

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)
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)
Revision of Part 15 of the Commission's Rules to) ET Docket No. 13-49
Permit Unlicensed National Information)
Infrastructure (U-NII) Devices in the 5 GHz Band)
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To: The Commission

**COMMENTS OF THE CONSUMER ELECTRONICS
ASSOCIATION**

Julie M. Kearney
Vice President, Regulatory Affairs
Brian E. Markwalter
Senior Vice President, Research and
Standards
Consumer Electronics Association
1919 S. Eads Street
Arlington, VA 22202
(703) 907-7644

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EXECUTIVE SUMMARY

The FCC should make additional spectrum available in the 5 GHz band for unlicensed operations while protecting federal and licensed incumbent operations. As the demand for mobile broadband services continues to grow exponentially, spectrum remains a critical resource on which the U.S. continues to run dangerously low. The FCC must explore all options to make additional spectrum available to address the spectrum crunch, enable service providers to satisfy consumer demand, and fuel innovation and economic growth.

Unlicensed spectrum is a key component of any plan to address the ongoing capacity shortage. It can be used for data offload, which significantly reduces networks' capacity constraints and enables carriers to use complementary spectrum resources more efficiently. Access to unlicensed spectrum also promotes innovation by lowering barriers to entry and has fostered the development of powerful technologies like Wi-Fi, Bluetooth, and others.

The 5 GHz band's wide expanse of underutilized spectrum is particularly well-suited for emerging wireless broadband technologies. The addition of 195 megahertz of spectrum in the proposed U-NII sub-bands can accommodate the IEEE 802.11ac standard, enabling data transmission at rates up to 1 GB per second.

However, in order to have rules for the 5 GHz band that adapt to technological change and thrive, the Commission should create a flexible regulatory framework that fosters innovation and investment. The FCC can do so by following three fundamental principles:

Maximize Flexibility. The FCC should permit flexible use in the 5 GHz band, which will allow market forces to shape the development of equipment and services. The FCC also should avoid technological mandates or use restrictions that would hamper innovation.

Harmonize the Operating Rules. Consistent rules will help produce economies of scale in equipment design and manufacture, simplify the FCC certification process for 5 GHz devices, and maximize the benefits of emerging standards such as 802.11ac that can accommodate broader channel widths.

Protect Incumbent Operations. As technology and consumer demands change, the Commission can and should allocate spectrum resources to shift spectrum to meet these demands, but such shifts must be careful to protect important federal and licensed incumbent operations from harmful interference while accommodating new spectrum users.

Finally, the Commission should consider this proceeding as only one of many tools in its tool belt to address spectrum needs. While shared access to additional unlicensed spectrum can help alleviate spectrum capacity constraints, it is by no means a complete solution and must not slow the Commission's pursuit of other means to address the spectrum crunch, including clearing and reallocation of spectrum for exclusive commercial use. This proceeding should support, not supplant, the FCC's efforts to clear and reallocate spectrum for exclusive licensed use.

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The Consumer Electronics Association (“CEA”)¹ hereby responds to the Federal Communications Commission’s (“FCC” or “Commission”) above-captioned Notice of Proposed Rulemaking (“NPRM”), which would amend the rules for the Unlicensed National Information Infrastructure (“U-NII”) service in the 5 GHz band.² The Commission should seize this opportunity to make additional spectrum available for unlicensed use and to improve the efficiency of existing allocations. These rule changes will help address the spectrum crunch, expedite ultra high-speed high-capacity Wi-Fi, and foster the fundamental investment and innovation that strengthens the U.S. economy.

¹ CEA is the principal U.S. trade association of the consumer electronics and information technologies industries. CEA’s more than 2,000 member companies lead the consumer electronics industry in the development, manufacturing and distribution of audio, video, mobile electronics, communications, information technology, multimedia and accessory products, as well as related services, that are sold through consumer channels. Ranging from giant multi-national corporations to specialty niche companies, CEA members cumulatively generate more than \$209 billion in annual factory sales and employ tens of thousands of people.

² *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, Notice of Proposed Rulemaking, 28 FCC Rcd 1769 (2013) (“NPRM”).

I. INTRODUCTION

The FCC should make additional spectrum available in the 5 GHz band for unlicensed operations while protecting federal and licensed incumbent operations. As the demand for mobile broadband services continues to grow exponentially, spectrum remains a critical resource on which the U.S. continues to run dangerously low. The FCC must explore all options to make additional spectrum available to address the spectrum crunch, enable service providers to satisfy consumer demand, and fuel innovation and economic growth. Congress recognized the potential of unlicensed spectrum in the 5 GHz band to help alleviate spectrum capacity constraints, and has required NTIA and the FCC to evaluate the feasibility of additional unlicensed use in the band.³

Unlicensed spectrum is a key component of any plan to address the ongoing capacity shortage. Unlicensed spectrum can be used for data offload, which significantly reduces networks' capacity constraints and enables carriers to use complementary spectrum resources more efficiently. Access to unlicensed spectrum also promotes innovation by lowering barriers to entry. This environment has fostered the development of exciting and important technologies like Wi-Fi, Bluetooth, and others.

The 5 GHz band's wide expanse of underutilized spectrum is particularly well-suited for emerging wireless broadband technologies. The addition of 195 megahertz of spectrum in the proposed U-NII-2B (5350-5470 MHz) and U-NII-4 (5850-5925 MHz) sub-bands can accommodate the wider channel bandwidths contemplated in the IEEE 802.11ac standard,

³ Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, § 6406(a)(1), 126 Stat. 156, 231 (2012), 47 U.S.C. § 1453 ("Spectrum Act"). *See also* NPRM, 28 FCC Rcd at 1773 ¶ 12.

enabling data transmission at significantly higher rates (up to 1 GB per second) than today's Wi-Fi technologies.

The FCC should modify its rules to enhance the efficiency and effectiveness of the 5 GHz band by harmonizing, where feasible, the rules governing operation within the band. While unlicensed operations already exist in a large portion of the 5 GHz band, the band is fragmented by disparate operating rules that increase the cost and complexity of developing equipment and securing government approval, even though the technical characteristics of the sub-bands and their incumbent users are largely similar (although their specific service offerings may be diverse). Harmonizing these operating rules will promote innovation and development of equipment by increasing economies of scale. Care must be taken, however, to ensure that revised operating rules appropriately protect incumbent licensed operations.

Finally, the Commission should move as quickly as possible to make additional unlicensed spectrum available in the 5 GHz band, but it should consider this proceeding as only one of many tools in its tool belt to address spectrum needs. While shared access to additional unlicensed spectrum can help alleviate spectrum capacity constraints, it is by no means a complete solution. Furthermore, not all advanced sharing technologies have been commercially deployed and proven. Some of these advanced dynamic spectrum sharing approaches may, in the future, be well suited for certain frequency bands and uses, but implementation of such dynamic spectrum sharing technology must not slow the Commission's pursuit of other means to address the spectrum crunch, including clearing and reallocation of spectrum for exclusive commercial use. This proceeding should support, not supplant, the FCC's efforts to clear and reallocate spectrum for exclusive licensed use.

II. INCREASING AND HARMONIZING THE UNLICENSED SPECTRUM ALLOCATIONS IN THE 5 GHZ BAND WILL HELP ADDRESS THE SPECTRUM CRUNCH, PROMOTE INNOVATION, AND STRENGTHEN THE ECONOMY

A. THE SPECTRUM CRUNCH REMAINS A MAJOR CHALLENGE

The FCC has made significant strides toward making additional spectrum available for mobile broadband, but the spectrum crunch remains a major national challenge. Commercial broadband spectrum is a critical input to the wireless broadband and consumer electronics industries and, as the Commission has recognized, the U.S. is running dangerously low on this valuable resource.⁴ Americans consume broadband capacity at a massive and increasing rate, placing ever more demand on mobile networks. Then-Chairman Genachowski recently noted that “U.S. mobile data traffic grew almost 300% last year, and driven by 4G LTE smartphones and tablets, traffic is projected to grow an additional 16-fold by 2016. With this exponential growth, demand for our wireless capacity is on pace to exceed supply, even with significant new spectrum coming online.”⁵ Indeed, the U.S. is expected to have a spectrum deficit of nearly 300 MHz in 2014.⁶ The Commission must act to free up additional spectrum – licensed and unlicensed – in order to maintain and promote the U.S. position as the leader in wireless communications and mobile broadband innovation and deployment.

⁴ *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Notice of Proposed Rulemaking, 27 FCC Rcd 15594, 15596 ¶ 2 (2012); FCC, CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN at xii, 76-78 (rel. Mar. 16, 2010) (“National Broadband Plan”), available at <http://www.broadband.gov/plan/>.

⁵ Julius Genachowski, Chairman, FCC, Remarks at Vox Media Headquarters, *Winning the Global Bandwidth Race: Opportunities and Challenges for the U.S. Broadband Economy*, at 10 (Sept. 25, 2012), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-316462A1.pdf.

⁶ FCC Staff Technical Paper, *Mobile Broadband: The Benefits of Additional Spectrum*, at 2, 18 (Oct. 2010), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-302324A1.pdf.

B. UNLICENSED SPECTRUM IS KEY TO ADDRESSING THE SPECTRUM CRUNCH, PROMOTING INNOVATION, AND STRENGTHENING THE ECONOMY

Allocating additional licensed spectrum is critical to enabling the provision of robust mobile broadband services, but the availability of unlicensed spectrum in higher bands also plays an important role in addressing spectrum constraints.⁷ Unlicensed spectrum can reduce the demands on licensed spectrum networks because many devices today have the ability to (often automatically) choose to transmit and receive data using networks operating on unlicensed spectrum, where available. Unlicensed spectrum also promotes innovation by lowering the barriers to entry for service providers, application developers, and manufacturers. Finally, by complementing licensed spectrum, enabling the more efficient use of spectrum, and promoting innovation, unlicensed spectrum encourages investment which further benefits our economy.

1. UNLICENSED SPECTRUM PROMOTES INNOVATION AND GROWS THE ECONOMY

Unlicensed spectrum promotes innovation and helps to strengthen the U.S. economy. The use of unlicensed spectrum as a complement to licensed wireless networks has a significant positive impact on the U.S. economy. Acting Chairwoman Clyburn, speaking to Congress late last year, stressed that “[P]romoting continued innovation in the unlicensed service industry is important to our National economy,” in part because “it is estimated that unlicensed spectrum generates between 16 and 37 billion dollars each year for the U.S. economy.”⁸ Studies have

⁷ See *infra* Section II(B)(2).

⁸ Mignon L. Clyburn, Commissioner, FCC, Statement Before the Committee on Energy and Commerce Subcommittee on Communications and Technology, Dec. 12, 2012, *available at* <http://www.fcc.gov/document/commissioner-clyburn-statement-hearing-broadband-spectrum-law> (“Clyburn December 2012 Statement”). See also Richard Thanki, THE ECONOMIC SIGNIFICANCE OF LICENSE-EXEMPT SPECTRUM TO THE FUTURE OF THE INTERNET 7, 35 (June 2012) (“[I]t is likely that the economic value generated by unlicensed devices over the coming decade will be significantly greater than \$16 - \$37 billion per year”) (“Thanki”). See generally,

estimated the global economic impact from connected devices (the majority of which will use unlicensed spectrum) will reach \$4.5 trillion by 2020.⁹ Using Wi-Fi to extend a home broadband connection is valued by households at between \$114 and \$331 yearly, for a total economic benefit across all Wi-Fi households of between \$4.3 billion and \$12.6 billion annually – and that is just for one particular use of one unlicensed spectrum technology.¹⁰

Unlicensed spectrum also uniquely promotes innovation by creating a distinct way to access spectrum, “increas[ing] opportunity for entrepreneurs and other new market entrants to develop wireless innovations that may not have otherwise been possible under licensed spectrum models.”¹¹ Indeed, unlicensed spectrum has “enabled innovation in devices at the ‘edge’ of the network.”¹² The rocketing growth of devices that use Wi-Fi is a testament to this innovation. In 1999, the first Wi-Fi capable laptops were sold; by the end of 2011, more than 61 percent of U.S. households had Wi-Fi networks installed at home.¹³ Wi-Fi device sales figures have seen double-digit growth in recent years, with annual growth in 2011 estimated to be between 25 and

Consumer Federation of America, THE CONSUMER BENEFITS OF EXPANDING SHARED USE OF UNLICENSED RADIO SPECTRUM, Nov. 18, 2011, *available at* <http://www.consumerfed.org/pdfs/Consumer-Benefits-of-Shared-Use-Spectrum.pdf>.

⁹ *See generally* GSMA, The Connected Life: A USD 4.5 Trillion Global Impact in 2020 (Feb. 2012), http://connectedlife.gsma.com/wp-content/uploads/2012/02/Global_Impact_2012.pdf.

¹⁰ *See* Thanki at 27 (estimating the economic value of the benefit from a home broadband connection that can be attributed to the flexibility provided by Wi-Fi)..

¹¹ National Broadband Plan at 79.

¹² *Id.*

¹³ Press Release, Strategy Analytics, *A Quarter of Households Worldwide Now Have Wireless Home Networks* (Apr. 4, 2012), <http://www.businesswire.com/news/home/20120404006331/en/Strategy-Analytics-Quarter-Households-Worldwide-Wireless-Home>.

30 percent.¹⁴ The sale of Wi-Fi routers alone “has sustained a compound average growth rate over 30 percent for almost a decade.”¹⁵ The Wi-Fi Alliance has approved more than 14,000 different products for use on Wi-Fi networks.¹⁶ CEA sales figures for the U.S. show that over 165 million Wi-Fi-enabled devices were sold in 2012, and predict that over 271 million such devices will be sold in the U.S. in 2016.¹⁷ Global sales of Wi-Fi consumer electronics devices are predicted to reach 2.8 billion units by 2017.¹⁸

Unlicensed spectrum has also spurred innovation in standards and platforms. Wi-Fi is the best-known standard to use unlicensed spectrum to provide broadband service, but other popular standards that use unlicensed spectrum include Bluetooth, ZigBee, Z-Wave, NFC, and wireless HD connections.¹⁹ These technologies have opened new frontiers of communications for consumers. Shipments of devices using short-range wireless technologies such as these are

¹⁴ Edgar Figueroa, CEO, Wi-Fi Alliance, at Center for Internet and Society at Stanford Law School, *The Power and Potential of the Unlicensed Economy* (July 11, 2012), available at <http://stanfordvideo.stanford.edu/stream/saapanel.html>.

¹⁵ Mark Cooper, Silicon Flatirons, EFFICIENCY GAINS AND CONSUMER BENEFITS OF UNLICENSED ACCESS TO THE PUBLIC AIRWAVES, at 10 (Jan. 2012), available at <http://www.markcooperresearch.com/SharedSpectrumAnalysis.pdf>.

¹⁶ Press Release, Wi-Fi Alliance, *Wi-Fi Alliance® and Wireless Gigabit Alliance finalize unification* (Mar. 5, 2013), <http://www.wi-fi.org/media/press-releases/wi-fi-alliance%C2%AE-and-wireless-gigabit-alliance-finalize-unification>.

¹⁷ CEA, U.S. Consumer Electronics Sales & Forecasts (January 2013).

¹⁸ Press Release, Strategy Analytics, *Sales of Consumer Electronic Devices with 802.11ac Wi-Fi to Surpass One Billion Units by 2015* (May 8, 2013), <http://www.wcax.com/story/22195178/strategy-analytics-sales-of-consumer-electronic-devices-with-80211ac-wi-fi-to-surpass-one-billion-units-by-2015>.

¹⁹ See, e.g., Lou Frenzel, *The Fundamentals of Short-Range Wireless Technology*, ELECTRONIC DESIGN, Oct. 11, 2012, <http://electronicdesign.com/communications/fundamentals-short-range-wireless-technology>.

expected to reach nearly 5 billion devices in 2013, and to grow to nearly 8 billion devices by 2018.²⁰

2. UNLICENSED SPECTRUM COMPLEMENTS LICENSED SPECTRUM AND PROMOTES EFFICIENT SPECTRUM USE

In addition to standalone uses, unlicensed spectrum also plays a critical role as a complement to licensed wireless communications networks. Many wireless broadband devices such as smartphones and tablets can and do use unlicensed spectrum technologies such as Wi-Fi to transmit and receive data, helping to reduce congestion on licensed wireless networks and improving service.²¹ Such offloading is important to spectrum-constrained service providers as a method to deliver content to customers without increasing demands on licensed wireless networks.²² Acting Chairwoman Clyburn recently noted that “commercial wireless carriers are increasingly using unlicensed Wi-Fi services and small cell architecture to offload their smartphone traffic.”²³ Indeed, in early 2012, three of the four major wireless carriers offloaded more than 50% of their smartphone data traffic to Wi-Fi networks.²⁴ Cisco estimates that 33

²⁰ Press Release, ABI Research, *Short-Range Wireless Technology IC Market to Reach Almost 5 Billion Units Shipped in 2013* (Mar. 6, 2013), <http://www.reuters.com/article/2013/03/06/abi-research-idUSnBw69ydBP+106+BSW20130306>.

²¹ Thanki at 8-9. (“In the absence of Wi-Fi mobile operators would be forced to invest large sums in their networks or strictly curtail their users’ usage.”).

²² See NPRM, 28 FCC Rcd at 1794 ¶ 79 (“The availability of unlicensed Wi-Fi networks in many locations enables licensed wireless providers to take data traffic off of their networks, thus reducing network congestion and delivering a better overall quality of service.”)

²³ Clyburn December 2012 Statement at 2.

²⁴ Informa Telecoms and Media White Paper, *Understanding Today’s Smartphone User: Demystifying Data Usage Trends on Cellular & Wi-Fi Networks*, at 4 fig. 5 (2012), http://www.informatandm.com/wp-content/uploads/2012/02/Mobidia_final.pdf. See also, Lynnette Luna, *Devicescape: Average data offload to Wi-Fi is 40 percent*, FIERCEBROADBAND WIRELESS (June 19, 2011), <http://www.fiercebroadbandwireless.com/story/devicescape-average-data-offload-wi-fi-40-percent/2011-06-19>; News Release, *Statement from FCC*

percent of global mobile data traffic was offloaded through Wi-Fi in 2012, totaling 429 petabytes of data per month, and this will increase by more than 4700% to 21 exabytes by 2017.²⁵

Using unlicensed spectrum as a complement to licensed wireless networks enables providers to make more efficient use of spectrum resources.²⁶ Particularly in bands where licensed uses are spread few and far between, permitting unlicensed operations can lead to incredible innovation and more concentrated and efficient spectrum use. Wi-Fi is an excellent example: before it was allocated to unlicensed use, the 2.4 GHz band was considered a “junk band” that was hardly used at all.²⁷ Yet today there are millions of Wi-Fi enabled devices in service²⁸, and by 2016 over half of all Internet content will travel over Wi-Fi.²⁹

Chairman Julius Genachowski on House Passage of Voluntary Incentive Auction Legislation, at 2 (Dec. 13, 2011), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-311528A1.pdf, (“Wireless providers rely on Wi-Fi to ‘offload’ nearly 40 percent of traffic from their networks”).

²⁵ Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017, http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html.

²⁶ Thanki at 9, 14 (“[S]mall-cell architecture is remarkably spectrally efficient; the aggregate spectral efficiency of the 2.4GHz band is at least 30 times greater than the overall efficiency of any cellular band.”); *See, e.g.*, Statement of FCC Commissioner Mignon L. Clyburn Before the Committee on Energy and Commerce Subcommittee on Communications and Technology United States House of Representatives, Dec. 12, 2012, http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-317899A1.pdf (“Unlicensed spectrum plays a critical role in advancing more efficient use of spectrum.”); *see also* Tom Wheeler, *Updating Spectrum Policy* (Oct. 3, 2011), http://www.core-capital.com/tmc_oct_11.aspx (characterizing Wi-Fi as “[e]xhibit A for 21st century spectrum planning” because the Wi-Fi model delivers efficient use despite “a cacophony of competing claims for use of the spectrum,” and explaining that “the characteristics of Internet Protocol (IP) packets allow Wi-Fi... to operate more efficiently than ... licensed spectrum,” in some situations).

²⁷ Council of Economic Advisers, Executive Office of the President, *THE ECONOMIC BENEFITS OF NEW SPECTRUM FOR WIRELESS BROADBAND* at 20 (Feb. 2012) (*citing* Statement of FCC Chairman Julius Genachowski, Sept. 23, 2010), http://www.whitehouse.gov/sites/default/files/cea_spectrum_report_2-21-2012.pdf.

²⁸ *See* Section VI, *infra*.

III. THREE KEY PRINCIPLES SHOULD GUIDE THE FCC AS IT ESTABLISHES RULES FOR THE 5 GHZ BAND

By adhering to three key principles, the Commission can best achieve its goals to make additional unlicensed spectrum available in, and more efficient use of, the 5 GHz band.

Experience tells us that the path of technology is difficult, if not impossible, to predict. In order to have rules for the 5 GHz band that adapt to technological change and thrive, the Commission should create a flexible regulatory framework that fosters innovation and investment. The Commission can do that by following these fundamental principles: 1) maximize flexibility; 2) to the extent possible, apply consistent operating requirements across the 5 GHz band; and 3) protect federal and licensed incumbent operations from interference.

A. PROMOTE INNOVATION BY MAXIMIZING FLEXIBILITY

The Commission should follow its well-established policy of flexible use in the 5 GHz band. This “flexible use policy ... focuses on technical rules to prevent or limit interference among multiple spectrum uses, rather than prescribing specific uses.” This frees licensees to “make fundamental choices about how to use spectrum... taking into account market factors such as consumer demand, availability of technology, competition, and opportunity cost.”³⁰ This approach “encourage[s] innovation and investment in mobile broadband, and ... provide[s] a stable regulatory environment in which broadband deployment could develop.”³¹ These policies

²⁹ Press Release, Cisco, *Cisco's VNI Forecast Projects the Internet Will Be Four Times as Large in Four Years* (May 30, 2012), <http://newsroom.cisco.com/press-release-content?articleId=888280>.

³⁰ *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Docket No. 12-268, Notice of Proposed Rulemaking, 27 FCC Rcd 12357, 12367 ¶ 23 (2012).

³¹ *Serv. Rules for Advanced Wireless Services in 2000-2020 and 2180-2200 MHz Bands*, WT Docket No. 12-70, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16110 ¶ 15 (2012).

provide “flexibility ... in developing and deploying new technologies that help them address changing needs.”³²

The Commission should build on its extensive record of success with flexible use allocations by permitting flexible use in the 5 GHz band, which will allow market forces to shape the development of equipment and services in the band. The Commission also should avoid technological mandates or use restrictions that would hamper innovation. This approach will best ensure that the 5 GHz band will achieve the goals set by Congress and the FCC.

B. APPLY CONSISTENT OPERATING REQUIREMENTS ACROSS THE BAND WHERE FEASIBLE

To the extent possible, and as further discussed in Section IV below, the Commission should harmonize the operating rules throughout the band – both for existing sub-bands and for the new 195 megahertz of spectrum the Commission proposes to make available for unlicensed use. Consistent rules, including rules allowing outdoor usage in the U-NII-1 sub-band, will help produce economies of scale in equipment design and manufacture, as equipment operating throughout the band will have similar constraints. A single set of technical rules for larger portions of the band also will simplify the FCC certification process for 5 GHz devices, reducing costs and speeding deployment. Finally, consistent rules will maximize the benefits of emerging standards such as 802.11ac that can accommodate broader channel widths.

C. PROTECT INCUMBENT OPERATIONS

Any changes to the FCC’s rules adopted in this proceeding must continue to protect important federal and licensed incumbent operations from interference. As technology and consumer demands change, the Commission can and should allocate spectrum resources to shift

³² *Promoting More Efficient Use of Spectrum Through Dynamic Spectrum Use*, ET Docket No. 10-237, Notice of Inquiry, 25 FCC Rcd 16632, 16644 ¶ 36 (2010).

spectrum to meet these demands. The Commission must, however, be careful to protect incumbent operations from harmful interference while accommodating new spectrum users.³³

IV. HARMONIZING THE OPERATING RULES FOR THE 5 GHz SUB-BANDS WILL MAXIMIZE THE BENEFITS OF UNLICENSED OPERATIONS

The Commission should establish, where feasible, consistency in the rules governing the various 5 GHz sub-bands. Consistent rules minimize technical challenges and will enable wideband applications (*e.g.*, wideband U-NII devices operating across multiple bands) and create economies of scale that may promote development of a new class of broadband products.

Harmonizing the bands should not raise significant technical issues. The regulatory distinctions among these sub-bands are a legacy of past allocations and no longer appear to be relevant – particularly the restriction to indoor usage in the U-NII-1 sub-band. As the NPRM recognizes, the technical characteristics of these various sub-bands are similar, as are the incumbent operations in each.³⁴ Therefore, rules that are consistent across the sub-bands are unlikely to increase the interference to such operators. If specific interference problems do emerge, the Commission should resolve those specific issues, while maintaining consistent operating rules across the sub-bands to the extent possible.

Harmonized operating rules in the band also would simplify the design and production of 5 GHz equipment. The current disparate rules governing operations in the existing U-NII-1, U-

³³ See, *e.g.*, *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems*, ET Docket No. 00-258, Fourth Memorandum Opinion and Order, 21 FCC Rcd 4441, 4444 ¶ 7 (2006) (“New AWS Order”) (explaining that the Commission has a “longstanding policy that first-licensed facilities have the right of protection from later-licensed facilities operating in the same band”); see also 47 C.F.R. §§ 2.104(d) and 2.105(c)(2) (establishing that stations operating in a secondary service cannot cause harmful interference to or claim protection from harmful interference from stations of a primary service).

³⁴ NPRM, 28 FCC Rcd at 1798 ¶ 95. As noted in Section IV(B), DSRC is the primary exception identified by the FCC.

NII-2A, and U-NII-3 sub-bands unnecessarily limit the development of devices in the 5 GHz band because engineers have to design current 5 GHz products to comply with three different sets of technical rules. Harmonizing these rules (along with the rules for the proposed U-NII-2B and U-NII-4 bands) would simplify the design of 5 GHz equipment, reducing the cost to develop and manufacture broadband equipment.

Consistent rules also would simplify the FCC certification process. Rather than comply with three sets of rules and three test standards, devices that are made to use the widest possible amount of 5 GHz spectrum would need only meet a single standard and test procedure to be certified by the Commission. This reduction in paperwork and certification effort would further reduce development costs and speed time to market, promoting innovation and investment that benefit both consumers and the economy.

Harmonizing the 5 GHz band would provide a wide swath of similarly-regulated spectrum for use by emerging technologies. For example, as discussed above in Section IV(A), the latest version of Wi-Fi (IEEE 802.11ac) equipment, expected to begin deployment in 2014, will be capable of using channels up to 160 MHz wide to deliver extremely high speed (up to 1 GB per second) wireless broadband. With a harmonized 5 GHz band, IEEE 802.11ac equipment could deliver almost five entire 160 MHz channels within the 5 GHz band alone. As the Commission notes, IEEE 802.11ac presents “exciting opportunities for new unlicensed use of the band for broadband services,” and creates a strong incentive to include “as much consistency in [the] rules as possible so that wide bandwidth U-NII devices operating across multiple [sub-]bands are not driven to comply with the most restrictive requirements for any one [sub-]band and forfeit opportunities for new broadband applications...”³⁵

³⁵ NPRM, 28 FCC Rcd at 1775-76 ¶¶ 18-19.

V. THE COMMISSION SHOULD ALLOCATE ADDITIONAL SPECTRUM FOR UNLICENSED USE IN THE 5 GHZ BAND AND ADOPT RULES TO PROTECT LICENSED INCUMBENT OPERATIONS

The Commission should adopt its proposal to allocate an additional 195 megahertz of spectrum in the 5 GHz band. However, consistent with the Spectrum Act, the Commission must carefully consider the impact of unlicensed operations in the proposed U-NII-2B band to ensure that licensed incumbent operations are protected and that the primary mission of federal users will not be compromised. The Commission also must consider the impact of operations on the proposed U-NII-4 band on licensed incumbent operations, including services such as the Dedicated Short Range Communications (“DSRC”).

A. ADDITIONAL SPECTRUM IN THE 5 GHZ BAND WILL PROMOTE TECHNOLOGICAL INNOVATION AND EASE CAPACITY CONSTRAINTS

As discussed above, adding 195 megahertz of spectrum in the U-NII-2B and U-NII-4 sub-bands would provide substantial additional spectrum that could be available for data offload, reducing demand on networks and allowing carriers to make more efficient use of spectrum. This spectrum is a promising vehicle for the new 802.11ac Wi-Fi standard, which uses wide spectrum channels to provide extremely fast (around 1 GB/sec) wireless broadband connections. The 5 GHz band could accommodate five high-speed wireless broadband channels with a wide range of wide range of high-speed wireless applications, including data offload.

B. THE COMMISSION MUST CONSIDER TECHNICAL RULES NECESSARY TO PROTECT INCUMBENT OPERATIONS

The Commission should establish rules that adequately protect important federal and licensed incumbent operations in the 5 GHz band. The Spectrum Act requires that, before allowing unlicensed use in the U-NII-2B sub-band, the Commission consult with NTIA and conclude that licensed users will be protected by technical solutions and the primary mission of

federal users in the sub-band will not be compromised.³⁶ The Spectrum Act does not establish a similar precondition to the allocation of additional spectrum in the proposed U-NII-4 sub-band. However, as an unlicensed allocation, operations on proposed sub-band U-NII-4 would be secondary to licensed operations and therefore must provide for protection of licensed operations.³⁷

The 5 GHz band is currently home to important incumbent uses like Terminal Doppler Weather Radar and other important government and military radar systems and the Fixed Satellite Service (“FSS”). Those operations can and have been protected from interference even where lawful operation of unlicensed devices is already permitted. As the Commission considers changes to the 5GHz band, it should develop and enforce rules that will continue to protect these incumbent operations. Specifically, the FCC should generally base the technical rules for the proposed U-NII-2B and U-NII-4 sub-bands on the rules governing operation of adjacent U-NII sub-bands, if those operating parameters are established to provide maximum operating flexibility and will not cause interference to licensed operations in the U-NII-2B and U-NII-4 sub-bands. Where the impact on incumbent users of unlicensed operations in these new portions of the 5 GHz band is unclear, additional research and analysis should be performed.

For example, the NPRM raises questions about how to protect DSRC operations, which it describes as having somewhat unique characteristics from other operations in the 5 GHz band, which may present unique interference issues.³⁸ DSRC, which is licensed in the proposed U-

³⁶ Spectrum Act § 6406(a)(1), 126 Stat. at 231.

³⁷ See, e.g., *supra* note 33 (citing *New AWS Order*, 21 FCC Rcd at 4444 ¶ 7).

³⁸ NPRM, 28 FCC Rcd at 1799-1800 ¶ 101. Contrast NPRM, 28 FCC Rcd at 1798 ¶ 95 (noting that “the types of incumbent services across the 5 GHz spectrum share similar characteristics” and therefore “the technical requirements for unlicensed devices [across the 5 GHz spectrum] also could share similar characteristics”).

NII-4 sub-band, differs from the radar and FSS services that form the bulk of the incumbent uses of the 5 GHz band. Radar and FSS systems operate in relatively few fixed, identified locations that can be registered in a database, marked with a beacon signal, or subject to other similar mitigation measures. Radar systems in particular generally issue a very identifiable periodic signal that devices can recognize and avoid. In contrast, DSRC is a combined fixed and mobile service used for connected vehicle technologies with a wide range of potential uses that could increase the safety of driving. Many DSRC transmitters and receivers are as mobile as the cars and trucks which use them, and therefore might not be well accommodated by location databases. And unlike most radar signals, DSRC signals are not uniform or periodic.

Therefore, the NPRM appropriately asks whether Dynamic Frequency Sensing (“DFS”) or other interference mitigation measures can adequately protect DSRC uses.³⁹ The Commission should investigate this issue thoroughly, by working with NTIA, the Department of Transportation, and DSRC stakeholders to gather information, understand the technical issues, and identify and develop any additional research necessary to resolve interference issues. To the extent DSRC technology is only just now developing, the Commission should be cautious not to adopt operating rules that could adversely affect DSRC in its nascent state.

VI. CONCLUSION

The Commission’s proposal to make additional unlicensed spectrum available in, and to more efficiently use, the 5 GHz band holds significant promise as one more effort to address the nation’s commercial broadband spectrum shortage. The Commission should adopt rules that establish a framework that promotes innovation while protecting federal and licensed incumbent

³⁹ DFS may not be the only mechanism with the potential to provide interference protection to incumbent operations. Other techniques such as a geo-location or database solution, or a low-power operation profile also may prove viable in the future.

users. Where additional input and data is needed to resolve interference issues – e.g., regarding the impact on DSRC of unlicensed operations in the U-NII-4 sub-band – the Commission should expeditiously move forward to gather information. Finally, the Commission must concurrently continue to pursue the critical, Congressionally-mandated mission to clear and reallocate additional spectrum for wireless broadband.

Respectfully submitted,

CONSUMER ELECTRONICS
ASSOCIATION

By: /s/ Julie M. Kearney

Julie M. Kearney
Vice President, Regulatory Affairs
Brian E. Markwalter
Senior Vice President, Research and
Standards
Consumer Electronics Association
1919 S. Eads Street
Arlington, VA 22202
(703) 907-7644

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