EDITOR'S NOTE

Welcome to the first Issue of Volume 69 of the Federal Communications Law Journal, the nation's premier communications law journal and the official journal of the Federal Communications Bar Association. As we commence with Volume 69, we are excited to publish several timely and thought-provoking pieces about vital topics in the communications field. This Issue has a particular focus on matters relating to domestic and international broadband deployment, the digital divide, and emerging technologies.

To start, T. Randolph Beard, George S. Ford, and Michael Stern use economic theory to describe current barriers to broadband deployment. They offer an economic model to show how limited broad services such as recently-introduced "free-but-limited" deployment programs may encourage broadband access and adoption for lower-income users in some circumstances.

This Issue also contains three student Notes. First, Chasel Lee explores the history of driverless cars and recent developments in their production and regulation. In response to questions involving cybersecurity and privacy, Lee's Note proposes a nuanced federal regulatory scheme that connects public and private entities and offers states and industry breathing room to experiment and innovate.

In our next student Note, Stephen Klein discusses the new First Responder Network Authority (FirstNet), which creates a nationwide broadband network for the exclusive use of first responders. Klein implores regulators and policymakers to not forget about rural first responders and recommends several ways that this new scheme can help first responders better protect citizens in both urban and rural areas.

Finally, Qiusi Yang's Note introduces readers to recent international agreements and disputes. Yang discusses regulatory hurdles that United States-based companies face in foreign host countries and the Federal Communications Commission's (FCC) role in regulating the entry of foreign carriers into the US market. Finally, Yang proposes several methods by which the US can fulfill its commitments to the World Trade Organization and work with foreign nations to create procompetitive regulatory schemes.

As always, the Journal is committed to providing its readership with substantive coverage of relevant topics in communications law. We appreciate the continued support of our readers and contributors. We welcome your feedback and submissions—any questions or comments about this Issue or future issues may be directed to fclj@law.gwu.edu, and any submissions for publication consideration may be directed to fcljarticles@law.gwu.edu. This Issue and our archive are available at http://www.fclj.org.

Warren Kessler
Editor-in-Chief

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ARTICLE

Private Solutions to Broadband Adoption: An Economic Analysis

By T. Randolph Beard, PhD, George S. Ford, PhD, and Michael Stern, PhD 1

For the last twenty years, promoting broadband adoption has been a focal point of communications policy around the world. Despite significant advances, there is still much work to be done. To help bridge this adoption gap, private communications companies are now offering services at deeply discounted prices or even for free in many countries. Facebook's "Free Basics" program, for instance, helps to address the awareness, digital literacy, and affordability barriers to adoption by offering consumers in more than forty-five countries free access to basic online services such as communication tools, health services, educational information, and job tools. By increasing digital awareness, many of the program's users upgrade to fee-based services to access the broader Internet in a short amount of time. Nonetheless, questions are being raised about the propriety of the basic connectivity offered by such programs. Using economic theory, we demonstrate that the price-quality variations of such programs are economically sensible, if not necessary, to address the key barriers to adoption without attenuating investment incentives. In addition, we demonstrate that such "free-but-limited" programs can increase adoption by "smoothing" Internet consumption over time, and we present econometric evidence of "connectivity insurance," keeping consumers online during periods of financial distress.

NOTES

Grabbing the Wheel Early: Moving Forward on Cybersecurity and Privacy Protections for Driverless Cars

By Chasel Lee 25

Since the arrival of driverless cars in our collective consciousness in late 2010, there has been a rush to gawk at, to understand, and to grapple with this new phenomenon. From the beginning, concerns were raised about various issues, ranging from public safety to robot overlords. However, two problems, particularly cybersecurity and privacy, became salient in the public mind but defied easy resolution. There was little precedent in other forms of technology in protecting these now-important interests, but the glacial pace of lawmaking made addressing these two issues much more difficult.

This Note proposes a viable framework by which these concerns can be addressed. Through the creation of a federal regulatory regime and consortium of federal agencies, including the National Highway Traffic Safety Administration (NHTSA), the Federal Communications Commission (FCC), the Federal Trade Commission (FTC), the National Institute of Standards and Technology (NIST), and the Intelligent Transportation Systems (ITS) Joint Program Office of the U.S. Department of Transportation, cybersecurity and privacy concerns arising from the driverless car revolution can be addressed uniformly throughout the United States, leaving private industry and innovators with the predictability and stability they need to propel this new technology forward. New and robust cybersecurity and privacy regulations, crafted with input from the private sector, will give consumers the assurance and confidence they need to move this next step of progress forward.

Rural Response: The Need for an Effective Rural FirstNet Network

By Stephen Klein 53

To mitigate major natural and human-induced disasters, Congress established the First Responder Network Authority (FirstNet), which was directed to create a nationwide broadband network dedicated to first responders. The network will allow interconnectivity between different first responders and will provide reliable service in the event of an emergency.

One of FirstNet's goals is to provide more reliable wireless access for rural first responders who have traditionally suffered from inconsistent communications capabilities. If the network is properly constructed, it would allow for more effective responses to disasters, especially ecological, that may occur in rural areas.

The development of wireless coverage has shown that national commercial wireless providers deprioritized rural areas. FirstNet needs to ensure that in a final plan, they have the capacity to ensure that rural infrastructure is given a sufficient level of attention to prevent the added risks that come with the inadequate infrastructure currently available to rural first responders.

Bridging Open Markets in the "Big Bandwidth" Era: A Blueprint for Foreign Broadband Internet Deployment

By Qiusi Yang 75

In the basic telecommunications services sector, granting a monopoly share of a service market to a domestic supplier is a common practice that has been challenged for its inconsistency with the goal of market liberalization as contemplated by the General Agreement on Trade in Services. The United States recently announced its "Global Connect" initiative, an attempt to bring about regulatory, technological, and economic changes to challenge Internet infrastructure market access that is historically insulated from foreign competition. Bearing in mind the United States' telecommunications commitments under the World Trade Organization's (WTO) agreements on basic telecommunications as well as past regulations and practices of the Federal Communications Commission (FCC), this Note will explore possible options in negotiating bilateral agreements with foreign countries that will maximize market access for United States basic telecommunications service

providers on reciprocal terms. This Note will focus on two core provisions in proposing such an agreement: market access and competitive safeguards. This Note will also emphasize how the FCC, with its expertise in managing regulatory conflicts, can utilize host countries' WTO commitments and obligations to pave the way for U.S. providers' investments.

Private Solutions to Broadband Adoption: An Economic Analysis

T. Randolph Beard, PhD *
George S. Ford, PhD †
Michael Stern, PhD ‡

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I. INTRODUCTION

Broadband Internet service is seen as critical to economic and social progress, yet broadband is not ubiquitously available and, even where available, the adoption rate is often seen as being too low. Consequently, expanding broadband deployment and adoption are top policy goals in nearly every industrialized nation as well as in many developing regions.[1] It is not proving to be an easy task. Faced with many impediments of both a public and private nature, progress on improving availability and adoption has proven unsatisfactory, resulting in what is often described as a "digital divide" separating the information "haves" from the "have nots."[2] In the United States, for example, broadband adoption appears to have plateaued even while systematic differences in adoption rates exist among subpopulations. The global digital divide is even more pronounced.[3] In less-developed economies, the hurdles to availability and adoption are especially high and Internet adoption rates remain very low.

Despite differences in the economic fundamentals of nations, the barriers to deployment and adoption are categorically of the same underlying nature. On the supply side, the lack of access to broadband is mostly a financial issue driven by the high infrastructure costs of network deployment relative to the revenue potential.[4] On the demand side, research consistently points to the related concepts of awareness and digital literacy, as well as

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1. *See* Catherine Novelli, *The Global Connect Initiative: Making the Internet a Development Priority*, U.S. DEP'T STATE: DIPNOTE (Jan. 25, 2016), https://blogs.state.gov/stories/2016/01/25/global-connect-initiative-making-internet-development-priority [https://perma.cc/9SNM-J6Q5].

2. JOHN B. HORRIGAN & MAEVE DUGGAN, PEW RESEARCH CTR., HOME BROADBAND 2015 (2015), http://www.pewinternet.org/files/2015/12/Broadband-adoption-full.pdf [https://perma.cc/5SWJ-8BZS]; WHITE HOUSE COUNCIL OF ECONOMIC ADVISORS, ISSUE BRIEF JULY 2016: MAPPING THE DIGITAL DIVIDE (2015), https://obamawhitehouse.archives.gov/sites/default/files/wh_digital_divide_issue_brief.pdf [https://perma.cc/7KGZ-RGEQ]; KATHRYN ZICKUHR & AARON SMITH, PEW RESEARCH CTR., DIGITAL DIFFERENCES (2012), http://www.pewinternet.org/files/old-media//Files/Reports/2012/PIP_Digital_differences_041312.pdf [https://perma.cc/USH9-F4D5].

3. *See generally* Joe Kloc, *Mind the Gap: The World's "Digital Divide" Is Not Closing Any Time Soon*, NEWSWEEK (Apr. 24, 2014, 6:08 AM), http://www.newsweek.com/mind-gap-worlds-digital-divide-not-closing-any-time-soon-248454 [https://perma.cc/27PD-BG8D]; Loren Treisman, *Access to Information: Bridging the Digital Divide in Africa*, GUARDIAN (Jan. 24, 2014, 13:58 EST), http://www.theguardian.com/global-development-professionals-network/2014/jan/24/digital-divide-access-to-information-africa [https://perma.cc/5BYR-GYV8]; KARA SPRAGUE ET AL., MCKINSEY & CO., OFFLINE AND FALLING BEHIND: BARRIERS TO INTERNET ADOPTION (2014), http://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/high%20tech/pdfs/offline_and_falling_behind_full_report.ashx [https://perma.cc/BMX2-NQQP].

4. The economics of deployment are explained in George S. Ford et al., *Competition After Unbundling: Entry, Industry Structure and Convergence*, 59 FED. COMM. L.J. 331, 367 (2007).

affordability.[5] An effective policy for expanding broadband adoption, therefore, seemingly must expose consumers to broadband service, do so at very low prices (or even free), and yet secure sufficient revenue for network deployment, maintenance, and upgrades. Thus far, despite much effort and discussion, no government has found an effective solution to this complex problem.

Private companies have begun their own search for methods to increase adoption, perhaps driven in part by altruism and in part by the pursuit of income. In the United States, for instance, Comcast's Internet Essentials program provides a subsidized 10-Mbps connection and low-cost computers to qualified lower-income households.[6] While privately funded, the program is connecting more households to the Internet than multibillion dollars efforts by the U.S. federal government.[7] Similarly, Facebook's Free Basics program helps to address the awareness and affordability barriers to adoption by offering consumers free access to basic online services such as communication tools, health services, educational information, and job tools.[8] Free Basics is available in more than fifty (mostly developing) countries and municipalities, and Facebook's connectivity efforts, including Free Basics, have successfully brought more than twenty-five million people online.[9]

Despite the obvious success of these programs at increasing adoption, some questions are being asked about the propriety of the basic connectivity

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5. *See* KATHRYN ZICKUHR, PEW RESEARCH CTR., WHO'S NOT ONLINE AND WHY (2013), http://www.pewinternet.org/~/media//Files/Reports/2013/PIP_Offline%20adults_092513_PDF.pdf [https://perma.cc/P5LA-VLJT]; CONNECTED NATION, BROADBAND ADOPTION AMONG LOW-INCOME HOUSEHOLDS: INSIGHTS FROM CONNECTED NATION RESEARCH (2011), http://www.connectednation.org/sites/default/files/bbadoptionamonglow-incomehh_final_071111.pdf [https://perma.cc/L4ZT-L3FP]; FCC, CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN 136 (2010), https://apps.fcc.gov/edocs_public/attachmatch/DOC-296935A1.pdf [https://perma.cc/F3CG-XQGL] [hereinafter NATIONAL BROADBAND PLAN]; DELOITTE & AEGIS SCHOOL OF BUSINESS, BROADBAND: THE LIFELINE OF DIGITAL INDIA (2014), http://www2.deloitte.com/content/dam/Deloitte/in/Documents/technology-media-telecommunications/in-tmt-broadband-noexp.pdf [https://perma.cc/QS4U-C73H].

6. *See Connection Is Essential*, COMCAST, http://www.connectionisessential.com [https://perma.cc/JN37-K9PY] (last visited Nov. 27, 2016).

7. *Id.*; *see*, U.S. GOV'T ACCOUNTABILITY OFF., GAO-14-511, RECOVERY ACT: USDA SHOULD INCLUDE BROADBAND PROGRAM'S IMPACT IN ANNUAL PERFORMANCE REPORTS 19 (2014) [hereinafter GAO-14-511].

8. *See Free Basics by Facebook*, INTERNET.ORG, https://info.internet.org/en/story/free-basics-from-internet-org [https://perma.cc/RH3M-N8ML] (last visited Nov. 27, 2016). Being free of data charges, the Free Basics platform grants users access to the Internet but only permits low-bandwidth communications. Even so, the available content includes socially-valuable content such as basic person-to-person communications, news, employment, health, education, and local information. Free Basics is an open platform available to any content provider willing to meet the specified limitations on bandwidth. Facebook manages the software, which is combined with the services of mobile providers choosing to participate in the program. Facebook receives no direct revenue for its efforts. *Id.*

9. *See Our Impact*, INTERNET.ORG, https://info.internet.org/en/impact [https://perma.cc/J6HP-Y8KB] (last visited Nov. 27, 2016); *Highlights from Internet.org at AfricaCom*, INTERNET.ORG (Nov, 19, 2015) https://info.internet.org/en/2015/11/19/highlights-from-internet-org-at-africacom [https://perma.cc/R935-FUYT].

offered by such programs.[10] These concerns often appear to be inspired by the belief that a program must provide a full Internet experience to be socially valuable.[11] Thus far, such claims are based on ideology alone and are bereft of any serious economic analysis.

In this paper, we take a more positive approach to the issue, using economic theory to demonstrate that these price-quality variations are economically sensible—if not necessary—to address the awareness, digital literacy and affordability barriers to broadband adoption. At the center of our analysis is the economic concept of the *separating equilibrium*, which requires that the "quality" of a free service be sufficiently adjusted relative to market-priced services to make it privately profitable. These programs obviously increase adoption, but we also show that such programs, due to network effects, both increase consumer surplus and restrain the market price of full Internet connectivity. If the user experience leads to the adoption of market-priced services, then the program also leads to increased income for providers, thereby providing motivation to providers to implement the program and increase infrastructure investment.

An additional benefit of such "free-but-limited" programs is that they can increase adoption by "smoothing" Internet consumption over time, increasing the present value of use and thereby increasing incentives for non-users to make a commitment to the technology. For instance, if connectivity may be interrupted in the future, then non-users may be reluctant to commit to Internet-based communications modalities (e.g., email or Skype). Also, such programs may serve as a type of "connectivity insurance" by providing basic Internet connectivity to individuals or households during periods of financial stress. To illustrate how such programs can play this role, we

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10. *See, e.g.*, Don Reisinger, *Why Facebook's Free Basics Internet Service Stirs Up Controversy*, EWEEK (Feb. 17, 2016), http://www.eweek.com/cloud/slideshows/why-facebooks-free-basics-internet-service-stirs-up-controversy.html [https://perma.cc/DMD8-4JME]; Romit Guha, *Net Neutrality Debate: Facebook Shuts Down Free Basics in India*, ECON. TIMES (Feb. 12, 2016, 1:50 AM IST), http://economictimes.indiatimes.com/tech/internet/net-neutrality-debate-facebook-shuts-down-free-basics-in-india/articleshow/50950026.cms [https://perma.cc/VH3K-QRNP]; Newley Purnell, *Facebook Sees Big Growth in Asia Despite Free Basics Controversy*, WALL ST. J. (Mar. 15, 2016, 9:21 AM EST), http://blogs.wsj.com/digits/2016/03/15/facebook-sees-big-growth-in-asia-despite-free-basics-controversy [https://perma.cc/V34V-TMHQ]; Emily Steel, *Comcast Critics Cast Doubt on Its Intensions*, N.Y. TIMES (Apr. 22, 2015), http://www.nytimes.com/2015/04/23/business/media/comcast-critics-cast-doubt-on-its-intentions.html [https://perma.cc/EP88-VZFT]; Aeyne Schriber, *Comcast Internet Essentials: Is It Bridging the Digital Divide?*, INTERNET ACCESS GUIDE (Sept. 30, 2014), http://internet-access-guide.com/comcast-internet-essentials-is-it-bridging-the-digital-divide [https://perma.cc/RS6A-LYD2].

11. *See, e.g.*, Mahesh Murthy, *Facebook Is Misleading Indians with Its Ads About Free Basics*, TECH ASIA (Dec. 28, 2015, 9:42 PM) https://www.techinasia.com/talk/facebook-misleading-indians-fullpage-ads-free-basics [https://perma.cc/LLD2-Z8UB] ("In their ads, [Facebook claims] they want to bring 'digital equality' when they're actually bringing digital slavery or digital apartheid to our poor."); Ajey Lele, *Facebook's Free Basics: A Digital Apartheid*, IDSA COMMENT (Jan. 7, 2016), http://www.idsa.in/idsacomments/facebooks-free-basics_avlele_070116 [https://perma.cc/YXF8-4DSJ] ("Free Basics actually leads to converting the internet, which is supposed to be a global public good, into a 'controlled' platform. For some this even amounts to compromising on their 'human rights.'").

provide empirical evidence demonstrating that the quantity of subscribers to the Lifeline program in the United States, which provides subsidies to consumers for telecommunications services, increases during periods of financial distress.[12] We expect that the value of "connectivity insurance" will be greater for private programs since they often have limited or no qualifications for subscription. Free Basics, for instance, is available through participating operators to all users without meeting or demonstrating income or other qualifications.[13] Also, government-funded programs may be caught up in political disputes about government spending along with fraud and abuse, thereby limiting their effectiveness and sustainability.[14] Privately provided programs are largely free from such concerns.

II. UNDERSTANDING THE BARRIERS TO BROADBAND ADOPTION

Formulating a policy to solve a particular problem requires knowledge of the problem to be solved. Here, the quandary is a perceived shortfall in broadband adoption, which results from both demand-side and supply-side factors. Research suggests that the key barriers to adoption are the related concepts of (a) awareness; (b) digital literacy; and (c) affordability.[15] That is, some individuals are simply not aware of the benefits of broadband or have trouble using the technology, and others simply cannot afford to pay market prices for either the service or equipment required for connectivity. On the supply side, the barriers are financial in nature.[16] Networks are expensive to deploy, and in some instances the revenue potential is inadequate to justify the necessary investments.[17]

A. Demand-Side Barriers

Survey evidence indicates that it is demand-side factors that are most responsible for the failure of individuals to adopt broadband, at least in the United States where broadband is widely-available. Table 1 summarizes

12. *See infra* notes 45–48.
13. *See* sources cited *supra* note 10.
14. *See* Kif Leswing, *The FCC Never Collected Fines Stemming from "Obama Phone" Fraud*, FORTUNE (Nov. 23, 2015), http://fortune.com/2015/11/23/fcc-never-collected-lifeline-fines [https://perma.cc/U4LM-FUJY]; *see also* Lachlan Markay, *FCC Kept "Obamaphone" Fraud Under Wraps Until After It Expanded Program*, FREE BEACON (Apr. 13, 2016, 12:10 PM), http://freebeacon.com/issues/fcc-kept-obamaphone-fraud-wraps-expanded-program [https://perma.cc/MD8K-9WJB]; Jillian Kay Melchior, *Expanding the Lifeline Phone Subsidy – Here Comes Obamanet*, NAT'L REV. (June 1, 2015 4:00 AM), http://www.nationalreview.com/article/419123/if-abuse-obamaphones-werent-enough-fcc-wants-subsidize-broadband-jillian-kay-melchior [https://perma.cc/G8KK-8YBD]; Doug Porter, *AT&T Voucher Program Threatens Phone Service for Low-Income Californians*, SAN DIEGO FREE PRESS (Aug. 16, 2013), http://sandiegofreepress.org/2013/08/att-voucher-program-threatens-phone-service-for-low-income-californians [https://perma.cc/6FN5-4XKQ].
15. *See* ZICKUHR, *supra* note 5, at 2, 6; SPRAGUE ET AL., *supra* note 3, at 3–4.
16. *See* SPRAGUE ET AL., *supra* note 3, at 30.
17. *Id.*

some findings from a 2013 survey by the Pew Research Center.[18] Awareness and digital literacy are the dominant explanations for the failure to adopt broadband. Affordability was also a determining factor, though much less significant than either relevance or usability, though we suspect affordability is more relevant in developing economies.[19] Also, affordability was mostly related to the cost of a computer rather than the broadband service.[20] Availability was not found to be one of the more significant explanations, though such responses are obviously impacted by the widespread availability of broadband services in the United States (a situation not common across all countries).[21]

Table 1. Main Reasons Adults Do Not Adopt Internet (USA)

Reasons Offline	Percentage
Relevance (not interested, waste of time, too busy, don't need/want)	34
Usability (difficult/frustrating, too old, don't know how, physically unable, worried about spam/viruses/hackers/etc.)	32
Price (too expensive, no computer)	19
Lack of availability	7

Source: Kathryn Zickuhr, Pew Research Center, *Who's Not Online and Why* 2 (2013).

In economics terminology, the *awareness* issue implies that broadband is an *experience good*. An experience good is a product for which the value is difficult to ascertain prior to its consumption.[22] Experience goods are very common. Purveyors of such products often craft ways for potential customers to "taste" the product prior to purchase: computer software vendors offer trial versions of their software, wine distributors hold tastings, movie studios provide trailers, and record companies offer sound clips. It seems plain enough that a lack of awareness of the value of broadband can only be resolved by allowing customers to experience broadband connectivity somehow. This experience must also address affordability concerns, which can be pronounced in certain populations.[23] In many cases, using broadband also requires knowledge of how to operate a computer or a smartphone, and technology poses challenges for some users. For instance, below-average

18. *See* ZICKUHR, *supra* note 5, at 2; *see also infra* Table 1.
19. *See* SPRAGUE ET AL., *supra* note 3, at 35.
20. *See id.* at 35–38.
21. *Id.* at 47.
22. *See* Phillip Nelson, *Information and Consumer Behavior*, 78 J. POL. ECON. 311, 312 (1970).
23. *See Mapping the Digital Divide*, *supra* note 2, at 1.

adoption by older adults is based in part on the complexity of operating the technology.[24] Illiteracy is also a barrier to adoption.[25] Again, getting some experience with the Internet, preferably at low cost, is the solution to such concerns.[26]

B. Supply-Side Barriers

On the supply side, availability is primarily a financial issue. Broadband networks are expensive to deploy, maintain, and upgrade. An analysis prepared by FCC staff as part of the United States' *National Broadband Plan* sums the issue up concisely: "[p]rivate capital will only be available to fund investments in broadband networks where it is possible to earn returns in excess of the cost of capital. In short, only profitable networks will attract the investment required."[27] In areas lacking access to broadband, the *National Broadband Plan* explains that "[b]ecause service providers in these areas cannot earn enough revenue to cover the costs of deploying and operating broadband networks, including expected returns on capital, there is no business case to offer broadband services."[28] Without the expectation of sufficient financial return, broadband networks will not be deployed nor will their capabilities be upgraded over time to modern standards. Financial issues are obviously not limited to the U.S. marketplace but are ubiquitous across the globe.[29]

In many countries, broadband networks are constructed and operated by a small number of private entities, so prices and demand must be sufficiently large relative to costs to spur investment.[30] In the United States, statistics show that about 90% of individuals have access to 25 Mbps broadband, with the lack of availability mostly occurring in rural areas where the costs are especially high relative to demand.[31] The economics of deployment are, of course, much more unfavorable in developing countries

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24. *See* ZICKUHR, *supra* note 5, at 9. *But see, e.g.*, AARON SMITH, PEW RESEARCH CTR., OLDER ADULTS AND TECHNOLOGY USE (2014), http://www.pewinternet.org/files/2014/04/PIP_Seniors-and-Tech-Use_040314.pdf [https://perma.cc/GXT5-RDFP].

25. *See* SPRAGUE ET AL., *supra* note 3, at 23.

26. At least in the United States, numerous programs exist to expose individuals both to the technology and the capabilities of broadband. *See generally Digital Literacy*, NTIA, https://digitalliteracy.gov/ [https://perma.cc/FS3Y-AAFZ] (last visited Feb. 9, 2017).

27. FCC, THE BROADBAND AVAILABILITY GAP: OMNIBUS BROADBAND INITIATIVE (OBI) TECHNICAL PAPER 1 (2010), http://download.broadband.gov/plan/the-broadband-availability-gap-obi-technical-paper-no-1.pdf [https://perma.cc/Q3WN-Y7JD]

28. *See* NATIONAL BROADBAND PLAN, *supra* note 5, at 136.

29. *See, e.g.*, Tom Geoghegan, *Why is Broadband More Expensive in the US?*, BBC NEWS (Oct. 28, 2013), http://www.bbc.com/news/magazine-24528383 [https://perma.cc/A3TZ-GZ4Z] ("[I]n Europe, the funds aren't there, so it's Europe that is lagging behind on 4G and fibre.").

30. *See* SPRAGUE ET AL., *supra* note 3, at 41.

31. *See, e.g.*, Inquiry Concerning the Deployment of Advanced Telecommunications Capability of All Americans in a Reasonable and Timely Fashion, etc., *2016 Broadband Progress Report*, 31 FCC Rcd 699, para. 4 (2016) ("Nationwide, one in ten Americans lacks access to 25 Mbps/3 Mbps broadband.").

due to low effective demand (from low incomes) and relatively high deployment costs.[32] Deployment is dependent on the relative sizes of demand and costs. While economic conditions may vary across geographic areas and nations, it is always the case that if more availability is the target, then policies must be designed to either increase effective demand or reduce costs (or both).[33] As discussed, increasing demand must address in part the lack of awareness, literacy, and affordability.

C. Social Value

A third reason adoption is argued to be too low is that broadband is believed to provide a social benefit above and beyond the private benefits of the service.[34] If broadband provided only private benefits, then the decisions of consumers and profit-motivated sellers should be sufficient to produce the desired availability and adoption outcomes. Social benefits, however, accrue neither to broadband providers nor their consumers, but to a third party. "Network effects"—where the value of a network is larger as the number of users on that network increase—are a type of third-party effect.[35] If these third-party effects are large enough, then the private incentives of consumers to pay for, and the private incentives of firms to deploy the "right amount" of broadband are systematically too low from a social perspective.[36] These social benefits *may* be a type of positive network effect (or externality, in some cases), thus producing a systematic departure of the private equilibrium from the desirable social outcome. The persistent and near-ubiquitous pleas for more adoption suggest that these external effects play a key role in the thinking about broadband policies. Public policies for broadband adoption aim to close this gap between privately profitable and socially desirable outcomes, but not all such policies are properly motivated and some have proven failures despite large expenditure levels.[37]

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32. *See* SPRAGUE ET AL., *supra* note 3, at 39–41.

33. *Id*.

34. *See, e.g.*, NATIONAL BROADBAND PLAN, *supra* note 5, at 3 ("Broadband is a platform to create today's high-performance America—an America of universal opportunity and increasing innovation, an America that can continue to lead the global economy, an America with world-leading broadband-enables health care, education, energy, job training, civic engagement, government performance and public safety.").

35. *See* S.J. Liebowitz & Stephen E. Margolis, *Network Externality: An Uncommon Tragedy*, 8 J. ECON. PERSPECTIVES 133, 135 (1994).

36. *See, e.g.*, NATIONAL BROADBAND PLAN, *supra* note 5, at 3; Shane Greenstein & Ryan C. McDevitt, *The Broadband Bonus: Accounting for Broadband Internet's Impact on U.S. GDP* (NBER Working Paper Series, PAPER NO. 14758, 2009), https://www.nber.org/papers/w14758.pdf [https://perma.cc/QR96-QM37]; T. Randolph Beard et al., *The Broadband Adoption Index: Improving Measurements and Comparisons of Broadband Deployment and Adoption*, 62 FED. COMM. L.J. 343, 351–55 (2010).

37. *See* Mark Jamison, *Failure to Connect*, U.S. NEWS & WORLD REP. (Aug. 6, 2015, 3:00 PM) http://www.usnews.com/opinion/economic-intelligence/2015/08/06/usda-shows-government-subsidized-broadband-is-a-bad-investment [https://perma.cc/G7D4-Y7UA]; Doug Mataconis, *The Final Verdict on the 2009 Stimulus: A Failure*, OUTSIDE BELTWAY (July 6, 2011), http://www.outsidethebeltway.com/the-final-verdict-on-the-2009-stimulus-a-failure

D. Global Adoption Data

While the underlying nature of barriers to increased adoption are likely similar across the globe, different nations face varied economic conditions. Table 2 provides 2014 data (the most recent made widely available) on select economic conditions and communication service penetrations for the world's twenty most populous countries (representing about 70% of the world's population).[38] The per capita GDP in the United States is about $54,000, which is substantially higher than that in India where average incomes are about $1,600 (in U.S. dollars). India's population is nearly four times larger than that of the United States, so affordability is a very serious global concern. Wide variation is observed for both fixed broadband and mobile cellular adoption, and such variations are highly correlated with income.[39] In the United States, fixed-line connections added to about 78% of total households, while mobile connections summed to 98% of persons at the time.[40] Market penetration of both services was also very high in Japan.[41] Compare these successes with India, Pakistan, Bangladesh, Nigeria, Ethiopia, and the Democratic Republic of the Congo, where fixed broadband adoption rates were quite low.[42]

[https://perma.cc/3GNU-HD48]; GAO-14-511, *supra* note 7, at 19 ("BIP status reports have previously contained information that was determined unreliable by GAO and USDA's OIG . . . .").

38. Data is provided by the WORLD BANK, http://data.worldbank.org/ [https://perma.cc/9GXB-HJES] (last visited Feb. 15, 2017). Household size data, used to convert fixed broadband connections per 100 persons to per household, is provided by EUROMONITOR INT'L LTD., THE WORLD ECONOMIC FACTBOOK 2014 (21st ed., 2014), http://www.euromonitor.com/medialibrary/PDF/Book_WEF_2014.pdf [https://perma.cc/A5EA-JK8D]. *See, e.g.*, GEORGE S. FORD, PHOENIX CTR., DEVELOPING A "NATIONAL BROADBAND STRATEGY": UNDERSTANDING THE OECD RANKINGS AND THE DRIVERS OF BROADBAND ADOPTION (2008), http://www.phoenix-center.org/PC_HlllEventJuly28_2008.pdf [https://perma.cc/AL5T-MW7W]; George S. Ford, *Broadband Expectations and the Convergence of Ranks*, PHOENIX CTR.: PERSPECTIVES (Oct. 1, 2008), http://www.phoenix-center.org/perspectives/Perspective08-03Final.pdf [https://perma.cc/4U2P-KN9Z]; *see generally* T. Randolph Beard et al., *supra* note 36; *Population Total*, WORLD BANK, http://data.worldbank.org/indicator/SP.POP.TOTL [https://perma.cc/94RJ-EQCU] (last visited Feb. 19, 2017).

39. *See infra* Table 2. Of course, there are other factors affecting broadband adoption such as education and age. *See* George S. Ford et al., *The Frontier of Broadband Adoption Across the OECD: A Comparison of Performance*, 25 INT'L ECON. J. 111 (2011).

40. *See infra* Table 2.

41. *Id.*

42. *Id.*

Table 2. Fixed and Mobile Internet Penetration in the Twenty Largest Countries (2014)

Country	Pop. (mil.)	Broadband Connections per 100 Households	Mobile Connections per 100 Persons	Pop. with Access to Modern Plumbing (%)	GDP per Capita (US$)
China	1,364	42.54	92.27	86.6	7,590
India	1,295	5.81	74.48	62.6	1,582
U.S.	319	77.71	98.41	100.0	54,629
Indonesia	254	5.09	126.18	72.3	3,492
Brazil	206	35.50	138.95	88.0	11,384
Pakistan	185	6.06	73.33	83.1	1,317
Nigeria	177	0.04	77.84	32.8	3,203
Bangladesh	159	4.21	75.92	57.7	1,087
Russia	144	43.06	155.14	77.0	12,736
Japan	127	70.19	120.23	100.0	36,194
Mexico	125	43.16	82.54	88.0	10,326
Philippines	99	82.67	111.22	77.9	2,873
Ethiopia	97	1.16	31.59	27.2	574
Vietnam	91	20.40	147.11	94.4	2,052
Egypt	90	12.62	114.31	96.8	3,199
Germany	81	69.55	120.42	99.3	47,822
Iran	78	22.99	87.79	92.8	5,443
Turkey	76	44.51	94.79	98.3	10,515
DR Congo	75	0.01	53.49	28.5	442
Thailand	68	24.72	144.44	89.9	5,977

Source: *see supra* note 38 and accompanying text.

Table 2 suggests that mobile connectivity is likely to be the dominant form of access to broadband, especially in less developed nations.[43] In Indonesia, for example, about 5% of households had fixed-line access in 2014 while there were more cellular connections than people (1.26 phones per person).[44] In India, while only 5.81% of persons had a fixed broadband connection in 2014, about 75% of the population had mobile phone service.[45] Similarly, in the Democratic Republic of the Congo, there was almost no fixed-line adoption but just above half of its population had a mobile phone.[46] Most countries, in fact, had higher adoption rates for mobile than fixed services. The relatively high penetration of mobile telephones per person suggests that mobile broadband is likely to be a much easier transition for the less developed countries than would be fixed broadband. Successful adoption

43. *Id.*

44. The statement is a bit loose as we ignore the possibility of multiple mobile broadband connections per person. *See supra* Table 2.

45. *See supra* Table 2.

46. *See supra* Table 2.

programs for less-developed economies, therefore, will likely be targeted to mobile broadband.

From a global perspective, there is much work to do. Some of the world's most populous nations are far behind in the adoption of Internet technology.[47] Given the profound lack of Internet use and challenging economic conditions, expanding broadband adoption in less-developed nations could prove difficult and expensive for governments.[48] Each country will likely face its own challenges. Public policies in one country may not transfer well to others due to very low incomes, high deployment costs, or just a lack of economic infrastructure. Certainly, policy concerns in the United States, Japan, and Germany may not be well-suited, for instance, in India and the Philippines. As illustrated in Table 2, some countries still struggle to provide basic infrastructure services like modern plumbing.[49] On the supply side, public policy must maintain or enhance financial incentives for private actors, not destroy them.[50] On the demand side, policies must address limited digital literacy and awareness, a lack of relevance and attractiveness, and affordability.[51] What is clear is that an effective policy to increase broadband adoption must address some or, ideally, all of these supply- and demand-side concerns, and these conditions vary widely.

III. A MODEL OF BROADBAND ADOPTION

Where awareness, digital literacy, and affordability concerns are severe, as they are for many of the world's most populous countries, offering an online experience for free obviously has great potential for addressing adoption shortages. Free service, however, does nothing to address the financial needs of network providers. Why then, do we see private-sector programs, like Free Basics, that offer free access to basic online services? What are the consumer implications of such offerings? And, what motivates the design of such programs? To answer these important questions, we now turn to an economic analysis of private-sector incentives to implement a program to encourage broadband adoption by offering free (or low-cost) connectivity.[52]

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47. *See supra* Table 2 (China and India).

48. *See, e.g.*, SPRAGUE ET AL., *supra* note 3, at 49.

49. *See supra* Table 2.

50. *See* George S. Ford, *Is the FCC's Regulatory Revival Deterring Infrastructure Investment?*, BLOOMBERG: BNA (Nov. 13, 2015), https://www.bna.com/fccs-regulatory-revival-n57982063711/ [https://perma.cc/S5N8-X23Y]; Ford et al., *supra* note 4, at 367.

51. *See, e.g.*, TIM KELLY & CARLO M. ROSSOTTO, WORLD BANK, BROADBAND STRATEGIES HANDBOOK 247–89 (2012), https://openknowledge.worldbank.org/handle/10986/6009 [https://perma.cc/R5GN-CZ5H].

52. Often, these "free-but-limited" models are lumped in with "zero rating" or "free data" plans, in which data arriving from certain content providers is not counted against a carrier's data cap. While such "free data" plans can also be socially beneficial, these "free data" programs are not the same as the "free-but-limited" programs we discuss herein. *See generally, e.g.*, WILLIAM P. ROGERSON, CTIA, THE ECONOMICS OF DATA CAPS AND FREE DATA SERVICES IN MOBILE BROADBAND (2016), http://www.ctia.org/docs/default-source/default-document-library/081716-rogerson-free-data-white-paper.pdf [https://perma.cc/TPY3-LM2E];

As previously noted, an individual's demand for broadband service differs along many dimensions, but the key factors determining whether broadband is used or not include: (a) awareness of the Internet's value; (b) digital literacy, or the skills and abilities necessary to use broadband technology; and (c) affordability concerns, which may relate to income differences.[53] In the interest of keeping our scenario simple, but informative, we imagine that there are two types of consumers for broadband access services—those that are aware, literate, and have a "high demand" (*H*) and those that are neither aware nor literate and thus have a "low demand" (*L*) for broadband service. More formally, the *H* buyers have a higher willingness to pay for broadband than the *L* buyers at all quality levels, and they have a higher *marginal* willingness to pay for quality improvements.

On the supply side, we assume, for convenience and to comport with earlier research on this topic, that there is a single seller of broadband service.[54] This seller is able to affect the quality of the services it sells, where quality is regarded as a vertical feature of service; that is, all buyers prefer a higher to a lower quality.[55] Quality is costly, of course, and the firm is permitted to set the prices and qualities of service free of direct regulation.

In this setting, the seller faces the challenge of designing service offerings to maximize its profits. In particular, given the two types of consumers, the seller faces the challenge of deciding whether to offer a single type of service, or two different types, each tailored for the different customer types. That is, should the seller offer a lower-quality, lower-priced service to the type *L* customers? The fundamental problem for the seller is that the *H* buyers will be sorely tempted by the lower-priced offering the seller intends for the *L* customers, thereby costing the seller some of its paying customers. In a seminal paper from 1978, Michael Mussa and Sherwin Rosen show that the solution to this problem—absent some effective mechanism (e.g., income or age certification) by which to prohibit defection—is to reduce the quality (and price) of the offering intended for the *L* buyers in the proper manner, so

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MULTICULTURAL MEDIA, TELECOM & INTERNET COUNCIL, UNDERSTANDING AND APPRECIATING ZERO-RATING: THE USE AND IMPACT OF FREE DATA IN THE MOBILE BROADBAND SECTOR (2016), http://mmtconline.org/WhitePapers/MMTC_Zero_Rating_Impact_on_Consumers_May2016.pdf [https://perma.cc/HW7H-35J3].

53. *See* SPRAGUE ET AL., *supra* note 3, at 35–38.

54. A benchmark model of quality choice is Michael Mussa & Sherwin Rosen, *Monopoly and Product Quality*, 18 J. ECON. THEORY 301 (1978). Monopoly supply is not very common in these markets, especially in mobile broadband service where competition exists even in many less-developed countries. Bhuma Shrivastava, *India Mobile Phone Subscribers Cross 1 Billion, Shows TRIA Data*, LIVEMINT (Dec. 30, 2015, 9:28 PM IST), http://www.livemint.com/Industry/2z7rdOSjNYi6cJShRUDvaL/India-mobile-phone-subscribers-cross-1-billion-shows-Trai-d.html [https://perma.cc/QS7Y-BY59]. Also, in assuming monopoly, the effects on consumers of the firm's profit-maximizing decisions can be evaluated in a setting where market power is present.

55. With vertical differentiation, all consumers prefer one type at equal prices. With horizontal product differentiation, consumers may prefer different types if all prices are the same. CLEMENT G. KROUSE, THEORY OF INDUSTRIAL ECONOMICS 170–71 (1990).

as to achieve market *separation* through the self-interested behavior of buyers.[56]

Our model is not merely a restatement of Mussa and Rosen, however, though their results are very informative. To this now-standard model of quality choice we incorporate two additional nuances relevant to broadband adoption. First, we add a type of network effects to the model by permitting the broadband consumer's utility to rise with the number of broadband users. Second, to account for the claim that *awareness* and *literacy* are barriers to broadband adoption, we allow for an experience with Internet service to change some type *L* customers into type *H* customers. That is, a nonpaying customer of a low-quality service may become a paying customer of a high-quality service as a result of the experience with the low-quality service.

A. Choosing the Number of Quality Tiers

Suppose that the two types of consumers (*H*, *L*) have equal unit masses: N_L, $N_H \in \{0, 1\}$.[57] Hence, N_L would equal one if the low-type consumers purchase broadband service and N_L would equal zero if they did not purchase any service (the good is either purchased or it is not; quantity does not vary for purchases). The same is true for N_H, or the high-type consumers. Recall that the high-type consumers place a larger valuation on quality compared to low-type consumers. Consumers must also obtain a piece of equipment to use broadband service, and we assume that both types of consumers use the same equipment (at least, we assume the equipment costs the same). Specifically, we assume the following expressions for consumer utility:

$$U_L = (N_L + N_H) + Q - (P + 3), \text{ and} \tag{1}$$

$$U_H = (N_L + N_H) + 2Q - (P + 3), \tag{2}$$

where *Q* denotes the quality of service, *P* denotes the price of service, and we assume hardware devices cost three (3) units merely to calibrate the example. Looking at Equation (1), we see that the "utility" or satisfaction derived by the *L*-type customer is equal to the number of users ($N_L + N_H$) plus the quality of the service (*Q*) less the price paid for the service and the equipment required to use it ($P + 3$). Also, in keeping with the awareness issue, notice that type *H* customers value quality twice as much as type *L* customers ($2Q$ rather than just *Q*) and that both types of consumers experience a positive network effect from having other consumers using broadband service (utility is a function of both types of *N*). To complete the setup, we assume a very simple quadratic cost function of providing a given quality of service per unit of consumer mass:

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56. *See* Mussa & Rosen, *supra* note 54, at 305–06. Our model does not directly address programs like Comcast's Internet Essentials or subsidy programs like the Lifeline program in the United States since both have income qualifications.

57. We will simplify the proceedings by assuming that the numbers of *H* and *L* customers are equal, although this is probably an excessive simplification.

$$C = \frac{1}{2}(Q^2 - 1). \quad (3)$$

Again, purely for convenience, we calibrate the cost of a single quality unit to zero.

In light of the two customer types, the service provider faces an important and consequential choice: should it offer one service contract or two of different qualities? If it offers a single contract, then this contract will appeal either to only the *H* buyers or else to both *H* and *L* types (the contract could appeal to nobody, but we ignore this case). Therefore, the real issue is whether the firm is better off attracting both types or only those with a high demand for broadband. To attract both types, the firm must select price and quality so that the welfare U_L in Equation (1) is nonnegative. As further inspection shows, any contract that does this will automatically attract the higher income buyers (due the higher valuation of quality). Alternatively, the firm could ignore the *L* buyers and simply design an offering to maximize its profits from the type *H* customers. In this latter case, higher prices and quality would presumably be offered, at the cost of foreclosing the network to the type *L* consumers.

To solve the firm's problem, it is useful first to solve the simpler problem: what if the firm could offer specific services to each group and did not have to worry about the type *H* buyers selecting the lower priced service intended for the *L* types? This scenario would be ideal from the firm's perspective, but is often not feasible in reality without some effective mechanism by which to keep the two types separate.[58] Still, the analysis is important.

So, suppose the firm was dealing with each of the two consumer types in isolation. Assuming reservation utilities are uniformly zero (a consumer gets zero utility if the service is not purchased), the firm would raise prices until the reservation utilities were exactly met:

$$P_L = Q_L + (N_L + N_H) - 3, \text{ and} \quad (4)$$

$$P_H = 2Q_H + (N_L + N_H) - 3. \quad (5)$$

The profit rate per market segment would be:

$$(P_L - C_L) = Q_L - \tfrac{1}{2}(Q_L^2 - 1) + (N_L + N_H) - 3, \text{ and} \quad (6)$$

$$(P_H - C_H) = 2Q_H - \tfrac{1}{2}(Q_H^2 - 1) + (N_L + N_H) - 3. \quad (7)$$

58. Comcast's Internet Essentials program accomplishes such a division (and forecloses arbitrage) by offering a discounted broadband program only to families with at least one child who qualifies for the National School Lunch Program (among other requirements). *Cf. Application*, INTERNET ESSENTIALS, https://apply.internetessentials.com [https://perma.cc/GM6H-M7PA] (last visited Feb. 15, 2017).

The simple quadratic structure in quality immediately implies that the profit-maximizing level of quality for the two types in isolation are: $Q_L^* = 1$ and $Q_H^* = 2$, which renders margins of zero for *L*-type and 1.5 for *H*-type consumers if both types buy the service. Notice that if the *H* types do not purchase service ($N_H = 0$), then the *L* types could only be served at a loss (negative price): by Equation (4), the price is −1.0. But, if the *H* types are in the market, then the network externality is sufficient to allow the low types to be served at break-even (at zero price for a free, low-quality service). Hence, if the firm is restricted to only one quality level of service, then the low-type consumers will be priced out of the market ($N_L = 0$) and the firm will set $Q^* = Q_H^* = 2$ and $P^* = 2$. This results in a profit for the firm of 0.5 and zero consumer surplus (the latter is an artifact of the specification).

Next, suppose the firm is allowed to offer two quality levels and thus potentially serve both customer types. From above we see that the best the firm can do with *L*-type consumers is to simply give away a very basic level of service, $Q_L^* = 1$ and $P_L^* = 0$. If an *H*-type consumer were to consume that basic free service, then they would receive one unit of utility: $U_H = (1 + 1) + 2 – (0 + 3) = 1$. Hence, the best the firm would be able to achieve with the *H*-types is $Q_H^* = 2$ and $P_H^* = 2$. The firm cannot extract a higher price from the *H*-types because they would switch to the free, low-quality service at any price above 2 units, as the low-quality service acts as a type of competitor to the high-quality service. The firm will once again make a half-unit of profit from the high types. However, the *H*-types will now earn one unit of consumer surplus due to the increased network effect from the presence of the *L*-types are on the network ($N_L = 1$, $N_H = 1$). Consumers as a whole would clearly prefer two quality tiers because surplus is higher, but the firm would be indifferent in terms of profits between the single-quality regime and the two-quality regime.

To summarize, we may say that the sale of a reduced-price, lower "quality" service can improve social welfare, even when we restrict our attention solely to the consumer surplus analysis and ignore the probable additional social benefits (i.e., external effects) of a more connected society. The crucial issue, though, is that the ability of the firm to do this depends on its ability to offer differentiated services, one with higher prices and quality, and the other basic service with a low or zero price. This limitation is, in fact, crucial: *the seller does not offer a basic service out of any animus toward the low income or inexperienced consumers. Rather, the purpose of the differentiation is to dissuade the rich and/or experienced from buying what is intended for the poor and/or inexperienced.* If regulations mean that differentiated services cannot be offered, then the seller is deprived of the ability to introduce quality differentials to support expansion of service to the lower end of the market. A prohibition on the free, basic service leaves only the high-value customer being served, which reduces consumer surplus and could lead to higher prices for those that do subscribe.

B. Awareness, Literacy, and Promotion

Of course, there are other incentives the seller may have to offer a free basic service that are not included in the example above. Even putting aside the charitable impulse (i.e., in the analysis above, the seller is indifferent between selling to both or to just the high types), it is quite plausible that a seller might wish to engage in a form of "introductory pricing" in order to overcome resistance born of unfamiliarity with online access. In developing economies, where adoption rates remain very low, this sort of unfamiliarity seems likely for large blocks of potential users.[59] From the firm's point of view, these users may transition to full-service accounts once they experience the benefits of service introduced by the free offering.[60] Indeed, evidence from Facebook's Free Basics program indicates that about 50% of Free Basics users upgrade to a paid data plan in the first month.[61]

This is a simple argument and can be illustrated by the model using a simple modification. Suppose a fraction θ of the *L*-type consumers quickly experience an "acquired taste" once exposed to broadband service and their quality valuation rises to become identical to that of an *H*-type consumer. In this case, the firm would strictly prefer (just like consumers) the two-quality regime as profits would be $(1+\theta)/2$ instead of just one-half unit under the single-quality regime (under which the *L* types are never exposed because they are priced out of the market). In other words, if there exists any introductory benefit of the sort contemplated here, then it works in the same direction, incentive-wise, as suggested in the example. In particular, it is often the case that introductory offers for websites, software, and memberships for clubs or organizations offer a less-than-complete menu of services.[62] For the reasons exposed in the analysis above, the purpose of a free and basic version of a product (or a trial that expires) is to make it low risk for the potential

59. *See Internet Access Limited in the Developing World*, PHYS.ORG (Feb. 26, 2015), http://phys.org/news/2015-02-internet-access-limited-world.html [https://perma.cc/8PMV-EBNE] ("People [in the developing world] aren't using the Internet because they're not aware of the Internet, there is insufficient content available in their primary language, or they can't read or understand content that is.").

60. *See* Vishal Mathur, *Facebook Free Basics: Moral Conundrum Overshadows Benefit Aspect*, LIVEMINT (Dec. 29, 2015, 11:13 AM IST), http://www.livemint.com/Consumer/a5r6BLvsCWBF6HaMOa1eCP/Facebook-Free-Basics-Moral-conundrum-overshadows-benefit-as.html [https://perma.cc/2ZFL-Y52W].

61. *See Free Basics: Myths and Facts*, INTERNET.ORG (Nov. 19, 2015), https://info.internet.org/en/2015/11/19/internet-org-myths-and-facts [https://perma.cc/D6YD-W5BU] ("50% of people who use Free Basics are paying for data—and access the internet outside of free basic services—within 30 days of coming online for the first time."); Mathur, *supra* note 60 ("Within a month, 50% of people who started their journey with Free Basics are paying for the entire Internet. Only single digit percentages of people are only on Free Basics after that month.").

62. *See Free Basics: Myths and Facts*, *supra* note 61.

buyer to examine the service, not to provide a service in competition with the standard offering.[63]

C. Summary

The analysis presented above demonstrates why a private-sector firm would offer a free online service, and why the quality of the free service must be below that of the standard market offering. Given the zero price, the seller must sufficiently reduce the capabilities of the zero-price plan to discourage defection by the paying customers who ensure the financial viability of the network.[64] Due to the network effect, consumer benefit from the expanded adoption as more consumers get online.[65] Thus, the program is good for consumers, and certainly good for society as a whole (especially given external effects).[66] The seller is indifferent unless some of the *L*-type consumers, as a consequence of their experience, eventually buy the higher quality service.[67] Evidence suggests that they do, thereby providing the profit motive for the program.[68]

Criticism of such programs, due largely to the limited capabilities of the free service, do not appear to have much merit. We stress, however, that the example described here is an extremely simple one, and it is not intended to establish any particular policy beyond the most obvious and prudent: before such programs are criticized or even banned, it is sensible to examine the circumstances under discussion rather than rely on ideological principle. It seems likely that naked prohibitions against "free-but-limited" access services will prohibit firms from offering very low-cost services to address the awareness, literacy, and affordability barriers to Internet adoption.[69] If all customers are required to have services fully equal in quality to the standard fare, then the zero-price offerings would attract high-demand users, rendering the entire exercise unprofitable in the extreme.[70] Thus, efforts to impede such programs will lead to a lack of Internet access for the least aware and poorest customers, an outcome with no apparent benefits.[71]

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63. *See* Comments of Verizon and Verizon Wireless at Exhibit 1, Framework for Broadband Internet Service, GN 10-127 (July 15, 2014), https://ecfsapi.fcc.gov/file/7521507614.pdf [https://perma.cc/UJE7-8E2M].

64. *See* Mussa & Rosen, *supra* note 54, at 305–06.

65. *See* Michael L. Katz & Carl Shapiro, *Systems Competition and Network Effects*, 8 J. ECON. PERSPECTIVES 93, 94 (1994).

66. *Id*.

67. *See* Mussa & Rosen, *supra* note 54, at 305.

68. *See* Mathur, *supra* note 60.

69. *See generally Free Basics: Myths and Facts*, *supra* note 61.

70. *Id*.

71. *See* Mike Godwin, *Facebook's Basic Instincts*, SLATE (Sep. 30, 2015, 12:17 PM), http://www.slate.com/articles/technology/future_tense/2015/09/facebook_s_internet_org_is_now_free_basics_and_critics_should_love_it.html [https://perma.cc/6FAM-DQQ4].

IV. ADDITIONAL WAYS "FREE-BUT-LIMITED" ACCESS ENCOURAGES ADOPTION

Our foregoing analysis shows how deeply-discounted or even free access to the Internet can address the barriers to Internet adoption while also being profitable for private companies to offer. Availability of a steeply discounted, lower "quality" service is shown to increase consumer surplus and improve social welfare more generally.[72] In terms of economic analysis, the analysis presented above represents a necessary first step in understanding the fundamental economics of adoption programs like Facebook's Free Basics.

There are, of course, other mechanisms by which adoption programs may influence Internet use and economic well-being. We address two here with some formality. First, we demonstrate how such programs can increase adoption by "smoothing" Internet consumption over time, increasing the present value of use and thereby increases incentives for non-users to make a commitment to the technology. Second, and related somewhat to the former, we provide econometric evidence showing that "free-but-limited" programs can provide a type of "connectivity insurance," keeping consumers subscribed to communications services during periods of financial distress.

A. Increasing Adoption by Ensuring Continuous Access

In a community where electricity is only intermittently available, consumers may still be interested in air conditioning, televisions, and lamps; however, it probably would not make much sense to invest in, say, a chest freezer. Video entertainment is not a perishable product, but any investment in foods that require freezing would be wasted at the next outage. In the same way, if consumers feel that their Internet connectivity and access to basic services could be interrupted in the future (at least, for an extended period), then their willingness to make a commitment to Internet technology may be diminished, other things constant.

We need look no further than to decades-old models of telephone adoption for a theoretical analysis of this problem.[73] A concise summary of this theoretical work is as follows. Consumer must pay some positive price to obtain access to the communications network (r), and once access is obtained, the consumer will communicate q messages at a per-message price of p. The net benefit to the consumer of using the communications network is the value from consuming the q messages less the price paid for them (pq). If the present value of usage (S) over the relevant future period exceeds the access

72. *See* Greenstein & McDevitt, *supra* note 36, at 1.

73. *See* LESTER D. TAYLOR, TELECOMMUNICATIONS DEMAND IN THEORY AND PRACTICE ch. 2 (1993); *see also* Roland Artle & Christian Averous, *The Telephone System as a Public Good: Static and Dynamic Aspects*, 4 BELL J. ECON. & MGMT. SCI. 89 (1973); Jeffrey Rolphs, *A Theory of Interdependent Demand for a Communications Service*, 5 ECON. & MGMT SCI. 16 (1974).

price *r*, then the consumer subscribes to the system (when $S > r$), otherwise the consumer does not subscribe.

While we do not formalize an extension of the access model to fit Internet adoption and interruptible service, the results of such an analysis are not terribly difficult to predict. If the service could be interrupted in the future (e.g., a negative income shock makes it unaffordable), then the consumer will perceive the system to be of less value because fewer messages can be sent.[74] Other things constant, a positive expectation of interrupted service reduces the incentive of a consumer to purchase access.

Practically, it is not difficult to see how such a framework applies with even greater effect to Internet adoption. When a consumer begins using the Internet, the communications applications adopted by the consumer (i.e., email, Facebook, Skype, and so forth) become a contact point recognized by other users. For instance, an email address may be the chosen modality of communications between a job applicant and the potential or actual employer.[75] If the applicant lost connectivity, even for a short interval, then important communications may be missed (some forms of communications are "perishable"). Therefore, uncertain access poses a risk to the commitment to use the Internet as a primary communications modality, which is a key source of value from Internet use. If so, non-Internet-based communications modalities may be preferred. By offering connectivity to basic services at a zero price, adoption programs like Free Basics (and other discounted, limited service options) maintain, in large part, the integrity of the communications modality and the future stream of net benefits from access, thereby encouraging adoption.

B. Adoption Programs as Connectivity Insurance

Globalization and technology have made economic activity across the globe very volatile. Nearly every country has experienced economic stress, with a global recession in 2008 and continued struggles in many countries.[76] These economic downturns lead to higher unemployment and greater

74. In the information systems community, the Technology Acceptance Model (TAM) is used to predict consumer usage of a technology based on the broad categories of "perceived usefulness" and "perceived ease of use," two concepts that essentially boil down to a cost-benefit analysis based on objective and subjective effort. *See, e.g.*, Fred D. Davis, *Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology*, 13 MIS Q. 319 (1989); Viswanath Venkatech & Fred D. Davis, *A Model of the Antecedents of Perceived Ease of Use: Development and Test*, 27 DECISION SCI. 451 (1996); Viswanath Venkatech & Fred D. Davis, *A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies*, 46 MGMT. SCI. 186 (2000).

75. *See* John Zappe, *Most Workers Get Emails in Off-Hours from Bosses Who Expect a Reply*, TLNT (June 24, 2011), https://www.eremedia.com/tlnt/most-workers-get-emails-in-off-hours-from-bosses-who-expect-a-reply/ [https://perma.cc/4KGU-664K].

76. Chris Giles, *Global Economic Recovery "In Danger of Stalling,"* FIN. TIMES (Apr. 10, 2016), https://www.ft.com/content/fae7a696-fd73-11e5-b3f6-11d5706b613b [https://perma.cc/V75Y-9LFU].

poverty.[77] At the same time, finding employment and new business opportunities is increasingly dependent on Internet connectivity.[78] When unemployment hits, however, paying for an Internet connection becomes difficult, and many subscribers are forced to abandon the service. Having an option for low-cost or free online access to basic services, even if with limited capabilities, softens the blow and provides for economic opportunity during periods of economic stress. Such programs provide a type of "connectivity insurance," ensuring that financial stress does not persist as long or as deeply as it might without any connectivity.[79]

Is there any evidence to support such a role for these programs? In the United States, the federal and some state governments' Lifeline program offers financial support for low-income households in the form of a monthly subsidy for the purchase of wireline or mobile wireless telephone services (but not both).[80] Whether or not these programs provide a type of "connectivity insurance" can be determined by evaluating the relationship between the use of such programs and periods of financial distress. To do so, we gathered annual data on state-level subscriptions (per capita) to such programs over the period 1998 through 2014 as well as data on state-level unemployment and poverty rates.[81] Using time-series econometric techniques, we then test whether subscriptions rise during periods of financial stress.

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77. *See* JOHN IRONS, ECON. POL'Y INST., ECONOMIC SCARRING: THE LONG TERM IMPACTS OF THE RECESSION (2009), https://secure.epi.org/files/page/-/img/110209scarring.pdf [https://perma.cc/3Z7Q-2JZG].

78. AARON SMITH, PEW RESEARCH CTR., SEARCHING FOR WORK IN THE DIGITAL ERA (2015), http://www.pewinternet.org/files/2015/11/PI_2015-11-19-Internet-and-Job-Seeking_FINAL.pdf [https://perma.cc/LQ46-FVSV]; T. Randolph Beard et al., *Internet Use and Job Search*, 36 TELECOMM. POL'Y 260, 270 (2012).

79. *See* Univ. of Colo. Denver, *Looking for Job on Internet Reduces Unemployment Time, Study Finds; Better Job Boards, Technology Benefit Job Seekers*, SCIENCE DAILY (Nov. 28, 2011), https://www.sciencedaily.com/releases/2011/10/111005111406.htm [https://perma.cc/DA82-JP4F].

80. At present, the Lifeline program provides a $9.25 monthly subsidy for eligible low-income families for either wireline or wireless services. *Lifeline Support for Affordable Communications*, FCC, https://www.fcc.gov/consumers/guides/lifeline-support-affordable-communications [https://perma.cc/4G9D-ZTZX] (last visited Feb. 15, 2017); *see* Lifeline and Link Up Reform and Modernization, *Third Report and Order, Further Report and Order, and Order on Reconsideration*, 31 FCC Rcd 3962 (2016); *see generally Universal Service*, FCC, https://www.fcc.gov/general/universal-service [https://perma.cc/323D-X3J5] (last visited Feb. 15, 2017).

81. Alaska is excluded for lack of subscription data for some years. Subscription data is available at *2015 Monitoring Report: Supplementary Material*, FCC, https://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/Monitor/2015_MR_Supplementary_Material.zip [https://perma.cc/5DFT-AZKS] (last visited Feb. 15, 2017); state unemployment data is available at *Annual Unemployment Rates by State*, IOWA ST. UNIV., http://www.icip.iastate.edu/tables/employment/unemployment-states [https://perma.cc/D44N-DKJN]; population and poverty data is available at *Table 21: Number of Poor and Poverty Rate, by State*, U.S. CENSUS BUREAU, http://www2.census.gov/programs-surveys/cps/tables/time-series/historical-poverty-people/hstpov21.xls [https://perma.cc/PT2C-RXEL] (last visited Feb. 15, 2017).

The econometric model is quite sophisticated and the full details are beyond the scope of this paper.[82] Our procedure involves the use of principal components to estimate a common latent component of subscriptions as well as idiosyncratic components analysis (dynamic factor analysis) for each state. The technique is likewise applied to the data on unemployment and poverty. A bivariate vector autoregressive model is then used to study the dynamic adjustment of subscriptions in response to structural shocks to the unemployment and poverty variables. We found a substantial degree of heterogeneity across states in the estimated factor loading coefficients, a likely consequence of variations in state programs that implement the Lifeline program. The common component for the poverty and unemployment rates and associated factor loading coefficients are more homogenous, and the dynamics are closely associated with the recent financial crises in 2001 and 2008.

While the analysis is rich in implications, our interest primarily relates to the response of Lifeline subscriptions to unemployment and poverty shocks. Such responses are computed using Impulse Response Functions for a 1% structural shock to the unemployment and poverty common components. We found the responses to be robust to different lag structures. Though we obtained qualitatively similar results using the unemployment and poverty common components, we note that the results for unemployment are weaker than those with the poverty rate. The Impulse Response Functions indicate that for a 1% shock to the poverty component, the subscription component increases by 0.6% on impact, then increase by over 1% in about two years. The responses are statistically significant based on the one standard deviation confidence bands of the responses computed using 500 bootstrap replications. For a 1% shock to unemployment, the subscription component rises by about 0.2% on impact, then increases by over 0.6% in about two years. The response is also statistically significant. These results suggest that the use of programs targeted at low-income households is responsive to changes in unemployment and poverty rates. The Lifeline program appears to provide a type of "connectivity insurance" to American households experiencing financial distress.

While there is insufficient data to assess the details, we suspect a program like Free Basics would be even more effective in providing broadband "connectivity insurance." The Lifeline program requires households to certify eligibility, which is not an easy task for many low-income households. In contrast, Free Basics is available through participating operators to everyone.[83] Additionally, government programs have faced a significant amount of concern over fraud and abuse,[84] concepts that have no meaning for programs such as Free Basics. Government programs such as

82. Additional details may be requested from the authors.

83. *See Free Basics by Facebook*, *supra* note 8.

84. *See, e.g.*, Total Call Mobile, Inc., *Notice of Apparent Liability for Forfeiture and Order*, 31 FCC Rcd 4191 (2016).

Lifeline have also been subject to a great deal of political hostility.[85] For each subscriber, the subsidies are also quite small (about $9.25 per line), forcing many of its users to pay positive prices for services.[86] Free Basics is free and enables users to experience the benefits of being online, thereby promoting the adoption of higher-quality data services. Unlike Lifeline and other government programs, private-sector programs have no budgetary consequence for government and thus avoid most, but not all, political interference and related complications.

Although the Lifeline program is in the early stages of expanding to subsidize broadband service, this effort has illustrated all of the inherent problems with public sector administration that private companies can avoid. The FCC's March 2016 decision to expand Lifeline to broadband was fraught with political contention, and the December 2016 roll-out has been hindered by pricing difficulties and major carriers opting out of participation.[87]

V. CONCLUSION

Getting the world online is no easy task. Building and maintaining broadband networks is a tremendously expensive endeavor; and even where networks are built, they provide less benefit if vast swaths of the Earth's population do not see any value in using them. Research indicates that awareness, digital literacy, and affordability are the key barriers to adoption.[88] A successful adoption program, whether implemented by the public or private sector, must expose non-users to the benefits of being online and do so at low prices (or even free). While some governments have attempted to spur deployment and adoption, the public sector operates with limited resources, particularly in developing economies.[89] Recently, private sector programs have been deployed to provide consumers with broadband access at low prices. For example, Facebook's Free Basics program offers users free access to basic online services in order to help address the awareness and affordability barriers to broadband adoption. Evidence from that program indicates that many users of the free service quickly upgrade to market-priced Internet services, a consequence of overcoming the awareness barrier.

Why do private firms offer free services? While altruism may certainly be a key motivator, our study also shows how these programs can be profitable to providers under plausible conditions. Specifically, the free, basic

85. *See, e.g.*, Charles C. W. Cooke, *Lifeline: A Corporate Boon*, NAT'L REV. (July 23, 2013, 2:33 PM), http://www.nationalreview.com/corner/354219/lifeline-corporate-boon-charles-c-w-cooke [https://perma.cc/BX28-553N].

86. *Chairman Wheeler and Commissioner Clyburn Propose Rules to Modernize Lifeline Program to Provide Affordable Broadband for Low-Income Americans*, FCC (Mar. 8, 2016), https://apps.fcc.gov/edocs_public/attachmatch/DOC-338113A1.pdf [https://perma.cc/JBU3-N4PM].

87. Joan Engebretson, *Lifeline Broadband Problems: Big Carriers Opt Out, Rural Carriers Struggle with Pricing*, TELECOMPETITOR (Dec. 19, 2016, 12:49 PM), http://www.telecompetitor.com/lifeline-broadband-problems-big-carriers-opt-out-rural-carriers-struggle-with-pricing/ [https://perma.cc/7T4U-ET7X].

88. *See* SPRAGUE ET AL., *supra* note 3, at 39–41.

89. *See supra* Table 2.

services must be sufficiently different from market-priced services to prevent higher-income users with more broadband experience from defecting to the basic service of the higher income, more experienced users. Absent the ability to freely set the "quality" of the free service, consumers with low demand, either due to a lack of awareness or income, will not be served. With a two-tier program, however, all types of consumers can experience the benefits of online access services, increasing consumer surplus and infrastructure investment.

Such programs also serve as a basic level of connectivity for consumers experiencing financial distress, rendering them unable to pay for market-priced services. We demonstrate that non-users may be reluctant to adopt the Internet for fear of service interruption, perhaps fearing a negative income shock that renders service unaffordable in the future. For example, using email as a primary communications modality is risky if messages cannot be received when service is not available. "Free-but-limited" services can thus increase adoption by "smoothing" Internet consumption over time, increasing the present value of Internet access for users. We also offer some new econometric evidence that these programs may serve as a type of "connectivity insurance." Using subscriptions from the Lifeline program in the United States, we find that the use of the subsidy program rises with increases in unemployment and poverty. We suspect that private programs such as Facebook's Free Basics may even be more effective than public programs, since the private programs are not directly influenced by political concerns and are available through participating operators to everyone for free without eligibility criteria.

Grabbing the Wheel Early: Moving Forward on Cybersecurity and Privacy Protections for Driverless Cars

Chasel Lee *

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I. INTRODUCTION

On October 9, 2010, the *New York Times* revealed that Google had been secretly testing driverless cars for almost a year.[1] This project, consisting mainly of modified Toyota Priuses, had already logged over 140,000 miles.[2] Resembling the company's Street View cars, seven prototypes had been twisting through San Francisco's steep and curvy Lombard Street, traversing the streets of the company's suburban hometown of Mountain View, and speeding down scenic Highway 1 to Los Angeles over 400 miles away.[3] The cars detected and announced upcoming crosswalks, could be driven cautiously or aggressively at the occupant's discretion, and had several mechanisms for the occupant to take manual control.[4]

While the driverless car concept has been tested since the 1920s with varying levels of success, news of Google's foray into autonomous vehicles electrified the world.[5] With the concept reintroduced into the popular consciousness, public and industry interest in driverless cars has grown immensely and allowed autonomous vehicles to gain mainstream traction. Since the *New York Times* article was published, Google has added more features, the vehicles have ventured farther, and the prototypes have been tested by various audiences, including the blind.[6] Hoping to grab a head start in this nascent market and garner publicity, traditional car companies such as Toyota and Audi have joined the fray by developing driverless car prototypes and incorporating automated parking functions into existing cars.[7] Tesla has also contributed its own innovations, such as transforming traditional human-controlled vehicles to autonomous cars simply via software updates to the car's onboard computers.[8] The company has already begun testing full-fledged self-driving cars in California and elsewhere since late 2016.[9]

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1. John Markoff, *Google Cars Drive Themselves, in Traffic*, N.Y. TIMES (Oct. 9, 2010), http://www.nytimes.com/2010/10/10/science/10google.html [https://perma.cc/U8EQ-DYZU].

2. *See id*.

3. *See id*.

4. *See id*.

5. *See* Emma Poole, *Navigating Driverless Cars*, WIPO MAG. (Dec. 2014), http://www.wipo.int/wipo_magazine/en/2014/06/article_0003.html [https://perma.cc/ZWS6-YRTD].

6. *See* Angela Moscaritolo, *Google's Self-Driving Car Takes Blind Man for a Ride*, PC MAG. (Mar. 29, 2012, 1:12 PM EST), http://www.pcmag.com/article2/0,2817,2402340,00.asp [https://perma.cc/TT92-4H3V].

7. Ian Scherr & Mike Ramsey, *Toyota, Audi Move Closer to Driverless Cars*, WALL ST. J. (Jan. 3, 2013, 10:17 PM ET), http://www.wsj.com/articles/SB10001424127887323374504578220081249592640 [https://perma.cc/B29M-46S6].

8. Ken Yeung, *Tesla Launches Its Long-Awaited Driverless Car Update in Beta*, VENTUREBEAT (Oct. 14, 2015, 2:21 PM), http://venturebeat.com/2015/10/14/tesla-launches-its-long-awaited-driverless-car-update-in-beta/ [https://perma.cc/B8SH-6GPU].

9. Dana Hull, *Tesla Is Testing Self-Driving Cars on California Roads*, WIRED (Feb. 1, 2017, 1:21 PM EST), https://www.bloomberg.com/news/articles/2017-02-01/tesla-is-testing-self-driving-cars-on-california-roads [https://perma.cc/N8XE-P8PN]; Fred Lambert, *Tesla*

Despite the optimistic outlook on the technological development of driverless cars, difficult legal and policy issues lurk in the background and emerge at every turn. For example, the 2010 *New York Times* article noted potential liability concerns between vehicle manufacturers and human passengers in cases of car crashes.[10] Other writers have discussed outdated state laws presuming human control of the car.[11] Additional concerns have turned on safety problems, whether arising from current technological limitations (such as bike lanes or left turns in oncoming traffic), the inability of vehicles to deal with certain weather conditions, and unpredictable driver behavior.[12] Transparency and reporting of malfunctions and other incidents to authorities, especially when crashes occur, have become salient issues.[13] Also, ethics has become a major flashpoint in the driverless car debate, as software programmers must now grapple with situations such as the Trolley Problem,[14] which would now be decided by artificial intelligence and engineer-preset choices rather than human proclivities or simple error.[15]

Driverless cars also raise questions involving cybersecurity and privacy.[16] By their nature, driverless cars must collect and process a substantial amount of data to determine their surroundings, find the best route to a destination, and interact with other vehicles (autonomous or otherwise).[17]

Hints at Testing Self-Driving Car Prototypes Outside of California, ELECTREK (Feb. 6, 2017, 5:27 AM ET), https://electrek.co/2017/02/06/tesla-testing-self-driving-car-prototypes-outside-california/ [https://perma.cc/AY8F-XC9W].

10. Markoff, *supra* note 1.

11. *Id.*; *see* Nathan A. Greenblatt, *Self-Driving Cars Will Be Ready Before Our Laws Are*, IEEE Spectrum (Jan. 19, 2016, 4:00 PM GMT), http://spectrum.ieee.org/transportation/advanced-cars/selfdriving-cars-will-be-ready-before-our-laws-are [https://perma.cc/R9ZR-5NAB].

12. *See, e.g.*, Sam Levin, *Uber Admits to Self-Driving Car "Problem" in Bike Lanes as Safety Concerns Mount*, GUARDIAN (Dec. 19, 2016, 17:42 EST), https://www.theguardian.com/technology/2016/dec/19/uber-self-driving-cars-bike-lanes-safety-san-francisco [https://perma.cc/XJ5A-T33E]; Alex Davies, *Google's Self-Driving Car Causes Its First Crash*, WIRED (Feb. 29, 2016, 2:04 PM), https://www.wired.com/2016/02/googles-self-driving-car-may-caused-first-crash [https://perma.cc/7PJC-MZVV]; Lauren Keating, *The Driverless Car Debate: How Safe Are Autonomous Vehicles?*, TECH TIMES (July 28, 2015, 9:00 AM EDT), http://www.techtimes.com/articles/67253/20150728/driverless-cars-safe.htm [https://perma.cc/73RF-LHEG].

13. *See* Justin Pritchard, *Google Acknowledges 11 Accidents with Its Self-Driving Cars*, ASSOCIATED PRESS (May 12, 2015, 12:46 AM EDT), http://bigstory.ap.org/article/297ef1bfb75847de95d856fb08dc0687/ap-exclusive-self-driving-cars-getting-dinged-california [https://perma.cc/A2C8-SQPK].

14. The Trolley Problem, a thought experiment devised by philosopher Philippa Foot, envisions a runaway trolley, helmed by the reader, barreling towards a fork in the tracks. If nothing is done, the trolley will run over five people working on the tracks and kill them, while if the trolley is turned onto a side track, it will run over one person working on it and kill him. The ethical dilemma rests on what action the reader should take. *See* Judith Jarvis Thomson, *The Trolley Problem*, 94 YALE L.J. 1395, 1395 (1985).

15. Ben Ellman, *Your Driverless Car Could Be Programmed to Kill You*, N.Y. MAG. (Oct. 28, 2015, 9:40 AM), http://nymag.com/scienceofus/2015/10/driverless-cars-might-be-programmed-to-kill-you.html [https://perma.cc/8Z8Q-GL4J].

16. *See* Keating, *supra* note 12.

17. *See* Ucilia Wang, *Driverless Cars Are Data Guzzlers*, WALL ST. J. (Mar. 23, 2014, 4:36 PM ET),

Among other conceivable privacy implications, this data collection raises numerous issues regarding the location of the vehicle, actions by passengers within the car, and common destinations.[18] Cybersecurity concerns include how and what data is stored onboard and for how long, how and what data is shared with others, and what defensive mechanisms are used to protect this data from hackers.[19] Does the consumer have control over what data is collected or shared? More importantly, can governments access this data, and if so, how?[20]

This Note explores the legal aspects and ramifications of cybersecurity and privacy issues regarding driverless cars. Section II of this Note proceeds with a brief discussion of the history of driverless cars, focusing especially on the developments made in the past ten years, before exploring the history of cybersecurity and privacy law in the United States and its relation, or lack thereof, to driverless cars. Section II will also examine legislative and regulatory efforts aimed at driverless cars, such as those recently launched by the National Highway Traffic Safety Administration (NHTSA).[21] This Note proposes in Section III that privacy and cybersecurity concerns should be analyzed, addressed, and regulated under a federal framework, while allowing the states and private industry leeway to engage in experimentation and innovation regarding regulation and promulgation of standards. Lastly, Section IV proposes that regulators collaborate with major players in the industry to craft new rules under their existing authority and set uniform consumer protection baselines for the private sector to follow. This legal regime would apply to both government surveillance and actions by private parties, such as manufacturers and third-party agents.

II. BACKGROUND

Despite the breakneck speed of driverless cars' technological advances, legislation and regulation are still plodding along at a glacial pace. Legislators and regulators, seemingly blindsided by the surge of recent public interest in driverless cars, are still slowly figuring out the path forward to foster

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http://www.wsj.com/articles/SB10001424052702304815004579417441475998338 [https://perma.cc/3LA6-P7CG].

18. *See, e.g.*, Stuart Dredge, *We Should Question and Challenge Google, but Not as Haters*, GUARDIAN (May 14, 2014, 7:20 AM EDT), http://www.theguardian.com/technology/2014/may/14/driverless-cars-google-data-privacy [https://perma.cc/P7NK-N923].

19. *See, e.g.*, *id.*; Jason Koebler, *Driverless Cars Are Giant Data Collection Devices, Say Privacy Experts*, VICE (Mar. 14, 2014, 4:30 PM EST), https://motherboard.vice.com/en_us/article/driverless-cars-are-giant-data-collection-devices-say-privacy-experts [https://perma.cc/85SP-TZB3].

20. *See* Timothy B. Lee, *Self-Driving Cars Are a Privacy Nightmare. And It's Totally Worth It*, WASH. POST (May 21, 2013), https://www.washingtonpost.com/news/wonk/wp/2013/05/21/self-driving-cars-are-a-privacy-nightmare-and-its-totally-worth-it/ [https://perma.cc/EH2Z-YTL2].

21. *See* Heather Caygle, *White House Pushes to Make Driverless Cars a Reality*, POLITICO (Jan. 14, 2016, 3:22 PM EST), http://www.politico.com/story/2016/01/white-house-driverless-cars-reality-217778 [https://perma.cc/Q6YY-5C3K].

innovation and incorporate consumer protections.[22] However, the current situation stems from the trajectory of development of driverless cars and the ossified nature of American cybersecurity and privacy laws.

A. Today's Driverless Car Revolution Has Made Great Advances, but State Governments Have Only Begun to Touch the Issue.

For the most part, research into driverless cars was an under-the-radar affair in the 20th century. The history of driverless cars begins in the 1920s, when daring entrepreneurs built radio-controlled prototypes, the precursor to today's radio-controlled toy cars.[23] In 1958, General Motors (GM) tested a customized Chevrolet using pick-up coils to sense inductive signals from wires embedded in a test road to propel and turn itself.[24] The 1960s saw the Stanford Cart, a rudimentary buggy with a video camera and a remote control, while the 1970s ended with the first truly autonomous car, a Japanese model equipped with two cameras and analog computers and guided by an elevated rail.[25] The 1980s witnessed German aerospace engineer Ernst Dickmanns and his team build various models with cameras and microprocessors that could navigate in standard European traffic, and the 1990s saw roboticists at Carnegie Mellon University drive NavLab 5, a Pontiac minivan with cameras and an onboard computer, almost 3000 miles from Pittsburgh to Los Angeles in a trip called "No Hands Across America."[26] Prototypes slowly incorporated numerous advances such as installing cameras to use visual-based cues rather than wire loops locating induced signals, using increasingly sophisticated onboard computers, and integrating GPS for navigation.[27]

The driverless car revolution in the United States had a major breakthrough in March 2004, when the U.S. Department of Defense, through the Defense Advanced Research Projects Agency (DARPA), held a Grand Challenge for fully autonomous cars in the California desert.[28] While no

22. *See, e.g.*, Melanie Zanona, *House Gets Serious About Driverless Cars*, HILL (Feb. 14, 2017, 12:32 PM EST), http://thehill.com/policy/transportation/319450-house-lawmakers-weigh-driverless-car-laws [https://perma.cc/5GBB-F5GE]; Pui-Wing Tam, *Daily Report: Regulators Catching Up with Driverless Cars*, N.Y. TIMES: BITS (Sept. 20, 2016), https://www.nytimes.com/2016/09/21/technology/daily-report-regulators-catching-up-with-driverless-cars.html [https://perma.cc/N2WH-V7GD].

23. *See* Poole, *supra* note 5.

24. Tom Vanderbilt, *Autonomous Cars Through the Ages*, WIRED (Feb. 6. 2012, 6:30 AM), http://www.wired.com/2012/02/autonomous-vehicle-history/ [https://perma.cc/NC2T-X4CG].

25. *Id.*

26. *Id.*; *see* NO HANDS ACROSS AMERICA, https://www.cs.cmu.edu/afs/cs/usr/tjochem/www/nhaa/nhaa_home_page.html [https://perma.cc/TE2X-HKFZ] (last visited Mar. 29, 2016).

27. *See* Vanderbilt, *supra* note 24.

28. *See* Denise Chow, *DARPA and Drone Cars: How the US Military Spawned Self-Driving Car Revolution*, LIVE SCIENCE (Mar. 21, 2014, 2:27 PM ET), http://www.livescience.com/44272-darpa-self-driving-car-revolution.html [https://perma.cc/ZL8X-NQCW].

vehicles in that year's challenge succeeded in the mission,[29] it created a budding community interested in the concept of self-driving cars and revealed the staggering amount of work needed to bring the idea to fruition.[30] This coming-together of disparate, formerly scattered groups of inventors, programmers, designers, and innovators saw its first taste of success in 2005, when DARPA held its second Grand Challenge.[31] That year, five vehicles successfully completed the event, with one team winning a $2,000,000 prize.[32]

The Grand Challenge laid the groundwork for the current rush of developments. Self-driving vehicles began to climb mountains and navigate urban-like environments.[33] They began to cross countries and continents, even (almost) getting ticketed by traffic police.[34] In 2011, Nevada became the first state to pass laws allowing autonomous vehicles to drive on public roads.[35] Other states, including California and Michigan, have since followed Nevada in passing or implementing laws and regulations permitting the same.[36]

B. The Rapid Advance of Driverless Car Technology Has Created and Magnified Problems Regarding Cybersecurity and Privacy.

As driverless cars gain prevalence in our cultural conversation, so too do a myriad of concerns and legal issues.[37] Addressing these concerns will have immense impact on consumer confidence in this emerging technology.[38] Some of the most important concerns involve cybersecurity and privacy measures surrounding driverless cars.[39]

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29. To win the Grand Challenge, a vehicle had to navigate a 142-mile course from Barstow, California to Primm, Nevada in 10 hours. The most successful vehicle managed to travel only 7.5 miles. *See id.*

30. *See id.*

31. *See id.*

32. *See id.*

33. *See* Vanderbilt, *supra* note 24.

34. The errant driverless car evaded the ticket due to the police officer "not knowing in what name to issue the ticket." *Id.*

35. Alex Knapp, *Nevada Passes Law Authorizing Driverless Vehicles*, FORBES (June 22, 2011, 5:29 PM), https://www.forbes.com/sites/alexknapp/2011/06/22/nevada-passes-law-authorizing-driverless-cars/ [https://perma.cc/7V24-UTS7]; *see also* NEV. REV. STAT. § 482A.010-200 (2016).

36. *Autonomous | Self-Driving Vehicles Legislation*, NAT'L CONF. ST. LEGISLATURES (Nov. 11, 2016), http://www.ncsl.org/research/transportation/autonomous-vehicles-legislation.aspx [https://perma.cc/Z2MB-48TU]; *see, e.g.*, CAL. VEH. CODE § 38750 (West 2016); MICH. COMP. LAWS § 257.663–66 (2016).

37. *See, e.g.*, Keith Kirkpatrick, *The Moral Challenges of Driverless Cars*, 58 COMM. ACM 19 (2015); Keating, *supra* note 12; Markoff, *supra* note 1.

38. *See* Ashiq JA, *Security Nightmare of Driverless Cars*, TRIPWIRE (Oct. 25, 2015), http://www.tripwire.com/state-of-security/security-data-protection/cyber-security/security-nightmare-of-driverless-cars/ [https://perma.cc/W67G-8EXC].

39. *See* Ellen S. Pyle, *The Connected Car and the Race to Keep Consumers in the Driver's Seat on Data Privacy*, BLOOMBERG BNA (Feb. 2, 2016), http://www.bna.com/connected-car-race-n57982066853/ [https://perma.cc/QQ5F-SVVY].

The adoption of increasingly sophisticated technology in cars has accentuated cybersecurity as a major concern. For example, one concern involves tricking a car's sensors with low-powered lasers, which can disorient the vehicle's computer systems.[40] Hackers can point the laser at a sensor, which tricks the car into taking needless evasive action or simply paralyzing itself to avoid phantom obstacles.[41]

Even before the advent of driverless cars, cybersecurity was a pressing issue impacting human-driven vehicles. Hackers have demonstrated an ability to wirelessly grab control of the vehicle and remotely control it via the car's software and connectivity systems.[42] Those with ill intent can find access paths through Bluetooth, remote keyless entry systems, cellular signals, or any wireless connection a car can make with the outside world.[43] Malware attacking critical car components such as brakes and transmission can be unwittingly introduced into a car's system at auto dealerships by mechanics.[44] With the continued addition of various digital systems and amenities to cars, especially driverless cars, such methods of unauthorized entry will only increase.

While hacking into a car is still difficult, requiring some level of physical access or long, arduous study of a car's programs,[45] the voluminous data gathered and used by these cars makes the effort valuable to hackers.[46] This data can include many types of information stored by the vehicle or

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40. *See* Ashiq JA, *supra* note 38.

41. *See* Samuel Gibbs, *Hackers Can Trick Self-Driving Cars into Taking Evasive Action*, GUARDIAN (Sept. 7, 2015, 6:28 AM EDT), http://www.theguardian.com/technology/2015/sep/07/hackers-trick-self-driving-cars-lidar-sensor [https://perma.cc/VXK7-PDLS].

42. *See* Angelo Young, *Car Hacking: Security Experts Caution Automakers on Greater Need for Cybersecurity and Anti-Hacking Measures*, INT'L BUS. TIMES (July 28, 2015, 8:26 AM), http://www.ibtimes.com/car-hacking-security-experts-caution-automakers-greater-need-cybersecurity-anti-2026472 [https://perma.cc/TVL4-XCLF] (hacking into a regular Jeep and subsequent recall); *see also* Ashiq JA, *supra* note 38 (other examples).

43. *See* Andy Greenberg, *How Hackable Is Your Car? Consult This Handy Chart*, WIRED (Aug. 6, 2014, 6:30 AM), http://www.wired.com/2014/08/car-hacking-chart/ [https://perma.cc/EH6E-K45J] (listing various vulnerable vectors permitting unauthorized entry into a car's systems).

44. *See* Andy Greenberg, *Car Hack Technique Uses Dealerships to Spread Malware*, WIRED (Oct. 1, 2015, 7:00 AM), http://www.wired.com/2015/10/car-hacking-tool-turns-repair-shops-malware-brothels/ [https://perma.cc/CSZ4-Z8TX].

45. *See* David Pogue, *Why Car Hacking Is Nearly Impossible*, SCI. AM. (Oct. 23, 2015), http://www.scientificamerican.com/article/why-car-hacking-is-nearly-impossible/ [https://perma.cc/EVU4-4H86]. *But see* Jonathan Vanian, *Security Experts Say Hacking Cars Is Easy*, FORTUNE (Jan. 26, 2016, 6:47 PM EST), http://fortune.com/2016/01/26/security-experts-hack-cars/ [https://perma.cc/LT2P-NJG4] ("With cars containing multiple computers coupled together through a maze of networks, it's also possible to break into the car's command center without having to physically plug something into the port. Hackers just have to find a hole somewhere within one of the networks to sneak in.").

46. *See* INST. OF ENG'G & TECH., AUTOMOTIVE CYBER SECURITY: AN IET/KTN THOUGHT LEADERSHIP REVIEW OF RISK PERSPECTIVES FOR CONNECTED VEHICLES 12 (2014), http://www.theiet.org/sectors/transport/documents/automotive-cs.cfm [https://perma.cc/DLK2-B2DY] (citing foreseeable motives of hacking into connected vehicles, with data theft ranking first). Immobilization of the vehicle and mischief ranked sixth and seventh among potential motivations, respectively.

utilized by onboard applications.[47] As driverless cars grow in the automobile market and the "Internet of Things" joins the mainstream,[48] these vehicles will only store and transmit more data, including lifestyle information, credit card usage, and medical records, thus making them attractive targets for hackers.[49]

To identify and understand these cybersecurity threats, the NHTSA has crafted a model looking at factors such as entry points into a vehicle's systems, access methods used to penetrate the systems' defenses, types of attacks on a vehicle's systems, and potential consequences of these attacks.[50] For example, if a type of car receives numerous cases of outside interference with use of its brakes, a manufacturer or regulator can use the above factors to establish patterns and respond accordingly.[51] Using this model, data on the ease, prevalence, and potential for various cybersecurity threats can be analyzed to inform standardization and regulatory decisions by governments and private industry.[52]

Like cybersecurity, privacy is becoming an increasingly prominent concern as driverless cars take to the road.[53] As previously discussed, a driverless car collects an immense amount of data in order to ascertain its surroundings, propel itself, move around on the roads, and cater to its passengers' needs.[54] This data can be sufficiently comprehensive that it may enable those who get their hands on the information to form a detailed profile of the car's user.[55] Even if the collection of such information is legal, it may cause users to believe the car is "spying" on them, which is usually not good optics from a public relations perspective.[56]

Moreover, much of the data collected can be connected to a specific user. Even the most innocuous and necessary data for the proper functioning of a driverless car, such as the information collected from the car's sensors or

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47. *See id.* at 12 (listing examples such as banking records, passwords, insurance information, and vehicle location information).

48. The Internet of Things is the "the concept of basically connecting any device with an on and off switch to the Internet (and/or to each other)." For example, cars can access online calendars or control the thermostat at home. Jacob Morgan, *A Simple Explanation of "The Internet of Things,"* FORBES (May 13, 2014), http://www.forbes.com/sites/jacobmorgan/2014/05/13/simple-explanation-internet-things-that-anyone-can-understand/#6def3b916828 [https://perma.cc/V66S-7AKB].

49. *See* INST. OF ENG'G & TECH., *supra* note 46, at 12.

50. *See* CHARLIE MCCARTHY ET AL., NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., CHARACTERIZATION OF POTENTIAL SECURITY THREATS IN MODERN AUTOMOBILES: A COMPOSITE MODELING APPROACH 9 (2014), https://www.nhtsa.gov/DOT/NHTSA/NVS/Crash%20Avoidance/Technical%20Publications/2014/812074_Characterization_PotentialThreatsAutos(1).pdf [https://perma.cc/98D8-97VV].

51. *Cf. id.* at 16–18 (filling out a detailed threat matrix using the brake disconnect example).

52. *See id.* at iii.

53. *See* Adrienne LaFrance, *How Self-Driving Cars Will Threaten Privacy*, ATLANTIC (Mar. 21, 2016), http://www.theatlantic.com/technology/archive/2016/03/self-driving-cars-and-the-looming-privacy-apocalypse/474600/ [https://perma.cc/98TW-KFXX].

54. *See* INST. OF ENG'G & TECH., *supra* note 46, at 7–8.

55. *See* Samantha Sayers & Sabba Mahmood, *Connected Cars: An Approach to Dealing with the Privacy Risks*, PRIVACY & DATA PROT. J., Sept. 2015, at 3 (2015).

56. *See id.*

from communicating with other vehicles in order to avoid collisions, can be used to identify people.[57] Data-mining techniques can take any data stripped of unique identifying markers to identify a car and, in turn, its users.[58] Thus, while vehicular data collection may enable a range of attractive consumer features, it is only steps away from surreptitious surveillance and untoward influence of consumer behavior, especially by companies looking to profit from such valuable information.[59]

C. Despite Cybersecurity and Privacy Concerns Surrounding Driverless Cars, There Is Currently a Dearth of Applicable Federal or State Law to Address These Concerns.

Despite some movements by states to pave the road for the anticipated driverless car revolution and protect consumers from wayward excesses, the newly passed driverless car legislation in Nevada and other states merely permit the *testing or use* of autonomous vehicles on the road. Complementary laws and regulations needed to address safety, liability, cybersecurity, and privacy concerns are either nonexistent[60] or stuck in the rulemaking process.[61] Various commentators have described recent guidelines from the NHTSA as unhelpfully vague.[62] The lack of clarity in the law addressing these complex

57. *See* William J. Kohler & Alex Colbert-Taylor, *Current Law and Potential Legal Issues Pertaining to Automated, Autonomous and Connected Vehicles*, 31 SANTA CLARA HIGH TECH. L.J. 99, 120–21 (2015).

58. *Id.*

59. LaFrance, *supra* note 53.

60. Aaron M. Kessler, *Hands-Free Cars Take Wheel, and Law Isn't Stopping Them*, N.Y. TIMES (May 2, 2015), http://www.nytimes.com/2015/05/03/business/hands-free-cars-take-wheel-and-law-isnt-stopping-them.html [https://perma.cc/M7SK-3TXM].

61. *See* Alex Davies, *California's New Self-Driving Car Rules Are Great for Texas*, WIRED (Dec. 17, 2015, 11:00 AM), https://www.wired.com/2015/12/californias-new-self-driving-car-rules-are-great-for-texas/ [https://perma.cc/DX9X-EFHN] ("The DMV will host public forums to discuss the regulations, which won't be finalized before later next year."); Samantha Masunaga, *California's Proposed DMV Rules for Driverless Cars Could Change in the Wake of Federal Guidelines*, L.A. TIMES (Sept. 20, 2016, 4:40 PM), http://www.latimes.com/business/la-fi-hy-dmv-driverless-rules-20160920-snap-story.html [https://perma.cc/DU7G-FHP7]. As of January 2017, the California rules are still in draft form. Russ Mitchell, *California Regulations for Driverless Cars Stall as Other States Speed Ahead*, L.A. TIMES (Jan. 26, 2017, 12:10 PM), http://www.latimes.com/business/autos/la-fi-hy-driverless-regulations-california-20170126-story.html [https://perma.cc/T4V7-EE8U].

62. *See, e.g.*, Ian Adams, *The New Federal Safety Guidelines for Self-Driving Cars Are Too Vague . . . And States Are Already Making Them Mandatory*, TECHDIRT (Oct. 14, 2016, 1:11 PM), https://www.techdirt.com/articles/20161006/00202435725/new-federal-safety-guidelines-self-driving-cars-are-too-vague-states-are-already-making-them-mandatory.shtml [https://perma.cc/2WYE-BAQP]; Russ Mitchell and Samantha Masunaga, *Government Paves Way for Driverless Cars to Hit the Roads*, L.A. TIMES (Sept. 20, 2016, 6:45 PM), http://www.latimes.com/business/la-fi-hy-driverless-car-guidelines-20160920-snap-story.html [https://perma.cc/9G76-9CYQ] ("Joan Claybrook, a consumer advocate who ran NHTSA in the Carter administration, called the guidelines 'a definite improvement' but says they're too vague.").

issues must be urgently addressed, as these concerns have only become more important as driverless cars become an impending reality.[63]

Beyond murky or nonexistent laws, certain concepts that are salient to driverless car regulation lack coherent legal definitions. For example, the term "cybersecurity" can mean slightly different things depending on the agency or party using the term.[64] Eric A. Fischer, Senior Specialist in Science and Technology for the Congressional Research Service, defined the term to mean "measures intended to protect information systems—including technology (such as devices, networks, and software), information, and associated personnel—from various forms of attack."[65] CTIA, the industry trade group representing the wireless industry, shares this methods-based orientation, focusing on the methods by which information or systems are protected from attack.[66] The Committee on National Security Systems (CNSS), an intergovernmental agency that sets standards for systems critical to national security,[67] uses a subtly different definition, with "cybersecurity" meaning "the ability to protect or defend the use of cyberspace from cyber attacks."[68] Still other applications treat "cybersecurity" as a synonym for "information security," a statutory term meaning "protecting information and information systems from unauthorized access, use, disclosure, disruption, modification, or destruction."[69]

Privacy is an even more nebulous legal concept than cybersecurity.[70] Samuel D. Warren and Louis Brandeis famously saw privacy as "the right to

63. *See generally* Dorothy J. Glancy, *Privacy in Autonomous Vehicles*, 52 SANTA CLARA L. REV. 1171, 1172 (2012) (listing various privacy concerns).

64. *See* ERIC A. FISCHER, CONG. RESEARCH SERV., R42114, FEDERAL LAWS RELATING TO CYBERSECURITY: OVERVIEW AND DISCUSSION OF PROPOSED REVISIONS 1 n.1 (2013), https://www.fas.org/sgp/crs/natsec/R42114.pdf [https://perma.cc/KN2V-3KHT] (noting that cybersecurity is "a broad and arguably somewhat fuzzy concept for which there is no consensus definition").

65. *Id.*

66. *See* CTIA, *Today's Mobile Cybersecurity: Blueprint for the Future* 4 (2013), http://www.ctia.org/docs/default-source/default-document-library/cybersecurity_white_paper.pdf [https://perma.cc/M8U9-Y54F] (defining cybersecurity as "'how' to protect" information).

67. *See* COMM. ON NAT'L SEC. SYS., https://www.cnss.gov/cnss/ [https://perma.cc/4W3Z-G29Z] (last visited Apr. 5, 2016) ("CNSS[] sets national-level Information Assurance policies, directives, instructions, operational procedures, guidance and advisories . . . for the security of National Security Systems (NSS).").

68. *See* COMM. ON NAT'L SEC. SYS., NATIONAL INFORMATION ASSURANCE (IA) GLOSSARY 22 (2010), http://www.ncsc.gov/nittf/docs/CNSSI-4009_National_Information_Assurance.pdf [https://perma.cc/U4FL-HSPJ]. "Cyberspace" is defined by the CNSS as "[a] global domain within the information environment consisting of the interdependent network of information systems infrastructures including the Internet, telecommunications networks, computer systems, and embedded processors and controllers." *Id.*

69. FISCHER, *supra* note 64, at 1 n.1 (citing 44 U.S.C. § 3532(b)(1) (2012)).

70. *See* William M. Beaney, *The Right to Privacy and American Law*, 31 L. & CONTEMP. PROBS. 253, 255 (1966) ("[E]ven the most strenuous advocate of a right to privacy must confess that there are serious problems of defining the essence and scope of this right.").

be let alone,"[71] an approach that Brandeis later grounded in constitutional law and brought with him to the Supreme Court.[72] William Prosser, former dean of the University of California, Berkeley School of Law, and a "giant of tort law,"[73] distilled privacy into four distinct torts,[74] which are recognized in the Restatement of Torts.[75] Daniel Solove, a professor at the George Washington University Law School and a leading expert in privacy law,[76] refers to privacy as "the practices we want to protect and to the protections against disruptions to these practices,"[77] which are drawn from "a common pool of similar elements" such as the "right to be let alone," personhood, and intimacy, among others.[78] On a less philosophical front, CTIA defines privacy as more of a determination of what information should be free from unauthorized intrusion or use (i.e., the "what" to protect).[79] Despite the vagueness of these terms legally and conceptually, it is important to note that privacy and cybersecurity are intertwined in the digital realm: "privacy cannot exist without cybersecurity," and cybersecurity is a moot point without privacy.[80]

Despite the cybersecurity threats facing today's and tomorrow's cars, there is still a dearth of laws and regulations addressing these issues, especially at the federal level. A major reason is the inability of the law to advance as rapidly as the technology, whether due to political uncertainty or inertia, and the inability to address concerns in a "regulatory void."[81] There is no overarching federal legal framework in place for cybersecurity issues, while a patchwork of laws addresses scattered aspects of this field.[82] In fact, until the enactment of several cybersecurity-related bills in late 2014, which shuffled around administrative agencies and codified existing actions and initiatives,[83] there had been no major federal cybersecurity legislation since

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71. *See* Samuel D. Warren & Louis Brandeis, *The Right to Privacy*, 4 HARV. L. REV. 193, 193 (1890) ("[N]ow the right to life has come to mean the right to enjoy life, – the right to be let alone . . . .").

72. *See* Olmstead v. United States, 277 U.S. 438, 478 (1928) (Brandeis, J., dissenting) ("The protection guaranteed by the Amendments is much broader in scope. . . . They conferred, as against the Government, the right to be let alone – the most comprehensive of rights, and the right most valued by civilized men.").

73. Christopher J. Robinette, *The Prosser Notebook: Classroom as Biography and Intellectual History*, 2010 U. ILL. L. REV. 577, 579, 581.

74. The four torts are (1) intrusion upon seclusion, (2) public disclosure of embarrassing private facts, (3) false light, and (4) appropriation of name or likeness. William L. Prosser, *Privacy*, 48 CALIF. L. REV. 383, 389 (1960).

75. RESTATEMENT (SECOND) OF TORTS §§ 652A(2)(a)–(e) (AM. LAW INST. 1977).

76. *See Daniel Justin Solove*, GW LAW, https://www.law.gwu.edu/daniel-justin-solove [https://perma.cc/68WJ-4TJT] (last visited Apr. 5, 2016).

77. Daniel J. Solove, *Conceptualizing Privacy*, 90 CALIF. L. REV. 1087, 1093 (2002).

78. *Id* at 1091, 1099.

79. *See* CTIA, *supra* note 66, at 4.

80. *See id*.

81. *See* Kessler, *supra* note 60 ("Part of why federal and state officials have struggled to define autonomous rules is that the issue cuts across traditional legal turf.").

82. *See* FISCHER, *supra* note 64, at 2.

83. *See In a Surprising Move, Congress Passes Four Cybersecurity Bills*, HUNTON & WILLIAMS: PRIVACY & INFO. SECURITY L. BLOG (Dec. 12, 2014), https://www.huntonprivacyblog.com/2014/12/12/surprising-move-congress-passes-four-cybersecurity-bills/ [https://perma.cc/69Y5-VU6S].

2002.[84] Recent guidelines issued by the NHTSA in September 2016 say little about cybersecurity other than to encourage documentation of risks and developments and encouragement of industry sharing.[85] In 2015, Senators Ed Markey and Richard Blumenthal introduced the Security and Privacy in Your Car Act (SPY Car Act) to address cybersecurity issues in driverless cars and to kickstart a rulemaking process at the Federal Trade Commission (FTC),[86] but the bill languished in committee.[87] In 2017, Representatives Joe Wilson and Ted Lieu introduced a more restrained Security and Privacy in Your Car Study Act (SPY Car Study Act),[88] but its prospects of passage are similarly uncertain.

In the face of federal inaction and growing public concern, states have taken some leadership and made more efforts to address cybersecurity along with many other issues surrounding the integration of driverless cars into society.[89] For example, many jurisdictions, such as California and the District of Columbia, have data security breach notification laws in place for other purposes that could be extended to driverless cars.[90] Several states also have laws requiring businesses to have minimum data security standards to prevent

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84. *See* H.R. REP. NO. 113-33, at 37 (2013). The Senate counterpart of the House bill, the Cybersecurity Enhancement Act of 2014, S. 1353, was signed into law on December 18, 2014. Press Release, White House Office of the Press Secretary, Statement by the Press Secretary – Bills Signed into Law (Dec. 18, 2014), https://obamawhitehouse.archives.gov/the-press-office/2014/12/18/statement-press-secretary-bills-signed-law [https://perma.cc/WDK4-K2NQ].

85. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., FEDERAL AUTOMATED VEHICLES POLICY 21 (2016).

86. Security and Privacy in Your Car Act of 2015 (SPY Car Act of 2015), S. 1806, 114th Cong. (2015); *see also* Thomas Fox-Brewster, *SPY Car Act Hopes to Save American Cars from Digital Disaster*, FORBES (July 21, 2015, 1:07 PM), http://www.forbes.com/sites/thomasbrewster/2015/07/21/senators-launch-spy-car-act/ [https://perma.cc/GL4B-952F]. Provisions of the bill include mandating that all motor vehicles comply with software system isolation and data security standards within two years of FTC-promulgated regulations, requiring that a "cyber dashboard" label detailing the car's cybersecurity and privacy measures be affixed to each vehicle, and compelling disclosure of how data is collected and retained by the vehicle. S. 1806 §§ 2(a)(2), 3(a), 4(a).

87. *See All Bill Information (Except Text) for S. 1806 – SPY Car Act of 2015*, CONGRESS.GOV, https://www.congress.gov/bill/114th-congress/senate-bill/1806/all-info [https://perma.cc/5WDE-4LKS] (last visited Feb. 17, 2017).

88. Security and Privacy in Your Car Study Act of 2017 (SPY Car Study Act of 2017), H.R. 701, 115th Cong. (2017). In contrast with the previous bill, this bill merely requires the NHTSA to conduct a study with other government agencies and the private sector to develop and recommend cybersecurity standards. *Compare id. with* text accompanying *supra* note 86.

89. *See* Kessler, *supra* note 60; Maggie Clark, *States Take the Wheel on Driverless Cars*, USA TODAY (July 29, 2013, 1:47 PM EDT), http://www.usatoday.com/story/news/nation/2013/07/29/states-driverless-cars/2595613/ [https://perma.cc/X6DD-NCKK].

90. *Security Breach Notification Laws*, NAT'L CONF. ST. LEGISLATURES (Feb. 24, 2017), http://www.ncsl.org/research/telecommunications-and-information-technology/security-breach-notification-laws.aspx [https://perma.cc/T9K8-KUFE]; *see, e.g.*, CAL. CIV. CODE § 1798.29(a) (West 2015) (mandating notification "following discovery or notification of the breach in the security of the data to any resident of California whose unencrypted personal information was, or is reasonably believed to have been, acquired by an unauthorized person."), D.C. CODE § 28-3852(a) (2015) (affording similar protections for District of Columbia residents).

breaches in the first place.[91] However, even these states have offered few or no regulations on cybersecurity issues specifically tailored to driverless cars.

Unlike the lack of cybersecurity laws, there are more privacy laws and protections at the federal and state level,[92] especially those addressing more general issues such as digital and Internet privacy.[93] These laws protect minors' library records and online information from disclosure, and create standards for business privacy policies and Internet service providers (ISPs).[94] Like cybersecurity, however, these laws have yet to be applied in the driverless car context. While there are some laws that address privacy concerns related to "traditional" driver-controlled cars,[95] there are also a multitude of privacy concerns surrounding driverless cars where existing privacy laws may be inadequate for the task. There is also a need to adapt existing (and worthwhile) protections and laws such as the Driver's Privacy Protection Act into the uncharted world of self-driving cars.[96] These additional concerns include ensuring secure interaction with external networks, interactions with other vehicles, and proper storage of gathered information.[97] Underlying these concerns are potential issues related to determining control of the information, protecting driver and passenger anonymity, and ensuring informed consent to gather information from passengers.[98]

Privacy concerns can extend not only to what private parties can do with the information, but also to what governments can do to acquire it or analyze it.[99] While such concerns have long existed—spanning the advent of

91. Corey M. Dennis, *Data Security Laws & the Rising Cybersecurity Debate*, LEXOLOGY (Jan. 28, 2013), http://www.lexology.com/library/detail.aspx?g=cc5c9a56-7a60-46ab-9cf4-f36cada0cafa [https://perma.cc/KL6J-EL2B]; *see, e.g.*, CAL. CIV. CODE § 1798.81 (West 2015) (requiring businesses to "take all reasonable steps to dispose, or arrange for the disposal, of customer records within its custody or control containing personal information when the records are no longer to be retained by the business").

92. *See, e.g.*, U.S. CONST. amend. IV; Electronic Communications Privacy Act, Pub. L. 99-508, 100 Stat. 1848 (1986).

93. *State Laws Related to Internet Privacy*, NAT'L CONF. ST. LEGISLATURES (Jan. 5, 2016), http://www.ncsl.org/research/telecommunications-and-information-technology/state-laws-related-to-internet-privacy.aspx [https://perma.cc/78P9-GX3H].

94. *See generally id.* (listing examples).

95. *See, e.g.*, Driver's Privacy Protection Act of 1994, Pub. L. 103-322, Title XXX, 108 Stat. 2099 (forbidding the disclosure of driver license information by state DMVs without the consent of the license holder except under certain circumstances).

96. *See* Glancy, *supra* note 63, at 1192; *see also supra* text accompanying note 95.

97. Glancy, *supra* note 63, at 1179–80.

98. *Id.* at 1191, 1195.

99. *See* Kohler & Colbert-Taylor, *supra* note 57, at 120–32; *see also generally* Glancy, *supra* note 63.

police detention,[100] telephone wiretapping,[101] and car searches[102]—driverless cars have created new opportunities and avenues for law enforcement and other government agencies to engage in mass surveillance or, even more troubling, surreptitious and warrantless tracking.[103] States have made tentative efforts to rein in such acts through new laws and regulations, but they have been few and far between.[104] Some of these efforts have stalled or been stymied due to the driverless car companies themselves.[105]

However, federal and state governments, along with interest groups, have begun to make initial steps to lay the groundwork for some regulation regarding privacy protections for driverless cars.[106] In 2016, the Obama administration aimed to bolster these efforts by including $4 billion in funding for driverless car pilot programs in its fiscal 2017 budget presented to Congress.[107] After soliciting comment from the public and private industry,[108] the NHTSA also issued some guidelines on "automated cars" in September 2016.[109]

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100. Terry v. Ohio, 392 U.S. 1, 38 (1968) (Douglas, J., dissenting) (quoting Henry v. United States, 361 U.S. 98, 100–02 (1959) ("This immunity of officers [to search without a warrant] cannot fairly be enlarged without jeopardizing the privacy or security of the citizen.").

101. Olmstead v. United States, 277 U.S. 438, 473 (1928) (Brandeis, J., dissenting) ("Subtler and more far-reaching means of invading privacy [such as telephone wiretapping] have become available to the government."); *see* Katz v. United States, 389 U.S. 347, 353 (1967) ("The Government's activities in electronically listening to and recording the petitioner's words violated the privacy upon which he justifiably relied while using the telephone booth . . . .").

102. United States v. Ross, 456 U.S. 798, 804 (1982) ("In every case [of a car search] a conflict is presented between the individual's constitutionally protected interest in privacy and the public interest in effective law enforcement."); United States v. Ortiz, 422 U.S. 891, 896 (1975) ("A search, even of an automobile, is a substantial invasion of privacy.").

103. Glancy, *supra* note 63, at 1211–12.

104. *See, e.g.*, S.B. 178, 2015-2016 Leg., 1st Sess. (Cal. 2015) (prohibiting law enforcement "from compelling the production of or access to electronic communication information or electronic device information . . . without a search warrant, wiretap order, order for electronic reader records, or subpoena issued pursuant under specified conditions, except for emergency situations . . . .").

105. *See, e.g.*, Koebler, *supra* note 19 (discussing Google's lobbying to strip privacy protections from California's driverless car legislation).

106. *See* Tom Risen, *How Safe Is a Self-Driving Car?*, U.S. NEWS & WORLD REP. (Oct. 8, 2015, 3:54 PM), http://www.usnews.com/news/articles/2015/10/08/nhtsa-volvo-seek-cybersecurity-privacy-for-driverless-cars [https://perma.cc/4PT3-GJSU] (referencing the federal Grow America Act, a transportation funding bill that would criminalize hacking a vehicle).

107. *Id.*

108. Caygle, *supra* note 21.

109. *See generally* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 85. The NHTSA gave guidance on various issues surrounding autonomous vehicles with varying specificity. *Compare id.* at 19–20 (the privacy section with seven detailed aspects that manufactures "should ensure") *with supra* discussion accompanying note 85 (sparse cybersecurity section).

D. Existing Cybersecurity and Privacy Laws Are Ill-Suited to Regulate Driverless Cars.

When there is a cybersecurity or privacy law on the books, it is often outdated and inadequate to shield consumers and systems from new risks.[110] Faced with intractable legislative gridlock and the demands of modernity, some courts have broadened legal definitions in preexisting laws to afford some protection to new technologies in the absence of more relevant legislation. For example, courts have deemed cellphones to be "computers" in order to qualify them for the cybersecurity protections in the Computer Fraud and Abuse Act (CFAA),[111] which criminalizes the use of "computers" to commit acts such as hacking or defrauding resulting in damages exceeding $5000.[112]

With the lack of federal laws covering cybersecurity generally, the FTC has resorted to using Section 5 of the Federal Trade Commission Act ("Section 5") to assert its jurisdiction over some cybersecurity issues.[113] Section 5 prohibits the use of "unfair or deceptive acts or practices in or affecting commerce."[114] According to the FTC and the courts, "unfair or deceptive acts or practices" can include failure to "maintain reasonable and appropriate data security" and/or loss of sensitive personal information as a result.[115] The FTC often relies on the "deceptive" legal term to penalize data security transgressors upon finding that companies have misrepresented or violated their own privacy policies.[116] To its credit, the FTC has made some efforts to examine cybersecurity issues related to connected cars,[117] but has

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110. *See* Eddie Schwartz, *It's Time to Update Antiquated Cybersecurity Legislation*, WASH. EXAMINER (Feb. 23, 2015), http://www.washingtonexaminer.com/its-time-to-update-antiquated-cybersecurity-legislation/article/2560412 [https://perma.cc/J8HT-8WWZ]; Miguel Helft & Claire Cain Miller, *1986 Privacy Law Is Outrun by the Web*, N.Y. TIMES (Jan. 9, 2011), http://www.nytimes.com/2011/01/10/technology/10privacy.html [https://perma.cc/8AZZ-43X3].

111. *See, e.g.*, United States v. Hill, 783 F.3d 842, 845 (11th Cir. 2015) (per curiam); United States v. Kramer, 631 F.3d 900, 902–03 (8th Cir. 2011).

112. *See* Computer Fraud and Abuse Act, 18 U.S.C. § 1030(a)(2), (4) (2012).

113. HANOVER RESEARCH, THE EMERGENCE OF CYBERSECURITY LAW 13–14 (2015), https://sm.asisonline.org/ASIS%20SM%20Documents/The-Emergence-of-Cybersecurity-Law.pdf [https://perma.cc/687T-XCY6].

114. Federal Trade Commission Act § 5, 15 U.S.C. § 45(a)(1) (2012).

115. FTC v. Wyndham Worldwide Corp., 799 F.3d 236, 236 (3rd Cir. 2015); *see also Identity Theft: Recent Developments Involving the Security of Sensitive Consumer Information: Hearing Before the S. Comm. on Banking, Hous., & Urban Affairs*, 109th Cong. 14, 15 (2005) (statement of Deborah Platt Majoras, Chairman, Fed. Trade Comm'n) ("In addition to deception, the FTC Act prohibits unfair practices. Practices are unfair if they cause or are likely to cause consumers substantial injury that is neither reasonably avoidable by consumers nor offset by countervailing benefits to consumers or competition.")

116. *See* HANOVER RESEARCH, *supra* note 113, at 14; *see also Identity Theft*, *supra* note 115, at 14 n.41 (listing examples of deceptive claim actions).

117. *Examining Ways to Improve Vehicle and Roadway Safety: Hearing Before the Subcomm. on Commerce, Mfg., & Trade of the H. Comm. on Energy & Commerce*, 114th Cong. 2 (2015) (statement of Maneesha Mithal, Assoc. Dir., Div. of Privacy & Identity Prot., Bureau of Consumer Prot., Fed. Trade Comm'n) ("[A]t its Internet of Things workshop in November 2013, the Commission specifically examined privacy and security issues relating to the different technologies in connected cars . . . .").

not initiated any enforcement actions related to connected, let alone driverless, vehicles.

In the absence of federal action to plug gaping loopholes in federal law, many states have used computer crime laws on their books to offer some cybersecurity protections.[118] For example, California's computer crime laws ban hacking on statutorily defined "computer networks," replete with prescribed criminal sanctions.[119] Michigan also has computer crime provisions criminalizing hacking to defraud or to "acquire, alter, damage, delete, or destroy property," among other purposes.[120] While California's and Michigan's definitions are sufficiently broad to encompass mobile devices within their reach,[121] little or no commentary exists on whether a driverless car or its components qualify as "computers" under this statute.

As is the case with cybersecurity, privacy laws were enacted in a different era for a different world. For example, the Electronic Communications Privacy Act of 1986 (ECPA) prohibits any act or attempt to "intercept" or "disclose . . . any wire, oral, or electronic communication."[122] The ECPA expanded a preexisting narrow prohibition on certain wiretapping acts on telephone lines to include other modes of electronic communication, including email.[123] However, this law does not apply to any data, such as geolocation; in fact, with the exception of the FTC's nebulous standard of "unfair or deceptive acts or practices," there are very few federal limitations on private sector use of personal data outside of statutory protections for children, credit reporting, and health information.[124]

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118. *Computer Crime Statutes*, NAT'L CONF. ST. LEGISLATURES (Dec. 5, 2016), http://www.ncsl.org/research/telecommunications-and-information-technology/computer-hacking-and-unauthorized-access-laws.aspx [https://perma.cc/Q257-ZZZ8]; *see, e.g.*, People v. Childs, 164 Cal. Rptr. 3d 287, 301 (Ct. App. 2013) (applying California's statute to defendant for malicious disruption and denial of access by authorized users into their computer systems); People v. Schlike, No. 253117 (Mich. Ct. App. May 3, 2005) (unpublished decision) (applying Michigan's statute to defendant for maliciously entering company's network remotely and deleting almost everything).

119. CAL. PENAL CODE §§ 502(b)(2), (c), (d) (West 2015) ("'Computer network' means any system that provides communications between one or more computer systems and input/output devices, including, but not limited to, display terminals, remote systems, mobile devices, and printers connected by telecommunication facilities.").

120. *See* MICH. COMP. LAWS §§ 752.794–.795 (2015).

121. *See* Patrick E. Corbett, *Cyberharassment, Sexting and Other High-Tech Offenses Involving Michigan Residents—Are We Victims or Criminals?*, 88 U. DETROIT MERCY L. REV. 237, 250 (2010) (citing MICH. COMP. LAWS § 752.792(3) (2000)) ("Michigan's computer crime laws appear to include broad enough definitions so that a cell phone would be considered a 'computer' for purposes of the law."). California's law includes "mobile devices" in its definition of "computer networks."); CAL. PENAL CODE § 502(b)(2).

122. 18 U.S.C. § 2511(1)(a), (c) (2012).

123. *See generally* Electronic Communications Privacy Act of 1986 (ECPA), 18 U.S.C. §§ 2510–2521 (2012); U.S. DEPT. OF JUSTICE, OFFICE OF JUSTICE PROGRAMS, BUREAU OF JUSTICE ASSISTANCE, https://it.ojp.gov/privacyliberty/authorities/statutes/1285 [https://perma.cc/9M9F-LSKK] (last visited Jan. 19, 2016).

124. Kohler & Colbert-Taylor, *supra* note 57, at 127–28 (citing the Children's Online Privacy Protection Act, 15 U.S.C. §§ 86501–86506 (2012), Fair Credit Reporting Act, 15 U.S.C. §§ 1681–1681x (2012), Health Insurance Portability and Accountability Act of 1996 Title II, 42 U.S.C. §§ 1320d to 1320d-9 (2012), and the Federal Trade Commission Act § 5, 15 U.S.C. § 45(a)(1) (2012)).

The Fourth Amendment of the U.S. Constitution has served as an important linchpin for privacy protections restraining the government. For example, the 2014 Supreme Court case of *Riley v. California* required law enforcement to obtain a warrant to search the information on a cellphone of someone who has been arrested.[125] In 2015, the Supreme Court struck down a municipal ordinance mandating that hotels open their registries for warrantless law enforcement inspection as an unconstitutional search,[126] a potential legal harbinger for any potential requirement to permit government searches in large databases such as those drawn on by mobile devices or driverless cars. However, like statutes, much of this case law restricts warrantless government collection of cell phone data during or after an arrest, rather than private or government collection under different circumstances, leaving those concerned about data collection in other technologies (such as driverless cars) in a legal gray area.[127]

States have attempted to plug some of the legal holes in federal privacy protection legislation.[128] The most comprehensive effort came from California in 2015, when the state passed its own Electronic Communications Privacy Act (ECPA).[129] California's ECPA, which went into effect in 2016, requires law enforcement agencies to obtain a warrant in order to search for a device's location data, content, metadata, and search history.[130] This applies to information held by either the device's owner or by service providers.[131] Some states, such as Minnesota, require warrants only for location data,[132] while other states have few or no protections at all.[133] However, there are currently multistate efforts to pass privacy protection laws,[134] but whether they are broad enough to encompass driverless cars remains to be seen.

125. *See generally* Riley v. California, 134 S. Ct. 2473 (2014).

126. Los Angeles v. Patel, 135 S. Ct. 2443, 2452 (2015).

127. *Riley*, 134 S. Ct. at 2489 n.1 (2014) ("[T]hese cases do not implicate the question whether the collection or inspection of aggregated digital information amounts to a search under other circumstances.").

128. Some states, such as California, have the right to privacy ingrained in their constitutions. *See, e.g.*, CAL. CONST. art. I, § 1 ("All people are by nature free and independent and have inalienable rights. Among these are . . . pursuing and obtaining . . . privacy.").

129. Kim Zetter, *California Now Has the Nation's Best Digital Privacy Law*, WIRED (Oct. 8, 2015, 9:58 PM), http://www.wired.com/2015/10/california-now-nations-best-digital-privacy-law/ [https://perma.cc/WF2D-UREM]; *see generally* Electronic Communications Privacy Act, CAL. PENAL CODE §§ 1546–1546.4 (West 2015).

130. Zetter, *supra* note 129; *see* CAL. PENAL CODE §§ 1546–1546.1.

131. CAL. PENAL CODE § 1546.1.

132. MINN. STAT. § 626A.28 subd. 3(d) (2015).

133. *See* Peter Cihon, *Status of Location Privacy Legislation in the States: 2015*, ACLU: FREE FUTURE (Aug. 26, 2015, 1:15 PM), https://www.aclu.org/blog/free-future/status-location-privacy-legislation-states-2015 [https://perma.cc/H7NW-H8JD].

134. Rachel Levinson-Waldman & Michael Price, *Multi-State Privacy Push Paves the Way for National Reform*, HUFFINGTON POST (Jan. 20, 2016, 2:24 PM ET), http://www.huffingtonpost.com/rachel-levinsonwaldman/multi-state-privacy-push_b_9031692.html [https://perma.cc/TY4X-WH22].

III. A NEW COHERENT REGULATORY REGIME IS NEEDED TO GUIDE AND FOSTER THE DRIVERLESS CAR REVOLUTION.

Today's patchwork of state-based regulation, combined with the inadequacy of existing federal laws, has fueled calls for new regulations and regulatory structures.[135] The rapid rate of technological advancement for driverless cars, combined with increasing globalization, is rendering this approach untenable. Instead, the federal government should take charge and institute a comprehensive nationwide regulatory framework for driverless cars to follow.

A. Given the Interstate Nature of Driverless Cars and Communications, Cybersecurity, and Privacy Pertaining to These Vehicles, Foundational Regulation Should Take Place at the Federal Level.

Highway safety and wireless communications represent two contexts in which a federalized regulatory approach has been pursued over a state-dominant status quo.[136] The concerns regarding safety requirements for driverless vehicles, and the privacy and security of transmitted data between vehicles and between a vehicle and some other infrastructure, are all attendant aspects of these key channels of interstate commerce. As forms of interstate commerce, both highway safety and wireless communications fall under the purview of the Commerce Clause of the U.S. Constitution, making them subject to federal regulation.[137]

Both human-driven vehicles and driverless cars are already regulated at the federal level. Motor vehicle safety in general is regulated by the NHTSA pursuant to the National Traffic and Motor Safety Act of 1966.[138] Wire and radio communication is regulated by the Federal Communications Commission (FCC) pursuant to the Communications Act of 1934.[139] As previously discussed, privacy and cybersecurity have become growing concerns for, and increasingly the province of, the FTC.[140] The FCC has

135. *See, e.g.*, Laura Putre, *Speed Up Self-Driving Regulation, Says Volvo CEO*, INDUSTRYWEEK (Oct. 9, 2015), http://www.industryweek.com/regulations/speed-self-driving-regulation-says-volvo-ceo [https://perma.cc/SVU4-RYXG].

136. *Cf.* 49 U.S.C. § 30101 (2012) (stating that the purpose of Chapter 301 of Title 49 of the United States Code is "to prescribe motor vehicle safety standards for motor vehicles and motor vehicle equipment in interstate commerce"); 47 U.S.C. § 151 (2012) (stating that the creation of the Federal Communications Commission is "[f]or the purpose of regulating interstate and foreign commerce in communication by . . . radio so as to make available, so far as possible, to all the people of the United States . . . .").

137. *See* U.S. CONST. art. I, § 8, cl. 3.

138. National Highway Traffic Safety Act of 1966, 49 U.S.C. § 30101 (2012).

139. Communications Act of 1934, 47 U.S.C. § 151 (2012).

140. *See* Federal Trade Commission Act § 5, 15 U.S.C. § 45(a)(1) (2012); Andrea Arias, *The NIST Cybersecurity Framework and the FTC*, FED. TRADE COMMISSION (Aug. 31, 2016, 2:34 PM), https://www.ftc.gov/news-events/blogs/business-blog/2016/08/nist-cybersecurity-framework-ftc [https://perma.cc/55N6-CHCG] ("As the nation's consumer protection agency, the FTC is committed to protecting consumer privacy and promoting data security in the

recently directed its attention toward cybersecurity and privacy issues, especially those involving telecommunications networks and the Internet.[141] Other federal agencies have also played a hand in regulation. For example, the National Institute of Standards and Technology (NIST) has promulgated certain cybersecurity standards, and the Intelligent Transportation Systems (ITS) office in the U.S. Department of Transportation has researched privacy protections for connected cars.[142]

Practical concerns also tip the scales toward preferring federal regulation of driverless cars over state regulation. The most important reason counseling against a state-based framework is the risk of inconsistency among state and local regulatory regimes, a concern echoed by the NHTSA.[143] An oddball patchwork of state and local regulations would result in confusion, inefficiency, and stifled innovation.[144] Overarching federal regulation facilitates a commonly understood vocabulary and a uniform regulatory model for driverless car companies and innovators to follow,[145] and, if done right, can foster sustained growth and development.

Leaving driverless car regulation solely to the states also magnifies the harmful impact posed by state regulators' lack of technical expertise, which can lead to uncertainty and hindered innovation due to ineffective legal guidance.[146] This problem is accentuated if poorly conceived laws are enacted in states where the driverless car industry is seeing the most growth. For example, when California proposed regulations requiring self-driving cars to have a human occupant behind a wheel (effectively banning driverless cars), what seemed to be a safety regulation measure on the surface sparked a panic in the driverless car world, given the concentration of companies in that state and its precedent-setting potential.[147] The draft regulations would essentially

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private sector . . . Section 5 of the FTC Act is the primary enforcement tool that the FTC relies on to prevent deceptive and unfair business practices in the area of data security.").

141. *See generally* Protecting the Privacy of Customers of Broadband and Other Telecommunications Services, *Report and Order*, 31 FCC Rcd 13911, para. 2 (2016).

142. *See* DANIEL J. FAGNANT & KARA M. KOCKELMAN, PREPARING A NATION FOR AUTONOMOUS VEHICLES: OPPORTUNITIES, BARRIERS AND POLICY RECOMMENDATIONS 13 (2013), https://www.enotrans.org/wp-content/uploads/AV-paper.pdf [https://perma.cc/E5MD-GNRF]; Pyle, *supra* note 39.

143. David Shepardson, *U.S. Vows "Nimble, Flexible" Approach on Self-Driving Car Rules*, REUTERS (Dec. 17, 2015, 4:09 PM EST), http://www.reuters.com/article/us-regulations-autos-driverless-idUSKBN0U02XV20151217 [https://perma.cc/FYU3-NFDM].

144. *See, e.g.*, Alex DuFour, *Voice over Internet Protocol: Ending Uncertainty and Promoting Innovation through a Regulatory Framework*, 13 COMMLAW CONSPECTUS 471, 487 (2005) (describing the former state-based regulatory regime of voice over Internet protocol (VoIP) services as increasing uncertainty and compliance costs while decreasing innovation).

145. Putre, *supra* note 135. *But see id.* ("Sam Abuelsamid, an auto industry analyst for Navigant, said that overarching regulation for autonomous vehicles is 'premature' and what the government needs now is to develop 'some minimum performance standards for these systems that can be tested.'").

146. *See* Masunaga, *supra* note 61 ("Jean Shiomoto, director of the California DMV, . . . said . . . that the agency does not have the 'expertise on staff' and has relied on NHTSA for guidance and expertise in autonomous vehicle research.").

147. *Compare* Conor Dougherty, *California D.M.V. Stops Short of Fully Embracing Driverless Cars*, N.Y. TIMES (Dec. 16, 2015), http://www.nytimes.com/2015/12/17/technology/california-dmv-stops-short-of-fully-

ban testing of any driverless vehicle that is "smarter" than currently existing prototypes.[148] Such concerns counsel that federal regulators assume control, perhaps even going so far as to preempt state regulation under the Supremacy Clause of the U.S. Constitution.[149]

The new federal regulatory regime envisioned by this Note should therefore harness the strengths of disparate federal agencies rather than reinvent the proverbial wheel by creating a new agency or forcing an existing agency to leave its comfort zone. A dedicated consortium of government agencies should be created, either through executive order or congressional action, to facilitate the sharing of up-to-date industry information between different entities and to coordinate the crafting of targeted driverless car regulations. At a minimum, this consortium should include the NHTSA, the FTC, the FCC, NIST, and ITS, while other agencies and departments could join the group as circumstances and demands for expertise warrant.

Different agencies should take primary jurisdiction over different aspects of driverless car technologies, with fellow consortium members available to offer additional support. In line with its current jurisdiction over motor vehicle safety,[150] the NHTSA would have responsibility over the hardware aspects of driverless cars and vehicle-specific technologies such as vehicle-to-vehicle (V2V) communications.[151] The FCC would have responsibility over spectrum usage, including consumer protection regulations impacting wireless V2V communications.[152] The FTC could exert jurisdiction over most cybersecurity and data privacy areas, along with enforcement of other consumer protection measures in areas that may not be under FCC jurisdiction, such as onboard software and apps.[153] Meanwhile,

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embracing-driverless-cars.html [https://perma.cc/VA5J-XL7U], *with* Sarah Buhr, *A Proposed California Law Would Require Drivers for Driverless Cars*, TECHCRUNCH (Dec. 16, 2015), http://techcrunch.com/2015/12/16/a-proposed-california-law-would-require-drivers-for-driverless-cars/ [https://perma.cc/5DR7-XXMY].

148. Davies, *supra* note 61.

149. Dorothy Glancy, *Autonomous and Automated and Connected Cars – Oh My! First Generation Autonomous Cars in the Legal Ecosystem*, 16 MINN. J.L. SCI. & TECH. 619, 655 (2015) ("Under the Supremacy Clause . . . , such federal autonomous vehicle legislation could preempt varied state laws. . . . If a diversity of state laws regulating autonomous vehicles in different ways appears to stifle the development of autonomous cars, such national law might come under consideration.").

150. *See About NHTSA*, NHTSA, https://www.nhtsa.gov/about-nhtsa [https://perma.cc/86EK-HP4U] (last visited Feb. 21, 2017); *see also* Pyle, *supra* note 39 (citing NHTSA's exerting jurisdiction over V2V technology).

151. V2V communications are a crash-avoidance system in which vehicles sense distances from one another and warn drivers when a crash seems imminent. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., FACT SHEET: IMPROVING SAFETY AND MOBILITY THROUGH VEHICLE-TO-VEHICLE COMMUNICATION TECHNOLOGY 1 (2014), http://www.safercar.gov/staticfiles/safercar/v2v/V2V_Fact_Sheet_101414_v2a.pdf [https://perma.cc/LX8K-9B88].

152. *See* Pyle, *supra* note 39 ("The FCC regulates wireless communication standards used by autonomous vehicles.").

153. *See* Jason Wool, *FTC and FCC Sign Consumer Protection MOU*, ALSTON & BIRD: PRIVACY & DATA SECURITY BLOG (Nov. 30, 2015), http://www.alstonprivacy.com/ftc-and-fcc-sign-consumer-protection-mou/ [https://perma.cc/7ASP-8RKF].

NIST and ITS could continue their work, cooperating with private industry and consumer groups to formulate robust standards for driverless cars.[154]

That a collection of federal agencies would have a hand in regulating driverless cars does not detract from the effectiveness of regulating this industry, nor is this sort of concurrent jurisdiction unheard of. Certain aspects of driverless cars necessarily call for the jurisdiction or expertise of various agencies. For example, NHTSA and the FCC oversee driver-controlled connected vehicles, such as those equipped with GM's OnStar service.[155] While the NHTSA handles many of the vehicle safety implications, the FCC has jurisdictional control over the use of OnStar, most notably when the system transitioned from an analog to digital network in 2008.[156] Another instance of concurrent jurisdiction occurred between the NHTSA and the FTC during GM's ignition switch scandal in 2014.[157] While the NHTSA had responsibility for evaluating the safety of the ignition switch itself, the FTC ultimately probed the company's selling of "certified" used cars with the faulty equipment.[158] The FCC and the FTC have begun to cooperate and share responsibility over areas such as consumer protection, and even signed a memorandum of understanding cementing this relationship in 2015.[159] The two agencies have also engaged in enforcement actions in overlapping jurisdictional areas (but not regarding vehicles), such as when both agencies fined Verizon and Sprint for "mobile cramming," the billing of customers for unauthorized subscriptions and services.[160]

Given these and other past examples of overlapping and/or shared responsibility among multiple federal agencies, it is possible for these agencies to successfully work together in a coherent federal regulatory framework for driverless cars. As noted before, the NHTSA has already taken the lead on establishing guidelines for the burgeoning driverless car industry.[161] The NHTSA has also kept the door open for other agencies to join

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154. *See generally* FAGNANT & KOCKELMAN, *supra* note 142.

155. Peter Svensson, *Old Cell Network Going Off Air*, USA TODAY (Dec. 21, 2007), http://usatoday30.usatoday.com/tech/wireless/2007-12-21-analog-network_N.htm [https://perma.cc/2WYG-XYQF].

156. *Id.*

157. *See* Melissa Burden, *GM Faces FTC Investigation*, DETROIT NEWS (July 23, 2015, 7:35 PM EDT), http://www.detroitnews.com/story/business/autos/general-motors/2015/07/23/gm-faces-ftc-investigation/30567821/ [https://perma.cc/N5Y2-5BKR]; Bill Vlasic & Rebecca R. Ruiz, *Safety Agency Admits Missing Clues to G.M. Ignition Defects*, N.Y. TIMES (June 5, 2015), https://www.nytimes.com/2015/06/06/business/nhtsa-admits-missing-clues-to-gm-ignition-defects.html [https://perma.cc/JUG5-2NGN].

158. *See* Burden, *supra* note 157; Vlasic & Ruiz, *supra* note 157.

159. *FCC-FTC Consumer Protection Memorandum of Understanding*, FCC (Nov. 16, 2015), https://apps.fcc.gov/edocs_public/attachmatch/DOC-336405A1.pdf [https://perma.cc/9KNQ-C2RZ]. The MOU allows both agencies to exercise oversight over common carriers such as broadband providers and to engage in joint enforcement actions against violators of consumer protection regulations involving common carrier services. Wool, *supra* note 153.

160. Andre Revilla, *Verizon and Sprint Ordered to Pay $158 Million in Fines over Cramming Charges*, DIGITAL TRENDS (May 12, 2015, 2:17 PM), http://www.digitaltrends.com/mobile/verizon-sprint-cramming-charges/ [https://perma.cc/AX8R-6F6V].

161. Caygle, *supra* note 21.

the conversation and develop a workable policy.[162] Indeed, it is optimal to allow each of these agencies to share their expertise rather than confining all jurisdiction and responsibility within a single agency.

Detractors may argue that this system of shared responsibility can lead to duplicative action, inefficiency, or shirking by government agencies.[163] However, as stated above, these agencies already have overlapping jurisdiction over traditional human-controlled vehicles. While federal agency overlap in driverless car regulation may lead to some inevitable inefficiency compared to a single agency with overall control, such a coordinated system is far more efficient than having fifty different state jurisdictions potentially enact over fifty different regulatory regimes with little coordination.

B. Within a Federal Framework, States Should Be Allowed to Experiment with Some Regulation, and Private Industry Should Be Allowed to Engage in Some Self-Regulation.

Despite the appeal of a uniform law across the country, it is important to remember that driverless cars will be driving on state-paved roads, governed by state-based traffic laws, and subject to state-level consumer protection statutes. As time-tested laboratories of democracy and policy development, states are already leading the way in allowing and regulating driverless cars on their roads.[164] Even as a federal regulatory regime takes shape in the coming months and years, states should be able to exercise some power to enact innovative legislation in areas such as licensing and conditions of operation, consistent with their traditional powers and duties.[165]

However, state regulation should be limited, and most aspects of driverless car regulation should ideally be deferred to a federal framework.[166]

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162. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., "DOT/NHTSA POLICY STATEMENT CONCERNING AUTOMATED VEHICLES": 2016 UPDATE TO "PRELIMINARY STATEMENT OF POLICY CONCERNING AUTOMATED VEHICLES" (2016), http://www.nhtsa.gov/staticfiles/rulemaking/pdf/Autonomous-Vehicles-Policy-Update-2016.pdf [https://perma.cc/AGS4-J9KD] ("DOT/NHTSA will continue to work . . . with other governmental entities . . . to help ensure that this testing takes place in a way that protects safety on today's roads while increasing safety for tomorrow.").

163. *See* U.S. GOV'T ACCOUNTABILITY OFF., GAO-16-375SP, 2016 ANNUAL REPORT: ADDITIONAL OPPORTUNITIES TO REDUCE FRAGMENTATION, OVERLAP, AND DUPLICATION AND ACHIEVE OTHER FINANCIAL BENEFITS 9 (2016) (noting overlapping agency jurisdiction in financial market regulation, resulting in "regulatory processes [being] sometimes inefficient, regulators oversee[ing] similar types of institutions inconsistently, and consumers [being] afforded different levels of protection"); *see also* Jacob E. Gerson, *Overlapping and Underlapping Jurisdiction in Administrative Law*, 2006 SUP. CT. REV. 201, 214 ("Overlapping jurisdiction also creates a risk of shirking by both agencies when Congress observes only outcomes and not effort.").

164. *See* Clark, *supra* note 89; *see also Autonomous | Self-Driving Vehicles Legislation*, *supra* note 36.

165. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., PRELIMINARY STATEMENT OF POLICY CONCERNING AUTOMATED VEHICLES 10 (2013), http://www.nhtsa.gov/staticfiles/rulemaking/pdf/Automated_Vehicles_Policy.pdf [https://perma.cc/LL4C-B9GM].

166. *See id.* ("NHTSA has considerable concerns however about detailed state regulation on safety of self-driving vehicles . . . .").

As stated before, wayward or ill-considered rules by states crafted by poorly equipped lawmakers and regulators can chill progress in the entire industry. A well-functioning federal regulatory framework should create a fundamental baseline that binds the entire country, but allows states to tack on laws in areas within their traditional control, such as emissions.

On other issues, the private sector, rather than federal or state regulators, should take charge.[167] This is not new; automakers have already joined together and established the Information Sharing and Analysis Center to craft cybersecurity best practices.[168] These developments should be encouraged. As driverless cars rapidly evolve technologically, the snail-like pace of lawmaking and politics makes it impractical for regulators and lawmakers to keep up with the cutting edge of development. For example, with V2V communications, which implicate cybersecurity concerns,[169] there should be room for the private sector to sort out a wide variety of technological and logistical kinks and arrive at industry-wide standards, rather than having them mandated from above. Since the industry usually has more expertise than federal or state regulators,[170] a robust and flexible regulatory regime should allow informed and cooperative creation of widely-adopted industry standards, which in turn permit further innovation. This self-regulation can, and should, be done in collaboration with governmental agencies such as NIST and ITS, among others.

IV. NEW CYBERSECURITY AND PRIVACY REGULATIONS ARE NECESSARY TO PROTECT CONSUMERS AND PROMOTE FUTURE GROWTH.

Creating a federal regulatory consortium is only a start. Given the patchwork of federal cybersecurity and privacy laws in existence, robust regulations created by the proposed federal driverless car consortium will pave the best way forward in overcoming these collective action problems and growing this nascent technology industry.

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167. *Cf.* Pyle, *supra* note 39 ("[T]he United States auto industry has made a concerted effort to self-regulate.").

168. *Id.*; Ryan Beene, *Automakers Form Alliance to Bolster Cybersecurity*, AUTO. NEWS (Aug. 24, 2015, 12:01 AM), http://www.autonews.com/article/20150824/OEM06/308249985/automakers-form-alliance-to-bolster-cybersecurity [https://perma.cc/3PVF-WLX9].

169. Interfering with V2V communications can not only cause more collisions, but also capture crucial location data for surveillance or other purposes. *See* Todd B. Benioff, *Automakers Should Not Be Held Strictly Liable for V2V Hacks*, LAW360 (Oct. 29, 2014, 6:04 PM EDT), http://www.law360.com/articles/591695/automakers-should-not-be-held-strictly-liable-for-v2v-hacks [https://perma.cc/3FXJ-UE4U]; *see also* Jake Williams, *NHTSA Begins to Explore Vehicle-to-Vehicle Communications*, FEDSCOOP (Aug. 20, 2014, 11:42 AM), http://fedscoop.com/nhtsa-begins-explore-vehicle-vehicle-communications/ [https://perma.cc/RP95-XHYZ].

170. *See* Matt McFarland, *How Can We Make Sure That Driverless Cars Are Safe?*, L.A. TIMES (Dec. 22, 2015, 5:00 AM), http://www.latimes.com/business/technology/la-fi-1222-thedownload-driverless-car-safety-20151222-story.html [https://perma.cc/TP69-G2KL].

A. Cybersecurity Concerns Regarding Driverless Cars Should Be Addressed Through Regulatory Action.

Determining the cybersecurity risks of autonomous cars is difficult, and applicable cybersecurity laws "are among the most elusive of the many unknowns" when it comes to driverless car regulation.[171] Given the novelty of driverless vehicle technology, it is extremely hard to predict the exact threats that these cars will face. Analogizing threats to ordinary computers to those faced by connected and driverless cars is also problematic because a car's onboard computers require higher physical endurance thresholds with fewer opportunities for physical upgrades or software updates.[172]

Despite these difficulties, there are still ways to craft robust cybersecurity regulations that strike the balance between encouraging innovation and protecting consumers. Such regulations should aim for a "preventative medicine" approach by having manufacturers proactively protect a vehicle's onboard systems and create mechanisms for systems to self-diagnose potential problems.[173] For example, a regulation could require that systems critical to the safety and functions of a driverless car, such as brakes, run separately from entertainment or informational systems, such as navigation. Such a "partition" can limit the reach of malware and other threats that enter a car's systems.[174]

The proposed NHTSA model offers a useful guide for determining what cybersecurity regulations are important and how to best craft them.[175] For example, a driverless car has multiple entry points into its systems, such as Bluetooth, charging ports, GSM wireless signals, and many more.[176] There are also several ways in which a hacker can damage systems, such as tampering with data or denying service.[177] Understanding these variables may lead to regulations such as the separation of core systems, as explained in the context of "preventative medicine."[178] Another example of potential regulation is self-diagnosis, whereby an onboard system periodically monitors its status and warns drivers of any potential issues.[179] Given the vast number of entry points into a driverless car's systems, some basic capacity of a system to fix itself, or even to notify users to fix it, is necessary for reliable operation.[180] Also, if all else fails, driverless cars should have some means of

171. Glancy, *supra* note 149, at 684.

172. *See* Hiro Onishi, *Paradigm Change of Vehicle Cyber Security*, 4 INT'L CONF. ON CYBER CONFLICT 387 (2012) ("[T]he first difficulty of automotive electronics is that online software updates have not prevailed yet . . . . The second difficulty in vehicle cyber security is that automotive electronics have lower computational performance than ordinary computers, because of the high endurance (temperature, humidity, vibration and others) and longer vehicle life cycle (over 10 years) compared to a computers' one (average 3 years).").

173. *See id.* at 389.

174. *See id.*

175. *See generally* MCCARTHY ET AL., *supra* note 50.

176. *Id.* at 10 tbl.3.

177. *Id.* at 11 tbl.5.

178. *See* discussion *supra* Section IV.A.

179. *See* Onishi, *supra* note 172, at 389.

180. *See id.*

mechanical override to ensure passenger safety, such as braking and unlocking doors.[181] Such measures may alleviate consumer fears regarding a complete loss of control of potentially deadly machines.

Cybersecurity regulations issued by different government entities should nonetheless be coordinated through the proposed interagency consortium. For example, rules impacting V2V communications should be under the purview of the NHTSA, which has already taken steps toward regulating such technology in collaboration with private industry.[182] On the other hand, cybersecurity regulations surrounding apps in a car should be under the purview of the FTC, while the FCC and NIST can have some supporting roles to both the NHTSA and the FTC.

Existing federal laws can also offer limited help in alleviating this data security conundrum. The CFAA is the most prominent example.[183] Many cars today already have onboard computers to control their engines, transmission, brakes, and steering.[184] The integration of new technologies into driverless cars means even more computer modules, computer systems, and data storage units.[185] While there is no case law directly relating to unauthorized access to a car's electronic control unit (ECU), cellphones have been classified by some courts as "computers."[186] This expansion of the definition of "computer" serves as a good indication that the ECU can also qualify as a "computer."[187] Just as unauthorized access or use of cellphones leads one to a CFAA violation, unauthorized access or use of a vehicle's ECU could lead to a violation of the CFAA.[188] However, this law has been criticized as outdated and vague, and its potential application to driverless cars may present a double-edged sword.[189] Detractors charge that it may unintentionally stifle needed innovation if someone tinkers with a car's unit, even in furtherance of well-intentioned academic research.[190] At best, the CFAA serves as an inadequate patch until new driverless car-specific regulations are advanced.

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181. *Id.*

182. Williams, *supra* note 169; *see* discussion *supra* Sections III.A, B.

183. *See* Computer Fraud and Abuse Act, 18 U.S.C. § 1030 (2012).

184. *See* Dan Goodin, *Tampering with a Car's Brakes and Speed By Hacking Its Computers: A New How-To*, ARS TECHNICA (July 29, 2013, 10:43 AM), http://arstechnica.com/security/2013/07/disabling-a-cars-brakes-and-speed-by-hacking-its-computers-a-new-how-to/ [https://perma.cc/QS2M-FCK3].

185. Lisa Vaas, *Warning Issued by FBI over Dangers of Car Hacking*, SOPHOS: NAKED SECURITY (Mar. 21, 2016), https://nakedsecurity.sophos.com/2016/03/21/warning-issued-by-fbi-over-dangers-of-car-hacking/ [https://perma.cc/D6QV-H6MK].

186. *See, e.g.*, United States v. Kramer, 631 F.3d 900 (8th Cir. 2011).

187. Cheryl Dancey Balough & Richard C. Balough, *Cyberterrorism on Wheels: Are Today's Cars Vulnerable to Attack?*, AM. BAR ASS'N: BUS. L. TODAY (Nov. 2, 2013), https://www.americanbar.org/publications/blt/2013/11/02_balough.html [https://perma.cc/EN8M-2V8U].

188. *Id.*

189. *See* Jeff Kosseff, *Congress Looks at Car Hacking*, HILL (Oct. 26, 2015, 9:30 AM EDT), http://thehill.com/blogs/congress-blog/technology/257936-congress-looks-at-car-hacking [https://perma.cc/N55Q-R7Y6].

190. *Id.*

B. New Privacy Laws, Regulations, and Guidance Are Also Needed to Address Concerns Specific to Driverless Cars.

Like cybersecurity, yesterday's privacy laws are also woefully inadequate for the task of protecting today's consumers, let alone tomorrow's driverless cars.[191] These laws handle technology such as answering machines instead of smartphones, and intranet mail instead of apps.[192] Consumer protections take the hit as more people transition to newer technologies without appropriate safeguards against surveillance or government disclosure requests.[193]

However, it is also important to acknowledge and understand some countervailing interests. Companies have an interest to sell to potential customers, and they want detailed user information in order to target them with individualized advertising, similar to that encountered on the Internet and on social media.[194] Law enforcement has public safety in mind, along with national security at the federal level.[195] Governments have continually expressed interest in source-identifiable information to discover and stop threats to the public.[196] However, as the documents disclosed by former National Security Agency (NSA) contractor Edward Snowden have shown, there is immense public interest and desire in keeping collected metadata private from both government and business.[197] These concerns apply to driverless cars in much the same way that they do to personal data from cellphones, Internet use, and other forms of modern technology, suggesting that vehicular data may therefore be treated under similar legal principles.[198]

To balance these interests, this Note urges the adoption of privacy regulations by the proposed consortium based on the findings of the U.S. Government Accountability Office's (GAO) 2014 In-Car Location-Based Services report.[199] The report details ten connected car companies' commitments to privacy practices in disclosures, consent and controls, safeguards and retention, and accountability.[200] Respecting these commitments as industry-adopted best practices,[201] the proposed consortium

191. *See* Helft & Miller, *supra* note 110.

192. *See id.*

193. *See id.*

194. Kohler & Colbert-Taylor, *supra* note 57, at 122.

195. *See* Helft & Miller, *supra* note 110.

196. *See id.*

197. *See, e.g.*, Susan Page, *Poll: Most Americans Now Oppose the NSA Program*, USA TODAY (Jan. 20, 2014), http://www.usatoday.com/story/news/politics/2014/01/20/poll-nsa-surveillance/4638551/ [https://perma.cc/L3QS-ZSS2]; Daniel J. Galligan, *What About Private Sector Data Collection?*, U.S. NEWS & WORLD REP. (Jan. 4, 2014), http://www.usnews.com/opinion/blogs/world-report/2014/01/06/compared-to-private-sector-data-collection-nsa-surveillance-is-nothing [https://perma.cc/DM2Y-4Y8J].

198. Kohler & Colbert-Taylor, *supra* note 57, at 121.

199. *See generally* U.S. GOV'T ACCOUNTABILITY OFF., GAO-14-81, IN-CAR LOCATION-BASED SERVICES: COMPANIES ARE TAKING STEPS TO PROTECT PRIVACY, BUT SOME RISKS MAY NOT BE CLEAR TO CONSUMERS (2013).

200. *Id.* at 6–7 tbl.1.

201. *Id.* at 6 (citing U.S. GOV'T ACCOUNTABILITY OFF., GAO-12-903, MOBILE DEVICE LOCATION DATA: ADDITIONAL FEDERAL ACTIONS COULD HELP PROTECT CONSUMER PRIVACY

should enact regulations and further guidance to detail, cement, and build on these baselines and encourage industry compliance therewith. Such regulations should include: (1) requiring companies to disclose information regarding data collection, use, disclosure, and destruction; (2) requiring companies to gain consumer consent to use data; (3) laying out baseline metrics for storing data; and (4) crafting enforcement mechanisms for companies that breach these obligations. Formalizing these protections will help improve consumer perceptions and confidence regarding connected and driverless car technology.[202]

Statutory and regulatory restraints are also required in order protect consumer privacy and to hinder government agencies, such as the NSA and law enforcement, from overzealous collection of identifiable data. Legislation such as the Geolocational Privacy and Surveillance Act (GPS Act) have been proposed to curtail the government's collection of locational data from both cellphones and other sources, potentially including driverless cars.[203] Such efforts should continue in order to garner and cement consumer trust in emerging technologies such as driverless cars.

V. CONCLUSION

The world of driverless cars is still new, and many aspects of cybersecurity and privacy remain to be explored. Even today, decision makers in both government and private industry are grappling with how an impending brave new world should be regulated. To balance the competing needs of full-throated innovation and gradual integration with our lives, a robust federal regulatory framework with some state and industry participation will yield the flexibility and predictability that government, industry, and society need to help this this exciting new technology thrive.

(2012)) ("Mobile industry associations and privacy advocacy organizations have recommended practices that companies can take to better protect consumers' privacy; we determined that these recommended practices can be applied to the companies discussed in this report.").

202. *See* GAO-12-903, *supra* note 201, at 37 ("Without clearer expectations for how industry should address location privacy, consumers lack assurance that the aforementioned privacy risks will be sufficiently mitigated.").

203. *See* Geolocational Privacy and Surveillance Act, S. 395, 115th Cong. (2017); Geolocational Privacy and Surveillance Act, H.R. 1062, 115th Cong. (2017).

Rural Response: The Need for an Effective Rural FirstNet Network

Stephen Klein *

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I. INTRODUCTION

Imagine: an oil spill rapidly spreading in the wilderness, and a terrorist threat to a major urban area. Both are devastating in different ways. However, what groups these phenomena together is the need for swift and comprehensive responses from multiple first responder groups, allowing for a sustained, simultaneous response to multiple concurrent events. The flaw in not having an interoperable system, which allows for different agencies to effectively communicate during a response to a catastrophe, was demonstrated during the terrorist attacks of September 11, 2001, and during Hurricane Katrina in 2005. In both cases, the lack of interoperable public-safety communications hampered rescue efforts and the overall effectiveness of public safety operations.[1] The need for a unified response from public safety officials prompted Congress to create the First Responder Network Authority (FirstNet), which will encourage greater interconnectivity between multiple first responder agencies in the event of an emergency.[2]

Responding to emergencies is a critical part of a first responder's job.[3] Communication systems are essential for public safety officials such as police, firefighters, and paramedics to gather and share information during emergencies.[4] In an attempt to provide first responders with adequate communications support, Congress established FirstNet with the passage of the Middle Class Tax Relief and Job Creation Act of 2012.[5] Specifically, the Act established FirstNet as an independent authority within the Department of Commerce's National Telecommunications and Information Administration (NTIA), charged FirstNet with the establishment of a nationwide public-safety broadband network, and allocated billions of dollars for this public-safety broadband network's construction.[6] The Act directly provided resources, including both spectrum licenses and financial appropriations, for the establishment of a nationwide, interoperable wireless broadband network specifically for first responders.[7] The Act required the FCC to reallocate the "D Block," part of the 700 MHz band that had previously been allocated for commercial use, to FirstNet.[8] Specifically, FirstNet's license allows them to operate between 758-769 MHz and 788-799 MHz.[9] FirstNet was also granted a license to operate within the existing

1. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-15-407, PUBLIC-SAFETY BROADBAND NETWORK: FIRSTNET SHOULD STRENGTHEN INTERNAL CONTROLS AND EVALUATE LESSONS LEARNED 1 (2015) [hereinafter GAO-15-407].
2. *See* 47 U.S.C. §§ 1424, 1426 (2012).
3. *See* GAO-15-407, *supra* note 1, at 1.
4. *See id.*
5. *See* Middle Class Tax Relief and Job Creation Act of 2012, Pub L. No. 112-96, § 6204, 126 Stat. 156, 208 (2012).
6. *See id.* §§ 6201–6202, 6204, 6207, 126 Stat. at 206, 208, 215.
7. *See id.* §§ 6201, 6207, 126 Stat. at 206, 215.
8. *Id.* § 6201(a), 126 Stat. at 206.
9. GAO-15-407, *supra* note 1, at 10.

public safety broadband spectrum.[10] States may opt out and deploy their own networks should the FirstNet's nationwide broadband plan be unsatisfactory to them.[11]

FirstNet is required to charge fees that are sufficient to cover its operating expenses for each fiscal year.[12] Public safety users will be assessed these annual fees to use the public-safety broadband network, just as they would for commercial broadband networks.[13] With FirstNet's need to become self-funding, it is probable that the focus on existing coverage areas with higher potential subscriber fees will lead to rural areas being deprioritized or abandoned because there is little to no incentive to expend the resources necessary to create the infrastructure to cover those areas. FirstNet must ensure that a private partner does not deprioritize rural network expansion. It would be prudent for the federal government, such as Congress and NTIA, to evaluate the need to commit additional funds toward rural network expansion during the initial build-out phase, as well as the possibility of providing loans or subsidies to state and local governments to enable them to have the resources to acquire the equipment which is required to access the network. It is imperative that FirstNet maintain its fiscal independence in NTIA and that it remembers to follow through on its statutory duty to ensure that rural areas receive the same adequacy of coverage as their urban counterparts. Meeting this mandate will require increased cooperation with local authorities, and a realization that, while it may not be the most economically advantageous proposition, greater use of local rural network providers is necessary to ensure that rural first responders can effectively communicate and coordinate a response to rural disasters.

This Note explores ways in which FirstNet may practically approach the need for reliable infrastructure in rural areas. Section II will look at the current structure and trends in FirstNet. Section II will show why rural areas need a reliable system for their public safety officers and why it is problematic if FirstNet delays implementation of a network in rural areas. Section II will also address why FirstNet is prioritizing urban areas with their national networks and what steps may be taken to ensure that the statutory goal of a nationwide network for first responders is reached.

Section III will provide a plan to balance FirstNet's need to be self-funding with the reality that rural areas need coverage and do not have the subscriber base or additional financial resources necessary to encourage growth from a market perspective. Section III demonstrates the need for FirstNet to prioritize, or at the least not to deprioritize, rural network expansion and equipage during the early expansion phase to meet its statutory obligations. Section III also analyzes the competing factors that determine how monetary resources are spent and how they affect the policies of FirstNet. This assessment shows how FirstNet can better work

10. Middle Class Tax Relief and Job Creation Act of 2012 § 6201, 126 Stat. at 206.
11. *See id.* § 6302, 126 Stat. at 219–20.
12. *See* 47 U.S.C. § 1428(b) (2012).
13. GAO-15-407, *supra* note 1, at 5.

with state and local governments to ensure that there is sufficient cooperation to provide rural access, and additional resources provided where available. Lastly, Section III will discuss how FirstNet should look at the costs associated with rural areas as a necessary public service that does not necessarily need to be profitable to be successful.

II. BACKGROUND

A. Statutory Background

The Middle Class Tax Relief and Job Creation Act of 2012 (the Act) established numerous responsibilities for FirstNet, most of which relate directly to developing the nationwide public-safety broadband network.[14] First, FirstNet needs to "enter into agreements to use, to the maximum extent economically desirable, existing commercial, federal, state, local, and tribal infrastructure" to accomplish the overall goal of a national network.[15] Second, FirstNet must consult the appropriate local or federal authority to gain information about the best ways in which to implement the network.[16] Third, FirstNet must require that equipment for the public safety network be built using open, non-proprietary standards."[17] Fourth, FirstNet needs to be rolled out in deployment phases, each including separate rural coverage milestones.[18] FirstNet must issue Requests for Proposals (RFP) to build, operate, and maintain the network. [19] RFPs should include timetables for construction of the physical network and goals for network coverage areas and service levels.[20]

To accomplish these tasks, FirstNet is allowed to establish agreements with entities involved in the construction, management, or operation of the public safety network that allow access to the public safety network on a secondary basis for services other than public safety.[21] This allows individual commercial customers to access the network when it is not needed for priority first responder uses.[22] FirstNet can also create the technical and operational requirements for the public safety network, as well as how it should be managed and operated.[23] In establishing the infrastructure for the public safety network, FirstNet is required to include the following network components: a core network of data centers and other elements based on commercial standards that will provide connectivity between "the radio access network (RAN) and the public Internet or the

14. *See* Middle Class Tax Relief and Job Creation Act of 2012, Pub L. No. 112-96, § 6204, 126 Stat. 156, 208–09 (2012); *see also* GAO-15-407, *supra* note 1, at 5.
15. *Id.*
16. *Id.* at 2.
17. *Id.* at 5.
18. *Id.*
19. *Id.*
20. *Id.*
21. *See* 47 U.S.C. § 1428(a)(2)(B) (2012).
22. *See id.*
23. GAO-15-407, *supra* note 1, at 6.

Public Switched Telephone Network, or both," and RAN "cell-site equipment, antennas, and backhaul equipment, based on commercial standards," to support wireless devices operating on frequencies designated for public safety broadband.[24]

First responders across thousands of local departments "rely on thousands of separate, incompatible, and often proprietary land-mobile radio (LMR) systems for their mission-critical voice communications."[25] Often, these LMR systems lack interoperability, which prevents first responders from communicating with their counterparts in other agencies and jurisdictions who use differing systems.[26] FirstNet is "expected to support important data transmission (such as the vital signs of critically injured people and security-camera video feeds) and foster greater interoperability among public safety entities."[27] Devices connected to the FirstNet network will deliver interoperability between first responders, because "they will be using the same radio frequency band nationwide, and will be required to use the same commercially available standards."[28]

To accomplish these goals, Congress determined that FirstNet should utilize public-private partnerships in establishing, maintaining, and operating the network.[29] The purpose of the partnership is to assist FirstNet in becoming self-funding after the initial expansion phase.[30] The FirstNet board decided that the best way to create the network necessary to meet their statutory duties is to accept only national deployment offers.[31] One potential side effect of this approach is that it may reduce the ability of regional rural broadband providers to contribute toward the network.[32] Even before FirstNet decided to take a national approach, rural lawmakers were concerned about the role that rural operators would be able to play in ensuring that rural areas had adequate network coverage and equipment to make joining the national network a practical decision.[33] Additional budgetary concerns could substantially delay development of infrastructure necessary to cover the entire country.[34]

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24. 47 U.S.C. § 1422 (2012).
25. GAO-15-407, *supra* note 1, at 1.
26. *Id.*
27. *Id.* at 2.
28. *Id.*
29. 47 U.S.C. § 1426(b)(1)(B) (2012).
30. *See* 47 U.S.C. § 1428(a) (2012).
31. *See* Donny Jackson, *FirstNet Opts for Nationwide Acquisition Approach for Final RFP*, URGENT COMM. (Oct. 2, 2015), http://urgentcomm.com/ntiafirstnet/firstnet-opts-nationwide-acquisition-approach-final-rfp [https://perma.cc/UJN8-LN9S].
32. *See id.*
33. *See* Monica Alleven, *Lawmakers Cite Rural, Budget Concerns in FirstNet House Subcommittee Hearing*, FIERCE WIRELESS (June 18, 2015, 10:33 AM), http://www.fiercewireless.com/tech/story/lawmakers-cite-rural-budget-concerns-firstnet-house-subcommittee-hearing/2015-06-18 [https://perma.cc/856P-36HR].
34. *See* FIRSTNET, USE OF STATE AND LOCAL INFRASTRUCTURE, RURAL COVERAGE, "EARLY BUILDERS" AND PILOTS FAQS (2015), http://www.firstnet.gov/sites/default/files/Use%20of%20local-state-infrastructure%20FAQs%20v1_0.pdf [https://perma.cc/K6Y9-9PKB].

FirstNet received its initial $7 billion funding from Congress[35] for build-out of the public safety network and the establishment of FirstNet as a part of the government.[36] The funding for FirstNet is designated to come from spectrum auctions, although FirstNet was able to borrow $2 billion from the general treasury prior to the auctions being completed.[37] FirstNet is required to be self-funding beyond the initial $7 billion dollars, further complicating how it needs to allocate resources to procure a sufficient revenue stream and still fulfill its statutory duty to provide service to rural areas.[38] FirstNet must develop a business plan to ensure adequate funding for both the upfront costs, and the ongoing costs of operating the public safety broadband network.[39] With cost estimates ranging from $12–47 billion over the first ten years,[40] FirstNet faces the difficult task of balancing value added in terms of financial gain, and the need to cover under-served, but less lucrative, areas.

The national first responders core network will utilize 4G Long Term Evolution (LTE) technology to provide the umbrella backbone.[41] The RAN portion of the system will be used to connect to user devices, and comprehensive RAN planning will be necessary to provide optimal coverage to the entire population.[42] Because of the nature of a first responders network, it is imperative that there are adequate redundancies in the system to prevent an outage in the case of a major emergency.[43] According to the Public Accountability Office, "the network will initially support data transmissions and non-mission critical voice services, with mission-critical voice communications expected to be integrated in the coming years."[44]

Both federal and state agencies have concerns regarding the planned timeline for the development of nationwide network coverage.[45] Some of these concerns are focused on how to best facilitate communication and interagency cooperation in order to effectively share information on issues that hinder coordinated responses to emergencies.[46] Others are concerned about the need to use FirstNet to provide knowledge to rural safety workers

35. *See* GAO-15-407, *supra* note 1, at 10.
36. *See* 47 U.S.C. §§ 1424, 1426 (2012).
37. *See* 47 U.S.C. § 1427 (2012).
38. *See* 47 U.S.C. § 1428(b) (2012). *See also* GAO-15-407, *supra* note 1, at 10.
39. GAO-15-407, *supra* note 1, at 2.
40. *Id.* at 31.
41. *See The Network*, FIRSTNET, http://www.firstnet.gov/network [https://perma.cc/N347-8L9B] (last visited Oct. 30, 2016).
42. *Id.*
43. *Id.*
44. GAO-15-407, *supra* note 1, at 2.
45. *See* Colin Wood, *FirstNet Makes Progress, But Cost and Quality Concerns Remain*, GOV'T TECH. (May 18, 2016), http://www.govtech.com/public-safety/FirstNet-Makes-Progress-But-Cost-and-Quality-Concerns-Remain.html [https://perma.cc/C8XS-FECW].
46. *See* U.S. DEP'T OF HOMELAND SEC., NATIONAL EMERGENCY COMMUNICATIONS PLAN 13 (2014), https://www.dhs.gov/sites/default/files/publications/2014%20National%20Emergency%20Communications%20Plan_October%2029%202014.pdf [https://perma.cc/5U9F-54CS].

who are less prepared to handle hazardous materials than their better-funded and trained companions in the cities.[47] Still others are afraid that, without effective management and innovation, FirstNet will be unable to meet its desired goals and will ultimately fail, impacting most those least able to adjust.[48] These concerns have the potential to add additional costs to the rollout that need to be accounted for to enable a single interoperable network.[49]

B. Rural First Responders Face Unique Challenges

Because of sparse populations, rural safety workers are responsible for covering a larger area that has poorer infrastructure than urban centers, increasing the need for a reliable network to support them.[50] A lack of resources combined with long transportation times to hospitals and long intervals between dispatch and arrival lead pose a greater challenge in rural areas.[51] The combination of distance traveled and communications challenges are a major contributor to why rural citizens are far more likely to die from a trauma injury than their urban counterparts.[52] This more separated and sparser population has dissuaded many national broadband providers from being extensively involved in rural areas.[53] The increased cost of entry and the lower return on investment has led to a broadband network that is unreliable for rural first responders.[54] Additionally, the wide area of coverage and lack of interoperability between devices on different

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47. *See* PIPELINE & HAZARDOUS MATERIALS SAFETY ADMIN., MARCH 13, 2014 ROUNDTABLE: EMERGENCY RESPONSE SIMULATION PROCEDURES / CONSIDERATIONS 6 (2014), http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Hazmat/Emergency_Responder_Simulation_Procedures.pdf [https://perma.cc/TA7H-F5N2].

48. *See* Bill Schrier, *Will FirstNet Become the Next Healthcare.gov?*, GOV'T TECH. (Mar. 5, 2015), http://www.govtech.com/public-safety/Will-FirstNet-Become-the-Next-Healthcaregov.html [https://perma.cc/WMZ5-3L9Q].

49. *See* GAO-15-407, *supra* note 1, at 39.

50. *See id.* at 38.

51. *See* Jaclyn Cosgrove, *Rural vs. Urban: Understanding the Obstacles of Providing Emergency Care in Oklahoma*, OKLAHOMAN (Apr. 16, 2014 12:00 AM CDT), http://newsok.com/article/3977926 [https://perma.cc/L95L-MEK6].

52. *See* IND. STATE DEP'T OF HEALTH, TRAUMA IN RURAL AREAS IS A SPECIAL CONCERN 1, http://www.in.gov/isdh/files/Trauma_in_Rural_Areas.pdf [https://perma.cc/W7AN-PP74]; *see also* Emily Badger, *You're More Likely to Die a Violent Death in Rural America Than in a City*, CITYLAB (Jul. 24, 2013), http://www.citylab.com/crime/2013/07/youre-more-likely-die-violent-death-rural-america-city/6312/ [https://perma.cc/8KHB-87FH].

53. *See* Amy Nordrum, *Rural Broadband Access Still Lacking in U.S., Even as Remote Alaska Communities Connect*, INT'L BUS. TIMES (Feb. 18, 2015, 3:32 PM), http://www.ibtimes.com/rural-broadband-access-still-lacking-us-even-remote-alaska-communities-connect-1820070 [https://perma.cc/FG89-WPSK].

54. *See* Inquiry Concerning the Deployment of Advanced Telecomms. Capability to All Ams. in a Reasonable & Timely Fashion, & Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecomms. Act of 1996, as Amended by the Broadband Data Improvement Act, *2015 Broadband Progress Report and Notice of Inquiry on Immediate Action to Accelerate Deployment*, 30 FCC Rcd 1375, paras. 5–6 (2015); IAFF, BRIEFING ON INTEROPERABILITY AND COMMUNICATIONS ISSUES AND FIRSTNET 2 (2014), http://docplayer.net/storage/25/5147065/1488012925/cwQi_DNxomXjAxkiR7B0Ow/5147065.pdf [https://perma.cc/9ELB-MRJV].

frequencies has increased the difficulty of responses to natural disasters, environmental risks, and potential rescue situations.[55] While concerns about network overload in urban areas is a large part of the push for a national first responders network,[56] the risks posed to individual rural citizens, who are most likely to be impacted by the combination of unreliable networks and increased commercial activity in rural areas, is just as valid a governmental concern.

Additionally, with the recent increases in oil and natural gas production in rural states like North Dakota, there are ever-increasing chances of oil spills or other potential ecological disasters that require a large scale emergency response to contain.[57] While oil production in the Bakken fields in North Dakota has fallen below its peak production levels of around 1.2 million barrels a day in 2015, the total production is still over a million barrels a day, up from under 200,000 in 2007.[58] More production can lead to greater risk of environmental impact, through natural risks or human carelessness. [59] Because of the increased risk of wide-ranging ecological harm potentially posed by wildfires, oil spills, hazardous waste or chemical spills, among other potential disasters, it is imperative that the final FirstNet plan ensures that there will be adequate networks in place to allow for rural first responders to effectively communicate with outside agencies to quickly coordinate responses to prevent large-scale ecological disasters.

Further complicating the coordination of rural emergency event response is the reliance of rural areas on regionally-available Federal resources, such as Coast Guard stations, military and National Guard bases, firefighting stations, and other Emergency Support Function (ESF) nodes.[60] These nontraditional, nonlocally-managed resources are critical to rural response in a severe weather event or major hazard incident, such as an earthquake or large hazardous materials spill, but they operate voice and

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55. *See* IAFF, *supra* note 54, at 3.

56. *See* Brendan Sasso, *Why Police and Firefighters Struggle to Communicate in Crises*, ATLANTIC (Sept. 18, 2015), http://www.theatlantic.com/politics/archive/2015/09/why-police-and-firefighters-struggle-to-communicate-in-crises/457443/ [https://perma.cc/KL3K-Y8YG].

57. *See* N. SLOPE SCI. INITIATIVE, SCENARIOS FOR ENERGY AND RESOURCE DEVELOPMENT ON THE NORTH SLOPE AND ADJACENT SEAS (2014), http://www.northslope.org/media/doc/2014/Feb/GeoAdaptive_NSSI_Scenarios_Fact_Sheet_2014.01.22_1.pdf [https://perma.cc/YP3D-Q2GL].

58. *See* U.S. ENERGY INFO. ADMIN., DRILLING PRODUCTIVITY REPORT FOR KEY TIGHT OIL AND SHALE GAS REGIONS 3 (2016), https://www.eia.gov/petroleum/drilling/pdf/dpr-full.pdf [https://perma.cc/D24K-9UNC].

59. *See* Nicolas Kusnetz, *North Dakota's Oil Boom Brings Environmental Damage with Economic Prosperity*, SCI. AM. (June 7, 2012), https://www.scientificamerican.com/article/north-dakotas-oil-environmental-damage-economic-prosperity/ [https://perma.cc/N4S3-SRTA]; Emily Atkin, *"It Will Never Be the Same": North Dakota's 840,000-Gallon Oil Spill One Year Later*, THINKPROGRESS (Oct. 21, 2014), http://thinkprogress.org/climate/2014/10/21/3582480/north-dakota-spill-one-year-later/ [https://perma.cc/F8MR-S54Y].

60. *See* FED. EMERGENCY MGMT. AGENCY, UNIT 3: OVERVIEW OF FEDERAL DISASTER ASSISTANCE 4–8, http://training.fema.gov/emiweb/downloads/is7unit_3.pdf [https://perma.cc/MMA2-W2Q8] [hereinafter FEDERAL DISASTER ASSISTANCE OVERVIEW].

data communications on frequency bands assigned to their respective primary missions, not on the LMR frequencies operated by local law enforcement and traditional first responders.[61] To ensure a coherent command and response structure in rural areas, FirstNet also needs to consider how best to enable access to these critical but infrequent response forces in order to provide the necessary level of communications in rural areas. The more different organizations and first responder groups that are needed to respond to a widespread situation, the greater the potential risk of issues posed by a lack of interconnectivity among the different groups.[62]

Interconnectivity is important because events like wildfires or toxic spills in rural areas require a wider range of response and cooperation to protect areas from major impacts to the environment and real personal property. Often, emergency response tests are dictated by urban areas that assume resources that rural responders do not have, including but not limited to human and financial capital.[63] This leads to an inability to properly train rural responders for emergency situations, leading to a need for either greater technology for rural areas or better interconnectivity to allow better trained responders to assist with emergency responses.[64] Finally, because of the nature of activities that take place in rural areas, it is plausible that rural areas will be at greater risk of certain types of disasters that require mass responses.[65]

C. FirstNet's Prioritization of Urban Areas

Despite the risks posed from potential disasters in rural areas, FirstNet has so far prioritized urban centers for early network deployment. This is due to the potential for greater magnitude of deaths in urban areas and the need for a large, concentrated subscriber base in order to become self-funding.[66] In fact, the origins of FirstNet can be found in the uncoordinated response to 9/11 and following disasters that showed a weakness in

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61. *See* ARLINGTON COUNTY CONFERENCE REPORT: LOCAL RESPONSE TO TERRORISM: LESSONS LEARNED FROM THE 9-11 ATTACK ON THE PENTAGON 4 (2012), http://arlingtonva.s3.amazonaws.com/wp-content/uploads/sites/21/2014/04/2012-ARCO_Conf_Report.pdf [https://perma.cc/93DD-5UYG].

62. *See* FEDERAL DISASTER ASSISTANCE OVERVIEW, *supra* note 60, at 6–8.

63. *See* Diana Bryant, *Challenges of Rural Emergency Management*, HOMELAND1 (Apr. 8, 2009), http://www.homeland1.com/disaster-preparedness/articles/480917-Challenges-of-rural-emergency-management/ [https://perma.cc/FB2K-4QA3].

64. *See id.*

65. *See Rural Emergency Preparedness and Response*, RURAL HEALTH INFO. HUB, https://www.ruralhealthinfo.org/topics/emergency-preparedness-and-response [https://perma.cc/E8T4-9AAK] (last visited Oct. 31, 2016) (listing increased risks of disasters in rural areas such as power plants (including nuclear), military bases and missile launch facilities, dams, agricultural chemical facilities, food production and aquifers, transportation of hazardous materials, natural resource production).

66. *See* Sasso, *supra* note 56; Jessie Bur, *States Feel Left Out of FirstNet Development Process*, 21ST CENTURY STATE & LOCAL (June 21, 2016, 11:43 AM), https://www.21centurystate.com/articles/states-feel-left-out-of-firstnet-development-process/ [https://perma.cc/K82D-5BPP].

communications between first responders.[67] Even though most large cities have since been able to standardize communications between the first responders within each city, there can still be network overload issues in the wake of disasters like the Boston Marathon bombing that have harmed emergency responses.[68] While first responders may have some level of prioritization in these types of situations,[69] even on a normal weekday, their reliance on commercial networks can lead to congestion that disrupts their ability to do their job.[70] The risk of congestion provides a strong incentive to develop the first responders network in urban areas first given the increased usage in urban areas and the greater risk of large loss of life in an extreme event.[71] The priority nature of FirstNet is designed to prevent the general public from using the network during an emergency, allowing first responders to use the network without the aforementioned overload issues.[72]

Beyond the advantages in focusing on responding to multiple major emergency events in urban centers, FirstNet has a congressional mandate to be self-funding.[73] Fortunately, the FCC has consolidated rules in various categories so that the availability of equipment for FirstNet will be expedited, allowing FirstNet to deploy its proposed network faster so that it can collect fees sooner.[74] The total cost of building the network is estimated at somewhere between $10–15 billion, with FirstNet paying $6.5 billion of that sum.[75] This large gap will need to be filled by a private partner who will want to ensure that they have the greatest opportunity to maximize their investment through public-safety and critical-infrastructure customers and

67. *See* Stephen Lawson, *U.S. Plan for a Public-Safety Network Could Mean a Windfall for a Big Carrier*, COMPUTERWORLD (Jan. 15, 2016, 3:23 PM PT), http://www.computerworld.com/article/3023361/mobile-wireless/us-plan-for-a-public-safety-network-could-mean-a-windfall-for-a-big-carrier.html [https://perma.cc/FRC7-K47R].

68. *See* Michael B. Farrell, *Cellphone Networks Overwhelmed After Blasts in Boston*, BOSTON GLOBE (Apr. 17, 2013), https://www.bostonglobe.com/business/2013/04/16/cellphone-networks-overwhelmed-blast-aftermath/wq7AX6AvnEemM35XTH152K/story.html [https://perma.cc/6RVV-FW2L].

69. *See id.*

70. *See* Wood, *supra* note 45.

71. *See id.*

72. *See id.*

73. *See* 47 U.S.C. § 1428(b) (2012) ("The total amount of the fees assessed for each fiscal year pursuant to this section shall be sufficient, and shall not exceed the amount necessary, to recoup the total expenses of the First Responder Network Authority in carrying out its duties and responsibilities described under this subchapter for the fiscal year involved.").

74. *See generally* Nick Kokkinos, *In Re Implementing Public Safety Broadband Provisions of the Middle Class Tax Relief and Job Creation Act of 2012; Implementing A Nationwide, Broadband, Interoperable Public Safety Network in the 700 MHz Band; Service Rules for the 698-746, 747-762 and 777-792 MHz Bands*, 22 COMMLAW CONSPECTUS 230, 230 (2014).

75. *See* Jim Patterson, *Reality Check: Sprint Network Overhaul, AT&T Unlimited and FirstNet*, RCR WIRELESS NEWS (Jan. 19, 2016), http://www.rcrwireless.com/20160119/opinion/reality-check-sprint-network-overhaul-att-unlimited-and-firstnet-tag12 [https://perma.cc/25TS-WV7F].

secondary income from nonemergency users while the network is not being prioritized.[76]

D. Urban First Responders Have Inherent Advantages

Rural first responders are at an inherent disadvantage in relation to their urban and suburban counterparts. Major urban centers are better able to allocate resources to ensure that they have the necessary equipment to keep up with evolving response needs.[77] This allows municipalities that have more resources to dedicate to their first responders to spend money to adapt to a new technical system.[78] Conversely, rural counties are often more limited in the amount of resources that they have to spend on implementation of new or upgraded networks and equipment.[79] This difference can be seen be seen clearly from the fact that while 70 percent of career firefighters protect communities of 25,000 people or more, 95 percent of volunteer firefighters serve communities of fewer than 25,000.[80] This can pose an issue as agencies start to switch from a conglomeration of different frequencies that are used for first responders to the national band of frequencies reserved for public safety.[81] This switch may create a situation in which rural agencies are unable to allocate the necessary funds to procure the newer equipment necessary to be interoperable on the primary FirstNet network as well as on the required backup networks.[82] Therefore, federal and state governments need to ensure that there is adequate funding to supply rural first responders with the necessary equipment to transition into the national system and not be left behind.

Unfortunately, rural counties routinely have their interests ignored at state and federal government levels.[83] This often results in situations in which decisions about how to implement programs such as first responders systems are shaped by the influential urban centers without a large amount of input from rural areas.[84] Ensuring that there is adequate attentiveness to the unique needs of rural areas is necessary for the determinations about

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76. *See* Donny Jackson, *Wireless Carriers Are Key to Successful FirstNet RFP Bid. Which Are Interested?*, URGENT COMM. (Jan. 21, 2016), http://urgentcomm.com/blog/wireless-carriers-are-key-successful-firstnet-rfp-bid-which-are-interested? [https://perma.cc/P76P-LRCF].

77. *See* NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., CHARACTERIZING LOCAL EMS SYSTEMS 1, 32–34 (2013), https://www.nhtsa.gov/staticfiles/nti/pdf/811824.pdf [https://perma.cc/W3MU-SQZP].

78. *See id.*

79. *See* Alleven, *supra* note 33.

80. *See Responder News: Can We Do More for America's Rural Volunteer Firefighters?*, U.S. DEP'T HOMELAND SEC. (Sept. 20, 2016), https://www.dhs.gov/science-and-technology/news/2016/09/20/responder-news-can-we-do-more-americas-rural-volunteer [https://perma.cc/TP9A-S9YL].

81. *See* Sasso, *supra* note 56.

82. *See Challenges for Rural 911*, 911.GOV, http://www.911.gov/911-issues/challenges.html [https://perma.cc/SN8A-MS95] (last visited Oct. 31, 2016).

83. *See, e.g.*, Craig Anthony Arnold, *Ignoring the Rural Underclass: The Biases of Federal Housing Policy*, 2 STAN. L. & POL'Y REV. 191, 194 (1990); Alleven, *supra* note 33.

84. *See* Alleven, *supra* note 33.

how state plans are going to be shaped and whether the state decides to opt out of the national FirstNet program. Although this type of dynamic is not easily solved, it will be necessary for individuals who have an interest in seeing that there is an adequate response network in place to protect rural areas from disasters resulting in mass fatalities and injuries, and economic and ecological disasters, to put pressure on the decision makers to enable rural areas to be full participants in the FirstNet system.[85]

Finally, rural areas are at the greatest disadvantage in relation to urban and suburban areas in that they lack sufficient infrastructure to support the level of coverage that is necessary, thus requiring extensive infrastructure investment to meet the required levels.[86] While this is part of the problem facing rural communities, it can also be part of the solution. In rural areas, the needs of public safety users will be less, and thus, there is greater opportunity for commercial carriers to sell commercial services to the general public.[87] The final RFP attempts to serve the needs of rural first responders.[88] However, the RFP still poses the risk that the bid winner will ignore or delay infrastructure deployment in rural areas.[89]

To build an effective, interconnected first responders system, the government must recognize and equalize the inherent advantages enjoyed by urban first responders by protecting the interests of rural first responders. If there are significant advantages for urban and suburban areas in network deployment, the right and fair action is for FirstNet to actively promote the interests of rural communities, helping to compensate for the rural areas' historic lack of influence with telecommunications service providers. If the government does not deliberately act to ensure full development of rural first responders network capabilities, the national providers will not have sufficient incentive to develop the network in rural areas in a timely manner, if at all.

III. ANALYSIS

FirstNet must take steps to promote the timely and expansive build-out of the rural portion of the network to prevent it from being deprioritized in the completion of the system. First, during the evaluation of bids on the RFP, FirstNet must find a proposal that does not set minimal goals for rural network advancement. In doing so, FirstNet should ensure that the winning

85. *See* Kayla Nick-Kearney, *Lawmakers Worry FirstNet Won't Cover More Remote Areas*, FEDSCOOP (Jun. 21, 2016), https://www.fedscoop.com/local-input-still-a-concern-for-firstnet-stakeholders/ [https://perma.cc/3KQS-K8C8].

86. *See* Darrell West & Jack Karsten, *Rural and Urban America Divided by Broadband Access*, BROOKINGS: TECHTANK (July 18, 2016), https://www.brookings.edu/blog/techtank/2016/07/18/rural-and-urban-america-divided-by-broadband-access/ [https://perma.cc/6RZ5-R7F7].

87. Jackson, *supra* note 76.

88. *See* Donny Jackson, *FirstNet RFP Outlines Financial Penalties for Contractor, If Public-Safety Adoption Targets Are Missed*, URGENT COMM. (Jan. 15, 2016), http://urgentcomm.com/ntiafirstnet/firstnet-rfp-outlines-financial-penalties-contractor-if-public-safety-adoption-targets- [https://perma.cc/KQR7-JZ4W].

89. *See id.*

bid includes local and regional broadband providers in order to gain value from their expertise and existing infrastructure. Additionally, FirstNet must partner with state and local governments to use governmentally-controlled "dark fiber"[90] to provide additional backhaul[91] capabilities for the network, easing the workload on the wireless portions of the network. Congress may need to modify the self-funding requirements to assist with the initial deployment of the rural network infrastructure. FirstNet must be allowed discretion to upgrade their technology as needed without creating disparities between rural and urban/suburban first responders networks.

A. FirstNet Needs to Ensure that National Providers Do Not Take Advantage of the RFP

Despite the safeguards in the final RFP designed to protect rural interests, FirstNet needs to ensure that the prime contractor[92] does not neglect to adequately service rural responders. The RFP establishes that, if the contractor fails to reach more than 70% of its public safety adoption goal for a state or territory, it would be required to pay 100% of its maximum disincentive payment, an amount that ranges from $124.7 million to $178.3 million for that particular year and increases annually over a twenty-year period.[93] This percentage decreases to 44% of the maximum disincentive payment if 80% is reached and 15% if 90% is reached.[94] In addition to financial penalties for failure to meet public safety adoption goals, FirstNet may utilize a variety of remediation tools, including "recommending lower pricing or taking certain business functions from the contractor[,] with the contractor funding any replacement operations."[95]

FirstNet has not defined what public-safety adoption goals should be in its RFP, but instead, has allowed potential contractors, as part of their bid, to propose what they believe the appropriate public-safety adoption rate should be.[96] In evaluating the bids, FirstNet will consider the public safety

90. Dark fiber is unused fiber optic cables that have already been laid to create a fiber network to provide high speed Internet access. April Glaser & Corynne McSherry, *Neutrality Begins at Home: What U.S. Mayors Can Do Right Now to Support a Neutral Internet*, ELEC. FRONTIER FOUND. (Jun. 20, 2014), https://www.eff.org/deeplinks/2014/06/neutrality-begins-home-what-us-mayors-can-do-right-now-support-neutral-internet [https://perma.cc/6FTT-DEQZ].

91. Backhaul is the transportation of cell traffic from the cell tower to the core network. *See Backhaul Basics, A Definition: Network Experts Define Backhaul Networks*, RCR WIRELESS NEWS (May 13, 2014), http://www.rcrwireless.com/20140513/network-infrastructure/backhaul-network-definitions-cellular-backhaul-definition [https://perma.cc/ZEK7-TGCS].

92. The prime contractor is responsible to the owner of the job for the completion of a project, and often fulfills portions of its obligations through the use of job-specific subcontractors. *See Prime Contractor*, LAW DICTIONARY, http://thelawdictionary.org/prime-contractor/ [https://perma.cc/DEC6-SM67].

93. Jackson, *supra* note 88.

94. *Id.*

95. *Id.*

96. *Id.*

adoption targets that each bidder is required to propose.[97] If national carriers like AT&T and Verizon, who potentially have the most to gain from the FirstNet system, intentionally and jointly limit their proposed public-safety adoption rates in rural areas, it is unlikely that the disincentives will trigger. Ultimately, the decision on the bids and the responsibility to choose one that promotes the interests of rural customers lies with FirstNet. If this is accomplished, it will incentivize the national provider to work with the rural first responders to acquire the equipment necessary to reach rural coverage goals.

Because the FirstNet network is designed to provide priority access to first responders in the event of an emergency, the primary source of revenue for the program is designed to be from subscription fees paid by public safety entities and secondary users.[98] To provide an incentive for private partners, the wireless provider can use the spectrum for other commercial activities when the network is not being used for public safety services.[99] This is especially tantalizing for industry leaders who already face spectrum allocation caps because usage of the FirstNet spectrum does not count against the aforementioned caps.[100] However, in heavily urban areas, there is a risk that the constant need for first responders to have access to the FirstNet network will sharply limit the secondary, commercial potential for the network.[101] Rural areas, which have lower usage of emergency services and thus will take up less of the FirstNet's capacity, may have a greater opportunity for actual secondary usage and the corresponding commercial benefits.[102] This increased level of potential return on investment in rural areas could promote greater network infrastructure deployment in rural areas. This, in turn, could allow for greater reliability when first responders are needed to handle a potential disaster in rural areas, potentially saving many lives and livelihoods.

B. The Final FirstNet Plan Needs to Include Local and Regional Service Providers

To adequately serve rural areas in accordance with the statutory intent and the specific provisions required in the RFP, there needs to be a mixed partnership of local rural coverage providers and larger national carriers. Currently, even America's largest national broadband providers have large gaps in service in rural areas.[103] In order to build out a network that will provide the necessary service to rural first responders in a reasonable

97. *Id.*

98. *See* 47 U.S.C § 1428(b) (2012).

99. *See* 47 U.S.C. § 1428(a).

100. *See* Jackson, *supra* note 76.

101. *See* Donny Jackson, *Rural Carriers Interested in Partnering with FirstNet, But Urban/Suburban Opportunities Appear Limited, CCA's Berry Says*, URGENT COMM. (Jun 15, 2015), http://urgentcomm.com/public-safety-broadbandfirstnet/rural-carriers-interested-partnering-firstnet-urbansuburban-opportun [https://perma.cc/P5E2-XNEJ].

102. *See id.*

103. *See* Patterson, *supra* note 75.

timeframe, the accepted proposal needs to include local and regional providers who have the infrastructure in place to serve the areas that the national giants have neglected.[104] Additionally, because rural providers are interested in improving the scope of their local coverage,[105] having a collection of rural providers on the winning bid should help protect the needs of rural customers.

There is already significant infrastructure in place in urban areas,[106] potentially allowing for a less expensive rollout within those areas by a national carrier, who is likely to be the prime contractor on a winning bid on the RFP.[107] The national acquisition approach caters to national broadband providers, who have so far underserved rural areas,[108] to promote a specific part of FirstNet's mandate. If a winning contractor is not sufficiently contractually bound, the contractor may fall back into the habit of prioritizing urban areas at the expense of rural infrastructure. This potential risk of prioritization is partly why it is necessary for FirstNet to ensure that rural areas are not forgotten by the contract winner, allowing for real expansion of the rural portion of the network.

While a coalition that includes local rural providers may form to bid on FirstNet,[109] FirstNet must still ensure that the approved final plan takes advantage of existing rural infrastructure while expanding the network to provide more reliable coverage for emergency situations. One potential way in which this could work is if it turns out that rural communities are the only area where network providers can collect revenue from secondary uses of the spectrum. This potential source of revenue would incentivize a coalition to invest in the rural network infrastructure

It is important that FirstNet takes advantage of existing infrastructure in rural areas that can provide a base, if limited, for consistent network coverage in rural areas. This base can decrease expansion costs into rural areas and expedite a timelier deployment of a comprehensive network.[110] The final agreement should be friendly enough to the participating local and regional carriers to reduce the risk of nonperformance. The agreement must ensure that if the prime contractor can set the state integration goals, it does not set them at a level that is unworkable for the smaller regional providers, while also contractually requiring them to shoulder the risk for noncompliance.

The final deal should also stipulate that rural providers will have the funding to create the necessary rural networks and will be free from repercussions if they are unable to perform because of actions taken by the

104. *See* Donny Jackson, *Rural Carriers Still Trying to Assess FirstNet Opportunity*, URGENT COMM. (Oct. 11, 2015), http://urgentcomm.com/public-safety-broadbandfirstnet/rural-carriers-still-trying-assess-firstnet-opportunity [https://perma.cc/2E9H-B4LY].

105. *See id.*

106. *See* West & Karsten, *supra* note 86.

107. *See* Jackson, *supra* note 76.

108. *See* West & Karsten, *supra* note 86.

109. *See* Jackson, *supra* note 76.

110. *See* FIRSTNET, *supra* note 34.

lead national carrier. This can be accomplished through contractual agreements that limit the amount of liability that national broadband providers can shift to small rural providers for failing to adequately build out the rural portions of the network. Holding the prime contractor responsible for failures that it could have prevented should incentivize the contractor to use its superior resources to assist the local providers in rural network deployment. To prevent this from becoming a further disincentive for national contractors' proposed adoption goals, FirstNet must ensure that smaller providers are held at least partially responsible if they are the primary reason for failure in a region. If rural providers can use their current resources and have assistance in expansion, it will enable a more rapid deployment of the rural parts of the network, limiting the possibility of neglect later in the contract.

As an additional incentive to using local resources, there should be a state and federal partnership to find ways to use existing dark fiber to assist with communications backhaul for rural systems.[111] This will relieve pressure on the wireless communications network and further enhance economic viability of secondary use. Rural areas have not had the consumer demand to make fiber economically viable.[112] As a result, there are multiple instances of existing dark fiber in rural areas potentially available for repurposing by FirstNet.[113] Additionally, with the desire to grow municipal and community broadband, there has been a renewed effort by small communities to lay new dark fiber for potential use in community broadband networks in areas lacking existing infrastructure.[114]

A partnership between the federal government, state and local governments, and rural utility services who own the abandoned dark fiber is necessary to allow control of the fibers to be functionally vested in FirstNet. This would allow FirstNet to use the existing infrastructure to reduce the costs associated with the necessary buildout into rural areas. Having access to additional existing infrastructure to accomplish the necessary requirements of having sufficient reliability through data backhaul reduces the inhibitions that may be held about rural expansion. Local cooperation is essential both because local and state governments control parts[115] of the existing fiber infrastructure and because it is the state and local governments

111. *Project Overview*, FIRSTNET, http://www.firstnet.gov/content/project-overview [https://perma.cc/5DZG-MPTT] (last visited Oct. 31, 2016); *see* Anton Troianovski, *Optical Delusion? Fiber Booms Again, Despite Bust*, WALL ST. J. (Apr. 3, 2012, 11:52 AM ET), https://www.wsj.com/articles/SB10001424052702303863404577285260615058538 [https://perma.cc/VP8P-PMF6] (In the early 2000s, governments and some private investors paid for the installation of fiber-optic cable and other hardwiring infrastructure to expand communications access across the United States. However, Internet traffic did not grow as fast as expected and was hampered by slow deployment of "last mile" connections).

112. *See* Troianovski, *supra* note 111.

113. *See Project Overview*, *supra* note 111.

114. *See* Susan Crawford, *The Bright Future of Dark Fiber*, BACKCHANNEL (May 27, 2016), https://backchannel.com/these-cities-have-brightened-their-future-with-dark-fiber-dc89a5d6a1d2 [https://perma.cc/S385-3U63].

115. *See Community Network Map*, COMMUNITY NETWORKS, https://muninetworks.org/communitymap [https://perma.cc/8BAW-DBTD] (last updated October 2015) (showing local control of dark fiber in over 115 communities).

that ultimately decide whether to join FirstNet. By having wired data backhaul, there is additional available wireless network capacity that would otherwise need to be used for data backhaul.[116] This increases the availability and desirability of secondary uses on the network. This may create additional financial incentives for the buildout and help the service provider profit from the system while simultaneously helping FirstNet save money and be one step closer to its mandate of self-funding. Further, by encouraging rural communities to continue their current expansion of dark fiber, FirstNet can work directly with communities to establish a broadband service by ensuring that the fiber will be put to use. By partnering with rural providers and taking advantage of their existing infrastructure, and encouraging broadband expansion through dark fiber, rural network capacity should be rolled out in a more timely, cost-effective manner, allowing rural first responders to gain access to a reliable system sooner and thus, provide superior responses to events that otherwise might be more disastrous.

C. FirstNet Should Dictate that a Certain Amount of Initial Federal Funding Go to Rural Areas

FirstNet should require a certain percentage of the initial network development funds to be used to build the rural network from the start.[117] Because FirstNet's initial funding for the network breaks down to an average of around $125 million per state,[118] it is important to direct those limited resources towards those areas where commercial partners are inclined to overlook. There is no firm directive for where the funds are to be allocated, giving FirstNet the capability to direct the funds to the states and areas that need it the most. Without guidance, it is likely that large corporations, or state governments that are controlled by urban centers, will set goals and funding priorities for the urban areas.[119]

The twenty-five-year duration of the contract should provide primary carriers with enough time to try to monetize the investment in the spectrum space used for the network. However, if the annual cost of operations runs around $10–15 billion a year to operate,[120] it is possible that once the initial investment is spent, investment in lower return rural areas may be indefinitely delayed. Further, there is no guarantee that any of the smaller providers with vested interests in providing broadband access to rural areas

116. Christopher Mitchell, *Google Fiber Pauses – But No One Else Should*, COMMUNITY NETWORKS (Oct. 27, 2016), https://muninetworks.org/node/6478 [https://perma.cc/8ZM4-NJEF].

117. This is despite the fact that the $6.5 billion FirstNet is providing for initial network development is not nearly enough to complete construction of the network. *See* Patterson, *supra* note 75.

118. *See* Michael Myers, *FirstNet – A Rebuttal to FirstNet's Legal Interpretations. I Emphasize the Word "Buttal,"* MYERS MODEL (Oct. 22, 2015, 8:44 PM), http://advancingtelecom.blogspot.com/2015/10/firstnet-rebuttal-to-firstnets-legal.html [https://perma.cc/N6Z6-K38F].

119. *Id.*

120. *Id.*

will be viable in the future.[121] Therefore, it is necessary that some of the initial funding goes directly to network expansion and backup reliability to enable rural first responders to have an adequate network early enough to remain technologically close to urban areas. If the initial appropriated funding runs out without significant rural expansion, there may not be sufficient motivation to complete the development of rural network capabilities.

Instead, if FirstNet allows much of the initial investment to be made primarily in urban and suburban areas, it could lead to the failure to remedy the issues facing rural responders.[122] If FirstNet is serious about its mandate to provide a nationwide first responders network with significant rural capacity, then it needs to use some of the initial funding to ensure that there is at least a beginning of infrastructure deployment in rural areas that are at the greatest risk of harm from inadequate network coverage. These could include areas like North Dakota, which has had a significant expansion in its oil and gas production,[123] and similar areas that have seen increased risks of wildfires, hazardous material spills, or other potentially devastating disasters without seeing an increase in reliable network coverage. It is possible that investing early in major urban areas will prevent an increased loss of life during the initial deployment of the network.[124] However, because of the financial incentives associated with secondary uses in major population centers, a national service provider may already be incentivized to build out the network in urban areas early in the network deployment phase, potentially limiting the amount of lives that would be saved.[125]

If the limited initial funds are spent on areas where the national service provider would already be likely to heavily invest its resources, it would take resources from rural areas where future spending is less certain to chase a potentially limited return.[126] If this allocation of resources subsequently limits the expansion of FirstNet in rural areas, the network will be unable to address the interconnectivity issues that face rural responders without major investments from commercial partners.[127] If rural portions of the network are underfunded, then the growing risks associated with the lack of rural network coverage will be exacerbated in the future.

121. *See* Jackson, *supra* note 76.

122. *See generally* Bryant, *supra* note 63 (rural emergency management faces four primary challenges: resource limitation, separation and remoteness, low population density, and communication).

123. *See* U.S. ENERGY INFO. ADMIN., *supra* note 58, at 3.

124. *See* Alleven, supra note 33.

125. *See* GAO-15-407, *supra* note 1, at 31.

126. *See id*. at 35 ("One study has shown that a nationwide public-safety broadband network would generally be profitable in urban areas and unprofitable in rural areas.").

127. *Id*. at 33.

D. The Network Needs to Be Able to Adapt with Advances in Technology

Given the likely technological advances that will take place over the life of the contract, FirstNet must be able to adapt to such advances. The federal government is not known for being on the cutting edge of technology.[128] Currently, the network is designed to take advantage of existing 4G LTE technology.[129] The final deal should not only provide the primary contractor with the ability to update the network to take advantage of advances in wireless technology, but also provide the ability for the government to create incentives at some time in the future to update the network without the need for a future RFP. With 5G commercial wireless networks expected to be deployed in some form by 2017[130] and the FirstNet network expected to still be deploying through 2020, [131] the network will likely be outdated by the time it is deployed. This potential limitation has been thrown into sharper focus with the FCC allocating spectrum in July 2016 and the surrounding uncertainty of what exactly 5G will look like in the future.[132] Because the FirstNet contract is twenty-five years, if it is bound to current technology for the duration of that contract, by the time it would be possible to do a new RFP at the end of the contract, the network may have fallen significantly behind the pace of commercial technology.

If the network fails to, at a minimum, stay close to commercial broadband technology, it may create a situation in which rural first responders are again at a technological disadvantage. If major urban areas receive commercial upgrades to their networks first—as has been the general trend in broadband deployment—this could create a situation in which urban first responders are inclined to return to the commercial networks if they provide a superior service. If so, even if there is sufficient rural deployment of network capacity, the entire FirstNet system could come undone due to a lack of subscription fees from the urban population centers. Additionally, if the network is unable to adequately plan for technological growth across the network, the natural prioritization of urban

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128. *See, e.g.*, Ricardo Alonso-Zaldivar, *Government Wastes Billions of Dollars on Old Computers, Report Says*, PBS (May 25, 2016, 1:28 PM EST), http://www.pbs.org/newshour/rundown/government-wastes-billions-of-dollars-on-old-computers-report-says/ [https://perma.cc/YFU3-J76Q]; David Fahrenthold, *Sinkhole of Bureaucracy*, WASH. POST (Mar. 22, 2014), http://www.washingtonpost.com/sf/national/2014/03/22/sinkhole-of-bureaucracy/ [https://perma.cc/YM4M-VHNJ].

129. *See* FIRSTNET, *supra* note 41.

130. *See* Neal Ungerleider, *5G Wireless Is Coming . . . But What Is It, Anyway?*, FAST CO. (Oct. 26, 2015, 11:08 AM), https://www.fastcompany.com/3051626/elasticity/5g-wireless-is-comingbut-what-is-it-anyway [https://perma.cc/UF25-MMWR].

131. Joey Jackson, *When Will We See a Large-Scale FirstNet Deployment?*, RCR WIRELESS NEWS (Oct. 22, 2015), http://www.rcrwireless.com/20151022/network-infrastructure/when-will-firstnet-we-see-a-large-scale-firstnet-deployment-tag20 [https://perma.cc/EDX2-G8V2].

132. *See FCC Opens Millimeter Wave Spectrum for 5G*, COOLEY LLP (July 14, 2016), https://www.cooley.com/news/insight/2016/2016-07-14-fcc-opens-millimeter-wave-spectrum-for-5g [https://perma.cc/F79T-98GN].

areas could again lead to interoperability issues if urban areas are upgraded and rural areas stay at an inferior level of technology. Ensuring that there is sufficient incentive to have FirstNet keep pace with commercial technology will help guarantee that the network maintains top-level capabilities and that first responders in rural areas who become reliant on the network for coverage will not fall behind their urban counterparts who are more likely to receive infrastructure upgrades or use advanced commercial networks that are made available.

E. The Federal Government Needs to Accept That Rural Areas May Not Be Profitable

Due to the costs associated with creating and operating a rural broadband network,[133] the government needs to adjust its thinking about how revenue-neutral FirstNet should be during its initial deployment. Despite Congress's self-funding requirement, it may be impossible, even with an effective private partnership, to successfully accomplish both self-funding and nationwide coverage. The federal government must understand that if national commercial wireless providers have not been able to make an extensive rural broadband network profitable in the past, it is unlikely that FirstNet will either.

Instead, the FirstNet network should be viewed as a public utility, providing a critical service for the public benefit. The rural broadband network may not be profitable, but it serves a necessary public need.[134] The government should instead focus on broadband deployment in rural and tribal areas while profits, if any, accrue to private partners. This would require Congress to modify FirstNet's self-funding requirement and replace it with a de facto subsidy for the rural portions of the network. If the government is able to spend additional funds to enable the construction of the rural sections of the network, this will reduce the cost of entry for the broadband provider and incentivize the carrier to follow through with the necessary plans for rural broadband network.

Congressional action to amend the self-funding requirement that promotes subscriber base evaluations is one path to accomplish the necessary aspects of the framework. Doing this, at least in the initial buildout phase, would enable FirstNet to receive additional federal funding for the deployment of the rural network while also requiring the urban/suburban area networks to reach the initial self-funding goals for their section. If, after total network deployment, it becomes obvious that the FirstNet network will neither be profitable to a private partner nor self-funding for FirstNet, Congress may need to reexamine the self-funding

133. *See* FCC, A BROADBAND NETWORK COST MODEL: A BASIS FOR PUBLIC FUNDING ESSENTIAL TO BRINGING NATIONWIDE INTEROPERABLE COMMUNICATIONS TO AMERICA'S FIRST RESPONDERS 18 (2010), https://transition.fcc.gov/national-broadband-plan/broadband-network-cost-model-paper.pdf [https://perma.cc/M9MN-K472] (showing the costs of building and upgrading rural cell sites as roughly 76% and 50% more expensive than urban sites respectively).

134. *See supra* Sections C–D.

requirement to determine if it is necessary to provide additional yearly funding for the maintenance of the rural network as a critical public utility.

If the self-funding requirement is left completely untouched, it may end up being incompatible with the mandate to create a nationwide dedicated network for first responders. If urban and suburban areas are prioritized in the initial deployment with the intent of getting significant subscription fees early, it may further undermine the effort to build out rural networks. The costs associated with rural buildout may be significant enough that if FirstNet is just barely self-funding after initial deployment in urban and suburban areas, it may not be possible to effectively build a rural network without any additional funding or waiving self-funding provisions. Treating the rural portions of the network, especially during initial deployment, as an exception to the self-funding requirements will allow rural network deployment without forcing subscription fees to immediately match the costs of building a rural network from scratch.

IV. CONCLUSION

While there are several good reasons to ensure that urban centers receive early focus for FirstNet network deployment, there needs to be a concerted effort to ensure that rural first responders are not left behind. The natural commercial prioritization of a network led by a national provider will follow the national provider's current model: prioritizing large consumer bases in urban and suburban centers while functionally forgetting about those first responders in rural areas who have the greatest need for reliable wireless access. To accomplish sufficient rural network deployment FirstNet needs to proactively negotiate to ensure that there will not be a deprioritization of rural areas by private partners. Support of rural first responders can be accomplished by ensuring that there are regional providers with an emphasis on rural coverage as part of the winning bid team, a focus of initial funds on rural infrastructure, including partnerships to acquire additional infrastructure from unused dark fiber, and a fundamental philosophical change about how the rural network is viewed. Accomplishing these goals will enable rural first responders to have reliable communications, saving lives and reducing the risk of an environmental catastrophe.

Bridging Open Markets in the "Big Bandwidth" Era: A Blueprint for Foreign Broadband Internet Deployment

Qiusi Yang *

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I. INTRODUCTION

Do you need a Federal Pizza Commission to control how to have a piping hot pizza delivered – in small, medium, or large size?[1] The former Chairman of the Federal Communications Commission (FCC), Reed Hundt, agrees with you: "No one thinks that pizzas are best delivered by a single monopoly."[2] Like pizza, "no one should think that personalized home or business bandwidth needs are best served by the old regime of regulated monopoly."[3] To deliver better pizza on the global information highway, on September 27, 2015, the U.S. Department of State unveiled a new initiative called "Global Connect" with the objective of bringing 1.5 billion people online by 2020.[4] Through this initiative, the U.S. government will work with other national governments, development agencies, nongovernmental organizations, and the private sector to acknowledge the economic importance of Internet access and integrate this goal into their countries' development strategies.[5] Under this initiative, people in developing countries will also be able to get anything they want on their "big bandwidth networks" —through voice, image, text, or data in any other combination.[6]

The announcement of the Global Connect broadband deployment initiative opens a discussion over the FCC's regulatory authority: while the FCC currently has presumptive regulatory authority over broadband deployment pursuant to Section 706 of the Telecommunications Act of 1996, this authority only covers broadband services in the United States, requiring the FCC to rely on other treaties, regulations, and rules to govern U.S. companies' entry into foreign markets.[7] Because of the involvement of foreign states' own regulatory interests, the Global Connect initiative and the anticipated direct investment projects will require the FCC to employ different rules and policies on U.S. basic telecommunications service providers and suppliers.[8]

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1. *See* Reed Hundt, Chairman, FCC, Remarks at Convergence or Collision: Telecommunications Regulation and the Internet (Mar. 7, 1997), https://transition.fcc.gov/Speeches/Hundt/spreh712.html [https://perma.cc/5AMB-EA27].
2. *Id.*
3. *Id.*
4. *See* Media Note, U.S. Dep't of State, U.S. State Department Launches Global Connect Initiatives at UNGA (Sept. 27, 2015), http://www.state.gov/r/pa/prs/ps/2015/09/247374.htm [https://perma.cc/8PYQ-UYFV].
5. *See* Catherine A. Novelli, Under Sec'y for Econ. Growth, Energy, & the Env't, U.S. Dep't of State, Remarks at the United Nations: Development in the Digital Age (Sept. 27, 2015), http://www.state.gov/e/rls/rmk/247375.htm [https://perma.cc/9YFM-8KSU].
6. Hundt, *supra* note 1.
7. *See* Telecommunications Act of 1996 § 706, 47 U.S.C. § 157 (2012). Such authority covers broadband services, "interstate communications, and international communications involving an [endpoint] in the United States." John P. Jenka, *Changing Federal Policies in Response to the Broadband Revolution*, N.J. LAW., Oct. 2012, at 21.
8. *See generally* Rachel Rosenthal, *United States v. Mexico: The First Telecommunications Challenge Confronting the World Trade Organization*, 10 COMMLAW CONSPECTUS 315, 334–35 (2002).

At the international level, the Basic Telecommunications Agreement (BTA),[9] entered into force in 1997, is the first concerted effort by sixty-nine members of the World Trade Organization (WTO), including the United States, to welcome foreign competition into some or all of their basic telecommunications service markets.[10] This agreement differed from earlier treaties[11] by providing sanctions to enforce compliance, mandating the development of operational services as well as breaking up legal monopolies on "infrastructure, standardized services, terminal equipment, and type approval" in each signatory's telecommunications market.[12] Two decades later, the United States has only experimented open telecommunications market in a four-year-long WTO dispute resolution in *United States v. Mexico*[13] and a FCC authorization of license application in *Telefonica Order and Authorization*.[14] As of today, the regulatory model set by the Telecommunications Act of 1996 has not been fully tested, even as U.S. Internet service providers,[15] one of the stakeholders under Global Connect, will soon advance into foreign markets to provide terminal equipment and operational services.[16]

This Note explores how the FCC should exercise its regulatory authority over U.S. companies' involvement in the provision of terminal equipment, operational services, and monetary assistance or capital contribution under a foreign host country's competition laws and policies. Section II of this Note describes the BTA commitments and other WTO obligations that the United States may utilize when negotiating with other WTO member states, as well as the regulatory impediments that U.S. company AT&T faced in providing long-distance calling services under Mexico's interconnection rate regulations. This Section examines the historical context of how the FCC's current regulations on foreign carriers' entry into U.S. telecommunications market may serve as a model to propose reciprocal treatment when negotiating investment agreements under the WTO framework. Section III discusses how the FCC – an expert agency well-positioned to regulate, implement, and remedy U.S. companies – is fulfilling the WTO commitments of the United States and how the post-BTA

9. Fourth Protocol to the General Agreement on Trade in Services, Apr. 30, 1996, 36 I.L.M. 366, WTO Doc. S/L/20 [hereinafter Fourth Protocol].

10. Rosenthal, *supra* note 8, at 315.

11. Earlier treaties include the Treaty Establishing the European Economic Community, art. 85, Mar. 25, 1987, 298 U.N.T.S. 3, and the Constitution and Convention of the International Telecommunication Union, Oct. 2, 1947, 63 Stat. 1399, 30 U.N.T.S. 316.

12. For the history of earlier treaties, see Amy Lin, Comment, *Telecommunications Competition in the European Union after* France v. Commission – *The Terminal Equipment Case*, 9 CONN. J. INT'L L. 355, 356 (1994).

13. Panel Report, *Mexico – Measures Affecting Telecommunications Services*, WTO Doc. WT/DS204/R (adopted Apr. 2, 2004) [hereinafter *United States v. Mexico Panel Report*].

14. Telefonica International Wholesale Services USA, Inc. (Lead Applicant) et al., *Order and Authorization*, 29 FCC Rcd 496, para. 1 (2014) [hereinafter Telefonica Order and Authorization].

15. Under U.S. domestic law, "Internet" refers to the "international computer network of both federal and nonfederal interoperable packet switched data networks." 47 U.S.C. § 230(f)(1) (2012).

16. *See* Novelli, *supra* note 5.

telecommunications market pressures developing countries into offering reciprocal treatments. Finally, this Note concludes that in carrying out negotiations with developing countries under common WTO commitments, the FCC should form a coalition with newly industrialized countries when proposing reciprocal procompetitive regulations and establishing competition safeguards.

II. BACKGROUND

The Internet is an essential element of every country's infrastructure, but even today, open and secure Internet access remains a great challenge for nearly sixty percent of the world's population.[17] Article 19 of the Universal Declaration of Human Rights provides: "Everyone has the right to . . . seek, receive and impart information and ideas through any media and regardless of frontiers."[18] Statistics have shown a positive correlation between a country's gross domestic product and its Internet penetration.[19] Internet access is also a modern form of free speech.[20] With the Internet shortening the distance for all aspects of service provision, restrictions, and limitations on Internet interconnection,[21] a monopoly on Internet infrastructure is a nontariff barrier to economic growth in today's global market and defeats the Internet's purpose as an equal-access, nonexclusive platform for communication, collaboration, innovation, productivity, and improvement.[22] An ongoing clash with different countries' regulatory regimes and cross-border network providers' appeal to a laissez-faire global market, therefore, call for a procompetitive regulatory regime.

Over the last three decades, the United States has taken the lead on efforts to privatize telecommunications services.[23] With the passage of the

17. Lulu Chang, *On the Web Right Now? You're in the Minority - Most People Still Don't Have Internet*, DIGITAL TRENDS (Sept. 24, 2015, 2:02 PM), http://www.digitaltrends.com/web/4-billion-people-lack-internet-access/ [https://perma.cc/EDC8-4PA7].

18. G.A. Res. 217 (III) A, art. 19, Universal Declaration of Human Rights (Dec. 10, 1948).

19. *See* Novelli, *supra* note 5 ("For every ten percent increase in a country's Internet penetration, its GDP expands by one to two percent.").

20. *See* Ivar A. Hartmann, *A Right to Free Internet? On Internet Access and Social Rights*, 13 J. HIGH TECH. L. 297, 302 (2013).

21. Interconnection refers to "linking with suppliers providing public telecommunications transport networks or services in order to allow the users of one supplier to communicate with users of another supplier and to access services provided by another supplier." United States Schedule of Specific Commitments: Supplement 2, § 2.1, WTO Doc. GATS/SC/90/Suppl.2 (Apr. 11, 1997) [hereinafter U.S. Commitments Schedule].

22. *See* ORG. FOR ECON. CO-OPERATION & DEV., SHAPING POLICIES OF THE FUTURE OF THE INTERNET ECONOMY 4 (2008), http://www.oecd-ilibrary.org/docserver/download/230388107607.pdf [https://perma.cc/N67B-8A4B].

23. Janet Abbate, *Privatizing the Internet: Competing Visions and Chaotic Events, 1987-1995*, IEEE ANNALS HIST. COMPUTING, Jan.–Mar. 2010, at 10, 14–17 (discussing the U.S. National Science Foundation's role in initiating Internet privatization of the telecommunications industry under the Reagan administration); Sean P. Gorman & Edward J. Malecki, *The Networks of the Internet: An Analysis of Provider Network in the USA*, 24

BTA, the FCC concluded that its previous "effective competition opportunity" (ECO) test resulted in unnecessary time and regulatory burden for foreign carriers entering the U.S. market.[24] As a result, the FCC adopted an "open entry" standard.[25] The FCC's modification on market access policies, however, does not universally apply to all foreign countries; it is reserved for WTO members only.[26] Despite the FCC's liberalization efforts, U.S. companies, in contrast to their foreign counterparts, are not guaranteed nondiscriminatory treatment under different host countries' regulatory regimes.[27]

A. The Basic Telecommunications Agreement Has Allowed the United States Access to Foreign Telecommunications Service Markets, But It Is Probable Most Developing Countries Will Not Agree to Incorporate Global Connect's Procompetitive Regulatory Principles by 2020.

In response to numerous countries' appeals to open market access in basic telecommunications, the BTA was concluded in 1997 to implement procompetitive regulatory principles to promote competition, connectivity, universal service, transparent licensing practice, independence of the regulator, and efficiency in source allocation."[28] The BTA places emphasis on market access for delivery of telecommunications services in cross-border trade.[29] Under the BTA, "market access means more than just a removing of barriers," it means making the entrance of telecommunications services an enforceable right.[30] As a result, the BTA removed many obstacles in the market for cross-border services, including broadband Internet services, by entrusting domestic networks to foreign carriers and providing assurance against expropriation.[31]

The United States began its procompetitive regulatory experiments in the long-distance services market after the divestiture of AT&T in 1982, a

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TELECOMM. POL'Y 113, 115 (2000) (discussing the role of the U.S. while the world's telecommunication networks shifted into private control).

24. Rules and Policies on Foreign Participation in the U.S. Telecommunications Market, *Report and Order and Order on Reconsideration*, 12 FCC Rcd 23891, paras. 9, 35 (1997) [hereinafter *1997 Foreign Participation Order*].

25. *Id.*

26. "In addition to requiring that non-WTO markets satisfy the equivalency [analysis] . . . on the U.S.-non-WTO route, the [FCC] also required that non-WTO markets satisfy . . . [certain] settlement rates for at least fifty percent of the settled U.S.-billed traffic." Rules and Policies on Foreign Participation in the U.S. Telecommunications Market, *Order on Reconsideration*, 15 FCC Rcd 18158, para. 7 (2000) [hereinafter *2000 Foreign Participation Order*]; *1997 Foreign Participation Order*, *supra* note 24, at paras. 15, 34, 36–40.

27. Peter Cowhey & Mikhail M. Klimenko, *Telecommunications Reform in Developing Countries After the WTO Agreement on Basic Telecommunications Services*, 12 J. INT'L DEV. 265, 268 (2000).

28. *Id.* at 356–57.

29. Cowhey & Klimenko, *supra* note 27, at 266.

30. *Id.* at 277.

31. *Id.* at 266; Alissi, *supra* note 38, at 490–91.

decade before the negotiation of the BTA.[32] After the BTA, the United States agreed to open its basic telecommunications service market to foreign suppliers to compete in "local, long distance[,] and international telecommunications services, provided either on a facilities-basis or through resale."[33] In return, the United States gained counterpart access to sixty-eight other members, including virtually all major U.S. international trading partners.[34] In addition to open access, the United States, along with sixty-four of these members, has attached the Reference Paper to the BTA "to enforce fair rules of competition for basic telecommunications services."[35] These Reference Papers put effective interconnection rules and the need to separate the regulator from the operator at their core.[36]

BTA negotiations are conducted within the GATS framework.[37] The BTA has a schedule of commitments from individual countries as an attempt to comply with the GATS principles, namely the requirement of national treatment and a number of market access provisions.[38] The GATS requires that WTO members provide "most-favored-nation" (MFN) treatment[39] to service providers from other WTO members.[40] The MFN principle, intended to prevent discrimination in trade and investment agreements, made many countries reluctant to open their market when they could not selectively close their market later to countries whose WTO commitments do not offer reciprocal treatment.[41] All member states are required to undertake the MFN obligation regardless of their individual level of participation in basic

32. ROBERT W. CRANDALL, BROOKINGS INST., THE AT&T DIVESTITURE: WAS IT NECESSARY? WAS IT A SUCCESS? (2007), http://www.justice.gov/atr/att-divestiture-was-it-necessary-was-it-success [https://perma.cc/AP7P-Y2CG].

33. Fourth Protocol, *supra* note 9.

34. Rules and Policies on Foreign Participation in the U.S. Telecommunications Market, *Order and Notice of Proposed Rulemaking*, 12 FCC Rcd 7847, para. 1 (1997) [hereinafter *1997 Proposed Foreign Participation Order*] (predating the *1997 Foreign Participation Order*).

35. *Id.* at para. 2; *see also* Stefan M. Meinsner. *Global Telecommunications Competition a Reality: United States Complies with WTO Pact*, 13 AM. U. INT'L L. REV. 1345, 1354–55 (1998) (explaining that the Reference Paper is a model instrument defining the form of basic telecommunications regulation, highlighting conducts that would warrant regulation, and outlining the types of anticompetitive behavior against which a WTO member must guard).

36. Cowhey & Klimenko, *supra* note 27, at 274.

37. *See* World Trade Organization, Ministerial Decisions of 15 December 1993, 33 I.L.M. 144 (1994) ("Negotiations shall [be] entered into . . . within the framework of the General Agreement on Trade in Services.").

38. John J. Alissi, Comment, *Revolutionizing the Telephone Industry: The World Trade Organization Agreement on Basic Telecommunications and the Federal Communications Commission Order*, 13 CONN. J. INT'L L. 485, 487–88, 490 (1999) (citing John H. Harwood II et al., *Competition in International Telecommunications Services*, 97 COLUM. L. REV. 874, 883 (1997)).

39. General Agreement on Trade in Services art. II, para. 1, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, Annex 1B, 1869 U.N.T.S. 186 [hereinafter GATS] ("With respect to any measure covered by this Agreement, each Member shall accord immediately and unconditionally to services and service suppliers of any other Member treatment no less [favorable] than that it accords to like services and service suppliers of any other country.").

40. Fourth Protocol, *supra* note 9.

41. *Id.*

telecommunications negotiations.[42] Although member states are permitted to give particular states less than MFN treatment, they are still obligated to "ratchet up" commitments under the MFN clause once they offer any other investor better treatment.[43] In order to comply with this obligation, members must publish "all international agreements that affect trade in services as well as 'all relevant [domestic] measures of general application, which pertains to or affect' the provision of services."[44] If utilized properly, free trade agreements (FTA) may be the ideal tool to come to terms with developing countries' reluctance to making BTA commitments.

At the negotiation table, developed countries often prioritize investments in advanced networking when negotiating for cross-border infrastructure development because foreign suppliers offer lower cost, higher efficiency, and more flexible telecommunications services as compared to their traditional state-owned monopoly counterparts.[45] Increased volumes and global mobility in the trade of goods and services has made it possible to demand for "even more sophisticated services at lower price" at regional level.[46] In contrast, developing countries fear the potential financial fallout during the adjustment period because "incumbent . . . companies were very significant features in their national stock markets."[47] Due to this ambivalence, developing countries were more reluctant to join the competition reform.[48] In addition, because of "a combination of inexperience, rapidly changing global conditions, and the difficulties of forging a political consensus on optimal policies" to transition to a competitive marketplace, countries have been tempted to prolong monopoly when privatizing the telecommunications market.[49] Despite these tensions, the newly industrialized countries' participation in the BTA negotiation strongly pushed forward the liberalization of telecommunications markets.[50]

42. Rosenthal, *supra* note 8, at 318.
43. *Id.* at 318; Cowhey & Klimenko, *supra* note 27, at 268.
44. Rosenthal, *supra* note 8, at 319 (citing GATS, *supra* note 39, at art. III, para. 1).
45. Cowhey & Klimenko, *supra* note 27, at 267.
46. *Id.*
47. *Id.*
48. During the Uruguay Round negotiations in 1994, "the industrial countries feared a two-tier market would emerge – general competition in industrial countries and a blend of privatization and very limited competition in developing countries." *Id.*
49. *Id.* at 278.
50. *Id.*

B. World Trade Organization Members Who Have Not Yet Committed to the Basic Telecommunications Agreement Are Free to Liberalize Their Markets on a Sector-by-Sector, Mode-by-Mode Basis Under the General Agreement on Trade in Services.

All WTO members are, at a minimum, bound by a certain level of obligations upon their accession to the WTO.[51] WTO member states who have not yet committed to the BTA bear the obligations to publicize their regulatory process, to refrain from discriminating between domestic and foreign suppliers, and to be legally bound by market access commitments.[52] Signatories of the BTA bear more obligations, but are not required to open their telecommunication transport networks or services fully to other members.[53]

The GATS constitutes an integral part of the WTO framework that is essential to ensure the opening of global markets.[54] As such, both the main body and the Annex of the GATS are applicable to every WTO member.[55] The GATS, like other WTO frameworks, "operates on three levels: the main text containing general principles and obligations; annexes dealing with rules for specific sectors; and individual countries' specific commitments to provide access to their markets."[56] The 1993 Annex on Telecommunications, however, contained no general commitments or principles with regard to the degree of liberalization of each member state's telecommunications markets.[57] Instead, under the 1993 Annex, member states are empowered to set individual standards, licensing requirements, and other qualification matters.[58] The current standard of liberalization of telecommunications is then established through approximately 100 schedules of commitments filed in the past two decades, including individual specific commitments under Articles XVI (Market Access), XVII (National Treatment), and XVIII (Additional Commitments).[59] The United States, like many WTO members, also made additional commitments in a "Reference Paper" that lays out "a set of procompetitive regulatory principles applicable to the telecommunications sector."[60] These specific commitments are grouped by service sector and by

51. *Handbook on Accession to the WTO: Introduction and Summary*, WTO, https://www.wto.org/english/thewto_e/acc_e/cbt_course_e/intro_e.htm [https://perma.cc/QU9H-M5GY] (last visited Nov. 14, 2016).

52. *See* Cowhey & Klimenko, *supra* note 27, at 280.

53. *See* Keven C. Kennedy, *A WTO Agreement on Investment: A Solution in Search of a Problem?*, 24 U. PA. J. INT'L ECON. L. 77, 124 (2003).

54. *United States v. Mexico Panel Report*, *supra* note 13, at 141; Alissi, *supra* note 38, at 489.

55 . *United States v. Mexico Panel Report*, *supra* note 13, at 139.

56. Alissi, *supra* note 38, at 488.

57. *Id.*

58. *Id.*

59. *United States v. Mexico Panel Report*, *supra* note 13, at 139; Alissi, *supra* note 38, at 489.

60. *United States v. Mexico Panel Report*, *supra* note 13, at 139.

mode of supply of the service.[61] In this way, in the telecommunications sector, the member states utilized the third level of the WTO framework, the member's specific commitments, to complement what was left blank in the second level.

Nondiscriminatory obligations, such as the MFN, are subject to negotiation on a sector-by-sector basis.[62] States are free to open access for telecommunication transport networks or services to another member state by undertaking sector-specific commitments on market access or national treatment.[63] Such commitments, once made, "cannot be withdrawn unless the commitment . . . did not benefit any other member or the withdrawing member gives a compensatory adjustment."[64] Because of this estoppel rule, sector-by-sector commitments provide common and effective safeguards for foreign investors' interest.[65]

WTO members also enjoy the freedom to choose their means of delivery on a mode-by-mode basis when entering into agreements for services. The GATS categorizes how international trade in services is supplied and consumed into four modes of delivery: (1) cross border supply, where nonresident service suppliers supply services across the border into another member's territory; (2) consumption abroad, where resident service suppliers supply services within their territory to a nonresident; (3) foreign commercial presence, where nonresident service providers establish companies or commercial presence in another member's territory; and (4) movement of natural persons, where a nonresident moves to another territory for the purpose of providing services.[66] In telecommunication services, modes 1 and 3 described above cover both the provision of telecommunication services that cross the border and foreign investment in independent telecom network infrastructures in another country.[67]

The basic telecommunications service sector has a dual function within the framework of the GATS because it is both "a means of economic activity and [a] means of delivery for other economic activit[ies]."[68] Without undertaking telecommunications market access commitments, member states are still required to refrain from imposing quotas or quantitative restrictions that are overly restrictive for new foreign service suppliers' entry into their domestic service markets.[69] In compliance with its MFN obligation, a member state should also give foreign basic telecommunications service suppliers the same opportunity as a national provider to access the public networks, to offer value-added services, to purchase or lease equipment, and

61. *Id.*; *see also* U.S. Commitments Schedule, *supra* note 21, at 2–3.
62. Fourth Protocol, *supra* note 9.
63. *Cf.* Rosenthal, *supra* note 8, at 322.
64. *Id.*
65. Alissi, *supra* note 38, at 490.
66. GATS, *supra* note 39, at art. I(2); *Glossary Term: Modes of Delivery*, WTO, https://www.wto.org/english/thewto_e/glossary_e/modes_of_delivery_e.htm [https://perma.cc/7EUP-B596] (last visited Nov. 14, 2016).
67. *See* Alissi, *supra* note 38, at 491.
68. Rosenthal, *supra* note 8, at 321.
69. *Id.* at 320.

to choose operating protocols.[70] These obligations cover the three means of private investment discussed in this Note.

Following the BTA, joint ventures, mergers and company takeovers will form partnerships that offer global access, defending against inflated charges with diversified options.[71] This discussion is of particular importance for agreements on broadband Internet services because the Internet has made distance less of a service barrier, has potential to benefit underserved citizenries and can dramatically improve developing countries' access to telecommunications and information systems.[72]

C. United States v. Mexico *Likely Will Serve as a Precedent for the Global Connect Initiative When Investing in Other Basic Telecommunications Agreement Members; Its Application, However, Has Limitations.*

The WTO's Dispute Settlement Body (DSB) issued a panel report on April 2, 2004, resolving a dispute where the United States raised a complaint against Mexico's domestic regulations on its international calls carriers.[73] This is the first WTO panel proceeding to deal with telecommunications services and the first to deal solely with trade in services under the GATS.[74] The issues raised by the United States reflected a strategic action, because Mexico, as one of the largest trading partners of the United States, suffered a disadvantage as its phone lines per capita were fewer than almost every other major Latin American country.[75] As a result of its anticompetitive policies, Mexico's "ability to attract investment capital [as well as to] develop electronic commerce and Internet services" was hindered.[76]

From 1997 to 2002, under Mexico's International Long Distance Rules (*Reglas del Servicio de Larga Distancia*),[77] eleven out of twenty-seven carriers were authorized to operate international gateways for incoming and outgoing international calls in accordance with the terms and conditions set by Telmex, the largest supplier of basic telecommunications services in Mexico.[78] In its complaint, the United States first claimed that Mexico had failed to set "cost-oriented, reasonable rates, terms[,] and conditions" for

70. *Id.* at 320–22.

71. Alissi, *supra* note 38, at 510–11.

72. *See, e.g.*, H.R. DOC. NO. 109-118, at 297 (2006) (presidential statement regarding the United States–Oman Free Trade Agreement).

73. *See generally United States v. Mexico Panel Report*, *supra* note 13.

74. *Id.* at 138.

75. Rosenthal, *supra* note 8, at 330.

76. *Id.*

77. Reglas para prestar el Servicio de Larga Distancia Internacional que deberán aplicar los Concesionarios de Redes Públicas de Telecomunicaciones autorizados para prestar este Servicio, Diario Oficial de la Federación [DOF] 11-12-1996 (Mex.), formato HTML, http://dof.gob.mx/nota_detalle.php?codigo=4906583&fecha=11/12/1996 [https://perma.cc/33NE-U4J6] (consultada el 26 de enero de 2017) (Mex.); *see also United States v. Mexico Panel Report*, *supra* note 13, at 4.

78. *United States v. Mexico Panel Report*, *supra* note 13, at 2.

Telmex's provision of interconnection.[79] As a result, U.S. basic telecom suppliers suffered economic loss when Mexico allowed Telmex to charge an interconnection rate that substantially exceeded cost in order to restrict the supply of scheduled basic telecommunications services and to monopolize the negotiation of interconnection rates with foreign countries.[80] Second, according to the United States, Mexico failed to effectively regulate Telmex's anticompetitive practice when the International Long Distance Rules allowed Telmex to fix rates for international interconnection.[81] As a result, U.S. basic telecom suppliers were unable to access Mexico's public telecom networks or lease private operation facilities on the same terms and rate as Mexican providers.[82] The United States requested the panel sanction Mexico for its failure to comply with its specific commitments undertaken in its GATS Schedule.[83] Mexico, in its defense, argued that its GATS obligations do not apply to the accounting rates at issue, which were set by bilateral agreements between the United States and Mexico, and therefore, it argued, the United States could not succeed in its claims.[84]

While the case was pending before the DSB, a voluntary industry agreement between Telmex and two U.S. companies, Alestra, and Avantel, was reached at the end of 2000 to reduce long-distance interconnection fees, market access charges, as well as resale tariffs.[85] However, the industry agreement did not provide a solution to Mexico's failure to revise the anticompetitive regulation in question that substantively harmed the U.S.carriers and failure to provide a competitive system in the international long-distance calling market.[86] The DSB panel eventually concluded that Mexico violated its GATS commitments when: (1) Mexico failed to maintain appropriate measures preventing Telmex's anticompetitive practices; and (2) Mexico failed to implement regulations ensuring reasonable, nondiscriminatory access to and use of telecommunication networks.[87] On June 1, 2004, Mexico and the United States reached an agreement on Mexico's implementation of the DSB panel report's recommendations and rulings.[88] By August 12, 2005, Mexico published its new resale regulations allowing for the commercial resale of access to long distance and international long distance services, fully complying with the DSB's recommendations.[89]

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79. *Id.* at 6.

80. *Id.*

81. *Id.* at 6.

82. *Id.* at 7. "Facilities-based" services are services provided by supplier over its own facilities. "Non-facilities-based" services are telecommunications services supplied through facilities leased from other operators. *Id.* at 144.

83. *Id.* at 7.

84. *Id.* at 7–8.

85. *Rosenthal*, *supra* note 8, at 331–32.

86. *Id.* at 331.

87. *See generally United States v. Mexico Panel Report*, *supra* note 13, at 224–25.

88. Status Report by Mexico, *Mexico – Measures Affecting Telecommunications Services*, WT/DS204/9/Add.8 (Aug. 19, 2005), http://trade.ec.europa.eu/doclib/docs/2005/november/tradoc_125847.pdf [https://perma.cc/F5KJ-MWAM].

89. *United States v. Mexico Panel Report*, *supra* note 13, at 1–2.

The telecommunications regime after the BTA suggests several important limitations of the existing WTO framework, which refused to "set common regulatory principles" for fear of infringing on national sovereignty.[90] First, services cannot have tariffs set upon them.[91] As Peter Cowhey, the former chief of the FCC's International Bureau, commented: "Liberalizing the rules of foreign investment in Mexico (to allow a foreign investor to own the majority equity of a phone company) has no convenient offset—Mexico would have to reduce its market access commitments on some other segment of the telecommunications services market."[92] Second, the regulators' constant shifts in market rules create continual grounds for unilateral national adjustments of market access commitments and have trade effects that cannot be easily determined.[93] Third, the nullification approach to dispute resolution under the Marrakesh Agreement would lead to uncertainty as to whether obligations would exist and survive in times of national turmoil.[94]

III. THE FCC'S REGULATIONS ON FOREIGN CARRIERS' ENTRY INTO THE U.S. TELECOMMUNICATIONS MARKET MAY SERVE AS A MODEL TO PROPOSE RECIPROCAL TREATMENT WHEN NEGOTIATING INVESTMENT AGREEMENTS UNDER GLOBAL CONNECT.

A. The FCC Is the Expert Agency on Issues Relating to Broadband Internet Access Service.

An independent agency unaffiliated with government ministries is the key to prevent inconsistency between initial policy goals and later enforcement.[95] In the United States, that independent agency whose purview is communications-related issues is the FCC.[96]

1. The FCC is an Expert Agency in Making Policy and Business Judgment to Leverage Foreign Markets' Restrictions in Future Trade Negotiations.

In response to the international telecommunications service market, the FCC has been making proactive efforts under the congressional mandate to "promote and protect competition . . . , encourage liberalization . . . , prevent [anticompetitive] conduct in the provision of international services or

90. Cowhey & Klimenko, *supra* note 27, at 276.
91. *Id.*
92. *Id.* at 276–77.
93. *Id.* at 277.
94. *Id.*
95. *Id.* at 278.
96. *What We Do*, FCC, https://www.fcc.gov/about-fcc/what-we-do [https://perma.cc/2PNH-6Z96] (last visited Nov. 16, 2016).

facilities, and take into account important interests related to . . . foreign policy and trade policy."[97] As the lead regulator on broadband Internet access matters, the FCC "is charged with regulating commercial use of the radiofrequency spectrum (such as that used for wireless broadband service), interstate communications, and international communications involving an endpoint in the United States."[98] The FCC asserts exclusive jurisdiction over most matters involving broadband Internet access services, especially those with international nature.[99]

When it comes to foreign carriers' entry into the U.S. telecommunications market, the FCC is equipped with the expertise to create a blueprint to assure easy entry while stimulating innovation. In designing a regulatory regime fulfilling the United States' BTA commitment to "provide[] for market access and national treatment for all telephone services . . . through any means of network technology,"[100] the FCC took its first step in August 1997, when it issued an Order requiring U.S. companies to agree with foreign companies on benchmark settlement rates.[101] Because AT&T and other U.S. carriers had to pay more than half of its long-distance-calling revenue in exchange of foreign carrier's interconnection services, the existing settlement system originally resulted in a net outflow of $5.4 billion each year.[102] The *1997 Benchmarks Order* trimmed the outflow to less than $2 billion and helped the customers save an average of sixty-eight cents on an oversea call.[103] The FCC's *1997 Benchmarks Order* was "specifically implemented to prepare the U.S. market for . . . when the [BTA] takes effect, by lowering settlement rates to a cost basis."[104] To provide an easy transition to the benchmark settlement rates, the FCC designed a five-step transition to accommodate foreign countries' different income level and monitored carriers' prices to ensure that the savings were passed on to U.S. consumers.[105]

At the time, international settlement rates were not an issue covered by either the Telecommunications Act of 1996 or the Marrakesh Agreement.[106] Because of the lack of legal support, the FCC's unilateral move drew harsh criticism from communications practitioners, who predicted that foreign

97. Reform of Rules and Policies on Foreign Carrier Entry into the U.S. Telecommunications Market, *Report and Order*, 29 FCC Rcd 4256, para. 1 (2014) [hereinafter *2014 Foreign Participation Order*].

98. Jenka, *supra* note 7, at 21.

99. *Id.* at 22.

100. Alissi, *supra* note 38, at 491–92.

101. International Settlement Rates, *Report and Order*, 12 FCC Rcd 19806, paras. 1–2 (1997) [hereinafter *1997 Benchmarks Order*]. U.S. carriers negotiate with foreign carriers to determine an "accounting rate," which is the price for one minute of international phone service. *Id.* at 495–96. The settlement rate is the portion that each carrier receives out of this accounting rate. *Id.* at 496.

102. Mark Landler, *Under FCC Rules, Cost of Overseas Could Drop*, LAS VEGAS SUN (Aug. 8, 1997, 9:21 AM), http://lasvegassun.com/news/1997/aug/08/under-fcc-rules-cost-of-overseas-calls-could-drop/ [https://perma.cc/Q6NG-BKJL].

103. *Id.*

104. Alissi, *supra* note 38, at 500.

105. *Id.* at 501.

106. *Id.* at 495.

carriers would refuse to accept the FCC's rates and question the FCC's action as an encroachment of the WTO's authority under the BTA.[107] The FCC's action also triggered strong disappointment from other WTO member states who saw the Order as placing overly restrictive conditions on foreign carriers and placing countries into different categories.[108]

In response to the criticism and the direct challenge to its jurisdiction, the FCC claimed that it had the legal authority under the Communications Act of 1934 "to declare rates and practices to be unjust and unreasonable and to . . . [place] a limit on the amount that U.S. carriers can pay" foreign companies to complete international calls.[109] Where the FCC lacks jurisdiction over foreign companies, the FCC can compel assistance from foreign government authorities when U.S. companies encounter resistance from foreign carriers.[110] For example, in 1996, when faced with the refusal from the dominant Argentine carrier, Telintar, to accede to AT&T's proposed rates on international calls, the FCC's order that other U.S. carriers withhold settlement payments to Telintar successfully forced Telintar to restore AT&T's service.[111] Even if a country were to cut off its circuits to the United States altogether, U.S. carriers would be able to route calls through a third country, allowing "that country's carrier [to] pass them on to the hostile country."[112] The FCC argued that its benchmark settlement rates would stimulate traffic flow, thus increasing foreign carriers' overall profits, and lead to higher quality service, lower costs, and more options for consumers.[113] The utilization of tactics such as the aforementioned go-between carrier would, according to the FCC, incentivize countries to come to an agreement on rates.[114]

The growth of the Internet led the FCC to decide that it should fix the access charge system by reducing terminating charges and originating charges.[115] The FCC would then "tilt that [] charge toward the business lines and away from residential, and increase flat rate charges" on multiple-line end users.[116] The FCC intends to guarantee price discounts for long distance services offered to low-volume users.[117]

The FCC and the WTO framework work together to reduce tariffs in telecommunications and to encourage international competition, further enabling the Internet's profound impact on technological advancements.[118] In

107. Landler, *supra* note 102 (quoting Albert Halprin, a former FCC official who commented on the Order's impact on New Zealand's national carrier: "This is going to antagonize foreign carriers . . . . Instead of trying to lead a global effort to reform the system, the FCC has chosen to make itself the champion for U.S. carriers.").

108. Alissi, *supra* note 38, at 503–04.

109. *1997 Benchmarks Order*, *supra* note 99, para. 24.

110. Alissi, *supra* note 38, at 501, 505.

111. *Id.* at 505–06.

112. Landler, *supra* note 102.

113. Alissi, *supra* note 38, at 502–03.

114. Landler, *supra* note 102.

115. *Id.*

116. *Id.*

117. *Id.*

118. Alissi, *supra* note 38, at 511.

the years leading up to Big Bandwidth era, the FCC repeatedly addressed the need to include Internet into its foreign participation packet. As former Chairman Hundt commented at roughly the same time of BTA's conclusion:

> In my term the Internet has exploded into consciousness; the hardware and software business in the [United States] has more or less tripled in market cap; . . . and the entire world has agreed in the World Trade Organization to reject the old way of monopoly in the communications sector and adopt the American paradigm of competition to build the global information highway.[119]

2. The FCC is Also an Expert Agency in Settling Investor-State Disputes and Enforcing Procompetitive Regulations.

Dispute settlement and rule enforcement are essential to the stability of a rule-based system.[120] Claims arising under the GATS, its Annexes, and schedules of specific commitments are subject to the Dispute Settlement Understanding.[121] Under the Dispute Settlement Understanding, WTO member states acknowledge WTO's binding authority and agree to its jurisdiction for disputes arising out of their schedule of commitments.[122] However, the FCC maintains it has the authority to address anticompetitive behavior and "is not limited to relying on WTO dispute resolution procedures."[123] In comparing dispute settling powers from different agencies, it is important to see if national practices appear to be significantly inconsistent with international "best practices" because appealing to different authorities may result in conflicting answers and raise conflict of laws concerns.[124]

The WTO's dispute resolution process focuses on efficiency and aims at prompt settlement.[125] Member states have changed the dispute resolution process to take more of a legal, rather than diplomatic, approach, including the right of recourse to the DSB, preventing one party from blocking panel formation, repealing the pre-1994 consensus requirement, allowing the possibility of a cross-retaliation remedy, and providing the option of arbitration on retaliation.[126] The WTO obligates governments to compensate entities that suffer losses when they violate their commitment schedules, which "increases the credibility of the government's intent to liberalize."[127]

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119. Hundt, *supra* note 1.

120. Alissi, *supra* note 38, at 490.

121. *United States v. Mexico Panel Report*, *supra* note 13, at 141.

122. Alissi, *supra* note 38, at 494.

123. International Settlements Policy Reform, *Report and Order*, 27 FCC Rcd 15521, para. 69 (2012) [hereinafter *2012 Benchmarks Order*].

124. Cowhey & Klimenko, *supra* note 27, at 275.

125. Alissi, *supra* note 38, at 490.

126. Rosenthal, *supra* note 8, at 321.

127. Cowhey & Klimenko, *supra* note 27, at 279.

Member states often agree on setting up a recommended domestic enforcement mechanism and a time frame after a panel report is issued with regard to interconnection settlements.[128] Member states often also agree on setting up an "independent domestic body" to resolve disputes regarding conditions, rates, and terms.[129] The BTA even requires the host countries to provide new marketplace entrants access to an independent regulator once interconnection disputes arise.[130]

The WTO dispute settlement proceedings function to interpret obligations not clearly defined by any of the agreements.[131] This is because states sometimes resort to "constructive ambiguity" to enable consensus on WTO rules.[132] For example, the BTA obligated states to ensure "timely" access with "transparent and reasonable" terms and to apply "cost-oriented" rates.[133] Member states may negotiate on removing nontariff barriers, such as criteria for licensing and anticompetitive business practices through any generally applicable trade measures "administered in a reasonable, objective, and impartial manner."[134] Although the signatories to the GATS retain some discretion over their national objectives and domestic anticompetition policies, at a minimum, they have committed "not to let monopoly suppliers become additional barriers" to basic telecommunications services.[135] The DSB, in *United States v. Mexico*, noted that "different approaches used by governments in the drafting of their respective GATS schedules may give rise to divergent understandings and expectations."[136] As a result, the DSB, when resolving disputes, will often allow expansive views in the interpretation and clarification of GATS provisions offered by adversary states.[137] The DSB considers whether rulings provided for in those agreements are in conformity with "customary rules of interpretation of public international law," are "to preserve the rights and obligations of members under the covered agreements," and are "to provide security and predictability to the multilateral trading system."[138]

The FCC is also a competent jurisdiction to regulate anticompetitive practices. The FCC established, in its recent *2012 Benchmarks Order*, a series of indicia demonstrating anticompetitive behavior: "(1) increasing settlement rates above benchmarks[;] (2) establishing rate floors . . . that are above previously negotiated rates[;] or (3) threatening or carrying out circuit disruptions to achieve rate increases or changes to the terms and conditions

128. Rosenthal, *supra* note 8, at 325.

129. *Id.*

130. Alissi, *supra* note 38, at 494. An "independent regulator" is one that is not "involved with any supplier of basic telecommunications services." *Id.*

131. *See* Understanding on Rules and Procedures Governing the Settlement of Disputes art. 3(2), Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 2, 1869 U.N.T.S. 410 [hereinafter *Dispute Settlement Understanding*].

132. *See United States v. Mexico Panel Report*, *supra* note 13, at 139.

133. Rosenthal, *supra* note 8, at 325.

134. *Id.* at 319.

135. *Id.*

136. *United States v. Mexico Panel Report*, *supra* note 13, at 138.

137. *See id.*

138. *Id.* at 138–39.

of termination agreements."[139] Although adopted as a case-specific approach, the FCC clarified a possible ambiguity in its rules that even "partial blockages . . . are unlikely ever to be appropriate or justified in the public interest and do not benefit the provision of international services to consumers in the United States or abroad."[140] The FCC also laid out evidentiary and intent requirements in adjudicating anticompetitive conduct claims.[141]

In comparison to WTO's DSB, the FCC's alternative dispute arrangement is better suited for policy enforcement because it gives the complainants a greater level of certainty while not sacrificing impartiality.[142] After the DSB resolves a particular dispute through a nonbinding action, member states may change regulatory policies to defeat the DSB's purpose of seeking "security and predictability."[143] The FCC, by contrast, was entrusted by Section 303(r) of the Communications Act to implement treaties and adopt further regulations to implement the United States' commitments.[144] Despite a lack of jurisdiction over pure foreign carriers, the FCC nonetheless possesses tools to enforce its policies when U.S. carriers petition to resolve matters that could not be agreed on over an extended period of time.[145] For example, the FCC may impose obligations under its regulatory mandates on U.S. international facilities-based carriers to indirectly pressure foreign carriers with termination of U.S. traffic or through collective negotiation power.[146] In the AT&T-Fiji dispute in 2014, the FCC directed all U.S.-based carriers to conduct settlements with Fiji International Telecommunications Limited (Fintel), the incumbent international carrier in Fiji, at a rate that does not exceed the FCC's benchmark rate and to notify the FCC should a benchmark-compliant rate be negotiated.[147]

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139. *2012 Benchmarks Order*, *supra* note 123, para. 31.

140. *Id.* at para. 35.

141. *Id.*

142. *Dispute Settlement Understanding*, *supra* note 131, at art. 27(2) (establishing impartiality of DSB). As an independent federal agency, FCC's impartiality is rooted in the Due Process Clause in the Fifth Amendment to the Constitution for the United States and the Administrative Procedure Act, 5 U.S.C. §§ 551–584 (2012). *See* William A. Wines & Mark E. Linebaugh, *Current Issues in Public Policy: An Analysis of the FCC's Ruling on Fleeting Profanies and Observations on the Road Ahead for the High Court*, 8 RUTGERS J.L. & PUB. POL'Y 73, 107–08 (2010).

143. Cowhey & Klimenko, *supra* note 27, at 277.

144. Jennifer A. Manner et al., *An Overlooked Basis of Jurisdiction for Net Neutrality: The World Trade Organization Agreement on Basic Telecommunications Services*, 22 COMMLAW CONSPECTUS 57, 72–73 (2014).

145. *See, e.g.*, Chip Yorkgitis, *FCC to Enforce Benchmark Rate on U.S. to Fiji Route*, COMMLAW MONITOR (Mar. 12, 2014), http://www.commlawmonitor.com/2014/03/articles/federal-state-regulatory/fcc-to-enforce-benchmark-rate-on-u-s-to-fiji-route/ [https://perma.cc/4ESE-EDMH].

146. *See id.*

147. Petition for Enforcement of International Settlements Benchmark Rates on the U.S.-Fiji Route, *Memorandum Opinion and Order*, 29 FCC Rcd 2210, paras. 2, 9, 13 (2014) [hereinafter *2014 U.S.-Fiji Benchmark Rate Order*].

B. The Open Entry Standard, Along with Other Measures that the FCC Has Taken, Offers a Three-Step Model for Other Countries to Fulfill Their World Trade Organization Commitments Through Broadening the Scope of Foreign Entry and Lifting Burdensome Application Requirements.

In light of the American commitments under the BTA to open markets, the FCC adopted the Open Entry Standard to further open the U.S. market to competition from foreign companies in its 1997 Foreign Participation Order.[148] The 1997 Foreign Participation Order modified the FCC's previous rules and policies applying the ECO test to WTO Members as a condition for foreign carrier to enter into the U.S. market.[149] Under the ECO test, foreign carriers were required to obtain: "(1) section 214 authorizations to provide facilities-based, switched resale, and resold non-interconnected private line service; (2) authorizations to exceed the [twenty-five percent] foreign ownership benchmark; and (3) cable landing licenses."[150] Under the Open Entry Standard, the United States granted WTO member applicants a presumption that their entry into the U.S. market was in the public interest because they were already subject to the same anticompetitive regime as U.S. carriers and thus, were not required to demonstrate that they meet the ECO test.[151] For issues related to market competition, such presumption may be overcome by a showing that the FCC's safeguards and potential conditions attached to grants of authority are not sufficient to offset the competitive concerns that may arise when a foreign carrier obtains dominant market power in the U.S. market.[152]

Two years after the adoption of the Open Entry Standard, upon reconsideration of the 1997 Foreign Participation Order, the FCC concluded that the Open Entry Standard would produce "significant consumer benefits through lower prices for existing services and greater service innovation, as well as one-stop shopping resulting from newly-found efficiencies."[153] The Open Entry Standard achieves the same goals as under the 1995 Foreign Carrier Entry Order: "(1) to promote effective competition in the U.S.

148. *1997 Foreign Participation Order*, *supra* note 24, at para. 48.

149. *2000 Foreign Participation Order*, *supra* note 26, at para. 2 (discussing Market Entry and Regulation of Foreign Affiliated Entities, *Report and Order*, 11 FCC Rcd 3873 (1995) [hereinafter *1995 Foreign Carrier Entry Order*]).

150. *Id*. (citations omitted).

151. The "anticompetitive regime" refers to the countries' enhanced commitments made under the BTA, the FCC's regulatory safeguards, and antitrust laws addressing competitive concerns resulting from foreign participation in the U.S. telecommunications market. *Id*. at paras. 2–3.

152. *2012 Benchmarks Order*, *supra* note 123, at para. 4 ("[This] presumption, however, is limited to competition issues."); *id.* at paras. 11–12, 16–17 (rejecting the petition that the same entry standard as WTO members' participation in the U.S. telecommunications market should apply to Bell Operating Companies' (BOC) entry into in-region interLATA markets because the BOCs would be significant market participants posing a greater risk of competitive harm to the U.S. international services market when possessing unique capabilities and incentives).

153. *2000 Foreign Participation Order*, *supra* note 26, at para. 4.

telecommunications services market; (2) to prevent [anticompetitive] conduct in the provision of international services or facilities; and (3) to encourage foreign governments to open their telecommunications markets."[154]

1. Under the United States' Basic Telecommunications Agreement Commitments, the FCC Has Adopted the Open Entry Standard to Replace Its Effective Competitive Opportunities Test Licensing Requirements.

Under the GATS, the United States committed to market access and national treatment for most services in the telecommunications sector with a limit of twenty percent direct foreign investment in mobile services, cellular services, and personal communications services.[155] In addition, under the BTA, the United States agreed to allow service suppliers recourse to a regulator independent from basic telecommunication suppliers to resolve interconnection disputes.[156] Furthermore, the scope of the United States' commitment to BTA is reflected in both the United States' submission to the Group on Basic Telecommunication and 47 U.S.C. § 310, the latter being amended by the Telecommunications Act of 1996 concurrently with the conclusion of the BTA.[157]

By enforcing the 1997 Foreign Participation Order, the FCC first "eliminat[ed] the application of the ECO test to flexible settlement arrangements that deviate from the international settlements policy, narrow[ed] the 'No Special Concessions Rule,'[158] revis[ed the FCC's] dominant carrier safeguards . . . , and streamlin[ed] the section 214 application process" under the Telecommunications Act of 1996.[159] Since the FCC issued the 1997 Foreign Participation Order, the FCC has further refined its procompetitive policies related to the International Settlement Policy (ISP) and its filing requirements.[160] The ISP Reform Order loosened the

154. *2000 Foreign Participation Order*, *supra* note 26, at para. 4.

155. U.S. Commitments Schedule, *supra* note 21, at 2.

156. *Id.* at 2.5, 5.

157. Communication from the United States, *Conditional Offer – Revision*, S/GBT/W/1/Add.2/Rev.1 (Feb. 12, 1997), http://www.ntia.doc.gov/legacy/oiahome/gbtfiles/USOFFER.htm [https://perma.cc/R4LD-9W6J]; *see also* Telecommunications Act of 1996, Pub. L. No. 104-104, § 403, 110 Stat. 56, 131 (1996) (codified as amended in scattered sections of 47 U.S.C.).

158. The "No Special Concessions" rule prohibits a U.S. international carrier from agreeing to accept special concessions with respect to traffic or revenue that flows directly or indirectly from any foreign carrier that possesses market power in the foreign market. *See* 1998 Biennial Regulatory Review Reform of the International Settlements Policy and Associated Filing Requirements, *Report and Order and Order on Reconsideration*, 14 FCC Rcd 7963, 7974 (1998) [hereinafter *ISP Reform Order*].

159. 47 U.S.C. § 214 (1994) (detailing the public interest analysis); *2000 Foreign Participation Order*, *supra* note 26, at para. 6.

160. *2000 Foreign Participation Order*, *supra* note 26, at para. 8 (discussing 1998 Biennial Regulatory Review Reform of the International Settlements Policy and the *ISP Reform Order*).

requirements on settlement arrangements for foreign carriers that lack market power in the United States, as well as on "routes where U.S. carriers are able to terminate at least fifty percent of their U.S. billed traffic at rates that are at least twenty-five percent below the applicable benchmark rate."[161]

As part of the post-BTA competitive carrier safeguards, the FCC modified foreign entry licensing requirements through the 1999 Benchmarks Reconsideration Order.[162] In doing so, the FCC narrowed the condition set in the 1997 Benchmarks Order that "the provision of facilities-based switched or private line service to foreign markets will only be authorized if the foreign carrier on the route offers a settlement rate that is at or below the relevant benchmark" to only apply "where the foreign carrier possesses market power in the foreign destination market."[163] This fulfills the United States' BTA commitments by subjecting foreign carriers to the same public interest standard of entry favoring neither foreign nor domestic applicants.[164]

The BTA also enables the FCC to adopt a deregulatory approach that would "allow [the FCC] to promote and protect competition in the international telecommunications service market."[165] The FCC eliminated the ECO test for "international section 214 applications and cable landing license applications filed by foreign carriers or their affiliates that have market power in countries that are not members of the [WTO]."[166] Monopolies were historically popular in phone services because they "assured jobs, prevented foreign companies from taking away potential revenue, and allowed the countries to resist foreigners' attempts to negotiate lower settlement rates."[167] Recent studies, however, show that monopolies lack motivation to adopt new technologies and result in a lower rate of return from existing public resources.[168] Under the old system, because monopolies in different countries controlled the domestic communications system and had the responsibility for handling international communications, monopolies forced the market into "accepting artificially inflated international settlement rates."[169] Today, liberalization of telecommunications markets in all countries would stimulate innovation, lower communications cost, and boost information sharing in the global marketplace.[170] Therefore, liberalization is the most sustainable solution to the risk that foreign market power may be used in an anticompetitive way to the detriment of U.S. consumers.[171]

The application of the ECO test to countries that are not members of the WTO is so limited that it is impractical. The FCC found that non-WTO

161. *Id.*
162. International Settlement Rates, *Report and Order on Reconsideration and Order Lifting Stay*, 14 FCC Rcd 9256, para. 8 (1999) [hereinafter *1999 Benchmarks Reconsideration Order*].
163. *2000 Foreign Participation Order*, *supra* note 26, at para. 9.
164. *Id.* at paras. 6, 11.
165. *2014 Foreign Participation Order*, *supra* note 97, at paras. 1, 4.
166. *Id.* at para. 1.
167. Alissi, *supra* note 38, at 497.
168. *Id.*
169. *Id.* at 497–98.
170. *2014 Foreign Participation Order*, *supra* note 97, at para. 16.
171. *Id.*

Member states "collectively represent only about one percent of the world's gross domestic product" and are also "smaller countries [that] may be without resources to support a regulatory framework that meets all of the detailed ECO Test requirements."[172] Even then, these countries may still have a "relatively open market" despite not fully satisfying the ECO Test.[173] The FCC therefore concluded that the 1997 Foreign Participation Order's intent to use the ECO test to incentivize non-WTO member states to open their markets to competition and join the WTO may no longer be the best approach to doing so.[174] The FCC redefined its public interest analysis of applications to review "whether U.S. carriers have the legal ability to offer international facilities-based services in the destination country, to obtain a controlling interest in a facilities-based carrier in that country to originate and terminate international traffic . . . in that market, or to own or lease submarine cable capacity in that market."[175] In doing so, the FCC attempted to review whether the U.S. carriers are able "to compete effectively in the market of an applicant from a non-WTO [m]ember country seeking authorization to provide international services in the United States."[176]

2. The FCC Can Analyze a Host Country's Procompetitive Obligations by Examining Its World Trade Organization Commitments, Existing Regulation for the Service or Facility, and Existing Licensing Requirements for Foreign Entrants.

The FCC should adopt the method of interpretation from DSB when examining a host country's policies on services covered by its GATS commitments. The first step is to determine whether a service and a mode of supply is covered by a WTO Member State's reference paper annexed to GATS.[177] Then the FCC should interpret the scope of this country's commitments with regard to that industry, in domestic and international context, respectively.[178] In *United States v. Mexico*, for example, broadband Internet infrastructure and service provisions are covered by the "interconnection" commitment in the BTA, because both the BTA and the FCC's rules have adopted a definition of "telecommunications," to include any "real-time transmission of customer-supplied information between two or more points without any end-to-end change in the form or content of the customer's information."[179] Finally, the FCC should examine whether the

172. *Id.* at paras. 10, 17.
173. *Id.* at para. 10.
174. *Id.* at paras. 16–17.
175. *Id.* at para. 18.
176. *Id.*
177. *Cf. United States v. Mexico Panel Report*, *supra* note 13, at 143 (DSB's method of interpretation).
178. *Cf. id.*
179. 47 U.S.C. § 153(43) (1994) (current version at 47 U.S.C. § 153(50) (2012)); GATS, *supra* note 39, at Annex on Telecommunications § 3(b).

host country intends to implement the laws and policies on that industry in a way that fulfills any of its commitments.[180]

U.S. companies, when seeking the FCC's approval of foreign ownership as common carrier, are also subject to a series of inquiries as required by the FCC's existing policies.[181] Currently, an FCC approval for licensing requires the FCC to: (1) ascertain the applicants' "percentages of foreign ownership, whether existing or planned," regardless of the foreign country's WTO membership, to determine whether the foreign investment may pose a risk of harm to important national policies; (2) compile "detailed information as to the citizenship and principal places of business of the [applicants'] investors," except for those holding "foreign equity and/or voting interests of five percent or less"; and (3) loosen filing requirements for petitions for declaratory ruling or modification on existing foreign ownership rulings.[182] Such licensing requirements require licensees to request and receive FCC approval before foreign ownership exceeds 20 percent in the licensee and "before direct or indirect foreign ownership of their U.S. parent companies exceed 25 percent."[183]

After the sunset of the ECO test, when U.S.-licensed companies enter into non-WTO countries, the FCC analyzes whether the host country has provided effective competitive opportunities for U.S.-licensed companies to own and operate relevant facilities under the 2012 Foreign Participation Order standard.[184] In the *Telefonica Order and Authorization*, the FCC examined a petition by a group of applicants to apply for a license in Aruba to "construct, land, and operate a noncommon carrier fiber-optic submarine cable system" under the Cable Landing License Act and Section 1.767 of the FCC's rules.[185] The applicants sought a determination as to whether Aruba, a WTO nonmember, provided "effective competitive opportunities for U.S. carriers to own and operate submarine cable facilities in Aruba."[186]

In making such determination, the FCC first examined whether there were impediments in the host country to the U.S. carriers' legal, or de jure, ability to hold ownership interests in target services or infrastructure.[187] The FCC may consider whether there are statutory limits on the number of licenses that may be issued, whether the licenses are issued to entities owned by foreign investors, and whether the process of obtaining approvals from

180. *See United States v. Mexico Panel Report*, *supra* note 13, at 143.

181. *See generally* Review of Foreign Ownership Policies for Common Carrier and Aeronautical Radio Licensees under Section 310(b)(4) of the Communications Act of 1934, As Amended, *Second Report and Order*, 28 FCC Rcd 5741, para. 3 (2013) [hereinafter *2013 Foreign Ownership Second Report and Order*].

182. *Id.* at paras. 3–5 (adopting the Open Entry Standard in the assessment of all foreign investment; revising and simplifying previous regulatory framework requiring licensee to return to the FCC repeatedly when, for example, creating a new subsidiary even if it has already received a foreign ownership ruling).

183. *Id.* at paras. 10–11.

184. *See* Telefonica Order and Authorization, *supra* note 14, at para. 13.

185. *Id.* at para. 1 (citing 47 C.F.R. § 1.767).

186. *Id.* at para. 7.

187. *See id.* at paras. 14–17.

host country agencies is the same regardless of the applicant's nationality.[188] If no impediments are found, the FCC then moves on to consider "whether other factors give U.S. carriers the practical or de facto ability to hold ownership interests in cable facilities in the destination market" followed by whether the U.S. carriers "have the right to collocate facilities, provide or obtain backhaul capacity, access technical network information, and interconnect to the public switched network."[189] The FCC's considerations include whether facilities owners "have agreed to provide access and collocation" to foreign applicants, whether U.S. companies have a right to use any capacity they own to provide service in the host country, and whether "there existed reasonable and nondiscriminatory charges, terms, and conditions for interconnection to a foreign carrier's domestic facilities."[190]

During negotiations, partner countries contemplated under Global Connect who are also WTO members should be invited to model their processes after the FCC's abovementioned measures. In return, the FCC should utilize a transition plan that exceeded the United States' BTA commitments, largely dispelling nonmember states' reluctance to commit to Global Connect without economic and political stability.

3. In Turn, Host Countries, As Partners Contemplated Under Global Connect, Will Be Pressured into Agreeing on Competitive Safeguards by Their Most Favored Nation Obligations and the Global Market.

Another incentive for all developing countries to adopt competitive safeguards is the increasingly widespread procompetitive practices in the global market. Competitive safeguards are one of the most essential elements in the BTA reference papers.[191] Because of these safeguards, the Reference Papers ensure fair and nondiscriminatory treatment of new entrants in host countries and prevent monopolists from abusing their market power.[192] They are more than just a gesture to welcome foreign investments, but rather, they enhance credibility with investors in the telecommunications sector who highly value stable policy environment in their risk analysis as to whether to enter into a given market.[193]

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188. *See id.* at para. 15.

189. *Id.* at paras. 12–13.

190. *See id.* at paras. 20–21 (determining that the Aruba Interconnection Decree did not render access or collocation impermissible when all involved station owners agreed to allow U.S. companies to own and use cable landing capacity, interconnection, collocation and backhaul facilities under the same terms as other Aruban companies).

191. *See* Alissi, *supra* note 38, at 493.

192. *See id.* at 493–94 (quoting *The WTO Telecom Agreement: Results and Next Steps: Hearing Before the Subcomm. on Telecomm., Trade, & Consumer Prot. of the H. Comm. on Commerce*, 105th Cong. 54 (1997) (statement of Dr. Kenneth W. Leeson, Chairman, Committee on International Telecommunications Policy; U.S. Council for International Business)).

193. Cowhey & Klimenko, *supra* note 27, at 277.

Countries with poor institutional endowments can improve the credibility of their regulatory agencies by importing policies from overseas.[194] For example, China made strong commitments on telecom concessions modeled after existing member states' commitment schedules as part of its terms of accession to the WTO.[195] Meanwhile, central and eastern European regulators who prepared early by incorporating existing member states' "best practices" into their domestic policies at the time of their accessions to the WTO gained credibility with European Union governments.[196] Regulators in developing countries have also benefited from an increase in credibility due to financial aid from international organizations like the International Monetary Fund and the World Bank conditional on adherence to their regulatory regimes.[197]

Existing FTAs have presented a few approaches to prevent major suppliers in its territory from engaging in or continuing anticompetitive practices. In addition to the MFN treatment required by the GATS, other FTAs have also offered national treatment to each other as a general obligation upon its major suppliers of public telecommunications services.[198] In comparison to MFN's purpose to ensure nondiscriminatory treatment between foreign service providers, national treatment intends to ensure nondiscriminatory treatment between "like" services from imported and domestic suppliers and providers once the foreign services have entered the market.[199] Some FTAs provide for additional obligations. In the United States-Chile FTA, for example, the parties agreed on making available "access to network elements on an unbundled basis."[200] While subject to the higher authority of national law and regulations, this FTA gives the parties more freedom to reach a tailored agreement to better address the needs of their bilateral investment relationship.[201] In the United States-Singapore FTA, additional provisions discharging foreign suppliers of the physical presence requirement where it is not practical by allowing for virtual collocation are adopted to transform the mobility of telecommunication services into competitive advantage.[202]

Opponents of this change argued that the private sector would hesitate to take the risks in developing countries that are more politically unstable and

194. *Id.* at 278.
195. *Id.* at 268.
196. *Id.* at 278.
197. *Id.*
198. *See, e.g.*, Trade Promotion Agreement, Peru-U.S., art. 14.4, Apr. 12, 2006, LEXIS 134 ("Each Party shall ensure that major suppliers in its territory accord suppliers of public telecommunications services of another Party treatment no less favorable than such major suppliers accord to their subsidiaries, their affiliates, or non-affiliated service suppliers regarding: (a) the availability, provisioning, rates, or quality of like public telecommunications services; and (b) the availability of technical interfaces necessary for interconnection.").
199. *Principles of the Trading System*, WTO, https://www.wto.org/english/thewto_e/whatis_e/tif_e/fact2_e.htm [https://perma.cc/WQ7V-2SWP] (last visited Oct. 18, 2016).
200. Free Trade Agreement, Chile-U.S., art. 13.4(3)(a), Jan. 1, 2004, LEXIS 242.
201. *Id.* at art. 13.4(3)(c).
202. Free Trade Agreement, U.S.-Sing., art. 9.4(4)(b), May 6, 2003, LEXIS 254.

unstructured.[203] They argued that "the ability to combine outdated [infrastructure] with state-of-the-art systems may prove to be too difficult."[204] Some were also concerned about the possible effect on employment rate and, by corollary, the economy in developing countries where monopoly carriers had employed around five million people.[205]

These concerns, can best be addressed by newly industrialized countries introducing BTA-level competition to reshape developing countries' commitments in all aspects. The U.S. government has calculated that at least eighty-five percent of the world market measured by revenue, is covered by strong market access commitments.[206] Because the BTA led to a revolutionary new way of doing business in the following decade, eighty percent of the world market could by no means refrain from spilling over to the rest of the global market.[207] The newly industrialized countries, through making binding commitments under BTA, are rerouting the lucrative international traffic into less competitive markets to induce more profits.[208] They also form interest coalitions to strengthen their own cross-border information services in riskier countries with less regulatory transparency and little competition.[209] Former monopolists who contributed heavily to these countries' recent industrialization, furthermore, became highly innovative and actively expanded into neighboring countries.[210] In doing so, they transformed into countries with a progressive political force conceiving and promoting new ways of providing services in developing countries who have yet to commit to cater to the needs of innovative business models and new technological approaches such as fiber-optic networks and worldwide undersea cable systems.[211]

As a general matter, with the market incentives channeled by newly industrialized countries, developing countries are also inclined to adopt competitive measures because they will eventually benefit from new technologies, tools, and innovative services made available by the diffusion of broadband and foreign investment on other Internet infrastructure.[212] For example, by increasing access to broadband, the Internet has created opportunities to gain broader access to information, to reallocate resources, and to create innovative and more user-driven business models.[213] With the help of independent regulators like the FCC and the WTO to minimize investors' risks and maximize the Internet's economic value, the telecommunications market could expect the global network soon reach its full potential.

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203. Alissi, *supra* note 38, at 508.
204. *Id.* at 508–09.
205. *Id.* at 509.
206. Cowhey & Klimenko, *supra* note 27, at 268.
207. *Id.*
208. *Id.*
209. *Id.* at 268–69.
210. *Id.* at 269.
211. *Id.*
212. *See* ORG. FOR ECON. CO-OPERATION & DEV., *supra* note 22, at 4.
213. *Id.*

IV. CONCLUSION

By forming a coalition with newly industrializing countries, who are the major players under the BTA regime, the United States can take advantage in trade negotiations, transnational political lobbying, and market activities to gradually sweep away the developing countries' reluctance to make stronger commitments. In addition to political and economic techniques regularly employed by the FCC, the United States, by exporting transparent processes, subject to host countries' legal review, offsetting concessions for the loss of monopoly suppliers, and incentivizing all stakeholders by offering reciprocal treatment, can successfully implement procompetitive regulatory policies over developing countries' underdeveloped telecommunications services.

In the end, new opportunities for U.S. companies to march into regions where Internet service has been controlled by monopolies should cut costs for broadband Internet services worldwide. Developing countries will enjoy significant changes when competition brings advanced technologies that industrialized countries have enjoyed for many decades. Under the Global Connect initiative, there will be more joint ventures, mergers, and company takeovers in the private sector, leading to new entities that will serve consumers in the global market. By eliminating nontariff barriers, these partnerships will help prevent inflated charges and facilitate local economic growth, which in turn will generate more revenue for technology advancement.