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Spectrum Sharing in the Context of Vehicle-to-Vehicle Technology: Bureaucratic Hoops, Fierce Competition, Political Maneuverings, and the Larger Policy Issue

Colleen A. Mallick*

I. INTRODUCTION

Over fifteen years ago, technology that would allow cars to “talk to each other” and save countless lives on the road was more than just a pipe dream. In 1999, the Federal Communications Commission (FCC) allocated spectrum in the 5.850-5.925 GHz band to the automobile industry for this specific purpose.¹ Today, Vehicle-to-Vehicle (V2V) technology is a reality. However, the V2V technology proposed by the auto industry must overcome both bureaucratic and political hurdles, along with technology and telecommunication competitors lobbying for access to the same bandwidth, before consumers will see V2V deployment.

V2V allows a vehicle to wirelessly share its position, speed, and direction with another vehicle in real-time.² The shared information notifies other drivers within the range of imminent danger, braking, or lane changes.³ In 2013, there were 32,719 fatalities related to motor vehicle accidents.⁴ The United States Department of Transportation (USDOT) estimates that V2V could warn other drivers of looming collisions and prevent 81 percent of all vehicle crashes involving non-impaired drivers.⁵

The USDOT and the National Highway Traffic Safety Administration (NHTSA) have accelerated efforts to equip new vehicles with V2V technology as

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¹ Stephanie Beasley & Lydia Beyoud, *Special Report: Vehicle-to-Vehicle Spectrum Sharing is a Microcosm of Larger Issues*, BLOOMBERG L. (Sept. 9, 2015), <https://www.bloomberglaw.com/document/X9U00V3800000?jsearch=bn%20A0H2J7Z3H6#jcite>.

² Press Release, NHTSA, U.S. Department of Transportation Announces Steps Towards V2V Deployment (Feb. 3, 2014) (on file with NHTSA).

³ *Id.*

⁴ NHTSA, U.S. DEP'T OF TRANSP., TRAFFIC SAFETY FACTS 2013, *available at* <http://www-nrd.nhtsa.dot.gov/Pubs/812139.pdf>.

⁵ Beasley & Beyoud, *supra* note 1.

quickly and safely as possible. However, new obstacles have stalled the implementation of this technology, namely the Wi-Fi Innovation Act and the slow, non-competitive process of FCC spectrum allocation. The Wi-Fi Innovation Act, proposed by Senators Marco Rubio (R-FL) and Cory Booker (D-NJ), would make 195 MHz available for Wi-Fi use within the same 5.9 GHz spectrum band reserved for the auto industry.⁶ Automakers have voiced concerns that opening up the reserved spectrum to Wi-Fi will interfere with V2V signal, potentially making the technology dangerous because the vehicle may be unable to receive signals of impending hazards.⁷ The FCC has been slow to address the industry needs of both automakers and Wi-Fi companies, and has yet to determine whether V2V and Wi-Fi can survive in the same spectrum.⁸

This article addresses the political and regulatory issues facing V2V implementation while promoting the larger policy question of greater wireless access. Opening the heavily regulated electromagnetic spectrum to greater commercial use benefits American consumers, advances technological innovations, and could create hundreds of thousands of jobs. V2V technology holds tremendous promise for improving vehicle safety and reducing fatalities, and deploying V2V as soon as possible could save thousands of lives.

To realize the true potential of V2V technology, the FCC, USDOT, automakers, telecommunication companies, and technology behemoths must align their interests and compromise.⁹ Opening the spectrum to greater wireless uses, while forcing the FCC to overhaul their spectrum distribution process, is something Americans cannot afford to lose. Testing V2V and Wi-Fi's ability to coexist in the same spectrum has been a slow and tenuous process. Although this article explores the competing interests between the automotive and wireless industries through the lens of V2V, the larger policy issue looms overhead: Congress is grappling with how to incentivize federal agencies to relinquish or share their spectrum with the private sector.¹⁰ The government institutions and agencies mandating V2V in vehicles have

⁶ *Id.*

⁷ *Id.*

⁸ *Id.*

⁹ Automakers no longer simply manufacture cars; they are competing with technology companies such as Google and Apple to develop connected vehicles. Because spectrum is an infinite resource, the federal government should relinquish spectrum for commercial use in order to accommodate data devouring devices (such as smartphones and tablets) and promote healthy competition within the private sector.

¹⁰ Lydia Beyoud, *Senate Leads Way on V2V Spectrum Sharing Consensus*, BLOOMBERG L. (Sept. 9, 2015), <https://www.bloomberglaw.com/document/X5RQM4E8000000?jsearch=bn%2520A0H2M2E9P1#jcite>.

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made inefficient use of the spectrum they control, and there has been resistance to give up this spectrum for commercial use. This article seeks to reconcile those competing interests by promoting spectrum sharing and collaboration between automakers, unlicensed spectrum advocates, federal agencies, and technology firms.

II. V2V: FIFTEEN YEARS IN THE MAKING

Connected, automated vehicles that can sense the environments around them and communicate with other vehicles and with infrastructure have the potential to revolutionize road safety and save thousands of lives.¹¹

V2V technology enables a car to communicate with other connected cars to warn nearby vehicles of collision hazards and dangerous road or weather conditions while sharing information such as vehicle speed and position ten times per second.¹² V2V essentially relies on small radio transmitters and receivers on each vehicle that broadcast information about the vehicle's speed, location, and direction to other vehicles within several hundred yards.¹³ Unlike current radar and other sensor systems, V2V can sense what oncoming or nearby vehicles are doing up to one-half mile away. The system is expected to cost around \$300 per vehicle.¹⁴

United States Transportation Secretary Anthony Foxx claims the technology is the “next generation of auto safety improvements,” likening the technology to innovations such as seatbelts and airbags.¹⁵ USDOT recognizes two main categories of vehicular communications: (1) Connected Vehicle Safety Systems that use Dedicated Short-Range Communications (DSRC) transceivers to send and receive vehicle status communications, and (2) Connected Vehicle Mobility Applications

¹¹ Beasley & Beyoud, *supra* note 1.

¹² NHTSA, *supra* note 2.

¹³ Csaba Csere, *Vehicle-to-Vehicle Communications Are the Next Big Thing in Auto Safety*, CAR AND DRIVER (Sept. 30, 2015, 4:14 PM), <http://blog.caranddriver.com/vehicle-to-vehicle-communications-are-the-next-big-thing-in-auto-safety/>.

¹⁴ *Id.*

¹⁵ *Id.*

that use cellular wireless signals to send and receive enormous amounts of data, from vehicle status to navigation.¹⁶ V2V uses DSRC technology.¹⁷

The idea of connected vehicles using DSRC technology developed as a USDOT program in the late 1990s.¹⁸ In 1997, the Intelligent Transportation Society of America and USDOT petitioned the FCC to allocate a specific spectrum for DSRC vehicle communications.¹⁹ The FCC granted the request and allocated 75 MHz of spectrum within the 5.9 GHz band to USDOT for the Intelligent Transportation System (ITS) radio service.²⁰ ITS has the sole authority to operate vehicle safety technology within this band.²¹ The allocation was premised on the expectation that the ITS technology would “improve traveler safety, decrease traffic congestion, facilitate the reduction of air pollution, and help to conserve vital fossil fuels.”²² Since the FCC allocated the spectrum, the auto industry has invested one-half billion dollars into V2V, while taxpayers have fronted the other half-billion.²³

The 5.9 GHz band provides unmatched speed, security, reliability, and protection from interference, and it is absolutely necessary that V2V operate safely.²⁴ This band allows DSRC-equipped vehicles to send and receive information almost instantaneously within a radius of over one-half mile.²⁵ Because vehicle position must be precise, a global positioning system provides location coordinates.²⁶ Amid numerous concerns expressed during the Notice and Comment process of agency rulemaking, the NHTSA has insisted that V2V technology does not involve exchanging or recording personal movements, nor does it track vehicle movements.²⁷

¹⁶ Dorothy J. Glancy, *Sharing the Road: Smart Transportation Infrastructure*, 41 *FORDHAM URB. L.J.* 1617, 1627–28 (2014).

¹⁷ *Id.*

¹⁸ *Id.*

¹⁹ *Id.*

²⁰ *Id.*

²¹ Letter from Cory Booker, Marco Rubio & John Thune, Senators, to Tom Wheeler, Chairman of the FCC, Anthony Fox and Penny Pritzker, Sec’y of Transp. (Sept. 9, 2015) (on file with Senate Comm. on Commerce, Sci. and Transp.).

²² Glancy, *supra* note 16, at 1629.

²³ *CBS This Morning: New Bill Could Kick Road Safety Tech to the Curb* (CBS television broadcast Mar. 26, 2015), available at <http://www.cbsnews.com/news/wi-fi-innovation-act-could-hamper-v2v-tech-cars/>.

²⁴ Glancy, *supra* note 16, at 1631.

²⁵ *Id.*

²⁶ *Id.* at 1632.

²⁷ See NHTSA, *supra* note 2.

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According to NHTSA, the information sent between vehicles does not reveal specific information about the identity of the vehicles involved, and neither VIN numbers nor registration numbers are associated with the technology.²⁸

USDOT intended V2V to be introduced with vehicle-to-infrastructure (V2I) technology.²⁹ V2I would allow vehicles to communicate with smart stop signs, traffic signals, pedestrian walkways, and roadway sensors to indicate slippery road conditions. However, the NHTSA lacks authority to force state and local highway departments to implement what will likely be a very expensive traffic light update. Thus, infrastructure redevelopment is likely to occur in the future, and the idea of driving in light traffic conditions with nothing but green lights guiding you home remains a fantasy for another day.

III. OPENING THE BANDWIDTH TO WI-FI

We have very serious concerns about any spectrum sharing that prevents or delays access to the desired channel, or otherwise preempts the [V2V] safety application. At this time, the [USDOT] is unaware of any existing or proposed technical solution which guarantees interference free operation of the DSRC safety critical applications while allowing Wi-Fi enabled devices to share the 5.9 GHz spectrum.³⁰

As motor vehicles become increasingly computerized,³¹ the auto industry faces challenges from unlikely competitors. Technology and Wi-Fi heavyweights want a piece of the V2V pie, and they have the resources to make their own technology,

²⁸ *Id.*

²⁹ Csere, *supra* note 13.

³⁰ *Challenges and Future of Federal Surface Transportation Research: Hearing Before the Subcomm. on Research & Tech. of the H. Comm. on Sci., Space and Tech.*, 113th Cong. (2014) (statement of Gregory D. Winfree, Assistant Secretary for Research and Technology, United States Department of Transportation) (emphasizing the importance of USDOTS's Connected Vehicle technology).

³¹ Mark Fields, CEO of Ford, said at the North American International Auto Show "Everybody is talking about Silicon Valley disrupting the car business. We're going to disrupt ourselves." Fields has indicated that Ford would turn itself into a "mobility provider" through apps and services that offer ride sharing and transportation assistance to limit technology firm upsets of the automaker's market. Meanwhile, General Motors is investing \$500 million in Uber rival Lyft. Matt Vella, *Automakers want to sell you much more than just a car*, TIME MAGAZINE, Jan. 25, 2016, at 14.

including their own autonomous cars.³² Spectrum has become a valuable commodity in the 21st century, but that commodity is both finite and scarce.³³ Subsequently, wireless companies like Comcast and technology giants such as Google have made huge investments to ensure that the FCC opens up the 5.9 GHz spectrum to wireless use.³⁴

The federal government still has sole or primary use of almost 70 percent of the spectrum that is best suited for broadband technologies.³⁵ This is known as the “spectrum drought,” which has been exacerbated as demand for spectrum has skyrocketed from a greater prevalence of data devouring devices and applications. Congress has faced increasing pressure to either open that spectrum to commercial use or force governmental agencies such as the Department of Transportation to relinquish the spectrum they are using inefficiently.³⁶ Telecom companies and automakers alike have devoted millions of dollars toward the issue, and Congress is taking action.

A. *Federal Communications Commission and the “Spectrum Drought”*

When economist Ronald Coase was invited by the FCC in 1959 to testify about his proposal for market allocation of radio spectrum rights, the FCC commissioners asked, “Is this all a big joke?”³⁷ Coase later received a Nobel Prize for his theory on the benefits of a market allocation of spectrum as opposed to rigid governmental regulation. Today, leading policy makers are echoing Coase’s radical ideas, calling for liberalization in the allocation of spectrum in light of emerging technologies and limited bandwidth. The FCC declared it illegal in December 1926 to assert a propertied interest in spectrum.³⁸ The theory behind that notion is that radio spectrum

³² Google seems to be leading the pack with its driverless cars. Google has logged over 2 million miles of test-driving since it began developing autonomous cars in 2009. Chinese technology firm Baidu Inc. has entered an already crowded field, by announcing its development of self-driving cars in China. Bloomberg News, *Baidu Enters the Global Race for Driverless Car Domination*, BLOOMBERG BUSINESS (Jan. 24, 2016, 4:00 PM), <http://www.bloomberg.com/news/articles/2016-01-24/baidu-enters-the-global-race-to-dominate-era-of-driverless-cars>.

³³ Thomas W. Hazlett, *The Wireless Craze, the Unlimited Bandwidth Myth, the Spectrum Auction Faux Pas, and the Punchline to Ronald Coase’s “Big Joke”: An Essay on Airwave Allocation Policy*, 14 HARV. J.L. & TECH. 335, 566 (2001).

³⁴ See *CBS This Morning: New Bill Could Kick Road Safety Tech to the Curb*, *supra* note 23.

³⁵ Julius Genachowski & Robert M. McDowell, *How to Feed a Data-Hungry Public*, WALL ST. J. (July 27, 2015, 7:31 PM), <http://www.wsj.com/articles/how-to-feed-a-data-hungry-public-1438039860>.

³⁶ *Id.*

³⁷ Hazlett, *supra* note 33, at 337.

³⁸ See Thomas W. Hazlett, *Physical Scarcity, Rent Seeking, and the First Amendment*, 97 COLUM. L. REV. 905, 925 (1997).

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is a unique resource that cannot be regulated by standard means, such as property rights. Coase disagreed,³⁹ and there is ample evidence that wireless licensees, and not the FCC, police their airspace most efficiently, reporting interferences of unauthorized users to law enforcement.⁴⁰ Typically, individuals are fiercely protective over their property. If companies can assert a property interest in the spectrum, the result will be a more efficient use of spectrum and greater technological advances. Intense regulation of spectrum by the federal government has received harsh criticism for its anti-competitive nature, and the Commission is feeling pressured to change its underlying rationale.

The FCC's policy for radio frequency and spectrum allocation is mandated under the statutory standard of "public interest, convenience or necessity."⁴¹ This approach dictates spectrum allocation according to services, slotting each type of wireless service into its own reserved section of the spectrum and preventing interference between operators.⁴² Critics argue that this micro-management of distribution blocks entry of new industries and diminishes innovation.⁴³ Spectrum that could provide a broad range of public uses—anywhere from creating jobs to providing Americans with greater access to wireless technologies—remains either off limits or severely underutilized.⁴⁴

The FCC allocates spectrum through a rigid process. First, the FCC conducts a rule-making process to consider the allocation of frequencies.⁴⁵ This is similar to property zoning, as it determines what frequency levels will be utilized for what purpose. In other words, it defines the service allowed within the designated spectrum block. It also defines the business model that the service will be offered under, such as broadcaster, wireless, or a private carrier; technical standards; the number of competitors in the marketplace; the geographic size of licenses; and the terms of license assignment, renewal, and transfer.⁴⁶

Once the band is allocated, there are several mechanisms that the FCC uses to make spectrum available for wireless use. Licensed frequencies can be designated

³⁹ See Hazlett, *supra* note 33, at 337.

⁴⁰ *Id.* at 373.

⁴¹ See THE FCC REPORT TO CONGRESS ON SPECTRUM AUCTIONS, WT DOCKET No. 97-150, at 6 (1997).

⁴² Hazlett, *supra* note 33, at 339.

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *Id.* at 398.

⁴⁶ *Id.* at 398–99.

for commercial or government use.⁴⁷ A licensed firm must abide by the terms and the scope of the license and often has exclusive use of a particular frequency.⁴⁸ A spectrum that is designated as “unlicensed” allows users to operate without an FCC license but requires that they use certified radio equipment and comply with the FCC’s Part 15 Rules.⁴⁹ Users of unlicensed bands do not have exclusive use of the spectrum and are subject to interference.⁵⁰

Unlicensed use is where the V2V quagmire lies. Wi-Fi devices operate on unlicensed bands of spectrum, as opposed to airwaves that are specifically licensed to wireless companies like Verizon or AT&T.⁵¹ Currently, the 5.9 GHz spectrum is subject to licensed use by ITS.⁵² New legislation, with support from technology and telecommunication companies, would open that band to “unlicensed” wireless use.⁵³ Users in unlicensed bands are liable for interfering emissions that they cause but are not protected from emissions that are caused by others.⁵⁴ V2V engineers are worried that interference from other users will disrupt the signals V2V relies on, jeopardizing the safety of its users.⁵⁵

From 1927 until 1981, the sole method used by the FCC to license firms was comparative hearings, basically a political selection of competing applicants⁵⁶ based on which political party dominated the Commission at a specific time. These hearings favored large companies and generally kept small or new firms out of the business. In 1981, Congress authorized the use of lotteries, which many view as an FCC failure costing millions of dollars at consumer’s expense.⁵⁷ Over 1,400 cellular telephone license were assigned using this method, even though hundreds of thousands of applications were sent to the agency.⁵⁸ Many of the applicants were

⁴⁷ *Accessing Spectrum*, FED. COMMS. COMMISSION, <https://www.fcc.gov/encyclopedia/accessing-spectrum> (last visited Oct. 18, 2015).

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ *Id.*

⁵¹ Julian Hattem, *Wi-Fi Push Grows in House*, THE HILL (July 17, 2014, 10:19 AM), <http://thehill.com/policy/technology/212543-wi-fi-push-grows-in-house>.

⁵² Glancy, *supra* note 16, at 1627–28.

⁵³ Wi-Fi Innovation Act, S. 424, 114th Cong. (2015).

⁵⁴ Hazlett, *supra* note 33, at 493.

⁵⁵ See *CBS This Morning: New Bill Could Kick Road Safety Tech to the Curb*, *supra* note 23.

⁵⁶ See Hazlett, *supra* note 33, at 493.

⁵⁷ *Id.* at 399.

⁵⁸ *Id.*

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incapable of constructing a mobile phone, let alone of servicing the public. There were so many applications that a FCC facility partially collapsed under the weight of the meaningless applications during the lottery period.⁵⁹ However, the system successfully shortened the regulatory delay of comparative hearings.⁶⁰

In 1993, Congress granted the FCC the authority to conduct auctions for electromagnetic spectrum licenses.⁶¹ The Commission auctions commercial licenses whenever frequencies become available for new uses.⁶² The purpose of these auctions is to increase the amount of spectrum available to mobile broadband services⁶³ at a quicker rate. These auctions are wildly popular, and in 1997 Congress extended FCC auction authority to virtually all licenses issued by the agency.⁶⁴ The FCC plans to hold a two-sided auction in 2016—known as an incentive auction—that will provide an opportunity for television broadcasters to voluntarily sell their spectrum rights and for wireless firms to buy licenses to use those frequencies.⁶⁵ The 2015 auction netted an astounding \$40 billion, while the Congressional Budget Office estimates that the 2016 FCC electromagnetic spectrum auction will net an average of \$10 to 40 billion.⁶⁶ Under current law, the proceeds will go to the U.S. Treasury to reduce the deficit.⁶⁷

Electromagnetic spectrum auctions have netted billions of dollars for the federal government,⁶⁸ and demonstrate just how valuable the low-band spectrum is to telecommunication giants. The auction bids comport with licensed spectrum use rather than the unlicensed use that has been proposed by Congress.⁶⁹ However, the

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ Letter from Dir. Keith Hall, Cong. Budget Office, to the Honorable Dean Heller, United States Senate (Apr. 21, 2015), available at <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/HellerLtrProceedsFromAuctions.pdf>.

⁶² *Id.*

⁶³ *Id.*

⁶⁴ See Hazlett, *supra* note 33, at 399.

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ Letter from Dir. Keith Hall, Cong. Budget Office, to the Honorable Dean Heller, United States Senate (Apr. 21, 2015), available at <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/HellerLtrProceedsFromAuctions.pdf>.

⁶⁸ *Id.*

⁶⁹ Phil Goldstein, *AWS-3 Auction Results: AT&T Leads with \$18.2B, Verizon at \$10.4B, Dish at \$10B and T-Mobile at \$1.8B*, FIERCEWIRELESS (Jan. 30, 2015), <http://www.fiercewireless.com/story/aws-3-auction-results-att-leads-182b-verizon-104b-dish-10b-and-t-mobile-18b/2015-01-30>.

auctions establish how valuable spectrum is, and that consumer demand is growing exponentially. AT&T bid \$18.2 billion at the AWS-3 auction in 2015, while Verizon spent more than \$10 billion the same year.⁷⁰

What did AT&T and Verizon actually purchase? AT&T won a total of 251 licenses, with some of its more valuable licenses in the 1770-1780 MHz/2170-2180 MHz block of spectrum, also known as “J Block.”⁷¹ There are J Blocks in each geographic location, narrowed in geographic scope by the FCC during the allocation process.⁷² Low-frequency airwaves are valuable because they have the ability to carry heavy data over long distances and through obstacles, such as buildings.⁷³ AT&T won the J Block for the New York City area, a vast market that is worth \$2.76 billion.⁷⁴ AT&T claims it can cover 96 percent of the population with the spectrum won at auction, while offering better performance to its customers.⁷⁵ Verizon said its licenses won at AWS-3 are in markets covering 61 percent of the United States.⁷⁶ Stronger coverage in every corner of the United States attracts customers, emphasizing the importance of the finite spectrum resource. This also makes AT&T highly competitive, as the wireless industry tried to satisfy consumers’ growing demand for data-guzzling devices and applications.

The FCC spectrum auctions have been successful in many ways. The auctions promote competitive bidding and reduce opportunities for political favoritism when assigning licenses.⁷⁷ The auctions reduce delays in issuing licenses and those carriers that win bids for licenses tend to make the most efficient use of the spectrum. The bids collected from winning firms are an effective means of tax collection, and the competitive bidding gives the FCC the momentum it needs to liberalize the spectrum allocation regime.⁷⁸

The FCC’s underlying rationale for spectrum utilization and distribution must change. The theory that any party, including the government, cannot own spectrum

⁷⁰ *Id.*

⁷¹ *Id.*

⁷² *See id.*

⁷³ Alina Selyukh, *U.S. FCC Rejects T-Mobile Request to Limit Spectrum for Verizon, AT&T*, REUTERS (Aug. 6, 2015, 12:59 PM), <http://www.reuters.com/article/2015/08/06/us-usa-fcc-t-mobile-us-idUSKCN0QB1OW20150806>.

⁷⁴ Goldstein, *supra* note 69.

⁷⁵ *Id.*

⁷⁶ *Id.*

⁷⁷ Hazlett, *supra* note 33, at 462.

⁷⁸ *Id.* at 465–66.

and spectrum should be held in common by the people of the United States⁷⁹ makes for inefficient use of spectrum. Even though electromagnetic spectrum auctions have netted huge profits for the federal treasury, spectrum allocation and licensing awards have not met the growing demand.⁸⁰ Auctions take years to implement, mostly because it takes the better part of a decade to identify the spectrum that needs to be transferred or freed up, set the auction rules, zone spectrum, organize bidders, build towers and other infrastructure, and start up the new networks.⁸¹ The 2016 auction will focus only on TV spectrum and subsequent sales have not been planned because Congress has not identified additional spectrum.⁸²

The United States leads the world in the implementation of 4G wireless technologies and has some of the most efficient networks on the planet.⁸³ Private investment in wireless technologies and the mobile infrastructure was nearly \$32 billion in 2014—this is more than 50 percent greater investment than Europe and up 60 percent since 2009.⁸⁴ Mobile data traffic is expected to grow sevenfold between 2014 and 2019, according to CTIA, the wireless industry association.⁸⁵ Opening up government-controlled spectrum ensures new technologies, more jobs, and increased competitiveness. The FCC policy rationale is slowly gravitating towards liberalization.

B. Wi-Fi Innovation Act: A Push Towards Market Allocation

Although the spectrum allocation regime has loosened since the FCC allocated the 5.9 GHz band to vehicle communication in 1999, there have been an increasing number of political efforts to open the allocated spectrum to wireless use. In 2013, the FCC announced that it would consider dedicating some of the 5.9 GHz spectrum to unlicensed wireless use.⁸⁶ The FCC has not opened the spectrum to unlicensed use due to fears that wireless usage along the same bandwidth would interfere with

⁷⁹ *Id.* at 400.

⁸⁰ Genachowski & McDowell, *supra* note 35.

⁸¹ *Id.*

⁸² *Id.*

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ See In the Matter of Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band, 28 FCC Rcd. 1769 (proposed Feb. 20, 2013).

V2V signals, creating a wide-range of defects in technology that needs to be flawless.⁸⁷

Lawmakers on Capitol Hill have long been frustrated by the slow pace of V2V development and the so called “spectrum drought”⁸⁸ due to FCC spectrum allocation procedures. New legislation proposes opening the reserved 5.9 GHz spectrum to unlicensed wireless use for the public.⁸⁹ The Wi-Fi Innovation Act would direct the FCC to explore the possibility and safety of spectrum sharing between Wi-Fi and DCRC technology in the 5.9 GHz band.⁹⁰ If Wi-Fi and V2V can coexist safely in the same band, the bill would require the FCC to set deadlines for testing and implementation of the shared technologies and the necessary regulations.⁹¹

According to Senator Booker, the legislation would allow disadvantaged people to access public Wi-Fi.⁹² Section 3 of the bill examines unlicensed spectrum and Wi-Fi use in low-income neighborhoods.⁹³ While 65 percent of homes in the United States have broadband access, 65 percent of households earning less than \$25,000 annually do *not*.⁹⁴ The legislation would also help meet growing demands for spectrum. Wi-Fi contributes \$140 billion in economic activity annually.⁹⁵ But the prognosis for the bill does not look good; GovTrack.com estimates that the bill has a 7 percent chance of making it past the Senate Commerce, Science and Transportation Committee.⁹⁶ Automakers and their allies agree to more efficient use of finite spectrum but argue that Congress lacks the expertise to impose a timeline

⁸⁷ Glancy, *supra* note 16, at 1627–28.

⁸⁸ Hazlett, *supra* note 33, at 337 (emphasizing and advocating for liberalization of spectrum allocation process to a flexible, market-based approach).

⁸⁹ *CBS This Morning: New Bill Could Kick Road Safety Tech to the Curb*, *supra* note 23.

⁹⁰ See Beasley & Beyoud, *supra* note 1.

⁹¹ *Id.*

⁹² See *CBS This Morning: New Bill Could Kick Road Safety Tech to the Curb*, *supra* note 23.

⁹³ Wi-Fi Innovation Act, S. 424, 114th Cong. § 3 (2015).

⁹⁴ Jimmy Soni, *Advocacy Groups Come Out in Favor of Wi-Fi Innovation Act*, WASH. EXAMINER (June 8, 2015, 12:01 AM), <http://www.washingtonexaminer.com/advocacy-groups-come-out-in-favor-of-wi-fi-innovation-act/article/2565672>.

⁹⁵ *Wireless Broadband and the Future of Spectrum Policy: Hearing on S. 424 Before the S. Comm. on Commerce, Sci. and Transp.*, 115th Cong. (2015) (statement of Jessica Rosenworcel, Commissioner, FCC).

⁹⁶ *Wi-Fi Innovation Act*, GOVTRACK.US, <https://www.govtrack.us/congress/bills/114/s424> (last visited Oct. 18, 2015).

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and make critical decisions,⁹⁷ and automakers are paying hundreds of thousands of dollars to make that point.

C. *Intense Lobbying*

Telecommunication companies and automakers list the spectrum reform debate as one of their top lobbying issues in 2015. A total of twenty-nine (29) groups registered to lobby the Wi-Fi Innovation Act in 2015.⁹⁸ Comcast gave lobbying firm Putala Strategies \$200,000 for the first two quarters of 2015 to lobby the issues of spectrum allocation and the Wi-Fi Innovation Act before the U.S. Senate, FCC, and White House Office.⁹⁹ Cable and wireless behemoths Comcast, Sprint, and T-Mobile, along with trade association the National Cable and Telecommunications Association (NCTA) together gave a total of \$330,000 to Putala Strategies in the second quarter to focus on the legislation as well as broader spectrum issues.¹⁰⁰ FCC spectrum allocation reform was listed on a report as one of the issues Comcast was lobbying in the first quarter of 2015.¹⁰¹ Comcast reported \$4.62 million expended to its in-house lobbying group in one of numerous first quarter Lobby Expense reports.¹⁰²

The Association of Global Automakers gave \$40,000 to Ogilvy Government Relations to represent their interest with respect to the legislation as well as other vehicle issues.¹⁰³ AT&T, Cisco, Ford, GM, Honda Motor Co., Hyundai Motor Co., KIA Motor Corp., Nissan Motor Co., Time Warner Cable, Toyota, and a number of trade associations for both industries listed V2V or the legislation as part of their direct lobbying activities.¹⁰⁴

The intense lobbying highlights a change in the country's views on spectrum over the past 15 years. When the FCC allocated the 5.9 GHz band to ITS in 1999 it was not valuable spectrum. Technological advances have changed that, along with a growing dependence on data devices.¹⁰⁵

⁹⁷ Soni, *supra* note 94.

⁹⁸ *Clients Lobbying on S.424: Wi-Fi Innovation Act*, CENTER FOR RESPONSIVE POLS., <https://www.opensecrets.org/lobby/billsum.php?id=s424-114> (last visited Oct. 18, 2015).

⁹⁹ Legislative Res. Ctr., 115th Cong., Lobbying Report: Putala Strategies (2015).

¹⁰⁰ Beasley & Beyoud, *supra* note 1.

¹⁰¹ Legislative Res. Ctr., 115th Cong., Lobbying Report: Comcast Corp. (2015).

¹⁰² *Id.*

¹⁰³ Legislative Res. Ctr., 115th Cong., Lobbying Report: Ogilvy Gov't Relations (2015).

¹⁰⁴ Beasley & Beyoud, *supra* note 1.

¹⁰⁵ *Id.*

IV. INDUSTRY COLLABORATION IN FAVOR OF PUBLIC INTEREST

Few of us go anywhere today without mobile devices in our palms, pockets, or purses. But as commonplace as wireless service may feel in our lives now, the truth is we are just getting started. Over the next five years, worldwide demand for mobile service is expected to grow by 10 times. As the Internet of Things emerges, wireless functionality will become a part of nearly everything we do.¹⁰⁶

Despite a common call for greater wireless access from both politicians and the public, the industry has been divided on the issue. As indicated above, the bill has little chance of passing. However, that does not mean that the legislation's underlying policy goals will die with the bill. Senate Commerce staff were able to find common ground on a divisive issue: spectrum sharing.¹⁰⁷ Spectrum sharing would enable federal, nonfederal, and commercial entities to share available radio spectrum within the same band. Popular support in Congress, coupled with FCC Commissioner Jessica Rosenworcel's embracement of spectrum sharing,¹⁰⁸ signals an underlying policy reform within the FCC. Because the bill is unlikely to pass, a more collaborative effort between automakers and the telecommunication's industry must blossom at a quicker rate. The FCC has been slow to test V2V technology with Wi-Fi use in the 5.9 GHz band.¹⁰⁹ Time is of the essence due to growing demand for data and Wi-Fi and the importance of life-saving technology.

The change in FCC policy should not come as a surprise to anyone with a smart device. In the United States, we live in an age where it is rare to encounter someone who does not own a smartphone, Blackberry, iPad, or all three. Wireless functionality is integral to nearly everything we do, necessitating more efficient uses of spectrum. Two proposals have been offered with regards to making room for Wi-Fi in the 5.9 GHz band.¹¹⁰ The proposal that garnered the most support is spectrum sharing offered by technology company Cisco Systems Inc., but some in the Wi-Fi

¹⁰⁶ *Wireless Broadband and the Future of Spectrum Policy: Hearing on S. 424 Before the S. Comm. on Commerce, Sci. and Transp.*, 115th Cong. (2015) (statement of Jessica Rosenworcel, Commissioner, FCC).

¹⁰⁷ Beyoud, *supra* note 10.

¹⁰⁸ Rosenworcel, *supra* note 106.

¹⁰⁹ Beasley & Beyoud, *supra* note 1.

¹¹⁰ *Id.*

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industry are more responsive to an idea akin to spectrum allocation: moving DSRC use to the upper end of the 5.9 GHz band, walling V2V from any interference.¹¹¹ The lower portion of the band would be opened up to sharing.¹¹² Automakers and their trade associations have lambasted this proposal by wireless tech company Qualcomm, claiming it could delay deployment of V2V indefinitely.¹¹³

Telecommunication companies and their trade associations have pushed for spectrum sharing, an idea proposed by the FCC, to share radio frequencies used by the government or military with commercial use.¹¹⁴ Spectrum sharing's chief purpose is to ensure that when the primary user does not need the spectrum, another party can make more efficient use, rather than allowing the spectrum to go to waste.¹¹⁵ Spectrum sharing uses database technology that would enable the sharing of radio frequencies among commercial broadband, military, and other government systems.¹¹⁶ For example, government communications may depend on spectrum being available at certain times in specific places, but that spectrum can be freed for commercial purposes when the government does not need the spectrum while still respecting the overriding needs of government communications.¹¹⁷ If the military has access to certain airwaves for communicating at a training site but that training site is not used on a particular day, a smartphone would be able to pick up a signal from the unused spectrum.

Spectrum sharing has proved successful in other bands. The National Telecommunications and Information Administration (NTIA), in conjunction with the FCC, established a Spectrum Sharing Innovation Test-Bed program to examine the feasibility of spectrum sharing between federal and commercial users.¹¹⁸ This pilot program required the federal government and industry to collaborate on a more efficient use of the nation's airwaves. Spectrum sharing is a fairly simple concept. If

¹¹¹ *Id.*

¹¹² *Id.*

¹¹³ Aebra Coe, *Carmakers Blast Qualcomm's Spectrum-Sharing Proposal*, LAW360 (July 6, 2015, 4:45 PM), <http://www.law360.com/articles/675952/carmakers-blast-qualcomm-s-spectrum-sharing-proposal>.

¹¹⁴ Genachowski & McDowell, *supra* note 35.

¹¹⁵ Sindhu Sundar, *Obama Tech Advisers Push Federal Spectrum Sharing*, LAW360 (July 20, 2012, 10:04 PM), <http://www.law360.com/articles/362705/obama-tech-advisers-push-federal-spectrum-sharing>.

¹¹⁶ Genachowski & McDowell, *supra* note 35.

¹¹⁷ Sundar, *supra* note 115.

¹¹⁸ *Spectrum Sharing*, NAT'L TELECOMMS. & INFO. ADMIN., <http://www.ntia.doc.gov/category/spectrum-sharing> (last visited Oct. 19, 2015).

it is so efficient, why has it not already been employed? The spectrum sharing technology is fairly new and would need a database to scan the airwaves to see which allocated frequencies are available for smartphone use.¹¹⁹ Setting up this database would be a big and costly job, appealing to companies such as Google to administer it.¹²⁰

It is of no coincidence that federal agencies such as NTIA and FCC have embraced spectrum sharing. President Barack Obama's top technology advisors released a report in 2012 recommending that the federal government share its underused wireless frequency spectrum to help commercial providers meet increasing demands for broadband.¹²¹ The report, authored by the President's Council of Advisors on Science and Technology (PCAST), concludes that the traditional practice of clearing and reallocating portions of the spectrum use by federal agencies is no longer a sustainable model for spectrum policy.¹²² The best way to increase capacity is to leverage new technologies that enable larger blocks of spectrum to be shared. Clearing certain airwaves is an expensive and time-consuming alternative to spectrum sharing.¹²³

Since many agree that spectrum sharing is an effective option, this may dictate the future of spectrum. In the case of V2V, the FCC has been slow to test the feasibility of spectrum sharing. Senate Commerce committee letters from Senators John Thune, Booker, and Rubio indicate that the FCC, in close coordination with USDOT and Department of Commerce, should take the lead to ensure that the spectrum sharing tests are conducted properly.¹²⁴ Cisco and Denso Corp., an automotive technology supplier, reached an agreement in September 2015 to begin testing a spectrum-sharing tool.¹²⁵ ITS and major automotive trade associations support the Cisco/Denso collaboration, but the lack of spectrum sharing data from federal agencies and industry groups has stalled potential spectrum sharing in the 5.9

¹¹⁹ Brian X. Chen, *How Spectrum Sharing Would Work*, N.Y. TIMES (May 29, 2012, 4:02 PM), http://bits.blogs.nytimes.com/2012/05/29/how-spectrum-sharing-would-work/?_r=0.

¹²⁰ *Id.*

¹²¹ Sundar, *supra* note 115.

¹²² PRESIDENT'S COUNCIL OF ADVISORS ON SCI. & TECH., EXEC. OFFICE OF THE PRESIDENT, FACT SHEET: FREEING UP SPECTRUM FOR WIRELESS BROADBAND (2012).

¹²³ *Id.*

¹²⁴ Letter from Cory Booker, Marco Rubio & John Thune, Senators, to Tom Wheeler, Chairman of the FCC, Anthony Fox and Penny Pritzker, Sec'y of Transp. (Sept. 9, 2015) (on file with Senate Comm. on Commerce, Sci. and Transp.).

¹²⁵ Beasley & Beyoud, *supra* note 1.

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GHz band.¹²⁶ Even though the automotive industry has endorsed spectrum sharing, the FCC process requires multiple methods to be tested, including Qualcomm's spectrum allocation proposal.¹²⁷ Cisco and Qualcomm are also allowed to modify their existing proposals, and the FCC can suggest alternative methods.¹²⁸

Others believe that V2V technology should be moved either out of the band or to an upper portion of the band, clearing the way for more efficient use of Wi-Fi.¹²⁹ The Crash Avoidance Metrics Partners LLC—an alliance between USDOT and numerous major automakers such as Ford Motor Co. and General Motors Corp. (“GM”)—said it had “grave concerns” about Qualcomm's spectrum allocation proposal because it could throw away years of research and V2V progress, delaying deployment of V2V and V2I technologies.¹³⁰ GM announced in 2014 that it would include V2V technology in the 2017 Cadillac CTS.¹³¹ Due to the Senate Committee's proposed testing completion date of December 31, 2016, this may no longer be feasible.¹³²

Qualcomm's proposal is unsustainable. Moving V2V into the upper portion of the spectrum ignores the larger issue of the spectrum drought, and pushes the problem away to be dealt with at a later time. The federal government holds 70 percent of the spectrum best suited for broadband technology.¹³³ Spectrum sharing, as opposed to spectrum allocation, is a more efficient use of the nation's airwaves because it does not leave unused government spectrum fallow, but allows the unused spectrum to be picked up by smart devices. Moving V2V to another part of the spectrum is returning to “business as usual” for the FCC. Allocating the spectrum to different firms for licensed use will create problems years down the road when consumer demand for spectrum climbs exponentially.

The effort to explore the coexistence between V2V and Wi-Fi is a microcosm of the larger issue: how to incentivize federal agencies to relinquish or share their spectrum with the private sector. As FCC Commissioner Rosenworcel stated before

¹²⁶ Beyoud, *supra* note 10.

¹²⁷ *Id.*

¹²⁸ *Id.*

¹²⁹ Beasley & Beyoud, *supra* note 1.

¹³⁰ Coe, *supra* note 113.

¹³¹ *Id.*

¹³² Letter from Cory Booker, Marco Rubio & John Thune, Senators, to Tom Wheeler, Chairman of the FCC, Anthony Fox and Penny Pritzker, Sec'ys of Transp. (Sept. 9, 2015) (on file with Senate Comm. on Commerce, Sci. and Transp.).

¹³³ Genachowski & McDowell, *supra* note 35.

the Senate Committee on Commerce, Science and Transportation, the traditional approach to rising commercial spectrum demand is for the FCC to coax or pressure federal authorities to free old government airwaves for new private sector use.¹³⁴ This is an unreliable process that takes too long and is inconsistent with commercial needs.

If the \$40 billion towards the federal deficit acquired from the last spectrum auction is not enough incentive for federal authorities to relinquish unused spectrum, then what will incentivize these officials? Commissioner Rosenworcel made a few suggestions at the Senate Committee. She suggests that participating federal authorities should receive a cut of the revenue from the commercial auction of the airwaves they clear and use those funds to support relocation of airwaves.¹³⁵ She also suggests assigning more resources to the Spectrum Relocation Fund, which assists federal authorities with relocating their wireless functions when their spectrum is being repurposed for commercial use.¹³⁶ This fund could provide greater incentives for more government sharing by rewarding federal users when they share their spectrum with agencies that have been relocated.¹³⁷

Current laws are counterproductive and inefficient, particularly the Miscellaneous Receipts Act.¹³⁸ The statute prevents negotiations between federal agencies and winning bidders in wireless auctions.¹³⁹ This is inefficient as it may prevent winning bidders from meeting their wireless needs. The lack of communication between commercial entities and federal agencies actually incentivizes fallow spectrum because both the industry and agency cannot identify the other's needs. Congress could force agencies relinquish spectrum that is not being used efficiently,¹⁴⁰ but that would anger too many on both sides of the federal agency and industry fields. Incentivizing federal authorities is an important step to a more efficient use of spectrum.

¹³⁴ *Wireless Broadband and the Future of Spectrum Policy: Hearing on S. 424 Before the S. Comm. on Commerce, Sci. and Transp.*, 115th Cong. (2015) (statement of Jessica Rosenworcel, Commissioner, FCC).

¹³⁵ *Id.*

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ 31 U.S.C. § 3302 (2012).

¹³⁹ *Wireless Broadband and the Future of Spectrum Policy: Hearing on S. 424 Before the S. Comm. on Commerce, Sci. and Transp.*, 115th Cong. (2015) (statement of Jessica Rosenworcel, Commissioner, FCC).

¹⁴⁰ Genachowski & McDowell, *supra* note 35.

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V. CONCLUSION

The Internet of Things is driven by mobility and spectrum. Right now, the connected car market is growing ten times faster than the traditional automobile market. By 2020, an incredible 97 percent of all vehicles shipped in the United States will be able to connect to the Internet. . . . Our connected future and the economic and social benefits that flow from it ride on wireless networks. These networks depend on investment and innovation.¹⁴¹

Spectrum sharing and allocation in the context of V2V represents just one of many disputes over a finite resource. The FCC must overhaul its underlying policy rationale, and with the leadership of forward-thinking Commissioners, it seems likely that spectrum allocation processes will change for the better. There is a silver lining in the V2V/Wi-Fi debacle: V2V is driving a policy change within the FCC and shifting the way consumers and federal authorities think about airwaves. Consumers will most likely see V2V in new vehicles by 2020, and the life-saving technology may not be made available at the expense of greater Wi-Fi access.

Congress can push federal agencies to relinquish unused spectrum to commercial use, but Congress has proven that their collaborative efforts can only go so far. Because efforts to force federal agencies to release unused spectrum has proven futile (such as the Wi-Fi Innovation Act), the policy change must come from within the federal agencies. Spectrum sharing offers the benefits to both the industry and the federal government while keeping America's rising data-driven needs in mind. Incentivizing federal authorities is important first step, but there is a lot of work ahead to achieve these greater policy goals.

¹⁴¹ *Wireless Broadband and the Future of Spectrum Policy: Hearing on S. 424 Before the S. Comm. on Commerce, Sci. and Transp.*, 115th Cong. (2015) (testimony of Meredith Atwell Backer, President and CEO of CITA—The Wireless Association).