



### **Open Internet & The Need for Net Neutrality**

PA Joint Democratic Policy Committee Panel, co-hosted by Policy Chair Katie Muth, Senator  
Amanda Cappelletti, Representative Elizabeth Fiedler  
Monday, March 29, 2021 at 10 a.m.

#### **Opening Remarks**

Senator Katie Muth, Policy Committee Chair

Senator Amanda Cappelletti

Representative Elizabeth Fielder, House Subcommittee on Progressive Policies Chair

#### **Panel Discussion**

Josh Stager, Deputy Director of Broadband & Competition Policy, Open Tech Institute

Sascha Meinrath, Palmer Chair in Telecommunications, Penn State University

Hollie Woodard, English Teacher and Technology Coach, Council Rock High School North

Glenn Updike, MD, Medical Director, MyUPMC, and Medical Director, Clinical Informatics  
for the Women's Health Service Line at UPMC Magee-Women's Hospital

#### **Q&A Session**



**Testimony of Joshua Stager**  
**Deputy Director, New America's Open Technology Institute**

*Respectfully submitted to the*

**Commonwealth of Pennsylvania**  
**Joint Senate and House Democratic Policy Committee**

*Regarding*

**Policy Hearing on Net Neutrality**

March 29, 2021

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## **Introduction**

My name is Joshua Stager, and I am the deputy director for broadband and competition policy at the Open Technology Institute (OTI). For more than a decade, OTI has studied the broadband market, developed internet policy, and advocated for closing the digital divide. Through this work, we have reached an inescapable conclusion: we need a law that protects net neutrality. The Federal Communications Commission (FCC) understood this as far back as 2005, when it began its first proceeding on the issue. After years of work, the FCC created federal rules in 2015. Those rules were strong, consensus-driven, and upheld in federal court.

However, in 2017, President Trump installed new FCC appointees who decided to repeal those rules and, in a radical move, entirely abdicated the agency's authority to oversee internet service providers (ISPs). After a decade of back-and-forth debate about the *best* way to protect net neutrality, the Trump FCC decided that it should no longer protect net neutrality *at all*. This decision was nonsensical, and we are paying the price for it today as many Pennsylvanians suffer through the pandemic with internet service that is overpriced, unreliable, or, worst of all, doesn't exist because their home is unserved.

My remarks today will examine why we need to restore net neutrality. Second, I will explain how Pennsylvanians are at risk without net neutrality. Lastly, I will discuss what a strong state law might look like.

### **I. Net neutrality needs to be restored**

At a high level, net neutrality is the basic principle of nondiscrimination that we find throughout common carriage law. It applies to many networked industries, from telephones to airlines. Net neutrality is also a protection against *gatekeeper power*—the threat that the ISPs we all rely on to access the internet could control online content, or determine which online businesses succeed or fail. ISPs should be neutral. This neutrality has been part of the internet since its inception, and it helps explain why the internet developed into a platform for innovation and free speech.

In the early days of the internet, neutrality was respected as an almost unspoken norm. Today, that norm is breaking down. What changed? First, ISPs now have the technical ability to discriminate traffic on their networks. This capability did not exist in the early days of the internet. Second, the market has consolidated. 20 years ago, there were many internet providers across the country. Today, thanks to a wave of mergers, just four companies now dominate the market. These four companies have enough market power to act as gatekeepers of the internet—if the law allows it.

This combination of factors means that neutrality is no longer guaranteed and, indeed, has been violated many times. In 2007, Comcast throttled a file-sharing service. In 2012, AT&T blocked FaceTime. In 2014, all of the big ISPs quietly degraded their own networks to extort fees from Netflix and other companies. This persistent creep of net neutrality abuses is what motivated the FCC to act in 2015, and it is why we still need rules today.

## **II. Repealing net neutrality put Pennsylvanians at risk**

The repeal of net neutrality stripped the federal government of its authority to protect the open internet and to ensure consumers are getting the internet service they paid for. This puts Pennsylvanians at risk, and the stakes are high.

First and foremost is the risk to public health. The repeal of net neutrality has severely undermined our pandemic response. Millions of people are relying on the internet to get through the pandemic—to work, learn, socially distance, and, now, to get vaccinated. But if any of us have problems with our service, we are left to the whims of our internet provider, who might offer unreliable speeds or might not be transparent with customers. There used to be rules in place to prevent this conduct, but now there is nothing.

Repealing net neutrality also hurt job creators and innovation. It cannot be said enough: net neutrality is good for the economy. It ensures that small businesses can compete on a level playing field. Without it, big ISPs can stifle innovation and block competitors—or worse, prevent new companies from getting off the ground in the first place.

Net neutrality also ensures that the internet is a level playing field for marginalized people. Content creators, political activists, even Etsy retailers have all used the open internet to

amplify voices that are often shut out of traditional avenues. The internet can be a democratizing force, but only if we protect it. Without net neutrality, ISPs are free to divide the internet into fast lanes for those who can afford it, and slow lanes for everyone else.

There are also many parts of Pennsylvania that still lack access to the internet. We need to be doing everything we can to get ISPs to expand their networks to these unserved communities. But the repeal of net neutrality has done the opposite—instead of investing in buildout, ISPs are now incentivized to extract new revenues from their existing customers. We will never close the digital divide with those incentives.

Lastly, repealing net neutrality was a threat to public safety. For example, in 2018—just two months after the FCC repealed net neutrality—firefighters in California discovered that Verizon was throttling their service, which cut them off from each other as they were battling the largest wildfire in that state’s history. In the past, the FCC could have enforced its rules to help—but the agency had just revoked them, so it did nothing. Net neutrality would have allowed these first responders to focus on fighting fires, instead of fighting with Verizon.

### **III. The elements of a strong state net neutrality law**

Given these risks, it is commendable that the General Assembly is exploring ways to help. Passing a law that codifies net neutrality would be an important step. Our experience with the federal regime taught us that any net neutrality law should contain, at a minimum, the following elements.

- The law should have bright-line rules against blocking, throttling, and paid prioritization.
- The law should include a “general conduct” rule that empowers an expert agency, such as the Public Utility Commission, to address new harms as they emerge. This is important because ISPs are continually changing their tactics. 10 years ago blocking was a big concern; now it’s zero-rating. We don’t know what it will be 10 years from now, so we need an expert agency that is empowered to prevent new harms before they emerge.

- The law should carefully define “reasonable network management.” This is important to avoid loopholes, but could include exceptions for public safety.
- The law should prohibit zero-rating. This practice is stealthy and misleading, as ISPs claim to offer “free data” for favored content that won’t count against your limit. In reality, zero-rating creates precisely the kind of fast and slow lanes that we want to prevent. The real problem here are the data limits—they are artificially low, designed to create scarcity where none exists, and should be investigated.
- The law should prohibit access fees related to interconnection. Interconnection is a vital chokepoint in the internet’s architecture that ISPs have a history of exploiting. For example, in 2014, ISPs degraded these chokepoints for months, slowing the connections of millions of people. It was all an effort to pressure companies into paying access fees, and consumers were just the collateral damage. In 2018, California prohibited this conduct, and so should a Pennsylvania law.
- Legislative findings and a severability clause can help if there is judicial review.

With these elements, the General Assembly could enact a strong law that restores net neutrality for Pennsylvanians.

## **Conclusion**

Let’s be clear: this issue is overwhelmingly popular. In 2017, millions of Americans wrote, emailed, and called the FCC to demand that they save net neutrality. So did thousands of businesses, large and small, and many smaller ISPs and community networks that do not want to exploit their customers. The Trump FCC ignored all of this, leaving us with a lot of damage to fix today.

After the past year, it is clear that we live in an ever-changing world where connectivity matters. It is undeniable that the internet is no longer a nice-to-have; it is a must-have. The internet is a utility, and the law should treat it as the essential service that it so obviously is. That is what net neutrality is all about.

**Testimony of**

**Sascha D. Meinrath**

**Palmer Chair in Telecommunications**

**The Penn State University**

**Before the Pennsylvania State House**

**Democratic Policy Committee**

**Hearing on Net Neutrality**

**Harrisburg, PA & Virtually**

**Monday, March 29, 2021**

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## **Introduction**

Thank you, Chairwoman Muth, Senator Cappelletti, and Representative Fiedler, for this opportunity to discuss the importance of Network Neutrality, and its myriad intersections with the current state of broadband adoption, both across the Commonwealth of Pennsylvania, and the country as a whole.

My name is Sascha Meinrath, and, since 2015, I have been the Palmer Chair in Telecommunications at Penn State University. However, my work on Network Neutrality dates back to early 2004 -- very near the genesis point when Tim Wu coined the term<sup>1</sup>. In 2004, I was tasked to help develop the Internet advocacy portfolio of the then-fledgling journalism-reform group, Free Press, and I spent the next few years working on the strategic framing that has defined the debate over Network Neutrality ever since.

In 2006, I co-founded the Cooperative Measurement and Modeling of Open Networked Systems Initiative at the Center for Applied Internet Data Analysis, in San Diego. And, in 2008, I founded the Open Technology Institute, a DC-based policy think tank, that I grew to become one of the major public interest groups working on various facets of the Network Neutrality policy battles. Tim Wu was one of OTI's original steering committee members.

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<sup>1</sup> 'Network Neutrality, Broadband Discrimination', 2003, Tim Wu - Kernochan Center for Law, Media and the Arts: [https://scholarship.law.columbia.edu/faculty\\_scholarship/1281/](https://scholarship.law.columbia.edu/faculty_scholarship/1281/)

In 2009, I co-founded Measurement Lab, which has grown to become the world's largest open broadband measurement data repository. And, more recently, in 2015, along with joining Penn State Faculty, I founded X-Lab, a tech policy institute devoted to exactly the type of vanguard research that brings me before you today.

Since 2018, I've led multiple broadband mapping efforts -- supported by the Center for Rural Pennsylvania -- that have provided unprecedented insights and resources to the members of the Pennsylvania legislature. In 2018, my team conducted an in-depth analysis of connectivity speeds; and our findings, delivered to the Pennsylvania legislature in June 2019's, "Broadband Availability and Access in Rural Pennsylvania" report were quite stark -- showing major discrepancies across the commonwealth between claimed availability of service and actual adoption of broadband services. In 2020, my team delivered a second major research report, "Broadband Demand: The Cost and Price Elasticity of Broadband Internet Service in Rural Pennsylvania," which documented major pricing differentials between rural and urban constituencies. Both data collection efforts underscored the dire state of broadband connectivity across Pennsylvania -- a fact that is now well-known, yet remains under-addressed.

As I've testified previously before the Pennsylvania legislature, our research results:

“systematically document that we face a dire crisis that is undermining our economy, our educational system, our health care, our access to media and

information, and availability of untold additional resources that broadband connectivity makes possible.”

Given the current state of connectivity demonstrated in this post-COVID world, the importance of maintaining a neutral network for broadband service provision has never been greater.

### **Network Neutrality & Competition**

Put simply, network neutrality is the idea that a telecommunications network should be a neutral medium of transport -- and that a failure to maintain a neutral network inevitably leads to discriminatory practices that invariably harm some users of that network. Without net neutrality regulations in place, Internet service providers as well as mobile network carriers are free to - and have previously<sup>2</sup> - restrain or altogether deny access to websites, streaming services and other online resources.

In a meaningfully competitive market, the dangers brought on by a lack of network neutrality would be far less dire; in essence, a customer whose connection to the Internet is throttled, limited, or otherwise compromised by their ISP would simply switch over to another provider who did not engage in those detrimental business practices. However, the stark reality is that citizens in most states - including

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<sup>2</sup> See <https://news.northeastern.edu/2018/09/10/new-research-shows-your-internet-provider-is-in-control/> for one such example.

Pennsylvania - have few or no alternatives to their existing company, when it comes to switching Internet providers.

Several carriers have already engaged in a host of different blocking, throttling, and prioritization regimes, including reducing performance to a competitor's video streaming platform or telephone services, or restricting viewing of news or legal proceedings against itself from within its own network. It's the same kind of censorship technology employed by ISPs in other countries with oppressive censorship regimes, such as in China or Iran.<sup>3</sup> The issue of Net Neutrality is, at its core, one of free speech and functioning markets. Broadband providers are the highways that we use to get online; they are not the Internet itself. As Free Press underscored, "To install broadband providers as gatekeepers of that open platform strips communities and individuals of their power and hands it to corporate behemoths like Verizon, AT&T and Comcast."<sup>4</sup> Giving any entity - corporate or governmental - unrestricted power to censor or hide any content they deem unfit, is something that all Americans can agree is inherently dangerous to our civil society, regardless of politics.

There are countless examples documenting the harms caused by violations of Network Neutrality: from the censoring of political speech telecom providers didn't like, to the blocking of specific services which compete with that provider's service offerings, to interfering with legal applications (and then lying about it). Most of the major telcos have engaged in fairly egregious Network Neutrality

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<sup>3</sup> See this 2019 FreedomHouse report: <https://freedomhouse.org/country/united-arab-emirates/freedom-net/2019>

<sup>4</sup> "Net Neutrality's Impact on Free Speech" June 23, 2014 freepress.net- Lauren Wilson, <https://www.freepress.net/our-response/expert-analysis/insights-opinions/net-neutralitys-impact-free-speech>

violations over the years. In fact, after Net Neutrality rules were repealed in 2017, most ISPs refused to comment on whether or not they would treat all Internet traffic equally, block or throttle traffic or offer higher-priced “fast lanes” for content they choose to prioritize.<sup>5</sup>

I’ve been writing peer-reviewed journal articles about Net Neutrality since 2008; in the *Journal of Internet Law*<sup>6</sup>, I discussed the importance of maintaining an open Internet, and warned about the dangers of abandoning net neutrality and allowing ISPs to act as the gatekeepers of information, knowledge, and content:

*Despite network operators assurances to the contrary, over the past several years there have been ominous glimpses of what a non-neutral network might look like. In 2004, North Carolina ISP Madison River blocked DSL customers from using its rival’s (Vonage) VOIP telephony services. In 2005, the Canadian telecom corporation, Telus, blocked users from accessing a pro-union Web site during a labor dispute. In 2006, AOL Time Warner blocked a mass email campaign from its customers that opposed AOL’s proposed tiered email system. In 2007, AT&T apparently censored a Webcast of the rock band Pearl Jam’s anti-Bush political commentary. Also in 2007,*

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<sup>5</sup> ISPs won’t promise to treat all traffic equally after net neutrality, Dec 15, 2017, The Verge - Jacob Kastrenakes: <https://www.theverge.com/2017/12/15/16768088/internet-providers-plans-without-net-neutrality-comcast-att-verizon>

<sup>6</sup> Transcending Net Neutrality: Ten Steps Toward an Open Internet, December 2008, Sascha Meinrath and Viktor Pickard, *Journal of Internet Law*: [https://repository.upenn.edu/cgi/viewcontent.cgi?article=1425&context=asc\\_papers](https://repository.upenn.edu/cgi/viewcontent.cgi?article=1425&context=asc_papers)

*Verizon was found blocking the pro-choice organization NARAL's text messages. In 2008, Bell Canada was caught throttling third-party DSL providers' P2P traffic. Perhaps best exemplifying the potential for abusing net neutrality has been Comcast, whose practices of blocking traffic associated with Bit Torrent, a peer-to-peer file-sharing system, were exposed in 2007. These are just a few of the more egregious infractions against net neutrality.*

## **Post-COVID Reality**

Pennsylvania's post-COVID broadband-reality is calamitous for both individuals and the communities in which they live. The Coronavirus pandemic focused our attention upon this longstanding service provisioning shortcoming because it has acted as a "force-multiplier" for the detrimental impacts of the digital divide and of the lack of meaningful net neutrality legislation:

1. Students learn less without broadband access -- and a generation of children are learning *far* less when distance learning is so prevalent and they don't have adequate broadband access.<sup>7</sup>

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<sup>7</sup> What We're Learning About Online Learning, June 13 2020, Benedict Carey - New York Times: <https://www.nytimes.com/2020/06/13/health/school-learning-online-education.html>

2. Entrepreneurs have difficulty thriving without broadband -- but today's local businesses face far greater disadvantages when they cannot pivot to online operations.

Because of the digital divide plaguing Pennsylvania during the coronavirus epidemic, administrators are compelled to send students to school, even when it's dangerous; local businesses stay open because they have no meaningful online capacity (and even if they did have connectivity, their customers too often do not); and these communities face greater risk that may be measured in increased sickness and mortality rates that are then further exasperated due to a lack of access to telehealth resources.

This state of affairs is particularly troubling for Pennsylvania residents, since, unlike other states, we've actually already paid for universal broadband service guarantees that were never actually delivered. When the state granted tax breaks and "rate flexibility" -- resulting in higher monthly bills for PA residents -- it was in return for an explicit commitment. To quote Verizon:

"Bell commits to deploy the technologies necessary to provide universal broadband availability in 2015...capable of supporting services requiring bandwidth of *at least 45 megabits per second...*"

While it is difficult to determine just how much money Pennsylvania residents have already paid for universal broadband we have yet to receive, the consumer

watchdog group, Teletruth, conducted in-depth investigations looking at Verizon's SEC filings and tax documents, and estimated that:

“...by the end of 2014, Verizon PA overcharged customers about \$18 billion for a fiber optic future they never got.”<sup>8</sup>

Today, Verizon continues to state that it has, “...met its Chapter 30 obligations to deliver broadband to 100% of its Pennsylvania service territory by the end of 2015.”<sup>9</sup>

### **Key 2020 Findings: Broadband Pricing**

Our most recent research initiative for the Center for Rural PA<sup>10</sup> collected survey/polling data from over 1400 PA residents regarding their broadband speeds, pricing, willingness-to-pay, and demographics. Key findings from this research include that:

1. Substantial service provision differentials exist between urban and rural communities;
2. Pricing data alone hides substantial differentials within speed tiers between urban and rural constituencies; within pricing tiers, rural areas are overrepresented with slower speeds, while urban areas are

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<sup>8</sup> Available from: [https://www.verizon.com/about/sites/default/files/pa\\_hsi.pdf](https://www.verizon.com/about/sites/default/files/pa_hsi.pdf)

<sup>9</sup> Ibid.

<sup>10</sup> Tentatively titled, “Broadband Demand: The Cost and Price Elasticity of Broadband Internet Service in Rural Pennsylvania,” which will be available via the Center for Rural PA website.

more likely to have faster speeds; thus, dollar for dollar, rural areas receive slower speeds than urban areas;

3. Survey responses document a “sweet spot” in terms of a willingness to adopt broadband (of under \$61/month), as well as relatively static “unwillingness-to-pay” for services above \$80/month; rural constituencies have consistently *higher* willingness-to-pay than urban respondents, regardless of price point;
4. Pennsylvania’s current definition of “broadband” is shockingly antiquated and should be harmonized to meet or exceed long-established federal standards. Currently, the Commonwealth’s definition is more than an order-of-magnitude slower than the current FCC definition of “broadband” connectivity; and,
5. The state should mandate standardized public disclosure of broadband service characteristics including price, speed, service limitations (e.g., data caps, throttling), and guaranteed minimum service levels, so that consumers can comparison shop and make informed decisions about which service to purchase.

And, of course, Pennsylvania would be far better positioned to leverage federal broadband support mechanisms if the State developed a comprehensive broadband mapping initiative using best-practices from the scientific and research community.

<sup>11</sup> The State’s failure to do so will likely be measurable in the tens, if not hundreds of millions of dollars in funding that will either be forgone or ill-applied.

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<sup>11</sup> Funding sources include the \$16 billion Rural Digital Opportunities Fund administered by the Federal Communications Commission, and potentially tens of billions of dollars in broadband support proposed by Congress through programs like the HEROES Act and the Moving Forward Act.

## Economic Take-Home Message

In 2015, the US Census Bureau reported that Pennsylvania had 1.35 million rural households. Based on the FCC's *optimistic* estimates, about 40% of rural households (540,000 households) do not have broadband connectivity. Taking into the \$2000/year opportunity cost<sup>12</sup>, **the current lack of broadband connectivity costs rural Pennsylvania residents over \$1 billion a year in lost economic opportunity.**

Together with the \$18 billion in overcharges and tax subsidies already paid to Verizon and other ISPs since the mid-1990s, **Pennsylvania's lack of universal broadband connectivity has likely already cost the state well over \$25 billion.**

## Conclusions

Pennsylvania's rural residents face a trifecta of digital disadvantage:

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<sup>12</sup> The opportunity costs of continuing inaction are enormous. The National Bureau of Economic Research estimated that broadband connectivity supplies roughly \$2,000 a year *per household* in economic value (see: <http://www.nber.org/papers/w21321.pdf>). This cost isn't just due to increased job prospects, but also cheaper flights, less expensive diapers, better medical advice, access to online resources, and e-commerce cost-savings. And that opportunity costs is without taking into account the bolstering of home property values associated with broadband connectivity. Researchers Steven Deller and Brian Whitacre released a 2019 study looking at 887 rural communities looking at the effect of broadband connectivity on home value. Among their many interesting findings, one, in particular, stood out: "...higher access to broadband, regardless of the specific estimator used, has a positive impact on remote rural housing values." (Pg. 15). According to Deller and Whitacre, these results translated to fairly extensive benefits that a "10% increase in coverage of at least 0.2Mbps results in the median house value increasing by \$661." Thus, for an unserved community, increasing even baseline connectivity by even a modest amount may have an impact of thousands of dollars *per house* within that local community. [From: <https://blogs.extension.wisc.edu/cced/files/2019/07/Deller-Whitacre-2019.pdf>]. Likewise, the National Federation of Independent Business (NFIB) found that lack of broadband access, especially in rural areas, hurts start-ups and small business prospects. According to the NFIB, "...for business owners in rural communities, [broadband] has become an issue they can't ignore. As more industries and day-to-day operations rely on fast and reliable connectivity, areas that lack the essential tool are increasingly left in the dust." [See: <https://bit.ly/2F8LeFW>].

1. Official measures overstate broadband availability;
2. The magnitude of the discrepancy is greater for rural areas than urban locales, thus hiding the extent of the divide; and,
3. Even when connectivity is available, dollar for dollar, rural residents appear to receive worse service than urban constituents.

As a first step to solving these problems, Pennsylvania should invest in the independent, longitudinal documentation of the state of broadband connectivity across the Commonwealth. Not only will a comprehensive documentation effort increase access to broadband buildout funding (likely more than paying for itself), it would also enable more effective implementation of broadband interventions by more accurately identifying underserved areas.

Furthermore, longitudinal speed and pricing data will empower the State of Pennsylvania to objectively measure which strategies and ISPs have been most effective at bridging the digital divide and improving broadband affordability over time. And in the immediacy, the State should substantially increase investment in immediate buildout efforts to slow the hemorrhaging of economic wealth, well-being, and vitality from communities across Pennsylvania.

### **A New Network Neutrality**

Rather than wait for the Federal Communications Commission and Federal Trade Commissions to address the harms being perpetuated against Pennsylvanians, Pennsylvania's State Legislature has an opportunity to enact a state-wide,

comprehensive framework to protect local residents -- particularly rural residents and others who do not have a meaningful number of broadband service providers to choose from. The detrimental effects of zero-rating, data caps, prioritization, content blocking, and Internet speed throttling are all well documented; and other states such as California have rightly already begun addressing these harms and protecting local residents by enacting their own state net neutrality laws.<sup>13</sup> We can start by revisiting how to operationalize the facets of a new network neutrality framework in my 2008 co-authored article, “Transcending Net Neutrality: Ten Steps Toward an Open Internet”:

1. Common carriage
2. Open architecture and open source driver development
3. Open protocols and open standards
4. An end-to-end architecture ( i.e., is based upon a “dumb network”)
5. Safeguards privacy ( e.g ., no back doors, deep packet inspection, etc.)
6. Fosters application-neutrality
7. Mandates low-latency and first-in/first-out ( i.e ., adequate capacity)
8. Interoperability
9. Business-model neutrality
10. Is governed by its users

Thank you for this opportunity to discuss net neutrality, our research, and the importance in forthrightly addressing these issues for all Pennsylvanians. I look forward to answering any follow-up questions you may have.

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<sup>13</sup>‘California can enforce its tough net neutrality law, federal judge says’, February 24 2021, Brian Fung, CNN, <https://www.cnn.com/2021/02/24/tech/california-net-neutrality/index.html>

# A Growing Digital Divide

## *Internet Freedom and the Negative Impact of Command-and-Control Networking*

Sascha D. Meinrath, James Losey, and Benjamin Lennett •  
New America Foundation



There is a growing consensus that communications is a fundamental right. However, achieving digital equality in the broadband age has become considerably more complex than just universal access. This article offers a more nuanced perspective on the widening digital divide that's centered on a user's utility of a broadband connection and outlines networking technologies that place control in users' hands.

A growing international consensus holds that communication is a fundamental human right ([www.un.org/en/documents/udhr/index.shtml](http://www.un.org/en/documents/udhr/index.shtml)). In 2010, United Nations Secretary-General Ban Ki-moon stressed the importance of access to the Internet and information in his remarks to the assembly (see [www.un.org/News/Press/docs/2010/obv875.doc.htm](http://www.un.org/News/Press/docs/2010/obv875.doc.htm)), and last September, ITU Secretary-General Hamadoun I. Touré said, "Broadband is the next tipping point, the next truly transformational technology. It can generate jobs, drive growth and productivity, and underpin long-term economic competitiveness."<sup>1</sup> Additionally, Spain and Finland have elevated broadband access to a legal right (see [www.bbc.co.uk/news/10461048](http://www.bbc.co.uk/news/10461048) and <http://tinyurl.com/3qp54de>), and 20 EU nations along with the US have set goals for universal broadband access ([http://ec.europa.eu/information\\_society/activities/broadband/docs/annex\\_2.pdf](http://ec.europa.eu/information_society/activities/broadband/docs/annex_2.pdf)).

While most commentators and policy makers have focused on the benefits of broadband and Internet connectivity, two significant dilemmas receive less attention. First, the challenges the unconnected face – the "dark side of Metcalfe's law" – have remained less explored. Telecommunications experts Rahul Tongia and Ernest Wilson propose that "the more people included within and enjoying the benefits of a network, the more the costs of exclusion grow exponentially to the excluded."<sup>2</sup>

The second key overlooked facet is that not all connectivity is created equal. Where, how, and what technologies and devices you use to connect to the Internet or broadband will increasingly determine your experience and access to digital opportunities. These two concerns are creating a more nuanced digital divide that manifests itself in terms not only of who has access to broadband and who doesn't but also of what users can actually do with their connectivity. How government policies address these new divides could determine whether the promise of the Internet as a universal communications medium is fulfilled or serves to reinforce existing societal inequities.

### Emerging Digital Inequalities

As each new communications revolution opens the door for greater equality – making information and knowledge more available to many – history documents that availability is insufficient unto itself. Confronting inequalities created by a divide between those who can take advantage of the Internet and those facing barriers is becoming increasingly complex. Whereas two telephone services, for example, could expect to have relatively equal experiences and opportunities, this isn't necessarily the case for broadband access. Rather, depending on the network provider, the broadband connection capabilities, or

the access device, one user might have considerably less freedom and opportunity than the other. These stark differences can create increased disparities in broadband's ability to benefit certain communities and users.

These differences are largely being driven by a worsening trend among communication providers and others to lock down networks, devices, and users. Consequently, we're in danger of losing our access to the technologies underlying today's communications renaissance. The Internet, though predicated on an open, decentralized architecture, is at risk of becoming subject to companies' and governments' command-and-control strategies. IP-based networks once optimized to facilitate open, end-to-end communications are increasingly designed with barriers that limit our right to communicate. In doing so, some network operators, business models, and government policies are fundamentally undermining the very freedom and openness of the Internet that helped create and shape 21st century communications.

Here, we look at some of the less-explored factors of rapidly developing digital divides – ones based not only on access to the Internet but also on how individuals can actually utilize that access. By highlighting the nuanced nature of today's digital exclusion, we hope to draw attention to new forms of discrimination and disempowerment that are becoming hallmarks of the next generation of broadband networking. We suggest real-world alternatives based on fundamentally different networking methodologies – ones that are user-defined and predicated on spreading equal opportunity to learn, innovate, and adapt new communication technologies.

### Defining the Digital Divide

The digital divide has traditionally been defined as a “gap between

people with and without Internet access.”<sup>3</sup> Although universal access is an important measure and a goal of many nations,<sup>4,5</sup> Paul DiMaggio and his colleagues suggest that “understanding of digital inequality requires placing Internet access in a broader theoretical context.”<sup>3</sup> A focus on access alone fails to determine whether all members of a society actually benefit from broadband connectivity. In much the same way that we could argue that 100 percent of US citizens have access to healthcare or education, we know that what really matters are outcomes: many people suffer from poor health because they can't afford appropriate healthcare or fail to graduate as a result of ineffective schools and teachers.

Likewise, the US government claims that “290 million Americans – 95 percent of the US population – live in housing units with access to terrestrial, fixed broadband infrastructure capable of supporting actual download speeds of at least 4 Mbps” (<http://tinyurl.com/3sftqpo>). Yet only 68 percent of all Americans and less than 50 percent of African-Americans and Hispanics actually use broadband at home (<http://tinyurl.com/3p7a6bo>). The rural/urban divide is also quite pronounced, with home broadband use at 60 percent in rural communities compared to 70 percent among urban constituencies.

Broadband adoption differentials around the globe also document this form of digital divide. The Organization for Economic Cooperation and Development (OECD) reports that Denmark leads OECD nations in broadband penetration – that is, subscribers per 100 inhabitants – with a rate of 38. Denmark is followed closely by the Netherlands, Switzerland, and Norway. The US has a penetration rate of 27 and is ranked 14th (before Finland but lagging behind Germany, the UK, Canada, Sweden, France, and Korea among others). Broadband penetration is lower still

in other OECD countries such as Mexico, Chile, and Turkey, where only 10 inhabitants per 100 have broadband subscriptions (see [www.oecd.org/dataoecd/21/35/39574709.xls](http://www.oecd.org/dataoecd/21/35/39574709.xls)). In 2009, the ITU estimated that the average fixed broadband penetration percentage in the developed world is 23 percent. Comparatively, the average penetration in developing countries is only 4 percent. As a whole, home broadband penetration rates worldwide are only 7 percent, although nearly a quarter of the world's citizens are Internet users.<sup>6</sup>

This discrepancy between access and adoption is only part of a considerably more nuanced digital divide. The Investigative Reporting Workshop at American University found that the best values for broadband were in the wealthy areas; poorer areas might pay slightly less but are getting significantly slower broadband speeds.<sup>7</sup> As the Internet has transitioned from dial-up, the minimum capacity requirements of connections necessary to access the full Internet ecosystem has likewise increased substantially. A recent ITU report estimates that a relatively simple webpage today can take 23 seconds to load on a dial-up connection versus half a second on broadband.<sup>8</sup> The divide can be even more pronounced when we factor in the significant discrepancies in advertised versus actual broadband speeds, a differential that can vary dramatically from network to network. For example, regulators in both the US and UK have found that actual speeds are regularly half of what's advertised (see <http://tinyurl.com/3bkbw63> and <http://tinyurl.com/3rhl9dw>).

Even this divide, however, is relatively straightforward compared with the myriad different traffic-management practices that detrimentally affect network users. Several wireline networks in Europe limit different types of traffic over networks, whereas

others have announced plans to charge per connected application. For example, O2 in the UK de-prioritizes video and peer-to-peer (P2P) protocols,<sup>9</sup> a limiting network management practice that Free in France has reportedly employed in some areas as well.<sup>10</sup> BT in the UK blocked access to the website thepiratebay.com before relenting under regulator pressure.<sup>11</sup> PlusNet in the UK sets different levels of speeds to different categories of Internet traffic (see <http://tinyurl.com/3d7drk3>). And KPN, a Dutch service provider, is taking these practices to a new level, announcing plans for differentiated pricing in which “services such as browsing, using mobile VoIP [voice over IP], instant messaging, and watching videos will get their own price tag” (<http://tinyurl.com/3efy9hf>).

These differentiated pricing models are prevalent on most mobile phone networks. Although many users already pay three times for data traffic (for voice, SMS, and a data plan), additional types of data use are beginning to carry their own fees. For example, Orange in France charges 15€ per month for VoIP,<sup>12</sup> and Vodafone and Deutsche Telekom respectively charge 10€ and 9,95€ per month for the service.<sup>13</sup> Telia Sonera in Sweden allows VoIP but only on its most expensive data plans ([www.telia.se/privat/produkter\\_tjanster/mobilt/surfaimobilen/](http://www.telia.se/privat/produkter_tjanster/mobilt/surfaimobilen/)), while SFR in France has blocked VoIP altogether on the iPad (<http://img.telecomix.org/EU/src/127728743242.png>). Additional carriers such as Vodafone in Italy block or degrade P2P traffic (<http://tinyurl.com/oj5a7e>).

Because lower-income subscribers rely more on mobile connectivity than affluent constituencies, these restrictions affect such subscribers most – populations where Internet access is most critical for opening doors to economic, educational, and other opportunities

and where mobile access might be the only connection to the Internet. In the US, for example, Metro PCS offers unlimited “MetroWeb” 4G service coupled with unlimited YouTube, yet blocks other streaming video services and applications such as Skype. Addressing the carrier’s severe limitations, civil rights advocate Malkia Cyril wrote that Metro PCS has been “termed ‘Ghetto PCS’ by many low-income black and Latino subscribers.”<sup>14</sup>

### The Impact of Command-and-Control Networks

Key technological advances are enabling this trend of restricting user freedom on Internet access networks. For example, the IP Multimedia Subsystem (IMS) is a still-evolving feature set being deployed on wireless networks that can designate an earmarked end-to-end channel to different dataflows.<sup>15</sup> Whereas the Internet once permitted users to access any number of applications and services that ran on top of the network, IMS lets a carrier break the Internet into differentiated services such as email or voice traffic and then charge the user for them on an individual basis. Likewise, Deep Packet Inspection (DPI) technologies let a network operator identify and monitor specific kinds of traffic – and both Plusnet and KPN (whose differentiated pricing depends on it) are avid DPI users. Meanwhile, authoritative regimes are using this same DPI technology to monitor and censor Internet communications, as documented by case studies conducted by the OpenNet Initiative (<http://opennet.net>).

In addition, the worldwide popularity of iPhones has further allowed Apple to export its iOS operating system. Because only Apple-approved applications can be officially installed through the iTunes App Store, Apple has significant control over its mobile devices.

Harvard Law professor Jonathan Zittrain warns that iPhones and similar technologies are examples of computing devices devolving into “dumb terminals” – no longer programmable computers but rather appliances with a predefined set of functions.<sup>16</sup> Some devices, such as the HTC G2 phone with Google, resist user modification by storing core software in read-only memory, while the Motorola Droid X contains a chip that can render the device inoperable if the phone detects unauthorized, though legal, software.<sup>16,17</sup>

Stanford Law professor Barbara van Schewick explains that a significant gap exists “between network providers’ private interests and the public interests.”<sup>18</sup> This gap has continued to manifest itself throughout history. As legal scholar Tim Wu writes in his review of information technologies of the past 100 years, “History shows a typical progression of information technologies ... from a freely accessible channel to one strictly controlled by a single corporation or cartel – from open to closed system.”<sup>19</sup> This shift to a more closed system on mobile networks poses significant dilemmas for closing the digital divide because it creates an unequal hierarchy of digital opportunities depending on how an individual accesses the Internet and could lead to fundamentally different Internets for different users.

If carriers and device manufacturers are in a position to determine the functionality of an Internet connection or an Internet-enabled device, efforts to close the digital divide will be negatively affected. As DiMaggio and his colleagues stress, understanding the digital divide requires that we comprehend what benefits users can achieve through their Internet connection.<sup>3</sup> Given current trends, those who can afford to access the Internet through a traditional wireline connection will have a considerable advantage over those who can

afford only a mobile connection. This divide won't be due to speed or price, but rather functionality. As providers add further limitations, such as bandwidth caps, or let users access certain applications only after purchasing higher-cost plans, the promise of the Internet and broadband as a great resource for society's least advantaged will go unfulfilled.

Moreover, the Internet's success as a transformative medium for communications rests on its users' ability to be active participants in its ongoing development. New York University professor Richard Sennett posits that craftsmanship, whether of a new cabinet or a new media, is a "basic human impulse, the desire to do a job well for its own sake."<sup>20</sup> In essence, the ability to localize, improve, question, and explore the tools we use is an important facet of being human. Early Internet adopters, in addition to possessing certain technical skills, were empowered to fundamentally shape the medium. The Internet in many respects reflects their ideas and innovations. These early users, or "Internet craftsmen," were fully empowered to build, improve, and innovate the technology. Yet over the past several years, that level of freedom and opportunity has been systematically erased. Today's networking technologies are continually shifting away from this open and participatory architecture. ISPs are creating ever-increasing barriers to innovation and are more resistant to end-user modifications. Today, ISPs are focusing substantial time and energy to locking down every facet of their networks, designing their systems to prioritize content consumption, and creating barriers to user-driven communications, adaptations, and innovations.

### Bridging the New Digital Divides

While world leaders are recognizing the Internet's importance, current

trends toward command-and-control networks pose a significant challenge for closing the digital divide and empowering all users. Solutions that help solve these problems embrace craftsmanship and participant control over networking technologies. Recent technological advances are already facilitating the development of hybrid networks that can utilize ISP networks when needed but create locally controlled networks that prioritize user-generated communication, applications, and services.

Metcalf's law assumes that a new network participant gains the benefits gleaned from other members. As we're seeing today, however, command-and-control networks sustained by business models based on an all-powerful network operator are bleeding off these networks' exponential benefits. Whereas such companies stand to gain enormous profits by commoditizing every form of communication possible, the inefficiencies these practices cause (in terms of lowered information flow, network congestion over centralized relay points, greatly lessened innovation at network edges, and so on) are coming at edge-users' expense. Better technologies exist that would dramatically lower communication costs, increase adoption rates, and fuel new service and application development, and that are synergistic with pre-existing infrastructure.

For example, using off-the-shelf Wi-Fi routers with upgraded software, mesh networks can facilitate local-to-local communications, letting individuals stream video, share local media, and use VoIP applications (such as Skype) for free phone calls.<sup>21</sup> Current implementations range from covering a few blocks in Detroit, Michigan ([www.newamerica.net/node/34925](http://www.newamerica.net/node/34925)), to covering hundreds of square kilometers in and around Vienna.<sup>22</sup> One recent report describes how in Berlin, "a city that has struggled with depopulation, high unemployment,

and budget deficits since the fall of the Berlin Wall, the community wireless network Freifunk has provided free Internet access to residents who cannot afford commercial services since 2002."<sup>22</sup> P2P networking on mobile handsets creates additional opportunities for edge-user empowerment. In Australia, the Serval Project ([www.servalproject.org](http://www.servalproject.org)) has developed mesh networking for cell phones running Android. Its system lets users make free voice calls through a local network or – by adding Asterisk ([www.asterisk.org](http://www.asterisk.org)) or another VoIP gateway – to almost anywhere in the world (<http://tinyurl.com/4g5cjpg>).

Gnu Radio and the OpenBTS projects are examples of what an empowering alternative to mobile network lockdown might look like. OpenBTS is developing an open source GSM air interface, potentially enabling users everywhere to build their own cell phone networks and provide low-cost or free services.<sup>23</sup> Gnu Radio, a software development toolkit that performs signal processing and lets users develop software radios using cheap hardware, could put adaptive networking technologies into the hands of the masses (see <http://gnuradio.org/redmine/wiki/gnuradio>).

Yet the direction of regulation has been to prevent the rollout of these innovations. Spectrum reforms to allow widespread use of cognitive radio technologies (especially shared and opportunistic spectrum access) have been met with hostility by current and previous US Federal Communications Commissions. Instead, the overarching focus has been on maintaining artificial scarcity through limited spectrum access. As these technologies mature, the gap between technological capabilities and permissible use will increase. Users will have far too limited legal space for communications due to this regulatory stagnation – a process that will

eventually lead to the rise of a generation of electromagnetic jaywalkers.

**T**he changes needed aren't solely in the regulatory space, however. Bridging today's digital divides means understanding that Internet craftsmen are digital literacy crusaders and mentors and that new thinking and innovative technologies are direly needed. Closing the divide means getting rid of antiquated barriers that prevent Internet craftsmen from pursuing outside-the-box thinking, but it also means making it illegal to develop new barriers to tinkering with and extending functionality. Supporting the Internet craftsman doesn't mean every Internet user will become an expert – it means providing the resources and opportunity necessary for anyone to develop innovative infrastructure, new services, and applications, and improve communications to better meet their own needs and that of their community. □

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# Transcending Net Neutrality: Ten Steps Toward an Open Internet

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# Transcending Net Neutrality: Ten Steps Toward an Open Internet

## **Abstract**

The past few years have witnessed a once-obscure issue known as “net neutrality” blow up into arguably the most publicized policy debate in US telecommunications history. An untold story is how this relatively technical debate spilled outside the rarefied airs of Congressional Committees and the Federal Communications Commission’s (FCC’s) eighth floor to rage across the blogosphere, major newspapers, YouTube clips, and episodes of The Daily Show to become, if not a household phrase, a topic of popular debate involving millions of Americans. One explanation is that, at its root, the net neutrality debate is far more significant than a squabble among technocrats. Rather, it is first and foremost a normative debate, one that will determine the role of the Internet in a democratic society, with profound implications for the daily welfare of millions of citizens who rely on the Internet as a critical resource. Unfortunately, it is such normative concerns, along with related political and historical contexts, that have been least explored in much of the net neutrality scholarship to date. This article aims to address these gaps while expanding the parameters of the existing debate.

## **Disciplines**

Internet Law | Law | Science and Technology Policy

# TRANSCENDING NET NEUTRALITY: TEN STEPS TOWARD AN OPEN INTERNET

**Sascha D. Meinrath and Victor W. Pickard**

The past few years have witnessed a once-obscure issue known as “net neutrality” blow up into arguably the most publicized policy debate in US telecommunications history. An untold story is how this relatively technical debate spilled outside the rarefied airs of Congressional Committees and the Federal Communications Commission’s (FCC’s) eighth floor to rage across the blogosphere, major newspapers, YouTube clips, and episodes of *The Daily Show* to become, if not a household phrase, a topic of popular debate involving millions of Americans. One explanation is that, at its root, the net neutrality debate is far more significant than a squabble among technocrats. Rather, it is first and foremost a normative debate, one that will determine the role of the Internet in a democratic society, with profound implications for the daily welfare of millions of citizens who rely on the Internet as a critical resource. Unfortunately, it is such normative concerns, along with related political and historical contexts, that have been least explored in much of the net neutrality scholarship to date. This article aims to address these gaps while expanding the parameters of the existing debate.

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“Network neutrality,” defined broadly, is non-discriminatory interconnectedness among data communication networks that allows users to access the content and to run the services, applications, and devices of their choice. In essence, network neutrality forbids preferential treatment of specific content, services, applications, and devices that can be integrated into the network infrastructure. This principle has been the foundation for rapid innovation and the Internet’s relative openness. As Congress debates whether network neutrality protections should be written into current legislation, the battle lines have been drawn between large telecommunications companies that own the pipes, on one side, and Internet content companies and public interest groups on the other. Although scholarship has begun to catch up with the net neutrality debate, the majority of this work has failed to connect this issue with larger

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### **Transcending Net Neutrality** **Continued from page 1**

ramifications that arise while striving toward a democratic Internet.

In this article, we attempt to broaden the net neutrality debate while briefly taking stock of recent scholarship. In doing so, we critically evaluate the current network neutrality debate and offer a set of technical and policy guidelines for a new, more broadly defined open Internet.<sup>1</sup> Specifically, we submit that beyond redefining network neutrality, we must connect issues usually dealt with separately—issues that are actually a subset of one overarching concern: the struggle for a democratic Internet. We conclude with an exploration of the social and political impacts of this broader conception of network neutrality. These recommendations, we argue, provide a proactive foundation for creating a more open and participatory Internet. This project builds upon an earlier formulation that we referred to as the “New Network Neutrality.”

## **WHY NET NEUTRALITY MATTERS**

Network neutrality helps ensure that telecommunication infrastructures remain “dumb,” delivering content and services equally in a best-effort manner that treats data/content delivery equitably. This best effort entails packets being delivered in a first-in first-out method at the maximum speed possible given network constraints. Under a framework of network neutrality, network operators do not decide what content users can access and cannot impede the flow of or give preferential treatment to particular kinds of content. The loss of network neutrality provisions, in effect, removes a crucial safeguard and increases the likelihood of a discriminatory telecommunications system.

A largely straightforward question of how the network will be operated has been rendered unnecessarily opaque by some of the actors in these debates. In particular, public relations representatives of the phone and cable companies who stand to gain the most from an Internet stripped of net neutrality protections devoted considerable resources toward averting consensus while maintaining a façade of a debate over democratic requirements for an open Internet. Some industry-funded “astro turf” groups have recast the debate as one over government regulation. Christopher Wolf, Co-Chair of HandsOff.org, claimed that “There is no established definition for the concept of ‘net neutrality’” and that “Such government control over the evolution of the Internet is unprecedented.”<sup>2</sup> Similarly, former Congressman Dick Armey’s organization FreedomWorks advocates for such a *laissez faire* regulatory approach.<sup>3</sup> Many of these claims against regulation ignore

the fact that the federal government developed, funded, and directly managed the Internet for more than a quarter of a century (until US officials handed over network control to the private sector in the mid-1990s), and continues to actively regulate and subsidize the Internet. Moreover, many of these self-defined anti-regulation organizations appear oddly complacent toward heavy-handed private control over the Internet.

While groups like HandsOff seem driven by a categorical opposition against all governmental interventions, public interest advocates, on the other hand, tend to stress openness as their main concerns. Many groups and individuals within the “Internet freedom” coalition have sought net neutrality as an end in itself, while others have cautioned that net neutrality does not fully restore common carriage and should not be seen as a silver bullet. Josh Breitbart makes the important point that net neutrality is actually a retreat from earlier ideas such as open access and common carriage, which were US law prior to *Brand X*:

Net neutrality is actually a retreat from “open access,” which is what we had before the Supreme Court’s *Brand X* decision. Open access applied to the Internet when we were using dial-up and it was classified as a “telecommunications service” like the telephone. With the telephone, that means owners of the lines can’t prioritize their customers’ calls over those of their competitors’ (net neutrality or, as it’s known in the phone world, “common carrier”), but it also means they have to lease their lines to other phone service providers (open access). Open access is how you can have real competition without having a dozen different wires running under your street, through your backyard, and into your house.<sup>4</sup>

As Breitbart suggests, network neutrality is inextricably linked to principles of “common carriage,” a bedrock principle of telecommunications policy for nearly 100 years that mandated non-discriminatory service.<sup>5</sup>

Making sense of what is at stake in current net neutrality debates requires examining key antecedents in telecommunications history. In the following section, we examine the historical context and the current parameters of the debate. This historical context, we argue, is necessary to begin imagining alternative trajectories for internet policy.

## **HISTORICAL OVERVIEW**

Prior to common carriage laws, telecommunication operators were able to abuse their market position. During the Civil War, Western Union controlled telegraph trunk

lines across the country and gradually achieved near monopolistic dominance by buying up competing companies and actively undercutting congressional and popular support for constructing a rival postal telegraph system. As its network expanded in the 20th century, Western Union focused on serving business clients while pricing potential competitors out of specific geographic markets and ignoring social obligations, such as universal service. Based on Western Union's business model and the larger political and regulatory environment, there was little incentive to create innovations that could have made access affordable for average citizens. With the rise of telephony and early build out of telephone networks during the early 20th century, public service protections were introduced into the telecommunications regulatory structure, including common carriage.

For decades, telephone network operators were considered "natural monopolies." The biggest monopoly (and largest corporation in the world) was the American Telegraph and Telephone Company, which, until its forced 1984 breakup into the "baby bells," dominated the telecommunications industry. Given its monopoly privileges, it was mandated as a basic public service that AT&T could not discriminate against other carriers using its lines. Leading up to the Modified Final Judgment that broke up the Bell system, Judge Harold Green in 1982 maintained that phone companies should not sell information. At the time, former FCC commissioner Nicholas Johnson argued that allowing phone companies to provide both conduit and content would hurt both businesses and consumers instead of providing the "channels of communication for a democratic society." Johnson argued that the phone companies' drive to get into the information selling business was the "No. 1 public policy issue confronting our nation." Arguing that they already profit from both ends of the process, he worried that telecom providers "charge us for getting information out of the system and they charge the supplier for putting it in."<sup>6</sup> Commissioner Johnson's fears became even more warranted after the 1984 Cable Act and the 1996 Telecommunications Act, which, respectively, allowed cable to remain a closed system and to become an Internet service provider.

The Telecommunications Act of 1996 was the first major overhaul of the landmark 1934 Communications Act and the first comprehensive attempt to reform US media policy for the digital era. This complex and far-reaching legislation replaced structural regulation with market incentives for telephony, radio, broadcast television, cable television, and satellite communications. Hailed as an effort to unshackle market forces and sold with the promise that deregulation leads to enhanced competition, the bill has instead led to unprecedented

telecommunications conglomeration, lessened consumer protections, and decreased ownership diversity. However, taking for granted the historical importance of common carriage in curbing market excesses, even the deregulatory thrust of the 1996 Telecom Act left the principles of non-discrimination intact.

This changed with the June 27, 2005, Supreme Court *Brand X* decision and subsequent August 5, 2005, FCC decision to "deregulate" carriage. Culminating after a long legal fight between cable companies (like Comcast and Time Warner) and independent ISPs (like Earthlink and Brand X) over whether cable operators should be required to sell access to their networks to potential broadband service provision competitors, the *Brand X* decision was significant for essentially deregulating broadband. The Supreme Court's 6-3 decision favored the National Cable and Telecommunications Association (NCTA), the principal trade association of the cable television industry, by overturning an earlier appellate court decision and affirming the FCC classification that cable broadband was an "information service" instead of a "telecommunications service," thus exempting cable companies from common carriage laws.

This seemingly minor turn of phrase meant that cable providers did not have to share their infrastructure with competitors. Together with the subsequent FCC decision to extend this exemption to phone companies (ostensibly to provide a level playing field among market players), this court decision removed safeguards and created the potential for access restrictions to non-preferred content. Many public interest advocates pointed out how this decision countered 100 years of telecom policy and risked changing the open and non-discriminatory nature of the Internet while creating a new class of potential gatekeepers.

## MONOPOLY POWER AND CONTENT DISCRIMINATION

The history of content control goes back centuries and bears mentioning given parallels to the outcomes that network neutrality advocates fear today, particularly when looking at the history of the US postal system. For example, analogies can be seen with the abortive attempt in the early 1790s to admit only certain newspapers into the mail. Congress rejected this policy when it enacted the Post Office Act of 1792, which put into law principles of non-discrimination. However, content restrictions persisted, such as postal administrators blocking the dissemination of books via mail, which they argued were too bulky, and southerners after 1835 blocking the circulation of information on slavery.<sup>7</sup> Although varying degrees of content discrimination have persisted, in general the opportunity

for anyone to send anything anywhere without constraint or discrimination was a fundamental assumption of this early US communications system. Alexis de Tocqueville, who credited newspapers and other information delivered via the post as greatly responsible for America's thriving democratic culture, praised the US system.<sup>8</sup>

This openness was periodically challenged, particularly by the monopolistic telegraph industry, which abused its market power. Paul Starr notes historical parallels with contemporary telecommunications marketplaces in which incumbents dominate networks to exploit their existing position rather than innovate and spend little money on research and development, often investing more in politics than in technology. Similar market conditions exist today. Once again, first-mile telecommunications are heading toward near-monopoly status. This time, however, a crucial safeguard is missing; the Internet is no longer classified as a telecom service and is at risk in being transformed into a cable television business model.<sup>9</sup>

Despite network operators assurances to the contrary, over the past several years there have been ominous glimpses of what a non-neutral network might look like. In 2004, North Carolina ISP Madison River blocked DSL customers from using its rival's (Vonage) VOIP telephony services. In 2005, the Canadian telecom corporation, Telus, blocked users from accessing a pro-union Web site during a labor dispute. In 2006, AOL Time Warner blocked a mass email campaign from its customers that opposed AOL's proposed tiered email system. In 2007, AT&T apparently censored a Webcast of the rock band Pearl Jam's anti-Bush political commentary. Also in 2007, Verizon was found blocking the pro-choice organization NARAL's text messages. In 2008, Bell Canada was caught throttling third-party DSL providers' P2P traffic. Perhaps best exemplifying the potential for abusing net neutrality has been Comcast, whose practices of blocking traffic associated with Bit Torrent, a peer-to-peer file-sharing system, were exposed in 2007. These are just a few of the more egregious infractions against net neutrality.

## PREVIOUS LITERATURE

Three waves of scholarship addressing the net neutrality debate can be discerned thus far. Although anticipated by earlier debates, the first phase was marked by Timothy Wu's initial formulation of "network neutrality" in his seminal 2003 work, *Network Neutrality, Broadband Discrimination*, where he forwarded the idea that network architectures should be neutral purveyors of data.<sup>10</sup> The debate simmered among a relatively small group of commentators until the Supreme Court's pivotal *Brand X* decision, which catapulted net neutrality to a new level of

urgency as the prospects of tiered Internet services paralleling a cable television business model became a distinct reality.<sup>11</sup>

The *Brand X* decision ushered in a second wave of scholarship that was remarkably cautious given the stakes involved. For example, Eli Noam has suggested a "Third Way" for net neutrality limited to "Last Mile" concerns.<sup>12</sup> Christian Sandvig was quick to discount some arguments posed by network neutrality advocates, suggesting that many aspects of net neutrality smacks of an old debate, evidenced by principles laid out by Ithiel de Sola Pool decades earlier. Noting that network neutrality has never been the norm given that all Internet providers have discriminated against certain types of content to some extent, Sandvig called for establishing a set of normative guidelines to distinguish acceptable types of traffic shaping.<sup>13</sup> Less common in this second wave were articles that staked out a position boldly calling for mandated net neutrality.<sup>14</sup>

Currently, we have reached a new phase of the debate, one that places net neutrality provisions in a state of uncertainty. Although prospects seem less dire than when we began working on this issue in 2005-2006, net neutrality protections are still not codified into law. However, even as scholarship has become less complacent toward the loss of net neutrality, we submit that now is precisely the moment that we should be aiming beyond mandated net neutrality for more encompassing safeguards to ensure an open Internet. Much of the existing scholarship and commentary fails to sufficiently emphasize the import of normative principles—principles regarding the role of the Internet in a democratic society and the debt that Internet providers owe to the public. When considering the fact that the four Bell companies earn roughly \$14 billion every year from access to Internet content and applications in addition to \$20 billion a year in direct access fees from broadband Internet subscribers and when taken in the context of the enormous tax subsidies and other benefits that telecom corporations receive from public entities, this debate should focus more on the social contract between telecom network operators and the public. These kinds of social contract debates often present themselves during critical junctures and periods of media crisis.<sup>15</sup> The fact that network neutrality is a normative principle is far too often overlooked. Industry attempts to reframe the debate, growing technological complexity, and shifting allegiances among competing actors artificially sunder democratic Internet principles that should be considered together.<sup>16</sup>

Contrary to these general trends lies a neglected tradition located in scholarship that addresses more normative concerns like open architecture, open access, and online

ethics.<sup>17</sup> Wu offers a short list of network neutrality rules that would prohibit carriers from discriminating content. Similarly, Benkler's *Wealth of Networks* advocates for a commons-based policy orientation. Along with Lessig and others, this approach is aligned with the notion of Cooper's "open architecture."<sup>18</sup> Drawing from the research of Yochai Benkler, Mark Cooper, Lawrence Lessig, Tim Wu, and others, we envision a more open and participatory Internet. Frequently referred to as a commons-based approach to the management of communications systems, this model emphasizes cooperation and innovation as opposed to privatization and enclosure. Given that all technology is inscribed with social values that foreclose certain possibilities while encouraging others, emphasizing these linkages illuminates what is at stake with network neutrality and situates this debate within a larger vision of Internet openness. We sit at a critical juncture for Internet policy; opportunities now abound that soon will disappear.

## CURRENT STATE OF AFFAIRS

While net neutrality helps prevent many of the worst market excesses, it does little to ameliorate some of the systemic problems that necessitate it. Media conglomeration and the attendant lack of diversity of ownership and perspectives provide one focal point for discussing network neutrality.<sup>19</sup> From the reemergence of telecommunications giant AT&T to current efforts by FCC Chairman Kevin Martin to relax media ownership restrictions, fewer players are gaining massive market share, creating increasingly vertically and horizontally integrated corporations with the potential to dominate entire market sectors.<sup>20</sup> By many measures, the current FCC regulatory environment fails to spur technological innovation and has retarded expansion of digital inclusion efforts.<sup>21</sup> Instead, the FCC has fostered a decades-long market environment fraught with pricing and geographical discrimination as well as overpriced, substandard telecommunications services.<sup>22</sup>

Exacerbating difficulties in these crucial media policy areas are state and national telecommunications laws that slow innovation and competition in broadband services, thus creating an environment of digital exclusion. To date, more than a dozen states have passed laws that in some way limit competition and prevent innovation in business models, public investment, and public-private partnerships.<sup>23</sup> At the national level, everything from local control over local rights-of-way to consumer protections would be undermined by pending legislation.

While yesteryear's newspapers and today's Internet are quite different media, their social functionality

within civil society is remarkably similar. Whereas the unrestricted transport of newspapers via the postal service has long been protected and subsidized, today ISPs are proposing to have discriminatory power over social networking applications that use their networks. Using the postal service, anyone can send packets first-class, second-class, third-class, parcel post, overnight, etc. However, when one sends a packet, it will be handled in a first-in-first-out manner within the chosen service without regard to the type of packet being sent. Likewise, network neutrality incorporates strong civil rights protections simply by mandating a neutral and non-reactive transport medium.

A related issue underlies concerns over surveillance. Recent endeavors to surveil network traffic encroach upon users' rights to privacy, creating a panoptic environment that undermines civil society, creativity, and public dialogue. Current law enforcement efforts should err on the side of maintaining network neutrality, yet often mandate data collection of user information that demonstrates both a lack of understanding of the current state of technology and, in actuality, undermines long-term law-enforcement goals (as discussed later in this article). The Communications Aid to Law Enforcement Act (CALEA) is just one example of significant risks posed to Internet freedom and, ironically, long-term law enforcement.

## ABUSE OF MONOPOLY MARKET POWER

The rise of telephony over the past century suggests that our current path has been tried before. As Paul Starr writes in *The Creation of the Media*, "From 1894 until 1907. . . the market broke open with a surge of independent commercial and nonprofit cooperative telephone enterprises."<sup>24</sup> AT&T and the Bell system, however, as the primary owner of telephone long-distance service, often refused to interconnect these "independent commercial and nonprofit cooperative enterprises" wherever they were in competition for local phone customers. Instead, AT&T used its long-distance monopoly to open 3,500 new exchanges in smaller communities of less than 10,000 people between 1894 and 1907. As Starr sums up:

The Bell-independent rivalry at the turn of the century led to the same breakneck extension of networks that had characterized the early telegraph industry around 1850. . . prices for telephone service fell sharply. Independent phone companies generally offered lower rates than Bell, and though Bell cut its rates everywhere, they were lower where it faced a rival.<sup>25</sup>

At least until the 1913 Kingsbury Agreement, AT&T interconnected with “Independents” when it suited its needs; however, it preferred to buy out or quash these competitors. Today, in the wake of *Brand X*, a market and regulatory environment has been recreated that eliminates independent companies and allows backhaul owners to engage in similar anti-competitive practices.

In 1907, AT&T’s new president, Theodore Vail, publicly declared that telephone service should be, in essence, a unified, interoperable, neutral network. AT&T, through the judicious use of governmental regulation—for which AT&T often directly lobbied—was able to create a national interconnected telephone network and grow its market share dramatically during the first three decades of the 20th century (to 66 percent in 1920 and 81 percent in 1932), crushing the “home rule” telephone movement, thus ensuring decades of market dominance until the 1984 divestiture. The public statements of today’s telecommunications leaders are explicitly interested in devising ways to close off their networks, maximize their billable minutes, and create new avenues for extracting additional fees for service quality, non-interference, and non-discrimination. This sensibility is best exemplified by AT&T and statements made by its CEO, Ed Whitacre:

I think the content providers should be paying for the use of the network—obviously not the piece from the customer to the network, which has already been paid for by the customer in Internet access fees—but for accessing the so-called Internet cloud . . . If someone wants to transmit a high quality service with no interruptions and ‘guaranteed this, guaranteed that’, they should be willing to pay for that . . . They shouldn’t get on and expect a free ride.<sup>26</sup>

An important lesson is that AT&T gained its prominence not by any superior business model alone, but through governmental regulation, predatory pricing, buying up competition, centralizing network control, and a dedication to creating *and controlling* a nationally interconnected network. Today, in much the same way it undermined the “home rule” telephone movement 100 years ago, AT&T is again attempting to leverage its network ownership—this time targeting not only telephone services but also all Internet-mediated communications, including data services, streaming audio and video, and television.

## FCC REGULATORY ENVIRONMENT

Network neutrality protections treat the question of access as a critical element in determining whether a

network is being operated in an open manner. Bottlenecks to network access undermine the types of services offered, create artificial scarcity, and lead to increased pricing and lowered quality of service. This is exemplified by current national policy surrounding the licensure of the public airwaves.<sup>27</sup> Well more than 99 percent of the public airwaves are either reserved for governmental use or licensed to private companies.<sup>28</sup> Even though the tiny sliver of so-called unlicensed frequencies has generated enormous economic activity and innovation, everything from WiFi devices to baby monitors, radio phones, garage-door openers, and microwave ovens coexist within these rare frequencies.<sup>29</sup>

The FCC has continued to privilege a model for licensure that allows only a single entity to broadcast on a given swath of spectrum, often at a specific power level and geographic location. While digital technologies have radically transformed almost every aspect of current society, our licensure regime is predicated on use of the public airwaves as if we were still using 1920s and ’30s technologies. Whether one looks at the debate over low-power FM radio licensure, interference temperature, or unlicensed devices in unused television broadcast bands, the story is invariably the same: Incumbent interests already invested in licensed frequencies seek to prevent competition by maintaining the licensure status quo and thereby dramatically slowing down change or stopping it altogether.

Given the accumulating evidence for broadband connectivity’s importance for economic development, purposefully limiting access to the necessary tools to build data communications networks is a disservice to the general populace.<sup>30</sup> Today, most wireless broadband providers are forced to use only a handful of unlicensed frequencies, creating a scarcity of capacity in dense urban areas. Meanwhile, rural areas are often completely neglected by broadband providers. Opening up large swaths of unlicensed frequencies would not only help meet current demand but also provide ample spectrum for future technologies such as cognitive and software defined radios. Yet proceedings to open up additional bands such as 3650-3700MHz or to open up bands to more users and unlicensed devices in unused 700MHz television broadcast frequencies continue to stagnate.

These same problems exist with other telecommunications media. Classical economics dictate that a glut of supply should lower pricing. However, US broadband pricing remains exceptionally high despite the open secret that a majority of fiber infrastructure in the United States is “dark” and remains underused. Information on where this dark fiber exists and how much is available is considered a “trade secret.” In his book *Broadbandits: Inside*

the \$750 Billion Telecom Heist, Om Malik discusses the enormous infrastructure overbuild of the late 1990s.<sup>31</sup> The reverberating effects from this \$750 billion market failure are still hindering US broadband development today. Meanwhile, the FCC has in many cases systematically removed the few remaining checks and balances protecting US residents from corporate malfeasance and market excesses.

## US BROADBAND PENETRATION RATES

Numerous states have passed laws restricting municipal entry into broadband service provision. Prior to 2005, 14 states created barriers to municipal broadband service provision, which ranged from outright bans on public utility districts providing retail telecommunications services to taxes on telecommunications services provided by public entities (but not private providers) to increase their prices.<sup>32</sup> In response to direct lobbying by telecommunications incumbents, more than a dozen states have passed regulations restricting competition in this market sector.<sup>33</sup> As the city of New Orleans discovered during Hurricane Katrina, these state laws often force municipal entities to spend crucial resources on making their networks worse.

Stagnation of US broadband penetration rates relative to a growing number of industrialized nations is due to the combination of the aforementioned factors. While the nation continues to lag further behind, this suboptimal state of affairs is continually worsened by official comments, reports, and protocols that purposefully confuse the issue and hide the extent of the problem.<sup>34</sup> For example, on July 26, 2006, the FCC released its most recent figures on “high-speed services for Internet access.” In previous years, the FCC had been lambasted for stating that 99 percent of the population had access to broadband services. Numerous experts provided feedback on how the data collected by the FCC could be improved so that its report would provide more useful information, such as collect information based on census track, disaggregate satellite and other services, and make explicit the speeds of the services provided.<sup>35</sup> Yet, the 2006 report does almost nothing to address the fundamental concerns raised. Instead, the FCC chose to wordsmith a “solution” that ignored the requested feedback, leaving many issues without redress: the inadequacy of the official definition for “broadband” as 200kbps in a single direction; the severe limitations of satellite as a medium for broadband service provision (in particular, speed limitations and latency, which severely limit its utility for streaming, VoIP, and other live services); and the lack of usefully disaggregated data. By systematically suppressing competition and erecting

numerous barriers to entry, the FCC and telecom incumbents have created an environment whereby substandard and exorbitantly priced broadband service provision has become the norm.

## TOWARD AN OPEN INTERNET

We synthesize existing commons-based models to create a more expansive standard of network neutrality conducive to Internet openness—a model that runs counter to US phone and cable companies’ plans and challenges the overly narrow parameters of current public interest arguments. Discussion among pro-and anti-network neutrality camps often centers on the debate over quality of services, bundling of services, and interconnection of networks. At its core, the question is whether the Internet should use an end-to-end infrastructure consisting of a dumb network or whether a centralized infrastructure should be used to inspect and shape network traffic based upon its content, origin, and/or destination; thus, supporters of smart networks are often aligned with the anti-network neutrality camp.<sup>36</sup>

Fundamental to smart networks is the idea that higher latency is not conducive to some services and applications. Thus, for example, VoIP (Voice over Internet Protocol is packet-based telephony, a replacement phone service) or streaming HDTV (High Definition TV) both require low-latency and low-jitter throughput to be useful, whereas file transfers like Web surfing and email tend to be relatively latency-agnostic and jitter-insensitive. An ideal smart network would be able to distinguish services and applications requiring low-latency and prioritize these network uses. The flip side is that low-priority network uses would find their latency increasing once low-latency prioritization took place. A corollary of this phenomenon is that latency is mainly an issue of network capacity; with adequate capacity, packet prioritization becomes a moot point. Thus, smart networks have the potential to create a *disincentive* for system-wide capacity upgrades.

For example, within Ethernet systems, network neutrality might be circumvented through the use of the 3-bit-wide “Precedence” section of the 8-bit “Type of Service” field along with the existing 3-bit delay, throughput, and reliability quality of service parameters. Precedence is, for the most part, rarely used across most public network infrastructure (though it is more prevalent within private networks). While originally conceptualized as a mechanism for determining the prioritization of traffic based on its import to network control (e.g., routine, priority, immediate, flash, flash override, CRITIC/ECP, Internetwork control, network control), it could also be

used to discriminate content based upon purchase of premium, high-speed, or tiered services.

Additional complexity arises in the administration of a packet-prioritizing network since this would necessarily involve some form of packet inspection (*i.e.*, to identify what type of packet is being sent and its prioritization level). Once system-wide prioritization levels are in place, an incentive exists to create software to “disguise” data as a higher priority form in order to speed its delivery. Thus, a user might “hide” instant messaging data by using a program that makes it appear to the network routers that these data are VoIP packets; someone downloading MP3 files might use an application that makes these data appear to be a streaming audio file. Network providers, knowing that this outcome is inevitable, would, in turn, need to do a deeper packet inspection, further slowing network capacity as router CPU time is used to ensure that each packet is correctly identified. A non-neutral network would create incentives for non-high-speed content providers to use high-speed content provision proxies to deliver content, creating an entire market dedicated to concealment of data-location and counter-measures to prevent these initiatives by network owners and those paying premium rates to avoid content discrimination. Thus, without network neutrality, a data-obfuscation arms race would certainly develop spanning all aspects of the network’s infrastructure.

## EXPANDING THE DEBATE

In our view, the ways in which network neutrality has been defined, with an emphasis on non-discriminating wires and common carriage, are too limited in their scope. Network neutrality advocates have been reacting to the actions of incumbents and their lobbyists instead of formulating more proactive next steps. Using the current national conversation as a springboard, we propose a far more encompassing perspective to help ensure network neutrality, one that we believe will better enable the Internet to reach its democratic and participatory potentials. Our recommendations go beyond questions of open access to consider the broader contours of Internet architecture, including software, hardware, wireless/broadband infrastructure, ownership, economics, and open protocols and standards.

Our model for an open Internet contains 10 facets that are necessary to ensure an interoperable, interconnected, non-discriminatory, global Internet. We assume that competition is vital at all layers of Internet operations. Without this competition, market capture through path dependency—a situation inherently detrimental to innovation and the best interests of network participants—tends to arise. While aspects of this analysis map onto the Open Systems Interconnection (OSI) Reference Model, we also

incorporate factors that help ensure a politically neutral transport medium as well. In other words, “neutrality” is not just a technical specification; it also facilitates a social contract that supports equity and justice through data communications. Given the shortcomings of traditional neutral networking conceptualizations, this approach envisions a more democratic network infrastructure that:

1. Requires common carriage
2. Supports open architecture and open source driver development
3. Maintains open protocols and open standards
4. Facilitates an end-to-end architecture (*i.e.*, is based upon a “dumb network”)
5. Safeguards privacy (*e.g.*, no back doors, deep packet inspection, etc.)
6. Fosters application-neutrality
7. Mandates low-latency and first-in/first-out (*i.e.*, requires adequate capacity)
8. Ensures interoperability
9. Remains business-model neutral.
10. Is governed by its users (*i.e.*, is internationally representative and non-Amerocentric)

The following provides an initial skeleton for what these 10 facets would entail; however, this is only a first step toward achieving full implementation. Substantial work is still required to flesh out these ideas.

### RECOMMENDATION 1: REQUIRES COMMON CARRIAGE

Common carriage ensures that network operators lease their lines to all potential market players, including municipalities, at market (wholesale) rates. Ideally, this would include universal service provisions and service level agreements. As has been seen repeatedly throughout the history of transportation and telecommunications, common carriage protects the general public against price and geographic discrimination and other anti-competitive business practices. Since 2000, the number of Internet service providers has nearly halved (from 8,450 in 2001 to 4,417 in 2005). With the demise of common carriage provisions resulting from the *Brand X* Supreme Court decision, this number will continue to decrease.

### RECOMMENDATION 2: SUPPORTS OPEN ARCHITECTURE AND OPEN SOURCE DRIVER DEVELOPMENT

Open architecture and open source driver development encourage a digital commons by keeping both the

hardware itself and any hardware access layer(s) open. As the open source movement gains ground (especially internationally) and hardware prices have plummeted, new business models have arisen to promulgate market capture and path dependence, creating potentials for secondary network closure.<sup>37</sup> Open architectures and access layers help promote competition by creating opportunities for new market entrants and rapid innovation of features and functionality.

### **RECOMMENDATION 3: MAINTAINS OPEN PROTOCOLS AND OPEN STANDARDS**

Maintaining open protocols and standards helps ensure free-flowing, non-enclosed Internet services. This, in turn, facilitates innovation and widespread adoption of technologies. With the growing pull toward proprietary networking (especially within the wireless medium), it is vitally important to prevent the so-called Balkanization of the Internet. Protocols and standards are the building blocks for everything from interoperability to end-to-end connectivity.

### **RECOMMENDATION 4: SUPPORTS AN END-TO-END ARCHITECTURE**

End-to-end architectures (E2E) help remove vulnerabilities to bottlenecks, gate-keeping, illegal surveillance by telcos, etc. E2E helps speed network throughput and increases network capacity while lowering network equipment costs and supporting peer-to-peer communications. An end-to-end architecture helps prevent both governmental and corporate interference in network traffic, an outcome that is especially important at a time when surveillance and digital rights management concerns are increasingly prevalent.

### **RECOMMENDATION 5: SAFEGUARDS PRIVACY**

Private networks do not privilege state security imperatives that compromise individual privacy rights and help ensure a non-discriminatory environment for content access and information dissemination. Private networking is essential since back doors and other devices introduce both enormous security holes as well as increased impetus for development and widespread adoption of privacy software that hampers, over the long-term, legitimate law enforcement efforts. Privacy is also essential for ensuring the continued expansion of online business.<sup>38</sup>

### **RECOMMENDATION 6: FOSTERS APPLICATION-NEUTRALITY**

With application neutrality, Internet television, VoIP, and diverse operating systems and services run unimpeded. Expected convergences in digital communications make this principle increasingly crucial to the long-term growth and health of the Internet. Digital Rights Management (DRM) considerations such as copy-right also make this a critical facet for a more open Internet. In much the same way that telephone systems are neutral transport mediums for voice communications, the Internet must remain free from discriminatory practices that privilege some applications, services, or features over others.

### **RECOMMENDATION 7: MANDATES LOW-LATENCY AND FIRST-IN/FIRST-OUT**

Low-latency and first-in/first-out helps remove the impetus for data packet and application discrimination by requiring that a service provider's profit margins adhere to the fundamental basic corporate responsibility to provide adequate services to its customers. These mandates help lower over-subscription rates, artificial scarcity, and the hoarding of dark fiber assets by mandating adequate capacity and providing incentive for network and capacity upgrades.

### **RECOMMENDATION 8: ENSURES INTEROPERABILITY**

Interoperability harmonizes different systems and integrates foreign attachments. This is especially important to the continued global expansion of broadband service provision. As Cooper points out, interoperability lowers costs while increasing the collaborative potential of the Internet. Interoperability is critical to ensuring that the 80 percent of humanity who are not currently online will be able to interconnect with next generation telecommunications infrastructures.

### **RECOMMENDATION 9: REMAINS BUSINESS-MODEL NEUTRAL**

A business-model-neutral infrastructure allows for public players such as municipalities and non-profits, as well as public-private partnerships and private corporations, to provide Internet services. Too often, competition is lessened, and the options for consumers to receive broadband services artificially limited, by shortsighted rules, regulations, and laws. A neutral

network cannot exist when limited to specific business models.

## RECOMMENDATION 10: IS GOVERNED BY ITS USERS

We recommend replacing and/or dramatically expanding control over important governance institutions like ICANN in a way that internationalizes control over such a vital global resource. The current US-controlled ICANN model is unsustainable over the long term.<sup>39</sup> Expanding governance would also help remove artificial scarcity and hoarding of IPv4 addresses. As Milton Mueller and others have documented, control over global communications networks and the Internet, in particular, has remained Amerocentric.<sup>40</sup> Moreover, purportedly representative bodies like ICANN and the Regional Internet Registries (RIRs) often appear to privilege industry interests.

## CONCLUSION

We submit that the implementation of these 10 principles will create a more participatory Internet. On a fundamental level, an open system is key to network growth and innovation. We acknowledge that our model does not address all material inequities, such as digital divide and lack of universal service issues, which, to be sufficiently remedied, require a redistribution of critical resources. Nor do we tackle some issues related to copyright, surveillance, and other contemporary political battles. However, our recommendations, if enacted, could improve the global deficit in Internet connectivity and help propel the United States toward its goals of universal, affordable broadband. These principles could help establish normative parameters to guide policy makers, both national and global, in their quest to create a better Internet. Ideally, these principles will be presented as a broadband democracy manifesto to be endorsed by members of Congress, state legislatures, and political candidates. Although piecemeal efforts are better than no movement at all, only if approached in tandem will these steps constitute a model for the Internet that is simultaneously open, democratic, and efficient.

## NOTES

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**Testimony of the  
Pennsylvania State Education Association (PSEA)**

**Public Hearing Regarding  
Net Neutrality**

**Presented to the  
House and Senate Democratic Policy Committees  
March 29, 2021**

**By  
Hollie Woodard  
English Teacher and Technology Coach  
Council Rock School District**

Good morning, Senator Cappelletti, Representative Fiedler, and members of the House and Senate Democratic Policy Committees. Thank you for holding today’s important hearing on digital equity. Additionally, let me express my appreciation to Chairman Bizzarro and Chairwoman Muth for inviting me to testify this morning.

My name is Hollie Woodard. I am a high school English teacher and technology coach from the Council Rock School District, and today I am representing the Pennsylvania State Education Association (PSEA). I have a master’s degree in Information Technology and helped to build a virtual program in our district eight years ago -- long before distance learning became a popular topic of conversation. Additionally, I serve as the Advocacy Chair for PAECT (Pennsylvania Association for Educational Communications and Technology), as a member of the Pennsylvania Teacher Advisory Committee, as founder of the Dyslexia Teacher Taskforce, and as a Keystone Technology Innovator. I am also proud to state that I am a 2022 finalist for Pennsylvania Teacher of the Year.

Imagine telling the NFL, in the middle of their season, that they must complete the rest of their season in a swimming pool. That’s what happened to teachers last March when public schools were physically shut down and the 2019-2020 school year continued on a virtual basis as a result of dangers associated with COVID-19. In theory, changing the setting of education should not have that big of an impact; however, if you view the change through the lens of an NFL player trying to adapt to playing in water, you might be able to get a sense of the overwhelming adjustment teachers had to make within the last year in shifting from face-to-face instruction to remote learning. Technically it was still instruction, but now it had to be done from cyberspace -- something most teachers had no experience with prior to 2020.

When assessing digital equity, there are three factors to consider:

1. Access to devices other than a cell phone;
2. Access to high-speed broadband internet or Wi-Fi; and
3. Properly trained teachers.

When the doors to my school closed on March 13, 2020, my district was poised for the challenge because of our access. As one of the wealthiest districts in the state, all students and staff had access to devices on day one and we were able to provide a device to any student who needed one. In addition, because of our geographical location between two major cities, Philadelphia and Trenton, our families had access to Wi-Fi. With these two things covered, the focus of our district primarily became providing students with access to properly trained teachers.

Unfortunately, many public schools weren’t as prepared as Council Rock on March 13, 2020 to respond immediately and seamlessly to the remote learning challenges presented by the pandemic.

- Underfunded schools in low-income areas, both rural and urban, did not have access to devices and could not provide students the basic tools they needed to learn in a virtual setting.
- Access to Wi-Fi or high-speed broadband internet became the burden of the family to provide. There were students who were denied instruction because their families lacked the economic or geographical means to access consistent Wi-Fi necessary to engage in online learning.
- Schools had not yet engaged in a professional development strategy to properly train all educators for virtual instruction.

Today, as the 2020-2021 school year draws to a close and the hope for a return to in-person instruction seems like a possibility, it is important to heed the lessons we learned from the past year and prioritize digital equity from a statewide policy perspective. In fact, I would argue that the need is far greater than it was before the pandemic. The pandemic showed us what many involved in information technology suspected but couldn't definitively prove. It exposed many deficiencies and our collective lack of preparedness as an education system. To ignore what we learned over the past year or to fail to adopt a statewide plan to fix those deficiencies would be a grave disservice to students, educators, and taxpayers.

Pandemic teaching and learning will result in learning deficits, as even the best trained teachers in the most prepared districts were not able to cover the anticipated course frameworks because of the constant changes in setting that occurred this year. Anecdotally, my students and I experienced the following instructional models over the past year:

1. A total school shutdown;
2. Asynchronous full virtual learning;
3. Full synchronous virtual learning;
4. Hybrid group rotation with live streaming; and
5. Full in-person learning with a shortened lunch-free schedule and a live stream component.

With each change to the learning environment, my students and I had to adapt to the setting, like the players on an NFL football team experiencing a learning curve while adapting to playing football in water. We have needed time to adapt at each transition point. That lost time will result in a decrease of skill and content mastery. While I can testify that my students have learned this year, we have not and will not complete the anticipated scope and sequence of the course outline.

This decrease in learning will create problems for schools, teachers, and students that will require innovation. That innovation will involve increased use of and dependence upon technology, because teachers will need tools to help efficiently assess student mastery and develop a

personalized learning plan to meet each individual student’s needs. Our existing understanding of the skills and content knowledge that students should be bringing to class is no longer reliable. To be successful, teachers will have to assess each and every child’s mastery and develop a personal plan to meet that child’s needs.

To accommodate the augmented need for assessment and personalized learning, student success will become dependent upon the utilization of Learning Management Systems (LMS). The best way to think about a learning management system is to imagine quite literally a virtual classroom where all the learning, communication, assessment, and grading takes place. Technology is not a luxury, nor is it an “alternative” approach to learning. I think some people understood that to be true prior to the pandemic, but clearly if the pandemic has done one thing it has accelerated the understanding and acceptance of that simple principle. Technology integrated into the principles of teaching and learning is essential for students to thrive and succeed. Technology can enhance the delivery of instruction, support all areas of the curriculum, and support the educational needs of students, staff, and community.

But again, recovering from the pandemic-related learning deficit and achieving future student success is still dependent on having properly trained teachers. Coming back to my pool analogy, many of my colleagues were treading water this year in terms of the use of technology for instruction. Honestly, some were drowning. All of us need to become professional swimmers moving forward. Therefore, the Commonwealth needs to prioritize a strategy to provide or enhance continual, job-embedded, high-quality professional development for all educators to enhance their comfort and utilization of classroom technology integration. Technological professional learning should be focused on effective pedagogy and application to instruction. Schools need the resources to offer skills-based and curriculum-integrated professional development opportunities, collaborative initiatives, and programs and tools that are up-to-date and relevant for a 21st century teaching and learning environment. And yes, this needs to be a state-led initiative. If we rely on individual districts or other public schools to lead on this front, educator professional development focused on information technology will inevitably fall into the equity gap, as some schools will have the financial resources and staff bandwidth to tackle the problem and some won’t.

Right now, throughout the Commonwealth, there are kindergarten through third grade students who have been deemed “The Alpha Generation.” Defined by their desire to create, they are device in-hand children, as they have spent their entire lives with a device in their hands. Now, as a result of COVID-19, they have actually spent more of their school time online than they have in a traditional classroom. When the dust settles and education returns to business as usual, their expectation will be technology-rich lessons led by teachers armed with 21st century instructional strategies and pedagogies. We’re not ready to meet that demand yet, but we will be with your help.

I'm hopeful that I've provided you with compelling information to motivate your dedication to ensuring digital equity for our students. There is one final thought I'd like to leave you with this morning. Prior to the pandemic, we used to say that denying a student a device to complete their schoolwork is like denying them a pencil to use in class. Now, denying a student access to a device is like denying them access to their classroom. We cannot continue to delay investments in or the prioritization of digital equity. Our students' future is quite literally dependent on all of us heeding the lessons from the pandemic. Thank you for your consideration of my comments. I will be happy to answer any of your questions.



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To: Pennsylvania Senate and House Democratic Policy Committees

From: Glenn Updike, MD

Medical Director, MyUPMC, and Medical Director, Clinical Informatics for the Women's Health Service Line at UPMC Magee-Womens Hospital

Re: Net Neutrality

March 29, 2021

Thank you, members of the Senate and House Democratic Policy Committees, for the opportunity to testify on this very important topic of net neutrality.

My name is Glenn Updike, and I am the Medical Director of MyUPMC and the Medical Director of Clinical Informatics for the Women's Health Service Line at UPMC Magee-Womens Hospital. I am also a practicing obstetrician.

In those capacities, I have been intrinsically involved with our patient engagement efforts at UPMC – especially as it relates to telemedicine and our patient portal, the MyUPMC app that allows our patients to make appointments, message their doctors, and renew prescriptions, among other features.

While telemedicine visits have become an integral part of our care – especially during this past pandemic year – we at UPMC Magee-Womens Hospital knew we had to ensure that our patients with chronic conditions could easily visit a specialist.

To meet those needs, we launched the UPMC Magee-Womens Virtual Care Center to ensure seamless access to care for patients – like one of my patients, a young woman with a chronic gynecologic condition who lives two hours from Pittsburgh. A caregiver for her elderly father, she worried about traveling during the pandemic – especially since she has no car and would have had to take public transportation.

Through the Virtual Care Center, this patient was able to schedule a new consultation with me online and conduct a video visit for her chronic condition. It turns out there were some very effective treatments she hadn't yet tried, and I was able to prescribe treatment that worked for her. Without having to travel, she and her father stayed safe.

In the several months since we launched the Virtual Care Center, we've already scheduled hundreds of visits. Why? Because our patients want to have access to high quality health care from their own communities and in the comfort of their own homes.

Thankfully, my patient had internet access enabling her to connect to the specialty care she needed.

But others in rural and urban communities are not be so fortunate. The Federal Communications Commission has drifted further from net neutrality since the “Restoring Internet Freedom” order became effective in June 2018.

Many of my patients struggle with slow internet speeds -- the kind of bandwidth that is required for high-fidelity video and audio to conduct medical care. With the policy of tier flattening – whereby urban and rural customers who only have access to slower infrastructure pay the same rates as those with access to more state-of-the-art network speeds – we exclude lower-income patients from any internet access at all – let alone access with appropriate bandwidth.

It is not surprising that these are the patients who would benefit most from telehealth – yet they struggle the most with connectivity.

We’ve finally recognized the health disparities in people of color – yet broadband access remains fraught with roadblocks. For example, to qualify for broadband access, many consumers must still pass a credit check. And, for our older patients – many suffering from a chronic illness -- 1 in 3 households do not have access to a computer or mobile device suitable to conduct telehealth.

Even as broadband access has expanded in some places, consumer access is receding because American broadband access is among the most expensive in the world. Programs like the FCC Lifeline Program, designed to provide subsidies for low-income families to foster connectivity, cover just a fraction of the cost to a consumer.

Health care is becoming increasingly digitized and differential access to broadband will inherently mean differential access to essential medical services.

Our country’s digital divide – the gap between those who do and do not have access to reliable internet – is a health care emergency.

Our patient care is no longer confined to discreet episodes during a hospital stay or during a brief office visit. Rather, we are increasingly working to remain connected to our patients during their daily lives through mhealth technologies, like wearables and remote monitoring.

At UPMC Magee-Womens Hospital, almost all patients diagnosed with hypertensive disorders of pregnancy are discharged after delivery with remote home monitoring devices. With these wristbands, which foster patient safety through early identification of hypertension and its symptoms, we are reducing the risk of costly hospital readmissions. Without reliable access though, these services cannot exist. This deprives our highest risk postpartum patients accessible state-of-the-art care.

For routine prenatal care, nearly half of our patients now conduct their visits as a hybrid of in-person and telemedicine care, keeping our waiting rooms socially distanced and offering the safety and convenience of staying at home for our expecting mothers.

However, it is impossible to participate fully in their health care without reliable, robust, and affordable broadband service.

The solutions to these problems may be complex. The Digital Divide is driven by multi-dimensional factors more complicated than just broadband access and speed. There is work to be done to make our digital health tools more culturally sensitive, relevant, and usable by a range of health literacies.

But our patients can't get their foot in the 'Virtual Care Clinic' door without first being connected.

We certainly need to understand and accurately map broadband availability across Pennsylvania, and we need to understand where the least connected areas overlap with our patients with the most medical needs. Telemedicine, especially video visits like the one I mentioned at the beginning of my comments, requires extended bandwidth; we must modernize our definitions of what constitutes adequate broadband speeds.

We should look to hospitals, community-based health centers, and other facilities to understand how we might expand connectivity in rural and urban areas and subsidize Wi-Fi hotspots and expanded high-capacity wireless internet for our patients when needed.

Finally, we must consider technology access and connectivity not as a luxury or alternative to standard care for those privileged with the option, but rather as a public health necessity and a patient right.

Again, thank you for this opportunity to speak with you today.

Dear Senators,

Thank you for giving Pennsylvania Farm Bureau, the state's largest general farm organization, the opportunity to offer some thoughts on broadband in Pennsylvania, and the funding and legislative changes we believe are necessary to aid deployment.

Briefly stated, this pandemic has shown there are haves and have nots when it comes to adequate broadband service in Pennsylvania. Unfortunately, that disproportionately impacts rural communities more than its suburban counterparts. What that means is that rural school children have a harder time learning from home, seniors can't take advantage of telemedicine, and working parents cannot telecommute. Many rural communities are only serviced by satellite internet service, which can become spotty during times of heavy cloud cover or bad storms. Fiber is simply not available in some rural communities.

From a business perspective, this puts many in the agriculture community at a competitive disadvantage. Technology is fundamentally changing agriculture—from the ability to collect real-time harvest data—to robotic milking. Each is dependent on adequate broadband service to work properly. But even farmers who simply want to start selling products directly to consumers in farm markets need high speed broadband service to take credit card transactions. That service is not available in every rural area.

Broadly speaking, we see the need for two parallel tracks to solve the broadband issue in Pennsylvania: funding, and legislative changes.

Pennsylvania made an important step last year with the creation of the Underserved High-speed Broadband Funding Program Account under the Commonwealth Financing Authority, which will allow state government grants to be awarded to private companies that will start or expand service to underserved rural areas. Currently, that is funded with a \$5 million annual allocation. While a good first step, clearly additional funding is needed—whether it is state investment, or the funneling of federal dollars into this program.

From a legislative perspective, we see the need to make several changes to improve the deployment of broadband. Last year, the Joint State Government Commission released a comprehensive report on the state of broadband in Pennsylvania, and made several recommendations to improve deployment. It's first recommendation calls for the creation of a statewide broadband authority, comprised of officials from the administration, General Assembly, stakeholder groups and private enterprise to map out a strategy for deployment, and act as a resource for private companies and communities. Rep. Pam Snyder is expected to soon introduce legislation to create this authority, and our organization supports its creation.

Secondly, it is time for Pennsylvania to revisit 30 regulations, last updated in 2004. Chapter 30 puts a statutory definition of broadband that is woefully outdated. The current Federal Communications Commission definition of broadband is 25 Mbps download and 3 Mbps upload speed. We think that is a good starting point for bringing the state's broadband definition up to modern standards.

In addition, our Chapter 30 regulations put limitations on the ability of local governments to offer broadband service. In order to offer service, local governments must first obtain the approval of incumbent local carriers to determine if they have any plans of offering or expanding service—such as increasing upload and download speeds. This arraignment worked in 2004 when broadband was a new frontier and private companies were concerned about local governments having an unfair advantage of being able to offer service. That was 17 years ago, and the landscape around broadband has changed. Private enterprise has concentrated their work at building service in areas where it is less costly to do so—namely urban and suburban areas.

Pennsylvania Farm Bureau supports giving local governments the ability to offer broadband service in their communities if they so choose. It will level the playing field and drive service in areas where private enterprise may have no interest in expanding. To be sure, many local governments may be in no position to provide such a service. But state government should not restrict the ability of those who want to offer service, or for multiple municipalities to be able to partner together on such projects. Pennsylvania needs to take an all-of-the-above approach to offering service. To that end, it is worth asking whether our Chapter 30 regulations governing broadband make sense in 2021.

Pennsylvania Farm bureau is committed to working with the General Assembly this session to advance broadband legislation. We know that building service is not an easy fix, nor will a single piece of legislation solve the problem. Please know that we are committed to working with you on this key issue. At the end of the day, we believe in rural Pennsylvania and want to make sure that it remains vibrant and a great place to live and run a business.

Testimony of

USTelecom – The Broadband Association

Before the  
Joint Democratic Policy Committee  
March 29, 2021

Discussing the Need for Equitable Internet Access across the Commonwealth of Pennsylvania  
and Net Neutrality

Senator Muth, and members of the Joint Democratic Policy Committee from the Senate and House of Representatives, USTelecom – The Broadband Association (“USTelecom”) appreciates this opportunity to comment on equitable Internet access across the Commonwealth of Pennsylvania and the importance of a free and open Internet as part of net neutrality.

USTelecom’s members include broadband providers, suppliers, and technology innovators connecting families, communities, and enterprises across Pennsylvania and America to the future. Our diverse membership includes large, publicly traded global enterprises to local, Main Street companies and cooperatives – all of whom provide continued access to communications services for all citizens, regardless of whether they live and work in urban or rural communities. USTelecom members, who collectively serve millions of Pennsylvania residents, include AT&T, Consolidated Communications, Frontier, Ironton Telephone, Lumen, Pennsylvania Telephone Company, Shentel, Windstream, and Verizon.

The impact of the COVID-19 pandemic removed any doubt about the essential role broadband plays in today’s society, but it also magnified the need for actions to make broadband accessible for all citizens of the Commonwealth of Pennsylvania—including policies designed to address affordability for low-income households, increasing broadband deployment, and preserving a free and open Internet. The legislature of the Commonwealth of Pennsylvania can play an important role in the broadband future of its residents, but for the legal and policy reasons discussed below, enacting prescriptive, utility-style laws that conflict with the national framework governing the broadband industry will have negative effects on consumers, innovation, and investment.

### **Essentiality of Broadband Grew During the Pandemic**

The Internet, and access to it, kept Pennsylvania residents connected to school, work, and family this past year. As the world shut down around them, the Internet remained open and more powerful than ever. This resiliency and openness is not an accident; it is the direct result of our nation’s broadband providers investing upwards of \$80 billion dollars annually to connect new communities, upgrade infrastructure, and innovate their networks. Broadband providers made these investments as a direct result of smart bipartisan policy decisions allowing companies to compete, invest, and innovate in a lightly regulated marketplace. As a direct result, USTelecom members had the incentive and flexibility to build, maintain, and enhance their networks, which produced today’s dynamic and secure networks that so successfully and seamlessly have met the increased demand during this crisis.

Some point to the essentiality of the Internet as a justification for prescriptive state regulation of broadband Internet Service Providers (“ISPs”). This is misguided. In fact, the overwhelming success we have seen during the COVID-19 pandemic in how the networks have adapted and are supporting the sharply increasing traffic demands of not only Pennsylvania citizens but all Americans illustrates exactly why smart, national, forward-looking bipartisan policies made today’s connectivity possible. Not every country has performed as well. According to one study, “[o]f the top 10 countries in the world by population, the U.S. is the only [country] that recorded no download speed degradation on average in the month of April [2020].”<sup>1</sup> Indeed, some nations have been forced to call on content providers to intentionally throttle their applications due to capacity limitations.<sup>2</sup> The essentiality of broadband

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<sup>1</sup> See, e.g., Tyler Coper, *Internet Performance Around the World Amid COVID-19*, BroadbandNow (May 6, 2020), <https://broadbandnow.com/report/international-internet-performance>; Anna-Maria Kovacs, Ph.D, *U.S. Broadband Networks Rise to the Challenge of Surging Traffic During the Pandemic*, Georgetown University (June 2020), <https://georgetown.app.box.com/s/8e76udzd1ic0pyg42fqsc96r1yzkz1jf>.

<sup>2</sup> See, e.g., Comments of the Competitive Enterprise Institute Comments, FCC Docket No. 17-108, at 7, <https://ecfsapi.fcc.gov/file/104212534916163/Hedger%20CEI%20-%20Comments%20to%20FCC%20Re->

service and the performance of American broadband providers during this pandemic demonstrates the importance of a smart, nimble, national, consumer-focused, light-touch approach to broadband regulation moving forward.

### **Increasing Broadband Capability and Affordability**

Broadband service providers have been making their service more affordable for everyone while simultaneously making that service more powerful than ever before. The massive network investments USTelecom members have made are paying off for their customers and delivering faster broadband speeds for less cost than ever, enabling unprecedented remote learning, working, and streaming.

Consumer prices for the most popular, the fastest, and the least expensive speed tiers have all dropped over the past five years, while the speeds for those plans have increased. According to a recent, independently corroborated analysis, USTelecom found that across the 2015-2020 period, prices dropped by 20% for the most popular tiers and dropped by 38% for the fastest tiers. When adjusted for inflation, these price drops have been 28% and 44% respectively—all while speeds delivered by these service tiers increased between 16% and 28%.<sup>3</sup> Further, the major ISPs' lowest price offerings have dropped by 13.6% in price from 2015 to 2020 while their associated speeds increased by 64% over this timeframe.<sup>4</sup>

Beyond the competitive forces of the market at work, many USTelecom members have voluntarily offered low-price plans for those with demonstrated need. For example, Verizon offers a \$20-per-month discount for eligible households,<sup>5</sup> and AT&T offers low-cost Internet service to eligible households participating in the Supplemental Nutrition Assistance Program (SNAP).<sup>6</sup> This is in addition to broadband providers' support of federal programs, such as the Lifeline Program and the recent Emergency Broadband Benefit Program.<sup>7</sup>

As the Commonwealth of Pennsylvania looks to further increase capability and affordability for its residents, it should focus its efforts on encouraging investment in building, improving and maintaining new and existing connections throughout the state, and continuously upgrading the networks that exist to carry more and more Internet traffic. Moreover, efforts are needed to ensure that all low-income

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[%20Mozilla%20v%20FCC.pdf](#) (“[T]he European Union, which takes a utility-style approach to broadband regulation, has been forced to lean on companies such as Netflix and other bandwidth-intensive service providers to reduce their service quality to preserve connectivity for other services. No such action has been required in the United States, despite similar surges in Internet traffic.”).

<sup>3</sup> In nine out of the past ten years, broadband price changes have been below inflation – negating any concerns that broadband pricing has outpaced inflation.

<sup>4</sup> See, e.g., *USTelecom 2020 Broadband Pricing Index*, USTelecom (Sept. 2020), <https://www.ustelecom.org/wp-content/uploads/2020/09/USTelecom-2020-Broadband-Pricing-Index.pdf>.

<sup>5</sup> Lifeline Discount Program, Verizon.com, <https://www.verizon.com/info/low-income-internet/> (last visited Mar. 23, 2021).

<sup>6</sup> *Stay Connected with Affordable Internet*, ATT.com, <https://www.att.com/internet/access/>.

<sup>7</sup> See Federal Communications Commission, *Emergency Broadband Benefit*, <https://www.fcc.gov/broadbandbenefit> (last visited Mar. 23, 2021) (“The Emergency Broadband Benefit will provide a discount of up to \$50 per month towards broadband service for eligible households and up to \$75 per month for households on Tribal lands. Eligible households can also receive a one-time discount of up to \$100 to purchase a laptop, desktop computer, or tablet from participating providers if they contribute \$10-\$50 toward the purchase price.”).

Pennsylvania residents are aware of opportunities available to them to help pay for access to broadband networks, such as the Emergency Broadband Benefit Program, or to promote digital literacy.

### **Expanding Broadband Deployment**

Recent FCC data on broadband deployment shows that broadband competition has improved exponentially across the board. From 2015 to 2019, there are four times as many households with access to two or more broadband providers at 100 Mbps; and 16 times as many households with access to three or more broadband providers.<sup>8</sup> In addition, we saw increases in the number of competitive broadband providers at each speed tier reported by the FCC – from less than 10 Mbps all the way to a Gigabit.

While broadband speeds are going up in communities that are served, there are still far too many rural communities that are not connected. USTelecom has repeatedly supported the goal of 100 percent connectivity for all Americans. The economic challenges of this goal are not insignificant as connecting the last one to two percent of Americans is extremely expensive.

While USTelecom continues to advocate for federal funding to help subsidize buildout, to further promote broadband deployment across the Commonwealth of Pennsylvania, the state must take action. First, it can implement policies to streamline access to infrastructure, and expeditiously review requests for regulatory approval, including, for example, pending change-in-ownership approval requests, permitting, small cell siting and rights-of-way applications. Second, it can promote grant programs that encourage deployment across a variety of broadband technologies.

### **Preserving a Free and Open Internet**

USTelecom and its members are committed to maintaining an open Internet for all consumers and businesses that rely on their networks. There is no debate about the importance of an open Internet. Rather, the debate is over how broadband networks should be regulated, and by whom. For decades, there has been bipartisan agreement that a light-touch, national framework should govern the Internet rather than a state-by-state approach. This is true for statutory and legal reasons given the interstate nature of broadband Internet access service, but also because consumers expect and deserve their online experience to be governed by the same set of rules regardless of where or how they connect. For example, a Pennsylvania resident traveling by train from Philadelphia, PA to Washington, DC should expect and receive the same protections when accessing the Internet when her journey begins at 30<sup>th</sup> Street Station in Philadelphia as when it ends at Union Station in DC. For this reason, as a matter of policy and law, permanent net neutrality protections should be taken up by Congress rather than the Pennsylvania legislature or any other state legislature.

A permanent federal legislative framework will provide consumers with strong protections as they use the Internet, and allow broadband providers clarity to continue investing and innovating. In the meantime, all major ISPs have publicly committed to enforceable open Internet principles. This includes agreeing not to block, throttle, and/or unreasonably discriminate against the lawful content, applications, services, or non-harmful devices of the consumers choosing. Rather than advancing conflicting state legislation, our collective efforts should be focused on working together to adopt federal legislation that will enshrine into law strong consumer protections and regulatory certainty for all so the Internet can continue to thrive and grow.

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<sup>8</sup> Fixed Broadband Deployment Data from FCC Form 477, FCC.gov, <https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477>.

## **Conclusion**

USTelecom appreciates the opportunity to inform the Committee of the many ways its members are working hard to ensure Pennsylvania residents get and stay connected. We look forward to working with you on policies that will further our shared goal of open and universal connectivity.