TESTIMONY OF
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BEFORE THE
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SUBCOMMITTEE ON COMMUNICATIONS, TECHNOLOGY, AND THE INTERNET

HEARING ON
"STATE OF WIRELESS COMMUNICATIONS"

JUNE 4, 2013

Mr. Chairman and Members of the Subcommittee:

Thank you for inviting me to testify today on the state of wireless communications. I am the Senior Vice President of Business Development and Strategy for Communications and Data Services at Comcast Corporation ("Comcast"), where I have worked since 2002. In my current role, I am responsible for leading the strategic development of Comcast's wireless services.

I welcome the opportunity to discuss the enormous potential for the continued growth of wireless services, and in particular unlicensed services such as Wi-Fi. At Comcast, we believe unlicensed spectrum is an essential input to technological innovation, investment, and economic growth. Only with access to enough unlicensed spectrum will industry be able to meet consumer demand for wireless data services. In addition, the importance of robust, widely available unlicensed networks has been made abundantly clear over the past 12 months, when Wi-Fi networks played an important role in facilitating communications in the aftermath of Hurricane Sandy, Winter Storm Nemo, and the horrific attack at the Boston Marathon. We commend Congress, the Administration, and the Federal Communications Commission ("FCC") for already taking several concrete steps toward developing solutions that would ensure unlicensed services will continue to thrive as an essential part of the wireless ecosystem, and we are committed to working with policymakers to achieve these solutions. I want to emphasize, however, that time is of the essence. Without action in the near term, Wi-Fi networks will not have access to the spectrum they need to provide the kind of services that consumers have come to expect.

Comcast has been active in the wireless marketplace for many years. We have long recognized that a robust wireless complement to our existing broadband services would enable us to extend our network and offer more value, more flexibility, and more options to our customers. Over the years, we have explored a variety of approaches to effectively integrate wireless services into our business model.

Today, I would like to discuss our innovative strategy to provide broadband services to our customers outside the home using our Wi-Fi network to deliver wireless services that operate over unlicensed spectrum bands. For over a decade, our residential and business customers have used Wi-Fi routers to extend high-speed Internet access throughout their homes and offices.

Recently, we have deployed a network of tens of thousands of Xfinity WiFi access points throughout many portions of our footprint, accessible for no additional charge to qualified Comcast residential and business broadband customers via any Wi-Fi-enabled device. And we are partnering with other cable companies to build one of the country's largest networks of Wi-Fi access points, which in less than two years already includes over 150,000 access points around the country. This substantial investment allows us to successfully extend our existing network in ways that make it more flexible, more interoperable, and more convenient for our customers. But it all depends on access to adequate unlicensed spectrum resources.

Our experience confirms that unlicensed technologies: (1) are a central component of the wireless ecosystem; (2) are among the most popular methods used by consumers to access the Internet; (3) contribute tens of billions of dollars of value to the nation's economy every year; and (4) can serve as critical sources of connectivity in times of crisis, when licensed wireless networks often cannot support heavy traffic loads or are otherwise unavailable. Americans' demand for data services continues to grow, regardless of whether they are at home or on the go, and unlicensed services like Wi-Fi play a key role in meeting that demand. Our nation's spectrum policy must reflect this reality by taking a balanced approach that focuses not only on spectrum for licensed services, but also on taking the necessary steps to address the current and future challenges to the continued growth of unlicensed services.

A core challenge is that the primary Wi-Fi spectrum band – the 2.4 GHz band – has become highly congested, especially in densely populated urban areas, making it harder to deliver the wireless broadband services that consumers and businesses expect. Solving this problem requires a balanced approach whereby the FCC allocates additional spectrum across a number of different bands for unlicensed use and removes regulatory roadblocks that limit the efficient use of unlicensed spectrum, such as unnecessary indoor-only restrictions, power limitations, and other technical requirements and restrictions.

As policymakers work toward this goal, it is important to recognize that supporting unlicensed technologies does not mean undermining licensed technologies. Quite the opposite is true. Licensed and unlicensed services have co-existed and complemented each other for many years. In fact, allocating additional spectrum for unlicensed use will substantially enhance the value of licensed wireless services by helping to address the challenges associated with increased data traffic on licensed mobile networks.

Congress embraced a balanced spectrum policy and took a significant step toward addressing the challenges facing both licensed and unlicensed wireless services when it passed the Middle Class Tax Relief and Job Creation Act of 2012, which included several provisions that paved the way for unlicensed services to share new spectrum bands with existing users in a way that maximizes the efficient use of spectrum and enhances the value of spectrum for all consumers. Comcast applauds Congress for passing this landmark legislation. We also appreciate the efforts of the FCC, which already has initiated multiple proceedings to implement Congress's directives. In particular, the FCC in its 5 GHz proceeding proposes a number of essential improvements that would facilitate more efficient sharing of the 5 GHz spectrum band, thereby enabling the development of the next generation of unlicensed technologies and encouraging the deployment of robust unlicensed services.

I. UNLICENSED SPECTRUM PROVIDES A PLATFORM FOR INVESTMENT, INNOVATION, AND ECONOMIC GROWTH.

Consumers today expect access to content and information anytime, anywhere, and via any device, and unlicensed spectrum has been a key catalyst to this revolution. The explosive growth of services and devices using unlicensed spectrum, including Wi-Fi, Bluetooth, RFID, and smart grid applications, among many others, has been remarkable. These services have greatly benefitted consumers, created billions of dollars of economic value, supported millions of jobs, and provided a platform for even more innovation and investment.[1] Wi-Fi in particular is now an integral part of daily life and a service upon which consumers and businesses – including mobile network operators – increasingly rely for cost-effective and robust wireless broadband access to the Internet. In light of the extremely positive economic and societal effects of unlicensed services, it is no surprise that there is widespread consensus among policymakers,[2] industry,[3] and other interested parties[4] that unlicensed services must continue to be a component

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[1] The unlicensed model reduces regulatory and economic barriers to use of the spectrum, thereby "encouraging a deluge of technological and business model innovation" and turning unlicensed spectrum "into the most economically productive radio spectrum in the world." Richard Thanki, *The Power of the Unlicensed Economy*, AllThingsD, July 10, 2012, *available at* http://allthingsd.com/20120710/the-power-of-the-unlicensed-economy/ ("*Thanki 2012 Paper*").

[2] *See, e.g.*, Presidential Memorandum: Unleashing the Wireless Broadband Revolution (June 28, 2010) (ordering the Secretary of Commerce to make spectrum available for, *inter alia*, "shared access by commercial and Government users in order to enable licensed *or unlicensed* wireless broadband technologies to be deployed.") (emphasis added) , *available at* http://www.whitehouse.gov/the-press-office/presidential-memorandum-unleashing-wireless-broadband-revolution; Press Release, Energy & Commerce Comm., U.S. House of Representatives, *Walden, Latta Welcome Progress on Efforts to Increase Unlicensed Spectrum* (Jan. 10, 2013), *available at* http://energycommerce.house.gov/press-release/walden-latta-welcome-progress-efforts-increase-unlicensed-spectrum; Press Release, FCC, *Statement from FCC Chairman Julius Genachowski on House Passage of Voluntary Incentive Auction Legislation* (Dec. 13, 2011) ("Unlicensed spectrum stimulates innovation, investment, and job creation in many ways, including by providing start-ups with quick access to a testbed for spectrum that is used by millions, bringing new technologies to consumers in a rapid fashion."); *Unlicensed Operation in the TV Broadcast Bands*, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd. 16807 (2008) (Statement of Commissioner Robert McDowell) ("Robust unlicensed use of white spaces will give nimble entrepreneurs the freedom to disrupt the market in positive and constructive ways that will force incumbents to keep pace with this new revolution.").

[3] *See, e.g.*, Comments of Motorola Solutions, Inc., ET Docket No. 13-49, at 8 (May 28, 2013) ("There is a well-documented need for additional wireless broadband spectrum, and unlicensed spectrum in particular is a key driver of innovation and economic development."); Comments of Time Warner Cable, Inc., ET Docket No. 13-49, at 4 (May 28, 2013) ("TWC believes that a robust Wi-Fi capability provides an important complement to its existing wireline broadband network to enable its subscribers to access the Internet anywhere, anytime, on any device."); Reply Comments of Sprint Nextel Corp., WT Docket No. 12-4, at 10 (Mar. 26, 2012) ("Wi-Fi networks that are easily – even seamlessly – accessible by customers of wireless carriers can provide users with advantages of higher-speed connections without wireless data limits."); Joint Comments of Google, Inc. & Microsoft, Inc., GN Docket No. 12-268, at 1 (Jan. 25, 2013) ("[B]usinesses depend on access to robust licensed services as well as access to robust unlicensed spectrum resources. One without the other simply will not allow U.S. businesses to meet accelerating consumer demand for wireless products and services.").

[4] *See, e.g.*, Mark Cooper, *Efficiency Gains and Consumer Benefits of Unlicensed Access to the Public Airwaves* 7 (Jan. 2012), *available at* www.markcooperresearch.com/SharedSpectrumAnalysis.pdf ("The unlicensed model has succeeded in supporting a large amount of economic activity in the wireless broadband space by bringing

of wired and wireless broadband Internet access services. Comcast has first-hand experience with the tremendous value these services offer to consumers.

A. Comcast's Xfinity WiFi Service Uses Unlicensed Spectrum to Deliver Fast, Reliable Wireless Broadband Access.

Comcast's residential and business customers have long used Wi-Fi routers in their homes and businesses to enhance the value of their wired high-speed Internet service. Over the last few years, Comcast has invested significant time, energy, and human and capital resources to bring that experience outside the home by deploying a robust Wi-Fi network that enables our customers to enjoy wireless Internet access on the go. Today, Comcast makes Xfinity WiFi available in several cities throughout the country for any consumer to access on a pay-per-use basis, and access is included for no additional charge for qualifying customers who have an Xfinity Internet or Comcast Business Internet subscription.

Comcast's efforts are really only beginning. In 2012, we expanded the Xfinity WiFi network from approximately 5,000 access points to more than 25,000 access points. So far this year, that number has increased to over 55,000 access points as we have ramped up the deployment of our network, enhancing the service in existing areas and expanding into several new regions. In fact, in the last two weeks we have expanded the Xfinity WiFi network to include hundreds of new access points in Chicago and Atlanta. And through our CableWiFi partnership with other cable operators, our customers have access to over 150,000 Wi-Fi access points throughout the country for no additional charge.[5]

We install these access points in a variety of locations that we determine will best serve our customers' needs. In addition to deploying Wi-Fi networks in retail locations, Comcast is building an extensive outdoor network to provide wireless broadband service in high-traffic areas, such as main street districts, commuter rail stations, parks, and other public areas. Xfinity WiFi deployments also serve large, high-traffic venues, such as malls, transportation centers, and sports stadiums. For example, Comcast recently made Xfinity WiFi available at Citizens Bank Park in Philadelphia as an amenity for no additional fee to any guest with a Wi-Fi-enabled device.[6]

Usage of Xfinity WiFi has grown dramatically as we have expanded its footprint. There are now more users of the Xfinity WiFi service than ever before, and they are doing more, more often, with more devices, for longer. Comcast now records as many Wi-Fi user sessions in one month as it did in the first two-and-a-half years of the Xfinity WiFi project.

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new and unique services to the market, increasing the value of broadband service by extending it to additional devices, and providing a lower cost, more efficient avenue to deliver data to consumers.").

[5] *See generally* CableWiFi™, http://www.cablewifi.com/ (last visited May 31, 2013).

[6] Press Release, Comcast Corp., *Xfinity WiFi Now at Citizens Bank Park*, (Mar. 18, 2013), http://corporate.comcast.com/comcast-voices/xfinity-wifi-now-at-citizens-bank-park.

B. Unlicensed Services Create Significant Value, Including to Mobile and Fixed Broadband Services.

Comcast's experience is consistent with the growing body of data showing that unlicensed services create huge benefits both for broadband providers and their customers, and support significant growth in the economy as a whole.

According to a 2012 study, "a variety of approaches all point toward economic benefits [from unlicensed technologies] at least in the tens of billions of dollars a year."[7] Additionally, a 2009 study that used consumer survey data to derive the incremental demand for broadband services attributable to Wi-Fi estimated that "Wi-Fi usage in the home, for only the purpose of broadband extension, may be generating anywhere between $4.3 and $12.6 billion in annual economic value for consumers in the United States."[8] And the value of in-home Wi-Fi, hospital Wi-Fi, and RFID tags "together may generate $16-37 billion per year in economic value for the U.S. economy over the next 15 years."[9] By some accounts, unlicensed services contribute upwards of $50 billion in annual economic growth.[10]

Unlicensed spectrum also adds value as a key complement to licensed wireless technologies, particularly as part of the solution to the rising demand for licensed spectrum caused by increased mobile wireless broadband traffic. According to Cisco, traffic on licensed mobile wireless networks increased 70 percent last year, rising from 520 petabytes per month in 2011 to over 885 petabytes per month in 2012.[11] Cisco expects that tremendous rate of annual growth to continue for at least the next four years.[12] Many mobile wireless broadband providers have come to recognize that, to keep up with this increasing level of demand, they will need to rely on unlicensed services to carry some of the load. As Sprint has explained,"[o]ne of the most effective methods of increasing the capacity of wireless data systems is moving data traffic,

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[7] Paul Milgrom et al., *The Case for Unlicensed Spectrum* ¶ 42 (Oct. 12, 2011), *available at* www.stanford.edu/~jdlevin/Papers/UnlicensedSpectrum.pdf.

[8] Richard Thanki, *The Economic Value Generated by Current and Future Allocations of Unlicensed Spectrum*, Final Report, Perspective Associates 35 (Sept. 28, 2009), *available at* http://spectrumbridge.com/Libraries/White_Space_Primer/whitespaces-microsoft-study.sflb.ashx.

[9] *Id.* at 42.

[10] *See, e.g.*, *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769 (2013) (Statement of Commissioner Mignon Clyburn).

[11] *See* Cisco, *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012-2017*, at 1 (Feb. 6, 2013) ("*2013 Cisco Forecast*"), http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf.

[12] *See id.* at 3.

whenever possible, from the licensed spectrum of commercial mobile carriers to unlicensed spectrum, such as that now used for Wi-Fi."[13]

The beneficial impact on licensed wireless providers and their customers resulting from Wi-Fi is staggering. The amount of mobile data offloaded to Wi-Fi networks is projected to reach 21 exabytes (or 21 *billion* gigabytes) by 2017.[14] One study concluded that, "[i]n the absence of Wi-Fi, cellular operators would need to construct up to 450,000 new radio base stations to serve increased smartphone data traffic. This could cost *$93 billion* – subjecting smartphone and tablet users to significantly higher network charges or greatly diminished service."[15]

There are also positive societal benefits associated with Wi-Fi services that are not as easily quantified, but are readily apparent. This was convincingly demonstrated by Comcast's experience during the chaotic aftermath of Hurricane Sandy and Winter Storm Nemo, and after the tragic events at the Boston Marathon. In February, I spoke about Comcast's experience in these situations at an FCC field hearing on network reliability. Following Sandy, mobile wireless service was unavailable for large portions of the affected areas.[16] In the aftermath of the storm, Comcast made approximately 20,000 Xfinity WiFi access points in ten hard-hit states and the District of Columbia available to anyone who needed them to communicate with family or friends, or otherwise to get important recovery information. Comcast recorded more than 250,000 individual sessions during that period, supporting tens of thousands of unique users while also adding a special functionality to permit non-Comcast subscribers to maintain their connection without having to refresh their credentials. Comcast took similar steps following Winter Storm Nemo, which caused widespread utility outages throughout New England and the eastern United States, and during the week after that storm, we carried almost 7 terabytes of data traffic more than we do in a normal week. Likewise, in the immediate aftermath of the attacks at the Boston Marathon, commercial mobile wireless networks were overloaded,[17] but Comcast opened its network to anyone – including non-Comcast subscribers – with a Wi-Fi-enabled device to establish communications with loved ones, leading to significantly increased usage of our Xfinity WiFi network in Boston and the surrounding communities. In each instance, we opened our Wi-Fi network in full cooperation with federal, state, and local officials as they looked for ways to ease the burdens on affected individuals and public safety officials.

Comcast has opened its Xfinity WiFi network during non-emergencies as well. For example, during the 2012 Summer Olympics, Comcast offered promotional access to thousands of indoor

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[13] Comments of Sprint Nextel Corp., WT Docket No. 12-4, at 5 (Feb. 21, 2012); *see also* Comments of Ericsson, ET Docket No. 13-49, at 2 (May 28, 2013) (discussing importance of technologies that "enable mobile operators to deliver supplemental small cell or stand-alone Wi-Fi" using unlicensed technologies).

[14] *See 2013 Cisco Forecast* at 3.

[15] *Thanki 2012 Paper* (emphasis added).

[16] *See, e.g.*, Brendan Sasso, *FCC Says Hurricane Sandy Knocked Out 25 Percent of Cell Towers in Its Path*, The Hill (Oct. 30, 2012), *available at* http://thehill.com/blogs/hillicon-valley/technology/264915-fcc-hurricane-sandy-knocked-out-25-percent-of-cell-towers.

[17] *See, e.g.*, Chloe Albanesius, *FCC Probes Post-Bombing Cell Phone Congestion in Boston*, PC Magazine (Apr. 17, 2013), *available at* http://www.pcmag.com/article2/0,2817,2417891,00.asp.

and outdoor access points in the greater Philadelphia area, allowing anyone with a Wi-Fi-enabled device to follow the Olympic programming from London.[18] Comcast also is currently offering, and has offered in the past, promotional access at Xfinity WiFi access points along the New Jersey shore, enabling consumers to conveniently surf the Web, share photos, access social media, and stream music, TV, and movies.[19]

During emergencies and non-emergencies alike, Wi-Fi networks offer a unique opportunity for consumers to communicate and stay connected because of the accessible nature of unlicensed spectrum and unlicensed services. Almost every mobile device is now equipped with a Wi-Fi radio, so almost everyone can access a Wi-Fi network, regardless of the identity of their underlying licensed mobile carrier. Mobile wireless providers simply cannot offer access to everyone, even if they wanted to, because of the closed nature of their networks and the licensed spectrum regime. In a sense, Wi-Fi has become the interoperable communications standard for consumers.

II. SOUND SPECTRUM POLICY MUST BE DESIGNED TO ENCOURAGE THE CONTINUED GROWTH OF UNLICENSED SERVICES BY MAKING ADDITIONAL SPECTRUM AVAILABLE FOR UNLICENSED USE AND BY REMOVING UNNECESSARY REGULATORY BARRIERS.

To meet the ever-increasing consumer demand and expectations for robust Wi-Fi services, all critical stakeholders must commit to address the remaining obstacles in a timely manner. While the benefits and importance of unlicensed services like Wi-Fi are clear, there are significant challenges that threaten to impair the growth and development of such services.

Comcast has identified two primary objectives that policymakers must achieve to overcome the barriers that stand in the way of further growth and innovation in unlicensed services. First, the government must ensure that access to unlicensed spectrum grows. Second, the government must remove unnecessary regulatory barriers that impede the efficient and intensive use of existing unlicensed spectrum resources. We believe these are common sense, straightforward approaches that will facilitate the continued growth and vitality of the unlicensed sector and will return to the public significant benefits in the form of innovation, investment, and economic growth.

A. A Shortage of Usable Spectrum Hampers the Growth of Unlicensed Services.

Comcast's experience shows that there are several pressing issues that must be addressed to facilitate ongoing growth and innovation in the provision of unlicensed services. Chief among

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[18] *See* J.T. Ramsay, Comcast Voices Blog, *Comcast Celebrates Live Streaming of the 2012 Olympics Games Through NBCOlympics.com, Offers Free Access to Xfinity WiFi Hot Spots* (Jul. 25, 2012), http://corporate.comcast.com/comcast-voices/comcast-celebrates-live-streaming-of-the-2012-olympic-games-through-nbcolympicscom-offers-free-acces.

[19] *See* Joshua Palau, Comcast Voices Blog, *Comcast Creates Lasting Memories this Memorial Day* (May 22, 2013), http://corporate.comcast.com/comcast-voices/12542; J.T. Ramsay, Comcast Voices Blog, *Surfing at the Shore Just Got Easier* (Jul. 1, 2011), http://corporate.comcast.com/comcast-voices/surfing-at-the-shore-just-got-easier.

these concerns is the congestion of existing unlicensed bands. Because of this congestion, the core unlicensed spectrum band is already heavily saturated in many densely populated communities. Simply put, congestion in the 2.4 GHz band will make it harder and harder for providers to deliver the kinds and quality of service that consumers have come to expect.[20]

The congestion problems in the 2.4 GHz band are well documented. Acting Chairwoman Mignon Clyburn has pointed out that the 2.4 GHz band is particularly congested in major cities.[21] Former FCC Chairman Julius Genachowski observed that "Wi-Fi congestion is a very real and growing problem."[22] Furthermore, former Commissioner McDowell noted, "The spectrum that is used for unlicensed Wi-Fi is also experiencing congestion, which will only increase in the coming years if we do not make appropriate bands, like the 5 GHz band, more attractive for investment and innovation."[23] A paper recently published by CableLabs detailed the spectrum shortage issues: "[A]ny reasonable extrapolation of known trends leads to the conclusion that WiFi spectrum exhaust is a matter of 'when,' not 'if'. . . . In the absence of new WiFi spectrum, it is likely that wireless broadband consumers will experience reduced performance. This poses a risk to continued growth of the wireless broadband ecosystem, a central element of technology and economic policy in the United States."[24] Essentially, there are so many devices using unlicensed spectrum in the 2.4 GHz band in certain locations that the result is significantly reduced Wi-Fi performance.[25] Further growth in data consumption via unlicensed technologies simply cannot occur unless service providers have access to more unlicensed spectrum.

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[20] "WiFi congestion will only accelerate as the number of wireless devices continues to grow. Without additional spectrum, wireless consumers are likely to experience reduced performance, threatening the future of the wireless ecosystem." Dirk Grunwald & Kenneth Baker, *FCC Broadcast Incentive Auction: A Band Plan Framework for Maximizing Spectrum Utility* 11 (2013) (attached to Reply Comments of Nat'l Cable and Telecomms. Ass'n, GN Docket No. 12-268 (Mar. 12, 2013)); *see also Dynamic Spectrum Management*, InterDigital 8 (Oct. 2012), *available at* http://www.interdigital.com/wp-content/uploads/2012/10/InterDigital-DSM-White-Paper_Oct2012.pdf ("Wi-Fi currently operates in the unlicensed bands 2.4 and 5.0 GHz. . . . Wi-Fi bands are often congested, particularly in high traffic public areas.").

[21] *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769 (2013) (Statement of Commissioner Mignon Clyburn).

[22] *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769 (2013) (Statement of Chairman Julius Genachowski).

[23] *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769 (2013) (Statement of Commissioner Robert McDowell).

[24] *See* Rob Alderfer, CableLabs, *WiFi Spectrum: Exhaust Looms* 5 (May 28, 2013) (included as Attachment A to Comments of Nat'l Cable & Telecomms. Ass'n, ET Docket No. 13-49 (May 28, 2013)) ("*WiFi Spectrum: Exhaust Looms*").

[25] *See, e.g.*, John Cox, *Wi-Fi Devices Crowd 2.4 GHz Band; IT Looks to 5 GHz Band*, Network World (Oct. 24, 2011), http://www.networkworld.com/news/2011/102411-wifi-unbalanced-252237.html ("'The 2.4 GHz band is congested, a symptom of the number of devices that only operate on that band, and the limitation of its [only] three non-overlapping channels.'").

B. The FCC Must Remove Regulatory Impediments to Address the Unlicensed Spectrum Crunch.

Perhaps the most important unlicensed spectrum-related proceeding currently underway at the FCC focuses on the 5 GHz band. The Spectrum Act directed the FCC to launch a proceeding to modify Part 15 of the FCC's rules to allow Unlicensed National Information Infrastructure ("U-NII") devices to operate in the 5.350-5.450 GHz band, and directed the National Telecommunications and Information Administration ("NTIA") to begin the process of allowing more intense sharing of the 5.350-5.450 GHz and 5.850-5.925 GHz bands between incumbent users and unlicensed services like Wi-Fi.[26] On February 20, 2013, the FCC issued a Notice of Proposed Rulemaking that would allow unlicensed devices to share these bands with existing users, and, critically, would update and improve the rules that govern the existing 5 GHz unlicensed bands.[27] Comcast commends Congress, NTIA, and the FCC for taking the necessary and significant first steps toward ensuring the availability of sufficient spectrum to encourage the continued growth, development, and proliferation of unlicensed wireless services.

As Comcast explained in our comments to the FCC, the 5 GHz band represents a crucial resource as the FCC works to alleviate the dramatic shortage in spectrum available for unlicensed services.[28] The 5 GHz band is the only band available for unlicensed services that can accommodate sufficiently wide channels to allow providers like Comcast to take advantage of the next generation of Wi-Fi – a new standard called 802.11ac. This standard will allow dramatically faster broadband speeds, potentially up to or in excess of one gigabit per second.[29] In contrast to networks using prior standards, Wi-Fi networks operating on the 802.11ac standard will support multiple data-intensive uses, such as several users simultaneously streaming HD videos, without any appreciable degradation in quality.[30] To realize its full potential, however, this standard requires 160 megahertz-wide channels, far wider than channels currently available in any of the spectrum bands used for unlicensed use.

The rules that currently govern the 5 GHz band significantly undermine investment today and prevent us from realizing the wide-band channels we will need to support 802.11ac.[31] Specifically, power levels are prohibitively low in some parts of the band. Rules unnecessarily

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[26] *See* Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No 112-96, § 6406, 126 Stat. 156, 231 (2012) (*codified at* 47 U.S.C. § 1453). U-NII devices are designed to provide short-range, high-speed wireless networking capability.

[27] *See Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769 (2013) ("*FCC 5 GHz Notice*").

[28] *See* Comments of Comcast Corp., ET Docket No. 13-49 at 14-17 (May 28, 2013) ("*Comcast 5 GHz Comments*").

[29] *See* Cisco, *801.11ac: The Fifth Generation of Wi-Fi Technical White Paper*, 3 (Aug. 2012), *available at* http://www.cisco.com/en/US/prod/collateral/wireless/ps5678/ps11983/white_paper_c11-713103.pdf.

[30] *See id.* at 4.

[31] *See WiFi Spectrum: Exhaust Looms* at 21 (noting that "the full benefit of 802.11ac cannot be realized under the current terms of access to 5 GHz [spectrum]").

prevent any outdoor use of a large part of the band where there are no government incumbents. And government operations in another part of the band result in rules that require the use of cumbersome "listen-before-talk" technologies (also called Dynamic Frequency Selection, or "DFS"). As a result, there is only a fraction of the current 5 GHz band that providers can use for Wi-Fi networks.

Fortunately, the FCC has proposed changes to its 5 GHz rules that would make the band far more attractive to investment and build-out of unlicensed services without causing harmful interference to incumbent users.[32] In the comments we filed with the FCC last week, Comcast supported the FCC's proposals to: (1) harmonize the 5 GHz U-NII-1 and U-NII-2 bands by removing an indoor-only restriction and increasing allowable power levels in the U-NII-1 band; (2) harmonize the U-NII-3 and the new U-NII-4 bands by setting the technical rules in U-NII-4 to match those of U-NII-3; and (3) update technical protections for government operations in the U-NII-2 bands but not extend DFS to either the U-NII-1 or U-NII-4 bands.[33] Devices operating in the 5 GHz bands would continue to be subject to the FCC's rules prohibiting U-NII devices from creating harmful interference to existing users.

These proposals have received widespread support from a broad range of interests, including both industry and public interest groups, because they enable more effective spectrum sharing in the 5 GHz band.[34] As the Administration has recognized, spectrum sharing, where technically feasible, maximizes the efficient use of spectrum and permits the simultaneous delivery of multiple services that provide significant public benefits.[35] The 5 GHz band is an ideal band to implement this approach: the changes the FCC has proposed will facilitate significant innovation and investment in unlicensed technologies, even while existing users may continue to use this spectrum to develop more experimental technologies that may come to fruition at some point in the future, such as the Dedicated Short-Range Communications ("DSRC") service, which enables vehicle-to-vehicle and vehicle-to-infrastructure communications-based automotive safety applications.[36] Notwithstanding the recent testimony by certain representatives of the auto industry before this Committee supporting the continued exclusive

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[32] *See FCC 5 GHz Notice* ¶¶ 26-28.

[33] *See Comcast 5 GHz Comments* at 21-22 (May 28, 2013) (setting forth the five principles that the FCC should adopt as it moves forward with the 5 GHz proceeding).

[34] *See, e.g.*, Comments of Nat'l Cable & Telecomms. Ass'n, ET Docket No. 13-49, at 12-23 (May 28, 2013); Comments of Wireless Internet Serv. Providers Ass'n, ET Docket No. 13-49, at 6-12 (May 28, 2013); Comments of Consumer Elecs. Ass'n, ET Docket No. 13-49, at 12-14 (May 28, 2013); Comments of Cisco Systems, Inc., ET Docket No.13-49, at 41-56 (May 28, 2013).

[35] *See* Executive Office of the President, President's Council of Advisors on Science and Technology, Report to the President: Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth at vi (July 2012) ("The essential element of this new Federal spectrum architecture is that the norm for spectrum use should be sharing, not exclusivity.").

[36] *See generally* DSRC: The Future of Safer Driving Fact Sheet, Research & Innovative Tech. Admin., Dep't of Transp., http://www.its.dot.gov/factsheets/dsrc_factsheet.htm (last visited May 31, 2013) (describing DSRC technology and ongoing experimental research projects that "may have the potential to significantly reduce" the frequency of dangerous accidents in the future).

use of this valuable spectrum,[37] Comcast agrees with those in the technology and auto sectors who believe that sharing of this spectrum is possible, and that doing so would be solidly in the public interest. We urge all relevant stakeholders to pursue in good faith a spectrum sharing outcome for the 5 GHz band that will serve the public interest by protecting incumbents and unleashing a new wave of innovation and investment.

We look forward to working with Congress, the FCC, NTIA, and other stakeholders to make this vision a reality as quickly as possible.

III. CONCLUSION

The future of wireless is bright, and Comcast is very excited to be a part of that future. Consumer demand for wireless services – licensed and unlicensed – continues to grow at unprecedented rates, creating new opportunities to provide innovative technological solutions and drive economic growth. Unlicensed wireless services in particular have proven to be an invaluable part of the wireless ecosystem, dramatically enhancing the value of licensed wireless and fixed broadband services.

All indications are that the trends toward heavier reliance on unlicensed services will continue well into the future. Congress and the FCC have made important strides by addressing the substantial policy challenges raised by this rapid technological development. Continued growth in this area will require more spectrum to address the critical shortages that are already occurring in many locations around the country. It will also require a reevaluation of the regulations that govern unlicensed operations, especially in the 5 GHz band. The FCC's current 5 GHz-related proceeding is a welcome development, but there is more work to be done.

Comcast is firmly committed to engaging with Congress, the Administration, and the FCC as they continue to evaluate our nation's spectrum policy and to implement solutions that will produce even greater economic and technological growth and benefits for consumers.

Thank you for the opportunity to testify today.

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[37] *See The Road Ahead: Advanced Vehicle Technology and its Implications: Hearing Before the S. Comm. on Commerce, Sci., and Transp.*, 113th Cong. 6 (2013) (statement of Mitch Bainwol, President & CEO, Alliance of Automobile Manufacturers) (arguing that policymakers should "ensur[e] that the radio frequency spectrum now dedicated to V-to-V and V-to-I – the 5.9 GHz band – remains solely dedicated to auto communications technologies."). Although Comcast appreciates the important safety benefits that such applications may someday bring, we believe that spectrum exclusivity in this band is both unreasonable and unnecessary.