
UNIVERSAL SERVICE IN AN ALL-IP WORLD

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INTRODUCTION

Universality is the essential promise of the phone network.¹ But today, as the phone network transitions to new technologies and as consumers increasingly rely on services like broadband access for business, education, civic engagement, and personal communications, many stakeholders have started to debate how exactly the nation will continue to fulfill its commitment to universal service as voice telephony and other communications services evolve.²

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¹ See, e.g., Kevin D. Werbach, *No Dialtone: The End of the Public Switched Telephone Network*, 66 FED. COMM'NS L.J. 203, 208 (2014); see also H.R. Energy and Com. Comm., Universal Service Policy and the Role of the Federal Communications Commission 1 (2014), *available at* <http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/20140822White%20Paper-USF.pdf> (“The principle of universal service has long been at the heart of federal and state telephone policy.”).

² See, e.g., Office of Press Sec’y, *Remarks by the President in the State of the Union Address*, THE WHITE HOUSE (Jan. 20, 2015), <http://www.whitehouse.gov/the-press-office/2015/01/20/remarks-president-state-union-address-january-20-2015> (“I intend to protect a free and open internet, extend its reach to every classroom, and every community, and help folks build the fastest networks, so that the next generation of digital innovators and entrepreneurs have the platform to keep reshaping our world.”); see also Mignon Clyburn, Commissioner, Fed. Commc’ns Comm’n, Prepared Remarks at the American Enterprise Institute: Reforming Lifeline for the Broadband Era (Nov. 12, 2014), *available at* <http://www.fcc.gov/document/commissioner-clyburn-remarks-american-enterprise-institute> (“As we discuss the prospect of reforming Lifeline, we are looking at allowing millions the opportunity to help themselves by connecting to jobs, employers, online education, and a host of services, which can dramatically improve and enrich their lives.”); Tom Wheeler, Chairman, Fed. Commc’ns Comm’n, Prepared Remarks at 1776 Headquarters, The Facts and Future of Broadband Competition (Sept. 4, 2014), *available at* <http://www.fcc.gov/document/chairman-remarks-facts-and-future-broadband-competition> (“Our universal service efforts are focused on bringing better broadband to rural America by whomever steps up to the challenge—not the highest speeds all at once, but steadily to prevent the creation of a new digital divide.”).

The public switched telephone network (PSTN) embodies the principle that everyone in the United States should have access to basic communications services.³ This principle of universal service is one of five fundamental values that guide our national communications policy, along with interconnection and competition, consumer protection, network reliability, and public safety.⁴

The structural protections built around our phone network impact everything from businesses' decisions about where to build new facilities to the personal communications we all conduct multiple times every day.⁵ For decades, people have assumed the network would always just work—because it did.⁶ This was not just a happy accident. Reliability requirements ensured phone lines would stay up during a power outage through backup power and generators that provided power through the copper line.⁷ Interconnection and nondiscrimination policies meant that any person with phone service could call any other person with a phone, regardless of which carriers the two subscribed to and where they each lived.⁸ Consumer protections prevented fraudulent charges or service changes and protected consumers' privacy on what is still one of the most trusted methods of communication today.⁹ And in the rare cases where any of these protections fail, we have government authorities that can step in quickly to restore service and provide redress to deter future problems.¹⁰

But especially in communications law, our concept of what constitutes “basic service” evolves as technology evolves. For example, in the Telecommunications Act of 1996,¹¹ Congress expanded our conception of universal service to include advanced services as well as traditional phone services, and set in place certain policies aimed at giving everyone access to advanced services, like Internet access service, at just and reasonable rates.¹² Today, one recent survey found that 89% of people think phone service is very or some-

³ See JODIE GRIFFIN & HAROLD FELD, PKTHINKS: FIVE FUNDAMENTALS FOR THE PHONE NETWORK TRANSITION 2 (2013), available at <https://www.publicknowledge.org/files/PKThinks5Fundamentals.pdf>; see also Wheeler, *supra* note 2.

⁴ GRIFFIN & FELD, *supra* note 3.

⁵ *Id.*

⁶ *See id.*

⁷ *See id.*

⁸ *See id.* at 7.

⁹ See Mary Madden, *Public Perceptions of Privacy and Security in the Post-Snowden Era*, Pew Research Center (Nov. 12, 2014), <http://www.pewinternet.org/2014/11/12/public-privacy-perceptions/>.

¹⁰ GRIFFIN & FELD, *supra* note 3; see, e.g., *In the Matter of AT&T Services Inc.*, Order File No. EB-TCD-14-00016243, Order (Apr. 8, 2015), available at https://apps.fcc.gov/edocs_public/attachmatch/DA-15-399A1.pdf (settling a privacy violation by AT&T with a \$25 million fine).

¹¹ Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (1996).

¹² *Id.* at 71-72.

what important for the typical household, and 78% said the same for broadband service.¹³ This strongly indicates that, while universal voice service must remain a high priority, Internet access is increasingly seen as a necessity, not a luxury.¹⁴ As FCC Commissioner Mignon Clyburn has put it:

I have been in the regulatory space for over 16 years, and have never been more confident about any statement than the one I am about to make: **Broadband is the greatest equalizer of our time.** . . . In addition to the societal benefits, broadband has become is a necessity for an education, employment, improved healthcare, civic engagement and communication.¹⁵

As broadband access becomes increasingly popular and increasingly necessary for daily life, is voice service still the quintessential “basic service,” or do we now include broadband service in the same category? Once we have decided what the “basic service” is, how do we know the extent to which we have achieved universal service? By what metrics do we measure interconnected voice or broadband service?

This paper will review the history of universal service values in the phone network, and will examine how those values were achieved through specific tools (including interconnection, cross-subsidies, and COLR obligations, among others). An understanding of how universal service was “operationalized” will help us understand how it can be achieved with the new networks and new technologies being tested and deployed today.

Universal basic service is a cornerstone of United States communications policy.¹⁶ It is essential for personal, business, and emergency communications for people across the country.¹⁷ But without fully understanding what our universal service goals are and how we will know whether we are achieving them, we will have no way to measure the efficacy of any regulatory or deregulatory regime. This paper therefore examines what “basic service” means today, for both voice and broadband, how we can measure that service, and how policy-makers may achieve universal access and adoption.

¹³ JOHN B. HARRIGAN, PH.D, CONSUMERS AND THE IP TRANSITION: COMMUNICATIONS PATTERN IN THE MIDST OF TECHNOLOGICAL CHANGE 2 (2014), available at <https://www.publicknowledge.org/assets/uploads/blog/Consumers.IP.Transition.FINAL.pdf>.

¹⁴ See, e.g., Krishnadev Calamur, *Broadband a 'Necessity,' Obama Says, As He Pushes FCC To Expand Access*, NPR (Jan. 14, 2015, 2:16 PM), <http://www.npr.org/blogs/thetwo-way/2015/01/14/377230778/obama-pushes-fcc-to-expand-broadband-access> (quoting President Barack Obama).

¹⁵ Clyburn, *supra* note 2 (emphasis in original).

¹⁶ See, e.g., *Universal Service*, FCC, <http://www.fcc.gov/encyclopedia/universal-service> (last visited Mar. 13, 2015).

¹⁷ GRIFFIN & FELD, *supra* note 3, at 10.

UNIVERSAL SERVICE: ONE OF THE FUNDAMENTAL VALUES OF UNITED STATES COMMUNICATIONS POLICY

United States national communications policy aims to ensure the benefits of communications technologies flow to *everyone* – regardless of race, color, religion, national origin, or sex.¹⁸ “We have, as a nation, decided to invest in a world-class communications infrastructure and so we should, as a nation, reap the benefits of that infrastructure.”¹⁹ The principle of universal service applies whether users live in rural areas or urban areas.²⁰ It applies to those with a physical disability that would interfere with communication.²¹ It applies to all users irrespective of their level of income.²² The efforts made pursuant to the goal of service to all Americans will include initiatives that go beyond traditional concepts of deployment and take advantage of the opportunities presented by new technologies.²³

There is no reason that technology transitions should make the United States become the first industrialized nation to step back from the goal of making basic communications service available to 100% of its population.²⁴ Even if the U.S. has not yet fulfilled its goal of universal affordable basic service, it is critical that our policies’ *goal* continue to be 100% penetration, or the United States will let its own standards slide through mediocre goals and self-defeatism.

This network transition is also an opportunity to look forward: what new opportunities are made possible by new technology, and how does that impact what we determine to be the “basic service” that all should have access to? Communications law specifies that universal service encompasses “an evolving level of telecommunications services” and that the FCC should take into account “advances in telecommunications and information technologies and services” as it decides what universal service will look like for homes, schools, libraries, and health care providers across the country.²⁵ Access to basic communications services reaps tremendous social and economic benefits to users,

¹⁸ See 47 U.S.C. § 151 (2012); GRIFFIN & FELD, *supra* note 3, at 6.

¹⁹ GRIFFIN & FELD, *supra* note 3, at 10; *see, e.g.*, Andrew P. Morriss, *Does the Internet Prove the Need for Government Investment?*, FEE (Nov. 1, 1998), <http://fee.org/freeman/detail/does-the-internet-prove-the-need-for-government-investment>.

²⁰ GRIFFIN & FELD, *supra* note 3, at 10; *see* Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56, 71-72 (1996).

²¹ GRIFFIN & FELD, *supra* note 3, at 10; 110 Stat. at 75.

²² GRIFFIN & FELD, *supra* note 3, at 10; *see* 110 Stat. at 72.

²³ GRIFFIN & FELD, *supra* note 3, at 10; *see* 110 Stat. at 154.

²⁴ GRIFFIN & FELD, *supra* note 3, at 10.

²⁵ 47 U.S.C. § 254(c) (2012).

regardless of the material or technology used to transport the communications.²⁶

This principle also entails a number of policies and rules designed to ensure the United States continues its goal of providing service to all Americans, including through carriers of last resort and rural build-out. Achieving service for all Americans also requires policies that ensure technology is deployed and is made truly accessible to traditionally marginalized communities in order to bring the social benefits of new technologies to those communities. This should include more than traditional anti-redlining rules.

Currently, the FCC's Connect2Compete program²⁷ and merger conditions requiring Comcast to make affordable broadband available to low-income users²⁸ are two examples of relatively recent efforts to promote adoption. While not perfect by any means,²⁹ these efforts do at least represent a recognition that the public interest for the 21st Century goes beyond traditional concepts of deployment.³⁰

It remains to be seen how the United States will continue to pursue the goal of 100% basic service for all Americans—regardless of location, income, or disability—as carriers stop maintaining their older, TDM-based facilities.³¹ Similarly, state carrier of last resort policies must be able to continue ensuring that all users are able to purchase reliable voice service under nondiscriminatory terms.³² These policies traditionally applied to all relevant carriers operating in some way on the traditional PSTN.³³ Neither the make-up of the physical plant nor the protocols used to transport data on the network diminish consumers' need for basic service—if anything, advances and new efficiencies in

²⁶ See, e.g., Eduardo Porter, *Measuring the Benefits of Tech Tools*, N.Y. TIMES, Apr. 30, 2013, at B1, B5.

²⁷ See Tim Devaney, *FCC Initiates Plan to Make Broadband Available to Low-Income Families*, WASH. TIMES (Nov. 9, 2011), www.washingtontimes.com/news/2011/nov/9/fcc-initiates-plan-to-make-broadband-available-to/.

²⁸ *In the Matter of Applications of Comcast Corporation, General Electric Company and NBC Universal, Inc. for Consent to Assign Licenses and Transfer Control of Licenses*, MB Docket No. 10-56, Memorandum Opinion and Order, 26 FCC Rcd 4238 para. 4 (Jan. 18, 2011).

²⁹ See Amy Chozick, *Mixed Response to Comcast in Expanding Net Access*, N.Y. TIMES Jan. 20, 2013, at B1, B4.

³⁰ See, e.g., Sam Gustin, *Is Broadband Internet Access a Public Utility?*, TIME (Jan. 9, 2013), <http://business.time.com/2013/01/09/is-broadband-internet-access-a-public-utility/>.

³¹ See Sean Buckley, *AT&T, Verizon execs cite 'chilling' effect of murky TDM-to-IP transition regs*, FIERCETELECOM (Oct. 9, 2013), <http://www.fiercetelecom.com/story/att-verizon-execs-cite-chilling-effect-murky-tdm-ip-transition-regs/2013-10-09> (stating that the FCC has set a 2017 goal for complete TDM shutdown and IP integration).

³² See, e.g., Cecilia Kang, *Landline Rules Frustrate Telecoms*, WASH. POST (Apr. 12, 2012), http://www.washingtonpost.com/business/economy/landline-rules-frustrate-telecoms/2012/04/12/gIQAG2XvDT_story.html.

³³ See *id.*

technologies may justify raising the standard for what is considered basic service.³⁴

Of course, in achieving this goal the FCC's current refusal to classify VoIP service will eventually hit center stage.³⁵ The FCC has in the past relied upon its ancillary authority under Title I of the Act to create universal service contribution obligations for interconnected VoIP providers,³⁶ but has not made VoIP services eligible for funding for universal service.³⁷ Although the FCC applied contribution obligations on interconnected VoIP providers for calls that did not actually touch the PSTN, it based its decision on the fact that interconnected VoIP services in general still offer the *capability* of reaching the PSTN.³⁸ This logic will become increasingly untenable as the PSTN moves to a system that looks more like interconnected VoIP than it does like the traditional PSTN—unless the FCC updates its understanding of what constitutes the PSTN.³⁹

“Similarly, in 2007 the [FCC] relied upon ancillary authority and its Title II jurisdiction⁴⁰ to extend disability access requirements to interconnected VoIP providers and to manufacturers that design interconnected VoIP equip-

³⁴ *See id.*

³⁵ *See generally* Mike Masnick, *VoIP Pioneer Worried About Net Neutrality Reclassification – But Without It, Broadband Providers Could Kill VoIP Startups*, TECHDIRT (Sept. 23, 2014, 10:19 AM), <https://www.techdirt.com/blog/netneutrality/articles/20140922/16464528601/voip-pioneer-worried-about-net-neutrality-reclassification-without-it-broadband-providers-could-kill-voip-startups.shtml> (describing, in other words, the central genesis of the Net Neutrality debate).

³⁶ *In the Matter of Universal Service Contribution Methodology; Federal-State Joint Board on Universal Service, 1998 Biennial Regulatory Review – Streamlined Contributor Reporting Requirements Associated with Administration of Telecommunications Relay Service, North American Numbering Plan, Local Number Portability, and Universal Service Support Mechanisms; Telecommunications Services for Individuals with Hearing and Speech Disabilities, and the American's with Disabilities Act of 1990; Administration of the North American Numbering Plan and North American Numbering Plan Cost Recovery Contribution Factor and Fund Size; Number Resource Optimization; Telephone Number Portability; Truth-in-Billing and Billing Format; and IP-Enabled Services*, Report and Order and Notice of Proposed Rulemaking, WC Docket No. 06-122; CC Docket No. 96-45; CC Docket No. 98-171; CC Docket No. 90-571; CC Docket No. 92-237; NSD File No. L-00-72; CC Docket No. 99-200; CC Docket No. 95-116; CC Docket No. 98-170; WC Docket No. 04-36, 21 FCC Rcd 7518, para. 16 (June 21, 2006), *aff'd in relevant part sub nom.*, Vonage Holdings Corp. v. FCC, 489 F.3d 1232, 1236 (D.C. Cir. 2007) [hereinafter *Universal Service Contribution Methodology Order*] (creating universal service contribution requirements for interconnected VoIP providers).

³⁷ *Universal Service*, FCC (Feb. 23, 2015), <http://www.fcc.gov/encyclopedia/universal-service>.

³⁸ *Universal Service Contribution Methodology Order*, 21 FCC Rcd 7518, para. 36.

³⁹ In this regard, nothing in the current regulatory definition of “public switched network” precludes the inclusion of VoIP services on the network. *See* 47 C.F.R. § 20.3 (2012).

⁴⁰ *See* 47 U.S.C. § 225(b)(1) (2012).

ment....”⁴¹ These requirements included “requiring interconnected VoIP providers to contribute to the Interstate Telecommunications Relay Services fund and to offer 7-1-1 abbreviated dialing for relay services.”⁴² “But for these obligations to function, there must at some point be an actual Title II telecommunications service upon which to base ancillary authority. In considering this issue, the [FCC] must be mindful of the continued needs for disability access services and rules in the post-transition PSTN.”⁴³

One of the most important goals of communications policy in the United States is reaching universal service for all Americans across the country. The transition of the PSTN is an opportunity to expand and improve the communications service that all Americans receive, and the Commission must determine how it can continue to serve its statutory mandate as the traditional make-up of the PSTN changes.⁴⁴

UNIVERSAL SERVICE AND EVOLVING TECHNOLOGY

As we look to what values should guide the transitions, we should carefully consider what values guided us on the old network. We should consider these not merely because they have shaped our national expectation on how our communications networks should work, but because of the incredible success of the network that was built on these principles.

For decades now, the PSTN’s penetration rate into more than 90% of United States homes and businesses made it one of the national “systems of record” for enabling communications across the nation.⁴⁵ Indeed, the new networks that have evolved, the Internet and the cell phone network, emerged out of the old communications network thanks to a series of policy decisions that made the

⁴¹ *In re* Technological Transition of the Nation’s Communications Infrastructure, *Comments of Public Knowledge*, GN Docket No. 12-353, at 16 (Jan. 28, 2013) (accessible via FCC Electronic Comment Filing System) [hereinafter *Comments of Public Knowledge*]; see *In the Matters of IP-Enabled Services; Implementation of Section 255 and 251(a)(2) of The Communications Act of 1934, as Enacted by The Telecommunications Act of 1996: Access to Telecommunications Service, Telecommunications Equipment and Customer Premises Equipment by Persons with Disabilities; Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities; and The Use of N11 Codes and Other Abbreviated Dialing Arrangements*, Report and Order, WC Docket No. 04-36, WT Docket No. 96-198, CG Docket No. 03-123, CC Docket No. 92-105, 22 FCC Rcd. 11275, para. 1 (May 31, 2007).

⁴² *Comments of Public Knowledge*, GN Docket No. 12-353, at 17; see *IP-Enabled Services*, 22 FCC Rcd. 11275, paras. 36, 42.

⁴³ *Comments of Public Knowledge*, GN Docket No. 12-353, at 16-17.

⁴⁴ *Id.* at 17; see, e.g., William Kennard, Chairman, Fed. Commc’ns Comm’n, *Chairman Kennard’s Agenda for the FCC for 1999*, FCC, <http://transition.fcc.gov/Speeches/Kennard/Statements/stwek901.html> (last visited Mar. 14, 2015).

⁴⁵ TECHNICAL ADVISORY COUNCIL, CRITICAL LEGACY TRANSITIONS WORKING GRP., FED. COMM’NS COMM’N, SUN-SETTING THE PSTN 20 (2011).

ubiquitous traditional telephone network an open and reliable platform for everyone to use.⁴⁶

In addition, policies like universal service have created a positive feedback loop by maintaining the central position of the PSTN to the communications infrastructure and reinforcing the importance and universality of the PSTN.⁴⁷ This history has built a series of networks that lie at the heart of the United States' economy and culture.⁴⁸ An examination of what policies created such success in the traditional phone network will help inform what policies we need to implement as the network transitions to its next iteration.

THE HISTORY OF UNIVERSAL SERVICE

Many trace the first prominent use of the term “universal service” in the United States back to a 1908 AT&T advertisement,⁴⁹ but the concept of universal communications service appeared much earlier than that, from the construction of postal roads that pre-date the United States Constitution⁵⁰ to proposals for the Uniform Penny Post in the United Kingdom in the 1830s.⁵¹

In the beginning of the 20th Century, policymakers had to confront a series of policy questions that would shape the development of our national communications infrastructure for decades to come.⁵² AT&T had built out its network, but had also attained dominance in both local and long-distance telephone services.⁵³ However, competing carriers found it difficult to offer customers competing voice services that let them connect with anyone else with a phone, be-

⁴⁶ Jason Oxman, Counsel for Advanced Commc'n, *The FCC and the Unregulation of the Internet* 3, 15-16 (Fed. Commc'ns Comm'n, Office of Plans and Policy, Working Paper No. 31, July 1999); see H.R. REP. No. 103-213, at 492-93 (1993) (Conf. Rep.), reprinted in 1993 U.S.C.C.A.N. 1088, 1181-82.

⁴⁷ See Oxman, *supra* note 46, at 6 (stating that the Commission maintained universal access to the telecommunications network which the Internet relies on to operate, while simultaneously ensuring the unregulated development of the Internet).

⁴⁸ See *id.* at 15.

⁴⁹ *Milestones in AT&T History*, AT&T, http://www.thocp.net/companies/att/att_company.htm (last Mar. 13, 2015). At the time, the use of “universal” service was intended to counter the concept of introducing competition in the marketplace, but the company's arguments were nevertheless based on the observation: “[t]hat the American public requires a telephone service that is universal is becoming plainer every day.” See AT&T, *One Policy, One System, Universal Service*, BROOKLYN LIFE, Nov. 28, 1908, at 25, available at <http://bklyn.newspapers.com/image/83167928/>.

⁵⁰ *Colonial Times*, U.S. POSTAL SERVICE, https://about.usps.com/publications/pub100/pub100_002.htm (last visited Mar. 13, 2015).

⁵¹ See J. C. HEMMEON, *THE HISTORY OF THE BRITISH POST OFFICE* 60 (1912).

⁵² See, e.g., GRIFFIN & FELD, *supra* note 3, at 2, 5-6.

⁵³ See MILTON MUELLER, *UNIVERSAL SERVICE: COMPETITION, INTERCONNECTION AND MONOPOLY IN THE MAKING OF THE AMERICAN TELEPHONE SYSTEM* 91 (1997), available at <http://surface.syr.edu/cgi/viewcontent.cgi?article=1017&context=books>.

cause AT&T employed the strategy of refusing to let independent local network interconnect with AT&T's long-distance network.⁵⁴ Without being able to complete calls to AT&T's customers, independent carriers were at a disadvantage, towns where AT&T had not deployed its network were left without a bridge to the rest of the world, and AT&T gained a monopolistic position in the market.⁵⁵

This pattern culminated in a 1913 antitrust lawsuit filed by the United States against AT&T.⁵⁶ Perhaps guided by Congress' simultaneous consideration of nationalizing the long-distance telephone network, AT&T decided to settle the lawsuit with an agreement known as the Kingsbury Commitment.⁵⁷ As part of that settlement, AT&T agreed to let independent local telephone carriers interconnect with AT&T's long-distance network, in addition to divesting Western Union and not purchasing other companies against the objections of the Interstate Commerce Commission.⁵⁸

The Kingsbury Commitment was by no means a comprehensive universal service policy, but it did use interconnection as a key tool in enabling competition and network build-out.⁵⁹ AT&T could still impose an access charge on independent carriers, and AT&T would not interconnect its local exchange with independent carriers' local exchanges, but the agreement was nonetheless a historic step forward in developing national communications policy.⁶⁰ Subsequently, federal law would recognize the importance of interconnection by broadly requiring telecommunications carriers to interconnect with one another,⁶¹ and even towards the end of the 20th Century, Congress went further in detailing the interconnection requirements of telecommunications carriers and incumbent local exchange carriers (ILECs) in particular.⁶²

Thus, universal service, along with other key fundamental values, shaped the development of communications policy in the United States, from basic interconnection commitments under antitrust law to policies that now include interconnection, intercarrier compensation, carrier of last resort (COLR) rules, and universal service support programs, to name just a few. Together, these policies have created a national telecommunications infrastructure that became

⁵⁴ *See id.* at 75, 102.

⁵⁵ *See id.* at 91.

⁵⁶ *See id.* at 127.

⁵⁷ Letter from Nathan Kingsbury, AT&T Vice President to the Attorney General (Dec. 19, 1913), in AT&T CO., 1913 ANNUAL REPORT 24, 24 (1914).

⁵⁸ *Id.* at 24, 26.

⁵⁹ *See* GRIFFIN & FELD, *supra* note 3, at 5-6.

⁶⁰ *See* MUELLER, *supra* note 53, at 128.

⁶¹ *See* Communications Act of 1934, Pub. L. No. 416, § 201(a) (1934).

⁶² *See* Telecommunications Act of 1996, Pub. L. No. 104-104, § 101(a), 110 Stat. 56 (codified at 47 U.S.C. § 251(a)).

the envy of the world.⁶³ And now, as the network continues to develop, smart policymaking will continue to seize opportunities to expand and improve service without leaving anyone behind.

THE FIRST MAJOR TRANSITION: FROM NATURAL MONOPOLY TO COMPETITION

Even after the Kingsbury Commitment opened the market to independent network build-out and competition, Congress continued to develop rules to protect the people relying on the network and encourage a robust marketplace.⁶⁴ As the telecommunications marketplace evolved to include competing carriers, policymakers used that developing competition to encourage build-out to underserved areas while also placing competitive pressure on incumbents in areas that already had service.

In the early years of our telecommunications networks, we served core network values like reliability and universal service through a “natural monopoly” system.⁶⁵ Each local area was served by a telecommunications carrier with a local monopoly—often through AT&T or “Ma Bell.”⁶⁶ The national system cross-subsidized local service through long-distance charges and sometimes through a regulated rate-of-return.⁶⁷

As technology has developed since the Kingsbury Commitment and the Communications Act of 1934, policymakers have shifted from policies designed to support and seek benefits from a monopoly-based system to one that promotes the benefits of competition wherever possible, complemented with policies that ensure we achieve basic values like universal service even where competition fails.⁶⁸ After some time in the AT&T monopoly, companies like MCI were able to enter the long-distance market to offer better rates and innovative new services for users.⁶⁹ Later on, wireless carriers were able to use cellular technologies to offer consumers mobility in basic voice service and com-

⁶³ Kennard, *supra* note 44.

⁶⁴ Bob Adelman, *The Breakup of Ma Bell*, THE NEW AM. (May 12, 2010), <http://www.thenewamerican.com/economy/sectors/item/4297-the-breakup-of-ma-bell>.

⁶⁵ A “natural monopoly” is defined as a service best delivered by one company rather than two or more competitors. *Universal Service*, *supra* note 16.

⁶⁶ *Id.*

⁶⁷ CLAUDE FISCHER, AMERICA CALLING: A SOCIAL HISTORY OF THE TELEPHONE TO 1940 369 (U. of Cal. Press 1994), available at <http://quod.lib.umich.edu/cgi/t/text/text-idx?c=acls;cc=acls;view=toc;idno=heb00141.0001.001>.

⁶⁸ See GRIFFIN & FELD, *supra* note 3, at 6.

⁶⁹ See *Regulatory Reform: A Survey of the Impact of Reregulation and Deregulation on Selected Industries and Sectors*, 47 ADMIN. L. REV. 569, 574 (1995) (stating that despite its prior existence, MCI was able to compete more efficiently in the long distance market in the wake of the Modern Final Judgment which divested the Baby Bells).

pete—albeit imperfectly—with traditional local phone service.⁷⁰ Later, a series of policy actions including the break-up of the AT&T and Bell monopoly in 1984, and the introduction of the spectrum auction in 1993⁷¹ confirmed competition as a fundamental principle in the nation’s communications industry.⁷²

But throughout this paradigm shift from monopoly to competition, policy-makers ensured that changes in the network did not undermine the other core network values: universal service, consumer protection, reliability, and public safety.⁷³ For universal service, this also involved the implementation of new policies and programs, like the Universal Service Fund, programs to bring service to rural areas, low-income communities, and anchor institutions.⁷⁴ In other cases, old tools found new uses. The interconnection rules that had initially served as universal service tools to help independent carriers and towns connect to the national network have since proved to be among the most important competition tools used by policymakers today.⁷⁵ With carriers required to allow users to connect any non-harmful devices of their choosing to the network, consumers had access to competitive choice in telephone equipment in addition to new technologies like fax machines and answering machines.⁷⁶ Similarly, rules that allowed “electronic publishers” and other “enhanced service providers” to interconnect with the telephone network set the stage for a new universe of services that rode on top of the phone network, like security systems, medical alerts, and voicemail.⁷⁷ And of course, these rules ultimately led to the creation of the dial-up modem—running on the traditional phone network—and some of the earliest work on the Internet.⁷⁸ All of these developments were

⁷⁰ See *id.* at 576 (“In business and residential markets, the Bells are also facing increased competition from cellular carriers.”).

⁷¹ See Omnibus Budget Reconciliation Act of 1993, Pub. L. 103-66, § 6001, 107 Stat. 312, 379 (1993).

⁷² See, e.g., *Regulatory Reform*, *supra* note 69, at 571.

⁷³ See *In the Matters of IP-Enabled Services and E911 Requirements for IP-Enabled Service Providers*, First Report and Order and Notice of Proposed Rulemaking, WC Docket No. 04-36, WC Docket No. 05-196, 20 FCC Rcd 10245 (May 19, 2005) [hereinafter *IP-Enabled E-911 Requirements Order*].

⁷⁴ Telecommunications Act of 1996, Pub. L. No. 104-104, § 254, 110 Stat. 56, 72 (1996).

⁷⁵ *U.S. v. Am. Tel. & Tel. Co.*, 524 F.Supp. 1336 (D.D.C. 1981); see Steven Semeraro, *The Antitrust-Telecom Connection*, 40 SAN DIEGO L. REV. 555 (2003) (“The Act is legislative competition policy-making that stimulates rivalry in local telephone service principally by requiring ‘incumbent local exchange carriers’ (ILECs), the existing local telephone companies, to interconnect with, and provide certain services.”).

⁷⁶ See Nicholas Johnson, *Carterfone: My Story*, 25 SANTA CLARA COMPUTER & HIGH TECH. L.J. 677, 677 (2008) (discussing the extent of innovation in the wake of the FCC’s *Carterfone* decision).

⁷⁷ See § 274, 110 Stat. at 102.

⁷⁸ Philip J. Weiser, *Regulating Interoperability: Lessons From AT&T, Microsoft, and Beyond*, 76 ANTITRUST L.J. 271 (2009-2010).

made possible by a suite of policies designed to ensure ubiquitous and affordable access to an open, neutral communications network.

POLICIES FOR NEWER NETWORKS: VOICE-OVER-IP, CABLE AND WIRELESS RISE AND THRIVE WITH THE “COPPER SAFETY NET”

Policymakers’ efforts to achieve ubiquitous, affordable services have not been without their share of twists and bumps in the road. As new voice services entered the market,⁷⁹ federal and state policymakers alike have faced the questions of whether and how to implement the fundamental values of the network to new technologies.⁸⁰

For decades, the FCC avoided many of these hard questions, instead using ad hoc decisions to create a patchwork of policies with no real guiding framework or consistent principles.⁸¹ Unsurprisingly, the result has been an inconsistent hodge-podge that risks segregating the most powerful and critical policies to traditional voice service offered over the “copper safety net.”⁸² Even now that the FCC has reclassified broadband Internet access service as a Title II telecommunications service,⁸³ there remain many questions, both about the classification of services like interconnected VoIP and text messaging services and about exactly how the core network values should be applied to each of these services.

For voice service in particular, the effectively unclassified status of interconnected VoIP continues to cast uncertainty over the policy discussions about the future of the voice network. In 2004, Vonage asked the FCC to classify interconnected VoIP as a Title I information service, and thereby pre-empt the Minnesota Public Utilities Commission (“PUC”) from applying telephone service rules to Vonage’s interconnected VoIP service.⁸⁴ The FCC did preempt the Minnesota PUC’s order, but it did not classify interconnected VoIP as either a telecommunications service or an information service.⁸⁵ However, in a separate

⁷⁹ See Werbach, *supra* note 1, at 275 (explaining that customers are switching from incumbent wireline providers to wireless phones and VoIP).

⁸⁰ See, e.g., GRIFFIN & FELD, *supra* note 3, at 7.

⁸¹ See *In the Matter of IP-Enabled Services*, Notice of Proposed Rulemaking, WC Docket No. 04-36, 19 FCC Rcd 4863 at para. 46 (Feb. 12, 2004).

⁸² GRIFFIN & FELD, *supra* note 3 at 7; see *IP-Enabled Services NPRM*, 19 FCC Rcd 4863 at para. 46.

⁸³ See *generally Protecting and Promoting an Open Internet*, GN Docket No. 14-28, Report and Order on Remand, Declaratory Ruling, and Order (Feb. 26, 2015).

⁸⁴ *In the Matter of Vonage Holdings Corporation Petition for Declaratory Ruling Concerning an Order of the Minnesota Public Utilities Commission*, Petition for Declaratory Ruling, WC 03-211 (Sept. 22, 2003).

⁸⁵ See *In the Matter of Vonage Holdings Corporation Petition for Declaratory Ruling Concerning an Order of the Minnesota Public Utilities Commission*, Memorandum Opinion and Order, WC Docket No. 03-211, 19 FCC Rcd 22404 at para. 1 (Nov. 9, 2004).

proceeding, the FCC also affirmed that AT&T's traditional copper-based network would still be treated as a traditional phone service in some ways even when it used IP in the middle of the network.⁸⁶ But on the whole, interconnected or non-nomadic VoIP still remains largely unclassified for regulatory purposes.⁸⁷

The FCC, however, has applied some rules to interconnected VoIP providers in various proceedings, using the Commission's ancillary authority or authority under section 706.⁸⁸ Neither of these sources of authority, however, provide the same level of certainty that Title II would offer. Ancillary authority must, after all, be ancillary *to something*, and it is not clear how a theory of ancillary authority could stand in a world where the network has been entirely transitioned to new technologies.⁸⁹ And section 706, while providing strong authority for the Commission in some respects, is limited by the "common carrier prohibition"—in other words, the Commission may only treat a provider as a common carrier if it classifies that provider as a telecommunications carrier.⁹⁰ Therefore, while these obstacles are not a problem for services that are already classified as Title II telecommunications services, like traditional POTS service and broadband Internet access service, the FCC's legal authority will continue to

⁸⁶ *In the Matter of Petition for Declaratory Ruling that AT&T's Phone-to-Phone IP Telephony Services are Exempt from Access Charges*, Order, WC Docket No. 02-361, 19 FCC Rcd 7457 at para. 1 (Apr. 14, 2004).

⁸⁷ *See Vonage Holdings*, 19 FCC Rcd 22404 at para. 32.

⁸⁸ *See Universal Service Contribution Methodology Order*, 21 FCC Rcd 7518, para. 35 (creating universal service contribution requirements for interconnected VoIP providers under section 254(d)); *IP-Enabled E-911 Requirements Order*, 20 FCC Rcd 10245, 7 at para. 27 (extending disabilities access requirements to interconnected VoIP under ancillary authority); *In the Matter of Telephone Number Requirements for IP-Enabled Services Providers, Local Number Portability Porting Interval and Validation Requirements, IP-Enabled Services, Telephone Number Portability, CTIA Petitions for Declaratory Ruling on Wireline-Wireless Porting Issues, Final Regulatory Flexibility Analysis, Numbering Resource Optimization*, Report and Order, Declaratory Ruling, Order on Remand, and Notice of Proposed Rulemaking, WC Docket No. 07-243, WC Docket No. 07-244, WC Docket No. 04-36, CC Docket No. 95-116, CC Docket No. 99-200, 22 FCC Rcd 19531, para. 17 (Oct. 31, 2007) [hereinafter *Local Number Portability Declaratory Ruling*] (extending local number portability requirements to interconnected VoIP providers under ancillary authority); *In the Matter of Implementation of the Telecommunications Act of 1996, Telecommunications Carriers' Use of Customer Proprietary Network Information and Other Customer Information, IP-Enabled Services*, Report and Order and Further Notice of Proposed Rulemaking, 22 FCC Rcd 6927, para. 54 (2007); *Id.* at n.3 (extending CPNI rules to interconnected VoIP service under ancillary authority).

⁸⁹ *See Local Number Portability Declaratory Ruling*, 22 FCC Rcd 19531, para. 28 (Oct. 31, 2007) (noting the Commission has ancillary authority because interconnected VoIP service is rapidly overtaking traditional telephone service).

⁹⁰ *See* 47 U.S.C. § 153(51) (2012); *see Verizon v. FCC*, 740 F.3d 623, 651 (D.C. Cir. 2014).

be a practical barrier to implementing a consistent policy framework on services that have not been classified.

WHAT IS THE BASIC SERVICE?

Before anyone can study or choose amongst the different approaches for achieving universal service, we have to first determine what the universal “basic service” *is*. Although basic voice service is still near-universally subscribed to and relied upon for many users’ most important communications,⁹¹ there is emerging agreement around the notion that broadband access should also be considered a “basic service” that is similarly necessary for personal, business, and emergency communications.⁹²

INTERCONNECTED VOICE SERVICE

Even as new technologies develop and attract more users, voice service, as coordinated by the North American Numbering Plan, continues to be a basic service for networks users across the country.⁹³ Whether looking at the activities voice service supports or rates of adoption among users, it is clear that almost everyone in the country relies on voice service for critical functions.⁹⁴

Basic voice service remains an important foundation of communications in the United States. People still need voice service to contact 911,⁹⁵ call their loved ones, and conduct business.⁹⁶ Even as new technologies arise, basic interconnected voice service continues to be the backstop that people across the country rely on.⁹⁷ Online e-mail forms and chat forums for customer service have become very popular, but when customers want to talk directly to another person, they turn to the company’s phone line.⁹⁸ Similarly, text messaging has

⁹¹ See *In the Matter of IP-Enabled Services*, Notice of Proposed Rulemaking, WC Docket No. 04-36, 19 FCC Rcd 4863, para. 5 (Feb. 12, 2004) [*IP-Enabled Services NPRM*].

⁹² *Id.* at para. 8.

⁹³ Werbach, *supra* note 1, at 207.

⁹⁴ *In the Matter of IP-Enabled Services NPRM*, 19 FCC Rcd 4863, para. 18.

⁹⁵ The FCC has encouraged voluntary commitments and recently announced new rules for implementing text-to-911 service, but for multiple reasons voice calls are still the near-only way customers contact emergency services. *In the Matter of Facilitating the Deployment of Text-to-911 and Other Next Generation 911 Applications, Framework for Next Generation 911 Deployment*, Second Report and Order and Third Further Notice of Proposed Rulemaking, PS Docket No. 11-153, PS Docket No. 10-255, 29 FCC Rcd 9846, para. 10 (Aug. 13, 2014) [*Facilitating Text-to-911 Order*].

⁹⁶ *IP-Enabled Services NPRM*, 19 FCC Rcd 4863, para. 19.

⁹⁷ *Id.* at para. 10.

⁹⁸ See Jordan Minor, *How to Talk to a Live Person: Every Customer Support Number You’ll Ever Need*, PC MAG. (Dec. 5, 2013)

been a tremendously popular tool for casual conversation,⁹⁹ but when Mother's Day comes around, everybody still picks up the phone.

Access to basic phone service is also presupposed throughout federal law and regulation.¹⁰⁰ Many of the federal and state governments' social support programs depend on phone access to disburse information and collect complaints.¹⁰¹ In all of the following ways, the functioning of many non-telecommunications laws and policies depends on universal and reliable access to communications networks:

Role of Communications Service	Statute
States agencies are required by law to maintain toll-free numbers for non-English speaking persons to access more information about food stamps. Anyone seeking to file a discrimination complaint regarding the Supplemental Nutrition Assistance Program will also need to provide the Food and Nutrition Service with a contact phone number. Federal law also gives states the option of allowing applicants to sign their applications via recorded verbal assent over the phone.	7 U.S.C. § 2020(e)(2)(C); 7 C.F.R. § 272.4(b)(3); 7 C.F.R. § 272.6(c)(1)(i).
The law requires the National Emergency Child Locator Center to maintain a toll-free phone number to receive reports about displaced children.	6 U.S.C. § 774(b)(3)(A).
The Secretary of Defense must maintain a national telephone number to receive reports of suspected child abuse or safety violations at a military child development center or day care.	10 U.S.C. § 1794(b)(1).

<http://www.pcmag.com/article2/0,2817,2427973,00.asp> (providing the direct customer service phone numbers for several major retailers as an alternative to online access methods).

⁹⁹ *Facilitating Text-to-911 Order*, 29 FCC Rcd 9846, para. 3.

¹⁰⁰ *See Lifeline Program for Low-Income Consumers*, FCC, <http://www.fcc.gov/lifeline> (last visited Mar. 13, 2015) (providing that a federal program has been in existence since 1985 that assists low-income individuals to gain access to cellular telephones, further implying that the government presumes that individuals have access to telephones).

¹⁰¹ SOC. SEC. ADMIN., *DISABILITY BENEFITS 2* (2014) (demonstrating that, for example, the Social Security Administration provides a telephone number to discuss disability benefits).

Federal law requires the secretary of Housing and Urban Development to maintain a telephone hotline for homeowners to obtain information about homeownership counseling.	12 U.S.C. § 1701x(c)(5)(D)(i)
Servicers of federally related mortgages must maintain toll-free phone numbers to answer inquiries about servicing transfers.	12 U.S.C. § 2605(b)(3).
State and local governments' multidisciplinary child abuse teams offer services including telephone consultations in emergencies and other situations.	18 U.S.C. § 3509(g)(2)(B).
The Secretary of Education must maintain a toll-free phone service to handle questions about financial aid applications.	20 U.S.C. § 1090(c).
The National Center for School and Youth Safety maintains a toll-free phone line for students to anonymously report criminal activity and other high-risk behaviors.	20 U.S.C. § 7138(b)(2).
Federal law gives retailers the right to request a hearing by phone before the Food and Drug Administration for violations of tobacco sale laws.	21 U.S.C. § 333(f)(8).
The Secretary of State must maintain a toll-free phone number for families of citizens involved in disasters abroad.	22 U.S.C. § 5504(b).
Federal law instructs the Department of Health and Human Services (HHS) to use toll-free phone lines to make information available about autism spectrum disorder, Alzheimer's Disease, and AIDS.	42 U.S.C. § 280i-1(c)(2)(C); 42 U.S.C. §§ 285e-7(b), 285e-8(b)(2); 42 U.S.C. §§ 300cc-17(b), 300ee-31(c).
The Substance Abuse and Mental Health Services Administration must require grant recipients providing research, training, and technical assistance to maintain toll-free informational phone lines.	42 U.S.C. § 290bb-34(c)(3).

States receiving federal maternal and child health services block grants must provide a toll-free phone line for parents to access health care information.	42 U.S.C. § 705(a)(5)(E).
Federal law requires HHS to provide a toll-free phone number for Medicare and Medigap and for health benefit exchanges.	42 U.S.C. § 1395b-2(b); 42 U.S.C. § 18031(d)(4)(B).
Programs receiving federal funds to encourage and facilitate the use of local transportation services and resources by old individuals must maintain toll-free numbers to disseminate information.	42 U.S.C. § 3032e(b)(2)(B).
Federal law establishes a 24-hour toll-free phone lines to report information about missing children, domestic violence, sexual assault, and breaches of health information privacy.	42 U.S.C. § 5773(b)(1)(A); 42 U.S.C. § 10413(a), (e); 42 U.S.C. § 16985(b)(2)(A); 42 U.S.C. § 17932(f)(5).
Federal law establishes the right of mental health patients to “convenient and reasonable access to the telephone.”	42 U.S.C. § 10841(1)(J).
States must maintain toll-free phone lines for reports of voting fraud and voter rights violations.	42 U.S.C. § 15301(b)(1)(H).
The Secretary of Transportation must maintain a toll-free phone line to dispatch trains and receive calls reporting rail safety issues and a toll-free phone line to handle calls from the families of train accident victims.	49 U.S.C. § 20152(a); 49 U.S.C. § 24316(b)(3).
The Secretary of Transportation must also maintain toll-free phone lines for people to report air transportation complaints and to inform the public about threats to civil aviation.	49 U.S.C. § 42302(a); 49 U.S.C. § 44905(c)(1)(B).

Even beyond the types of uses made by the public using basic voice service, interconnected voice service remains a basic service by virtue of the sheer number of people who continue to rely on it.¹⁰² By June 2013, there were 441

¹⁰² See FED. COMM’NS COMM’N, INDUS. ANALYSIS AND TECH. DIVISION: WIRELINE

million retail phone service connections in the United States, of which 90 million were end-user switched access lines and 45 million were interconnected VoIP lines.¹⁰³ Even only looking at residential wireline phone service, the United States still has one such active line for every four people in the country.¹⁰⁴ In addition, the Federal Communications Commission continues to require all Universal Service Fund recipients to offer basic voice service.¹⁰⁵

Basic voice service can to some extent be delivered using various technologies and infrastructure, but new technologies may vary in some aspects from the traditional TDM-based voice service delivered over copper infrastructure.¹⁰⁶ In terms of consumer perception, it is unclear whether users who switch from traditional TDM-based copper phone service to a wireline interconnected VoIP service are made fully aware of all of the differences between copper, cable, and fiber infrastructure.¹⁰⁷ For example, one of the most prominent distinguishing characteristics of copper-based service is copper's ability to receive power through the line—an especially useful feature during commercial power outages.¹⁰⁸ However, after some recent outages, reports surfaced of customers remarking on how they were surprised by the fact that their cable or fiber service

COMPETITION BUREAU, INTERNET ACCESS SERVICES: STATUS AS OF JUNE 30, 2013 1 (2014) (demonstrating the number of people who rely on these services).

¹⁰³ *Id.* at 1.

¹⁰⁴ *See id.* at 2-3. The United States' population as of June 30, 2013, is estimated at 316,122,143. *U.S. World and Population Clock*, U.S. CENSUS BUREAU, <http://www.census.gov/popclock/> (last visited Mar. 13, 2015) (follow "Select a Date" hyperlink; then choose "June 30, 2013").

¹⁰⁵ *In the Matter of Connect America Fund, A National Broadband Plan for Our Future, Establishing Just and Reasonable Rates for Local Exchange Carriers, High-Cost Universal Service Support, Developing an Unified Intercarrier Compensation Regime, Federal-State Joint Board on Universal Service, Lifeline and Link-Up, Universal Service Reform – Mobility Fund*, Report and Order and Further Notice of Proposed Rulemaking, WC Docket No. 10-90, GN Docket No. 09-51, WC Docket No. 07-135, WC Docket No. 05-337, CC Docket No. 01-92, CC Docket No. 96-45, WC Docket No. 03-109, WT Docket No. 10-208, 26 FCC Rcd 17663 paras. 77, 78, 84 (Oct. 27, 2011) (describing the core functionalities of supported services as "voice telephone service," in order to focus on the functionality offered rather than the technology used).

¹⁰⁶ *In the Matter of Ensuring Customer Premises Equipment Backup Power for Continuity of Communications, Technology Transitions, Policies and Rules Governing Retirement Of Copper Loops by Incumbent Local Exchange Carriers, Special Access for Price Cap Local Exchange Carriers, AT&T Corporation Petitions for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, Notice of Proposed Rulemaking and Declaratory Ruling, PS Docket No. 14-174, GN Docket No. 13-5, RM-11358, WC Docket No. 05-25, RM-10593, 29 FCC Rcd 14968 para. 1 (Nov. 21, 2014).

¹⁰⁷ *See id.* at paras. 94, 112 (explaining that the FCC is still grappling with whether or not this information should be available to consumers).

¹⁰⁸ Mitch Lipka, *Phone Carriers Migrating From Copper to Fiber Optic Lines*, BOS. GLOBE (Aug. 31, 2014), <http://www.bostonglobe.com/business/2014/08/30/copper-fiber-phone-service-better-fight-than-switch/83SzuNwB4QmJbyM1Rfmg1J/story.html>.

was not also self-powered and went down during the power outage, leaving them unable to make emergency calls.¹⁰⁹

In contrast, many of the customers who have chosen to continue to use copper-based phone service—either instead of or in addition to a wireless phone—seem very cognizant of the benefits of traditional copper service.¹¹⁰ One recent survey found that nearly half of respondents had both wireline and wireless phone service.¹¹¹ Of those consumers, 65% reported that they mostly use their landline phone to make calls when they are home.¹¹² Among those with household incomes under \$25,000, 72% of respondents with both landline and mobile phones mostly use their landline phone when at home.¹¹³ Among respondents with both landline and mobile phones, 82% of respondents reported that they keep their landline because of its reliability, 73% appreciated the connection quality of the landline as compared to the wireless phone, and 45% kept a landline because it would stay up during an electrical outage.¹¹⁴

Additionally, in several areas across the country, many of those customers have spoken out when they felt their phone company was not adequately maintaining the copper line¹¹⁵ or was trying to force customers onto a new service.¹¹⁶ These customer complaints also have the effect of complicating any cause-and-effect analysis of the reported movement from copper and switched access lines to interconnect VoIP or other infrastructure.¹¹⁷ If it is the case that at least some carriers are failing to maintain their copper service or carriers' customer service representatives incorrectly telling customers they must switch to new

¹⁰⁹ *Surprise! Your high-tech home phone system could go dead in an emergency*, CONSUMERREPORTS.ORG (Jan. 2012), <http://www.consumerreports.org/cro/2012/01/surprise-your-high-tech-home-phone-system-could-go-dead-in-an-emergency/index.htm#>.

¹¹⁰ The most recent survey results indicate approximately 83 million of the 90 million active switched access lines still use copper local loops to deliver service. FED. COMM'NS COMM'N, *supra* note 102, at 9.

¹¹¹ HERRIGAN, *supra* note 13.

¹¹² *Id.*

¹¹³ *Id.*

¹¹⁴ *Id.* On the point of self-powered phone service, landline phone service offered over cable or wireline VoIP technologies would not be powered through the line that way traditional copper-based phone service is. As a result, some landline phone customers may not report preferring their landline because it is self-powered because their particular line is not, in fact, self-powered.

¹¹⁵ Letter from Jodie Griffin, Senior Staff Attorney, Public Knowledge, to Julie A. Veach, Chief, Wireline Competition Bureau, Fed. Commc'ns Comm'n (May 12, 2014), *available at* https://www.publicknowledge.org/assets/uploads/blog/14.05.12_Copper_Letter.pdf.

¹¹⁶ *Id.*; PUB. KNOWLEDGE, THE PHONE NETWORK TRANSITION: LESSONS FROM FIRE ISLAND 1 (2014) *available at* https://www.publicknowledge.org/assets/uploads/documents/Lessons_from_Fire_Island_On_e-Pager.pdf.

¹¹⁷ See FED. COMM'NS COMM'N, *supra* note 102, at 14.

technologies, it becomes much more difficult to discern whether customer migrations occur because customers freely choose a different technology over a properly-maintained basic voice service, or because carriers' failure to fulfill their legal obligations as telecommunications services make newer technologies more attractive in comparison.¹¹⁸ Parsing the causes and effects in this area will likely continue to be difficult, if not impossible, until relevant state and federal authorities have at least investigated pending complaints.¹¹⁹

BROADBAND ACCESS SERVICE

The idea that broadband access service itself has now become a "basic service," that is properly included in universal service policies, is gaining increasing traction among many stakeholders.¹²⁰ Broadband is only becoming more and more necessary for day-to-day personal, educational, and occupational activities.¹²¹ Additionally, some of the government's existing policies promoting universal communications service have already been updated to include broadband access.¹²² For example, the FCC's recent update of its Universal Service Fund disbursements requires eligible telecommunications carriers (ETCs) to offer broadband in their supported service areas.¹²³

Broadband is increasingly necessary for personal communications, economic advancement, and civic engagement for people across cultural and socioeconomic divides.¹²⁴ Certain VoIP and video chat services use broadband connections to help people communicate with loved ones, which is especially useful

¹¹⁸ See Letter from Jodie Griffin, *supra* note 115 (demonstrating that many companies have been permitting their copper wires to fall in disrepair in order to force transfer to different technologies); see also PUB. KNOWLEDGE, *supra* note 116 (further demonstrating that individuals are being forced to transfer to different technologies whether or not that is their desire).

¹¹⁹ See PUB. KNOWLEDGE, *supra* note 116, at 6 (demonstrating the importance of the relationship between consumers and state and federal governments).

¹²⁰ See FED. COMM'NS COMM'N, *supra* note 102 (explaining that VoIP requires broadband service and that the FCC started requiring reports on this system in December 2008).

¹²¹ JAMES VOLLMAN & ANTHONY CARNEVALE, NATIONAL BROADBAND PLAN BROADBAND ACCESS FOR ALL AMERICANS FACILITATING AN EFFICIENT AND EFFECTIVE LABOR MARKET (2009), available at <https://cew.georgetown.edu/wp-content/uploads/2009/12/09-51-12-04-2009-Anthony-P.-Carnevale-7020351160.pdf>.

¹²² *USF/ICC Transformation Order*, 26 FCC Rcd 17663, para. 1 (Oct. 27, 2011).

¹²³ *In the Matter of Connect America Fund, A National Broadband Plan for Our Future, Establishing Just and Reasonable Rates for Local Exchange Carriers, High-Cost Universal Service Support, Developing an Unified Intercarrier Compensation Regime, Federal-State Joint Board on Universal Service, Lifeline and Link-Up*, WC Docket No. 10-90, GN Docket No. 09-51, WC Docket No. 07-135, WC Docket No. 05-337, CC Docket No. 01-92, CC Docket No. 96-45, WC Docket No. 03-109, 26 FCC Rcd 4554, para. 71 (Feb. 8, 2011).

¹²⁴ See 47 U.S.C. §§ 1301-02 (2012).

for those living long distances away from each other or overseas.¹²⁵ Educational resources, like distance or online education initiatives, can require capacity for documents, graphics, and videos in addition to the capability to deliver two-way communications for live chats between students and teachers.¹²⁶ Advances in telemedicine are constantly improving patients' access to health care even when they are not close to a doctor or hospital.¹²⁷ Remote health monitoring can be especially important for older populations planning to age-in-place.¹²⁸ More and more, people need a broadband connection to do their homework, submit college applications, apply for jobs, access nutritional information, and keep informed about current events in a diverse media marketplace.

Probably due in no small part to broadband service's increasing importance, the number of Internet access connections continues to increase.¹²⁹ Between December 2012 and December 2013, the number of fixed connections with download speeds at or above 3 Mbps and upload speeds at or above 768 kbps increased 21% to 78 million connections.¹³⁰ The number of wireless connections at those same speeds increased 116% to 93 million connections in the same time period.¹³¹ However, the severely limited data caps that often come along with wireless data connections make it difficult to assume consumers can rely solely on wireless connections for all of the important broadband uses discussed above.¹³²

¹²⁵ See *President Obama's Plan to Connect Schools Online Affirms Importance of Broadband Adoption for Education*, BROADBAND FOR AMERICA (June 7, 2013), <http://www.broadbandforamerica.com/blog/president-obama%E2%80%99s-plan-connect-schools-online-affirms-importance-broadband-adoption-education>.

¹²⁶ See FED. COMM'NS COMM'N, *CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN 227* (2010).

¹²⁷ See, e.g., FED. COMM'NS COMM'N, *HEALTH CARE BROADBAND IN AMERICA: EARLY ANALYSIS AND A PATH FORWARD 5* (2010); CTR. FOR TECH. AND AGING, *TECHNOLOGIES FOR REMOTE PATIENT MONITORING FOR OLDER ADULTS 13* (2010), available at <http://www.techandaging.org/RPMPositionPaper.pdf>.

¹²⁸ CTR. FOR TECH. AND AGING, *supra* note 127, at 2.

¹²⁹ FED. COMM'NS COMM'N, *INDUS. ANALYSIS AND TECH. DIVISION: WIRELINE COMPETITION BUREAU, INTERNET ACCESS SERVICES: STATUS AS OF DEC. 31, 2013 1* (2014).

¹³⁰ *Id.* at 2. Incidentally, 39 million interconnected VoIP connections are bundled with broadband service. FED. COMM'NS COMM'N, *supra* note 102, at 7.

¹³¹ FED. COMM'NS COMM'N, *supra* note 129, at 2.

¹³² ANDREW ODLYZKO ET AL., *PUB. KNOWLEDGE, KNOW YOUR LIMITS: CONSIDERING THE ROLE OF DATA CAPS AND USAGE BASED BILLING IN INTERNET ACCESS SERVICE 50-52* (2012) (stating that data limits have not changed in over three years, yet an increasing demand for higher data usage in applications such as educational programs where users have to "track each megabyte uploaded and downloaded during the course of a lesson," or in workplace environments where users worry about "hitting caps or punitive overage fees").

But the progress in broadband adoption has not been without its wrinkles.¹³³ Even as broadband adoption increases, the pace of broadband adoption has slowed substantially over the past few years.¹³⁴ The Pew Research Center's Internet Project has found that broadband adoption increased by an average of seven percentage points *per year* between 2000 and 2009, but only increased by seven percentage points *total* from 2009 to 2013.¹³⁵

Increases in broadband adoption are also not uniform between all demographic groups, citing that "demographic factors most correlated with home broadband adoption continue to be educational attainment, age, and household income."¹³⁶ Although the Pew Research Center found that 70% of American adults reported that they had a wireline broadband connection,¹³⁷ that number fell to 64% among black respondents and 53% among Hispanic respondents.¹³⁸ Only 43% of respondents 65 years and older had an Internet connection, and only 54% of those with household incomes under \$30,000 per year were connected.¹³⁹ Educational levels also have a substantial impact on broadband adoption: only 37% of adults without a high school diploma have Internet access at home, and only 57% of those with a high school diploma but no college education are connected.¹⁴⁰ Finally, rural respondents were significantly less likely to have broadband access at home, at 62%, compared to 73% of suburban respondents.¹⁴¹

Broadband Internet access has now become so crucial to the basic economic, civic, and personal lives of users across the country,¹⁴² policymakers should now ensure the tools they use to achieve universal communications service are also geared toward achieving universal broadband access.

¹³³ See *id.* at 49-50 (stating that there is a correlation between affordability and adoption, and that "one-third of Americans without broadband cite affordability as a barrier to adoption")

¹³⁴ *Broadband Adoption The Next Mile: Hearing Before S. Comm. On Commerce, Sci, & Transp.*, 113th Cong. 1 (2013) (statement of Adam Smith, Senior Researcher, Pew Research Center), available at <http://www.pewinternet.org/2013/10/29/statement-of-aaron-smith-broadband-adoption-the-next-mile/>.

¹³⁵ *Id.*

¹³⁶ Kathryn Zickuhr, *Home Broadband 2013*, PEW RES. CENTER (Aug. 26, 2013), <http://www.pewinternet.org/2013/08/26/home-broadband-2013>.

¹³⁷ *Id.* This study excluded wireless and dial-up connectivity, but did not otherwise exclude any connections from its definition of "broadband" based on speed or usage limits. See *id.*

¹³⁸ *Id.*

¹³⁹ *Id.*

¹⁴⁰ *Id.*

¹⁴¹ *Id.*

¹⁴² David Salway, *Why is Increasing Broadband Adoption so Important to Society?*, ABOUT.COM, <http://broadband.about.com/od/barrierstoadooption/a/Why-Is-Increasing-Broadband-Adoption-So-Important-To-Society.htm> (last visited Mar. 14, 2015) (stating that broadband provides educational, civic, and safety advances in modern society).

METRICS

Once policymakers have agreed upon certain basic services that should be meaningfully accessible by everyone, there remains the question of how to define and measure those services. What are the metrics by which we will evaluate whether a providers' service actually meets the standards for basic service? How will technology transitions impact basic communications services like voice and Internet access under those metrics? Do these transitions bring opportunities to increase our standards for quality of service? Will the transitions create new challenges in achieving a particular level of quality of service?

After all, just because a technology is newer does not mean it is better in all respects. While a new network technology may bring some advantages like lower deployment costs,¹⁴³ that technology is not a true step forward for everyone if it also abandons technologies that have not yet fully matured, leaving for the possibility that the new technology may fail.¹⁴⁴ As part of these transitions, therefore, policymakers and stakeholders must more fully understand where new technologies may improve service for consumers and where those technologies must still be improved before we can rely upon them for our communications safety net.¹⁴⁵

This issue arises regardless of the tools being used to achieve universal service because "broadband services in the market today vary along several important dimensions."¹⁴⁶ Qualifications for USF recipients, service obligations under COLR rules, and standards for network change proceedings under Section 214 will all necessarily rely on an understanding of how we measure adequate basic service in order to satisfy public interest obligations.¹⁴⁷

Service metrics are also necessary regardless of the specific type of service at issue as policymakers have now found the extent to which consumers use

¹⁴³ Ellis Davidson, *The Advantages of New Technology for Businesses*, CHRON, <http://smallbusiness.chron.com/advantages-new-technology-businesses-4047.html> (last visited Mar. 14, 2015) (stating that while "new technologies can be both a major source of expenses for your business," they can also be a "method of eradicating your biggest costs").

¹⁴⁴ *Id.*

¹⁴⁵ The Federal Communications Commission has issued a Notice of Proposed Rulemaking soliciting comments on the criteria it should use to evaluate new network technologies when carriers file applications to discontinue service under § 214(a). *Customer Premises Equipment Backup Power NPRM*, 29 FCC Rcd 14968, para. 93 (Nov. 25, 2014).

¹⁴⁶ *USF/ICC Transformation Order*, 26 FCC Rcd, 17663 para. 90 (Nov. 18, 2011) (stating that while variations exist, a focus on speed latency, and capacity will be used in defining broadband service obligations).

¹⁴⁷ *Id.* at paras. 73-75.

broadband in terms of download and upload speed.¹⁴⁸ Indeed, many metrics evaluating the technical parameters and practical efficacy of a service can apply to both voice and Internet access service as voice services now use broadband networks.¹⁴⁹ Analogous to voice grade access during the 1990s, we have had the goal of universal communications service, now looking at expanding Internet services through broadband and using some similar forms of metrics to measure that service.¹⁵⁰ For example, the U.S. Postal Service must provide universal mail service, as measured by geographic scope, a suitable range of products, access, delivery services, fair and reasonable rates, quality of service, and user protections.¹⁵¹ In telecommunications, the metrics that best measure performance of voice and broadband services may differ slightly, as video demand has become part of the “basic service” expected of broadband,¹⁵² but whatever the “basic service” is, policymakers must have some way to measure whether consumers are actually receiving that basic service.

Nor is it without precedent for policymakers to establish standards or metrics for measuring service in the telecommunications field as the Commission has considered voice essential since the 1990s.¹⁵³ These standards are not necessarily focused on the specific technologies used to deliver a service, but rather delineate aspects of the service itself.¹⁵⁴ In this sense, one could set out a series of metrics for evaluating basic voice service regardless of whether a carrier uses IP or TDM-based technology to deliver that service. For example, the FCC has adopted a technology-neutral approach for USF recipients.¹⁵⁵ The FCC requires USF recipients deliver:

[V]oice grade access to the public switched network or its functional equivalent; minutes of use for local service provided at no additional charge to end users; toll limitation to qualifying low-income consumers; and access to the emergency services 911

¹⁴⁸ *Id.* at para. 93 (stating that the Commission had found that the ability of a user to download content from the Internet at 4 Mbps and to upload content at 1 Mbps over a broadband network was a reasonable benchmark).

¹⁴⁹ *See id.* at para. 77.

¹⁵⁰ *Id.* at para. 76 (stating that in 1997, the Commission looked to voice grade access to low income customers; however, as times have changed since that point, the Commission has since looked to simplifying those supported services).

¹⁵¹ JAMES I. CAMPBELL, JR., GEORGE MASON UNIV. SCH. OF PUB. POL., UNIVERSAL SERVICE OBLIGATION: HISTORY AND DEVELOPMENT OF LAWS RELATING TO THE PROVISION OF UNIVERSAL POSTAL SERVICES 6-7 (2008), available at https://www.npes.org/Portals/0/pdf/GM_Study_Universal_Service_App_B.pdf (citing 39 U.S.C. §§ 101, 403); 39 U.S.C. § 101 (2012); 39 U.S.C. § 403 (2012).

¹⁵² *USF/ICC Transformation Order*, 26 FCC Rcd 17663 para. 93 (stating that along with e-mail and web browsing, high quality video streaming has recently become a “basic service”).

¹⁵³ *Id.* at para. 76.

¹⁵⁴ *Id.* at para. 77.

¹⁵⁵ *Id.* at para. 78.

and enhanced 911 services to the extent the local government in an eligible carrier's service area has implemented 911 or enhanced 911 systems.¹⁵⁶

Similarly, for example, one can use many of these same standards for broadband access, such implementing a rate ceiling,¹⁵⁷ whether it is delivered over cable, fiber, or other physical infrastructure, and also include some more broadband-specific metrics where voice and Internet access service differ. Many of the metrics for basic voice service apply to broadband access as well, for example, where a "rate ceiling component charge" would allow a flat rate for residential local service that would provide for flat rate affordable charges so that consumers can still get access to basic service, such as emergency 911 access.¹⁵⁸ Just as policymakers must investigate network capacity, service quality, interoperability, accessibility, system availability, public safety, security, coverage, and affordability to understand to what extent we have achieved universal voice service,¹⁵⁹ policymakers would need to use those metrics to evaluate the nation's progress on broadband deployment and availability as well, "which cannot be lost due to technology changes."¹⁶⁰ In its *USF/ICC Transformation Order*, the FCC set out three basic metrics for measuring broadband services: actual speed, latency, and capacity (as measured by usage limits).¹⁶¹ Meeting minimum requirements on these metrics is crucial to ensuring users have meaningful access to broadband connections that can support key economic, educational, and personal activities.

NETWORK CAPACITY

To understand whether the network providing voice service is adequate, policymakers must know how much traffic that network can handle, which would "identify the system's real-world 'breaking point.'"¹⁶² By quantifying a network's "breaking point," network capacity stress tests reveal the limits of the network and help providers and policymakers ensure service will continue to function during periods of high call volume, like holidays and large-scale emergencies.¹⁶³

¹⁵⁶ *Id.*

¹⁵⁷ *Id.* at para. 914.

¹⁵⁸ *Id.* at paras. 914-16 (stating that a rate ceiling would "help ensure consumer rates remain affordable and set at reasonable levels").

¹⁵⁹ *Customer Premises Equipment Backup Power NPRM*, 29 FCC Rcd 14968, para. 1.

¹⁶⁰ *Id.*

¹⁶¹ *USF/ICC Transformation Order*, 26 FCC Rcd 17663 para. 88.

¹⁶² COLUMBIA TELECOMM. CORP., A BRIEF ASSESSMENT OF ENGINEERING ISSUES RELATED TO TRIAL TESTING FOR IP TRANSITION 5 (2014), available at <https://www.publicknowledge.org/files/CTCPK%20PSTN%20Report.pdf>.

¹⁶³ *Id.*

Network capacity should be measured in the access network, switching, aggregation system, and connections between wire centers to understand strong and weak points in the network during heavy usage.¹⁶⁴ While the current PSTN has shown high level of availability given that there is sufficient capacity even when the network is at its peak, policymakers should look to confirm that even during these times of peak usage, calls are still routed to the correct locations, calls are completed, call quality does not deteriorate, and call setup does not show noticeable latency.¹⁶⁵ To do this, stress tests can collect data on the loss or delay of voice packets or jitter in voice calls, call setup time, and call answer delay.¹⁶⁶

SERVICE QUALITY AND SPEED

It is also clear that any guarantee of adequate basic service must have some way to ensure adequate service quality to reliably conduct a conversation or transmit data.¹⁶⁷ For voice service, service quality is especially important for those with hearing loss or other disabilities that make users particularly vulnerable to losses in call quality.¹⁶⁸

CALL QUALITY

Metrics on call quality can include both quantitative and qualitative measurements.¹⁶⁹ Qualitative data can include tools like the Delivered Audio Quality (DAQ) score, which helps quantify the qualitative judgments of reviewers.¹⁷⁰ On the quantitative side, call quality can be measured by frequency response, signal levels, and distortion, with any audible problem leading to a failing score.¹⁷¹

Quality testing, especially before migrating customers to new services, is nothing new.¹⁷² The FCC maintains initial and ongoing performance testing requirements for cable television providers,¹⁷³ and some states required testing

¹⁶⁴ *Id.*

¹⁶⁵ *Id.* at 18.

¹⁶⁶ *Id.* at 16 (citing *Performance and Stress Testing of SIP Servers, Clients and IP Networks*, STARTRINITY, <http://startrinity.com/VoIP/TestingSipPbxSoftswitchServer.aspx#tests> (last visited Aug. 18, 2014)).

¹⁶⁷ *Id.*

¹⁶⁸ *Id.*

¹⁶⁹ *Id.*

¹⁷⁰ *Id.* at 7-8.

¹⁷¹ *Id.* at 8.

¹⁷² *See, e.g., id.* at 7 (explaining that a land-mobile radio testing standard would be applicable).

¹⁷³ 47 C.F.R. §§ 76.601, 76.605(a) (2012).

of up to 40% of lines during the E-911 transition.¹⁷⁴ Policymakers can use the lessons learned from these experiences when applying similarly appropriate caution to alterations to the voice network.

SPEED

Additionally, for Internet access, broadband download and upload speeds make a tremendous difference in what someone is actually able to do with her Internet connection.¹⁷⁵ Here, the main question for universal service policies is how to maintain an evolving standard for broadband speeds to adequately meet the demands of new network uses.

The FCC has recently updated its standards both for USF recipients' delivered speeds and for its definition of broadband service.¹⁷⁶ In December 2014, the FCC decided that USF recipients must offer actual delivered speeds (as opposed to advertised speeds) of at least 10 Mbps for downloads and 1 Mbps for uploads.¹⁷⁷ Even more recently, the FCC has updated its broadband speed threshold past to 25 Mbps/3 Mbps for purposes of its Broadband Progress Report.¹⁷⁸ However, FCC estimates indicate that 1 out of every 6 people in the U.S. lack any access at all to a fixed 25 Mbps or higher connection.¹⁷⁹ In rural areas, more than 53% of people lack access to a 25 Mbps connection.¹⁸⁰

Network users increasingly rely on broadband access to place voice or video calls, stream videos or games, work remotely, and upload and transfer large files through email, cloud storage, or social networks.¹⁸¹ In addition, some users

¹⁷⁴ See ILL. ADMIN. CODE tit. 83, § 725.500 (2013).

¹⁷⁵ *Speed Test*, MEGAPATH, <https://www.speakeasy.net/speedtest/moreinfo.php> (last visited Mar. 14, 2015).

¹⁷⁶ *In the Matter of Connect America Fund; ETC Annual Reports and Certifications; Petition of USTelecom for Forbearance Pursuant to 47 U.S.C. § 160(c) from Obsolete ILEC Regulatory Obligations that Inhibit Deployment of Next-Generation Networks*, Report and Order, WC Docket No. 10-90, 14-58, 14-192, 29 FCC Rcd 15644, para. 62, 63 (Dec. 11, 2014); *Id.* at 90, 97 (Statement of Chairman Wheeler).

¹⁷⁷ *Id.* at para. 4.

¹⁷⁸ *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, Broadband Progress Report, FCC 15-11, GN Docket No. 14-126, GN Docket No. 12-228, at 4 (Feb. 4, 2015) (Statement of Chairman Wheeler) [hereinafter *Deployment of Advanced Telecom Capacity Broadband Progress Report*].

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

¹⁸¹ SANDVINE INTELLIGENT BROADBAND NETWORKS, GLOBAL INTERNET PHENOMENA REPORT 5-6 (2014), available at <https://sandvine.com/downloads/general/global-internet-phenomena/2014/1h-2014-global-internet-phenomena-report.pdf>; *Digital Differences*, PEWINTERNET.ORG 11-12 (2012), <http://pewinternet.org/Reports/2012/Digital->

are starting to use “connected home” devices like security alarms, thermostats, door locks, and home appliances.¹⁸²

Broadband access inspires more ideas for more uses of broadband networks, and users’ need for greater speeds only continue to increase.¹⁸³ The total number of fixed and mobile connections with speeds less than 6 Mbps/1.5 Mbps actually decreased 8.8% between December 2012 and December 2013, from 190.3 million connections to 173.6 million, while connections greater than or equal to 6 Mbps/1.5 Mbps increased 66% from 72.3 million to 119.7 million.¹⁸⁴ The number of connections with downstream speeds of 10 Mbps or greater has increased 104% since December 2012, totaling 122 million connections.¹⁸⁵

In addition to call quality and speed, latency¹⁸⁶ can be a useful measure of the service quality delivered by communications technology. Latency is especially important for real-time communications, including two-way voice and video services.¹⁸⁷ The FCC’s broadband measurement test results found that most wireline networks could reliably achieve latency of less than 100 milliseconds.¹⁸⁸

DEVICE INTEROPERABILITY

Device interoperability has become one of the hallmarks of the traditional phone network—one that also proved an important precedent for the develop-

differences.aspx (last visited Mar. 14, 2015); DARRELL M. WEST, CTR. FOR TECH. INNOVATION AT BROOKINGS, THE EVOLUTION OF VIDEO STREAMING AND DIGITAL CONTENT DELIVERY 1-2 (2014), available at http://www.brookings.edu/~media/research/files/papers/2014/05/02%20video%20streaming%20of%20videostreaming%20and%20digital%20content%20delivery_final.pdf.

¹⁸² Claire Cain Miller, *Is 2014 the Year of the Connected Home?*, N.Y. TIMES BITS (Jan. 3, 2014), <http://bits.blogs.nytimes.com/2014/01/03/is-2014-the-year-of-the-connected-home>; CISCO, CISCO VISUAL NETWORKING INDEX: GLOBAL MOBILE DATA TRAFFIC FORECAST UPDATE, 2014-2019 3 (2015), available at http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white_paper_c11-520862.pdf.

¹⁸³ CISCO, *supra* note 182.

¹⁸⁴ FED. COMM’NS COMM’N, *supra* note 102, at 2 (Figure 1). It is worth noting here that the connection speeds in this report are often the advertised speeds, regardless of the actual delivered speed at any given moment. *Id.* at n.1.

¹⁸⁵ *Id.* at 4.

¹⁸⁶ Latency is a “measure of the time it takes for a packet of data to travel from one point to another in a network,” often measured by the milliseconds necessary for a round-trip. *USF/ICC Transformation Order*, 26 FCC Red 17663 para 96.

¹⁸⁷ *Id.*

¹⁸⁸ See FED. COMM’NS COMM’N, OFFICE OF ENG’G AND TECH. AND CONSUMER AND GOV’T AFFAIRS BUREAU, MEASURING BROADBAND AMERICA, A REPORT ON CONSUMER WIRELINE BROADBAND PERFORMANCE IN THE U.S., 22 (2011) (Chart 9).

ment of wireline Internet access service.¹⁸⁹ One recent survey found that, of the respondents who continue to keep a traditional landline phone service, 26% do so because they need it for a fax machine, 24% need the line to use medical alert services, and 17% use the line for a home security system.¹⁹⁰ Especially given consumers' strong expectations that certain voice and non-voice devices will *just work* on the phone network, regardless of the network's underlying technology,¹⁹¹ it is important to verify that devices will continue to function on new networks and make customers whole when devices will no longer work.

If existing devices will not operate on new networks, network users across the country would be facing serious consequences and substantial costs.¹⁹² Whether a particular type of device will not work at all on a new network, or customers will need to purchase a new version of the device to continue using the same functionality, the transition would impose significant costs on users and businesses that policymakers should be aware of.¹⁹³

For interoperability in voice devices, policymakers can test analog telephone adapters (ATAs) to ensure they can work with voice devices and standard jacks.¹⁹⁴ Policymakers can also determine whether a new technology will impact non-voice devices like fax machines, credit card/point-of-sale terminals, ATMs, voting machines, medical monitoring and alert systems, security alarms, elevator phones, ringdown lines at fire stations, and intercoms for building access, by testing the full range of standard modem protocols.¹⁹⁵

ACCESSIBILITY

The technology transitions present opportunity to take advantage of new technologies to increase accessibility for network users, in addition to preserving the functionality the network offers now.¹⁹⁶ Individuals with disabilities rely on specialized devices and services like Telecommunications Relay Services (TRS), Telecommunications Devices for the Deaf (TDD), and Text Telephones (TTY) to communicate over the network.¹⁹⁷

¹⁸⁹ *Interoperability Systems*, CISCO, <http://www.cisco.com/c/en/us/products/physical-security/interoperability-systems/index.html> (last visited Mar. 14, 2015).

¹⁹⁰ HERRIGAN, *supra* note 13, at 7.

¹⁹¹ *Id.*

¹⁹² *U.S. Cellular Device Unlocking Policy*, U.S. CELLULAR, <http://www.uscellular.com/site/legal/mobile-wireless-device-unlocking.html> (last visited Mar. 14, 2015).

¹⁹³ *Id.*

¹⁹⁴ COLUMBIA TELECOMM. CORP., *supra* note 162, at 12.

¹⁹⁵ *Id.*

¹⁹⁶ *Id.* at 16.

¹⁹⁷ *Id.* at 15.

Both the TTY/TDD system and the TRS system are well-established technologies that allow users to communicate via text over the phone network.¹⁹⁸ Other text- or video-based communications often require a wireless or wireline broadband connection, and therefore are less accessible to users who do not have access to a high-enough quality connection or cannot afford it.¹⁹⁹

Any new network technology should therefore be examined to determine how and whether it will interoperate with TTY/TDD and TRS service. TTY/TDD service in particular relies on analog telephone modem technology, which may make it less reliable during times of heavy network usage.²⁰⁰ A network transition would therefore require examination of the potential points of failure for the majority of TTY/TDD devices in use (not just those currently for sale), including qualitative and quantitative testing for users' ability to connect, place calls, and send and receive messages.²⁰¹

SYSTEM AVAILABILITY

The traditional phone network was intentionally designed and governed to deliver a high level of availability for customers.²⁰² The copper lines received power through the central office, helping to ensure operation even during commercial power outages.²⁰³ The network was designed to have enough capacity to connect users even during peak demand.²⁰⁴ Interconnection ensured customers could reach any other network user, regardless of location or carrier choice.²⁰⁵

A system availability test could determine whether a new network technolo-

¹⁹⁸ *Id.* at 16.

¹⁹⁹ *Id.* at 15.

²⁰⁰ *Id.* at 16.

²⁰¹ *Id.*

²⁰² See INTERNET SOC'Y, THE INTERNET AND THE PUBLIC TELEPHONE SWITCHED NETWORK: DISPARITIES, DIFFERENCES, AND DISTINCTIONS 2 (2012), available at <http://www.internetsociety.org/sites/default/files/The%20Internet%20and%20the%20Public%20Switched%20Telephone%20Network.pdf> (describing the structure of network switching offices that provided the capability of the telecommunications system to host a large amount of users).

²⁰³ Jon Brodtkin, *FCC to prevent phone companies from screwing over copper customers*, ARS TECHNICA (Nov. 21, 2014, 2:45 PM), <http://arstechnica.com/business/2014/11/fcc-to-prevent-phone-companies-from-screwing-over-copper-customers/> (comparing copper lines and VoIP); COLUMBIA TELECOMM. CORP., *supra* note 162, at 18.

²⁰⁴ COLUMBIA TELECOMM. CORP., *supra* note 162, at 18.

²⁰⁵ 47 U.S.C. § 251(c)(2) (2012); see ENERGY AND COMMERCE COMM., NETWORK INTERCONNECTION 1 (2014), available at <http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/20140715WhitePaper-Interconnection.pdf> ("Incumbent local exchange carriers... were obligated by the Act to negotiate in good faith for interconnection of traditional, circuit switched traffic at any technically feasible point in their network.").

gy could deliver the same level of availability that the existing network infrastructure did.²⁰⁶ With IP-based technology, the system's availability can be tested non-intrusively, so tests can poll ATA devices or use another monitoring functionality to document network availability and outage causes.²⁰⁷ These tests should also note the times of incidents like commercial power outages, storms, Internet outages, or times of high network usage, to better examine possible causes of network downtime.²⁰⁸

PUBLIC SAFETY COMMUNICATIONS

One of the most crucial functionalities of the phone network is the ability to call for help during times of emergency.²⁰⁹ Unsurprisingly, 96% of respondents to one recent survey said that it is important for phones to be able to reach emergency services like 911.²¹⁰ Policymakers cannot take for granted that new technologies will always offer the public the same access to 911 service, so new technologies must be tested to ensure calls to 911 reliably go through and public safety answering points can reliably and quickly access callers' locations.²¹¹

Traditional landline phone service gives people reliable access to 911 and public safety answering points (PSAPs), and provides PSAPs with dispatchable location information to help public safety workers find callers even if the caller cannot tell the operator his or her location.²¹² But it still remains to be seen how policymakers will ensure new technologies will offer those same public safety guarantees to users.²¹³ For example, wireless technologies may

²⁰⁶ COLUMBIA TELECOMM. CORP., *supra* note 162, at 18.

²⁰⁷ *Id.* at 19.

²⁰⁸ *Id.*

²⁰⁹ *Id.* at 20.

²¹⁰ HERRIGAN, *supra* note 13, at 10 (finding that 59% of respondents stated that it is important "that their phone have the capability to communicate their location" for purposes like 911 location technologies).

²¹¹ See COLUMBIA TELECOMM. CORP., *supra* note 162, at 20 (listing the variety of test scenarios to which new telecommunications technologies should be subjected to ensure reliable access to emergency services).

²¹² INTRADO, INC., PSAP OPERATIONS GUIDE FOR WIRELESS 9-1-1 2 (2005), available at http://www.intrado.com/sites/default/files/documents/PSAP_Operations_Guide_for_Wireless_9-1-1.pdf.

²¹³ See NENA NEXT GENERATION PARTNER PROGRAM, NG9-1-1 TRANSITION POLICY BRIEF 1, 3, available at https://c.ymcdn.com/sites/www.nena.org/resource/collection/B6781C63-012C-4E90-939B-001733976BBC/NG9-1-1_Transition_Policy_Considerations-ALL.pdf ("Policy makers need to . . . effectively promote innovation while ensuring the reasonable 9-1-1 expectations are met" and they should "actively support the development of nationally recognized standards and best practices to ensure effective automatic 9-1-1 location capabilities are put into place for all technologies and services as they go to market").

offer new or greater problems with reliability, coverage, and congestion during large-scale emergencies.²¹⁴ Wireless service also does not currently provide PSAPs with the same dispatchable location data as the traditional landline phone network did.²¹⁵ Testing for new network technologies should therefore include verifying that users can complete 911 calls and reach the correct PSAP, and that PSAP staff can provide the same level of response to a caller on the new network as on the existing network.²¹⁶

SECURITY

The IP transition has already brought with it VoIP denial-of-service attacks on PSAPs, resulting in large numbers of calls overloading the PSAPs' capacity and obstructing true emergency calls.²¹⁷ To protect the network from attacks and preserve functionality for users' legitimate calling needs, policymakers must determine the degree to which a new network is vulnerable to attack, the presence of points of failure, and users' ability to impersonate other users, maliciously disconnect other devices, or generate spoofed calls.²¹⁸ Independent experts could review carriers' reports of how they address security issues, and examine whether those efforts comply with industry best practices and with the Cybersecurity Framework developed as part of *Executive Order 13636, Improving Critical Infrastructure Cybersecurity*.²¹⁹ Policymakers could even use "white hat" external tests to determine the level of risk without actually damaging the network.²²⁰ Meanwhile, best practices like using separate "tunnels" for voice communications and system management could help secure the network.²²¹

²¹⁴ See COLUMBIA TELECOMM. CORP., *supra* note 162 (stating that the complexity of an IP system exacerbates the problems associated with high network traffic).

²¹⁵ INTRADO, INC., *supra* note 212 ("With the advent of wireless telecommunications-and its inherent mobility-the 'who' and 'where' were no longer associated with the caller's telephone number."); see generally *In the Matter of Wireless E911 Location Accuracy Requirements*, Third Further Notice of Proposed Rulemaking, PS Docket No. 07-114, 29 FCC Rcd 2374 para. 2 (Feb. 21, 2014) (stating that a change of the public's use of mobile phones has caused the FCC to consider rules to increase location accuracy standards for 911 calls made from mobile phones indoors).

²¹⁶ COLUMBIA TELECOMM. CORP., *supra* note 162, at 20-21.

²¹⁷ *Id.* at 23 (citing David Kahn, *The Growing Threat to PSAPs from Telephony Denial of Service (TDoS) Attacks*, 9-1-1 Magazine (July 3, 2013), <http://www.9-1-1magazine.com/Kahn-Threat-of-TDoS-Attacks>).

²¹⁸ *Id.*

²¹⁹ *Id.* at 23-24; see generally *Improving Critical Infrastructure Cybersecurity*, 78 Fed. Reg. 11,739 (Feb. 19, 2013).

²²⁰ COLUMBIA TELECOMM. CORP., *supra* note 162, at 23.

²²¹ *Id.* at 24.

Particularly as voice communications increasingly share infrastructure with the broader Internet, carriers and policymakers will need to be vigilant against cybersecurity risks to ensure basic voice service cannot be hacked to harass or harm network users.

CALL PERSISTENCE

The wireline phone network's reliability led to the common expectation that calls will almost never be "dropped."²²² Indeed, the landline network offered such great reliability it encouraged the development of devices and features that *require* persistent connectivity to function, like health and security monitoring services.²²³ Especially in the early days of commercial mobile phone service, call persistence on the wireline network was one of the distinguishing features between landline and cell phone service.²²⁴ Call persistence in wireless phone service varied enough that it became marketing point between companies, as opposed to a feature of the service that everyone could safely take for granted.²²⁵

To understand how often a network drops calls, policymakers can measure "how long a call persists under a range of circumstances."²²⁶ If there are no call persistence problems, calls should be able to stay connected for one week.²²⁷ Any calls that are dropped can be examined for the root cause and necessary modifications can be made to the network to ensure calls are not dropped.

CALL FUNCTIONALITY

For several basic functions of the phone network, consumers have relied on certain features for so long, it does not even occur to customers that changing to a new technology could compromise their service.²²⁸ For example, people take for granted that their phone connections will always give them the ability to connect to any other phone customer, regardless of which carrier that customer uses.²²⁹

²²² *Id.*

²²³ *See id.* (stating that connection reliability is required for monitoring applications).

²²⁴ *Id.*

²²⁵ *See* Theresa Howard, 'Can You Hear Me Now?' a Hit, USA TODAY (Feb. 23, 2004, 10:30 PM), available at http://usatoday30.usatoday.com/money/advertising/adtrack/2004-02-22-track-verizon_x.htm.

²²⁶ COLUMBIA TELECOMM. CORP., *supra* note 162, at 24.

²²⁷ *Id.*

²²⁸ *Cf. id.* at 25 ("There is no technological reason why a user should lose basic functionality simply because of IP migration.").

²²⁹ *Id.*

There is no technological reason that basic functionalities like this should fall away during transitions that should by all accounts be an *upgrade* in technology, nor should we assume that new technologies must necessarily result in closed proprietary systems instead of the open, innovative structures.²³⁰ When, for example, network transitions result in carriers placing greater restrictions on customers' ability to reach other networks, new limitations should raise a red flag for policymakers evaluating the public interest impacts of the transitions.²³¹

To understand network changes' implications for users, policymakers must test the full range of user functions that currently rely upon the network, including transport of caller-ID information, the ability to reach outside carriers' networks, and making and receiving collect calls and third-party billed calls.²³²

WIRELINE COVERAGE

It is not inconsistent for policymakers to both commit to being technology-neutral and to acknowledge that wireline service currently offers certain features that wireless networks do not.²³³ Until wireless technology has developed to the point where it truly offers equal or better service than the wireline network on all fronts, wireline coverage will necessarily be of concern to policymakers.²³⁴

For example, when Verizon responded to the damage caused by super-storm Sandy by migrating customers from the copper network to the fixed, voice-only wireless service Voice Link, many customers objected that Voice Link was inferior to the copper-based service in many respects.²³⁵ Even outside the

²³⁰ *Id.*

²³¹ See, e.g., Letter from Joseph A. Post, Deputy Gen. Counsel, Verizon, to Honorable Jeffrey C. Cohen, Sec'y, N.Y. State Pub. Serv. Comm. (May 20, 2013), available at <https://www.publicknowledge.org/files/VZ%20Voice%20Link%20TOS.pdf> (containing Verizon's Voice Link Terms of Service, which notified customers of limited access to long distance providers, international phone service providers, and calling card services).

²³² COLUMBIA TELECOMM. CORP., *supra* note 162, at 25-26.

²³³ See generally Peter Alexadis & Miranda Cole, *The Concept of Technology Neutrality*, in EURO. COMPETITIVE TELECOMM. ASS'N REV. 76, 77 (2004), available at http://www.gibsondunn.com/fstore/documents/pubs/Alexiadis-ECTA_Review_2004.pdf (stating that the technology-neutral concept should be applied with the "concepts of substitutability and functional interchangeability"; however, wireline and wireless services are not functionally interchangeable, because they do not offer all of the same services).

²³⁴ See, e.g., Herman Watger, *3G/4G as a Landline Data Substitute*, FIBER EVOLUTION (Sept. 10, 2014), <http://www.fiberevolution.com/2014/09/3g4g-as-a-landline-data-substitute/> (noting that in the context of just broadband service, data caps, capacity, and service quality continue to differentiate most commercially available wireless and wireline services).

²³⁵ See PUB. KNOWLEDGE, *supra* note 116 (stating that hundreds of customer complaints

realm of natural disaster response, customers have complained that carriers are delaying repairs to the copper network or only providing temporary repair solutions.²³⁶

Policymakers could determine levels of wireline service by physically verifying service and confirming that those locations are actually able to receive service.²³⁷

AFFORDABILITY

Ultimately, a service cannot be universal if people cannot afford to adopt it. Even if service is technically available, service that is priced out of the reach of customers' budgets is not available in any meaningful sense of the word. Universal service means everyone must be realistically able to obtain service, not just wealthy households or neighborhoods.²³⁸ If, for example, a carrier is required to provide service but permitted to charge a very large Contribution in Aid of Construction (CIAC), that can effectively prevent service from reaching hard-to-serve areas.²³⁹

Policymakers therefore must investigate and document pricing trends to be able to determine whether pricing for new technologies is comparable to what customers pay for existing technology. In this respect it is important to watch not just for overall price increases, but for differences in payment structures or functionality that can impact the value customers are receiving for their mon-

were received by Verizon on this matter).

²³⁶ See Jon Brodtkin, *Verizon Accused of Refusing to Fix Broken Landline Phone Service*, ARS TECHNICA (Mar. 23, 2014, 4:32 PM), <http://arstechnica.com/information-technology/2014/03/verizon-accused-of-refusing-to-fix-broken-landline-phone-service/>; Carolyn Shapiro, *With aging infrastructure, Verizon has trouble on the line*, PILOT ONLINE (Oct. 24, 2011), <http://hamptonroads.com/2011/10/aging-infrastructure-verizon-has-trouble-line>.

²³⁷ See COLUMBIA TELECOMM. CORP., *supra* note 162, at 26-27 (explaining the methodology of the physical verification process).

²³⁸ See DEP'T OF COMMERCE, ECON. AND STATISTICS ADMIN. & NTIA, *EXPLORING THE DIGITAL NATION: AMERICA'S EMERGING ONLINE EXPERIENCE* 36 (2013), *available at* http://www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_-_americas_emerging_online_experience.pdf (stating that 8% of the highest earning households without home Internet reported having other outside means of Internet access, while only 2% of households earning less than \$25,000 annually reported similar opportunities); JOHN HERRIGAN, JOINT CTR. FOR POLITICAL AND ECON. STUDIES, *BROADBAND ADOPTION AND USAGE: WHAT HAS FOUR YEARS TAUGHT US?* 2 (2013), *available at* http://moody.utexas.edu/sites/communication.utexas.edu/files/images/content/tipi/Herrigan_FCC_Summit.02.06.pdf (demonstrating that price is one of the most common reasons why people cannot subscribe to broadband access service).

²³⁹ See PETER BLUHM & PHYLLIS BERNT, PHD, *CARRIERS OF LAST RESORT: UPDATING A TRADITIONAL DOCTRINE*, NAT'L REG. RES. INST. 8-9 (July 2009), *available at* http://www.nrri.org/pubs/telecommunications/COLR_july09-10.pdf.

ey.²⁴⁰ For example, new below-the-line fees are effectively price increases in all but name,²⁴¹ and services that nominally cost the same but offer fewer features or inferior service do not offer truly comparable value. Policymakers should also document whether and to what extent customers have access to a variety of price points and service levels,²⁴² and watch for practices that could push customers to purchase more than what they want or need.

It is also possible that new technologies will offer the opportunity for lower retail prices.²⁴³ Carriers have certainly touted the cost savings offered by new technologies,²⁴⁴ and with sufficient competitive pressure those savings could be passed on to consumers.²⁴⁵ And as technology further improves, these cost savings may even be paired with improvements in service.²⁴⁶ Policymakers could use the pricing data discussed above to better understand and seize opportunities to make basic service more affordable for consumers.

The metrics for interconnected voice and broadband service have significant overlap.²⁴⁷ If policymakers use these metrics to develop a set of standards for

²⁴⁰ See Thomas Gryta, *AT&T Imposes New 61-Cent Monthly Wireless Fee*, WALL STREET J. (May 23, 2013), available at <http://online.wsj.com/news/articles/SB10001424127887323975004578501330496021310>.

²⁴¹ See, e.g., *id.*

²⁴² See, e.g., FED. COMM'NS COMM'N, NATIONAL BROADBAND PLAN: CONNECTING AMERICA 39 (2010), available at <http://www.broadband.gov/plan/4-broadband-competition-and-innovation-policy/> (concluding that "better data" is required to analyze "price competition").

²⁴³ See, e.g., Matthew Flamm, *Super-fast Internet is here. What to do with it?*, CRAIN'S: N.Y. BUS. (Feb. 24, 2015, 9:00 AM), <http://www.crainsnewyork.com/article/20150224/TECHNOLOGY/302229997/super-fast-internet-is-here-now-what-to-do-with-it> (discussing a Brooklyn startup that provides gigabit broadband Internet service at a fraction of the traditional price).

²⁴⁴ See *In the Matter of AT&T Petition to Launch a Proceeding Concerning the TDM-to-IP Transition*, Petition to Launch a Proceeding Concerning the TDM-to-IP Transition, GN Docket No. 12-353, at 4 (Nov. 7, 2012); see generally *In re AT&T Petition to Launch a Proceeding Concerning the TDM-to-IP Transition*, *Comments of Verizon and Verizon Wireless*, GN Docket No. 12-353 (Jan. 28, 2013).

²⁴⁵ See *LTE and Wireless Service Assurance*, MONOLITH SOFTWARE, <http://www.monolith-software.com/solutions/telecommunications-and-cable/lte-and-wireless-service-assurance> (last visited Mar. 13, 2015) ("With LTE, IMS and other wireless technology upgrades accelerating, the resulting competitive pressures have made it imperative for service providers to take a customer-centric and end-to-end view of mobile and fixed services, focusing on customer experience management (CEM) and service assurance.").

²⁴⁶ See Flamm, *supra* note 243.

²⁴⁷ See, e.g., *In re The Proposed Extension of Part 4 of the Commission's Rules Regarding Outage Reporting to Interconnected Voice Over Internet Protocol Service Providers and Broadband Internet Services Providers*, *Comments of the Telecommunications Industry Association*, PS Docket No. 11-82, at 6 (Aug. 9, 2011) (urging adoption of the metrics proposed in the SamKnows, which provide consistent factors for determining outages for both VoIP and Broadband services).

“basic” voice and broadband service, stakeholders on all sides will know what to expect during new build-outs and network changes. Carriers will be able to plan their investment knowing what will be expected of them, and end users will know they can depend on a network that will offer at least a certain level of service and support certain features.

TOOLS TO ACHIEVE UNIVERSAL SERVICE

Once policymakers have committed to ensuring universal access to voice and broadband service, and determined the metrics by which to evaluate what the “basic service” is and whether it is actually being delivered, the question still remains of how to actually achieve that goal. The “how” of universal service has been debated by stakeholders and policymakers for over 100 years now,²⁴⁸ and this paper makes no pretense of solving the puzzle for good, but will instead review the tools, new and old, that policymakers could use to ensure universal deployment of basic voice and broadband service.

Congress already requires the FCC to annually investigate whether “advanced telecommunications capability” is available to all Americans and whether “advanced telecommunications capability is being deployed to all Americans in a reasonable and timely fashion.”²⁴⁹ In the FCC’s most recent Notice of Inquiry on broadband deployment pursuant to Section 706, the agency identified several tools already at its disposal to encourage broadband deployment and access, including “price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment.”²⁵⁰ Separately, the FCC is considering whether to preempt certain state laws that restrict local governments’ ability to offer broadband service.²⁵¹ These and oth-

²⁴⁸ See generally, Mann-Elkins Act of 1910, ch. 309, 36 Stat. 539 (1910) (attempting to establish universal service in the message transmission across “telegraph, telephone, or cable”).

²⁴⁹ 47 U.S.C. § 1302(a) (2012).

²⁵⁰ See *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, Tenth Broadband Progress Notice of Inquiry, GN Docket No. 14-126, 29 FCC Rcd 9747 para. 49 (Aug. 5, 2014) (quoting 47 U.S.C. § 1302(a) (2012)) [hereinafter *Deployment of Advanced Telecommunications NOI*].

²⁵¹ See *Pleading Cycle Established for Comments on Electric Power Board and City of Wilson Petitions, Pursuant to Section 706 of the Telecommunications Act of 1996, Seeking Preemption of State Laws Restricting the Deployment of Certain Broadband Networks*, Public Notice, DA 14-1072, 29 FCC Rcd 9239 (July 28, 2014).

er tools could have tremendous impact on the efforts of the U.S to achieve universal voice service, broadband service, or both.²⁵²

CARRIER OF LAST RESORT POLICIES

Carrier of last resort (COLR) policies have been a critical component of our national commitment to universal service for decades.²⁵³ Particularly at the state level and for companies receiving support through Universal Service Fund programs, COLR rules have guaranteed that virtually everyone in the country could receive basic voice service upon request.²⁵⁴ By requiring carriers to serve all requesting customers in their service areas, COLR rules imposed significant construction costs on carriers (which could be offset by government funding mechanisms or reimbursement by customers in certain circumstances) as a condition of entering the common carrier business of telephony service.²⁵⁵ This approach proved to be wildly successful and resulted in near universal nationwide voice service.²⁵⁶

Traditionally, COLR responsibilities have been assigned to local exchange carriers²⁵⁷—responsibilities that included a duty to provide reasonable quality service on request,²⁵⁸ not discriminating against any prospective customers,²⁵⁹ offering service at rates set or approved by state authorities,²⁶⁰ and seeking advance approval for any significant network change, sale, or exit.²⁶¹ At both the state and federal levels, COLRs also have the obligation to interconnect with

²⁵² See *Deployment of Advanced Telecommunications NOI*, 29 FCC Rcd 9747 para. 49 (explaining that pursuant to 47 U.S.C. § 1302(a) the Commission has authority to take measures to ensure competition throughout the broadband infrastructure when United States citizens are not receiving reasonable and timely access to broadband services).

²⁵³ See BLUHM & BERNT, PHD, *supra* note 239, at 1.

²⁵⁴ See *id.*

²⁵⁵ See *id.* at 4-5, 8.

²⁵⁶ See JEFF LANNING, CENTURYLINK, THE COLR CHALLENGE, BROADBAND, AND RURAL AMERICA 5 (2010), available at <http://www.narucmeetings.org/Presentations/NARUC%20COLR%202010-11-14.pdf>.

²⁵⁷ See BLUHM & BERNT, PHD, *supra* note 239, at 2. Some states automatically classify all incumbent local exchange carriers as COLR, and many states exempt competitive local exchange carriers from COLR responsibilities. Other states assign COLR or COLR-like duties to any LEC that becomes an eligible telecommunications carrier. See *id.* at 3.

²⁵⁸ See *id.* at 5 n. 13 (providing 16 N.Y.C.R.R. § 609.3(a)(1)); see, e.g., tit. 16, part 2 TEX. ADMIN. CODE § 26.54(b)(1) (2015); see, e.g., WASH. REV. CODE § 80.36.090 (examples of state imposed duties to serve the public upon request).

²⁵⁹ See 47 U.S.C. § 251(g) (2012) (“[E]ach local exchange carrier, to the extent that it provides wireline services, shall provide...in accordance with the same equal access and nondiscriminatory interconnection restrictions and obligations....”); BLUHM & BERNT, PHD, *supra* note 239, at iii.

²⁶⁰ See BLUHM & BERNT, PHD, *supra* note 239, at iii.

²⁶¹ *Id.*

other carriers, which ensures that every phone on the network could call every other phone.²⁶²

COLR policies typically cover retail service quality standards, like dial tone availability, call blocking rates, outage times, customer complaint rates, response time to complaints, and emergency service continuance plans.²⁶³ COLRs may also be required to offer certain consumer protections and other guarantees, like participating in the federal Lifeline program, providing certain disclosures, offering trial periods, providing specified cancellation terms, taking steps to maintain power during blackouts, and allowing even disconnected customers to make 911 calls.²⁶⁴

As we are now in the midst of the technology transitions, and the questions arise of whether and how COLR policies could be used to serve the same social goals that they have been used for in the development of the traditional phone network.²⁶⁵ Particularly when paired with other efforts, like voluntary build-out and affordability programs and universal service funding, policy-makers may want to consider adopting some of the strategies of COLR to prevent low-income or high-cost areas from being left behind in the transitions.²⁶⁶

In these policy debates, it should be noted that even robust competition in urban and suburban areas would not entirely eliminate the need for COLR duties.²⁶⁷ After all, the areas where COLR is most needed are the areas where there is no business case to build out and maintain the networks, so competition will necessarily be lacking.²⁶⁸ Competition may give users more choice in some areas, but on its own could result in no service for high-cost or low-income areas.²⁶⁹ However, even in areas with competitive choices, market forces may not on their own give carriers sufficient incentive to offer customers all of the benefits of COLR policies. Even a competitive telecommunications

²⁶² *Id.* at iii, 2.

²⁶³ *Id.* at 64; *see generally* LILIA PÉREZ-CHAVOLLA, NAT'L REGULATORY RESEARCH INST., SURVEY OF STATE RETAIL TELEPHONE QUALITY OF SERVICE REGULATIONS FOR SELECTED CATEGORIES OF SERVICE: METRICS, PENALTIES AND REPORTS (2004), *available at* <http://nrri.org/pubs/telecommunications/04-09.pdf> (providing state specific examples of service quality standards).

²⁶⁴ *See* BLUHM & BERNT, PHD, *supra* note 239, at 7-8, 11.

²⁶⁵ *See* INTERGOVERNMENTAL ADVISORY COMM. TO THE FED. COMM'NS COMM'N, POLICY RECOMMENDATION 2013 – 3: REGARDING TECHNOLOGICAL TRANSITION FROM LEGACY COPPER WIRE INFRASTRUCTURE TO NEWER TECHNOLOGIES 1 (2013), *available at* <http://transition.fcc.gov/statelocal/recommendation2013-03.pdf> (“In a competitive environment in which wire, wireless, IP-based, satellite and other technologies exist to move voice and data communications, a legitimate question exists as to whether the requirement for a designated carrier of last resort should remain.”).

²⁶⁶ *See id.* at 2.

²⁶⁷ *See* BLUHM & BERNT, PHD, *supra* note 239, at 56.

²⁶⁸ *See* LANNING, *supra* note 256, at 3, 5, 7.

²⁶⁹ *See* BLUHM & BERNT, PHD, *supra* note 239, at 56-57.

market may have inadequate transparency,²⁷⁰ and each individual carrier may have little incentive to serve important but less-frequent needs of particular user groups, like users with disabilities or consumers relying on security devices or heart monitors, support for which could fall by the wayside without policies ensuring their needs continue to be served.²⁷¹

The FCC has declined to preempt state obligations, including COLR requirements, in its *USF/ICC Transformation Order*.²⁷² Some have suggested that states update traditional doctrines by, for example, assigning relatively large service areas to ETCs, adapting COLR duties to anticipate multi-subscriber properties and competitive overbuilds, differentiating between COLR duties and duties for supported ETCs, giving wireless and broadband subscribers separate ETC designation, and providing universal service support to COLRs.²⁷³

Some have also suggested that states may want to consider applying COLR responsibilities to broadband service providers in addition to voice service providers.²⁷⁴ The concept of requiring COLRs to provide some level of computer data transmission using a modem is not unprecedented,²⁷⁵ although the required transmission levels have not met what we would consider adequate broadband service today.²⁷⁶

The need for policies to ensure ubiquitous and nondiscriminatory broadband access seems to only be growing.²⁷⁷ Even as the number of broadband connections continues to increase, the demographic disparities between the broadband haves and have-nots continue.²⁷⁸ The FCC's most recent *Internet Access Services Report* found that there are only 43 residential fixed broadband connections (defined as a speed of at least 200 kbps in either direction) for every 100 households in the bottom decile of counties, sorted by income.²⁷⁹ Notably, this

²⁷⁰ See FED. COMM'NS COMM'N, *supra* note 242, at 44 ("Putting more information in the hands of consumers is a proven method to promote meaningful competition....").

²⁷¹ See *id.* at 167-69.

²⁷² *USF/ICC Transformation Order*, 26 FCC Rcd 17663 para. 82 (Oct. 27, 2011).

²⁷³ See BLUHM & BERNT, PHD, *supra* note 239, at iv-v.

²⁷⁴ See Phyllis Bernt, *Universal Service in the National Broadband Plan: A Case for Federal-State Cooperation*, 1 J. OF INFO. POL'Y 125, 133-34 (2001) (explaining the various possible uncertainties that states would encounter when applying COLR responsibilities to broadband providers).

²⁷⁵ See, e.g., TEX. ADMIN. CODE. tit. 16, part 2, § 26.54(b) (requiring transmission at 14,400 bits per second); see, e.g., WIS. ADMIN. CODE. PSC, § 160.031 (requiring 9,600 bits per second).

²⁷⁶ See Bernt, *supra* note 274, at 131.

²⁷⁷ See, e.g., ANGELE A. GILROY, CONG. RESEARCH SERV., R40616, ACCESS TO BROADBAND NETWORKS: THE NET NEUTRALITY DEBATE 1 (2015), available at <http://fas.org/spp/crs/misc/R40616.pdf> (discussing the New Neutrality debate, at which access to broadband absent discrimination is central).

²⁷⁸ See OFFICE OF SCI. AND TECH. POLICY & THE NAT'L ECON. COUNCIL, THE WHITE HOUSE, REPORT: FOUR YEARS OF BROADBAND GROWTH 4 (2013).

²⁷⁹ See FED. COMM'NS COMM'N, *supra* note 129, at 66 (Chart 17).

is actually lower than the subscribership ratios for the bottom decile of households in June 2013 and December 2012.²⁸⁰ In contrast, the top decile of counties by income had 83 fixed connections for every 100 households—93% more than the number of connections in the lowest decile.²⁸¹ Similarly, counties with the largest share of college graduates had 81 residential fixed connections for every 100 households, while counties with the lowest share of college graduates had only 48 connections per 100 households—69% fewer connections than the most-educated counties had.²⁸²

If policymakers—whether at the federal or state level—look to a COLR approach for universal service policy in new technologies, specific aspects of existing COLR rules could help give at least a starting point for thinking through what specific rules might look like. For example, line extension rules under COLR regimes could also be informative for broadband universal service policy.²⁸³ Often COLRs are permitted to charge a Contribution in Aid of Construction (CIAC),²⁸⁴ but carriers may be required to include the fee in their state tariffs, which are reviewed by the state commission to ensure the fees are just and reasonable.²⁸⁵ These tariffs may include general rules, like a commitment that the carrier will install up to two new poles without charging a CIAC, or state law may limit CIAC practices.²⁸⁶ New Jersey, for example, prohibits CIACs where a line extension would be profitable even without a CIAC.²⁸⁷ Again, this paper is not specifically endorsing any one approach, but the example of line extension rules shows how policymakers could examine the various approach different states have taken to implement COLR duties when crafting rules for broadband carriers.

Of course, if policymakers choose to pursue COLR rules to achieve universal voice and broadband service, they will need to confront many more issues and answer many more questions about what a COLR obligation for broadband could look like, who it would apply to, and how transitions to the new regime would operate.²⁸⁸ For example, how would COLR duties differ from the duties of an ETC receiving financial support? How should the COLR duties be as-

²⁸⁰ See FED. COMMC'NS COMM'N, *supra* note 102, at 17; see also FED. COMMC'NS COMM'N, INDUS. ANALYSIS AND TECH. DIVISION: WIRELINE COMPETITION BUREAU, INTERNET ACCESS SERVICES: STATUS AS OF DEC. 31, 2012 66 (2013).

²⁸¹ See FED. COMMC'NS COMM'N, *supra* note 129, at 66 (Chart 17).

²⁸² *Id.* at 70 (Chart 21).

²⁸³ See BLUHM & BERNT, PHD, *supra* note 239, at 8.

²⁸⁴ See *id.*

²⁸⁵ See, e.g., 52 PA. CODE § 63.20 (1969); see, e.g., N.J. STAT. ANN. § 48:2-27 (2015).

²⁸⁶ BLUHM & BERNT, PHD, *supra* note 239, at 8-9.

²⁸⁷ § 48:2-27.

²⁸⁸ See Bernt, *supra* note 274, at 133 (listing examples of questions that must be confronted).

signed to carriers? When should they arise or expire for each carrier, and when can an unsuccessful COLR exit the market?

THE UNIVERSAL SERVICE FUND

Another approach to achieving universal service—which can be used in conjunction with other universal service policies and projects—is to establish funding mechanisms to defray the costs of building new lines in low-income or high-cost areas.²⁸⁹ In recognition that basic communications service (traditionally voice) is “crucial to full participation in our society and economy which are increasingly dependent upon the rapid exchange of information,”²⁹⁰ the FCC for some time has collected funds from telecommunication providers and others to sponsor substantial programs through the Universal Service Fund.²⁹¹ Currently, the Universal Service Fund includes the Connect America Fund for high-cost rural areas,²⁹² the Lifeline program and Link Up America program for low-income consumers,²⁹³ the Schools and Libraries program,²⁹⁴ and the Rural Health Care program.²⁹⁵

In recent years the FCC has updated its USF programs to increasingly support broadband deployment and adoption.²⁹⁶ Spurred in part by recommendations in the National Broadband Plan, the high cost fund, rural health care, and E-rate programs have all been adjusted to incentivize and enable broadband deployment to rural areas and anchor institutions like hospitals, schools, and libraries.²⁹⁷ In 2013, the FCC made up to \$400 million available annually to aid broadband deployment to support telemedicine initiatives,²⁹⁸ and in 2011 the FCC updated its Connect America Fund and intercarrier compensation regime to support networks that offer both basic voice and broadband service.²⁹⁹ By tying broadband service to voice service for funding purposes, the FCC has

²⁸⁹ See *Universal Service*, *supra* note 16.

²⁹⁰ *MTS and WATS Market Structure, and Amendment of Parts 67 & 69 of the Commission's Rules and Establishment of a Joint Board*, Report and Order, 50 Fed. Reg. 939 (Jan. 8, 1985).

²⁹¹ *Universal Service*, *supra* note 16.

²⁹² See *Connect America Fund*, FCC, <http://www.fcc.gov/encyclopedia/connecting-america> (last visited Mar. 13, 2015).

²⁹³ See *Lifeline Program for Low-Income Consumers*, *supra* note 100.

²⁹⁴ *Universal Service*, *supra* note 16.

²⁹⁵ *Id.*

²⁹⁶ *Id.*

²⁹⁷ *Id.*

²⁹⁸ *FCC Chairman Genachowski Announces Up to \$400 Million Healthcare Connect Fund to Create & Expand Telemedicine Networks, Increase Access to Medical Specialists*, FCC (Jan. 7, 2013), <http://www.fcc.gov/document/fcc-chairman-announces-400-million-healthcare-connect-fund>.

²⁹⁹ *USF/ICC Transformation Order*, 26 FCC Rcd 17663 para. 648.

thus far passed judicial scrutiny,³⁰⁰ but it is not clear what the future of the high cost programs will be as usage shifts more to broadband and potentially away from traditional voice service. The FCC's recent decision to reclassify broadband Internet access service as a Title II telecommunications service strengthens the Commission's authority under § 254 to modernize USF programs by applying them to broadband, even sometimes as a standalone product, but the actual rules implementing those changes have not been created yet.³⁰¹

In 2014, the Commission set new broadband connectivity targets for schools and libraries in addition to establishing new target expenditures for WiFi support, and later increased the E-rate cap from \$2.25 billion to \$3.9 billion to better meet the program's connectivity goals.³⁰² However, Commissioner Clyburn and Commissioner Rosenworcel have both pointed out that a lack of broadband connectivity at home will result in a persistent "homework gap" that will leave some students at a strong disadvantage.³⁰³

This has made the topic of reforming subsidies for low-income households to gain greater traction among policymakers recently.³⁰⁴ FCC Commissioner Mignon Clyburn has recommended reforms like including standalone broadband as a supported service for Lifeline customers, in addition to establishing minimum service standards for Lifeline providers, removing carriers' responsibility to determine customers' eligibility, implementing a streamlined approval process, instituting coordinated enrollment with other government benefits programs, and creating public-private partnerships to coordinate outreach efforts.³⁰⁵ Shortly afterward, Commissioner Michael O'Rielly set forth his own principles for Lifeline reform, generally designed to limit the size of the program and implement more safeguards against abuse.³⁰⁶

Outside of the FCC, other actors have been debating and taking action on reforming universal service mechanisms.³⁰⁷ The California Public Utilities Com-

³⁰⁰ See generally *Petitions for Review of Orders of the Federal Communications Commission*, In re: FCC 11-161, 753 F.3d 1015 (10th Cir. 2014) (No. 11-9900).

³⁰¹ See *Net Neutrality Order* GN Docket No. 14-28, paras. 59, 486.

³⁰² *In the Matter of Modernizing the E-rate Program for Schools and Libraries, Connect America Fund*, Second Report and Order and Order on Reconsideration WC Docket No. 13-184, WC Docket No. 10-90, 29 FCC Rcd 15538 paras. 78, 81 (Dec. 11, 2014).

³⁰³ See Mignon Clyburn, Commissioner, Fed. Comm'n's Comm'n, *Reforming Lifeline for the Broadband Era* (Nov. 12, 2014), available at <http://www.fcc.gov/document/commissioner-clyburn-remarks-american-enterprise-institute>; see also Jessica Rosenworcel, Commissioner, Fed. Election Comm'n, *Remarks to the Texas Computer Association* (Feb. 4, 2015), available at <http://www.fcc.gov/document/rosenworcel-remarks-texas-computer-education-association>.

³⁰⁴ Clyburn, *supra* note 303.

³⁰⁵ *Id.*

³⁰⁶ Michael O'Rielly, *Sound Principles for Lifeline Reform*, FCC Blog (Feb. 13, 2015, 3:51 PM), <http://www.fcc.gov/blog/sound-principles-lifeline-reform>.

³⁰⁷ See NTCA- THE RURAL BROADBAND ASSOCIATION COMMENTS IN RESPONSE TO U.S.

mission has voted unanimously to include smartphone service with voice, text, and data capabilities in its state Lifeline program.³⁰⁸ In the private sector, the Internet Innovation Alliance—a coalition whose members include AT&T, the American Conservative Union, and Alcatel-Lucent—recently called for updating the federal Lifeline program by bringing a new focus to support for broadband, distributing benefits through a voucher system, and determining eligibility through the government instead of providers.³⁰⁹

A shift in technologies, and how many people are using those technologies, could also have tremendous impact on how payments travel into and out from universal service programs.³¹⁰ For example, as fewer people shift from services that pay into the USF and over to newer technologies that do not, the base of contributions has been shrinking while the need for greater deployment and adoption has not.³¹¹ On this point the FCC recently asked the Federal-State Joint Board on Universal Service to make recommendations to modify the universal service contribution methodology.³¹²

It will be important to continue to evaluate which communities are being reached by universal service programs throughout technology transitions. Anchor institutions, rural areas, tribal lands, and urban and suburban areas all rely in some way on the existing funding mechanisms to remain connected to the up-to-date basic technologies.³¹³ Leaving these communities behind, intention-

HOUSE OF REPRESENTATIVES ENERGY AND COMMERCE COMMITTEE WHITE PAPER 5: UNIVERSAL SERVICE POLICY AND THE ROLE OF THE FEDERAL COMMUNICATIONS COMMISSION 2, 4-5 (2014), available at <https://prodnet.www.neca.org/publicationsdocs/wwpdf/91914ntca.pdf>; see also Marc Lifsher, *PUC Makes Cellphones Eligible for Low-Cost LifeLine Program*, L.A. TIMES (Jan. 16, 2014), <http://www.latimes.com/business/la-fi-phone-regulations-20140117-story.html>.

³⁰⁸ Lifsher, *supra* note 307.

³⁰⁹ *Community, INTERNET INNOVATION ALLIANCE*, <http://internetinnovation.org/community/members/> (last visited Feb. 24, 2015); INTERNET INNOVATION ALLIANCE, BRINGING THE FCC'S LIFELINE PROGRAM INTO THE 21ST CENTURY 4, 21 (2014) available at http://internetinnovation.org/images/misc_content/Lifeline_White_Paper_FINAL.pdf.

³¹⁰ See FED. COMM'NS COMM'N, *supra* note 126, at 135, 142; see CHARLES AQUARD, RESPONSE TO THE HOUSE COMMITTEE ON ENERGY AND COMMERCE FIFTH WHITE PAPER ON, UNIVERSAL SERVICE POLICY 2 (2014).

³¹¹ *Hearing Before the Committee on Commerce, Science, and Transportation United States Senate*, 109th Cong. 11 (2006) (prepared statement of Glen Post, Chairman/Chief Executive Officer, Centurytel, Inc.).

³¹² *In the Matter of Federal State Joint Board on Universal Service, Universal Service Contribution Methodology, A National Broadband Plan for Our Future*, Order, WC Docket No. 96-45, WC Docket No. 06-122, GN Docket No. 09-51, 29 FCC Rcd 9784 (Aug. 6, 2014).

³¹³ See ALASKA COMM'N SYS., RE: COMMITTEE ON ENERGY & COMMERCE WHITE PAPER, UNIVERSAL SERVICE POLICY AND THE ROLE OF THE FEDERAL COMMUNICATIONS COMMISSION 1-2 (2014); see, e.g., Modernization of the Schools and Libraries "E-rate" Program and Connect America Fund, 80 Fed. Reg. 23, 5968 (Feb. 4, 2015); see generally NAT'L

ally or not, in the transition would risk driving a wedge even further in the digital divide.

NONDISCRIMINATION POLICIES

As the Commission has explained,³¹⁴ net neutrality and other open Internet rules can themselves encourage more broadband deployment.³¹⁵ In the “virtuous cycle of innovation,” new network functions lead to greater demand for improved broadband service, which leads to broadband infrastructure investment, which then leads to innovators developing more network functions.³¹⁶ However, if broadband providers could leverage their control over the last-mile infrastructure to prioritize some companies’ traffic over others, broadband providers’ incentive to invest in their infrastructure and market entrants’ incentive to bring new data-intensive applications to market would be seriously threatened.³¹⁷

Similarly, policymakers understanding the use of data capacity thresholds (“data caps”) is crucial to ensuring capacity limits do not create a disincentive to invest in networks.³¹⁸ If providers can place artificial limits on customers’ capacity demands—and indeed profit from those limits—providers will have precious little incentive to invest in more robust networks that have even less

CONG. OF AM. INDIANS, RE: COMMITTEE ON ENERGY & COMMERCE WHITE PAPER, UNIVERSAL SERVICE POLICY AND THE ROLE OF THE FEDERAL COMMUNICATIONS COMMISSION 1 (2014) (providing an example of how tribal lands are becoming increasingly involved with in and are starting to take steps to rely on the existing broadband universal services).

³¹⁴ See *In the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications 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, GN Docket No. 14-126, para. 151 (Jan. 29, 2015).

³¹⁵ See, e.g., *In re* Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act, *Comments of Netflix, Inc.*, GN Docket No. 14-126, at 13, 14-15 (Sept. 4, 2014) (discussing the “virtuous circle of innovation” that open Internet facilitates).

³¹⁶ See *id.* at 13-14.

³¹⁷ See *In re* Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act, *Comments of Public Knowledge*, GN Docket No. 14-126, at 7-8, 9, 11 (Sept. 4, 2014) (“A company that controls broadband access and profits from charging consumers for video, voice, and data separately has an economic incentive to leverage that broadband access control to protect its other revenue streams.”).

³¹⁸ See *id.* at 4, 6.

technical need for data caps.³¹⁹ To put another way, when broadband providers can very profitably monetize artificial scarcity, they have little reason to create actual abundance.³²⁰

In this sense, “open-Internet-as-universal-service” policy may sometimes fit better in the context of improving existing infrastructure (particularly broadband infrastructure that no longer qualifies as broadband due to evolving technological standards), as opposed to encouraging greenfield deployment.³²¹ However, ensuring that the broadband service being provided continues to develop in line with the evolving standards for “basic service” makes this a potentially important tool for the FCC in efforts to ensure high-quality networks proliferate.³²²

Additionally, interconnection policies, although somewhat different than the traditional net neutrality concerns of discrimination in the last mile of the network, can have significant impact on the viability of new networks.³²³ Any network, whether offering basic voice or Internet access service, must directly or indirectly physically connect with other networks to offer its customers phone service or Internet access.³²⁴ Ensuring efficient interconnection between networks encourages network deployment by getting those networks online, and is therefore a significant tool for achieving universal service.³²⁵

Now that the FCC has reclassified broadband Internet access service as a telecommunications service and established strong open Internet rules, the stage is well set to see how those rules incentivize carriers to invest in their networks, rather than monetizing artificial scarcity in network capacity.³²⁶

³¹⁹ *Id.* at 9, 11.

³²⁰ *Id.* at 11.

³²¹ See *Comments of Netflix, Inc.*, GN Docket No. 14-126, at 13-14; Cory Janssen, *Greenfield Deployment*, TECHOPEdia, <http://www.techopedia.com/definition/5063/greenfield-deployment> (last visited Feb. 24, 2015) (explaining that, converse to Net Neutrality, greenfield deployment builds the network from scratch, having no impact on the improvement of existing networks).

³²² See N.Y. PUB. SERV. COMM’N, 05-C-0616, PROCEEDING ON MOTION OF THE COMMISSION TO EXAMINE ISSUES RELATED TO THE TRANSITION TO INTERMODAL COMPETITION IN THE PROVISION OF TELECOMMUNICATIONS SERVICES, COMMENTS OF THE COMMUNICATIONS WORKERS OF AMERICA, AFL-CIO 14-16, 25 (Aug. 15, 2005).

³²³ Bruce Edgerton, *Interconnection- New Policies Promote Competition*, CONNECT-WORLD (1997), <http://www.connect-world.com/index.php/magazines/latin-america/item/1959-interconnection-%E2%80%93-new-policies-promote-competition>.

³²⁴ See TELECOMMUNICATIONS REGULATION HANDBOOK: MODULE 3 INTERCONNECTION, 3-2 (Hank Intven ed., & McCarthy Tetrault 2000), available at http://www.itu.int/ITU-D/treg/Documentation/Infodev_handbook/3_Interconnection.pdf (defining this process, known as “interconnection”).

³²⁵ See Letter from Brad E. Mutschelknaus & Edward A. Yorkgitis, Jr., Counsel for Eschelon Telecom et al., to Marlene H. Dortch, Secretary, Fed. Comm’ns Comm’n 1-2 (June 6, 2005), available at <http://apps.fcc.gov/ecfs/document/view?id=60001010005>.

³²⁶ See *Net Neutrality Order*, GN Docket No. 14-28, para. 151.

VOLUNTARY APPROACHES

Whether independent or combined with the types of policies described above, voluntary efforts to increase build-out, especially for broadband, can have significant impacts within their geographic purviews.³²⁷ Whether launched by local governments or private companies, voluntary efforts to increase broadband infrastructure or adoption may not have the same reach as a national or state-level universal service regime, but can play an important role in increasing broadband access over the long term.³²⁸

Municipal broadband efforts have become increasingly popular as municipalities that either have little competition in the broadband marketplace or no broadband infrastructure at all decide to take matters in their own hands and gain local control over the next generation of their communities' infrastructure.³²⁹ Local broadband planning allows network planners to pay particular attention to improving access to the community's anchor institutions, and can be constructed for less cost if coordinated with other infrastructure projects like repairs to roads or water or electricity infrastructure.³³⁰

Municipal broadband projects have launched under a number of different financing options and business models.³³¹ Not every municipal broadband project has been successful, but enough success stories have appeared that the efforts have drawn the attention of national policymakers at the FCC, which is currently considering whether to preempt state laws that restrict community broadband efforts.³³² In addition to President Obama recently voicing strong

³²⁷ See *Connect America Fund*, *supra* note, 292; see, e.g., MICHAEL J. COPPS, BRINGING BROADBAND TO RURAL AMERICA: REPORT ON RURAL BROADBAND STRATEGY 51, 53-54 paras. 118, 120 (2009); see also Letter from Thomas A. Schatz, President, Council for Citizens Against Government Waste, to Hon. Greg Walden, Chairman, Subcommittee on Communications and Technology, Committee on Energy and Commerce, U.S. House of Representatives & Hon. Anna Eshoo, Ranking Member, Subcommittee on Communications and Technology, Committee on Energy and Commerce, U.S. House of Representatives 4 (Sept. 17, 2014), [available at](http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP5_Responses_1-18.pdf) http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP5_Responses_1-18.pdf (describing how private entities have begun to fund network improvement projects).

³²⁸ See Letter from Thomas A. Schatz, *supra* note 327, at 3, 5, 8 (describing how state and federal government programs have an abundance of resources that are specifically allocated to network build out).

³²⁹ *Community Connectivity Toolkit*, COMMUNITY BROADBAND NETWORKS, <http://muninetworks.org/content/community-connectivity-toolkit> (last visited Feb. 25, 2015).

³³⁰ See NW. COLO. COUNCIL OF GOV'TS, REGIONAL BROADBAND STRATEGIC PLAN 28, 130, 134 (2013), *available at* <http://co.grand.co.us/DocumentCenter/View/2100>.

³³¹ See *How Municipal Networks are Financed*, INST. FOR LOCAL SELF-RELIANCE, <http://www.ilsr.org/wp-content/uploads/2014/01/financing-munis-fact-sheet.pdf> (last visited Mar. 13, 2015).

³³² See, e.g., *Opelika Speaks From Experience: Support Local Authority!*, COMMUNITY

support for municipal broadband efforts,³³³ the Department of Commerce's National Telecommunication and Information Administration and the Department of Agriculture have announced new support, tactical assistance, and loan opportunities for new networks.³³⁴

Finally, less traditional efforts like voluntary commitments by carriers to provide reasonably priced basic broadband service have resulted in more access for at least some portion of underserved populations.³³⁵ For example, Comcast's Internet Essentials program offers basic broadband service for a base price of \$9.95 per month.³³⁶ Eligibility for the program is quite limited, as the program is only offered to participants: (1) within Comcast's existing footprint; (2) having at least one child eligible to participate in the National School Lunch Program; and (3) who are not recent Comcast customers or have outstanding debt due to Comcast.³³⁷ Even within that portion of the population, adoption is a small fraction of the eligible population—for example, one recent estimate of Comcast's Internet Essentials program in California put adoption rates at 11% of eligible households.³³⁸ Even though the service has slowly reached only some of the eligible subscribers who would otherwise not have broadband in their home, the service is worth examining for ways to improve access to households that currently do not have broadband service.³³⁹

This type of program may not be workable with its current limitations to reach true universality on its own, but it could play at least some small part in getting more people online while policymakers pursue other approaches to encourage build-out and affordability. However, in the context of its proposed merger with Time Warner Cable, Comcast has bristled against proposals to strengthen the Internet Essentials service and improve adoption among eligible

BROADBAND NETWORKS (Feb. 25, 2015), <http://www.muninetworks.org/content/opelika-speaks-experience-support-local-authority>.

³³³ Office of Press Sec'y, *supra* note 2.

³³⁴ Lawrence Strickling, *NITA Announces BroadbandUSA Effort to Assist Communities with Broadband Plans*, BROADBANDUSA (Jan. 14, 2015), http://www2.ntia.doc.gov/ntia_announces_broadbandusa_effort; *USDA Announces Funding for Rural Broadband and Telecommunications Infrastructure*, U.S. DEP'T OF AGRIC. (Oct. 22, 2014), <http://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=2014/10/0234.xml>.

³³⁵ MATT LARSEN, AMERICA'S BROADBAND HEROES: FIXED WIRELESS BROADBAND 2 (2011), *available at* <http://www.wirelesscowboys.com/wp-content/uploads/2011/10/americas-broadband-heroes-fixed-wireless-2011.pdf>.

³³⁶ *Internet Essentials Support*, COMCAST, <http://learning.internetessentials.com/internet-essentials-support> (last visited Feb. 25, 2015).

³³⁷ *Id.*

³³⁸ *See In re Application of Comcast Corporation and Time Warner Cable Inc. and Spinco to Assign and Transfer Control of FCC Licenses and Other Authorizations, Comments of the California Emerging Technology Fund*, MB Docket No. 14-57, at 4 (Aug. 25, 2014).

³³⁹ *See id.* at 3.

households.³⁴⁰ If Comcast and other carriers decline to invest in improving the performance and efficacy of voluntary measures like Internet Essentials, it may not turn out to be a viable model to meaningfully improve adoption.³⁴¹

CONCLUSION

As the network transitions in several different ways, policymakers have the challenge of seizing the opportunities presented by new technologies and preventing potential harms from network changes. We have already seen evidence that not every technological change will automatically be a step forward for everyone³⁴²—or even for most—so communications policy must continue to pursue universal, reliable, and affordable communications service. The technologies will inevitably change, and the services at issue may even upgrade as well, but the basic social needs remain the same. If policymakers examine and evaluate the tools the U.S. has used in the past to achieve universal service, they may find lessons and tools that can be useful in crafting policies to accomplish universal broadband service in the years to come.

³⁴⁰ Jon Brodtkin, *Comcast Gets a Merger Approval, But Objects to New Low-Income Requirements*, ARS TECHNICA (Feb. 14, 2015), <http://arstechnica.com/business/2015/02/comcast-gets-a-merger-approval-but-objects-to-new-low-income-requirements/>.

³⁴¹ See *Comments of the California Emerging Technology Fund*, MB Docket No. 14-57, at 24; see Kate Cox, *Two Big Reasons The New Broadband Standard Is Bad News For The Comcast Merger*, CONSUMERIST (Jan. 29, 2015), <http://consumerist.com/2015/01/29/two-big-reasons-the-new-broadband-standard-is-bad-news-for-the-comcast-merger/> (explaining that because Comcast's program narrows the digital divide by providing low income families with low cost Internet access, there would be more people without Internet access without investment and support from Comcast to implement Internet Essentials).

³⁴² KATHERINE BATES ET AL., ICF INT'L, CLOSING THE DIGITAL DIVIDE: PROMOTING BROADBAND ADOPTION AMONG UNDERSERVED POPULATIONS 1, 2, 13 (2012).