

**Before the
Federal Communications Commission
Washington, D.C. 20554**

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

COMMENTS OF THE HIGH TECH SPECTRUM COALITION

The High Tech Spectrum Coalition (HTSC)¹ hereby responds to the Commission’s *Notice of Proposed Rulemaking* in the above captioned proceeding.² HTSC supports the use of voluntary incentive auctions (VIA) to transition high valued spectrum for mobile broadband use. Our comments focus on how the Commission should maximize the amount of spectrum auctioned and why clearing 120 MHz should be the Commission’s goal. Meeting rising consumer demand for wireless broadband will result in significant economic gains including job creation. The Commission’s unlicensed proposal fails to supply the requisite technical analysis required by the law.³

I. THE STATUTORY AND POLICY IMPERATIVE: MORE SPECTRUM FOR LICENSED BROADBAND

As Congress, the FCC, and the Executive Branch realize, the widespread adoption of smartphones, tablets and other devices capable of running advanced applications has dramatically increased the need for additional spectrum to be allocated to wireless broadband. Each subsequent generation of devices, featuring ever more computing power, is putting pressure

¹ Qualcomm is not a party to this filing.
² *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Docket No. 12-268, Notice of Proposed Rulemaking, FCC 12-118 (October 2, 2012) (“NPRM”).
³ Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96 §§ 6401-6414, 125 Stat. 156 (2012) (“Spectrum Act”). The NPRM implements the Spectrum Act.

on 3G wireless networks and hastening the rollout of 4G wireless technologies such as Long Term Evolution (LTE). As 4G networks deploy, the improved network capability will in turn create demand for even more powerful devices, and therefore more spectrum for broadband commercial use.

In order to facilitate future evolution in devices, services, applications, and content, additional spectrum needs to be allocated. This will help solve problems created by the rapidly growing amount of traffic travelling to and from end-user mobile devices. Currently, there is insufficient spectrum for commercial wireless broadband available for auction in the near future. Without new spectrum resources, available service quality will degrade, prices will likely rise, demand will sag, and innovation will suffer. U.S. global leadership in the wireless industry cannot prosper if demand is forced to recede.

The explosive growth in demand for capacity on wireless networks is expected to increase dramatically over the coming years. Cisco's VNI Mobile Forecast predicts that wireless data demand will increase at least 16 fold from 2011 to 2016, a compound annual growth rate of 74 percent.⁴ The FCC itself projects that by 2014, such demand will be 35 times the level in 2009.⁵

The cause of this skyrocketing consumer demand is linked to advances made in device processing power and access to enriched data. In 2011, 4% of users were generating more than 1 gigabyte of mobile data.⁶ By 2016, 74% will generate that much data.⁷ Today's smartphones

⁴ Cisco Visual Networking Index (VNI): Mobile Forecast Highlights 2011 – 2016, http://www.cisco.com/web/solutions/sp/vni/vni_mobile_forecast_highlights/index.html#~Country ("Cisco VNI").

⁵ FCC Staff Technical Working Paper, *Mobile Broadband: The Benefits of Additional Spectrum*, October 2010, at 9.

⁶ Cisco VNI, select Filter by Country/United States, 2011 Year in Review, Top Users and Tiered Pricing Study – "In the United States, 214,117,698 mobile users (74% of total mobile users) will generate over 1 gigabyte per month in 2016, up from 11,129,145 mobile users (4.2% of total mobile users) in 2011."

⁷ Id.

consume 14 times more data than a basic handset.⁸ Alcatel-Lucent estimates that by 2016 tablets and smartphones will make up 59% of the mix compared to only 19% feature phones.⁹ In its latest Mobility Report, Ericsson similarly estimates that by 2018 almost all handsets will be smartphones.¹⁰ Much of the increase in spectrum use is caused by the video streaming and video communications made possible by these devices. By 2016, it is estimated that video streaming and video communication will account for almost half of all mobile traffic in North America.¹¹ This would represent a 5 year compound annual growth rate (“CAGR”) of 95%.¹² Users are also increasing the number of connected devices they own. In 2011, 8% of US subscribers used multiple mobile devices.¹³ By 2016, that number will advance to 25% of subscribers.¹⁴

As in the past, some portion of the increased demand will be met by new technologies. For example, deploying LTE technologies will likely double capacity over current 3G technologies.¹⁵ Other capital investments in networks—largely the increasingly expensive approach of dividing cells—will further increase the capacity of existing networks. Some of the increased demand will be met by various demand management techniques, such as Wi-Fi offloading, off-peak transmission and on-device storage, and pricing tiers designed to mitigate peak demand. Improving capacity through network densification, such as applying new network structure/topology, can also relieve data traffic congestion, particularly in urban areas. Small

⁸ Cisco Global Mobile VNI, select Filter by Country/United States, Device Growth/Traffic Profiles.

⁹ Bell Labs, *Network Planning, Performance and Economic Analysis Division, Mobile Data Traffic Indices*, Feb. 10, 2012 (“Bell Labs Mobile Data”).

¹⁰ *Ericsson Mobility Report*, (November 2012), <http://www.ericsson.com/res/docs/2012/ericsson-mobility-report-november-2012.pdf>, at 6.

¹¹ Bell Labs Mobile Data

¹² Id.

¹³ Cisco Ex Parte in WTB Docket No 11-186, “Cisco Visual Networking Index US Mobile Data Traffic” Forecast Update, filed November 2, 2012.

¹⁴ Id.

¹⁵ Peter Rysavy, *Information Week Reports, LTE Huge Technology, Huge Challenges*, March 2012, http://www.rysavy.com/Articles/2012_03_LTE.pdf at 5.

cells are a key enabler of network densification to optimize use of available spectrum resources. Despite all of these approaches, none will eliminate the need for additional radio spectrum to be allocated to mobile broadband in order to meet rising consumer demand at affordable prices.

The Commission understands the critical importance of clearing the maximum amount of spectrum possible. By launching the National Wireless Initiative, President Obama also recognizes the opportunity to expand the economy while addressing our nation's mobile broadband deficit.¹⁶ The FCC and the President set a goal of freeing 500 MHz for commercial use.¹⁷ We fully support this goal and want the FCC to fashion this voluntary incentive auction in a way that ensures it will be a significant down payment on the promise of 500 MHz.

II. ECONOMIC BENEFITS OF WIRELESS BROADBAND

The economic benefits of licensed wireless broadband include an increase in U.S. jobs, productivity, and innovation. The wireless broadband industry is a critical and rapidly growing sector of the U.S. economy. Its contribution to the overall economy is significant. For each dollar invested in wireless network deployment, U.S. GDP increases by as much as \$7-\$10.¹⁸ In just one year, the wireless broadband industry generated \$28 billion in productivity gains and cost reductions.¹⁹ Deloitte has produced a study that demonstrates a positive, causal relationship between mobile broadband penetration and country GDP growth.²⁰ Using econometric analysis,

¹⁶ White House Wireless Initiative, 2011, <http://www.whitehouse.gov/the-press-office/2011/02/10/president-obama-details-plan-win-future-through-expanded-wireless-access>.

¹⁷ Id.

¹⁸ Larry Summers, Speech at New America Foundation, (June 28, 2010) <http://www.whitehouse.gov/administration/eop/nec/speeches/technological-opportunities-job-creation-economic-growth>.

¹⁹ Roger Enter, *The Increasingly Important Impact of Wireless Broadband Technology and Services on the U.S. Economy*, 2008, http://files.ctia.org/pdf/Final_OvumEconomicImpact_Report_5_21_08.pdf, at 2.

²⁰ *What is the Impact of Mobile Telephone on Economic Growth?*, Deloitte, November 2012, <http://www.deloitte.com/assets/Dcom-UnitedKingdom/Local%20Assets/Documents/Industries/TMT/uk-tmt-GSMA-report-112012.pdf>.

Deloitte demonstrates that a doubling of mobile data causes GDP per capita to grow by 0.5%.²¹ This is a significant economic analysis that goes beyond associating mobile broadband penetration with GDP growth, and instead verifies a causal link between increasing mobile data and GDP. Thus the more licensed spectrum the Commission can transition, the more data will flow on our networks resulting in significant economic growth.

Most importantly, this extraordinary growth in the mobile broadband sector has generated hundreds of thousands of U.S. jobs over the last two decades – and it has the potential to grow hundreds of thousands more jobs if the Commission is able to transition a significant portion of 600 MHz spectrum. Two reports indicate that unleashing more spectrum for wireless broadband will have a substantial impact on job creation and the American economy.

The reports concluded that, unleashing 300 MHz of spectrum for mobile broadband by 2016 will spur \$75 billion in new capital spending, create between 300,000 to 770,000 new jobs, and add \$230 billion in GDP.²² New capital and new jobs are likely to be higher than these conservative figures because economists cannot fully anticipate the effects of future innovation just as a few years ago, they could not predict the explosion of mobile “apps” or the popularity of tablets.

Spectrum is the lifeblood of the wireless broadband industry. Without access to an increasing amount of this finite resource, the U.S. economy will not enjoy the economic and social benefits that our country needs to stay innovative and competitive in the future. Increases in wireless broadband have measurable impacts and benefits for the entire American economy.

²¹ Id.

²² David Sousa, Marc Van Audenrode Analysis Group, *The Impact of 4G Technology on Commercial Interaction, Economic Growth, and U.S. Competitiveness*, Deloitte, August 2011, <http://www.mobilefuture.org/page/-/spectrum-impact-study.pdf>, at 1-2.

Voluntary incentive auctions are at the heart of a spectrum strategy that will promote U.S. global leadership and innovation in the wireless broadband sector. Moreover, incentive auctions have the potential to create hundreds of thousands of jobs and expand economic growth.

III. 600 MHZ BAND PLAN

There are several principles that the Commission must follow in order to maximize the value of the cleared spectrum. To the greatest extent possible, the band plan should provide national uniformity. However the Commission should accommodate varying amounts of spectrum cleared in different geographic locations.²³ In order for the Commission to satiate the overwhelming demand for licensed spectrum, it should also have a goal of clearing 120 MHz while clearing no less than 84 MHz. Missing this bottom line threshold will result in a suboptimal band plan configuration which could dampen demand in the forward auction.

IV. UNLICENSED USE IN THE GUARD BANDS OR DUPLEX GAP

The Spectrum Act was carefully crafted to economize a precious resource in order to ensure that every megahertz possible would be available for licensed use. The guiding principle embedded in the bill requires the Commission to auction every megahertz cleared. This general rule includes only one narrowly tailored technical exception that was designed to in fact maximize this precious resource. The band plan may include guard bands to the extent technically needed to protect adjacent, licensed operations. The law further states that the Commission “may permit” unlicensed use in the guard bands but it has the burden to explain

²³ The incentive auction may clear more spectrum in St. Louis than Los Angeles. The Commission should accept bids in St. Louis for spectrum bands that may not be cleared in Los Angeles. The Commission should not limit itself by clearing only what it can in the largest markets.

why that it is more in the public interest to allocate this spectrum for non-auctioned, unlicensed use than auctioned, licensed use.²⁴

Section 6407(a) states that nothing in the law should be construed to prevent the Commission from creating guard bands.²⁵ While the term “guard bands” are not defined in the law, the meaning of the term can be inferred from Section 6407(b): “to prevent harmful interference to licensed services outside of the guard bands.” Whatever use the guard bands might be assigned by the Commission, it must therefore be consistent with this primary mission – the protection of the television licensees and the mobile broadband licensees.²⁶ Moreover, if a guard band is designated by the Commission, it shall be “no larger than technically reasonable” to protect the licensed uses.²⁷ The law therefore establishes constraints on the FCC’s decision-making, namely, the size of the guard bands must be no larger than needed to protect the licensed services from harmful interference. Unfortunately, the NPRM lacks the necessary technical analysis needed to support a final selection of guard band size. This omission is even more unfortunate in that few parties are as well positioned as the Commission to determine the protection requirements for a guard band that buffers mobile broadband from broadcast television. HTSC expects that parties to this proceeding will, in this comment round, begin to flesh out the technical detail necessarily to answer the statutory question. However, the Commission should consider publishing its own analysis of its proposed guard band size in a supplemental Public Notice.

²⁴ Congressional Record, Extension of Remarks, (statement of Rep. Fred Upton), February 24, 2012, E237-E239, explained the FCC’s authority as permitting it to “create guard bands and allow secondary, unlicensed use in the spectrum it has cleared with federal funds and auctioned . . . so long as such guard bands are no larger than technically reasonable to prevent harmful interference between licensed services outside the guard bands and the use does not interfere with the licensed uses.”

²⁵ Spectrum Bill at § 6407(a).

²⁶ Spectrum Bill at § 6407(e) (the Commission may not permit a use that would cause harmful interference to licensed services).

²⁷ Id at § 6407(b).

The Commission proposes to “add to the guard bands the 0 to 4 megahertz of ‘remainder’ spectrum in any given market.”²⁸ The law does not provide the Commission authority to simply add several megahertz onto the guard band – it must auction the spectrum or provide a technical justification explaining why additional spectrum in the guard bands is necessary to protect licensed uses. The law specifically grants only a *narrow* exception to the rule that all spectrum cleared must be auctioned. The exception only allows the guard bands to be “no larger than technically reasonable.”²⁹ Without technical justification, the Commission cannot add spectrum to the guard band.

As a substantive matter, the future benefits of unlicensed use of 600 MHz guard bands appear to be highly speculative. The Commission cites “broadband access” as a use of the unlicensed guard bands. HTSC remains skeptical. If anything, the history and evolution of 3G technologies into 4G technologies, as well as the history and evolution of the highly successful Wi-Fi broadband access ecosystem, teach us that broadband access must be supported by broad channelization of radio signals. Wi-Fi channelization today utilizes 40 MHz per channel, and the next generation will utilize 80 MHz channels.³¹ LTE’s channelization is also increasing over time. While anything is possible, it appears highly unlikely that broadband access can be supported in the more narrow guard bands that will emerge from this proceeding. That’s not to say the spectrum is useless, but that its use as a broadband access technology doesn’t match the physics of the available spectrum. Other challenges exist as well. At a minimum, if the

²⁸ NPRM para 234.

²⁹ Spectrum Bill at 6407 (b).

³¹ As a technical matter “Super Wi-Fi” is in fact not Wi-Fi. “Wi-Fi Alliance cautions that the use of terminology such as “Super Wi-Fi” or “Next Generation Wi-Fi” for the Television White Spaces implementations available today will lead to substantial user confusion. Consumers should be aware that recently-announced deployments using terms like “Super Wi-Fi” are not in fact Wi-Fi®.” <http://www.wi-fi.org/media/press-releases/wi-fi-alliance%C2%AE-statement-regarding-super-wi-fi> Wi-Fi Alliance statement, January 27, 2012

