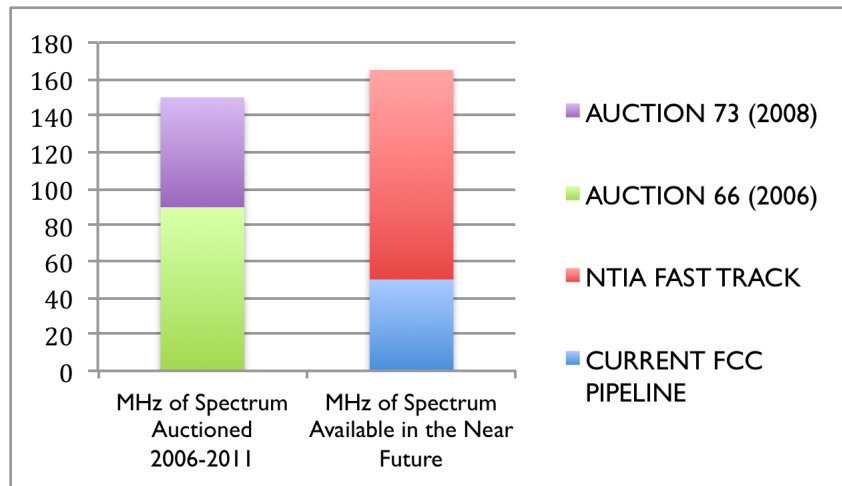
B. The FCC Should Immediately License Underutilized Spectrum Previously Identified by NTIA

Last year, NTIA undertook a “fast-track review” to identify spectrum bands that could be reallocated for commercial use. The NTIA Fast Track Evaluation Report recommends that a total of 115 megahertz be made available for wireless broadband use within five years.

- Radio transmitters on weather balloons, as well as for weather satellites, currently use the first spectrum band identified by the NTIA, ranging from 1695 to 1710 MHz. This band can be used for commercial broadband services by establishing exclusion zones that prevent commercial services from interfering with government operations.
- NTIA also identified the 3550 to 3650 MHz band that is used mostly by the Department of Defense for high-power radars. According to NTIA, this spectrum can be safely licensed for broadband “outside certain coastal areas and test and training areas.”

On January 19, 2011, NTIA officially requested that the FCC “take the necessary regulatory actions to make available for wireless broadband” 15 MHz at 1695 to 1710MHz, and 100 MHz at 3550 to 3650 MHz. NTIA’s rapid progress in identifying bands that could be transitioned to commercial broadband use provides the Commission with another 115 MHz of available spectrum.¹³⁵ As illustrated in Figure 2, below, when combined with the 50 MHz of spectrum currently in the Commission’s pipeline (as discussed above), the FCC will have at its disposal just as much spectrum as was auctioned in the past five years. The Commission should expedite the licensing of all these bands.

FIGURE 2: “Five Years” Worth of Wireless Broadband Spectrum . . . Pending Assignment



C. The Commission Should Help Facilitate the Success of the Secondary Market

Carriers are also able to increase their spectrum holdings through secondary market transactions. Over a decade ago, when the concept of the secondary spectrum market was formulated, it was envisioned by the FCC as a means of addressing increased demands for wireless services: “We continue to believe that an effective way to make unused spectrum held by existing licensees available to others may be through secondary markets.”¹³⁶

A few notable transactions that leveraged the secondary market include:

- In 2007, AT&T purchased licenses for 12 MHz of broadband-capable spectrum from Aloha Partners for \$2.5 billion.¹³⁷ AT&T's purchase covers 196 million U.S. residents, including 72 of the 100 largest markets in the U.S.
- In 2010, investment firm Harbinger Capital Partners completed an acquisition of mobile satellite telecom provider SkyTerra Communications. Taking into account outstanding debt and securities, the deal was valued at more than \$1.8 billion.¹³⁸
- In 2010, AT&T signed a \$1.93 billion deal with Qualcomm to buy spectrum licenses covering more than 300 million people nationwide in the lower 700-megahertz band.¹³⁹

Despite these and other examples, the National Broadband Plan states, “[w]hile the FCC currently has rules that enable secondary markets, the record is mixed.”¹⁴⁰ The Plan concludes that by the end of 2010 “the FCC should identify and address barriers to more productive allocation and use of spectrum through secondary markets.”¹⁴¹ This is not the first time the FCC has sought to enhance the secondary market rules. In 2004, the FCC issued a rulemaking in which it explained that the Commission would “continue to explore additional steps that could further enhance secondary markets and increase the efficient use of spectrum and the availability to the public of innovative wireless services.”¹⁴²

Six years after the FCC obtained a record in response to its initial rulemaking seeking to strengthen secondary markets, the Commission in 2010 issued yet another report questioning whether the secondary markets were working adequately. Reports asking questions are not enough. The FCC must do all it can to encourage secondary market transactions. As economist Jeffrey Eisenach explained to the House Subcommittee on Communications, Technology and the Internet, Committee on Energy and Commerce:

Rather than trying to engage in a one-time repurposing exercise (which would, indeed, take a decade or more), the Commission would do better to focus on implementing reforms that would allow spectrum to move dynamically – that is, continuously – to its highest valued uses, in response to changes in markets and technologies.¹⁴³

The secondary market proceedings should be brought to a quick close and the FCC should revise its rules to permit robust use of this critical spectrum management tool. In addition, the FCC should further encourage the use of the secondary marketplace by adopting meaningful build out requirements and appropriate enforcement mechanisms, including specific license forfeiture procedures for licensees failing to utilize their spectrum in a timely manner. Doing so will significantly promote the secondary market, ultimately get spectrum in the hands of parties that seek to use it and allow consumers to reap the benefit of greater competition.

IV. CONCLUSION

In the final analysis, the impending “spectrum crisis” is not real. In fact, it includes all the elements of a bestselling science fiction novel. First, the story seamlessly merges reality and fantasy. Second, the tale includes dire predictions about the future if, and only if, the worst-case scenario were to happen concerning a long list of variables. Third, the account ignores all simple solutions in favor of a dramatic conclusion. And, of course, there is a manufactured *enemy*. In this case, many seem to indirectly and incorrectly believe that free over-the-air broadcasting is the enemy of mobile broadband. But this debate masks the fact that there are other spectrum resources available and that carriers and the FCC have meaningful alternatives to manage the increased demand for data services.

In reality, broadcast and broadband can and should be complementary—projections show that the large amounts of future demand for mobile broadband will be for mobile video,¹⁴⁴ and broadcasting (with its point to multipoint distribution system) is the most efficient way to distribute video (especially video wanted by significant numbers of viewers). This only serves to underscore the importance of the Commission fully investigating and quantifying the impact of all capacity-generating alternatives, including permitting all licenses sufficient flexibility to leverage technological breakthroughs to help deliver the type of mobile services that U.S. consumers deserve.

* * *

About the author:

Uzoma Onyeije, President, Onyeije Consulting LLC
2000 N. 14th Street, Suite 600 Arlington, VA 22201 (703) 894-9090

ENDNOTES

¹ American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 6001(k)(2)(D), 123 Stat. 115, 516 (2009) (Recovery Act).

² *Id.*

³ CTIA Written Ex Parte Communication, GN Docket No. 09-51 at 13 (Sept. 29, 2009).

⁴ Connecting America: The National Broadband Plan, Recommendation 5.8, p.86 (FCC, 2010) (Broadband Plan).

⁵ Broadband Plan, Recommendation 5.8, p.86.

⁶ *Id.* Notably, the Cisco Forecast, which is among the three reports relied on by the Commission to support the claim of massively increased spectrum demand, is based on *global* use.

⁷ FCC Staff Technical Paper, Mobile Broadband: The Benefits of Additional Spectrum (FCC, October 2010) (OBI Technical Paper No. 6). While the OBI paper claims that it provides “additional technical analysis to validate the need for additional mobile broadband spectrum in the near-term,” no previous engineering analysis on this topic was issued by the agency. *Id.* at 2.

⁸ See “The Emperor’s New Spectrum Crisis,” available at <http://www.tvnewscheck.com/article/2010/04/12/41368/the-emperors-new-spectrum-crisis> (discussing a blog post by Edward Lazarus, FCC Chief of Staff, entitled “The Record Is Clear: America Needs More Spectrum,” which claims that the National Broadband Plan record shows “overwhelming” agreement that the U.S. needs more broadband spectrum despite considerable comments in the record that take a contrary position). The blog is available at <http://blog.broadband.gov/?entryId=358488>. More recently, Chairman Genachowski has suggested that spectrum still not used but compliant with FCC build out regulations did not contribute to any perceived lack of available spectrum even though certain licensees have admitted (several years after winning licenses auction) that they still have no plans to deploy (See <http://www.dsreports.com/shownews/FCC-Boss-Spectrum-Hoarding-Illusory-113223>). The Chairman also indicated that there was no need to conduct a long envisioned comprehensive spectrum inventory that would provide data about spectrum occupancy and usage (“FCC on Spectrum Inventory: Already Did It,” The Hill (Mar. 16, 2011) available at <http://thehill.com/blogs/hillcon-valley/technology/150197-fcc-on-spectrum-inventory-already-did-it>). On April 12, 2011 at the 2011 NAB Show in Las Vegas, Chairman Genachowski characterized arguments that challenge the notion of a spectrum crunch as “distractions” and claimed that “some have argued that there’s no spectrum crunch – but the data couldn’t be clearer.” While the data shows increased use of mobile data by consumers, this paper demonstrates that data demand has been somewhat exaggerated and, in any event, when placed in context with the many alternative mechanisms available, increased data demand does not necessarily mean more spectrum assignments are required.

⁹ “With more than 276 million subscribers in the U.S., it is vital for our industry to secure at least 800 MHz of additional spectrum within the next six years.” “Without this additional spectrum, our industry will cease to provide U.S. consumers with the most innovative and most competitive wireless offerings in the world.” Statement of Steve Largent, President and CEO, CTIA (December 15, 2009) (emphasis added) (Largent Statement). See also CTIA Comments, GN Docket Nos. 09-157, 09-51, at vi (filed Sept. 30, 2009).

¹⁰ See Largent Statement.

¹¹ “CTIA and our member companies are extremely pleased” about the FCC’s and the broadband team’s focus on making available “500 MHz of spectrum for broadband within 10 years, of which 300 MHz should be made available for mobile use within 5 years.” Statement of Steve Largent, President and CEO, CTIA (March 15, 2010).

¹² Petition for Reconsideration of the Cellular Telecommunications & Internet Association, ET Docket Nos. 00-258 and 95-18; IB Docket No. 99-81 (filed Oct. 15, 2001).

¹³ “Cut MSS Spectrum Loose, Says CTIA,” Connected Planet (May 22, 2001) available at http://connectedplanetonline.com/news/telecom_cut_mss_spectrum/ (last visited April 14, 2011).

¹⁴ Statement of Julius Genachowski, Chairman, FCC (July 20, 2010).

¹⁵ OBI Technical Paper No. 6 at 2.

¹⁶ *Id.*

¹⁷ *Id.* at Exhibit 10.

¹⁸ *Id.* at 17.

¹⁹ *Id.* at Exhibit 10.

²⁰ This technological progression has been coined “Cooper’s Law.” See <http://www.arraycomm.com/serve.php?page=Cooper>

²¹ OBI Technical Paper No. 6 at Exhibit 10.

²² See <http://stevencrowley.com/2011/03/29/should-a-sales-brochure-underlie-us-spectrum-policy/>

²³ See http://www.att.com/Common/about_us/pdf/INV_PRES_3-21-11_FINAL.pdf

²⁴ See http://www.download-telekom.de/dt/StaticPage/97/67/90/tmo-invday11.pdf_976790.pdf

²⁵ *Id.* T-Mobile predicts 60% CAGR from 2009-14 or 10 times growth in 5 years.

²⁶ OBI Technical Paper No. 6 at 9. It is also notable that the Commission relied on an arithmetic mean of the three forecasts when it should have utilized a geometric mean, which would have led to a more modest growth rate.

²⁷ See <http://tmfassociates.com/blog/2010/10/22/analyzing-the-spectrum-crisis-can-the-fcc-add-up/> (emphasis added).

²⁸ For a well respected and often cited discussion of this phenomenon see Bohlen, Joe M.; Beal, George M. (May 1957), “The Diffusion Process”, *Special Report No. 18* (Agriculture Extension Service, Iowa State College) 1: 56–77 available at <http://www.soc.iastate.edu/extension/presentations/publications/comm/Diffusion%20Process.pdf>

²⁹ Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2010-2015.

³⁰ “Cisco: U.S. Mobile Data Growth Falling 60-80%,” DSL Prime (Mar. 29, 2011) available at <http://www.dslprime.com/a-wireless-cloud/61-w/4040-cisco-us-mobile-data-growth-falling-60-80>

³¹ *Id.*

³² Jon Healey, “Spectrum crisis? What spectrum crisis?” Opinion, LA Times (Apr. 1, 2011) available at <http://opinion.latimes.com/opinionla/2011/04/spectrum-crisis-what-spectrum-crisis.html>

³³ Peter Svensson, “AT&T Talks of Spectrum Shortage, Yet It Has Plenty,” AP (Mar. 21, 2011) available at <http://abcnews.go.com/Technology/wireStory?id=13188504>

³⁴ CTIA’s Innovation and Advocacy Position Paper is available at http://www.ctia.org/advocacy/policy_topics/topic.cfm/TID/64

³⁵ LTE technology will be significantly more spectrum efficient than 3G. Nevertheless, the Rysavy Research report contends that “there are both theoretical and practical limits to spectral efficiency and current systems are approaching those limits.” See CTIA Written Ex Parte Communication, GN Docket No. 09-51 at 1 (Sept. 29, 2009) (attaching Rysavy Research, “Mobile Broadband Spectrum Demand,” at 19 (Dec. 2008)) (“Rysavy Report”).

³⁶ See, e.g., Op-ed by CTIA CEO Steve Largent entitled “FCC Not Free Market, Best for Spectrum Auction,” (Mar. 21, 2011) available at <http://benton.org/node/53499>

³⁷ See http://www.cfr.org/publication/21840/conversation_with_ivan_seidenberg.html

³⁸ Comments of Sprint Nextel Corporation, GN Dockets 09-47, 09-51 and 09-137 at 23 (October 23, 2009).

³⁹ “T-Mobile’s Ray discusses HSPA+ 42, spectrum refarming and backhaul deployment,” *Fierce Broadband Wireless* (Jan. 18, 2011) available at <http://www.fiercebroadbandwireless.com/story/t-mobiles-ray-discusses-hspa-42-spectrum-refarming-and-backhaul-deployment/2011-01-18>.

⁴⁰ *Id.*

⁴¹ “AT&T to Acquire T-Mobile for \$39 Billion,” *CNN Money* (Mar. 21, 2011) available at http://money.cnn.com/2011/03/20/news/companies/att_tmoble_deal/index.htm?source=yahoo_quote

⁴² “Mobile Data: Traffic Jam Ahead?” — Merrill Lynch Report at 1 (released Feb. 2, 2010).

⁴³ Clearwire Annual Report, Form 10-K at 2 (filed Feb 22, 2011).

⁴⁴ *Id.*

⁴⁵ “WiMAX Throttling Lawsuit: Clearwire Can’t Deliver The Goods,” *Wired* (Mar. 10, 2011) available at <http://www.wired.com/epicenter/2011/03/throttling-lawsuit-clearwire/>

⁴⁶ See <http://www.arraycomm.com/serve.php?page=Cooper>

⁴⁷ AT&T to Acquire T-Mobile USA From Deutsche Telekom, AT&T Press Release (Mar. 20, 2011) available at <http://www.att.com/gen/press-room?pid=19358&cdvn=news&newsarticleid=31703&mapcode=corporate|financial>

⁴⁸ See <http://www.fiercebroadbandwireless.com/story/t-mobiles-ray-discusses-hspa-42-spectrum-refarming-and-backhaul-deployment/2011-01-18>

⁴⁹ *Connecting America: The National Broadband Plan*, p.77 (FCC, 2010) (emphasis added).

⁵⁰ Rysavy Research, “Mobile Broadband Capacity Constraints And the Need for Optimization” (updated February 24, 2010) at 5 (“Spectrum reuse, which cellular technologies accomplish through the use of the same frequencies over and over in different cells is, in fact, the greatest determinant of overall network capacity.”).

⁵¹ “Will the Rapid Growth in Data Traffic Overwhelm Wireless Networks?” — *The Economist* (Feb. 11, 2010).

⁵² See Gregory Rose, *How Incumbents Blocked New Entrants in the AWS-1 Auction: Lessons For the Future*, in *Spectrum Auction Breakdown: How Incumbents Manipulate FCC Auction Rules To Block Broadband Competition* (June 2007), Working Paper 18, available at http://www.newamerica.net/files/WorkingPaper18_FCCAuctionRules_Rose_FINAL.pdf; Gregory Rose; Peter Cramton and Jesse A. Schwartz, “Collusive Bidding in FCC Spectrum Auctions,” *Contributions to Economic Analysis and Policy* 1:1 (2002) available at: <http://works.bepress.com/cramton/2>

⁵³ See Rysavy Report at 15.

⁵⁴ Comments of Sprint Nextel Corporation, GN Dockets 09-47, 09-51 and 09-137 at 23-24 (October 23, 2009) (explaining that first-generation cellular services using the AMPS standard had a spectral efficiency of 0.17 bps/Hz. 2.75G networks almost *doubled* first generation efficiency to 0.33 bps/Hz using GSM+EDGE technology. 3G networks nearly *quadrupled* 2.75G efficiency to 1.3 bps/Hz using CDMA2000 1x EV-DO Rev. A. 3.5G networks employing HSDPA *more than doubled* 3G efficiency to 2.88 bps/Hz). While specific figures for spectral efficiency vary from party to party based on definitions and measurements, parties generally agree on the trend toward more efficient networks.

⁵⁵ High Speed Packet Access (HSPA) is the set of technologies that defines the migration path for 3G/WCDMA operators worldwide. HSPA, which uses the Frequency Division Duplexing transmission scheme, includes HSDPA (High Speed Downlink Packet Access), HSUPA (High Speed Uplink Packet Access) and HSPA Evolved (HSPA+). See <http://www.gsmworld.com/technology/hspa.htm>

⁵⁶ “AT&T: 3% of Wireless Users Eat 40% of Data,” *Venture Beat* (December 9, 2009) available at <http://venturebeat.com/2009/12/09/att/>

⁵⁷ “AT&T’s iPhone Mess,” *Business Week* (February 3, 2010) available at http://www.businessweek.com/magazine/content/10_07/b4166034389519_page_3.htm. It is notable, however, that such

techniques are only one tool available to carriers. This can be seen by the fact that AT&T now selectively employs unlimited data plans as a customer retention tool.

⁵⁸ “T-Mobile Will Skip Overage Charges, Throttle Data,” *Phone Scoop* (April 26, 2010) available at <http://www.phonescoop.com/news/item.php?n=5877>

⁵⁹ “Verizon Wireless Plans to End Unlimited Data Options for Apple's iPhone,” *Bloomberg* (Mar. 1, 2011) available at <http://www.bloomberg.com/news/2011-03-01/verizon-wireless-to-drop-unlimited-iphone-data-plans-cfo-says.html>

⁶⁰ See www.cisco.com/en/US/solutions/collateral/.../brochure_c02-620392.pdf

⁶¹ Each 5MHz HSPA carrier can handle up to 60-70 simultaneous voice conversations (equivalent to 0.5Mbps at 8Kbps). But HSPA handles data at about 1 bit/second/hertz (depending on the release), implying 5Mbps per 5MHz carrier at 100% utilization, or ten times greater efficiency than voice.

⁶² “AT&T CTO Says Voice Over LTE Coming In 2013,” *Forbes* (Feb. 15, 2011) available at <http://blogs.forbes.com/elizabethwoyke/2011/02/15/att-cto-says-voice-over-lte-coming-in-2013/>

⁶³ Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2010-2015. Despite the rising popularity of offloading, Cisco's forecast is in part premised on the unlikely notion that there will be less than 2% annual growth in offloading in the United States over the next 4 years. *Id.* at Table 7.

⁶⁴ “T-Mobile to Join 3G Femto Fray,” available at http://www.lightreading.com/document.asp?doc_id=203288&

⁶⁵ Earlier this year, AT&T began mailing coupons for free Microcells to the 7.5 percent of its mobile subscribers who are most likely to have very limited AT&T coverage in their homes. “AT&T May Give Away MicroCells for Weakly Covered Homes,” *PC World* (Jan. 21, 2011) available at http://www.pcworld.com/businesscenter/article/217385/atandt_may_give_away_microcells_for_weakly_covered_homes.htm

⁶⁶ “Sprint Begins Offering EV-DO Femtocells,” *Fierce Wireless* (Aug. 20, 2010) available at <http://www.fiercewireless.com/story/rumor-mill-sprints-ev-do-femtocells-begin-shipping/2010-08-20>

⁶⁷ See <http://www.verizonfemtocell.com/>

⁶⁸ See, e.g., <http://gigaom.com/2010/06/02/att-explains-its-pricing-change-its-all-about-value/>

⁶⁹ “Femtocells Make their Way into the Office,” *Computerworld* (March 7, 2011) available at http://www.computerworld.com/s/article/355071/Femtocells_Make_Way_Into_Enterprises?taxonomyId=75

⁷⁰ See AT&T Inc. 2010 Annual Statement, Chairman's Letter available at <http://www.att.com/gen/investor-relations?pid=19236>

⁷¹ “AT&T Offers Times Square Wi-Fi,” *Wireless Week* (May 25, 2010) available at <http://www.wirelessweek.com/News/2010/05/Carriers-Times-Square-Wi-Fi-ATT/>

⁷² See http://www.mcdonalds.com/us/en/services/free_wifi.html; <http://www.starbucks.com/coffeehouse/wireless-internet>; <http://www.barnesandnoble.com/u/Wi-fi-at-Barnes-and-Noble/379001240/>

⁷³ “Is All Wi-Fi Offload the Same?” *Wireless Week* (July 11, 2010) available at <http://www.wirelessweek.com/Articles/2010/07/Technology-Offload-Wi-Fi/>

⁷⁴ “AT&T Mulls Plans to Deal with iPhone Data Demand,” *BusinessWeek* (December 21, 2009) available at http://www.businessweek.com/technology/content/dec2009/tc20091221_605613.htm

⁷⁵ Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2009-2014, February 9, 2010; Coda Research Consultancy, US Mobile Traffic Forecasts: 2009-2015, 2009 (Cisco Forecast).

⁷⁶ “AT&T Addresses 3G Woes With Massive Backhaul Build,” *Sidecut Reports*, <http://www.sidecutreports.com/2010/01/06/att-addresses-3g-woes-with-massive-backhaul-build/>

⁷⁷ “Skepticism Greets AT&T Theory, Telecom Giant Says T-Mobile Deal Will Improve Network Quality, but Experts See Other Options,” Wall Street Journal (April 4, 2011) available at <http://online.wsj.com/article/SB10001424052748703806304576236683511907142.html>

⁷⁸ *Id.*

⁷⁹ Additional data on MAS performance in deployed systems is available on the ArrayComm Web site. See <http://www.arraycomm.com/serve.php?page=proof>.

⁸⁰ “CTIA: Vendors Collaborate on LTE Picocells, Femtocells,” Connected Planet Online (Mar. 15, 2010) available at <http://connectedplanetonline.com/ctia/2010/news/ctia--vendors-collaborate-lte-0315/>

⁸¹ See Alcatel-Lucent’s lightRadio™ Receives First Place Award in 2011 CTIA E-Tech Competition Honoring Emerging Mobile Technologies, Alcatel-Lucent Press Release (Mar. 24, 2011) available at http://www.alcatel-lucent.com/wps/portal/!ut/p/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKLd4x3tXDUL8h2VAQAURh_Yw!!?LM_SG_CABINET=Docs_and_Resource_Ctr&LMSG_CONTENT_FILE=News_Releases_2011/News_Article_002384.xml

⁸² See http://www.alcatel-lucent.com/features/light_radio/index.html

⁸³ See “The Tiny Cube that Could Cut Your Cell Phone Bill,” CNN Money (Mar. 21, 2011) available at http://money.cnn.com/2011/03/21/technology/light_radio/index.htm?iid=HLM

⁸⁴ *Id.*

⁸⁵ See <http://www.thedasforum.org/>

⁸⁶ See “AT&T Invests in New Jersey Network to Deliver Most-Advanced Mobile Broadband Experience,” AT&T Press Release (Mar. 18, 2011) available at <http://www.marketwatch.com/story/att-invests-in-new-jersey-network-to-deliver-most-advanced-mobile-broadband-experience-2011-03-18>

⁸⁷ *Id.*

⁸⁸ “Booming Business for Backhaul,” *Wireless Week* (May 3, 2010) available at <http://www.wirelessweek.com/articles/2010/05/booming-business-for-backhaul/>

⁸⁹ Comments of CTIA, In the Matter of Vuze, Inc. Petition to Establish Rules Governing Network Management Practices by Broadband Network Operators, WC Docket No. 07-52 (filed Feb. 13, 2008).

⁹⁰ See In the Matter of Preserving the Open Internet; Broadband Industry Practices, GN Docket No. 09-191, WC Docket No. 07-52, *Report and Order*, FCC 10-201 at 88 (rel. Dec. 23, 2010).

⁹¹ “Volubill Research Gives Insight into Mobile Operators’ Future Traffic Management Strategies,” Volubill Press Release (April 5, 2011) available at http://www.volubill.com/rep-press_releases/ido-91/volubill_research_gives_insight_into_mobile_operators_future_traffic_management_strategies.html. On April 5, 2011, Volubill and Telesperience released a report entitled, “Utilizing offloading and traffic shaping to optimize capacity and deliver commercial success”, which reveals the steps mobile network operators are taking to address the capacity crunch caused by the increases in wireless data traffic consumption. Notably, the survey found that 47 percent of operators currently employ traffic shaping and 97 percent plan to by 2013.

⁹² <http://www.youtube.com/watch?v=kffacxfA7G4>

⁹³ “IEEE Approves Development of IEEE P2200™ Draft Standard to Deliver High Quality Mobile Entertainment (HQME),” IEEE Standards Association Press Release (Feb. 15, 2011) available at <http://standards.ieee.org/news/2011/p2200.html>

⁹⁴ See <http://www.hqme.org/>

⁹⁵ See <http://www.hqme.org/hqme.php>

⁹⁶ “LTE-Advanced ‘Carrier Aggregation’ on Commercial Equipment a World First,” Nokia Siemens Networks Press Release (Feb. 9, 2011).

⁹⁷ “AT&T CTO Says Voice Over LTE Coming In 2013,” *Forbes* (Feb. 15, 2011) available at <http://blogs.forbes.com/elizabethwoyke/2011/02/15/att-cto-says-voice-over-lte-coming-in-2013/>

⁹⁸ Rysavy Research, “Smartphone Efficiency Report” at 3 (January 25, 2011) (Smartphone Efficiency Report) available at http://www.rysavy.com/Articles/2011_01_Smartphone_Efficiency.pdf

⁹⁹ Smartphone Efficiency Report at 8.

¹⁰⁰ See Smartphone Efficiency Report at 7-12.

¹⁰¹ 47 U.S.C. § 309(j)(3)(D).

¹⁰² See <http://www.sharedspectrum.com/papers/spectrum-reports/>

¹⁰³ See Comments of Google, *In the Matter of Fostering Innovation and Investment in the Wireless Communications Market*, GN Docket No. 09-157 at 6 (filed Sept. 30, 2009).

¹⁰⁴ “Phoney Spectrum Scarcity,” *TechAlps* (June 19, 2010) available at <http://www.techalps.com/wireless/phoney-spectrum-scarcity.html>

¹⁰⁵ See <http://www.dslreports.com/shownews/FCC-Again-Promises-More-Spectrum-112141?nocomment=1>

¹⁰⁶ “70-90% of AT&T’s spectrum capacity is unused,” *DSL Prime* (Mar. 22, 2011) available at <http://www.dslprime.com/a-wireless-cloud/61-w/4193-70-90-of-atat-spectrum-capacity-unused>

¹⁰⁷ Comments of Verizon Wireless, *In the Matter of 700 MHz Mobile Equipment Capability*, RM-11592 (Mar. 31, 2010).

¹⁰⁸ “How Craig McCaw Built a 4G Network on the Cheap,” *Bloomberg Businessweek* (May 20, 2010) available at http://www.businessweek.com/magazine/content/10_22/b4180035396063.htm; see also “Clearwire Said to Seek Up to \$5 Billion in Spectrum Auction,” *Reuters* (Oct. 13, 2010) available at <http://www.bloomberg.com/news/2010-10-12/clearwire-said-to-seek-up-to-5-billion-for-spectrum-at-t-sprint-may-bid.html>.

¹⁰⁹ 47 U.S.C. § 309(j)(4)(B) requires the Commission to prescribe regulations that “include performance requirements, such as appropriate deadlines and penalties for performance failures, to ensure prompt delivery of service to rural areas, to prevent stockpiling or warehousing of spectrum by licensees or permittees, and to promote investment in and rapid deployment of new technologies and services.”

¹¹⁰ See <http://www.pff.org/issues-pubs/pops/pop1332robertsluncheon transcript.pdf>

¹¹¹ *Communications Daily*, January 28, 2011.

¹¹² Charles Ergen, *Dish Network CEO Discusses Q3 2010 Results – Earnings Call Transcript, Q&A Section*, *SeekingAlpha.com* (Nov. 5, 2010), available at <http://seekingalpha.com/article/235177-dish-network-ceo-discusses-q3-2010-results-earnings-call-transcript?part=qanda> (last visited March 7, 2011).

¹¹³ Letter from Federal Communications Commission (FCC) Chairman Julius Genachowski to Senator John Rockefeller (July 14, 2010).

¹¹⁴ “FCC on Spectrum Inventory: Already Did It,” *The Hill* (Mar. 16, 2011) available at <http://thehill.com/blogs/hillicon-valley/technology/150197-fcc-on-spectrum-inventory-already-did-it>

¹¹⁵ See Reforming Airwaves by Developing Incentives and Opportunistic Sharing Act (“RADIOS Act”), S.455, 112th Cong. (2011).

¹¹⁶ *Id.*

¹¹⁷ See <http://reboot.fcc.gov/reform/systems/spectrum-dashboard/about> (“The data and analyses provided in the Spectrum Dashboard are for informational purposes and research assistance only. The Spectrum Dashboard does not constitute the official licensing records for the Commission. Specifically, the FCC makes no representations regarding the accuracy or completeness of the information maintained in the Spectrum Dashboard.”)

¹¹⁸ *Id.*

¹¹⁹ See <http://reboot.fcc.gov/license-view/>

¹²⁰ Letter from Senator Olympia Snowe to FCC Chairman Julius Genachowski (January 12, 2011).

¹²¹ CTIA Written Ex Parte Communication, GN Docket No. 09-51 at 23 (Sept. 29, 2009).

¹²² Broadband Plan, Section 5.1 (FCC, 2010).

¹²³ Reed E. Hundt and Gregory L. Rosston, “Communications Policy for 2005 and Beyond,” Stanford Institute for Economic Policy Research (SIEPR Discussion Paper No. 04-07, March 10, 2005) at 9.

¹²⁴ See “FCC vs. Innovation,” *The Wall Street Journal* (Feb. 12, 2011); see also *In the Matter of Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz*, Report and Order, ET Docket 10-142 at ¶¶ 15 (rel. April 6, 2011) (We agree that applying these spectrum leasing policies and rules will help facilitate efficient and innovative new arrangements for using MSS/ATC spectrum, including in both urban and rural areas.”).

¹²⁵ See Jeffrey A. Eisenach, “Spectrum Reallocation and the National Broadband Plan” (October 2010).

¹²⁶ 47 U.S.C. § 301 (requiring that no person transmit radio signals except pursuant to a license granted under the Act); 47 U.S.C. § 302 (empowering the Commission to regulate the interference potential of radio transmitters); 47 U.S.C. § 303 (empowering the Commission to adopt such regulations as it deems necessary to prevent interference between radio stations and to encourage more effective use of radio spectrum in the public interest).

¹²⁷ As far back as 2002, the Commission had a record before it demonstrating the need for receiver standards. In summarizing the record at that time, the Spectrum Policy Task Force Report explained, “Most parties support the need for the development of receiver standards or guidelines, or, in the alternative, minimum receiver performance requirements. Indeed, many of the parties asserted that, from a purely technical standpoint, interference susceptibility, as well as increased spectrum efficiency is highly dependent on the quality and selectivity of the receiver used.” See Spectrum Policy Task Force Report, ET Docket No. 02-135 at 31 (rel. Nov. 15, 2002); see also *In the Matter of Interference Immunity Performance Specifications for Radio Receivers*, Notice of Inquiry, ET Docket No. 03-65 ¶ 1 (rel. Mar. 24, 2003) (“Increasingly in recent years, the preemptive effect of minimally performing receivers has been demonstrated, as licensees seek protection for service predicated on the performance of receivers with little tolerance for other signals.”); NTIA Report 03-404, Receiver Spectrum Standards, Phase I — Summary of Research into Existing Standards at iv (November 2003) available at www.ntia.doc.gov/osmhome/reports/ntia03-404/ntiareport03-404.doc (“In recent years, there have been a growing number of cases of non-cochannel interference that has been caused by inadequate performance of receivers instead of by transmitter performance.”).

¹²⁸ NTIA Report 03-404 at iv.

¹²⁹ Letter from Karl B. Nebbia, Associate Administrator of the Office of Spectrum Management to Julius Knapp, Chief, Office of Engineering and Technology, ET Docket No. 10-237 (Mar. 2, 2011). See also “NTIA Urges FCC to Adopt Receiver Standards,” NTIA Press Release (rel. Nov 12, 2003) available at http://www.ntia.doc.gov/ntiahome/press/2003/receiverstds_11122003.htm (explaining that “Receiver standards mean less interference and more available spectrum.”)

¹³⁰ Letter from Evelyn Hirt, President, IEEE-USA to FCC Chairman Julius Genachowski and NTIA Administrator Lawrence Strickling (May 6, 2010).

¹³¹ See LightSquared Subsidiary LLC Request for Modification of its Authority for an Ancillary Terrestrial Component, SAT-MOD-20101118-00239, Order and Authorization, 26 FCC Rcd 566, 586-87, at ¶¶ 41-43 (International Bureau, Jan. 26, 2011).

¹³² *In the Matter of Fixed and Mobile Services in the Mobile Satellite Service Bands at 1525-1559 MHz and 1626.5-1660.5 MHz, 1610-1626.5 MHz and 2483.5-2500 MHz, and 2000-2020 MHz and 2180-2200 MHz*, Report and Order, ET Docket 10-142 at ¶ 28 (rel. April 6, 2011).

¹³³ The Commission explained that “[t]he Agenda focuses on 2010 items but discusses 2011 items where appropriate . . .” *Broadband Action Agenda* at n. 1.

¹³⁴ In a January 2010 response to Representative Eshoo’s letter expressing concern that AWS-3 had been pending too long, Mr. Genachowski noted: “I want to assure you that establishing service rules for the AWS-3 spectrum remains an important Commission priority. Such rules should aim to put AWS-3 to use as expeditiously as feasible, while ensuring that those rules are consistent with our legislative mandate to develop a comprehensive broadband policy for our nation.” In the end, no decision at all was made and the rulemaking was terminated prior to the issuance of a final order.

¹³⁵ Letter from Karl B. Nebbia, Associate Administrator of the Office of Spectrum Management to Julius Knapp, Chief, Office of Engineering and Technology (Jan. 19, 2011).

¹³⁶ *Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets*, Policy Statement (FCC 00-401) at 5, III-12.

¹³⁷ *In the Matter of Application of Aloha Spectrum Holdings Company LLC (Assignor) and AT&T Mobility II LLC (Assignee) Seeking FCC Consent For Assignment of Licenses and Authorizations*, WT Docket No. 07-265, FCC 08-26 (adopted January 25, 2008).

¹³⁸ *In the Matter of SkyTerra Communications, Inc., Transferor and Harbinger Capital Partners Funds, Transferee Applications for Consent to Transfer of Control of SkyTerra Subsidiary, LLC*, IB Docket No. 08-184, DA 10-535 (adopted March 26, 2010).

¹³⁹ “AT&T Agrees to Acquire Wireless Spectrum from Qualcomm,” Qualcomm Press Release (Dec. 20, 2010) available at <http://www.qualcomm.com/news/releases/2010/12/20/att-agrees-acquire-wireless-spectrum-qualcomm>

¹⁴⁰ *Broadband Plan*, p.77 (FCC, 2010), Recommendation 5.7.

¹⁴¹ *Id.*

¹⁴² See *Second Report and Order, Order on Reconsideration, and Second Further Notice of Proposed Rulemaking*, ET Docket No. 04-167 (Sept. 2004).

¹⁴³ Testimony of Jeffrey A. Eisenach, Ph.D., Before the Subcommittee on Communications, Technology and the Internet, Committee on Energy and Commerce, United States House of Representatives, April 21, 2010.

¹⁴⁴ See Cisco Forecast (“Mobile video traffic was 49.8 percent of total mobile data traffic at the end of 2010, and will account for 52.8 percent of traffic by the end of 2011.”).

Attachment B

Reply Comments of MSTV and NAB

NBP Public Notice #30, in GN Docket Nos. 09-47, 09-51, 09-137

January 27, 2010

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington DC 20554**

In the Matter of)	
)	
Spectrum for Broadband)	GN Docket Nos. 09-47, 09-137
)	
A National Broadband Plan for Our Future)	GN Docket No. 09-51

To: The Broadband Task Force

REPLY COMMENTS – NBP PUBLIC NOTICE #30

**THE ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC. AND
THE NATIONAL ASSOCIATION OF BROADCASTERS**

Jane E. Mago
Jerianne Timmerman
Ann Bobeck
Scott Goodwin
Lynn Claudy
Kelly Williams
THE NATIONAL ASSOCIATION OF
BROADCASTERS
1771 N Street N.W.
Washington, D.C. 20036
(202) 429-5430

David L. Donovan
Victor Tawil
Bruce Franca
ASSOCIATION FOR MAXIMUM SERVICE
TELEVISION, INC.
4100 Wisconsin Avenue, NW
Washington, D.C. 20016
(202) 966-1956

Jonathan D. Blake
James R. Dean, Jr.
Eve R. Pogoriler
COVINGTON & BURLING LLP
1201 Pennsylvania Avenue, N.W.
Washington, DC 20004-2401
(202) 662-6000

January 27, 2010

Counsel for MSTV and NAB

TABLE OF CONTENTS

INTRODUCTION AND SUMMARY.....1

I. WHILE WELL-INTENTIONED, THE CEA/CTIA PROPOSAL IS INFEASIBLE AND WILL NOT FREE UP SIGNIFICANT SPECTRUM..... 3

A. Single-Frequency Networks Would Result In Significant Service Losses To The American Public. 4

B. The Proposal Seriously Underestimates The Transitional And Operational Costs That A DTS Replacement Service Would Impose. 6

C. The Proposal Would Not Make Available 100 To 180 MHz Of Contiguous Spectrum. 9

D. The Proposal Would Encounter Additional Environmental and Wildlife Protection Issues..... 10

II. THE COMMENTS OF DOJ AND NTIA FOCUSING ON WIRELESS COMPETITION UNDERSCORE THE NEED TO SCRUTINIZE THE BROADER INDUSTRY PICTURE WHEN CONSIDERING THE BROADBAND PLAN..... 11

III. CONCLUSION 14

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington DC 20554**

In the Matter of)	
)	
Spectrum for Broadband)	GN Docket Nos. 09-47, 09-137
)	
A National Broadband Plan for Our Future)	GN Docket No. 09-51

REPLY COMMENTS – NBP PUBLIC NOTICE #30

**THE ASSOCIATION FOR MAXIMUM SERVICE TELEVISION, INC. AND
THE NATIONAL ASSOCIATION OF BROADCASTERS**

Introduction and Summary

The Association for Maximum Service Television, Inc. (“MSTV”)¹ and the National Association of Broadcasters (“NAB”)² submit these reply comments in response to the Commission’s *National Broadband Plan Public Notice #30* (“*NBP Notice #30*”). Specifically, MSTV and NAB here address (1) the Joint Comments filed by CTIA and CEA in response to NBP Public Notice #26³ and (2) the Comments filed by the Department of Justice (“DOJ”) and by the National Telecommunications and Information Administration (“NTIA”) in the general broadband proceeding.⁴

¹ MSTV is a nonprofit trade association of local broadcast television stations committed to achieving and maintaining the highest technical quality for the local broadcast system.

² NAB is a nonprofit trade association that advocates on behalf of local radio and television stations and also broadcast networks before Congress, the Federal Communications Commission and other federal agencies, and the courts.

³ See Comments of CTIA – the Wireless Association (“CTIA”) and the Consumer Electronics Association (“CEA”) on NBP Public Notice #26, Uses of Spectrum (Dec. 22, 2009).

⁴ See Submission of the United States Department of Justice (Jan. 4, 2010), and Letter from the NTIA to Chairman Julius Genachowski Regarding the National Broadband Plan, GN Docket No. 09-51 (Jan. 4, 2010).

Recognizing the value of broadband service, the television broadcast industry reiterates its support for the Administration's efforts to increase broadband access. MSTV and NAB have expressly stated that the broadcasting industry will work with the Commission to find the best way to achieve this national goal, particularly the goal of deploying broadband services in underserved rural areas.⁵ At the same time, we also recognize that over-the-air television is a service to the public with an enduring and increasingly important and innovative role in the nation's communications landscape. With this reality in mind, we offer comment on CTIA/CEA's proposal to transform the transmission system for television broadcasting and the analysis outlined by the DOJ and NTIA.

In their comments, CTIA/CEA propose to establish a distributed architecture for digital television. We appreciate the proposal proffered by CTIA/CEA and their efforts to be constructive to this proceeding. As noted below, the CTIA/CEA proposal is an important advance because it accepts the value of broadcasting and specifically recognizes the public interest in:

- Protecting consumers' investment in digital televisions;
- Preserving every broadcaster's entire 6 MHz/19.4 Mbps broadcast bitstream; and
- Ensuring that broadcasters would not be required to cover the costs of any transition designed to reallocate spectrum to the wireless industry.

MSTV and NAB agree with these principles. Nonetheless, we cannot endorse this proposal.

⁵ See, e.g., Broadcasting And The Broadband Future: A Proposed Framework For Discussion," GN Docket Nos. 09-47, 09-137, and 09-51 (Dec. 22) ("Framework Document") at 38.

While distributed transmission system (DTS) technology may be used primarily as a fill-in service in certain circumstances, it is not practical or feasible as a sole vehicle for delivering digital television (“DTV”) nationwide. Although theoretically attractive, the CTIA/CEA proposal would, in reality, undermine the localized services provided by broadcasters and, as a result, would harm those central to the spectrum debate – American consumers. The proposal would impose significant costs on the public’s broadcast service and would cause harmful service losses to viewers as a result of interference and coverage gaps. Moreover, it could not and would not make available significant amounts of contiguous spectrum in the congested areas where the wireless industry claims the greatest spectrum shortfalls.

DOJ and NTIA’s submissions in the general broadband docket address the issue of additional spectrum for wireless broadband services. While providing additional insights, it is noteworthy that these submissions were not filed in response to the FCC’s Public Notice No. 26, which dealt specifically with broadcast spectrum, and do not support reallocating spectrum now used for local television. Rather, the submissions focus on strategies to increase broadband competition based on the claims of spectrum needs by the wireless telephone industry. They do not address other vital competitive issues, such as the effective and efficient competition that new broadcast mobile video will offer to wireless providers’ video services. In formulating a national broadband plan, the FCC must consider these additional issues and take a broader view of the entire communications ecosystem, of which broadcasting and wireless broadband are both valuable and complementary services.

I. WHILE WELL-INTENTIONED, THE CEA/CTIA PROPOSAL IS INFEASIBLE AND WILL NOT FREE UP SIGNIFICANT SPECTRUM.

CEA and CTIA properly acknowledge that any Commission proposal that would affect television broadcast spectrum should “(1) allow consumers to continue to enjoy over-the-

air television including broadcast high-definition TV without disturbing consumer television sets; (2) allow television licensees to continue to have the full use of 6 MHz of spectrum and the associated 19.4 Mbps data stream; [and] (3) allow costs of the transition not to be borne by broadcasters.”⁶

CEA/CTIA have offered their DTS proposal “to stimulate discussion.”⁷ It is in this spirit that we raise the following concerns. Our initial assessment shows that DTS, while it can be used as a fill-in technology under certain circumstances, cannot, for a host of technical and practical reasons, be adopted as the sole architecture for delivering over-the-air DTV. Use of DTS in this manner would cause the viewing public to suffer significant service losses and would be cost prohibitive. Because of various serious technical complexities that CTIA and CEA have acknowledged, the proposed system is simply impractical. Moreover, implementation of DTS would not fulfill the ultimate goal of the proposal: to free up large contiguous blocks of spectrum for use by other services, particularly in the most heavily populated areas in the country.

A. Single-Frequency Networks Would Result In Significant Service Losses To The American Public.

Replacing the current system with DTS would trigger heavy service losses to the American public of two kinds: service losses due to interference and service losses due to coverage gaps.

The 8-VSB modulation method currently used for digital television broadcasting is a single-carrier system that was chosen for its ability to efficiently cover large service areas.

⁶ See CEA/CTIA Comments at 2.

⁷ See *id.* at 25.

As CEA/CTIA acknowledge, it “was not designed with an SFN [single frequency network] architecture in mind.”⁸ As they indicate, the ATSC has also developed a synchronization standard, ATSC A/110B, for DTS, and as they further state, “[i]t is important to note that every transmitter in an SFN must always transmit completely identical programs and bitstreams.”⁹ Otherwise, viewers will receive different DTV signals from both the main TV transmitter and a DTS transmitter, or from multiple DTS transmitters, and as a result will experience interference and loss of service. On paper, a carefully engineered system, with all transmitted signals properly synchronized and with signals from multiple stations being received with the proper amplitude relative to one another, could reduce this interference. But in the real world, signal variations due to radio propagation effects and tower siting problems¹⁰ make such perfection unattainable. The inevitable result of these real-world problems would be that viewers would receive signals with improper amplitude or subject to delays relative to one another -- in both cases causing substantial loss of service to American consumers due to interference.

Wide-scale deployment of DTS for broadcast television is not practically achievable with a single-carrier system such as 8-VSB without causing additional interference. DTS cannot be implemented to “cellularize” DTV nationwide, but may be used primarily as a means to provide “fill-in” service where high-power DTV signals were blocked by terrain or buildings, or other constraints. While DTS may work well to solve limited coverage problems,¹¹

⁸ *See id.* at 11.

⁹ *See id.* at n.17.

¹⁰ Problems would include zoning limitations, FAA requirements, migratory bird considerations, limited site availability, terrain irregularity, and land cost and availability issues.

¹¹ Indeed, depending on the terrain, urbanization, real estate costs, zoning and other local factors, a DTS system will not in some circumstances provide an attractive solution even for filling coverage area gaps.

a complete cellularization of entire DTV service areas using 8-VSB is extremely technically challenging and impractical. Signals from different DTS transmitters will reflect off buildings and other obstructions and other propagation factors and will cause signals to lose synchronization and/or be outside the equalizer range of DTV receivers.¹² (Or they may be at varying signal strengths, so that adequate signal-to-noise in the receiver will be unattainable.) And, given that all existing DTV receivers now in the hands of consumers may not function properly in such an environment, many viewers will lose existing service due to interference.¹³

Replication of present over-the-air coverage would require near-perfect siting of every tower in a DTS deployment. For the reasons enumerated above, that is not possible. Coverage gaps are the unavoidable consequence of trying to use a fill-in technology such as DTS as an across-the-board substitute for the existing wide-area service provided by high-power ATSC deployment. Moreover, because of local zoning laws and litigation¹⁴ and thousands of tower siting problems, location compromises inevitably will occur, ultimately resulting in the further sacrifice of existing DTV coverage to the American public.

B. The Proposal Seriously Underestimates The Transitional And Operational Costs That A DTS Replacement Service Would Impose.

The costs of implementing DTS for every DTV station nationwide would be orders of magnitude higher than the estimates provided by CTIA/CEA. First, CTIA/CEA's

¹² Moreover, equalizer range and performance of receivers differs from one receiver manufacturer to another. Performance may also differ based on the different generation of receivers. The DTV receivers in use have varying equalizer ranges and performance, further exacerbating the problem.

¹³ CTIA/CEA recognize this problem, stating that "DTS implementation is not without technical impediments that must be considered." *See id.* at 16.

¹⁴ For example, the dispute over a single transmitter site in Denver in connection with the DTV transition took four years to resolve.

estimate that transitioning the country's broadcast service to DTS would cost \$1.37 billion to \$1.83 billion was computed incorrectly. Their transition cost analysis was derived from a calculation that assumed an average deployment of 15 to 20 SFN transmitters per market in all 210 markets, with each transmitter estimated to cost \$435,000. The analysis assumes, however, that one transmitter, encoder and related set of equipment is needed at a SFN tower site. This is incorrect, as it fails to take into account the fact that there are several DTV stations in each market and each station will require its own encoder, transmitter and related equipment. In other words, multiple transmitters and encoders will be needed at each location.¹⁵ Using CTIA/CEA's own estimates of an average of 8.57 stations per market, a more accurate cost estimate for providing DTS transmitters for all stations would be \$11.7 billion to \$15.7 billion.¹⁶

Second, the proposal estimates that only 15-20 DTS transmitters would be needed for each TV station to transition from a "high power/high tower" to a "low power network" model. This estimate is incorrect, and the mistake has a large impact on the spectrum yield that CTIA/CEA claim to achieve through their proposal. A typical full-power UHF DTV station has a service area with a radius of about 90 kilometers (55 miles), thereby achieving a typical service area of about 25,430 square kilometers. In order for 15-20 SFN transmitters to replicate a service area of this size, each transmitter would need to cover approximately 1,560 square kilometers (with a service radius of about 25 kilometers). A substantial transmit power is

¹⁵ In practice, each TV station would have to install transmitters at 15 to 20 sites. There is no equipment available that would permit multiplexing all TV channels in a market at each SFN site. Further, it is highly unlikely that such transmitters and antennas could be constructed technically or at price points that could compete with separate facilities (or would be below the \$435,000 average cost estimate used by CEA/CTIA).

¹⁶ These amounts are derived by multiplying the original CTIA/CEA costs estimates of \$1.37 to \$1.83 billion by the average number of stations per market (8.57).

necessary to provide this coverage,¹⁷ which would not be consistent with a low-power model. Thus, the separation distances necessary to re-use the channel (several times the service distances) would substantially reduce the amount of spectrum that CTIA/CEA speculate could be reallocated under their proposal. On the other hand, if the service radius were reduced to five kilometers to mitigate this problem, the number of required transmitters would increase to 325 or more per station, thereby exponentially increasing the costs and complexities of the approach.

Finally, beyond these calculation errors, the CTIA/CEA submission fails to take into account a number of other factors. These omissions lead to a substantial underestimation of DTS implementation costs. For example, the proposal fails to include the costs of obtaining transmitter sites (up to 325) for each station, including land purchases or ongoing rental expenses, and the costs of connecting those sites by fiber or microwave to a central control point.¹⁸ While CTIA/CEA state that each station must be carefully engineered and synchronized in order to reduce service losses, they do not include the initial capital investment for fiber or microwave connections in their cost calculations. Moreover, additional day-to-day operational expenses would be incurred in the deployment of multiple DTS transmitters in a service area, including the maintenance of fiber or microwave links to a central control point.

¹⁷ For example, a MediaFlo transmitter that covers a similar service area requires an Effective Radiated Power (“ERP”) of 50 kW. Thus, with respect to economic and spectral efficiency for a point to multipoint service, Media Flo did not employ the low power cellular structure envisioned by the CTIA/CEA proposal. Rather, it relied on a higher power approach, thereby requiring greater separation distances.

¹⁸ The costs of dealing with tower siting, zoning, and environmental challenges must also be included. See pp. 10-11, below.

C. The Proposal Would Not Make Available 100 To 180 MHz Of Contiguous Spectrum.

CTIA/CEA assert that the use of low power transmitters would yield 100 to 180 MHz of contiguous spectrum. Their comments do not support this claim, however. Indeed, even if the co- and adjacent-channel DTV spacing requirements could be substantially reduced, a review of the markets in the eastern United States shows that a yield of 100-180 MHz is not possible.

For example, as noted by CEA/CTIA, the current full-power UHF DTV co-channel separation requirements are approximately 196 to 224 kilometers. They also note that adjacent channel operations must be co-located or sited 110 kilometers apart. CTIA/CEA state that the “[c]urrent FCC separation requirements effectively preclude Baltimore from using the same or adjacent channel TV channel as Washington.”¹⁹ However, this fact would not change for the proposed 10-15 site SFN architecture. As stated above, employing this limited number of SFN sites will require the power level at each site to be relatively high. Required separation distances are dependent on relative signal levels, and separation distances would continue to be more than two times the service area radius. If one assumes a service radius of 25 kilometers, a co-channel separation distance of more than 60 kilometers would still be required. Adjacent channel operation still would not be permitted within that station’s service area. Given the distance separation and the overlap in service areas, stations in Baltimore and Washington are effectively precluded from using the same or adjacent channels, whether the service areas are 90 kilometers from a single high power station or 25 kilometers from multiple low power sites. As a result, in the New York-Philadelphia, Boston-Providence, Baltimore-Annapolis-Washington

¹⁹ See CEA/CTIA Comments at 8.

markets, and in other congested metropolitan markets throughout the country, different channels would be required for almost all stations, even if separation distances were drastically reduced. Thus, even for low power transmitters, different channels would have to be used in order to avoid interference. The Commission consequently would be unable to reclaim the amounts of contiguous spectrum claimed by CTIA/CEA.

D. The Proposal Would Encounter Additional Environmental and Wildlife Protection Issues.

Beyond those who would oppose DTS tower siting for aesthetic and general environmental concerns in local zoning disputes, DTS tower siting would likely encounter opposition based on concerns about migratory birds and endangered species. The 2008 remand in *American Bird Conservancy, Inc. v. FCC* directed the Commission to determine “how it will provide notice of pending tower applications that will ensure meaningful public involvement in implementing [National Environmental Policy Act] procedures.”²⁰ The Commission currently is considering how to handle tower applications on both an interim and permanent basis in light of the *Remand Order*.²¹ The outcome ultimately may require some or all tower applicants to undergo a public notice process or Environmental Assessments or both. These tower siting and zoning issues clearly will increase costs, cause delays, and make some tower facility relocations impossible. For example, the U.S. Fish and Wildlife Service (USFWS) recently opposed the siting of a short, unlit tower (180 feet high) alongside a highway in Duluth City, MN, citing concerns for migratory birds, and threatened enforcement action under the Migratory Bird Treaty

²⁰ 516 F.3d 1027, 1035 (D.C. Cir. 2008) (“*Remand Order*”).

²¹ See In the Matter of Amendment of Parts 1 and 17 of the Commission’s Rules Regarding Procedures for Processing Antenna Structure Registration Applications, *WT Docket No. 08-61*.

Act.²² A requirement that all 1,700 broadcast television stations abandon their current single tower transmission systems and each deploy perhaps hundreds of towers per station in their place is not tenable.

In summary, CTIA/CEA's proposal would require a complete restructuring of the technical architecture of the country's broadcast service – a restructuring that is infeasible, would cause service losses, entail unacceptably high costs and fail to achieve its desired spectrum yields.

II. THE COMMENTS OF DOJ AND NTIA FOCUSING ON WIRELESS COMPETITION UNDERSCORE THE NEED TO SCRUTINIZE THE BROADER INDUSTRY PICTURE WHEN CONSIDERING THE BROADBAND PLAN

MSTV and NAB agree with several aspects of the submissions from DOJ and NTIA. DOJ predicts increased consumer demand for mobility, technical speed, and HD video.²³ Mobile DTV offers consumers real-time, high-quality video on-the-go; thus, broadcasters are poised to meet important future consumer demands. DOJ's comments also urge "greater use of secondary markets in spectrum."²⁴ MSTV and NAB endorse this suggestion as the kind of limited and localized opportunity to develop broadband solutions, for which the broadcast community has voiced support.²⁵ DOJ endorses the need, where spectrum reallocation is being considered, to take into account "transition" costs.²⁶ MSTV and NAB agree.²⁷ As MSTV and NAB have pointed out, in exercising this responsibility, the Commission should take into

²² See <http://www.duluthnewtribune.com/event/article/id/155859/>.

²³ See DOJ submission at 6 and 8.

²⁴ See *id.* at 32.

²⁵ See "Broadcasting And The Broadband Future: A Proposed Framework For Discussion," GN Docket Nos. 09-47, 09-137, and 09-51 (Dec. 22) ("Framework Document"), at 38.

²⁶ See DOJ submission at 23.

²⁷ This point is developed in the Framework Document at 21-22.

account the value of “public goods” in evaluating incumbent spectrum uses versus new spectrum uses. Neither DOJ nor NTIA address this point. This factor is particularly important and relevant in the case of proposals to take spectrum away from the public’s broadcast service.²⁸

NTIA’s submission urges “exploring both commercial and government spectrum available for reallocation and favors a spectrum inventory.”²⁹ MSTV and NAB agree that a comprehensive inventory of present and future spectrum availability and usage is necessary,³⁰ and they support the spectrum inventory bill recently passed by the House Subcommittee on Communications, Technology, and the Internet.³¹ NTIA also recommends “research and development that leads to innovative new spectrum access technologies, because these can spur a new round of innovation that will increase domestic spectrum efficiency through sharing and opportunistic use.”³² As noted in MSTV/NAB’s Framework Document, “[n]ew technologies are being developed now and will be developed in the future that will unquestionably enhance the wireless carriers’ efficient use of existing wireless (and wireline) capacity.”³³ We agree with NTIA that exploration of these new technologies is essential.

To the extent that some may suggest that the DOJ and NTIA submissions may be read to endorse taking spectrum away from the public’s broadcast service, MSTV and NAB point out that no such reading is valid. These submissions in fact focus on providing more

²⁸ See DOJ submission at 22-23; see Framework Document at 11-17.

²⁹ See NTIA submission at 5.

³⁰ See Statement of Senator Gordon H. Smith, President and CEO of NAB, Hearing on H.R. 3125, the “Radio Spectrum Inventory Act,” and H.R. 3019, the “Spectrum Relocation Improvement Act of 2009,” U.S. House of Representatives, Subcommittee on Communications, Technology and the Internet (Dec. 15, 2009); see also MSTV/NAB Framework Document at 38.

³¹ Radio Spectrum Inventory Act, H.R. 3125.

³² See NTIA submission at 5.

³³ See Framework Document at 36.

spectrum to wireless services in order to promote competition within the wireless market and between wireless and wireline providers.³⁴ The DOJ comments do not discuss either the effective and efficient competition that mobile DTV will provide to the wireless video services, or the competitive role that the public's free-over-the air broadcast service will play as a marketplace alternative to pay-video services provided by cable, telephone, and satellite systems.³⁵ In addressing ways to promote competition, efficient spectrum use and the public interest across the entire communications ecosystem, the Commission will need to focus on these and other digital television issues.

Indeed, it should be recognized that increasing the amount of spectrum available for wireless (1) will not necessarily solve the competitive problems about which DOJ is concerned and (2) may curtail efforts to develop other innovative ways to meet properly-assessed wireless spectrum needs, including investment in technologies that would more efficiently use current wireless spectrum.

Particularly problematic is the assumption that a lack of spectrum is the key impediment to increased competition in broadband generally.³⁶ This assumption is based on a static view of broadband competition and technologies. As noted previously in this proceeding, there is no necessary nexus between allocating additional spectrum and increased broadband

³⁴See DOJ submission at 22; NTIA comments at 5. DOJ's perspective that wireless lags behind wireline does not comport with marketplace realities. Wireline disconnections increase, while wireless subscriptions and usage surge. Accordingly, the largest communications companies are divesting their wireline voice services.

³⁵ See Framework Document at 23 ("Local broadcast television is a vital alternative to expensive subscription services.").

³⁶ See DOJ submission at 21-22. As described in the Framework Document submitted by MSTV and NAB in response to NBP Notice #26, the claim that more spectrum is needed for point-to-point wireless service is speculative at best. See Framework Document at 34 and its Attachment A.

deployment and use.³⁷ Many countries with higher broadband usage rates than the United States have less spectrum allocated for broadband purposes. Accordingly, reallocating spectrum for broadband will not necessarily increase broadband penetration or competition. New wireless competitors need to succeed on the basis of lower costs and/or better service, both of which, through new technologies, can be achieved, wholly or to a very large extent, within the amount of spectrum currently allocated to wireless services.

The Commission must also consider the extent to which some of these policy recommendations are premature because they fail to take into account the large number of wireless broadband providers, many of whom use different spectrum bands and different technical solutions. New competitors (including those with various service offerings such as mobile DTV services) continue to emerge. In this environment, meeting all of the claimed spectrum demands of one class of service provider is neither practical nor desirable. Nor should the Commission essentially declare a winner by directing spectrum to particular providers (wireless) and taking it away from more efficient, competitive providers (broadcasting).³⁸

III. CONCLUSION

This proceeding calls for the Commission to undertake the following analytical steps:

- assess the real need for additional wireless spectrum;

³⁷ See Framework Document at 6 and its Attachment A at Section III(D).

³⁸ The DOJ and NTIA comments acknowledge the difficulty of efficiently allocating spectrum in markets with powerful incumbents that have both high use value for additional spectrum but uncertain motivations for fully developing wireless broadband as a competitor to wireline services. See, e.g., NTIA Comments at 5 (“In the presence of market power, however, the bidders with the highest private value may be incumbents intent on forestalling new entry that will compete for the incumbents’ existing customer base.”).

- consider sources for this additional spectrum other than broadcasting;
- assess the economic and non-economic costs to the public of taking spectrum away from the public's broadcasting services; and
- consider less disruptive ways of using broadcast spectrum for wireless broadband services, aside from reallocation.

These steps should be based on the fundamental fact that broadcasting and wireless broadband are complementary services, each with a necessary role to play in a healthy, innovative, universally-available communications ecosystem. This is more than a statement of principle. It is a statement of technological reality. Point-to-multipoint broadcasting is simply a more efficient way to deliver mass-audience video content to the public than wireless point-to-point technology, and it is more immediately deployable. Wise spectrum policy will recognize that reality and conserve wireless spectrum capacity for other uses where point-to-point technologies are more suitable.

MSTV/NAB's Framework Document elaborated on the analytic steps identified above. The Framework Document emphasized that the wireless industry's analysis of the costs of expropriating the spectrum allocated to the public's broadcast service failed to consider broadcasting's "social benefits," not measurable using conventional economic methodologies. It also emphasized that all Americans, including those consumers who subscribe to pay-cable, satellite or phone systems, benefit from and rely on local broadcast television for local journalism, local emergency information and alerts, over-the-air service on additional TV sets, and other services. No showing has been made that, if the Commission took spectrum away from broadcasting, these services would be effectively replaced.

The CTIA/CEA comments represent an important advance in the debate because they accept the value of broadcasting and the need to preserve stations' 19.4 Mbps capacity, so that the public can receive the benefits of broadcasters' innovative use of this capacity.

However, the CTIA/CEA comments drastically *under*-count the financial and loss-of-service costs of their proposed use of DTS technology to repack broadcast spectrum while *over*-estimating the spectrum yield of their proposal. DTS is an appropriate fill-in technology. It is not a feasible replacement for the country's existing digital infrastructure.

The DOJ and NTIA pleadings do not specifically address broadcast issues. Their submissions, however, underscore the point that the first step is to scrutinize the wireless industry's real spectrum needs and conduct an inventory of present and future spectrum availability. Their comments also are helpful in pointing out the importance of assessing the social costs of taking spectrum away from other services. A focus on the communications landscape as a whole will show the Commission that broadcasting and wireless broadband are valuable, complementary services to be integrated and coordinated, not traded off against each other.

Within the framework of that perspective, the Commission can craft a practical, effective, spectrally-efficient broadband plan, with full and constructive participation by the broadcasting community.

Respectfully submitted,

/s/

Jane E. Mago
Jerianne Timmerman
Ann Bobeck
Scott Goodwin
Lynn Claudy
Kelly Williams
THE NATIONAL ASSOCIATION OF
BROADCASTERS
1771 N Street N.W.
Washington, D.C. 20036
(202) 429-5430

/s/

David L. Donovan
Victor Tawil
Bruce Franca
ASSOCIATION FOR MAXIMUM SERVICE
TELEVISION, INC.
4100 Wisconsin Avenue, NW
Washington, D.C. 20016
(202) 966-1956



Jonathan D. Blake
James R. Dean, Jr.
Eve R. Pogoriler
COVINGTON & BURLING LLP
1201 Pennsylvania Avenue, N.W.
Washington, DC 20004-2401
(202) 662-6000

Counsel for MSTV and NAB

January 27, 2010