

**NETWORK INTERCONNECTION**  
**QUESTIONS FOR STAKEHOLDER COMMENT**

**RESPONSES OF THE AMERICAN CABLE ASSOCIATION**  
**August 8, 2014**

**Introduction**

In previous submissions to the Committee, the American Cable Association (ACA) set forth key principles that provide direction on when government intervention in communications policymaking is warranted and how regulation should be applied.<sup>1</sup> These principles should underlie efforts to amend and modernize the Communications Act. The Committee now is seeking comment on a specific issue, interconnection policy, and the government’s role in ensuring this critical need is achieved. ACA’s response herein reflects its previous submissions and provides a framework for determining when and how to regulate interconnection between networks.

Interconnection policy is and has been for over a century at the heart of communications policy. To ensure the integrity and efficiency of our overall communications system, our nation’s networks need to interconnect and exchange traffic seamlessly. Moreover, as the FCC noted in the *USF/ICC Transformation Order*, “Interconnection among communications networks is critical given the role of network effects.” And, the need for government oversight of interconnection policy has become even more important as tens of thousands of entities build and operate networks and related facilities using different technologies and often compete in the offering of services.

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<sup>1</sup> ACA’s principles upon which communications policymaking should be based are as follows –

1. Regulatory intervention in a relevant product and geographic market is warranted when –
  - i. There is an exercise of substantial market power or unfair or deceptive acts or practices;
  - ii. Competition or consumers are harmed in a manner contrary to the “public interest;”
  - iii. Smaller or more rural providers are disproportionately disadvantaged compared to other industry participants; and
  - iv. There are specific social objectives to achieve that markets will not deliver, such as ensuring vital communications services remain viable during emergencies and related events and available to all consumers, including those with special needs.
2. Any regulatory intervention should be applied in a competitively and technologically neutral manner.
3. Any regulatory intervention should be precisely targeted to avoid imposing excessive costs and exemptions and special considerations should be afforded to smaller and rural providers where appropriate.

Aside from the general importance of interconnection policy, there are many specific reasons it is vital, including —

- Interconnection ensures universal service develops and is preserved.
- Interconnection enables and maintains competition.
- Interconnection ensures public safety and emergency preparedness and national security needs are met.

Any examination of interconnection policy (including the exchange of traffic) should have a broad scope to ensure no entity can block or degrade traffic or engage in unjust or unreasonable discrimination on communications networks. Today, there are an enormous number of entities engaged in or otherwise affecting the flow of or access to traffic on communications networks. If all of these entities are not taken into account in developing interconnection policy, it may well lead to distortions in the market.<sup>2</sup>

Accordingly, to achieve public and national interests, the FCC (and states where appropriate) should have the general authority to oversee entities engaged in interconnection of communications networks; and, they should, where there are demonstrable public and national interests, have the authority to require interconnection at reasonable rates, on not unreasonable, non-discriminatory terms and conditions, and at technically feasible points. Finally, where these interests no longer require government intervention, regulatory relief should be provided. In general, ACA submits that the Communications Act, as amended, contains in sections 201 and 251 a reasonable regulatory structure for interconnection, and any amendments to the Act should build upon the requirements in these provisions even as technologies evolve and market dynamics change.

## Responses to Questions

*1. Question: In light of the changes in technology and the voice traffic market, what role should Congress and the FCC play in the oversight of interconnection? Is there a role for states?*

ACA supports the current interconnection framework contained in sections 201 and 251 of the Communications Act. These provisions recognize the key need to interconnect to further the

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<sup>2</sup> For example, Internet edge providers are a vital part of networks delivering Internet access services because they offer sufficiently important content to end users of the Internet and can severely threaten the overall value of broadband access services and the Internet by limiting access to (i.e. interconnection with) their content in a commercially unreasonable manner. These concerns are not merely hypothetical. The past five years have witnessed a number of examples where Internet edge providers who are online video distributors have selectively blocked or threatened to block access to content otherwise made freely available on the Internet to users served by broadband ISPs. Ignoring important network actors will result in the asymmetric application of interconnection policy, which constrain the business behavior of a single class of platform providers (i.e., fixed broadband ISPs that are also MVPDs) and would distort market incentives and accentuate content providers' abilities and incentives to threaten actors more constrained in their behaviors due to regulation. In sum, these practices threaten the seamless interconnectivity of our communications system.

public interest, provide for additional oversight of networks providers with market power, and enable deregulation where market power no longer exists. Moreover, they are (and should be) technology neutral. They also give states an important role where negotiations between incumbents and competitors break down.

*2. Question: Voice is rapidly becoming an application that transits a variety of data platforms. How should intermodal competition factor into interconnection mandates? Does voice still require a separate interconnection regime?*

Despite the trend for voice to be an application, for most consumers, it is not so today. Even as the voice market evolves, consumers may still want assurances that voice traffic is exchanged reliably – especially where vital 911 and other public safety calls are involved -- and that requires providers to manage that traffic — not just provide a best efforts service. This highlights the important policy framework that Congress should pursue: interconnection is so critical that it needs to be overseen by the government, and relief from regulation should be provided when it is demonstrated that government intervention for a particular product and geographic market is no longer necessary to ensure public and national interests are met.

*3. Question: How does the evolution of emergency communications beyond the use of traditional voice service impact interconnection mandates?*

ACA agrees with the Committee that emergency communications will be increasingly transmitted in different modes and from different networks in addition to traditional voice calls over the public switched network. From ACA’s perspective, this makes interconnection even more important. The public needs to be confident that regardless of mode or network the transmission reaches public safety personnel. Thus, while government involvement was essential when only voice traffic was exchanged, where there are different types of emergency traffic using different types of technologies over different networks, the role for government involvement becomes even more critical.

*4. Question: Ensuring rural call completion has always been a challenge because of the traditionally high access charges for terminating calls to high-cost networks. Does IP interconnection alleviate or exacerbate existing rural call completion challenges?*

In its November 2013 Report and Order adopting rules to address rural call completion problems, the FCC found multiple factors may be involved. The Commission identified that high charges for terminating calls to rate-of-return carriers provides an incentive for long distance carriers to hand off a call to an intermediate carrier that offers to terminate it more cheaply, although without assurances it will be completed properly. The Commission also cited rural associations’ claim that a cause was improper call signaling and routing set up by originating carriers. In addition, one ACA member, Mid-Rivers Communications, states:

The Nation’s long distance network is in transition from “legacy” to IP-based technologies and is therefore currently comprised of many interconnecting networks utilizing a variety of evolving technologies (e.g., TDM, IP, wireline, and wireless). There are thousands of interconnecting service providers and

thousands of points of interconnection across the United States. In a call path, network equipment, equipment components, transport facilities and customer owned/controlled equipment can impact the characteristics of a call and its ability to complete. Such impacts can be constant or intermittent. Since most of the rural call completion problems are caused by the routing practices of intermediate carriers, and not the actual originating or terminating carriers on either end of the call, the problem carriers are very difficult to track down and identify. These intermediate carriers often strip all identifying information from call records so that they cannot be identified by the terminating carrier or by an enforcement agency.

As a result of these many factors underlying rural call completion problems, it is likely that a series of measures will be needed to address them, at least in the interim, and the Commission's recent decision began to address the problems. But, more work is needed. In the long run, when all networks are IP based (enabling more efficient IP-IP interconnection) and when access charges no longer permit arbitrage, carriers should have the proper incentives to route calls efficiently and complete them. Thus, IP interconnection should help alleviate rural call completion issues.

*5. Question: Should we analyze interconnection policy differently for best-efforts services and managed services where quality-of-service is a desired feature? If so, what should be the differences in policy between these regimes, and how should communications services be categorized?*

While interconnection is critical, the specific type of regulatory intervention should be based on the type of interconnection and traffic (services) exchanged and the many public and national interests. Is there a specific universal service or emergency need? Is competition at stake? Accordingly, because best efforts and managed services are distinct today (that is, in different product markets), any analysis about interconnection should focus on each specifically to determine whether and to what extent government intervention is warranted.

*6. Question: Much of the Committee's focus in the #CommActUpdate process has been on technology-neutral solutions. Is a technology-neutral solution to interconnection appropriate and effective to ensure the delivery and exchange of traffic?*

The need to interconnect and exchange traffic should not depend on the technology. Solutions to interconnection issues — that is, government intervention — should be based on the many public and national interests at stake for the particular type of interconnection at issue.

*7. Question: Wireless and Internet providers have long voluntarily interconnected without regulatory intervention. Is this regime adequate to ensure consumer benefit in an all-IP world?*

Not necessarily. The particular dynamics of those markets – which have been growing and where providers generally did not have disproportionate leverage -- have so far largely enabled successful voluntary interconnection. But, there have been interconnection disputes, including recent intense disputes where government agencies have become involved. For instance, the

FCC has seen fit to act in regard to mobile data roaming, and, in response to a petition from T-Mobile, it has asked for comments on whether to define more precisely its “commercially reasonable” standard. In addition, both the FCC and the Department of Justice are currently examining interconnection disputes between Internet transit providers and access ISPs. Government involvement also may become more necessary in wireless and Internet markets as public and national interests evolve.

*8. Question: Is contract law sufficient to manage interconnection agreements between networks? Is there a less onerous regulatory backstop or regime that could achieve the goals of section 251?*

Contract law may be sufficient to address interconnection matters if it meets our public and national interests. Otherwise, greater government intervention is required. More specifically, the Committee should recognize that ACA’s smaller operators often lack the resources to enter into complex interconnection agreements and address disputes with larger providers. Here, the certainty provided by regulations setting forth reasonable interconnection parameters by having regulators available to settle disputes can have significant value for these operators and their customers. ACA believes the framework in the Act and particularly sections 201 and 251 is a reasonable and time-tested approach. While the Committee rightfully wants to explore whether other regulatory models may be better, it needs to be cognizant of the harm that would occur if it gets such a critical policy wrong.



**NEW YORK  
LAW SCHOOL**

August 8, 2014

The Honorable Fred Upton  
2183 Rayburn House Office Building  
Washington, DC 20515

The Honorable Greg Walden  
2182 Rayburn House Office Building  
Washington, DC 20515

**Re: Network Interconnection – Response to White Paper #4**

Dear Chairman Upton and Chairman Walden,

The Advanced Communications Law & Policy Institute (ACLP) at New York Law School respectfully submits the following comments in response to the Committee’s white paper titled, “Network Interconnection.” We appreciate the opportunity to make this submission and commend the Committee for continuing forward with its inquiry into updating the nation’s telecommunications laws.

Should you or your staff have any questions, please do not hesitate to contact us.

Respectfully submitted,

/s/ Charles M. Davidson  
CHARLES M. DAVIDSON, DIRECTOR

/s/ Michael J. Santorelli  
MICHAEL J. SANTORELLI, DIRECTOR

**To:** The Honorable Chairman Upton and the Honorable Chairman Walden, Energy & Commerce Committee, U.S. House of Representatives

**From:** Charles M. Davidson & Michael J. Santorelli, ACLP at New York Law School

**Re:** Network Interconnection

**Date:** August 8, 2014

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The House Energy & Commerce Committee is to be commended for its continuing efforts to update the nation's communications laws. The present inquiry<sup>1</sup> to understand the modern mechanics of network interconnection is both timely and critical to any changes that might be made to the laws and policies governing the U.S. advanced communications sector.

As discussed in these comments, while much has changed in this sector vis-à-vis interconnection, much has remained the same. Indeed, despite increasing complexity of networks, the intermodal nature of the marketplace, a more sophisticated customer base, and numerous other factors impacting how data is transmitted over networks, the basic notion of interconnection remains largely unchanged – i.e., negotiating an array of business relationships to deliver information to end-users. However, in the modern Internet ecosystem, complexity oftentimes begets complexity, a maxim that is certainly evident when navigating the many different network architectures, business arrangements, and technical details that underlay even the simplest Internet communications. Understanding how and why these nuances emerged and how they continue to evolve will be essential to assuring that any new policies are sufficiently flexible and adaptable to accommodate continued innovation and growth in this space going forward.

As an overview, the following comments include:

- A discussion of the historical dimensions of network interconnection, with an emphasis on the conditions and assumptions that informed initial federal policy responses (p. 2);
- An examination of the contours of interconnection in the Internet era, along with an analysis of the novel policy questions that are being raised as new platforms, new services, and new players collaborate to deliver content to consumers (p. 4); and
- Foundational principles to guide reform efforts (p. 8).

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<sup>1</sup> See *Network Interconnection*, July 15, 2014, Energy & Commerce Committee, U.S. House of Representatives, available at <http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUdpdate/20140715WhitePaper-Interconnection.pdf>.

## HISTORICAL DIMENSIONS & CONSIDERATIONS

Network interconnection has deep roots in U.S. telecommunications. Indeed, as the white paper correctly notes, the resolution of interconnection disputes among telephone network owners in the early part of the 20<sup>th</sup> century informed core aspects of the historical approach to telecommunications policymaking, some of which still prevail, in some form, to this day.<sup>2</sup> The regulatory framework that grew out of these early disputes revolved primarily around a desire by policymakers to manage dominant providers of basic telephony and ensure that they fulfilled obligations to provide service to every person in the United States. To do so, regulators at the federal and state levels developed and implemented a complex oversight scheme that entailed, among many other things, close monitoring of the telephone traffic flowing over local and long-distance networks and using that data to determine payment and cross-subsidy schemes in support of realizing certain service goals (e.g., low local rates).<sup>3</sup> This system of network interconnection, access fees, and termination charges eventually evolved into what is now known as intercarrier compensation (ICC).<sup>4</sup>

For many decades, this system of regulated interconnection and payments among carriers was messy and fraught with tension between service providers and regulators at the state and federal levels.<sup>5</sup> Even so, it worked reasonably well for many years because of the nature of the service and the marketplace – it was dominated by one type of service and one type of service provider; traffic was homogenous and relatively easy to monitor; and the market was fairly stable. However, as new voice technologies and platforms emerged in the latter half of the 20<sup>th</sup> century – i.e., new types of long-distance services; cellular telephony; IP-enabled services like VoIP – this framework began to strain under the weight of innovation.<sup>6</sup> Indeed, despite seemingly clear guidance in the Communications Act,<sup>7</sup> the realities of crafting appropriate regulatory responses to the many interconnection and payment disputes that inevitably arose proved to be exceedingly difficult.

After more than a decade of trying to reconcile the laws on the books with the realities in the marketplace, the FCC finally succeeded in implementing sweeping changes to the

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<sup>2</sup> *Id.* at p. 1.

<sup>3</sup> See, e.g., Peter Temin & Geoffrey Peters, *Is History Stranger Than Theory? The Origin of Telephone Separations*, 75 Am. Econ. Rev. 324 (1985).

<sup>4</sup> The FCC defines intercarrier compensation as “the charges that one carrier pays to another carrier to originate, transport, and/or terminate telecommunications traffic.” See FCC, Encyclopedia: Intercarrier Compensation, <http://www.fcc.gov/encyclopedia/intercarrier-compensation>.

<sup>5</sup> See, e.g., Eli Noam, *Federal and State Roles in Telecommunications: The Effects of Deregulation*, 36 Vand. L. Rev. 949 (1983).

<sup>6</sup> See, e.g., Charles M. Davidson & Michael J. Santorelli, *Federalism in Transition: Recalibrating the Federal-State Regulatory Balance for an All-IP World*, 29 Berkeley Tech. L. J. (forthcoming, fall 2014).

<sup>7</sup> 47 U.S.C. §§251-252.

regime governing the pathways and payments of voice traffic.<sup>8</sup> A central impetus for these reforms was recognition that the nature of voice communication and the market for it were changing rapidly. In particular, the FCC observed that the original ICC system was “designed for an era of separate long-distance companies and high per-minute charges, and established long before competition emerged among telephone companies, cable companies, and wireless providers.”<sup>9</sup> Indeed, maintaining such a rigorous and far-reaching system of antiquated rules and payments well into the modern era resulted in a number of negative outcomes for consumers and for service providers. For example, the cross-subsidy scheme that ICC supported quickly became an anachronism in a marketplace defined by intermodal competition. As a result, millions of consumers paid more on their wireless and long-distance bills than they should have.<sup>10</sup> In response, the FCC implemented a range of reforms that, among other things, will begin the process of winding down the regulated payment structure.<sup>11</sup>

The ICC example is relevant to ongoing discussions about modern network interconnection – and updating the communications laws generally<sup>12</sup> – because it highlights the many downsides associated with implementing a rigorous system of regulated interconnection in a dynamic marketplace.<sup>13</sup> Indeed, the inevitable gaps that arose as regulators attempted to retrofit existing rules for new services and platforms created numerous arbitrage opportunities that bad actors exploited for many years,<sup>14</sup> as well as disincentives for

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<sup>8</sup> See *In the Matter of Connect America Fund*, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd. 17,663 (2011) (“*Connect America Fund Order*”).

<sup>9</sup> *Id.* at 17,669.

<sup>10</sup> *Id.*

<sup>11</sup> See generally *id.*

<sup>12</sup> Justifying these much-needed reforms required the FCC to engage in broad readings of several statutory provisions. See *Direct Commc’ns Cedar Valley, LLC v. F.C.C.*, No. 11-9581 (10<sup>th</sup> Cir. 2014) (upholding recent FCC reforms to the Universal Service Fund and the ICC framework). Despite many arguments to the contrary, federal courts are increasingly deferential to these kinds of readings by the Commission. See *City of Arlington v. FCC*, 133 S. Ct. 1863 (2013) (holding that courts should defer to an agency’s interpretation of its own jurisdiction so long as that interpretation is reasonable); *Verizon v. FCC*, 740 F.3d 623 (D.C. Cir. 2014) (holding that section 706 of the Communications Act likely provides the FCC with broad authority to regulate broadband). As a result, even though the Commission has been able to move forward with modernizing outdated programs like ICC and the federal universal service fund, the broad discretion that it is being given by federal courts vis-à-vis interpreting the Communications Act has raised questions about whether there any real limits to FCC authority in the broadband era. This particular dynamic underscores the need for clearer legislative language and guidance regarding the limits of FCC authority going forward.

<sup>13</sup> These comments are agnostic with respect to the addressing specific voice interconnection issues. In previous comments, however, we raised the idea of using alternative dispute resolution mechanisms to address voice interconnection disputes that might arise under existing provisions of the Communications Act. See Charles M. Davidson & Michael J. Santorelli, *Response to Congressional White Paper #3*, at p. 18, ACLP at New York Law School (June 13, 2014), available at [http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP3\\_Responses\\_1-21.pdf](http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP3_Responses_1-21.pdf) (“*Response to Congressional White Paper #3*”).

<sup>14</sup> The leading example here is traffic pumping. See *Connect America Fund Order*.

innovation in certain instances.<sup>15</sup> Moreover, even the reformed ICC framework will likely become outdated in the near term as the distinction between voice traffic and general data traffic vanishes. Nevertheless, the language of ICC – e.g., access charges, transit, termination fees, etc. – has begun to permeate the modern debate over interconnection of IP data networks. Indeed, some firms have used ICC as a way to frame this discussion in an effort to support the development of a regulatory model that would assure favorable outcomes.<sup>16</sup> Such an outcome would be contrary to larger imperatives around regulatory modernization and otherwise calibrating rules for the intermodal broadband marketplace of tomorrow, not the monopoly telephone market of yesterday. In addition, and as discussed in the next section, numerous technical and policy differences caution against adapting ICC-related assumptions about the nature of communications networks for use in today’s Internet ecosystem.

### MODERN CONTOURS & QUESTIONS

Although there are numerous ongoing discussions implicating the interconnection regime for voice traffic, most recent discussions about network interconnection revolve around data networks. More specifically, these conversations tend to focus on how the various components that comprise the broader Internet – content developers, backbone providers, content delivery networks (CDNs), ISPs, etc. – work together to transmit content to end-users. The complexity of the relationships that, in the aggregate, serve as the foundation for basic Internet communications is best seen in the sheer number of components that must work together to enable the online experience. By one estimate, this implicates “a collection of 35 thousand autonomous systems bargaining with one another through arms-length transactions.”<sup>17</sup>

Unlike in the context of voice traffic, which originates from within disparate networks of callers (and can be in several different formats), the vast majority of Internet data traffic originates on the edges of networks (e.g., streaming video, website content, etc.) and is transmitted via the Internet Protocol (IP).<sup>18</sup> This key difference impacts how different players interact with one another when negotiating pathways for the delivery of information. In some cases, entities (e.g., an ISP and CDN) opt to interconnect directly via peering arrangements.<sup>19</sup> These can be “settlement free,” in which case both entities agree to exchange roughly equal amounts of traffic, or they can be paid, which typically occurs

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<sup>15</sup> As the FCC noted, by focusing on “minutes rather than megabytes,” the ICC framework created little incentive for some carriers to invest in deploying broadband networks. *Id.* at 17,669.

<sup>16</sup> See, e.g., *In the Matter of Protecting and Promoting the Open Internet*, Notice of Ex Parte Presentation by Netflix, GN Docket No. 14-28 (Aug. 1, 2014), available at <http://apps.fcc.gov/ecfs/document/view?id=7521748026> (arguing that the FCC should adopt a “bill-and-keep” approach for interconnection).

<sup>17</sup> See CHRISTOPHER S. YOO, *THE DYNAMIC INTERNET: HOW TECHNOLOGY, USERS, AND BUSINESSES ARE TRANSFORMING THE NETWORK*, at p. 55 (2012) (“DYNAMIC INTERNET”).

<sup>18</sup> See, e.g., Kevin Werbach, *Only Connect*, 22 Berkeley Tech. L. J. 1233, 1250 (2007).

<sup>19</sup> See, e.g., JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, *DIGITAL CROSSROADS* (2<sup>ND</sup> ED.), at p. 180-182 (2013).

when one entity (e.g., a streaming video provider) is transmitting more traffic than the other.<sup>20</sup> In other cases, one entity (e.g., a smaller ISP) enters into a transit agreement with a larger entity (e.g., a backbone provider) to connect to a broad array of networks.<sup>21</sup>

In the early days of the commercial Internet, when much of the content being shuttled across networks was text-based, these various interconnection arrangements, especially those that were settlement-free, worked well. However, as the Internet grew in popularity, certain components soon became overwhelmed with data traffic, requiring stakeholders to experiment with new business relationships and transmission techniques to assure timely delivery of increasingly time-sensitive information.<sup>22</sup> This shift is still ongoing as entities across the Internet attempt to adapt to the new realities of the digital ecosystem – i.e., voracious consumer demand for streaming media services and significant asymmetries in data flows.

Signs of uncertainty about the scope and structure of new interconnection arrangements were first evident around the time when broadband Internet access started to replace slower dial-up connections (i.e., the mid-2000s). In 2005, for example, a dispute arose between backbone providers Cogent and Level 3 regarding the extent to which the former should have to pay for its peering arrangement with the latter.<sup>23</sup> Level 3 rationalized that such a payment was necessary because it was “carrying the bulk of the traffic in its [peering] deal” with Cogent.<sup>24</sup> At one point during the negotiations, Level 3 cut off its connections with Cogent, preventing millions of consumers from accessing certain online content.<sup>25</sup> The two companies eventually came to an agreement that included “commitments from each party about the characteristics and volume of traffic to be traded.”<sup>26</sup> A similar dispute arose between Cogent and Sprint in 2008. This also led to service disruptions as the two companies “de-peered” over a disagreement regarding whether and to what extent Cogent should pay for transit services.<sup>27</sup>

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<sup>20</sup> *Id.*

<sup>21</sup> *Id.* For additional discussion of data network interconnection basics, see also Michael Kende, *The Digital Handshake: Connecting Internet Backbones*, FCC OPP Working Paper No. 32 (Sept. 2000), available at [http://transition.fcc.gov/Bureaus/OPP/working\\_papers/oppwp32.pdf](http://transition.fcc.gov/Bureaus/OPP/working_papers/oppwp32.pdf).

<sup>22</sup> See, e.g., DYNAMIC INTERNET at p. 60-69.

<sup>23</sup> See, e.g., Stacy Cowley, *ISP Spat Blacks Out Net Connections*, Oct. 6, 2005, Computer World, available at [http://www.computerworld.com/s/article/105210/ISP\\_spat\\_black\\_out\\_net\\_connections?taxonomyId=062](http://www.computerworld.com/s/article/105210/ISP_spat_black_out_net_connections?taxonomyId=062).

<sup>24</sup> *Id.*

<sup>25</sup> See, e.g., John Borland, *Blackout Shows Net's Fragility*, Oct. 6, 2005, CNET.com, available at [http://news.cnet.com/Blackout-shows-Nets-fragility/2100-1038\\_3-5890424.html](http://news.cnet.com/Blackout-shows-Nets-fragility/2100-1038_3-5890424.html).

<sup>26</sup> See Stacy Cowley, *Level 3, Cogent Resolve Peering Dispute, Renew Deal*, Oct. 28, 2005, Computer World, available at [http://www.computerworld.com/s/article/105790/Level\\_3\\_Cogent\\_resolve\\_peering\\_dispute\\_renew\\_deal](http://www.computerworld.com/s/article/105790/Level_3_Cogent_resolve_peering_dispute_renew_deal).

<sup>27</sup> See, e.g., Todd Underwood, *Wrestling With Zombies: Sprint Depeers Cogent, Internet Partitioned*, Oct. 31, 2008, Renesys.com, available at <http://www.renesys.com/2008/10/wrestling-with-the-zombie-spri/>. See also Philip J. Weiser, *The Future of Internet Regulation*, 43 U.C. Davis L. Rev. 529, 531-532 (2009).

Ever since, there have only been a handful of other, less disruptive public interconnection disputes between service providers.<sup>28</sup> In each of the instances since the 2008 Cogent-Sprint dispute, these negotiations have not resulted in service blackouts.<sup>29</sup> In most cases, federal regulators only weighed in indirectly (e.g., via public statements), opting instead to let market forces shape resolutions.<sup>30</sup>

Some recent interconnection negotiations, however, have provoked increased interest by the FCC, other federal policymakers, and those who advocate for a more robust FCC role in regulating the Internet, including the business arrangements impacting the delivery of content.<sup>31</sup> In particular, after recent negotiations between Netflix and several major ISPs regarding paid peering, the streaming video provider called for the implementation of rules – so-called “strong net neutrality” – that would essentially forbid paid interconnection arrangements.<sup>32</sup> Others have noted that various provisions of the Communications Act provide sufficient justification for the FCC to either reclassify certain elements of Internet service (i.e., “sender-side” traffic routed from edge companies to end-users via an ISP) as a common carrier, and thus subject it to expansive regulation by the Commission,<sup>33</sup> or to otherwise “compel[] interconnection on the Internet.”<sup>34</sup>

In many ways, these more recent disputes are similar to those that emerged in the mid-2000s. Growing asymmetries in traffic flows, whereby one entity (e.g., a CDN) sends significantly more traffic than it receives from another (e.g., an ISP), have led stakeholders on numerous occasions to revisit industry norms that long favored settlement-free peering. One key difference, however, is the scale of traffic that must be transmitted. At peak times of the day, streaming video via Netflix typically accounts for more than a third of Internet

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<sup>28</sup> For an overview, see generally Hal J. Singer, *Mandatory Interconnection: Should the FCC Serve as an Internet Traffic Cop?*, Progressive Policy Institute (May 2014), available at [http://www.progressivepolicy.org/wp-content/uploads/2014/05/2014.05-Singer\\_Mandatory-Interconnection\\_Should-the-FCC-Serve-as-Internet-Traffic-Cop.pdf](http://www.progressivepolicy.org/wp-content/uploads/2014/05/2014.05-Singer_Mandatory-Interconnection_Should-the-FCC-Serve-as-Internet-Traffic-Cop.pdf) (“Should the FCC Serve as an Internet Traffic Cop?”).

<sup>29</sup> *Id.* at p. 5.

<sup>30</sup> This is typically because the relevant actors in these disputes are classified as information services and thus subject to a mostly light-touch regulatory regime that has never contemplated an active role for the FCC vis-à-vis IP network interconnection. See generally *Should the FCC Serve as an Internet Traffic Cop?*. See also Kevin Werbach, *No Dialtone: The End of the Public Switched Telephone Network*, 66 Fed. Comm. L. J. 203, 240 (2014) (“No Dialtone”).

<sup>31</sup> See, e.g., Bryce Baschuk, *Wheeler: Peering Not a Net Neutrality Issue but FCC Spokesman Says it Will be Watched*, April 2, 2014, Bloomberg BNA, available at <http://www.bna.com/wheeler-peering-not-n17179889335/>; Press Release, *Statement by FCC Chairman Tom Wheeler on Broadband Congestion and Internet Congestion*, June 13, 2014, FCC, available at <http://www.fcc.gov/document/chairman-statement-broadband-consumers-and-internet-congestion> (announcing that the FCC would begin collecting information about recent interconnection arrangements between ISPs and major content providers).

<sup>32</sup> See Reed Hastings, *Internet Tolls and the Case for Strong Net Neutrality*, March 20, 2014, Netflix U.S. & Canada Blog, available at <http://blog.netflix.com/2014/03/internet-tolls-and-case-for-strong-net.html>.

<sup>33</sup> See Tejas N. Narechania & Tim Wu, *Sender Side Transmission Rules for the Internet*, Fed. Comm. L. J. (forthcoming), draft available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2447107](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2447107).

<sup>34</sup> *Should the FCC Serve as an Internet Traffic Cop?* at p. 2 (citing *No Dialtone*).

downloads in the U.S.<sup>35</sup> Together with services provided by Google, Apple, and Amazon, streaming media services can take up almost half of all Internet traffic during peak usage times.<sup>36</sup> ISPs and others have argued that such stark asymmetries warrant paid peering arrangements in order to offset some of the costs associated with delivering such large amounts of data to customers.<sup>37</sup> Conversely, network engineering experts have questioned actions by content companies like Netflix during and after its interconnection negotiations with ISPs. In particular, it has been argued that its paid peering arrangements with ISPs is similar to the many other transit and peering deals that the company and others like it have long had with other entities to deliver content to end-users.<sup>38</sup>

In the absence of regulatory intervention by the FCC, entities like Netflix, Google, and the full array of content providers have been able to develop and implement a range of strategies for ensuring that their content reaches end-users in a timely manner. For example, recognizing that existing pathways, especially major network interconnection points, are increasingly congested due primarily to underinvestment,<sup>39</sup> a growing number of companies that can afford to have opted to build proprietary CDNs and invest in interconnect arrangements with ISPs.<sup>40</sup> Many others have negotiated better peering and transit deals and otherwise worked to figure out ways of streamlining delivery of their content. That so many different options are available for entities throughout the ecosystem evidences a competitive marketplace for delivering content. To the extent that regulation or a “backstop” might be necessary, market conditions seem most amenable to self-governance.<sup>41</sup> Only when the market fails – i.e., when interconnection disputes result in harmful disruptions – should there be cause for formal regulatory intervention.<sup>42</sup>

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<sup>35</sup> See Drew Fitzgerald, *Netflix's Share of Internet Traffic Grows*, May 14, 2014, Wall St. Journal (citing data from Sandvine).

<sup>36</sup> *Id.*

<sup>37</sup> See, e.g., *Should the FCC Serve as an Internet Traffic Cop?*

<sup>38</sup> See, e.g., Dan Rayburn, *Netflix & Level 3 Only Tell Half the Story, Won't Detail What Changes they Want to Net Neutrality*, March 21, 2014, StreamingMediaBlog.com, available at <http://blog.streamingmedia.com/2014/03/netflix-level-3-telling-half-story-wont-detail-changes-want-net-neutrality.html>.

<sup>39</sup> See, e.g., Grant Gross, *Internet Traffic Congestion Real, but Sporadic, Study Says*, June 18, 2014, PCWorld.com, available at <http://www.pcworld.com/article/2365320/internet-traffic-congestion-real-but-sporadic-study-says.html> (citing data collected and analyzed by David Clark).

<sup>40</sup> For a general discussion of these trends, see DYNAMIC INTERNET at p. 55-68. For more specific examples, see, e.g., Mitch Wagner, *Apple Launches 'Massive' CDN – Report*, July 31, 2014, LightReading.com, available at [http://www.lightreading.com/video/content-delivery-network-\(cdn\)/apple-launches-massive-cdn---report/a/d-id/710203?](http://www.lightreading.com/video/content-delivery-network-(cdn)/apple-launches-massive-cdn---report/a/d-id/710203?) (noting that Apple “is using the CDN to deliver some of its own content directly to consumers, with direct access to ISP networks.”); Jon Brodtkin, *See Which ISPs Google, Microsoft, and Netflix Trade Internet Traffic With*, May 21, 2014, Ars Technica, available at <http://arstechnica.com/information-technology/2014/05/see-which-isps-google-microsoft-and-netflix-trade-internet-traffic-with/>.

<sup>41</sup> See, e.g., *Future of Internet Regulation* (proposing a self-regulatory model).

<sup>42</sup> See, e.g., DYNAMIC INTERNET at p. 134 (arguing that dynamism throughout the Internet ecosystem means that “policymakers should be careful not to lock the Internet into any particular infrastructure, and not to reflexively regard deviations from the status quo as inherently anticompetitive.”).

## FOUNDATIONAL PRINCIPLES

The preceding discussion supports several foundational principles, which are respectfully offered to the Committee as it contemplates reforms impacting network interconnection and related issues. In particular, any new policies that might emerge from Congressional reform efforts should seek to:

- ***Support continued flexibility vis-à-vis forging business relationships impacting the delivery of data to end-users.*** To date, stakeholders throughout the Internet ecosystem have benefited from having broad latitude to devise appropriate strategies for routing data traffic and entering into relationships with the diverse range of entities that work together to deliver content to end-users. Accordingly, Congressional reform efforts should seek to enshrine or otherwise assure that stakeholders will continue to have sufficient flexibility in order to support continued business model experimentation and promote, rather than constrain, innovation in how firms collaborate in the transmission of content across networks. Indeed, as the ICC example above demonstrated, implementing and having to maintain a comprehensive regulatory framework in this type of context is often counterproductive and costly for firms and consumers.
- ***Articulate a default preference for market-driven solutions to any problems that might arise during interconnection negotiations.*** In addition to assuring continued flexibility for business model experimentation going forward, Congress should also seize the opportunity to articulate a preference for market-driven solutions to any problems that might arise during interconnection negotiations. To date, this dynamic has prevailed – the absence of formal FCC intervention has not precluded timely resolution of interconnection disputes. Indeed, its absence has arguably facilitated more beneficial outcomes for the entities involved and for consumers.<sup>43</sup> To the extent that a more formal structure might be needed, Congress should clearly articulate the scope of possible FCC action to address interconnection disputes or related issues. Foremost among the actions that Congress might empower the FCC to undertake could be the convening of a self-regulatory body that would be responsible for monitoring negotiations, memorializing industry norms and best practices, and issuing advisories regarding possible methods for resolving disputes. If these processes prove inadequate, then Congress could revisit its framework and adjust accordingly.
- ***Craft clear and precise legislative language impacting interconnection and the scope of authority delegated to the FCC and the states.*** As discussed in previous comments, it is essential that any new laws that might emerge from Congressional reform efforts be as precise and clear as possible, especially with respect to delegations of authority the FCC and/or state regulators.<sup>44</sup> Failure to do so – or to

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<sup>43</sup> See, e.g., *Should the FCC Serve as an Internet Traffic Cop?*

<sup>44</sup> See *Response to Congressional White Paper #3* at p. 10-18; Charles M. Davidson & Michael J. Santorelli, *Response to Congressional White Paper #2*, at p. 10-13, ACLP at New York Law School (April 25, 2014),

build in sunset clauses or similar language that would trigger further updates<sup>45</sup> – could result in unintended consequences or broad interpretations of ambiguous provisions that could, in practice, yield nearly unfettered regulatory authority for the FCC or unintended regulatory authority for state regulatory entities. With federal courts increasingly willing to defer to administrative agency interpretations of their enabling statutes, such outcomes are likely and will likely be counterproductive to realizing federal imperatives for broadband going forward.<sup>46</sup>

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available at [http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP2\\_Responses\\_1-13.pdf](http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP2_Responses_1-13.pdf); Charles M. Davidson & Michael J. Santorelli, *Response to Congressional White Paper #1*, at p. 13-16, ACLP at New York Law School (Jan. 31, 2014), available at [http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP1\\_Responses\\_1-20.pdf](http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP1_Responses_1-20.pdf).

<sup>45</sup> See, e.g., *Response to Congressional White Paper #3* at p. 11-12.

<sup>46</sup> See *supra*, note 12, for additional discretion.



Date: August 7, 2014

To: Committee on Energy and Commerce,  
United States House of Representatives

From: Richard Bennett, Visiting Fellow, American Enterprise Institute,  
Washington, DC

Subject: Modernizing America's Network Interconnection Policy

This is in response to your eight questions on Network Interconnection policy raised by your White Paper.

- 1. In light of the changes in technology and the voice traffic market, what role should Congress and the FCC play in the oversight of interconnection? Is there a role for states?*

Network interconnection consists of two parts: A) Technical interconnection of networks of similar technology; and: B) Two or more systems of money transfer overlaid on technical interconnection to pay for service costs. The technical part consists of agreements as to the time, place, and quality of the interconnection service, and the financial part is an amalgam of voluntary agreements in some cases and government mandates in others. These agreements vary by technology:

- The PSTN uses interconnection fees to transfer money from urban users to rural operators in order to pay for Universal Service. Additionally, PSTN interconnections fees between nations are the subject of treaties.
- Broadband Operators use interconnection fees to pay for bandwidth costs and upgrades. Interconnection fees enable predictable service upgrade in the right times and places.
- Mobile Broadband operators use interconnection fees to cover service costs of data roaming agreements. Roaming fees provide universal service in markets that would have one provider or fewer without them.
- Cable TV services use something similar to interconnection fees (retransmission consent agreements) to pay for content production and advertising revenue distribution. Retransmission consent ensures that new content will be created.
- Hypothetically, Broadband Operators could also charge interconnection fees to providers of innovative new services that are impractical under current Internet norms, such as multi-user video conferencing over residential connections. This does not occur in the U. S. because the FCC's long-running

(and unsuccessful) effort to discourage engineering progress in the Internet ecosystem in the name of “net neutrality” has discouraged such innovation. This unfortunate side-effect of the net neutrality campaign should be identified and halted.

As the voice, video, broadband, and mobile networks converge to a common infrastructure, public policy should facilitate the use of common physical facilities. Policy should also encourage growth in the number and quality of interconnection facilities. The best way to ensure such progress is to decouple universal service subsidies from interconnection agreements. This step will help to ensure that interconnection facilities modeled on the Internet’s peering centers, Internet Exchange Points, and local Ethernet Exchanges will continue to flourish.

Each state should have at least two general-purpose commercial Network Interconnection Centers to all networks with the size and scope to interconnect with each other as peers or as paying customers. To the extent that Universal Service funds are needed to pay for network expansion into uneconomic areas, such funds should be raised from the taxpayers and distributed according to need, merit, and taxpayer protection. As the cost of communication technology continues to fall, many areas that require subsidy today will not need it tomorrow.

It’s reasonable to dispense Universal Service funds to states as block grants based on rural population with minimal federal oversight.

- 2. Voice is rapidly becoming an application that transits a variety of network data platforms. How should intermodal competition factor into interconnection mandates? Does voice still require a separate interconnection regime?*

Voice is simply an application on today’s data networks, but it’s one with a set of needs that are quite distinct from web browsing. Similarly, video streaming and conferencing are data applications, each with its own needs. Providing for this diverse set of applications on a common network platform implies an ability that does not exist in today’s Internet, that of the application to communicate its needs to the network and for the network to carry out the transmission of data according to the application’s needs at a price agreeable to both the user and the network operator.

In the absence of this feature, network operators build separate network facilities – most of them using Internet Protocol over MPLS – to meet application needs by over-provisioning. It would be more beneficial to build a common network platform with greater flexibility and to re-located price bargaining from its current network-to-network locus to an application-to-network locus. The current regime charges the wrong user for the wrong thing, which does not stimulate progress. A more cost-based system provides incentives to upgrade quality.

As indicated in the answer to question 1, a reform of the Universal Service mechanism is needed.

- 3. How does the evolution of emergency communications beyond the use of traditional voice service impact interconnection mandates?*

Advanced emergency communication – the ability to communicate dynamic location information, video streams, and text messages – bears to a great extent on the willingness of public safety to evolve its systems to keep up with the times. In reality, public safety has no needs that are not shared by many commercial interests; the economy is not short on enterprises that need resilient, reliable, high-capacity and low latency networks. Legitimizing these needs across the board benefits the entire economy and is the best way to encourage public safety to move forward.

- 4. Ensuring rural call completion has always been a challenge because of the traditionally high access charges for terminating calls to high-cost networks. Does IP interconnection alleviate or exacerbate existing rural call completion challenges?*

IP technology, as currently employed, is inefficient for rural call completion but highly efficient for meeting the broader communication needs of rural America, such as mobile voice, video, and data. But most of the problems with rural call completion are financial rather than technical.

- 5. Should we analyze interconnection policy differently for best-efforts services and managed services where quality-of-service is a desired feature? If so, what should be the differences in policy between these regimes, and how should communications services be categorized?*

Rather than re-creating traditional regulatory silos by distinguishing best-efforts from other forms of prioritization, the Committee should move forward with a policy framework that promotes the provision of diverse services on a common foundation. This can best be achieved by relying on industry self-regulation and industry norms development in favor of bureaucratic micro-management.

Communications services are largely interchangeable and increasingly based on Internet Protocol. Section 706 of the 1996 Telecommunications Act directs the FCC to take all necessary steps toward the diffusion of advanced communication networks. This mandate should be understood as pertaining to advanced mobile and stationary networks built on a common IP foundation and offering increasingly powerful capabilities at higher speeds and for lower prices over time.

The FCC's current passion for net network actually prevents the agency from fulfilling its Section 706 mandate and should be set aside to the extent that it interferes with network progress.

6. *Much of the committee's focus in the #CommActUpdate process has been on technology-neutral solutions. Is a technology-neutral solution to interconnection appropriate and effective to ensure the delivery and exchange of traffic?*

Yes.

7. *Wireless and Internet providers have long voluntarily interconnected without regulatory intervention. Is this regime adequate to ensure consumer benefit in an all-IP world?*

Yes.

8. *Is contract law sufficient to manage interconnection agreements between networks? Is there a less onerous regulatory backstop or regime that could achieve the goals of section 251?*

Section 251 is best regarded as a transitional step between the highly regulated Bell System monopoly that prevailed before divestiture and the highly competitive market to come, in which voice is simply one among many applications that facilitate interpersonal communication. Voice services have no more intrinsic need for micromanagement by government bureaucrats than do email, text messaging, or Twitter does.

Section 251 should sunset along with the PSTN, and interconnection between broadband data networks using Internet Protocol should be allowed to continue to function as it always has, overseen by multi-stakeholder organizations and individualized bargaining between network operators. If it ain't broke...

Thank you,

Richard Bennett

Visiting Fellow, American Enterprise Institute  
Editor, High Tech Forum  
Email: [REDACTED]

August 8, 2014

Hon. Fred Upton  
Chairman  
Energy and Commerce Committee  
US House of Representatives  
2125 Rayburn House Office Building  
Washington, DC 20515

Hon. Greg Walden  
Chairman  
Communications and Technology Subcommittee  
Energy and Commerce Committee  
US House of Representatives  
2125 Rayburn House Office Building  
Washington, DC 20515

*Re: Comments on Network Interconnection in Communications Markets*

Thank you for the opportunity to respond to your inquiry on an update of the Communications Act. Your latest inquiry asks the public to comment specifically on the question of peering and interconnection in communications markets, and on the role of government in regulating these agreements.

I have written extensively on these issues in several contexts, including with regard to wireline and wireless interconnection mandates of various kinds, as well as proposals to extend interconnection mandates to the IP environment in one form or another. I have provided a copy of my AEI monograph on *Broadband Competition in the Internet Ecosystem* in response to your previous requests for comments, and note that much of that paper addresses issues relevant to your current inquiry.

More recently, in December 2013, I was among 14 economists who wrote to newly-confirmed FCC Chairman Tom Wheeler expressing our views on competition issues likely to arise during his tenure. A copy of that letter is attached. In pertinent part, it reads as follows:

One serious threat to continued innovation and dynamism in the communications sector is the potential for public-utility style regulation to be imposed on IP networks in the form of mandatory interconnection requirements.

Economic theory predicts that the incentive issues associated with interconnection among traditional telephone networks are unlikely to be present in IP-based networks, and these theoretical predictions are supported by two decades of empirical evidence: Since its inception in the 1990s, the modern commercial Internet has functioned remarkably well without mandatory interconnection requirements. There are virtually no significant instances of traffic being blocked

or delayed as a result of failures to interconnect. At least equally important, the peering and transit regime has responded to changing market and technological conditions through continuous, transformational change.

The success of the Internet's voluntary interconnection regime stands in stark contrast to the distortionary, inflexible regulatory regimes that have governed interconnection in the POTS world. Simply put, regulators lack the information necessary to set efficient interconnection prices and the flexibility to adjust them in the face of changing market conditions, leading to inefficient market structures, misallocated investment, arbitrage schemes, and regulatory gamesmanship.

Allowing even "weak form" interconnection mandates to spill over onto the Internet would distort market outcomes and limit innovation. Moreover, since the Internet is global in scope and scale, any interconnection mandate imposed by the U.S. would invite involvement by international regulators, many of whom would surely welcome U.S. support for the principle of regulating interconnection of IP networks.

In summary, both economic theory and a large body of real-world experience demonstrate that the potential costs of prophylactic imposition of mandatory IP interconnection are very high, while the benefits likely are non-existent.

The most important point I would ask you to consider is that, while interconnection mandates may appear at first blush to be costless, they are not. Rather, as with virtually every other economic institution or arrangement, interconnection has costs as well as benefits. Such costs may take the form of reduced incentives for network owners to invest in their networks,<sup>1</sup> the loss of specialization that accompanies forced standardization, or various other forms. That is why interconnection and interoperability are not ubiquitous – why all applications that run on Android devices don't also run on Microsoft's, why Playstation games can't generally be used on Nintendo devices, why Skype is not fully interconnected with Facetime, etc. In the Internet environment, the value of interconnection is very high – which is why, again, IP interconnection has been both ubiquitous and voluntary from the Internet's inception – but that does not mean that interconnection is always the right answer.

The question for policymakers is whether the task of balancing the benefits of interconnection against the costs should as a general matter be made by administrative process, or by the marketplace. As suggested in the letter to Chairman Wheeler quoted above, a simple comparison – between the successful voluntary regime that has governed the Internet and the terribly flawed and politicized POTS interconnection regime overseen by the FCC – should be all it takes to answer the question.

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<sup>1</sup> See e.g., Jeffrey A. Eisenach, The Nature of Wireless Competition, TechPolicyDaily.com (January 6, 2014) (available at [www.techpolicydaily.com/communications/nature-wireless-competition/](http://www.techpolicydaily.com/communications/nature-wireless-competition/)).

I thank you again for the opportunity to submit comments to the Committee, and applaud your initiative to review and replace the Communications Act. I remain at your service to discuss ideas and answer any questions you might have.

Respectfully,

Jeffrey Eisenach

Visiting Scholar, Director for the Center for Internet, Communications, and Technology Policy  
American Enterprise Institute

Attachment

December 11, 2013

Hon. Tom Wheeler  
Chairman  
Federal Communications Commission  
445 12th Street S.W.  
Washington, DC 20554

Re: *Economic Evidence on Competition in Communications Markets and Implications for Key Policy Issues*

Dear Chairman Wheeler:

Congratulations on your confirmation as Chairman of the Federal Communications Commission. As economists who study and write about communications policy and regulation,<sup>1</sup> we agree with your comment during your confirmation hearing that “the role of the FCC has evolved from acting in the absence of competition to dictate the market, to promoting and protecting competition with appropriate oversight.” The economic evidence on this point is clear: in all but a few areas, communications networks no longer have the characteristics of natural monopolies, and should no longer be regulated as public utilities. Indeed, the convergence of the communications sector into the dynamic, intensely competitive Internet ecosystem is now virtually complete.

We write because we believe these economic facts have important implications for some of the key challenges facing you and the Commission in the months and years ahead.<sup>2</sup>

To begin, the emergence of robust competition does not obviate the need for consumer-welfare-focused, economically-informed antitrust oversight where residual monopoly power remains. Further, in areas such as consumer protection, public safety, spectrum management, and universal service, government involvement – whether by the Commission or by other appropriate state or Federal agencies – will continue to be appropriate. Even in these areas, however, economic analysis and market-based approaches can lead to better policy outcomes. The question, in other words, is not whether there is a role for government, but what specific policies should be pursued to maximize consumer welfare now and in the future.

This letter addresses this question in three parts. First, we summarize the economic evidence with respect to the overall competitiveness and performance of the communications sector. Next, we discuss the implications of the current competitive landscape for three major areas of policy: (a) regulation of IP networks and interconnection; (b) vertical issues, including net

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<sup>1</sup> None of us have been compensated by any client for participating in this effort.

<sup>2</sup> Each of us shares the overall views and primary conclusions expressed herein, though as individuals we each reserve the right to use different wording or characterize particular points differently and, of course, to change our opinions on the basis of new facts which may present themselves in the future.

neutrality; and (c) spectrum policy. Third, we offer a few broader observations about the importance of allowing markets to supplant regulation in defining the future of the communications sector.<sup>3</sup> References to a sampling of studies that provide empirical support for the conclusions below are attached.

### The Communications Sector Is Vigorously Competitive

In August 1999, Chairman William Kennard released a *Draft Strategic Plan for a New FCC for the 21<sup>st</sup> Century*. Its first sentence reads as follows: “In five years, we expect U.S. communications markets to be characterized predominately by vigorous competition that will greatly reduce the need for direct regulation.”

The economic evidence that communications markets are now “vigorously competitive” is incontrovertible. The vast majority of Americans have access to multiple high speed broadband providers, multiple sources of digital video, and multiple providers of mobile wireless services. Communications firms have invested hundreds of billions of dollars in wireline and wireless networks (satellite as well as terrestrial), resulting in dramatic improvements in the capacities and capabilities of America’s communications networks. American wireless networks are unarguably the most advanced in the world, and more than 85 percent of U.S. households are passed by wireline networks capable of download speeds in excess of 100 Mbps. Competition in all of these markets is dynamic and intense. In many areas of the United States, less than one third of all households are still connected to the traditional wireline telephone infrastructure – i.e., the “natural monopoly” the FCC was created to regulate.<sup>4</sup> Three of out of four households, on the other hand, have broadband Internet connections, which have been virtually exempt, up until now, from economic regulation.

Most importantly, the communications sector has now converged so thoroughly with the rest of the Internet ecosystem that it has become difficult to draw clear boundaries. Where does a content delivery network stop and the “telecommunications infrastructure” begin? What is a “telecommunications service” in a world in which more traffic travels over Skype and FaceTime than over the Public Switched Telephone Network? How much monopoly power does a wireless carrier have in a world in which consumers’ choices are driven at least as much by devices, operating systems and applications ecosystems as by coverage and pricing plans? None of the markets that make up the Internet ecosystem fits the model of atomized, commoditized “perfect competition” described in introductory economics textbooks – but all of them, communications no less than the others, are “vigorously competitive.”

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<sup>3</sup>To ensure compliance with the Commission’s rules, we are filing this letter as an *ex parte* comment in the following proceedings: WC Docket No. 12-268; WC Docket No. 12-269; GN Docket No. 09-191; WC Docket No. 07-52; GN Docket No. 10-127; and, GN Docket No 12-353.

<sup>4</sup> For example, AT&T reports that fewer than 15 percent of homes in Florida and Michigan are still connected to the PSTN; Verizon reports that only about one million (out of 17 million) homes in its FiOS footprint are connected to copper. We acknowledge that there are pockets of the country where residents have limited choices in wireline broadband networks capable of achieving speeds in excess of 6 Mbps. But with the coming advances in wireless and satellite broadband services, the opportunity for any targeted exercise of market power is remote. Rather than regulating carriers who have deployed high-speed networks in those areas, a better approach is to create a regulatory climate in which entrants are encouraged to expand their networks.

## POTS-style Interconnection Regulation Should Not Be Imposed on IP Networks

One serious threat to continued innovation and dynamism in the communications sector is the potential for public-utility style regulation to be imposed on IP networks in the form of mandatory interconnection requirements.

Economic theory predicts that the incentive issues associated with interconnection among traditional telephone networks are unlikely to be present in IP-based networks, and these theoretical predictions are supported by two decades of empirical evidence: Since its inception in the 1990s, the modern commercial Internet has functioned remarkably well without mandatory interconnection requirements. There are virtually no significant instances of traffic being blocked or delayed as a result of failures to interconnect. At least equally important, the peering and transit regime has responded to changing market and technological conditions through continuous, transformational change.

The success of the Internet's voluntary interconnection regime stands in stark contrast to the distortionary, inflexible regulatory regimes that have governed interconnection in the POTS world. Simply put, regulators lack the information necessary to set efficient interconnection prices and the flexibility to adjust them in the face of changing market conditions, leading to inefficient market structures, misallocated investment, arbitrage schemes, and regulatory gamesmanship.

Allowing even "weak form" interconnection mandates to spill over onto the Internet would distort market outcomes and limit innovation. Moreover, since the Internet is global in scope and scale, any interconnection mandate imposed by the U.S. would invite involvement by international regulators, many of whom would surely welcome U.S. support for the principle of regulating interconnection of IP networks.

In summary, both economic theory and a large body of real-world experience demonstrate that the potential costs of prophylactic imposition of mandatory IP interconnection are very high, while the benefits likely are non-existent.

## Vertical Practices Should Be Addressed on a Case-by-Case Basis

The *Open Internet Order* applies an *ex ante* approach to the regulation of vertical conduct by effectively prohibiting priority delivery arrangements. A better approach would be to permit new forms of contracting, and to police any abuses after the fact.

High tech industries, including those that make up the Internet ecosystem, have several characteristics -- including high rates of investment and R&D, large fixed costs, product differentiation, network effects, multi-sidedness and strong complementarities -- which tend to make economic analysis of particular business practices highly fact dependent: The effects of a particular practice are intrinsically dependent on the circumstances of the market at issue. Moreover, because market circumstances in the IT sector are constantly evolving, even conduct

that is harmful at one point may, a few years or even months later, be efficiency-enhancing and pro-competitive.

The upshot of these economic realities is that *ex ante* regulation of vertical conduct – i.e., blanket prohibitions on certain types of business practices – necessarily will yield a high incidence of Type II error: The well-intentioned but counterproductive prohibition of conduct that is actually welfare-enhancing. Accordingly, such regulations – including the *Open Internet Order* – are very likely to generate greater costs than benefits. The economic evidence is clear: Vertical practices, whether in the broadband space or in other areas (e.g., access to content and programming) should be policed on a case-by-case basis, not through prescriptive regulations or categorical bans on particular forms of conduct.<sup>5</sup> Indeed, the Commission has correctly tolerated vertical integration and market-based contracting in the cable television industry, recognizing that the efficiencies outweigh the costs relating to potential discriminatory acts, which can be mitigated with *ex post* review of any claimed abuses. The same types of tradeoffs are at issue for the Internet. While we recognize that the *Open Internet Order* is before the courts, we hope you will take these considerations into account in thinking about how, if it is upheld, the *Order* is enforced or, if it is not, how best to proceed.

#### The Commission Should Continue to Expand the Role of Markets in Allocating Spectrum

A dozen years ago, a group of 37 “concerned economists” (including some of us) submitted a filing in the Commission’s secondary markets proceeding urging the Commission “to adopt market-oriented rules opening the radio spectrum and capturing its full potential for society.”<sup>6</sup> We continue to support the expansion of market-based mechanisms for the allocation and reallocation of spectrum and urge the Commission to redouble its efforts in this regard.

The market-oriented spectrum policy reforms adopted by the Commission over the course of the past two decades have generated enormous benefits for consumers, and are one of the main reasons the U.S. now has the world’s most advanced mobile wireless services. Market-based spectrum allocation has allowed spectrum to flow away from inefficient uses to more highly valued ones and thus made possible the explosive growth of mobile broadband.

While not all of us felt that the incentive auction mechanism was the best or only choice for reallocating spectrum from broadcasting to mobile broadband, we all support the principle (embodied in the incentive auction mechanism) of voluntary exchange leading to efficient reallocation, and we all agree with the goal of transferring spectrum from the inflexible broadcast licensing regime to the far more flexible, secondary-market-friendly regime that governs mobile broadband. We urge you to make the success of the incentive auction a top priority.

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<sup>5</sup> See e.g., *Comments of Jerry Brito et al, Net Neutrality: The Economic Evidence, In the Matter of Preserving the Open Internet* (GN Docket 09-191; April 10, 2010) (available at <http://apps.fcc.gov/ecfs/document/view?id=7020408753>).

<sup>6</sup> See *Comments of 37 Concerned Economists, In the Matter of Promoting Efficient use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets* (WT Docket 00-230, February 7, 2001) (available at <http://apps.fcc.gov/ecfs/document/view?id=6512460886>).

In that context, it has been suggested that the auction be used to try to affect the structure of the mobile wireless market, either by restricting participation by some firms or by providing artificial advantages to others. We do not believe the Commission can, through economic analysis or otherwise, accurately predict the most efficient structure of the market for mobile wireless services (which may depend, for example, on the extent to which the wireless and wireline broadband markets converge); and we note that the use of eligibility restrictions and similar rules in prior auctions has resulted in delays and market distortions. By imposing such restrictions, prior auction policy has presumed that “more carriers are always better,” despite the growing importance of economies of scale in providing wireless networks and the growing demands on wireless networks from bandwidth-intensive applications. Economic research has shown such restrictions can be harmful, and the Commission should refrain from imposing such rules in the incentive auction.

More generally, we reiterate the advice proffered by our 37 colleagues more than a decade ago: The Commission should “seek not to create secondary markets directly but instead to institute rules permitting such markets to emerge,” “relax[] restrictions on the use of radio spectrum by both current licensees and new entrants,” and “eliminate all wireless license requirements unrelated to interference or anti-competitive concentration.”

#### The Internet Should Not Become a “Regulated Industry”

In closing, we return to a theme introduced above – the convergence of the communications sector with the Internet ecosystem.

As a veteran of the telecommunications policy arena, you know more than most about the political economy of regulation: the pressures brought by various interest groups to use regulatory means to achieve private ends; the bias thereby created in favor of regulatory expansion; the inherent cumbersomeness of the regulatory process; the inertia and inflexibility of regulations once put in place.

In the mid-1990s, the Clinton Administration elected to privatize the operation and governance of the Internet and to refrain from imposing industry specific regulation on broadband. These choices, combined with a series of decisions by the Commission over the course of many years (e.g, the three *Computer Inquiries*, the *Broadband Over Cable Order*) have allowed the evolution of the Internet ecosystem to be guided largely by market forces. Very few economists now challenge the wisdom of this course, or question the tremendous benefits it has created in economic terms and for the larger public interest.

The choices now before the Commission, including but by no means limited to the issues discussed above, will determine whether the Internet continues to be guided by market forces or, alternatively, whether the results of free interaction between consumers and producers will be supplanted by the preferences of regulators, using a regulatory system designed for a different industry in a different time. From an economic perspective, the costs of allowing the Internet to be transformed into a “regulated industry” would be tremendous.

We appreciate your attention to these thoughts, and wish you every success in your tenure as Chairman.

Respectfully,

Robert D. Atkinson  
Information Technology and Innovation Fndn.

Robert W. Hahn  
University of Oxford

Kevin W. Caves  
Navigant Economics

Kevin A. Hassett  
American Enterprise Institute

Robert W. Crandall  
Brookings Institution

Steve Pociask  
American Consumer Institute

Wayne Crews  
Competitive Enterprise Institute

Hal J. Singer  
Navigant Economics

Everett Ehrlich  
ESC Inc.

Timothy J. Tardiff  
Advanced Analytical Consulting Group

Jeffrey A. Eisenach  
American Enterprise Institute

Leonard Waverman  
Berkeley Research Group

Gerald Faulhaber  
Wharton School, University of Pennsylvania

Dennis L. Weisman  
Kansas State University

c: Hon. Mignon Clyburn  
Hon. Michael O’Rielly  
Hon. Ajit Pai  
Hon. Jessica Rosenworcel

\* Affiliations listed for identification purposes only.

## ATTACHMENT

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**Network Interconnection**  
**House Committee on Energy & Commerce**  
**August 8, 2014**

AT&T welcomes the opportunity to address the Committee’s questions about the approach that Congress should take toward the regulatory framework surrounding network interconnection in reforming the Communications Act in light of dramatic ongoing and rapid technological advances. As the White Paper recognizes, the communications market has changed dramatically since the 1996 Act and “[t]he historic, ‘natural’ monopoly that justified special rules to govern [incumbent local exchange carriers] has faded in the years since 1996; there is inarguably more competition in the voice market today.” As the Public Switched Telephone Network (PSTN) sunsets and Internet Protocol (IP) networks become the ubiquitous platform for communications and entertainment, “interconnection for the exchange of voice traffic,” which has been the focus of legacy interconnection and intercarrier compensation rules, will diminish significantly in practical importance. Instead, in this era of convergence, providers will interconnect for the exchange of IP packets, of which voice-bearing packets will be but a small subset. Continued reliance on market forces, which have successfully guided the thousands of Internet interconnection arrangements since the inception of the commercial Internet, will best ensure the efficiency and growth of those traffic exchange arrangements going forward, rather than intrusive and often counter-productive regulatory oversight that too frequently leads to unintended consequences that can take years to remedy.

Data, video and voice flow over wireline networks, cable networks, wireless and, increasingly satellite networks. The underlying network, whatever its form, is merely the medium for delivering IP services that continue to evolve at breakneck speed. Voice, video conference, video entertainment, ultra-high-bandwidth data services, gaming traffic – they all travel over each of the various network infrastructures. Gone are the days, on which the old rules were premised, when there was a single network dedicated to voice and on which regulators could focus in imposing interconnection obligations. In the converged, IP world, bits truly are bits. Whatever the service, the constituent bits all travel across interchangeable networks. And these networks have efficiently grown to be robust and redundant, serving virtually every corner of the country, through commercial agreement and without regulatory intervention. In crafting a new Communications Act, we respectfully suggest that Congress continue the hands-off approach to interconnection that has yielded the networks that we have today.

**1. In light of the changes in technology and the voice traffic market, what role should Congress and the FCC play in the oversight of interconnection? Is there a role for states?**

- For the past two decades, the traffic exchange agreements that enable information-bearing IP packets to travel between two different IP networks have taken the form of commercially-negotiated bilateral peering and transit<sup>1</sup> contracts. Those private

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<sup>1</sup> Peering is an arrangement whereby two networks voluntarily interconnect to exchange traffic between their respective customers pursuant to a barter transaction. Transit is a service whereby a network provides another entity access to the entire Internet for a negotiated fee.

agreements have always been unregulated, and their inherent adaptability and flexibility underpin the phenomenal success of the modern Internet, where millions of Internet users engage in data and voice communications every day.

- Given this resounding success, there is no plausible basis for concluding that commercially-based traffic exchanges between IP networks will be any less efficient in the future than they have been for the past two decades or that they will be any more in need of prescriptive regulation. In fact, as we have learned during years of regulated intercarrier compensation arrangements, and the ongoing efforts to adapt those regulations to fast-changing market realities, the application of prescriptive forms of regulation to competitive markets is harmful. Rather than helping, regulations, especially those that purport to apply different rules based on the type of traffic that is involved, have encouraged arbitrage activity and discouraged the type of infrastructure investment that directly benefits consumers.<sup>2</sup> And because the arbitrage opportunity is enabled by, and can even be guaranteed by, those regulations, eliminating them takes government action that has literally taken more than a decade, and continues today. Commercial arrangements are a much more flexible and efficient means of addressing uneconomic and irrational behavior.
- The same harms would be inherent in any regulation of IP-to-IP interconnection arrangements, for several reasons. First, it would subject IP traffic exchanges, for the first time, to the hornet's nest of regulatory controversies that have long beset the PSTN. For example, such regulation inevitably would tempt many carriers to play the "regulatory card" in what heretofore had been purely commercial negotiations, thus miring the industry in intractable disputes about whether ever-evolving forms of IP-to-IP interconnection should be considered to be outside the Internet (and thus presumably subject to some form of regulatory oversight) or instead considered to be part of the (long-unregulated) system of Internet peering and transit agreements. Such regulation would also distort the natural development of the Internet, as the uncertainty and delays that are inherent in any regulatory process skew investment incentives and decisions, thus stifling innovation.
- Second, the strong trend in the IP ecosystem is toward convergence, and indeed the Internet already carries countless "over-the-top" Voice over Internet Protocol (VoIP) calls without any regulatory oversight. But adopting different regulatory treatment for IP packets carrying "voice" content would artificially impede prospects for integrating such packets with Internet traffic more generally. Determining whether a particular packet, or stream of packets, contains the specific type of "voice" content to be regulated – and not other categories of unregulated voice, video, or data content

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<sup>2</sup> See Developing a Unified Intercarrier Compensation Regime, CC Docket 01-9, Further Notice of Proposed Rulemaking, 20 FCC Rcd 4685, ¶147 (2005) ("These regulatory distinctions provide an opportunity for regulatory arbitrage activities, and distort the telecommunications markets at the expense of healthy competition. "); *see also* Separate Statement of Commissioner Michael J. Copps ("Our intercarrier compensation system is Byzantine and broken. We have in place today a scheme under which the direction and amount of payments vary depending on whether carriers route traffic to a local provider, a long distance provider, an Internet provider, a CMRS carrier or a paging provider. In a marketplace defined by convergence and technological change, this hodgepodge of rates looks more like an historical curiosity than a rational compensation system.")

- would generate endless technical and regulatory disputes and mire the industry in years of litigation.
- Finally, just as troubling, any *U.S.* regulation of IP-to-IP interconnection would encourage *foreign* authorities, acting through the International Telecommunication Union (ITU), to begin regulating Internet peering and transit in opposition to U.S. interests.
  - These harmful consequences from exposing the Internet to a legacy regulatory system are not counter-balanced by any obvious, provable benefits. To the contrary, these harms would be inflicted needlessly, because market forces already are producing efficient traffic exchanges on their own. The phenomenal and continuing success of the Internet confirms that conclusion as an empirical matter.
  - Even the principal *theoretical* basis for imposing interconnection rules on the PSTN is inapplicable to the IP ecosystem: there is no “terminating access monopoly” on the Internet. In part, because IP technology is distributed and packet-switched, indirect interconnection (via transit links) has always been the predominant form of interconnection on the Internet. And the multiplicity of alternative transit routes into a given Internet Service Provider’s (ISP) network, combined with the interdependence of every IP network on every other, deprives any individual ISP of the ability to coerce inefficiently high payments from any other IP network. Under their negotiated interconnection agreements, ISPs accept aggregated traffic coming over their interconnection links, without regard to its type, source or destination. ISPs do not sort or filter this incoming traffic in a manner that would somehow allow them to attempt to extract additional fees from a particular party trying to reach their subscribers. Moreover, because Internet interconnection arrangements are bilateral commercial agreements, there is no government-enforced tariff that can force parties to pay for the exchange of traffic regardless of whether they agree with the other party’s terms or not. As such, Congress should recognize the success of the commercial model for interconnection utilized to exchange Internet traffic, allow voice services to converge with data and the market to evolve on its own without stifling regulation. Indeed, importing common carrier style interconnection obligations to IP interconnection would make matters worse, not better.<sup>3</sup>
  - To the extent that a new statutory framework envisions a role for the FCC in competition policy, it should be transformed and narrowed so that the agency’s existing focus on developing prescriptive rules and managing tariffs is replaced by the market oversight, or case-by-case adjudicatory, model that the Federal Trade Commission employs to address specific anticompetitive behavior. Intervening in a competitive market through prescriptive, economic rulemaking distorts competition, encourages arbitrage and runs a serious risk of suppressing investment and stifling innovation.
  - Of course, as we have indicated in our previous responses to the Committee, the FCC has an important oversight role to play in facilitating the transition to an all-IP world,

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<sup>3</sup> For example, in the FCC’s CLEC Access Charge Order, the FCC itself acknowledged that the problem underlying the CLEC access charge controversy arose from application of [Title II] regulation – not from free market dynamics. *See* Seventh Report and Order, *Access Charge Reform*, 16 FCC Rcd 9923, 9924-25 ¶2 (2001) (“[W]e limit the application of our tariff rules to CLEC access services in order to *prevent use of the regulatory process* to impose excessive access charges on IXCs and their customers.”) (emphasis added).

given its historical oversight of the PSTN and associated telecommunications services. However, this role must adapt to the realities of IP platforms and services. Unlike interconnection for last century's circuit-switched, Time Division Multiplexing (TDM) voice traffic, VoIP interconnection will not respect LATA (or even state) boundaries; instead, while the specific arrangements between individual IP networks may vary, the future of interconnection will involve the exchange of traffic over broader regional, national, or global areas and at perhaps only a handful of geographic locations across the country (or the globe). In a system in which traffic is exchanged primarily at a handful of peering points in the U.S., and that traffic is destined for recipients throughout the U.S. and around the globe, there can be no meaningful role for individual states to regulate interconnection. Indeed, the broad geographic scope and competitive nature of IP-to-IP interconnection, undergirded by a dynamic market for peering and transit, explains why regulation has never been necessary to ensure such interconnection on the Internet, even between ISPs of radically differing size. As voice migrates to the IP platform, any new framework should continue to follow a light regulatory oversight role where intervention only occurs in the case of a demonstrated market failure.

**2. Voice is rapidly becoming an application that transits a variety of network data platforms. How should intermodal competition factor into interconnection mandates? Does voice still require a separate interconnection regime?**

- The ecosystem of commercially-negotiated agreements (described above in response to Question 1) that has organically developed to handle the exchange of Internet traffic includes providers and carriers of all types, many (if not all) of whom compete against each other in the marketplace. The explosive growth of intermodal competition demonstrates the virtues of this model. It just as decidedly demonstrates the folly of exposing this system to the problems inherent in a regulatory model. In effect, the intermodal competition that developed between historically distinct service platforms is rapidly morphing into competition among a variety of heterogeneous IP platforms. These platforms may use different physical transmission media – e.g., xDSL or fiber-based wireline, coaxial cable, or wireless networks – but they all increasingly rely on the same fundamental IP-based network technology.
- As described above in response to Question 1, voice packets are and will continue to be an extremely small subset of the overall volume of traffic exchanged by carriers and other providers in the all-IP ecosystem. Congress should therefore formalize the longstanding light touch framework for IP interconnection and discard the legacy framework that targets “the exchange of voice traffic” for special regulatory treatment as though “voice” were uniquely in need of special interconnection arrangements, because it is not.
- Indeed, the continuation of a voice-centric approach for interconnection would ignore the phenomenon of convergence and plunge the industry back into the increasingly meaningless regulatory silos of the 20<sup>th</sup> century, when policymakers assigned special rules to higher-layer *services* (such as “voice” or “video”) on the premise that each such service would be forever associated with its own distinct set of physical-layer

transmission arrangements. The modern IP ecosystem obliterates that premise; bits are bits, and they can ride on top of any broadband platform. Such convergence carries many advantages beyond the obvious economies of scale and scope derived from building one network rather than several; it also allows for the integration of voice, video, and text into feature-rich multimedia applications, and it facilitates greater competition among service providers. Designing special regulations “for the exchange of voice traffic” would simply create incentives for IP networks to try to cabin the scope of such regulations by artificially segregating the affected traffic from other IP traffic. That outcome would defeat one of the key aspirations of the Internet revolution: the convergence of all forms of electronic communication over a dynamic and unified IP platform. And it would therefore inflict wasteful costs on the Internet ecosystem in the form of diminished innovation, redundant infrastructure, and decreased economies of scale and scope.

- For much the same reason, special regulation of IP-to-IP interconnection “for the exchange of voice traffic” – or for any other traffic class defined on the basis of its retail service label – would usher in a new generation of intractable regulatory controversies. Similar, thorny questions would arise under a framework focused on the exchange of “managed” or “facilities-based” VoIP, as distinct from “over the top” VoIP.” Lawmakers would still need to define “VoIP” services in a fast-evolving marketplace and answer questions about *how much* voice functionality converts an unregulated traffic exchange into a regulated one. Beyond that, the distinction between “managed” and “over-the-top” is also unstable and could not serve as a coherent limiting principle for regulation. To say that an IP service is “managed” is simply to say that the IP networks handling the service’s packets have agreed to give those packets some form of special handling in order to ensure some specified degree of quality of service (QoS). But there are many forms of special handling and many degrees of QoS, and both concepts denote sliding scales in performance rather than binary choices.

### **3. How does the evolution of emergency communications beyond the use of traditional voice service impact interconnection mandates?**

- Ensuring that consumers have access to emergency communications should continue to be an objective of Congress and the FCC. Given the importance of public safety, it would be appropriate for a new framework to include an oversight role for the FCC to incentivize industry cooperation and collaboration, where necessary, to ensure that emergency communications are available. Given the increasing reliance by consumers of over-the-top applications for their core communications needs, it is important that emergency communications standards apply to all types of providers and not primarily or exclusively on network providers.
- The industry is actively engaged in the development of standards for emergency communications in an IP environment. The standards have been completed for IP interconnection of voice from originating IP networks to Next Generation 911 networks and the industry (including AT&T) is actively implementing these standards. Once the standards for the non-traditional data services are complete, we

expect industry to follow a similar path with respect to those standards. In short, industry recognizes the critical importance of emergency communications and is working diligently to develop and implement the necessary standards for emergency communications in an IP world.

**4. Ensuring rural call completion has always been a challenge because of the traditionally high access charges for terminating calls to high-cost networks. Does IP interconnection alleviate or exacerbate existing rural call completion challenges?**

- The central problem with rural call completion has been the flawed intercarrier compensation regime – the traditionally high access charges have incentivized carriers to avoid these charges by using unreliable intermediate providers. The Commission has already taken some action to address the broken intercarrier compensation regime by putting the industry on a steady and certain glide path to bill-and-keep for terminating rates and by adopting new rules to ensure that traffic is terminated to rural carriers. Unfortunately, the FCC did not consider the likelihood that ‘traffic pumpers’ rates would not only include an end office switch element, but also significant transport mileage. Although the allowed per minute/per mile rates were significantly reduced by the FCC’s new rule, the FCC did not consider the fact that the vast majority of ‘traffic pumpers’ based their facilities in rural locations. Conversion to IP interconnection without prescriptive regulation will eliminate the arbitrage opportunities that exist with the current access charge regime, including the elimination of mileage pumping, since distance will not be a factor in compensation. The change also will prevent the diversion of vast sums of money to profiteers that otherwise could be used for the buildout of broadband and IP networks.

**5. Should we analyze interconnection policy differently for best-efforts services and managed services where quality-of-service is a desired feature? If so, what should be the differences in policy between these regimes, and how should communications services be categorized?**

- Whether traffic exchanged between providers is for managed or best-efforts services does not change the calculus for determining that regulation is unnecessary. In fact, following the commercial model for Internet interconnection, interconnection arrangements for the exchange of managed services are already in full swing.
- Specifically, managed services traffic exchanges have begun appearing as terms in *bilateral* arrangements between IP networks, similar to (but often still distinct from) the Internet peering and transit arrangements that govern best-effort Internet interconnection today. For example, AT&T has reached separate bilateral “Telepresence exchange” agreements with London-based BT and Paris-based Orange. Under each agreement, AT&T’s business customers can join BT’s or Orange’s business customers in Telepresence videoconferencing sessions, even though these various participants are reaching the sessions via unaffiliated IP networks, and even though these sessions require special end-to-end packet handling across multiple continents to ensure service quality. Similarly, a number of other

major IP networks – including Tata, Sprint, Telstra, and Telus – announced a multilateral Telepresence exchange agreement of their own. As with regular peering and transit, self-interest has driven each of the parties to reach these QoS-aware interconnection agreements, all without any governmental compulsion.

- Analogous private arrangements likewise enable mobile providers to exchange Multimedia Messaging Service (MMS) messages efficiently across different mobile networks. When a calling party on one network sends an MMS message (such as a photo or video clip) to a called party on another network, the sending network may not know what multimedia formats the called party’s handset can accept, what reformatting might be needed, or even what mobile network the called party is on. Many of the nation’s major mobile providers have solved these problems by agreeing to use central clearinghouses that keep track of which mobile customers have which handsets (and on which networks) and manage the reformatting necessary for fast and efficient delivery of technologically suitable MMS content to those handsets. Here, too, the industry has met these challenges without any regulatory oversight.
- Market forces are driving IP networks to negotiate efficient exchanges of “managed” traffic when necessary, no less than those same market forces have driven them for over two decades to negotiate efficient exchanges of “best effort” traffic through Internet peering and transit agreements. No market failure has arisen to suggest that regulation will be necessary to ensure efficient outcomes for any type of IP traffic exchange. And, as discussed above, the so-called “terminating access monopoly” – a creature of the PSTN and its regulatory peculiarities – has never applied to, much less threatened the efficiency of, interconnection arrangements among IP networks.
- These examples also show that the “managed” traffic that IP networks exchange separately today from best-effort Internet traffic do not include only, or even primarily, ordinary “voice” services. Indeed, plain-vanilla voice services have far less need for special-handling arrangements than do a variety of more bandwidth-intensive and performance-sensitive services such as real-time video. Over-the-top interconnected VoIP providers like Vonage and Skype have gained tens of millions of satisfied and passionately loyal customers. Each day, these customers use the best-effort Internet to place and receive millions of calls connecting them with one another. Significantly, the (usually distinct) broadband ISPs serving the calling and called parties treat the voice-bearing packets of those parties no differently from all other Internet packets traversing their networks, and the packets cross Internet peering points to move from one IP network to the next. Even so, and precisely because Internet peering and transit arrangements are so efficient, users generally perceive the call quality of these over-the-top VoIP services to be sufficient, at least relative to the value proposition. These services are likely to continue appealing to consumers who place as much of a premium on price and portability as on call quality.
- Of course, enterprise business customers and some consumers likely will continue to value the greater security and reliability of managed VoIP services, and carriers will negotiate commercial arrangements for the exchange of non-Internet traffic, such as managed VoIP traffic, across their disparate networks much as they have negotiated the exchange of Telepresence traffic without the need for any regulatory intervention. But the point is that QoS-aware exchanges of non-Internet, managed IP traffic are no more likely to involve special handling for simple voice services than they are to

involve special handling for a variety of other performance-sensitive applications, such as massive multiplayer gaming applications, real-time high-definition video, and videoconferencing. And in the long run, these commercial interconnection arrangements may well be indifferent to the *retail labels* (“voice,” “gaming,” “teleconferencing”) applied to particular higher-layer applications.

- There also are many possible ways for networks to exchange “managed” IP services along with Internet traffic. While some providers may agree to exchange certain categories of “managed” IP traffic over *physically* separate interconnection facilities, some might opt instead for a more convergent approach based on *logical* separation (much as individual IP networks, as discussed above, logically separate “managed” and “best effort” traffic within the same Internet backbone facilities). As a result, it makes no sense to establish a regulatory framework for interconnection delineating between managed services and “best efforts” services. And under *any* model that attempts to make those delineations, the regulatory obligations would give IP networks throughout the Internet ecosystem arbitrary and economically inefficient incentives to choose one packet-exchange technology over another simply to avoid (or exploit) various regulatory consequences. The opportunities for arbitrage and gamesmanship would be immense.

**6. Much of the committee’s focus in the #CommActUpdate process has been on technology-neutral solutions. Is a technology-neutral solution to interconnection appropriate and effective to ensure the delivery and exchange of traffic?**

- See the responses to Questions 1, 2 and 5 above.

**7. Wireless and Internet providers have long voluntarily interconnected without regulatory intervention. Is this regime adequate to ensure consumer benefit in an all-IP world?**

- See the responses to Questions 1, 2 and 5 above.

**8. Is contract law sufficient to manage interconnection agreements between networks? Is there a less onerous regulatory backstop or regime that could achieve the goals of section 251?**

- As described in response to Question 1, the Internet has developed as an economic engine for this country on the strength of commercially-negotiated private agreements. Those agreements have always been unregulated, and they are responsible for the phenomenal success of the modern Internet. And similarly efficient private agreements will continue to govern the exchange of IP packets in the years to come, even as all “carriers” complete their transition to IP networks. There is no plausible basis for concluding that traffic exchanges between IP networks will be any less efficient in the future than they have been for the past two decades or that

they will be any more in need of prescriptive regulation. In short, the empirical marketplace evidence demonstrates that a model based on contract law and case-by-case adjudication is sufficient to manage the commercial exchange of IP traffic between networks.

- As discussed in our January 31, 2014 submission, the FCC’s role in overseeing the IP marketplace should change, including its role overseeing interconnection issues. The FCC should not proscriptively regulate commercial transactions between competing members of the marketplace. And, absent some rigorous showing of a real, ongoing – i.e., not hypothetical – market failure, it should not intervene at all. In a world of robust, inter-modal competition, and in which new services and applications seem to arise on a weekly basis, the justifications for the legacy regulatory model, conceived in the first half of the 20<sup>th</sup> century, no longer exist. Promoting consumer access to broadband communications and maintaining incentives to invest and innovate in new IP platforms is the best way to ensure a competitive consumer marketplace. The Commission, therefore, should be rededicated to facilitating universal broadband deployment and adoption in order to ensure that the benefits of competitive, packet-based services are available to all American consumers. To this end, the Commission’s ongoing regulatory authority should be focused on promoting consumer deployment and adoption of broadband, regulatory certainty in markets, and private sector investment in IP infrastructure. The Commission should be specifically directed by Congress to promote, rather than mandate, broadband infrastructure deployment and investment through rulemakings under the Administrative Procedures Act, while at the same time the FCC should be prohibited from establishing rules or adopting practices that would inhibit or discourage broadband deployment and investment in broadband facilities. The FCC should have no authority to regulate the rates, charges, terms or conditions for, or entry into the provision of any broadband enabled services.
- In this vein, the Commission should have no rulemaking authority to regulate Internet interconnection or other forms of IP interconnection that has not been expressly granted by Congress, and any such authority should apply to all equivalent service or applications, regardless of the underlying platform and further one or more of the following five organizing principles:
  1. **Service to All Americans:** The Commission should continue its focus on the current Act’s goal of universal service, but in a competitively and technologically neutral manner. First and foremost, it should focus on ensuring broadband connectivity to all Americans, not legacy voice service. As AT&T has discussed at length in connection with the IP transition, voice service will continue to be available to all Americans, but it will be a broadband application, not a unique and separately regulated service obligation.
  2. **Public Safety and Network Reliability:** The Commission should address 911 access, location accuracy and database obligations. These objectives would apply equally to VOIP, wireless and, as appropriate over-the-top providers and not be imposed primarily or exclusively on network providers. CALEA and some forms of outage reporting would also fall under this heading.
  3. **Competition:** Congress should specifically direct the Commission to recognize and encourage a market-based, commercially negotiated interconnection regime

to govern packet-based communications with limited oversight functions. In other areas affecting competition, the Commission would focus, *inter alia*, on numbering obligations and number portability. Any regulatory obligations or rights that aim to further competition should apply in a competitively and technologically neutral, as well as reciprocal, manner to all providers.

4. **Consumer Protection:** The Commission should receive specific, clearly defined authority to protect consumer welfare, particularly with respect to public safety, emergency response and law enforcement access and the universal availability and accessibility of broadband networks and services. The Commission would continue its important work on disabilities access, where thanks to the Communications and Video Accessibility Act, we are already seeing more of the eco-system-wide approach that AT&T advocates for the remainder of the FCC's work.
  5. **Spectrum Management:** The Commission would continue with many of the spectrum functions currently performed today including: spectrum allocations and licensing; establishing and enforcing service rules, including build-out requirements and operating parameters; and facilities siting.
- Further information responsive to this question can be found in AT&T's submissions of January 31, 2014 and June 14, 2014.



August 8, 2014

The Honorable Fred Upton  
Chairman  
Energy and Commerce Committee  
U.S. House of Representatives  
Washington, DC 20515

The Honorable Greg Walden  
Chairman  
Communications and Technology Subcommittee  
U.S. House of Representatives  
Washington, DC 20515

The Honorable Henry Waxman  
Ranking Member  
Energy and Commerce Committee  
U.S. House of Representatives  
Washington, DC 20515

The Honorable Anna Eshoo  
Ranking Member  
Communications and Technology Subcommittee  
U.S. House of Representatives  
Washington, DC 20515

Dear Representatives Upton, Walden, Waxman, and Eshoo:

Broadband for America (“BFA”) is dedicated to ensuring that every American citizen has high-quality access to the Internet, and promotes well-informed public policy choices to create the right incentives for the private sector to build advanced networks offering innovative services. Our members include national and state-based community organizations, education and medical professionals, religious and minority groups, and stakeholders in the broadband Internet industry. As such, BFA stakeholders experience first-hand the dramatic changes in the communications landscape, the dynamic competition in the Internet ecosystem, and the technological evolution referenced by the Committee’s “Network Interconnection” White Paper and its previous white papers examining how communications law can be rationalized to address the 21<sup>st</sup> century communications landscape.

BFA therefore appreciates this opportunity to comment on Internet interconnection agreements between communications networks and the role of government in regulating these agreements. As the Committee considers updating the Communications Act, this discussion and the White Paper’s thoughtful questions will facilitate a robust dialog regarding “who is responsible for ensuring smooth end-to-end delivery of traffic, what is needed to ensure quality of service, and how our legal and regulatory framework can foster high-quality networks.”

In comments on White Paper 1: Modernizing the Communications Act, BFA offered six principles to help shape the dialogue around a potential new framework for communications policy in the 21<sup>st</sup> Century:

1. The objective of these principles is to enhance the lives of our citizens and strengthen our economy by fostering consumer choice and private sector investment and innovation in an Internet ecosystem that is robust, accessible, universal, and open.

2. Public policy must treat every business participating in the Internet ecosystem in a consistent manner.
3. Competition policy must account for the dynamism of the Internet.
4. To the extent that government regulation is required, it must be smart and consumer-focused.
5. The legitimate rights and interests of all Internet stakeholders – including the protection of free expression, the security and integrity of networks, privacy, and intellectual property – should be recognized and preserved through policies intended to promote good digital citizenship.
6. Public policy should embrace the highly successful model of dispersed Internet governance conducted through multi-stakeholder organizations. Government authorities should seek to defer to these organizations for Internet governance and the resolution of important issues to the greatest extent possible.

These principles should guide the Committee’s consideration of Internet interconnection agreements and the government’s role in the negotiation and enforcement of such contracts. In this regard, lawmakers should embrace the history and competitive realities of the Internet interconnection market, which clearly have protected, and will continue to protect, consumers from anticompetitive conduct on the part of backbone network providers without any need for government intervention. If legislators nonetheless conclude that this requires government to play a greater role in the oversight of Internet interconnection arrangements, any new regulatory approach should cultivate an environment for network interconnection that continues to support innovation in an Internet ecosystem that is robust, accessible, universal, and open.

***Internet Interconnection Is Working Without Regulatory Involvement.*** Internet traffic-exchange arrangements, such as peering and transit agreements, concern the technical and economic aspects of transporting Internet traffic across a multitude of networks, including Internet backbones and Internet Service Provider (“ISP”) networks, and exchanging that traffic with those networks. Content providers, end users, and their ISPs rely on commercially negotiated agreements with backbone operators – network providers with extensive facilities used to carry Internet traffic around the globe. Backbone providers, in turn, make arrangements with other backbone providers, and traffic carried between Internet endpoints often transits multiple backbone networks before reaching the end user’s ISP’s network. As White Paper 4 notes, these commercial agreements might constitute a “peering” relationship in which two network operators exchange traffic from their respective users; where the traffic exchanged is roughly symmetrical, such peering arrangements often do not involve one party paying the other because of this mutual benefit. The agreements might also constitute a “transit” relationship in which one network operator pays another to transmit traffic.

These arrangements have evolved organically over time to solve the problems arising from interconnecting disparate Internet networks. They are intensely competitive, are negotiated based on a variety of business and technology factors, and have never been subject to industry-specific regulation. In the absence of any regulatory interference, Internet interconnection

arrangements have worked and evolved with minimal bumps in the road for consumers. Moreover, Internet interconnection pricing has declined year over year since the inception of the Internet and is expected to continue to decline. Thus, as one analyst recently put it, peering and other Internet interconnection agreements are “the Internet’s effective free-market substitute for mandatory and regulated interconnection” and, for decades now, these agreements have made “the competitive backbone ‘market’ work.”

In the face of explosive growth of Internet traffic in recent years, network operators and other industry participants have continued to devise new and creative ways to interconnect. Content delivery networks (“CDNs”), for instance, have become a principal means for delivering video and other high-bandwidth content to end users. CDNs use geographically dispersed servers to store content nearer to end users, allowing traffic to reach end users more quickly and with less latency or jitter than traffic travelling over a series of backbone networks. In addition to relying on CDNs, a content provider can also choose from among at least a dozen major providers of “transit” services focused on delivering traffic to ISPs, or the content provider can interconnect directly with the ISP itself. The breadth and variety of peering and other Internet interconnection arrangements being used today demonstrate a robust healthy Internet interconnection market, in which there are many choices for content providers to reach end user customers.

The complexity of the interconnection market continues to increase, with many companies playing multiple roles in the Internet ecosystem. A single company can serve as an ISP, a backbone provider, and offer CDN services as well. Likewise, large content providers often control significant networks of their own, and may operate their own CDNs. Additional complexity can arise because content providers can select among diverse routing options for their content, giving rise to a dynamic situation in which traffic shifts quickly and congestion can come and go just as quickly.<sup>1</sup> The diversity of interconnection options and the flexibility inherent under a commercial framework are critical to the Internet’s ability to stream massive volumes of content (i.e., high definition video content) and ensure that the traffic reaches its destination smoothly.

While the FCC is gathering information on peering and other Internet interconnection arrangements, there is every reason to expect that the information it gathers will confirm that this traffic-exchange market is robustly competitive and operating efficiently. Indeed, notwithstanding apparent public concern regarding whether ISPs are adequately delivering Netflix’s video content and whether consumers are “get[ting] what they pay for,” researchers at MIT have released a preliminary report showing that there is not a “widespread congestion problem among the U.S. providers.” With regard to the recent public attention to the Internet interconnection arrangements between Netflix and ISPs such as Comcast and Verizon, the report noted that most of the observed congestion related to Netflix traffic, and that “all parties are moving toward adequate resolution.”

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<sup>1</sup> Importantly, out of the hundreds of thousands of Internet interconnection arrangements that have been struck in the private marketplace in the last several years, only about half a dozen have ever resulted in any real interruption of service to consumers. Moreover, all but one of these disputes involved the very same backbone provider. Hal J. Singer, *Mandatory Interconnection: Should the FCC Serve as Internet Traffic Cop?*, Progressive Policy Institute (May 2014) at 1, 5, available at [http://www.progressivepolicy.org/wp-content/uploads/2014/05/2014.05-Singer\\_Mandatory-Interconnection\\_Should-the-FCC-Serve-as-Internet-Traffic-Cop.pdf](http://www.progressivepolicy.org/wp-content/uploads/2014/05/2014.05-Singer_Mandatory-Interconnection_Should-the-FCC-Serve-as-Internet-Traffic-Cop.pdf).

***Internet Interconnection Policy for the Future.*** Today’s Internet interconnection market is working efficiently and effectively to the benefit of consumers, all without regulatory involvement. In fact, the robust Internet interconnection market would not exist but for the fact that the federal government chose a hands-off, market-driven approach to this segment of the broadband industry. The government’s choice to rely on a flexible commercial approach permitted industry stakeholders to develop Internet interconnection arrangements that support new and innovative services and business models as they arose. No one – service providers, content providers, or regulators – could have predicted the swift rise of online video and other high-volume traffic. No prescriptive, *ex ante* regulatory framework could function with the speed and flexibility of the free market to allow stakeholders to adapt to the rapidly shifting consumer demands and competitive realities.

This will remain true going forward. Current research shows that “[g]lobal IP traffic has increased more than fivefold in the past 5 years” and “will increase threefold over the next 5 years.” In North America alone, Internet traffic is expected to grow from 16,607 petabytes of data in 2013 to 40,545 petabytes of data in 2018.

In this dynamic Internet environment, it is impossible to predict what usage patterns, content offerings, and capacity needs will be in the future. Thus, regulation of these complex Internet interconnection business relationships would prove to be immensely complicated, costly, and inefficient. Indeed, Internet interconnection regulations adopted without sufficient knowledge of how the market will evolve will likely give rise to regulatory arbitrage and skew the economic incentives away from minimizing the costs and ensuring the smooth and efficient transportation and delivery of content. In short, rules that prescribe which Internet interconnection arrangements are permissible, and which are not, are not likely to be an improvement upon the commercial solutions that have worked well to date. To the contrary, such rules will likely distort and impede the Internet’s ability to serve consumers’ ever-changing needs.

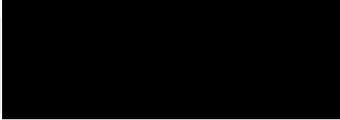
The principles that govern Internet interconnection policies in the future should derive from and expressly acknowledge these fundamental market and regulatory realities. Thus, lawmakers should ensure that public policy gives every participant across the Internet economy the freedom to innovate and invest without being constrained by pre-existing regulatory limitations. The presumption should be that Internet interconnection regulation is required only where there is clear and convincing evidence of market failure.

Finally, Internet interconnection policy should continue to defer, to the greatest extent possible, to the highly successful self-governance model with the government playing a limited role, if at all. The history of Internet interconnection demonstrates conclusively that this model works and has created high-quality networks and services that ensure continued smooth, end-to-end delivery of Internet traffic.

***Conclusion.*** As lawmakers address Internet interconnection policies for the future, they should continue to cultivate a highly flexible regulatory environment that drives more private risk capital into the domestic broadband economy – to create jobs, foster innovation, and maintain our global leadership. Lawmakers should be wary of traditional command and control regulations in this highly competitive and rapidly evolving segment of the Internet. If, however,

evidence conclusively demonstrates a market failure that may warrant regulatory intervention, policymakers should ensure that such rules are narrowly tailored and are designed to avoid marketplace distortions and disparities among market participants. In all events, Internet interconnection regulatory policy should remain focused on preserving incentives that foster investment, increase broadband competition, and benefit American consumers. BFA looks forward to working with Congress and this Committee to ensure American leadership in the decades to come.

Sincerely,



John Sununu  
Honorary Co-Chairman



Harold Ford, Jr.  
Honorary Co-Chairman

## **#CommActUpdate: Modernizing the Communications Act**

### **Fourth White Paper: Network Interconnection**

#### **Comments of Competitive Carriers Association**

Competitive Carriers Association (“CCA”) submits these comments in response to the Energy and Commerce Committee’s (“Committee”) White Paper on Network Interconnection (“Fourth Paper”). CCA is the nation’s leading association for competitive wireless providers and stakeholders across the United States. CCA’s membership includes more than 100 competitive wireless providers ranging from small, rural carriers serving fewer than 5,000 customers to regional and national providers serving millions of customers. CCA also represents almost 200 Associate Members consisting of small businesses, vendors, and suppliers that service carriers of all sizes. Together, CCA’s members represent a broad range of entities with a shared goal of a competitive wireless market as a critical driver of the U.S. economy. Competitive carriers depend on technology-neutral interconnection and access obligations as a critical part of a framework for sustainable competition in the digital age.

The Committee rightly observes that “[t]he interconnection of telecommunications networks has been at the heart of longstanding telecommunications policy since the Kingsbury Commitment in 1913.” As noted in his blog post “Opening Day at the FCC: Perspectives, Challenges, and Opportunities,” Federal Communications Commission (“FCC”) Chairman Tom Wheeler pointed out that, “a change in technology may occasion a review of the rules, but it does not change the rights of users or the responsibilities of networks.” Over the last 100 years, technology has evolved, carriers have adapted, and rules have been updated, yet the basic requirement to interconnect between and among networks has remained. Just as traffic lights – first deployed in 1914 – have continued to govern automobile traffic since the Ford Model T traversed the highway to today’s all-electronic Tesla, technological advances have not eliminated the need for basic rules of the road.

In modernizing the Communications Act, policymakers should support commercially necessary requirements for technology-neutral interconnection. Maintaining baseline interconnection and access obligations support a competitive communications marketplace by enabling all companies large and small, serving rural or urban areas, the opportunity to invest and compete. The Committee correctly notes that the “market for communications services has changed dramatically” as technological innovations have continued. Importantly, these dramatic communications innovations and advances have occurred because of the obligations for good faith interconnection negotiations, which provide a critical backstop for negotiations. While rules should be reviewed, these responsibilities must remain to encourage investment, protect consumers, enhance competition, and support economic growth in the 21<sup>st</sup> century.

#### Policymakers Should Reaffirm Technology-Neutral Interconnection Obligations

Congress should preserve technology-neutral interconnection by outlining framework principles for competition and providing the FCC with flexible authority to establish and adjust rules as necessary to accomplish Congressional goals. In turn, the FCC should reaffirm technology-neutral obligations to interconnect, and utilize Congressionally-conferred flexible authority for specific applications as appropriate, adopting rules that are narrowly-tailored effective at Congress’s goals.

Reaffirming interconnection obligations logically follows the ongoing transition to an all-IP world without disrupting existing investments and innovations. The continued promise of interconnection provides all carriers with certainty that they will have access to the physical infrastructure necessary to connect their networks and their customers, and in turn the confidence to invest. This is consistent with the procompetitive spirit and aim of the Telecommunications Act of 1996 (“96 Act”) to enable rapid development of advanced services. Importantly, maintaining interconnection obligations bolsters the business-case for broadband deployment in rural and underserved areas.

A regulatory backstop is appropriate to facilitate voluntary negotiations to reach interconnection agreements, making clear the possibility for enforcement in the event of a failure to reach an agreement. Where competition reigns, interconnection is mutually beneficial and fosters voluntary agreements that enhance the networks of both parties. However, Congress must provide the FCC with the flexible authority to grant relief before consumer and economic harm results from declining communications competition.

#### Intermodal Competition Underscores the Need for Interconnection Obligations

The emergence of intermodal competition, resulting from interconnection and increased competition brought about by the 96 Act, underscores the need for interconnection requirements. With the convergence of services provided using different technologies – as all traffic becomes “bits” in an all-IP world – interconnection allows innovation and economic growth to continue marching forward. The Committee correctly recognizes that “voice is rapidly becoming an application.” Failure to maintain interconnection among the various technologies delivering the voice session, however, may compromise existing voice services across carriers and platforms and result in a step backwards for consumers across the country, particularly those living in rural areas or served by competitive carriers.

While the transition to all-IP continues, carriers should not be forced to endure the burdens and costs associated with converting IP services to legacy technology in order to exchange traffic and interconnect with other carriers also providing IP services. Requiring a carrier to do so, by relaxing interconnection obligations for future technologies, discourages innovation and investment, provides opportunities for arbitrage and goes against the principles of structuring communications policy to support competition over regulation.

Competitors within the same sector providing services in the broader communications industry may require additional connection requirements to support intermodal competition. For wireless

carriers in particular, this may include connection to other wireless networks for voice and data roaming, interoperability, and access to backhaul services on other intermodal competitors' networks. The emergence of retail competition for services does not *ipso facto* prove that wholesale access for interconnection is also competitive.

The Committee notes the importance of voluntary interconnection for wireless providers without regulatory intervention as a potential regulatory regime for an all-IP world. Wireless carriers have benefitted from the technology neutral interconnection requirements for voice services established in the Telecom Act. Voluntary negotiations occur when there are regulatory backstops helping bring and keep both parties at the negotiation table. Accordingly, using wireless interconnection as a model for technology-neutral intermodal connection is only appropriate when clear statutory obligations for interconnection are present.

#### Technology-Neutral Interconnection Policies Should Accompany Technology-Neutral Support for Universal Service

In supporting technology-neutral interconnection policies, policymakers must also adopt technology-neutral support for Universal Service. Ideally, interconnecting with intermodal competitors will advance overall connections throughout the country, yet Universal Service support will still be necessary to provide connection to rural and other hard to reach areas. This support should be available for the most efficient carrier, regardless of technology. No carrier or technology should be provided a right-of-first-refusal (ROFR) for support, but if regulators provide preferences for one type of service, equivalent preference should be given to carriers utilizing other technologies (i.e., if policymakers continue to support a ROFR for wireline operations in rural America, policymakers should consider equivalent preferences for wireless to ensure opportunities for competition).

Additionally, contributions to the Universal Service Fund (“USF”) should be reevaluated to establish a competitively neutral support mechanism for an all-IP world. As consumers continue to trend towards interconnected services that do not utilize legacy networks, existing support sources will continue to shrink, increasing the burden on the remaining few.

#### Preserving Interconnection Requirements Protects Consumers and Competition

New, innovative services require interconnection to other networks for an opportunity to compete for customers, and in turn the certainty to invest. Carriers that do not have the benefit of preexisting legacy networks, including legacy networks funded by ratepayers dating back to the monopoly era, will not immediately have sufficient scope and scale to command reasonable interconnection agreements with dominant carriers. Accordingly, an obligation for interconnection provides a critical backstop to voluntary negotiations.

Negotiations for interconnection are not always among equals, and absent an obligation to reach an interconnection agreement, rural and competitive carriers will end up on the losing end, ultimately harming the consumers they serve. Conversely, with obligations in place and interconnection widely available, the aggregate value of all communications services are enhanced, knowing that the call or packet will reach its destination.

Contract law alone is particularly inadequate to sufficiently manage interconnection agreements between networks of differing sizes and dominance. This does not mean that rate-regulation is necessary, or that access to other networks should be free, but the FCC must possess regulatory flexibility to ensure that reasonable access among and between carriers.

Preserving interconnection obligations throughout and beyond the ongoing transition to all-IP networks is a cornerstone in supporting competition in the digital age. Consumers expect and should reasonably rely on networks to connect, regardless of the technology or protocols used to complete their session. Preserving interconnection obligations to all providers in a technology-neutral manner will provide the framework for continued investment, innovation, and deployment of services throughout all parts of the nation.

### **Network Interconnection**

CenturyLink commends the Members of the House Energy & Commerce Committee for initiating this important inquiry into the appropriate regulation of interconnection for the exchange of voice services.

As noted in the fourth white paper, the past two decades have showcased two competing visions of network interconnection. For traditional voice services, the Act continues to saddle incumbent local exchange carriers (ILECs) with burdensome interconnection obligations not applicable to their competitors, even though ILECs now serve less than one-third of homes passed and their traditional telephone services comprise less than 20 percent of all local voice connections. In contrast, Internet and wireless networks have flourished during this time, utilizing commercially-negotiated interconnection arrangements largely free of regulation. And now we are witnessing the convergence of these two paradigms, as traditional wireline voice services rapidly give way to wireless and wireline IP-based services.

Given these trends, current ILEC-specific interconnection obligations should be retired at the same time as the obsolete circuit-switched networks on which they are based. As voice services move to IP networks, all providers have incentives to negotiate commercial agreements enabling their customers to make calls to and receive calls from anyone, regardless of provider, and voice providers can exchange calls without interconnecting to the ILECs' traditional hub-and-spoke network.

In addition to being unnecessary, detailed mandates would stunt innovation by calcifying inefficient interconnection arrangements. Such misguided regulation also could inadvertently spill over to peering arrangements used for non-voice IP traffic, or cause providers to create redundant interconnection arrangements to handle VoIP traffic, simply to avoid triggering regulation of their Internet traffic. Of most concern, asymmetric interconnection obligations tied to the identity of the provider or the technology employed would hinder efficiency and natural technological evolution.

For all these reasons, and consistent with a public interest focus, Congress should avoid detailed interconnection requirements in an updated Communications Act.

***1. In light of the changes in technology and the voice traffic market, what role should Congress and the FCC play in the oversight of interconnection? Is there a role for states?***

At most, Congress should establish a section 251(a)(1)-like, competitively-neutral requirement for all voice providers, regardless of current regulatory classification, to interconnect with each other. The details of such interconnection arrangements should be worked out through commercial negotiations—as has long occurred in the wireless and IP data industries—rather than through statutory or regulatory mandates.

Congress should particularly avoid any provisions that tilt the balance of these negotiations, akin to section 251(c)(2)'s requirement that ILECs allow their competitors to interconnect at *any* technically feasible point, of the competitors' choosing, at regulated rates, terms and conditions. Such "market-opening" measures may have been justified in 1996, when wireless communications were in their infancy, VoIP barely existed, and all voice providers needed to interconnect with the ILECs' hub-and-spoke public switched telephone network (PSTN). But things could hardly be more different today. For 80 percent of voice customers, traditional ILEC telephone services have been supplanted by wireless, VoIP and other IP-based services. Indeed, 41 percent of U.S. households do not even have a wireline phone, and another 16 percent receive all or almost all of their calls on a cell phone. Interconnection with the ILECs' PSTN is also increasingly unnecessary, as wireline and wireless voice services migrate to IP, enabling a much smaller number of interconnection points, often far removed from both the PSTN and federal or state regulation.

At the same time, wireless and IP data providers have demonstrated that telecommunications providers can interconnect successfully through commercially-negotiated arrangements, largely free from regulation. Over the past two decades, these providers have entered into countless interconnection arrangements while sustaining remarkable growth, with few instances of regulatory intervention.

Given these transformative changes, regulatory oversight of interconnection for voice services is no longer necessary, at either the federal or state levels. With less than 20 percent of the voice market, ILECs simply do not have the incentive or ability to disrupt their competitors by denying or degrading interconnection. From a technological perspective, the ongoing migration to IP-based voice services makes such anticompetitive conduct even less likely, as IP providers can choose to terminate their traffic indirectly through other peering providers.

In addition to being unnecessary, prescriptive interconnection requirements would harm the public interest in at least three respects.

*First*, regulation of this rapidly evolving area would stunt innovation and lead to inefficient, one-size-fits-all interconnection arrangements. Details regarding the number, location and technical characteristics of interconnection arrangements should be resolved through negotiation, experimentation, and standard-setting bodies, rather than government fiat. Optimal interconnection configurations may vary significantly among providers. CenturyLink, for example, has proposed a network architecture with IP interconnection points in each state, whereas providers with a wireless focus tend to seek much fewer points of interconnection.

*Second*, given the convergence of IP-based voice and data services, regulation of interconnection for IP voice services could easily bleed into regulation of IP data services. Up until now, the government generally has wisely avoided such regulation of the Internet. But, as voice becomes an application—albeit a relatively minor one in terms of bandwidth capacity—there is a risk that detailed interconnection mandates will, in practice, end up applying to IP data services as well, or cause providers to keep voice and data interconnection arrangements separate (to avoid having those mandates apply to the latter).

*Third*, ILEC-specific mandates would skew interconnection negotiations toward arrangements that are beneficial to non-ILEC providers, rather than arrangements that are most efficient overall. While such efficiency losses may have been considered necessary to open local markets in 1996, that time is long past.

***2. Voice is rapidly becoming an application that transits a variety of network data platforms. How should intermodal competition factor into interconnection mandates? Does voice still require a separate interconnection regime?***

The transformation of voice from a standalone service to one of many IP-based applications eliminates the need for voice-specific interconnection mandates. As noted, providers of IP *data* services have been successfully exchanging traffic through commercially-negotiated peering arrangements for two decades, and more recently using those same arrangements to exchange voice traffic generated by the millions of users who subscribe to Skype and other “over-the-top” VoIP services. Likewise, wireless providers have long interconnected and exchanged data and traditional voice traffic without significant government oversight. There is no reason that the addition of IP-based voice traffic should alter this reliance on commercially-negotiated interconnection arrangements, particularly given that such voice

traffic will make up only a small percentage of the IP-based traffic exchanged between providers and will be one of many real-time applications requiring prioritized treatment.

As noted, these dramatic technological and market changes also eliminate the need for provider-specific interconnection mandates, such as section 251(c)(2)'s ILEC-specific requirements in the current Act. Providers of interchangeable services should be subject to interchangeable regulation, particularly when no provider of those services retains market power, as is the case with ILEC voice services today.

Indeed, ILECs face intermodal competition not only from cable, CLEC and wireless providers, but also from so-called “edge” providers, such as Google and Amazon, which increasingly provide competing services and operate their own networks. Many large edge providers have considerable economic resources and, as a result, are able to leverage multiple paths for exchanging traffic. Some own their own large-scale content distribution networks, and all constantly manage their traffic distribution to reduce their own cost and improve their own performance. Innovations like this are beneficial in the deregulated framework for IP-data exchange, but application of legacy voice interconnection regulations such as mandatory bill-and-keep to IP networks would interact with those same market developments to harm competition and consumers.

Edge providers that are responsible for the majority of the traffic on the Internet,<sup>1</sup> but a much smaller share of customers, increasingly argue today that “Net Neutrality” principles should be extended to the exchange of IP voice and data traffic. However, what they actually demand, rather than transparency or fairness, is the imposition of mandatory peering without compensation, which is akin to the highly regulatory mandatory bill-and-keep requirement that generally applies to common carrier voice traffic. In other words, these providers are looking to impose archaic monopoly-era voice regulation to all IP voice and data traffic (without accepting common carrier regulation of their services). The end result would be to effectively pass on the costs of carrying their traffic—which may be a substantial portion of Internet traffic overall—to all customers, including those that do not use their services. Congress should be careful not to exacerbate this situation by importing legacy voice regulation and its asymmetrical regulatory burdens into IP voice and data interconnection arrangements.

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<sup>1</sup> A recent study by Sandvine found that, combined, Netflix and Google's YouTube service now account for more than half of downstream traffic during peak periods in North America.

**3. *How does the evolution of emergency communications beyond the use of traditional voice service impact interconnection mandates?***

This ongoing evolution of emergency communications should not alter the fundamental premise of any interconnection mandate in an updated Communications Act: all providers of competing services should be subject to the same interconnection requirements. To the extent Congress includes any interconnection mandates in the updated legislation—which should at most impose a basic duty to interconnect—such requirements should be the same for all providers.

**4. *Ensuring rural call completion has always been a challenge because of the traditionally high access charges for terminating calls to high-cost networks. Does IP interconnection alleviate or exacerbate existing rural call completion challenges?***

Regardless of the type of interconnection employed, smooth, end-to-end delivery of all traffic is essential, particularly in rural areas of the type CenturyLink has served for decades. Given its importance, substantial industry work is underway in this area, including on the question of how to ensure quality of call completion as services and networks migrate to IP. This concern may also be lessened over time, as IP network upgrades reach farther into rural areas.

**5. *Should we analyze interconnection policy differently for best-efforts services and managed services where quality-of-service is a desired feature? If so, what should be the differences in policy between these regimes, and how should communications services be categorized?***

The same interconnection regime, founded on commercial negotiations, should apply to all interconnection for the exchange of voice services. As noted, Congress should be careful not to do anything that could disrupt the current IP peering regime, which has provided the foundation for the explosive growth of the Internet these past two decades.

At the same time, Congress should avoid applying different interconnection policies to best-effort and managed services, because any such regulatory disparity could drive providers to offer services in the form with the most favorable regulatory treatment. Instead, Congress should allow providers and standard-setting bodies such as the Alliance for Telecommunications Industry Solutions (ATIS) to work out technical standards and best practices for maintaining quality-of-service across networks, including measures to ensure that all providers are adequately compensated for carrying managed service traffic. Particularly at this early stage, regulation could cause unintended consequences that could harm innovation in this rapidly developing area.

**6. *Much of the committee’s focus in the #CommActUpdate process has been on technology-neutral solutions. Is a technology-neutral solution to interconnection appropriate and effective to ensure the delivery and exchange of traffic?***

Yes. Anything but a technology-neutral solution will result in arbitrage, regulatory gamesmanship, and incentives to use technologies and network configurations that may be less efficient, as providers adjust their behavior to gain favorable regulatory treatment. Furthermore, technology simply changes too quickly, often in unanticipated ways, for regulation to keep up. The robust intermodal competition noted in the white paper further supports adoption of technology- and provider-neutral interconnection requirements.

**7. *Wireless and Internet providers have long voluntarily interconnected without regulatory intervention. Is this regime adequate to ensure consumer benefit in an all-IP world?***

Yes. The success of these voluntary interconnection arrangements provides compelling real-world evidence that providers can and will negotiate efficient interconnection arrangements, because it is in their interest to do so. There is simply no reason to believe that the voluntary interconnection regime that has worked so well for wireless and Internet providers cannot work equally well for interconnection of wireline voice providers, including ILECs, given that no provider possesses market power.

**8. *Is contract law sufficient to manage interconnection agreements between networks? Is there a less onerous regulatory backstop or regime that could achieve the goals of section 251?***

While commercial negotiations would likely be sufficient to ensure interconnection, CenturyLink supports the inclusion of a competitively-neutral statutory provision, similar to section 251(a) in the current Act, requiring all providers to interconnect for the exchange of voice traffic. However, Congress should allow providers to work out the details of such interconnection through commercial negotiations. This approach will allow interconnection arrangements to evolve, as technologies and best practices change, and also enable providers to develop arrangements that best suit their particular circumstances, such as with regard to the number and location of interconnection points. As noted, it is critical that any interconnection mandates apply equally to all providers.

***Conclusion***

CenturyLink wholeheartedly endorses the Committee’s work on this important issue. The fundamental market and technological changes since 1996 have eliminated the need for the

Act's current asymmetric obligations imposed on ILECs in this area. By modeling the regulation of interconnection for voice traffic on that used so successfully for Internet and wireless services, Congress will further our national goals of facilitating network investment and creating innovative, customer-enhancing services to the benefit of all.

**COMPTEL's Response to Questions in House Energy and Commerce White Paper**  
**"Network Interconnection"**

COMPTEL, the leading industry association for competitive communications service providers, submits its response to the questions in the Committee on Energy and Commerce's fourth white paper, which focuses on "Network Interconnection." For more than 30 years, COMPTEL and its members have advocated for pro-competitive policies that will ensure *all* consumers benefit from the innovation and investment that robust competition brings to the communications marketplace.

As discussed in COMPTEL's response to the Committee's first white paper "Modernizing the Communications Act,"<sup>1</sup> it is important that any examination of the nation's communications laws focus on a core set of principles that:

- Ensure competition, universal service, and public safety and security
- Ensure consumers have unfettered access to networks and content, and
- Ensure technology neutral, competitive interconnection policies

Interconnection of networks is key for all the above principles to be fulfilled. Indeed, interconnection is the equivalent of the First Amendment free speech rights for all networks. Without the requirement of interconnection, business and residential consumers' ability to access any network (whether wired or wireless), service, and the content they wish will be hampered.

Indeed, when Congress passed the 1996 Act, the goal was to create a "network of networks" that would all be interconnected, allowing cable systems, long distance, local phone service, and new entrants to compete in each other's markets, especially where competition had previously been prohibited. Combined with Congress' actions in 1994 to expand the wireless market to new entrants

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through competitive spectrum auctions to break up the then-duopoly, the actions in 1996 effectively ended monopoly era communications policy, and removed regulatory barriers to competition. As a result, the U.S. economy experienced an increased amount of investment in the communications industry to the tune of an estimated \$1.2 trillion. This amount of investment and innovation would not have been possible if the largest of the incumbent carriers had been allowed to restrict competitive entry and either deny interconnection outright, or set conditions on interconnection that would make competing in a particular market economically impossible for smaller companies. Congress' direction to include technologically neutral, "rules of the road" to ensure non-discrimination and reasonable rates, terms, and conditions was, and continues to be, the light touch needed for free, functioning, and competitive markets.

In fact, the significant inroads that mobile wireless providers have made in the marketplace for offering mobile voice services is a direct result of Congress' technology-neutral interconnection policy in the Act. Wireless companies were granted the right to request interconnection with wireline companies. The Federal Communications Commission's voice roaming policy also has promoted further use of mobile phone service. As a result, today almost every American has a mobile phone.

As the Committee examines our communications laws, it should consider the fact that a vast majority of the communications industry favors these common sense "rules of the road" in the Act to ensure all networks are interconnected and consumers can choose any service provider and access any content they wish. Traditional competitive services providers, cable, wireless, and rural providers are all on record supporting reasonable interconnection policies that allow the market to function, regardless of the technology employed.<sup>2</sup>

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<sup>2</sup> See <http://thehill.com/blogs/congress-blog/technology/312901-put-sound-policy-before-technology>

COMPTEL's members continue to be at the forefront of innovation in the marketplace. Our members are the fiber, cloud computing, wireless, cable, tower, and rural providers that continuously drive the development and deployment of technologies that are changing how services to consumers and businesses are created and delivered. In fact, several of our members already offer *all* IP services. The availability of interconnection to deliver voice services on just and reasonable terms have been critical to the success of these companies to date. Consumers, both residential and business, desire to purchase a bundle of services from their service providers, including voice, broadband, and in the case of business customers, data services. Accordingly, the delivery of those services necessarily involves interconnecting with other providers and their networks.

Even though the interconnection provisions in the Act—which cover all telecommunications carriers—have worked well for voice services, over the past five years, there has been a persistent agenda by some large ILECs to disavow the interconnection requirements of the Act for managed VoIP services. The majority of competitors have long-recognized the superior advantages of serving their subscriber base via IP technology and, as described above, many do so. In contrast, however, the ILECs serve merely 10% of their wireline voice traffic subscriber base via this new advanced technology.<sup>3</sup> Thus, the largest ILECs, while capable of exchanging traffic in IP, have an incentive to keep interconnection arrangements with voice traffic exchange partners in TDM format, until they progress in technology. They also have a financial incentive to refuse to negotiate interconnection agreements pursuant to the Act, as we describe further in our response to question six. As such, the three largest ILECs are effectively holding up the rest of industry's progression to a more advanced technology that offers significant innovation and substantial cost savings. They argue that the basic rules of interconnection no longer

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<sup>3</sup> Federal Communications Commission "Local Telephone Competition: Status as of June 30, 2013," Industry Analysis and Technology Division Wireline Competition Bureau June 2014, p. 5, Figure 4 (2014 Local Competition Report").

apply because of new technologies and, thus, refuse to interconnect under the Act—the exact problem Congress was trying to avoid in establishing interconnection obligations in the first place. Residential and business consumers, edge providers, and forward-looking competitive carriers suffer, since IP interconnection is what will allow end-users to experience the innovation of IP, and carriers the cost savings of a superior technological interconnection framework. The promise of new technologies increases—rather than decreases—the need to maintain basic rules to ensure that the *physical facilities* (wireline, wireless, etc.) continue to interconnect and do so in the most efficient manner and at just and reasonable rates.

*In addressing a number of the assumptions in the “White Paper,” let us consider the facts. First, the vast majority of voice services are not applications that transit public data network platforms, such as the Internet. Simply because a voice service uses Internet Protocol-based (IP-based) technology does not mean that the service transits the Internet, or is accurately described as an Internet application. The nature of the telephone call or communication does not change merely because a carrier uses IP technology. Indeed, 89% of interconnected VoIP subscriptions are for a traditional *managed* voice service provided over a private, managed IP network, not an over-the-top (“OTT”) service<sup>4</sup> – meaning the traffic does not traverse the public Internet, and the traffic cannot be exchanged through the same peering/transit arrangements used for Internet traffic. Private, managed IP networks are necessary because they provide the high quality of voice service the market demands, as demonstrated by the*

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<sup>4</sup> 2014 *Local Competition Report*, p. 7, Figure 5. The FCC does not directly collect and report statistics that distinguish between managed and OTT networks. However, the FCC requires providers to separately report nomadic and non-nomadic VoIP subscriptions. For all practical purposes, nomadic VoIP subscriptions (which are operational on any broadband connection) are OTT applications; conversely, non-nomadic services correspond with a managed architecture. Consequently, the statistics reported by the FCC that distinguish between nomadic and non-nomadic voice subscriptions are the equivalent of requiring providers to report OTT and managed services.

advertising of AT&T and Verizon for their managed voice services—U-verse and FiOS<sup>5</sup>—and by the fact that there are over 130 million wireline subscribers to a managed voice service.<sup>6</sup>

As illustrated by the attached diagram, in managed IP networks the exchange of voice traffic flows and interconnects in IP format, but separately from Internet traffic even though both may share the same physical facility for part or all of the journey. The concept that the same physical *facilities can and already support* various types of *logical* networks is not novel to the IP transition.<sup>7</sup> These logical networks include *unmanaged* networks such as the Internet, as well as *managed* IP networks such as managed VoIP and video services. These are not simply three applications sharing the same “pipe” (such as when you have various applications riding the Internet). These are three distinctly separate logical networks unaware of the existence of, and incapable of interacting with, each other. Logical networks can be thought of as individual inner “pipes” within a common physical sleeve. Consequently, the interconnection for these logical networks are and will remain separate from each other.

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<sup>5</sup> AT&T and Verizon’s own product and marketing, as well as subscribership data, confirms that the majority of customers, both residential and business, desire the continuation of PSTN quality and security, even if OTT offering also exist. Both carriers assure their customers that their VoIP services are not Internet services. See, <http://newscenter.verizon.com/press-releases/verizon/2010/fios-digital-voice-heres.html> “To understand the features and quality of FiOS Digital Voice, you first need to know that the service is not the same as the services you get with a little Internet adapter for your modem and phone, and it does not ever touch the public Internet.”; See also [www.att.com/esupport/article.jsp?sid=KB401031#fbid=L8RYx19uzva](http://www.att.com/esupport/article.jsp?sid=KB401031#fbid=L8RYx19uzva) “AT&T U-verse Voice service is provided over AT&T’s world-class managed network and not the public Internet.”

<sup>6</sup> 2014 Local Competition Report at 3 and 7. Switched access lines are included in the total number of managed lines because circuit switch technology is inherently a managed network that specifically designed around the unique needs of real-time voice service.

<sup>7</sup> Obviously, one of the major attributes, and the primary source of beneficial economic and operational improvements gained through the use of IP technology is the ability to share the same physical facilities (*i.e.* fiber, copper, poles, conduit, etc.) among separate, isolated logical networks in a highly efficient manner.

*Second*, the change in technology does not *per se* alter the advantages of the largest incumbents. Specifically, the change in technology does not alter the size and ubiquity of the largest incumbents' networks, nor does it change the size of their subscriber base. *The same physical infrastructure that has supported TDM-based services over the decades supports IP-based services.* This network consists of trenches, poles, rights of way, conduits, fiber, copper loops, spectrum licenses, municipal permitting for disruptions of streets and pavements, easements, right of access to buildings, and all the other necessary inputs for any network. The economics of replicating this network have not changed, as the most significant costs of providing service lie with the physical infrastructure, not with higher layers that electronically define and control traffic flow.

Moreover, the majority of subscribers still subscribe to the incumbent LEC.<sup>8</sup> Significantly, the incumbent's market share is effectively consolidated in a *single* provider, while the competitors share is spread among *multiple competitors*. For example, according to the FCC's Local Competition Report, in the District of Columbia the single incumbent LEC (Verizon) has 59% of the total end-user switched access lines and VoIP subscriptions, while the remaining 41% of the market is divided among 99 *competitors*.<sup>9</sup> Disparity in *relative* size between the incumbent in its region, and each individual

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<sup>8</sup> According to the FCC's most recent local competition report there were just over 135 million retail local wireline telephone connections (retail switched access lines and VoIP subscriptions) as of June 2013, the majority of which still subscribe to the incumbent LEC.<sup>[1]</sup> *2014 Local Competition Report*, at 4, Figure 3. When including mobile subscriptions there are 441million total connections (Source: *2014 Local Competition Report*, at 2, Figure 1), of which AT&T and Verizon (including their mobile affiliates), serve *at least* 62% of the total connections (which does not appear to include all wholesale subscriptions such as CenturyLink reselling Verizon's wireless service). Sources: SEC 10Q Reports (2Q 2013) for AT&T at 27, and Verizon at 29.

<sup>9</sup> See *2014 Local Competition Report* at pp. 20 (Table 9) and 28 (Table 17).

competitor is one factor that creates the conditions for discrimination that the interconnection provision of the Act is intended to prevent.

Switching the technology to serve a customer from TDM to IP does not constitute a loss of that customer. As the Commission has found consumers view interconnected VoIP services the same as traditional voice telephone services.<sup>10</sup> In fact, as AT&T recently responded to Congress that its own market research shows that *in many cases consumers who use VoIP do not even realize that they are using a VoIP service (as compared to plain old telephone service).*<sup>11</sup>

Consequently, the change in technology does not change the need for application of existing requirements. The significance of this issue is demonstrated by the fact that there has seldom been such broad support in the industry across service providers as there has been—such as by cable

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<sup>10</sup> See Report and Order and Further Notice of Proposed Rulemaking, *Connect America Fund et al*, WC Docket No. 10-90 *et al*, FCC 11-161, ¶ 946, n. 1906 (2011)(“ICC/USF Transformation Order and FNPRM”), *citing Telephone Number Requirements for IP-Enabled Services Providers; et al.*, WC Docket Nos. 07-243, 07-244, 04-36, CC Docket No. 95-116, Report and Order, Declaratory Ruling, Order on Remand, and Notice of Proposed Rulemaking, 22 FCC Rcd 19531, 19547, ¶ 28 (2007) (recognizing that interconnected VoIP services increasingly are viewed by consumers as a substitute for traditional telephone services).

<sup>11</sup> See Letter from Keith K. Krom, AT&T, to Charlotte Savercool, Committee on Energy and Commerce, Mr. James Cicconi’s Responses to the Questions for the Record, at 3 (Jan. 16, 2014).

providers,<sup>12</sup> rural carriers,<sup>13</sup> wireless carriers<sup>14</sup> and traditional competitive LECs<sup>15</sup>—on the need for application of the interconnection provisions of the Act to IP interconnection for managed voice

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<sup>12</sup> See e.g., Comments filed *In the Matter of Connect America Fund, et al*, Before the Federal Communications Commission, WC Docket No. 10-90 *et al*, filed on Feb. 24, 2012 by the following representative in the cable industry: National Cable and Telecommunications Association (“NCTA”) at 5 (“...the interconnection provisions of section 251 of the Act afford telecommunications carriers the right to establish IP-to-IP voice interconnection with an incumbent LEC network for the provision of telephone exchange service and exchange access.”); Time Warner Cable at 5 (“... negotiating IP-to-IP interconnection agreements under Section 251 of the Act is not merely an aspiration, but rather is a fundamental statutory obligation of ILECs.”); Charter Communications at 4 (“An ILEC’s duty under Section 251(c)(2) to provide interconnection for “any requesting telecommunications carrier . . . at any technically feasible point within the [ILEC’s] network” clearly encompasses IP-to-IP interconnection arrangements.”). See also Letter of Howard J. Symons, Mintz Levin, on behalf of Cablevision and Charter Communications, to Marlene Dortch, WC Docket No. 10-90 *et al*, p. 1 (filed Oct. 12, 2011) (“[S]ection 251(c)(2) requires ILEC to provide IP-to-IP Interconnection...IP-to-IP interconnection will ensure that consumers enjoy the full benefits of IP services and networks, and encourage all carriers to migrate to IP-based networks.”).

<sup>13</sup> See e.g., Comments filed *In the Matter of Connect America Fund, et al*, Before the Federal Communications Commission, WC Docket No. 10-90 *et al*, filed on Feb. 24, 2012 by the following rural carrier associations: National Exchange Carrier Association (NECA), National Telecommunications Cooperative Association (NTCA), The Organization for the Promotion and Advancement of Small Telecommunications Companies (OPASTCO), and the Western Telecommunications Alliance (WTA) at 38 (“...Sections 251 and 252 of the Act govern all interconnection arrangements, including IP-to-IP Interconnection for the purposes of exchanging traffic between carriers.”); Alaska Rural Coalition (“ARC”) at 17 (“[R]egulation of IP-to-IP networks should remain consistent with [] regulation of traditional interconnection. All carriers should remain obligated to interconnect their networks in the most efficient configuration possible and negotiate those contractual relationships in good faith, consistent with the Telecommunication Act obligations outlined in section 251.”); Nebraska Rural Independent Companies (“NRIC”) at 27 (“...Sections 251/252 interconnection framework...will ensure that any migration from TDM to IP-based transmission technologies and then to IP-to-IP technologies is not hampered by those entities with the ability to exercise market power ...”).

<sup>14</sup> See e.g., Comments filed *In that Matter of Technology Transition Task Force*, Before the Federal Communications Commission, GN Docket 13-5, filed on July8, 2013 by the following wireless providers: Sprint at 12 (“The Commission should reaffirm that all Section 251 and 252 obligations extend to the exchange of traffic [via] IP interconnection.”); T-Mobile at 7-10 (“The record developed in response to the AT&T and NTCA IP transition petitions demonstrate why carriers’ negotiations toward IP interconnection agreements must occur with a clearly defined regulatory backdrop... T-Mobile previously demonstrated that the Commission has authority to oversee IP interconnection under Sections 251, 252 and other provisions of the Act.”)

<sup>15</sup> See e.g., Comments filed *In the Matter of Connect America Fund, et al*, Before the Federal Communications Commission, WC Docket No. 10-90 *et al*, filed on Feb. 24, 2012 by the following competitive carriers: COMPTTEL at 13-20; XO at 12-15; Cbeyond *et al* at 20-25; U.S. TelePacific *et al* at 7-14.

services. It is well documented that the noncompliance with the rules by the major ILECs has greatly hindered the IP transition.<sup>16</sup> As the Federal Communications Commission has found, VoIP interconnection has been happening all over the world “at a rapid rate” yet it has been delayed in this country notwithstanding “*the efforts of some cable companies and competitive local exchange carriers.*”<sup>17</sup> Similarly, the FCC’s Technology Advisory Council’s (“TAC”) Working Group on VoIP Interconnection recognized that VoIP interconnection is growing as a result of competitors including cable, but being delayed by commercial and policy considerations.<sup>18</sup> Competitors have been asking the FCC to address this issue since 2009. As the competitors explained to the FCC, instead of agreeing to interconnect and exchange traffic on an IP-basis, the major ILECs have required competing carriers to convert traffic to legacy TDM-format prior to delivering it to the ILEC, even where the ILEC itself had

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<sup>16</sup> See e.g., Comments filed *In the Matter of Technology Transition Policy Task Force*, Before the Federal Communications Commission, GN Docket No. 13-5, on July 8, 2013, by the following parties: Matrix Telecom at 5 (Specifically, the remaining impediment is the refusal of the RBOCs to negotiate agreements for IP interconnection pursuant to the framework of sections 251 and 252 of the Act.”); Peerless Networks at 6 (“Competitive carriers have difficulty *only* with directly connecting in IP format with ILECs and their affiliates.”) *emphasis added*; Sprint at 7 (“The fact that Sprint has yet to obtain IP-to-IP interconnection for voice traffic from any of the major ILECs is evidence of their unwillingness to comply with their obligations under the Act.”); Bullseye Telecom and Access Point (“Bullseye Telecom et al”) at 12-13 (“The impediment remains the refusal of the RBOCs to negotiate IP agreements under the framework of Sections 251 and 251 of the Act.”); XO Communications at 8 (“Managed IP interconnection is far from ubiquitous at this time, in part because most ILECs refuse to abide by interconnection obligations under Section 251 of [the Act], to exchange IP-based voice traffic with requesting carriers.”); T-Mobile at (“For T-Mobile [VoIP Interconnection] is typically with wireless carriers, cable operators, and [CLECs] rather than [ILECs] with whom, in T-Mobile’s experience, it has been exceedingly difficult to negotiate IP interconnection agreements.”); Cablevision at 2 (While Cablevision has successfully negotiated IP interconnection agreements with competitive providers and IXCs, it has been unable to obtain IP interconnection from the ILECs.)

<sup>17</sup> *Technology Transitions Policy Task Force Seeks Comment on Potential Trials*, GN Docket No. 13-5, Public Notice, DA 13-1016, p.4 (Technology Transitions Policy Task Force, p. 4 (2013)(emphasis added).

<sup>18</sup> Federal Communications Commission Technical Advisory Council, TAC Memo – VoIP Interconnection, at 1-2 (Sept. 24, 2012)( *emphasis added*)(“As a working group, we have posited that delays in VoIP Interconnection are largely due to policy and commercial issues, not technology issues... VoIP Interconnect is happening all over the world, at a rapid rate. VoIP Interconnection is growing in the USA due to efforts by MSOs and CLECs. This reinforces the point that deployment is technically feasible today but is largely being delayed due to commercial and policy considerations.”)

deployed facilities that could transport the traffic in packet form on its own network. The result of this forced conversion is increased cost for unnecessary media gateways, and reduced voice quality for consumers because of the unnecessary protocol conversions.<sup>19</sup> The FCC has confirmed that ILECs have a good faith duty to negotiate IP interconnection agreements:

The duty to negotiate in good faith has been a longstanding element of interconnection requirements under the Communications Act and does not depend upon the network technology underlying the interconnection, whether TDM, IP, or otherwise. Moreover, we expect such good faith negotiations to result in interconnection arrangements between IP networks for the purpose of exchanging voice traffic.<sup>20</sup>

However, the large ILECs continue to refuse to negotiate pursuant to the Act's interconnection provisions, presumably claiming that they are overly burdensome and do not apply.

But the Act's interconnection provisions are not overly burdensome. Indeed, they have provided important incentives and protections that benefit consumers directly by promoting competition. Indeed, it's the interconnection of networks—no matter their technology—that has advanced mobile wireless networks and calling and that has supported more than 40% of residential consumers to rely solely on their mobile phones.

IP interconnection is less complex, requiring far fewer points of interconnection than TDM interconnection. The Act's provisions allow parties to negotiate agreements, but provide for arbitration through state agencies if negotiations fail. The filing and review of the agreements by states agencies confirm that carriers that are not party to the agreement are not being discriminated against and that the public interest—namely the consumer's interest—is being served. If carriers reach an agreement, the filed agreement can serve as the model for other agreements, saving the industry time and cost of

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<sup>19</sup> Letter of William H. Weber, Cbeyond, *et al*, to Marlene Dortch, GN Docket No. 09-51, p. 1, filed Sept. 22, 2009.

<sup>20</sup> *ICC/USF Transformation Order and FNPRM* at ¶ 1011.

negotiations and arbitration. Indeed, far more agreements are opted into than arbitrated.

Consequently, the public filing and availability of contracts is a critical feature of the competitive landscape.

It is crucial that the Federal Communications Commission and the state commissions continue to maintain *and fulfill* their role under the Act with regard to interconnection agreements so that consumers are able to reap the benefits of the transition of the nation's networks to this innovative IP technology and to ensure a competitive market is sustained and promoted and that consumers continue to have a choice in providers.

Competitive carriers have been at the forefront of the IP transition, investing in IP networks and offering IP-based services to their customers for well over a decade. Indeed, some of COMPTTEL's members are all IP and have been so for over a decade. Consumers' realization of the benefits of IP technology hinges on competitors' ability to obtain just and reasonable terms for interconnection from the large ILECs. One of the critical factors to eliminating barriers to the industry's transition to IP (such as competitors having to downgrade their services to TDM technology in order to exchange traffic with the incumbent) is ensuring that the pro-competitive interconnection provisions of the Act are enforced. This will make certain that competition will not be stifled once the technology transitions—that are well underway—are complete.<sup>21</sup>

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<sup>21</sup> In addition, as we discuss further below in response to question seven, recent developments in the Internet interconnection marketplace should be closely scrutinized by policy makers. Disputes have arisen that certain residential broadband Internet access providers are allowing points of interconnection to become congested and requiring edge and/or transit providers to pay a toll so that their traffic can reach consumers who have requested the content. Allowing broadband internet access providers to use their terminating access monopolies to charge "access fees"—either directly or indirectly—to edge and/or transit companies responding to requests from the Internet access providers' customers is in stark contrast to the policy that's been accepted by policy makers that each provider bears their own costs to interconnect (also known as bill and keep). Internet service subscribers pay their providers substantial fees for the speeds necessary to meet their needs. The Commission has recognized that having end users pay for the network and service to which they subscribe is consistent with the principles of cost causation, meaning that they party who causes the cost should have to pay for it.

## Questions for Stakeholder Comment

### **1. In light of the changes in technology and the voice traffic market, what role should Congress and the FCC play in the oversight of interconnection? Is there a role for states?**

*For “consumers to have a choice of service providers, competitive carriers need to be able to interconnect their networks with incumbent providers. Basic interconnection regulations, which ensure that a consumer is able to make and receive calls to virtually anyone else with a telephone, regardless of service provider, network configuration or location, have been a central tenet of telecommunications regulatory policy for over a century. For competition to thrive, the principle of interconnection—in which customers of one service provider can communicate with customers of another—needs to be maintained.”<sup>22</sup> The interconnection provisions of the Act have worked well for the past two decades--when applied. Where the interconnections provisions have not been enforced (such as large ILEC refusal to interconnect in IP), then consumers lose.*

*Under the Act, interconnection agreements start with commercial negotiation between the parties. States agencies’ role as arbitrator under the Act only comes into play should negotiations fail. Both parties have the incentive to avoid arbitration if possible due to the time and expense of arbitration. The agreements reached (whether by voluntary negotiations or arbitration) are filed with the state for approval (and consistency with the public interest), and other parties can opt into the agreements, providing efficiencies for all parties.*

*It is crucial that the FCC and the state commissions continue to maintain and fulfill their role under the Act with regard to interconnection agreements for voice services so that consumers are able to reap the benefits of the transition of the nation’s networks to IP technology and ensure a competitive market is sustained and promoted.*

*As discussed above, seldom has there been such broad support in the industry across service providers as there has been – such as by cable providers, rural carriers, wireless carriers and traditional competitive LECs – on the need for application of the interconnection provisions of the Act to IP interconnection for managed voice services. It is well documented that the noncompliance with the rules by the major incumbent LECs has greatly hindered the technology transition. As the FCC concluded, VoIP interconnection has been happening all over the world “at a rapid rate” yet it has been delayed in this country notwithstanding “the efforts of some cable companies and competitive local exchange carriers (CLECs).” As a result, the IP transition in the U.S. has been stymied by large ILECs, and the consumer benefits of interconnected VoIP service, such as the availability of enhanced (HD) voice services, have been delayed.*

*The principal role for Congress at this time should be oversight, rather than modifying the current interconnection requirements. As COMPTTEL discussed in response to the first and third white papers, changes in technology do not, and should not, equate to a change in the basic rules that ensure markets are competitive and consumers continue to enjoy innovative and competitively priced services. As the FCC has confirmed, the interconnection provisions of the Act are technologically neutral. The interconnection obligations are relatively modest solutions to problems that continue in the market.*

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<sup>22</sup> FCC, Connecting America: The National Broadband Plan, at 49, rel. Mar. 16, 2010 (“National Broadband Plan”), available at: <http://www.fcc.gov/national-broadband-plan>.

*There is no reason to inject additional uncertainty, and promote additional concentration, by lessening these obligations. To the contrary, the states have only recently begun to perform their statutory duties with regard to IP interconnection for voice services, such as through arbitration invoked by the negotiating parties (Michigan), and addressing the public filing of interconnection agreements (Massachusetts). While some may claim that there will be “a patchwork of 50 inconsistent state decisions,” the vast majority of states will likely never have need to arbitrate. Once a few agreements are reached and filed, they will likely serve as the model for all others. Moreover, it is possible that the FCC could rule on its outstanding rulemaking on IP interconnection. The FCC already has found that providers have a good faith duty to negotiate for IP interconnection and affirmation from the Commission on the applicability of the interconnection provisions in the Telecom Act has been sought and has gained wide support from industry, as mentioned above. These processes provide an opportunity for Congress to gain additional information about these issues.*

**2. Voice is rapidly becoming an application that transits a variety of network data platforms. How should intermodal competition factor into interconnection mandates? Does voice still require a separate interconnection regime?**

*Voice is not just another application provided over any sort of data network. Voice services are real-time interactive services that demand the performance attributes of managed networks if they are to provide the subscriber with any measure of consistency, reliance or security. Thus, the vast majority of voice services transit and interconnect through a managed network. (See the attached diagram.) This distinction is appropriate, as where data services are bursty, voice is constant. Where data services can handle latency and delay, voice is unable to. And finally, where data service is asymmetric, voice service is symmetric. The fact is that voice service is a real time information flow that has particular performance and security needs requiring a managed network.*

*In addition, voice service continues to play the leading communications role in our society and requires public policy attention. This is true for both residential and business consumers. While consumers have embraced email and text as a form of communication, most consumers continue to rely on voice service as the principal means of their most important communications.*

*Accordingly, the interconnection regime should specifically ensure that voice calls are connected. As the FCC found, “[i]nterconnection among communications networks is critical given the role of network effects. Historically, interconnection among voice communications networks has enabled competition and the associated consumer benefits that brings through innovation and reduced prices.”<sup>23</sup> Moreover, the FCC also has stated that “[w]ithout interconnection for voice service, a broadband provider, which may partner with a competitive telecommunications carrier to offer a voice-video-Internet bundle, is unable to capture voice revenues that may be necessary to make broadband entry economically viable.”<sup>24</sup> Finally, consumers do not distinguish between traditional TDM voice calls and VoIP calls, and whether a voice call is over wireless or wireline network, consumers expect that they will be able to call any other voice consumer and it will be connected. This is true whether a consumer is calling 911 to seek*

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<sup>23</sup> ICC/USF Transformation Order and FNPRM at ¶ 1009.

<sup>24</sup> National Broadband Plan at 49.

*emergency assistance from public safety officials, wants to order a pizza for dinner, or a business consumer that is negotiating a billion dollar transaction.*

**3. How does the evolution of emergency communications beyond the use of traditional voice service impact interconnection mandates?**

*The IP technology used for Next Generation 911 services is and will be designed to enable the public to send emergency communications to Public Safety Answering Points (“PSAPs”) via a variety of different media in addition to traditional voice service, including text, photographs, videos, and data. Having real-time access to such multimedia transmitted from the scene of an accident, crime or natural disaster will enhance the ability of PSAPs and first responders to assess and respond to emergencies. The ability of service providers to interconnect on an IP-to-IP basis is a precondition to the delivery of their subscribers’ multimedia traffic to PSAPs and to promote the ubiquitous availability of advanced emergency services.*

**4. Ensuring rural call completion has always been a challenge because of the traditionally high access charges for terminating calls to high-cost networks. Does IP interconnection alleviate or exacerbate existing rural call completion challenges?**

*Pursuant to its 2011 USF/ICC Transformation Order, the FCC has required all voice providers, including those operating in high-cost areas, to gradually reduce their terminating access charges over a period of years to \$0.00 (bill and keep). The FCC determined that high terminating access charges were the main, although not the only, reason that certain carriers do not or have not completed calls to rural areas. That opportunity for arbitrage is diminishing and will eventually disappear completely as terminating access rates approach, and eventually reach, zero. In its Further Notice of Proposed Rulemaking, the FCC is examining whether high transport rate elements may also serve as an incentive to delay IP-to-IP interconnection.*

**5. Should we analyze interconnection policy differently for best-efforts services and managed services where quality-of-service is a desired feature? If so, what should be the differences in policy between these regimes, and how should communications services be categorized?**

*As depicted by the attached diagram, interconnection for best-efforts Internet traffic is separate from traffic being exchanged with a managed service. Even best efforts OTT VoIP service has to go through a managed POI if the call is to a subscriber of managed VoIP services, in order to ensure the quality of service and security provided to the subscriber of the managed service. Given recent expressed concerns in the market, the FCC should investigate this matter further. But, regardless of the outcome of that debate, it is clear that the points of interconnection for managed services fall under the existing statutory interconnection provisions and should continue to do so as discussed above.*

**6. Much of the committee’s focus in the #CommActUpdate process has been on technology-neutral solutions. Is a technology-neutral solution to interconnection appropriate and effective to ensure the delivery and exchange of traffic?**

*Yes. The principle of technological neutrality should remain at the heart of any legislative examination of the interconnection provision. Interconnection is required of all voice providers whether they are wireline, wireless, or satellite. Importantly, the FCC has found that when similar network functionalities are regulated differently, based on the technology used, it undermines longstanding competition policy objectives.<sup>25</sup>*

*But technology neutrality does not mean that certain industry members should not be treated differently. As discussed in our introduction and further discussed in the answer immediately below, certain ILECs continue to have a dominant position in the voice market. Their size and market power make it necessary for smaller voice providers to interconnect with them. If that market power is not adequately addressed, then smaller providers may be put at a significant disadvantage in the marketplace. For example, as discussed, the FCC has now determined that terminating access charges for voice providers should go to bill and keep over a certain period of time. If IP interconnection is only available via commercial negotiations and not pursuant to the Act's provisions, large ILECs will be able to demand access charges from smaller providers and refuse to pay them in turn. As such, large ILECs will be able to gain an even greater financial advantage over smaller providers, increasing their costs and impacting their capability to provide an alternative to consumers.<sup>26</sup>*

**7. Wireless and Internet providers have long voluntarily interconnected without regulatory intervention. Is this regime adequate to ensure consumer benefit in an all-IP world?**

*No. To begin, the premise is factually inaccurate with respect to the wireless marketplace. As the FCC confirmed in a series of Orders, interconnection provisions of the Act apply to interconnection between local exchange carriers and CMRS (mobile wireless) providers. In fact, the significant inroads that mobile wireless providers have made in the marketplace for offering mobile voice services is a direct result of wireless companies being granted the right to request interconnection with wireline companies under the Act. Moreover, because Section 251(a) of the Act applies to all telecommunication carriers, the FCC is able to address disputes between various types of carriers, including to the benefit of the incumbent LEC. For example, wireless carriers indirect interconnection with the smaller incumbent LECs through the larger incumbent LECs led to numerous disputes on compensation. In the FCC's decision in T-Mobile, the Commission clarified that these smaller carriers may request direct interconnection from a CMRS provider and invoke the negotiation and arbitration procedures set forth in section 252 of the Act.<sup>27</sup>*

*For its part, the wireless industry today is far more concentrated with two dominant providers (AT&T and Verizon) than it has been in the past. In addition, the third largest wireless carrier (Sprint) has been forced to seek arbitration in order to obtain IP interconnection for voice services with the incumbent LEC.*

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<sup>25</sup> *National Broadband Plan* at 47.

<sup>26</sup> To add insult to injury, the FCC granted ILECs recovery in its USF/ICC reform for losses in access charge revenues. It did not do the same for competitors. As such, ILECs could reap the benefits of bill and keep for itself, but then refuse to honor bill and keep for competitors.

<sup>27</sup> *Id.* at ¶ 9.

*A fact that cannot be ignored is that competitors have been unsuccessfully seeking interconnection on an IP basis in accordance with the Act from the major incumbent carriers since 2009.<sup>28</sup> To the extent one provider has been willing to enter into agreements, it refuses to do so pursuant to the Act and only wants to limit it to a small percentage of its subscriber base thereby requiring two forms of interconnection, which isn't a workable condition.<sup>29</sup> As a result, as noted in the White Paper, voice interconnection is overwhelming limited to traditional TDM rather than IP, even though IP interconnection can reduce costs by 90%<sup>30</sup> and support innovative new services (such as High Definition voice) that cannot be provided over the existing TDM network.<sup>31</sup>*

*Moreover, in the wireless context, the FCC determined that it was necessary to adopt both voice and data roaming rules to ensure that end users can obtain mobile coverage nationwide and use their mobile devices when they are within the service areas of other carriers.<sup>32</sup> The FCC found overwhelming support for its adoption of rules, from all sectors of the industry, but for AT&T and Verizon Wireless.<sup>33</sup> Despite the existence of the data roaming rules, smaller wireless carrier have brought to the Commission's attention the difficulties they continue to experience in negotiating reasonable data roaming arrangements with Verizon and AT&T.<sup>34</sup>*

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<sup>28</sup> Letter of William H. Weber, Cbeyond, *et al*, to Marlene Dortch, GN Docket No. 09-51, p. 1, filed Sept. 22, 2009. As the competitors explained, instead of agreeing to interconnect and exchange traffic on an IP-basis, the major ILECs require competing carriers to convert traffic to legacy TDM-format prior to delivering it to the ILEC, even where the ILEC itself had deployed facilities that could transport the traffic in packet form on its own network. The result of this forced conversion is increased cost for unnecessary media gateways, and reduced voice quality for consumers because of the unnecessary protocol conversions.

<sup>29</sup> See Letter from Maggie McCready, Verizon, to Marlene H. Dortch, FCC, GN Docket No. 13-5, p. 3, filed Jan. 10, 2014. Verizon will only exchange in IP if their endpoint is in IP even though is it technically feasible and more economically do establish the interconnection for all traffic. While the majority of competitors' subscriber base is in IP, ILECs have less than 10% of their subscriber base in IP. *Local Competition Report*, p. 5, Figure 4.

<sup>30</sup> See Comments of COMPTTEL, *In the Matter of Facilitating the Deployment of Text-to-911 and Other Next Generation 911 Applications, Framework for Next Generation 911 Deployment*, PS Docket Nos. 11-153, 10-255, Attachment, "IP INTERCONNECTION FOR MANAGED VOIP" April, 2011, at 21-22 (filed Dec. 12, 2011) ("*COMPTTEL Interconnection Cost Analysis*").

<sup>31</sup> The experiment to which the White Paper refers involved OTT VoIP providers and, therefore, has no impact on the ability of the vast majority of VoIP subscriptions being exchanged in IP.

<sup>32</sup> Second Report and Order, *In the Matter of Reexamination of Roaming Obligations of Commercial Mobile Radio Service Providers and Other Providers of Mobile Data Services*, WT Docket 05-265, FCC 11-52, 26 FCC Rcd 5411 at ¶ 4, 13 (2011), *aff'd sub nom.*, *Cellco Partnership v. FCC*, 700 F.3d 534 (D.C. Cir. 2012) ("*Data Roaming Order*"). See also 47 C.F.R. §20.12.

<sup>33</sup> *Id.* at ¶¶ 11-12.

*In the case of Internet interconnection, it grew from a series of government-funded computer networking efforts. The Internet architecture that largely remains in place today was established by the National Science Foundation (NSF) through solicitation and awarding of contracts to provide connection points between commercial networks, and one routing arbiter, to ensure an orderly exchange of traffic across the Internet.<sup>35</sup>*

*For many years the Internet grew without significant concentration as most ISPs were able to share local telephone networks using dial-up access (thereby avoiding the need to duplicate the local loop), and there were multiple backbone networks competing aggressively. Competitive access to broadband Internet access is not available, and competition for robust residential broadband Internet access service has been limited. Indeed, we now have parties, including transit providers and one major video streaming company, raising Internet interconnection and access charge issues. Their concern is that some broadband Internet access providers are exercising their market power (including their terminating monopoly power). It is important for policymakers to investigate these concerns that have been raised. As such, policymakers should exercise great caution when drawing conclusions concerning the historical absence of controversy involving Internet interconnection, as the current market structure, most especially the need for last mile conductivity to compete, and the ongoing complaints is very different than the conditions that produced its historical past.*

*Moreover, unlike the Internet, where traffic generally goes anywhere in the world, most voice traffic is heavily local in nature. The majority of calls address our basic needs—calls to friends and neighbors, places of employment, doctors, hairstylists, and the parents and teachers of our children. The list goes on and on. A change in the technology a carrier uses to carry traffic does not change subscriber calling patterns. Nor does it change the critical need to make sure that local networks are interconnected to ensure that these calls are completed in the most efficient manner. Without governance, however, the carrier with the larger network and more subscribers—i.e. the largest ILECs—could dictate terminating access charges and inefficient distant point of interconnection on its network so that it can extract charges for transport from its competitors, thereby raising their rivals’ costs and harming competition. Instead, large ILECs should be competing on innovation and value.*

**8. Is contract law sufficient to manage interconnection agreements between networks? Is there a less onerous regulatory backstop or regime that could achieve the goals of section 251?**

*No. Contract law does not ensure an agreement will be reached. A primary principle of the interconnection provisions of the Act is to ensure all carriers can enter into agreements for the exchange of traffic so that consumers can have a choice in providers and be assured that their calls will be completed, regardless of the provider of the called party. Another objective is nondiscrimination so that disparate interconnection agreements do not give advantage to the one carrier over another. The*

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<sup>34</sup> Memorandum Opinion and Order *In the Matter of Application of Cricket License Company, LLC, et al., Leap Wireless International, Inc. and AT&T, Inc. for Consent to Transfer Control of Authorizations*, WT Docket No. 13-193, DA 14-349, ¶104 (rel. Mar. 13, 2014); Petition for Expedited Declaratory Ruling of T-Mobile USA, Inc. filed May 27, 2014 in WT Docket No. 05-265, at 6-9.

<sup>35</sup> See National Science Foundation, “A Brief History of NSF and the Internet” (2003), available at: [http://www.nsf.gov/od/lpa/news/03/fnsf\\_internet.htm](http://www.nsf.gov/od/lpa/news/03/fnsf_internet.htm)

*interconnection provisions of the Act accomplish this by providing arbitrations when negotiations fail, and the filing and opt-in requirement to ensure non-discrimination and that public interest is served. Section 251(c)(2) provides the pro-competitive criteria against which interconnection agreements are evaluated, such as technical feasibility and just and reasonable and nondiscriminatory rates, terms and conditions. This criterion is the basis for arbitrations and dispute resolutions. Contract law, in and of itself, has no comparable pro-competitive criteria.*

*The interconnection provisions of the Act are not unduly burdensome to any party and actually save resources. Indeed, the process begins with commercial negotiations. Once carriers reach an interconnection agreement, they are merely required to publicly file the contract and allow others to opt-in where those third parties are willing to accept the same terms and conditions. This saves the industry time and expense of negotiating multiple (there are hundreds of carriers) interconnection agreements. It also provides a market check on discrimination. The vast majority of interconnection agreements are reached through the opt-in opportunity, not arbitration.*

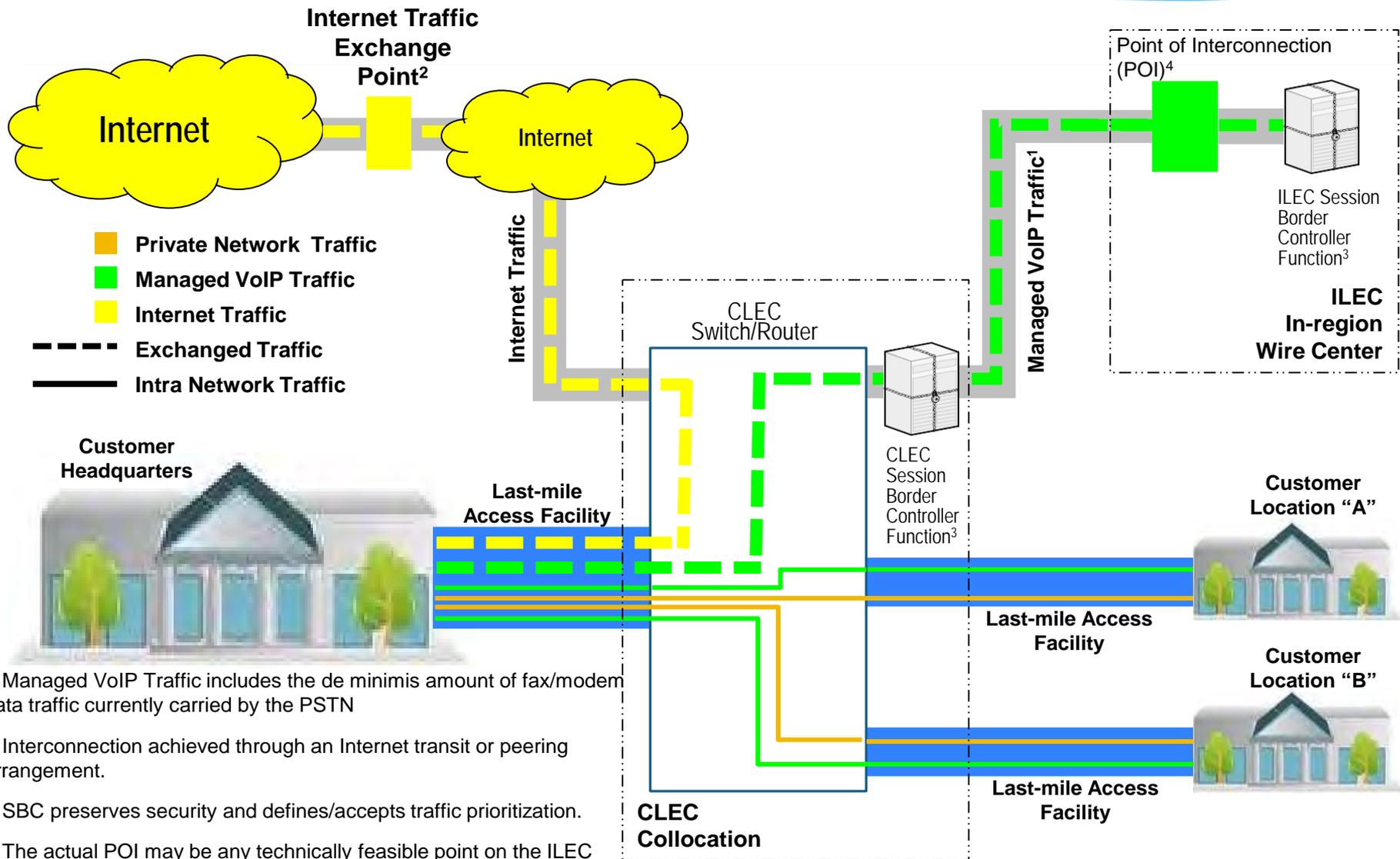
*As final confirmation that the interconnection requirements of Section 251 are not unreasonable, it is important to note that applying these provisions to IP interconnection is supported by the organizations representing the nation's smallest incumbent local telephone companies, even though the provisions would apply to these companies. If the provisions were as onerous as some make out, then the smallest incumbent local exchange carriers would confront the greatest difficulty complying with them. Consequently, their support for IP interconnection falling under the statute is compelling evidence that the administrative burden is reasonable, particularly in comparison to the absolutely vital protections that it provides.*

Thank you for the opportunity to comment.

Alan Hill  
Senior Vice President, Government Relations  
COMPTEL

Attachment

# User IP Traffic Flows



<sup>1</sup> Managed VoIP Traffic includes the de minimis amount of fax/modem data traffic currently carried by the PSTN

<sup>2</sup> Interconnection achieved through an Internet transit or peering arrangement.

<sup>3</sup> SBC preserves security and defines/accepts traffic prioritization.

<sup>4</sup> The actual POI may be any technically feasible point on the ILEC network such as the interface port of a router, L-2 switch, ROADM, etc.

C O U N C I L F O R



*Thomas A. Schatz*  
President

August 8, 2014

The Honorable Greg Walden  
Chairman  
Subcommittee on Communications and  
Technology  
Committee on Energy and Commerce  
U.S. House of Representatives  
2123 Rayburn House Office Building  
Washington, DC 20515

The Honorable Anna Eshoo  
Ranking Member  
Subcommittee on Communications and  
Technology  
Committee on Energy and Commerce  
U.S. House of Representatives  
2123 Rayburn House Office Building  
Washington, D.C. 20515

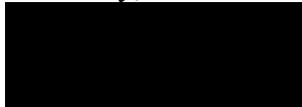
Dear Chairman Walden and Ranking Member Eshoo,

On behalf of the more than one million members and supporters of the Council for Citizens Against Government Waste (CCAGW), I extend our appreciation of your continued work in modernizing the Communications Act of 1934.

The last major overhaul of the Communications Act of 1934 occurred with the Telecommunications Act of 1996. While the law addressed the state of communications at the time of enactment and included the Internet in broadcasting and spectrum allotments, it did not anticipate the dramatic changes that have occurred in the intervening 18 years. The convergence of voice, data, and video has created a new ecosystem that existing law is ill-equipped to regulate.

I am submitting the following responses to the questions posed by the Committee in its most recent white paper on "Network Interconnection." Should you have any questions, please feel free to contact either myself, or Deborah Collier, CAGW's director of technology and telecommunications policy at (202) 467-5300.

Sincerely,



Thomas A. Schatz  
President

**Questions for Stakeholder Comment:**

- 1. In light of the changes in technology and the voice traffic market, what role should Congress and the FCC play in the oversight of interconnection? Is there a role for states?**

The Telecommunications Act of 1996 was enacted 12 years after the breakup of the Baby Bell companies in order to promote competition in the local exchange carrier (LEC) markets by requiring incumbent local exchange carriers (ILECs) to lease parts of their networks to competitors at cost; provide wholesale discounts to competitors for any service provided by the ILEC; and charge reciprocal rates in termination of calls to their networks and the networks of local competitors.

While the law addressed the state of communications at the time of enactment and included the Internet in broadcasting and spectrum allotments, it did not anticipate the dramatic changes that have occurred in the marketplace over the past 17 years. The convergence of voice, data, and video has created a new ecosystem that existing law is ill-equipped to regulate.

Yet, in lieu of direction from Congress, and despite attempted regulatory overreach by the FCC, the communications industry has evolved best practices for peering traffic over the networks in order to provide improved customer experience across all platforms. It has been through free market negotiations that agreements have been forged to provide improved download speeds for content providers such as Netflix, without the need to degrade service to other customers.

Therefore, the marketplace has effectively addressed the changing nature of telecommunications infrastructure and the FCC and the states would be wise to restrain their respective regulatory impulses. At the same time, Congress should apply lessons learned in removing barriers to market innovations.

- 2. Voice is rapidly becoming an application that transits a variety of network data platforms. How should intermodal competition factor into interconnection mandates? Does voice still require a separate interconnection regime?**

Interconnect mandates should be relaxed to allow for more robust competition and innovation. On November 7, 2012, AT&T requested that the FCC initiate IP transition testing for those who remain on copper wireline plain old telephone service (POTS) and have yet to adopt new technologies such as fiber or cable.<sup>1</sup> In its petition, AT&T asked the FCC to keep these tests free of legacy

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<sup>1</sup> Bob Quinn, "Beta Testing the Final Transition to IP Broadband," AT&T Public Policy Blog, January 28, 2013, <http://www.attpublicpolicy.com/broadband-policy/beta-testing-the-final-transition-to-ip-broadband/>.

regulations that are currently imposed on ILECs and to declare that ILECs would no longer be the dominant provider for plain old telephone service (POTS).<sup>2</sup>

A January 8, 2013 article in *Ars Technica* noted that copper-wire POTS connections will begin to fade from existence by 2018. AT&T Vice President for Federal Regulatory Division Hank Hultquist explained that the telephone networks the U.S. has relied upon for service are rapidly becoming obsolete and difficult to repair due to a lack of spare parts. Because of the number of different services offered by POTS systems, transitioning to an all-IP network will be challenging. Merging different services configurations, such as voicemail with or without caller ID and various kinds of dialing capabilities, creates complications in moving from existing legacy POTS systems to the new all-IP networks.<sup>3</sup>

On February 25, 2013, the Phoenix Center for Advanced Legal and Economic Public Policy Studies released its analysis of AT&T's petition for wire center trials.<sup>4</sup> Citing the benefits of real world testing of the transition to an all-IP network, the report stated that while legacy communications rules remain in place, the testing itself will be conducted with a "regulatory blank slate" on which the FCC can build its new model and determine which existing legacy regulations remain appropriate once the all-IP transition is completed. The report also highlighted the economic benefits for companies participating in the testing to be on their best behavior, thereby setting a precedent for the new all-IP regulatory structure. Finally, the analysis offered that the FCC would continue to have its enforcement charge within the new all-IP regime consistent with its existing regulatory mission.<sup>5</sup>

On October 8, 2013, the Internet Innovation Alliance released a report on the all-IP transition. The report stated that legacy switched communications traffic amounted to less than 1 percent of IP traffic, and the new platforms that transport IP, including fiber, cable, satellite and mobile broadband, have provided consumers with multiple choices in an increasingly competitive marketplace. By 2017, use of ILEC-maintained copper-wire POTS systems will diminish to less than a fraction of a percent. Those platforms (including Internet, cable, and wireless) that are the least regulated have been the most successful, while the

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<sup>2</sup> Elise Ackerman, "FCC Calls for More Feedback On Switch To New, National IP-Based Phone Network; Punts on AT&T Request," *Forbes*, May 12, 2013, <http://www.forbes.com/sites/eliseackerman/2013/05/12/fcc-calls-for-more-feedback-on-switch-to-new-national-ip-based-phone-network-punts-on-att-request/>.

<sup>3</sup> Jon Brodtkin, "The Telephone Network Is Obsolete: Get Ready for the all-IP Telco," *Ars Technica*, January 7, 2013, <http://arstechnica.com/information-technology/2013/01/the-telephone-network-is-obsolete-get-ready-for-the-all-ip-telco/>.

<sup>4</sup> George S. Ford, Ph.D., Lawrence J. Spiwak, Esq., "Searching for a New Regulatory Paradigm: A Comment on AT&T's Petition for Wire Center Trials," Phoenix Center for Advanced Legal & Economic Public Policy Studies, February 25, 2013, <http://www.phoenix-center.org/perspectives/Perspective13-01Final.pdf>.

<sup>5</sup> Ibid.

most regulated platforms, such as ILECs, have been forced to waste capital and operating funds maintaining obsolete copper-wire POTS connections.<sup>6</sup>

Between 2006 and 2011, ILECs invested \$81 billion on legacy copper-wire POTS and \$73 billion on modern broadband infrastructure. ILECs are losing circuit-switched voice and low-speed DSL subscribers, yet when they have deployed broadband fiber infrastructure, they have gained Internet access and video subscribers. However, the ILECs remain encumbered by a regulatory framework that lags behind marketplace realities. For example, ILECs must ask the FCC for permission to stop using obsolete technologies such as POTS in a given geographic area.<sup>7</sup>

On May 13, 2013, the FCC's Technology Transitions Policy Task Force,<sup>8</sup> which was created to address issues surrounding IP interconnection, network resiliency, business broadband competition and consumer protection for voice services, requested public comment on potential trials for new technologies, including all-IP networks.<sup>9</sup> The FCC also asked for more details from stakeholders on AT&T's proposed geographic trials.

The all-IP trials create an opportunity to review outdated rules governing the communications industry and permit changes to the existing regulatory structure to meet the needs of the modern innovative paradigm. However, the FCC should move cautiously in promulgating rules for the all-IP networks to ensure that they can move forward with limited government interference.

**6. Much of the committee's focus in the #CommActUpdate process has been on technology-neutral solutions. Is a technology-neutral solution to interconnection appropriate and effective to ensure the delivery and exchange of traffic?**

Maintaining a technology-neutral solution to interconnection is critical in the #CommActUpdate process. One of the key factors leading to the current issues with the Communications Act is that it was not technology-neutral. The law has therefore been unable to keep pace with the disruptive technologies that have evolved over the past 80 years.

The writers of the Communications Act of 1934 never foresaw the innovations the world enjoys today. Even the ensuing amendments to the Act were ill-

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<sup>6</sup> Anna-Maria Kovacs, Ph.D., CFA, "Telecommunications Competition: The Infrastructure-Investment Race," Internet Innovation Alliance, October 8, 2013, [http://internetinnovation.org/images/misc\\_content/study-telecommunications-competition-09072013.pdf](http://internetinnovation.org/images/misc_content/study-telecommunications-competition-09072013.pdf).

<sup>7</sup> Ibid.

<sup>8</sup> Sean Buckley, "FCC Unveils Technology Transition Task Force," *Fierce Telecom*, December 11, 2012, <http://www.fiercetelecom.com/story/fcc-unveils-technology-transition-task-force/2012-12-11>.

<sup>9</sup> "Technology Transitions Policy Task Force Seeks Comment on Potential Trials, GN Docket No. 13-5," Federal Communications Commission Public Notice, May 13, 2013, [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DA-13-1016A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-13-1016A1.pdf).

prepared to address such advances. The Cable Act of 1992 was written to address changes in the video marketplace, and the Telecommunications Act of 1996 was developed to respond to the de-monopolization of the Baby Bell companies, in order to allow for growth in communications technology. Yet neither bill fully addressed oncoming changes in technology that now permit the wireless use of video, voice, and massive computing power held in a small device in the palm of the hand.

Today, intermodal communications allow consumers a wide variety of choices in the communications space. Cable operators offer their customers not only video connections, but also voice and Internet, and telephone operators now provide video and Internet choices over fiber optic lines. Even Internet content providers such as Google have begun to engage in the communications space with Google Fiber, although they have forgone offering telephone services in order to avoid some of the more cumbersome regulatory burdens under which telephone operators must perform.

The future of technology is unknown. Already, innovations including Wi-Fi enabled vehicles, heads-up displays for vehicles that offer the ability for drivers to stay connected while keeping their eyes on the road,<sup>10</sup> and the increasing development and use of new mobile apps to do everything from remotely checking the contents of a refrigerator and setting the temperature inside a home to providing a patient's vital health statistics to a doctor continue to stretch the imagination.

Unless interconnection regulations remain technology-neutral, these fantastic innovations will become encumbered with a regulatory scheme that would inhibit growth in the marketplace.

**7. Wireless and Internet providers have long voluntarily interconnected without regulatory intervention. Is this regime adequate to ensure consumer benefit in an all-IP world?**

Providing voluntary interconnection without regulatory intervention is the most desired regulatory regime in order to allow future innovations in the telecommunications space. Without a light regulatory touch in both wireless and Internet providers, the technology revolution might not have happened so rapidly.

Trends are showing an increasing departure from traditional POTS services to wireless only services across the country. In June 2013, the Centers for Disease Control issued a report that the number of wireless-only households had risen

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<sup>10</sup> Stephanie Mlot, "Navy HUD 'Like Driving In The Future'," *PC Magazine*, August 5, 2014, <http://www.pcmag.com/article2/0,2817,2462039,00.asp>.

from less than 5 percent in 2003 to 36.5 percent in 2012.<sup>11</sup> The CDC's July 2014 report shows the number of households using only wireless services now constitutes 39.1 percent of American households.<sup>12</sup>

The transition from traditional POTS, which has stagnated under the confines of Title II regulations, to wireless services that have not been burdened by the same regulatory regime, provide a significant reason to reevaluate whether Title II interconnection mandates are even necessary. Americans are no longer reliant on only one form of communications service; they are using innovative tools and devices that rely on wireless services, broadband Internet, and fiber optic lines.

As the nation moves into an all-IP world, where voice, video, and data all share a connection via Internet protocols and over wireless and wireline services, allowing these industries to continue to grow with voluntary interconnection agreements and a light regulatory touch is the preferred regulatory scheme.

**8. Is contract law sufficient to manage interconnection agreements between networks? Is there a less onerous regulatory backstop or regime that could achieve the goals of section 251?**

Given the current intermodal status of the communications industry as well as the increased competitive marketplace, the committee should consider the elimination of the interconnection mandates found in Section 251 and permit telephone service providers to move into a less strict model of regulations similar to that followed by the wireless and Internet service industries. By imposing fewer restrictions, more competition and innovation will follow.

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<sup>11</sup> Stephen J. Blumberg, Ph.D., and Julian V. Luke, "Wireless Substitution: Early Release of Estimates From the National Health Interview Survey, July – December 2012," Centers for Disease Control, Division of Health Interview Statistics, National Center for Health Statistics, June 2013, <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201306.pdf>.

<sup>12</sup> Stephen J. Blumberg, Ph.D., and Julian V. Luke, "Wireless Substitution: Early Release of Estimates From the National Health Interview Survey, July – December 2013," Centers for Disease Control, Division of Health Interview Statistics, National Center for Health Statistics, July 2014, <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201407.pdf>.



**Paul G. Scolese**

Assistant Vice President, Government Affairs

August 8, 2014

**Via E-mail to [commactupdate@mail.house.gov](mailto:commactupdate@mail.house.gov)**

The Honorable Fred Upton  
Chairman  
Committee on Energy and Commerce  
United States House of Representatives  
2125 Rayburn House Office Building  
Washington, D.C. 20515

The Honorable Henry Waxman  
Ranking Member  
Committee on Energy and Commerce  
United States House of Representatives  
2125 Rayburn House Office Building  
Washington, D.C. 20515

**Re: Cox Communications, Inc. Comments on Fourth Committee White Paper on Network Interconnection**

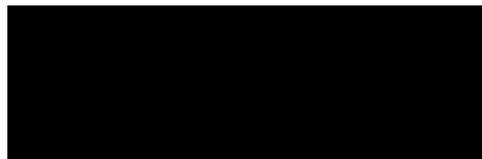
Dear Chairman Upton and Ranking Member Waxman:

As a longstanding and significant participant in the competitive markets for video, broadband, and voice services, Cox Communications, Inc. ("Cox") is pleased to be able to participate in the current efforts of the Committee on Energy and Commerce to consider appropriate modernization of laws and regulations governing the communications and technology sectors of the American economy.

The fourth in the related series of white papers issued by the Committee asks about the important role of the government in regulating interconnection agreements between communication networks. As Cox suggests in the attached comments, the current regulatory framework for voice network interconnection should be retained to ensure the level of competition for reliable quality voice services that consumer now enjoy.

Thank you for the opportunity to take part in this important process.

Respectfully submitted,



Paul G. Scolese  
Assistant Vice President, Government Affairs  
Cox Enterprises, Inc.

Attachment



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**Comments of Cox Communications, Inc.  
In Response to the House Committee on Energy and Commerce  
White Paper on Network Interconnection**

Cox Communications, Inc. (“Cox”) appreciates the opportunity to provide these comments in response to the Committee’s most recent white paper on updating Federal communications laws. Cox’s comments focus on the importance of preserving voice interconnection rights as providers continue to transition from time division multiplexing (“TDM”) technology to IP-based networks. Cox is one of the country’s largest cable system operators, a leading provider of broadband Internet services, and a major provider of voice communications. Cox’s ability to offer consumers attractive and competitive communications services depends upon a policy framework that ensures the company’s customers will be able to reach all businesses and households served by all other providers of interconnected voice communications services. The technology-neutral regulatory framework for interconnection embodied in the Communications Act has proven successful over many years in promoting and developing the competitive voice service market. It has brought great benefits to consumers and should be retained in any revision of the Act.

**The Importance of Technology-Neutral Voice Interconnection Regulation**

The Telecommunications Act of 1996 succeeded in bringing consumers the benefits of a richly competitive voice services market. It has led to the successful presence of a broad range of competitive providers of wireline telephone service, including widely available “over the top” and facilities based IP voice services. This expansion of competitive voice service alternatives relies in large part on the policy regime established in Sections 251 and 252 of the Act, ensuring that competitive carriers can obtain interconnection with incumbent local exchange carrier (“ILEC”) networks on fair and reasonable terms. The Act’s regulatory framework ensuring interconnection of voice service networks on fair and reasonable terms is no less important for fostering a competitive all-IP voice environment than it has been in promoting competition and choice for voice services providers over the traditional public switched telephone network (“PSTN”).

***Competition in Voice Service Markets Continues to Rely on Regulatory Oversight of Interconnection.***

The success of competitive voice service providers significantly depends upon their ability to interconnect with ILECs. Interconnection allows competitive providers to obtain access to key functions routinely controlled by ILECs, including access to emergency calling facilities and databases, ILEC number portability, operations support systems, and other elements needed to provide competitive voice telephone service. In most cases, the only

reasonable way for a competitive network to obtain access to these essential network elements and features is through interconnection with and cooperation from the local ILEC.

Interconnection with ILECs also plays a vital role in competitive voice service markets by providing a means for competitive carriers to indirectly interconnect their networks with other carriers. Because ILECs are the only carriers that interconnect with all other carriers in their local calling areas, they provide a critical link (called transit service) between a competitive carrier and every other carrier that also connects with the ILEC, often eliminating the need for the competitive carrier to have a direct connection to each of the other carriers. This creates market efficiencies that benefit consumers, and in many cases offers the only reasonable way to create needed connections where the level of traffic between one competitive carrier and another may not justify direct interconnection.<sup>1</sup>

Interconnection with ILECs also allows competitors to efficiently connect their customers with the nearly 60 percent of wireline voice consumers that obtain their retail service through ILEC networks. ILECs still maintain the largest market share in nearly every local retail voice service market, meaning a competitive carrier cannot successfully compete in the marketplace without access to those ILEC customers at reasonable rates and on reasonable terms and conditions.

In large part, the statutory interconnection protections of Sections 251 and 252 of the Act were adopted by Congress in recognition of the fact that without regulation ILECs would have both the incentive and the means to disadvantage competitive voice service providers by refusing to provide interconnection on fair and reasonable terms. While competition in voice markets has expanded significantly – due in no small measure to the guarantee of interconnection afforded to competitors – ILECs still wield control over key network resources in nearly every local market, often remain the only carriers capable of furnishing efficient transit service between providers, and retain substantial customer bases to which competitors require access. As a result, a strong interconnection policy remains necessary to preserve and strengthen the competition and consumer choice in voice service markets that have emerged in the wake of the 1996 Act.

### ***Transition to All-IP Voice Service Networks Does Not Eliminate the Continuing Need for Regulatory Oversight of Network Interconnection***

Despite claims from some parties to the contrary, the transition of modern voice networks to all-IP technology does not eliminate the need for a strong regulatory framework for interconnection between the managed networks of voice service providers. Certainly, transition to IP networks will enable interconnection to be more efficient and economical, for example by allowing exchange of traffic at fewer points of interconnection. But the change in technology from TDM technology to IP technology does not eliminate or reduce the need for competitive providers to interconnect, nor does it alter the ILECs' bottleneck control over key resources or the role ILECs fill as transit providers.

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<sup>1</sup> Competitive transit providers exist as an alternative to ILECs in some markets, but even the most successful competitive transit provider does not reach all of the carriers with which a competitive carrier needs to interconnect, leaving indirect interconnection through an ILEC as the only alternative.

Suggestions that voice networks will no longer need interconnection regulation upon conversion to all-IP technology because the public Internet has developed without regulation of broadband interconnection are mistaken. Managed interconnected VoIP service, and all of the ancillary services associated with managed interconnected VoIP service, like that furnished by Cox and other competitive service providers, is very different from services – even voice services – offered over the public Internet. Managed voice service offers real-time, full duplex communication that requires an expected, predictable, and controllable level of service throughout the duration of the voice communication. That level and quality of service cannot be offered by a “best efforts” model, which is prevalent with non-managed services provided via the public Internet. The assured quality that managed IP voice networks can obtain only through interconnection with other managed voice networks – and not through the public Internet – is necessary for offering consistent, high-quality phone service and ensuring the reliable connections needed for 911 emergency calling and other necessary services.

The ILECs incentive and means to disadvantage competitive voice service providers are not dependent on the technology used to transmit voice communications over their networks. Recent examples of ILECs delaying or even refusing to provide IP interconnection pursuant to Section 251 and 252 arrangements to competitive service providers demonstrates that the concern is not merely hypothetical.<sup>2</sup> To ensure competitive quality voice services continue, a technology-neutral voice service interconnection regulatory framework should be a key feature of any revision of the Communications Act.

### **Cox Responses to Specific Questions Raised in the White Paper**

#### **1. In light of the changes in technology and the voice traffic market, what role should Congress and the FCC play in the oversight of interconnection? Is there a role for states?**

Congress, the FCC, and state commissions played key roles establishing the regulatory framework for interconnection that opened voice service markets to competition. Those roles should not fundamentally change going forward. Congress should continue to pass procompetitive laws to be implemented by the FCC. The FCC should bring its core expertise to bear on evolving and enforcing a level playing field as voice network technologies and services evolve. States should continue to play a role in reviewing, resolving and enforcing interconnection issues within their jurisdiction that arise under the national framework established by Congress and administered by the FCC.<sup>3</sup>

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<sup>2</sup> See, e.g., *Technology Transitions Policy Task Force*, FCC GN Docket No. 13-5, Reply Comments of Cbeyond, EarthLink, Integra, Level 3, and tw telecom, at 15-16 (Aug. 7, 2013) (listing five instances where a competitive carrier has been refused IP interconnection by an ILEC and detailing other difficulties competitive carriers have had with trying to make such interconnections).

<sup>3</sup> Given that one of the benefits of IP technology may be the ability to establish many fewer interconnection points – potentially including one or more interconnection points that serve multiple states – it may become unclear which state would have arbitration and enforcement jurisdiction over the interconnection agreement that establishes the multi-state interconnection point. It may be necessary, in such a situation for the FCC to assume the role of arbitrator and enforcer for multi-state interconnection

While the technology of managed voice networks and the composition of the markets in which they operate are changing, providers are at various stages of transforming their networks. Some providers, including Cox, are rapidly converting their voice networks to utilize IP technology. Yet, TDM switching remains the prevalent technology in today's marketplace. Because carriers' networks and resources vary and network conversion is an expensive process that requires careful planning, carriers will be at different stages in network evolution over a relatively long period of time. That requires a neutral third party such as the FCC or state commission to arbitrate fair arrangements so a large ILEC with disproportionate bargaining power may not dictate unfair interconnection terms. Any changes made to the Communications Act provisions governing voice service network interconnection must acknowledge the long transition necessary for all networks and the ILECs' continued incentive and means to disadvantage competitive voice service providers regardless of the technology used.

**2. Voice is rapidly becoming an application that transits a variety of network data platforms. How should intermodal competition factor into interconnection mandates? Does voice still require a separate interconnection regime?**

Voice services will continue to require a separate interconnection regime both for the immediate future and for the long term. The suggestion that voice is becoming simply an application that runs over data networks may be true for "over-the-top" VoIP services that use the public Internet, but it is not true for the broad range of IP voice services brought to consumers over managed facilities-based voice networks, for which consumers have high expectations for service quality and reliability. Over-the-top VoIP services that rely on the public Internet to transmit their calls do not need regulated interconnection because they are based on the same "best efforts" model that works for broadband services. These services are able to offer their customers low cost in a trade-off that does not – indeed cannot – guarantee service or connection quality. In comparison, a managed interconnected IP voice service, like that offered by Cox and other competitive service providers, offers real-time, full duplex communication that requires an expected, predictable, and controllable level of service throughout the duration of the voice communication. Maintenance of these essential direct interconnection arrangements is needed to ensure good quality phone service and reliable connections for necessary services like 911 emergency calling.

As explained above, the transition to all-IP networks is occurring at varying paces and still has a long way to go. Cox, like most other providers, has interconnection arrangements with many other providers using both the legacy TDM technology and a growing number with the newer IP technology. The idea that the existing interconnection regulatory framework may no longer be necessary because many providers are shifting to IP networks ignores the fact that there are – and will continue to be for a long time – large numbers of TDM interconnections that were created based on the current regulatory framework. But even when the ongoing transition

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agreements, or to designate a process for coordinated state commission participation in multistate arbitrations. While there is some precedent for multi-state arbitration processes developed under the current Act, Congress should consider providing direction for how FCC and state roles will evolve in the new interconnection landscape.

to all-IP voice networks is complete there will be a need to retain the interconnection regime for managed voice service networks. It also is needed to ensure that providers of high-quality managed voice services like Cox continue to invest in improving networks and services. Thus, a policy framework that continues to ensure robust interconnection with ILEC networks is critical to ensuring that managed interconnected VoIP networks continue to provide consumers with meaningful competition and choice in voice communications.

### **3. How does the evolution of emergency communications beyond the use of traditional voice service impact interconnection mandates?**

As consumers enjoy an expanding array of communications platforms and devices, it remains critical to preserve their ability to quickly and efficiently connect with emergency service providers. The FCC has addressed this issue over the years, expanding emergency calling capability requirements to include wireless and VoIP service providers. Voice service providers that manage the networks on which emergency calls originate, the intervening networks that transmit those calls to the appropriate Public Safety Answering Point (“PSAP”), and the PSAPs themselves all need to adapt to changing technologies as they develop.

There are two ways in which interconnection mandates are important to ensuring the emergency service calling system continues to meet the needs of consumers. First, an emergency call that cannot be clearly heard by PSAP personnel puts the caller in danger of not getting a timely response from emergency services. For emergency calls, perhaps more than any others, the need for interconnection between networks that provides reliable and resilient connectivity is essential. A “best efforts” interconnection simply may not be good enough.

Second, voice service providers, must interconnect with the ILEC to be able to connect emergency calls to the appropriate PSAP. It is not feasible for a PSAP to have a direct connection with every voice service provider, and generally PSAPs connect with only a single provider – most usually the ILEC in the area – to provide a communications connection for carrying emergency calls. Any revision to the Communications Act must provide a continuing regulatory framework that ensures voice networks have the connectivity, reliability, and resilient functionality necessary to support clear and accurate connection of emergency calls.

### **4. Ensuring rural call completion has always been a challenge because of the traditionally high access charges for terminating calls to high-cost networks. Does IP interconnection alleviate or exacerbate existing rural call completion challenges?**

The FCC’s transition of rural carrier terminating access charges to “bill-and-keep” by 2020, as part of the Commission’s universal service and intercarrier compensation reform process, should eliminate the current financial incentives for other providers to avoid termination of calls to those areas. Because interconnection is the key for voice service providers to connect to every voice service subscriber, including those in rural areas, rural call completion issues could occur if interconnection rights and regulatory oversight are weakened. For example, rural ILECs and competitive providers could lose cost-effective access to larger carrier networks to provide transit of traffic to and from rural areas; inferior interconnection facilities could emerge which would affect the quality and reliability of connection of calls to rural areas; and onerous

“network edge” requirements could force interconnecting providers to pay for excessively long stretches of dedicated transport service to bring traffic to a rural provider.

**5. Should we analyze interconnection policy differently for best-efforts services and managed services where quality-of-service is a desired feature? If so, what should be the differences in policy between these regimes, and how should communications services be categorized?**

Interconnection policy can and should differ between “best efforts” or “over-the-top” voice services and managed voice service networks. Best-efforts providers do not need to obtain an interconnection agreement to place their calls on the open public Internet – they need to only enter a “best efforts” commercial agreement with an Internet service provider (“ISP”). They therefore do not need any regulatory oversight to ensure they can get interconnection on reasonable terms for transmitting their calls. And because they are using the public Internet on a best-efforts basis, they knowingly assume the reliability limitations and quality of service afforded by that model.

Managed voice service networks need to obtain interconnection agreements to be able to provide their customers with the level of reliable, high quality service on an end-to-end basis promised to their customers. Thus, even after transition to direct facilities between all-IP managed voice networks, there will be continuing need for regulatory oversight of interconnection rights for those networks. The Committee should carefully consider the impact any revisions to interconnection rules will have on the ability of managed IP voice customers to receive the level of end-to-end service quality at an affordable price necessary to ensure that voice competition will continue to evolve and flourish.

**6. Much of the committee’s focus in the #CommActUpdate process has been on technology-neutral solutions. Is a technology-neutral solution to interconnection appropriate and effective to ensure the delivery and exchange of traffic?**

A technology-neutral solution to oversight of managed voice network interconnection is not only appropriate, but it also has been proven effective over nearly two decades. Technological neutrality is an essential attribute of the interconnection requirements and responsibilities adopted in the 1996 Telecommunications Act that have been successful in promoting and developing the competitive voice service market that exist today. As both ILECs and competitive providers upgrade their networks to all-IP, the current Act should ensure that interconnection rights continue to apply. This important feature of technological neutrality should continue to be a prominent part of any replacement interconnection regulatory framework.

**7. Wireless and Internet providers have long voluntarily interconnected without regulatory intervention. Is this regime adequate to ensure consumer benefit in an all-IP world?**

Since they are not historical monopoly networks, and they do not provide essential services for competitors such as E911 access and operational support services or transit, there is no need to apply interconnection obligations to wireless carriers or Internet providers.

While wireless carriers enter into voluntary agreements with other providers, wireless carriers have the ability to request and obtain interconnection from ILECs. Like other telecommunications carriers, wireless carriers have had to file for arbitration in state commissions, pursuant to Section 252, to enforce the requirement. Recently, Sprint filed for arbitration in Michigan in order to obtain an IP interconnection agreement with AT&T.<sup>4</sup> The resistance of ILECs to agree to interconnection with competitive networks and with unaffiliated wireless networks therefore continues and is unlikely to change simply because an ILEC changes the technology of its network. Regulatory interconnection protections for managed voice service networks, between competitive carriers or wireless carriers when interconnecting with ILECs should continue in an all-IP world

**8. Is contract law sufficient to manage interconnection agreements between networks? Is there a less onerous regulatory backstop or regime that could achieve the goals of section 251?**

Contract law alone is not sufficient to manage interconnection between voice networks, and a regulatory backstop similar to that provided by Sections 251 and 252 is needed to continue to maintain the level of competition and quality of service that consumers deserve. Managed voice services are too important a lifeline for consumers to leave network interconnection issues to the courts or the Federal Trade Commission to address *after* problems occur.

Perhaps the biggest deficiency with reliance on contract law is the fact that there is no requirement in contract law that a party must enter into a contract for interconnection. Thus without a regulatory mandate requiring interconnection, an ILEC could refuse to enter into an interconnection contract with a competitive provider and the competitive provider would have no recourse, except perhaps to invoke the essential facilities doctrine, setting interconnection rights back to the days of the 1983 *MCI v. AT&T* case, before the 1996 Act gave competitive providers robust interconnection rights.<sup>5/</sup>

Without a regulatory means to arbitrate differences that develop in contract negotiations, competitive carriers could be faced with a take-it-or-leave-it proposition of an ILEC that agrees to interconnect only under impossibly difficult terms. Contract law offers no means to quickly or equitably resolve such differences. Contract law also fails to be an adequate substitute for regulation in enforcement of interconnection agreements that may be breached. Recourse to the court system is an expensive and lengthy proposition that most carriers would undertake only in response to the most grievous of contract violations.

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<sup>4</sup> *In the Matter of Petition of Sprint Spectrum L.P. for Arbitration Pursuant to Section 252(b) of the Telecommunications Act of 1996 to Establish Interconnection Agreements with Michigan Bell Telephone Company, d/b/a AT&T Michigan*, Order, MPSC Case No. U-17349 (Dec. 6, 2013)

<sup>5</sup> *MCI Communications Corp. v. American Tel. & Tel. Co.*, 708 F.2d 1081 (7th Cir. 1983).

To ensure that competitive voice service networks are able to interconnect with ILECs that continue to have bottleneck control over network resources and access, a regulatory regime is needed that at minimum will require that ILECs directly interconnect their networks with requesting CLECs; provide an arbitration procedure for impasses in interconnection agreement negotiations; and provide recourse to a neutral arbitrator to quickly resolve complaints of violation or misapplication of the agreement. Of course that, in short, is exactly the regulatory framework currently provided by Sections 251 and 252 of the Act, and is the type of regulatory framework that needs to be carried forward into any Communications Act revision.

### **Conclusion**

As it addresses issues of network interconnection in updating the Communications Act, the Committee should recognize that growth in competition in voice services markets since adoption of the 1996 Telecommunications Act has relied on a strong interconnection policy that ensures competitive networks interconnection on fair and reasonable terms. The importance of Sections 251 and 252 provisions is not changed or diminished by the ongoing conversion of voice networks to all-IP technology. Inclusion of a similar regulatory framework for interconnection in any revision to the Communications Act will ensure that the vibrant competition in voice services markets that brings so many benefits to consumers can continue to exist and expand.

*August 8, 2014*

## CTIA – THE WIRELESS ASSOCIATION® RESPONSE TO HOUSE WHITE PAPER ON NETWORK INTERCONNECTION

CTIA – The Wireless Association® (“CTIA”) submits the following response to the White Paper released on July 15, 2014, by the House Committee on Energy and Commerce (“Committee”), as a part of its ongoing efforts to reform the Communications Act of 1934, as amended (the “Act”), requesting input on interconnection and peering agreements between communications networks and the role of the government in regulating these agreements.<sup>1/</sup>

### I. INTRODUCTION AND SUMMARY

CTIA continues to support the Committee’s efforts to update the Act generally<sup>2/</sup> and welcomes the Committee’s review of network interconnection policies in particular. Consumers will see significant benefits as the nature of interconnection evolves from legacy transmission platforms to those based on Internet Protocol (“IP”) technology, including an expanded choice of communications services at faster speeds and more resilient and reliable networks. Indeed, the wireless industry has already made massive investments in infrastructure to effectuate the deployment of IP-based broadband networks, with wireless providers having invested approximately \$34 billion in their networks in 2013.<sup>3/</sup>

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<sup>1/</sup> See House Committee on Energy and Commerce, *Network Interconnection* (July 15, 2014) (“White Paper”), available at <http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/20140715WhitePaper-Interconnection.pdf>; see also 47 U.S.C. § 151 *et seq.*

<sup>2/</sup> See, e.g., CTIA–The Wireless Association Response to House White Paper on Modernizing U.S. Spectrum Policy (filed Apr. 25, 2014) (“CTIA Spectrum Policy Comments”), available at [http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP2\\_Responses\\_14-25.pdf](http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP2_Responses_14-25.pdf); CTIA–The Wireless Association Response to House White Paper on Competition Policy (filed June 13, 2014) (“CTIA Competition Policy Comments”), available at [http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP3\\_Responses\\_22-42.pdf](http://energycommerce.house.gov/sites/republicans.energycommerce.house.gov/files/analysis/CommActUpdate/WP3_Responses_22-42.pdf).

<sup>3/</sup> See CTIA Spectrum Policy Comments at 1; see also CTIA Competition Policy Comments at 1; CTIA, *US Invests Four Times More in Networks* (Mar. 13, 2014), available at <http://www.ctia.org/resource-library/facts-and-infographics/archive/us-investment-networks>.

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In order to ensure that consumers realize the full benefits of the transition to an IP ecosystem, CTIA recommends that the Communications Act:

- Contain a uniform regulatory regime for interconnection;
- Continue to allow interconnection agreements to be governed principally by contract negotiations among providers, with an appropriate regulatory backstop that includes firm timelines for resolving disputes; and
- Promote interconnection policies that are technologically neutral.

**II. INTERCONNECTION OBLIGATIONS SHOULD BE GOVERNED BY A UNIFORM REGULATORY REGIME**

In light of changes in technology and the voice traffic market, the White Paper asks about the role Congress and the FCC should play in the oversight of interconnection.<sup>4/</sup> It also seeks comment on whether there is a role for states in interconnection policy.

As CTIA previously explained, it is important for Congress to ensure that there is a uniform national scheme for wireless communications products and services as technologies continue to advance and converge.<sup>5/</sup> It is particularly important for Congress to adopt uniform policies for IP interconnection because IP-based services are fundamentally national and international in nature. Unlike traditional circuit-switched Time-Division Multiplexing networks, IP networks typically are not configured to identify the originating or terminating point of a data packet.<sup>6/</sup> Data packets from the same message can be sent over many different routes, and users of IP-enabled services can access the service from any point on the public

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<sup>4/</sup> See White Paper at 3 (Question 1).

<sup>5/</sup> See CTIA Competition Policy Comments at 11-12.

<sup>6/</sup> See Comments of CTIA–The Wireless Association, GN Docket No. 12-353, at 3 (filed Jan. 28, 2013) (“CTIA Interconnection Comments”).

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Internet.<sup>7/</sup> As the physical location of devices and people become decreasingly relevant in an IP environment, it no longer makes sense from a technological standpoint for interconnection policies to draw geographic boundaries.

Moreover, a patchwork of different IP interconnection obligations would only create confusion and slow the proliferation of interconnection arrangements. As the White Paper recognizes, modern IP networks may interconnect at just a dozen points in the U.S.<sup>8/</sup> This reduction in the number of points of interconnection (“POIs”) necessarily means that the interconnecting sites will likely cover multiple states. Giving multiple regulatory bodies authority to impose obligations on a single POI would be arbitrary and could subject providers to potentially conflicting requirements, reducing the regulatory certainty that providers need to invest and innovate. Therefore, a uniform approach to interconnection is required.

A uniform regime for interconnection is consistent with CTIA’s recommended approach to communications jurisdictional issues generally. Specifically, CTIA has promoted a nationwide approach to the regulation of wireless services.<sup>9/</sup> CTIA has recommended that Congress should consider eliminating the preservation of state authority under Section 332(c)(3) of the Act over “other terms and conditions” of commercial mobile radio services.<sup>10/</sup> Moreover, Congress should remove the preservation of state authority to regulate intrastate communications services under Section 2(b) of the Act.<sup>11/</sup>

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<sup>7/</sup> See *id.* at 3-4.

<sup>8/</sup> See White Paper at 2.

<sup>9/</sup> See CTIA Competition Policy Comments at 9.

<sup>10/</sup> See *id.*; see also 47 U.S.C. § 332(c)(3).

<sup>11/</sup> See 47 U.S.C. § 152(b).

**III. COMMERCIAL ARRANGEMENTS WITH AN APPROPRIATE BACKSTOP AND CLEAR TIMELINES FOR ACTION SHOULD BE THE PRIMARY MECHANISM FOR ESTABLISHING INTERCONNECTION OBLIGATIONS**

Recognizing that wireless and Internet providers have long voluntarily interconnected without regulatory intervention, the White Paper asks whether this regime is adequate to ensure consumers benefit in an all-IP world.<sup>12/</sup> While voluntary agreements may not be the *sole* method by which interconnection obligations will be formed, they should certainly be the primary mechanism.

As the White Paper observes, wireless networks typically interconnect through commercial agreements between carriers.<sup>13/</sup> Under these policies, wireless carriers have successfully negotiated interconnection agreements among themselves for over 20 years. As CTIA explained to the Committee, this current light-touch approach to the wireless industry has created a “virtuous cycle” of wireless investment and innovation.<sup>14/</sup> This has not only resulted in explosive growth of the wireless marketplace, but has also made the wireless industry a significant driver of the U.S. economy.<sup>15/</sup> Similarly, the market for IP-based services has been largely unimpeded by regulation, and the Commission has historically chosen not to “monitor or exercise authority over” interconnection among Internet backbone providers.<sup>16/</sup> As a result, Internet peering agreements have also flourished without government intervention.

While Section 251 of the Act imposes a general duty on telecommunications carriers to interconnect, either directly or indirectly, with the facilities and equipment of other carriers, it

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<sup>12/</sup> See White Paper at 3 (Question 7).

<sup>13/</sup> See *id.* at 2.

<sup>14/</sup> See CTIA Competition Policy Comments at 1-2.

<sup>15/</sup> See *id.*

<sup>16/</sup> See *id.* at 5; *Connect America Fund, et al.*, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd. 17663, ¶ 1338 (2011) (internal citation omitted).

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otherwise includes limited mandates.<sup>17/</sup> This limited framework should continue to apply to interconnection as the IP transition occurs, allowing providers to freely negotiate and contract with each other as they see fit. Absent clear evidence of a market failure, Congress should refrain from imposing any additional economic parameters around those obligations, including rate regulation or tariffing.<sup>18/</sup>

Nonetheless, the key to an effective interconnection regime is the ability for providers to reach agreements and resolve disputes expeditiously. Thus, to the extent that providers are unable to conclude an interconnection arrangement, Congress should consider including a regulatory backstop in the Act to help resolve disputes. Today, state commissions are permitted to intervene pursuant to Section 252 of the Act and may assist to mediate differences that arise during the course of interconnection negotiations.<sup>19/</sup> The process contained in Section 252 of the Act serves as a useful safety valve because it contains specific timelines by which action is required to occur. While CTIA prefers a federal mechanism, such as one administered by the Commission or governed by the antitrust laws, as an appropriate backstop, Congress should consider all options and identify the most effective forum and means for resolving disputes. Regardless of where and how the dispute resolution backstop operates, Congress should ensure that it is subject to firm timelines and provides the necessary authority to resolve disputes in a timely manner.

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<sup>17/</sup> See 47 U.S.C. § 251(a). However, local exchange carriers are subject to certain rate regulations, and incumbent local exchange carriers are subject to a more detailed framework, which includes a duty to negotiate interconnection agreements in good faith. See *id.* § 251(b), (c).

<sup>18/</sup> See CTIA Interconnection Comments at 5.

<sup>19/</sup> See 47 U.S.C. § 252.

**IV. A TECHNOLOGY NEUTRAL APPROACH TO INTERCONNECTION IS APPROPRIATE**

The White Paper points out that voice is rapidly becoming an application that transits a variety of network data platforms.<sup>20/</sup> Thus, the White Paper asks whether voice still requires a separate interconnection regime. In addition, noting that much of the Committee’s focus throughout this reform process has been on technology-neutral solutions, the White Paper requests input on whether a technology-neutral solution is likewise appropriate for interconnection.<sup>21/</sup>

As it has noted to the Committee before, CTIA concurs that the Act should be technology neutral.<sup>22/</sup> The White Paper observes that voice networks have advanced to handle data, and wireless providers now offer voice, video, and data services on their networks.<sup>23/</sup> CTIA agrees and believes interconnection policies, like communications policies in general, should remain indifferent to the services offered by providers and the underlying technologies that are employed.

**V. CONCLUSION**

The ubiquitous deployment of IP networks has the potential to unlock significant consumer benefits. This potential can be most completely unleashed with an appropriate interconnection regime. CTIA urges Congress to adopt a uniform framework for interconnection. Further, Congress should employ a light regulatory touch, allowing contract

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<sup>20/</sup> See White Paper at 3 (Question 2).

<sup>21/</sup> See *id.* (Question 6).

<sup>22/</sup> See, e.g., CTIA Spectrum Policy Comments at 20 (suggesting that spectrum policies should be flexible such that licensees are not locked into a particular technology or service); see also CTIA Competition Policy Comments at 14-15 (stating that all competitors should be treated the same regardless of the underlying technology that they utilize).

<sup>23/</sup> See White Paper at 1.

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negotiations to govern, with an appropriate regulatory backstop and timeframes for action when required. Finally, Congress should ensure that its policies are technology neutral, eliminating any artificial division between voice and data services.

August 8, 2014

August 8, 2014

The Honorable Fred Upton  
Chairman  
Committee on Energy and Commerce  
House of Representatives  
Washington, DC 20515

The Honorable Greg Walden  
Chairman  
Subcommittee on Communications and Technology  
House of Representatives  
Washington, DC 20515

Re: Network Interconnection

Dear Chairman Upton and Chairman Walden:

Thank you for the opportunity to comment on network interconnection.<sup>1</sup>

Interconnection involving Incumbent Local Exchange Carriers (ILECs) is currently subject to excessive regulation that is based on an historical predicate that is no longer relevant. Enacted by Congress in 1996, Sec. 251(c) of the Communications Act was designed to attract new entrants to previously government-sanctioned monopoly markets for local telephone service.

Highly-prescriptive interconnection and unbundling rules seemed appropriate to many at the time considering the challenges that new entrants had previously encountered in the market for long distance services. Often overlooked then and now was the Bell System's particular vulnerability to "cream-skimming competition" due to the fact that it was under constant political pressure to keep monthly rates for local telephone service as low as possible. The monopoly franchise enabled the Bell System to charge high prices for long distance and use that revenue to subsidize local services. Aligning prices with costs (e.g., lowering long distance rates and raising local rates) would not be easy. As Steve Coll has written, for example:

The state commissioners knew that revenues from AT&T's long-distance services, which were used mainly by businesses, subsidized the costs of maintaining the nation's local telephone networks. So when the FCC had authorized long-distance competition by approving MCI's microwave application in 1969, the state commissioners had rallied to AT&T's side, arguing that competition in the phone business was not in the public's interest. If AT&T's long-distance revenues were eroded, or if AT&T was forced to drop its long-distance prices to compete with companies like MCI, the cost of local phone service would rise dramatically. The state commissioners would have no alternative but to raise local phone rates too, and they would then find themselves in the midst of serious political controversy.<sup>2</sup>

The ILECs' status as common carriers subject to public utility regulation (under Title II of the Communications Act of 1934 at the federal level) created a headache for MCI at the bargaining table due to the state commissions' strong support for the universal service objectives of ubiquitous, reliable and affordable local telephone service. According to Coll,

It was legally possible for AT&T to dictate unilaterally the terms of an interconnection agreement with MCI. Rather than sitting down at the bargaining table to hammer out a contract, as the two sides had been trying to do over the last year, AT&T could simply draw up the terms it wanted, in the form of a tariff, and submit them to state or federal regulators for approval. This was actually how AT&T handled most of its business and legal arrangements.<sup>3</sup>

The Telecommunications Act of 1996 created a duty to negotiate in good faith as well as the obligation to provide interconnection for the transmission and routing of "telephone exchange service and exchange access" at any feasible point in the network, of equal quality and on rates, terms and conditions that are just, reasonable and nondiscriminatory.<sup>4</sup>

A related provision—which generated enormous controversy—required ILECs to provide "nondiscriminatory access to network elements on an unbundled basis at any technically feasible point on rates, terms, and conditions that are just, reasonable, and nondiscriminatory."<sup>5</sup> The Unbundled Network Element Platform (UNE-P) model developed by the FCC ultimately failed to create significant intra-modal competition in part because of universal service objectives that obliged ILECs to over-charge some users and subsidize others within markets for local services. As Anna-Maria Kovacs has explained,

Obviously, the below-cost UNEP discounts were painful to the [Regional Bell Operating Companies], and they did not rush to welcome the [Competitive Local Exchange Carriers (CLECs)]. But UNEP prices generally did not provide enough margin for profitable operations for the CLECs either.

Bottom line, UNE-based competition failed in the consumer market, even though it provided CLECs with the opportunity to enter the local market at prices below the incumbents' own cost, because retail prices in the consumer market were kept artificially low by regulators to promote universal service. Simply put, there was not enough margin in consumer prices to sustain the CLECs. The poor economics combined with regulatory uncertainty to ultimately doom UNEP. (footnotes omitted.)<sup>6</sup>

The telecommunications market of today bears little resemblance to the one that existed in the mid 1990s. For one thing, as the White Paper acknowledges, today there is significant intermodal competition (“[v]oice is rapidly becoming an application that transits a variety of network data platforms”) and voluntary interconnection agreements are common (“[w]ireless and Internet providers have long voluntarily interconnected without regulatory intervention”). Consequently, highly-prescriptive interconnection rules are no longer necessary to protect consumers.

Second, ILECs are migrating to all-IP networks, and interconnection rules that may require ILECs to indefinitely maintain legacy TDM facilities for the benefit of few users would be prohibitively costly. For example, according to Alcatel-Lucent,

As [Public Switched Telephone Network] voice service attrition continues, the inefficiency of the PSTN platform continues to grow. A large carrier supporting 30 million or more TDM connected lines may have as many as ten thousand switch nodes that make up their PSTN network. Many of these switch nodes are operating with more than 70% of capacity unused. Nonetheless, these substantially underutilized assets continue to draw energy, require ongoing maintenance and operations support. A market area serving over 6 million subscribers operating at 30% capacity wastes over \$100 million in energy costs each year.<sup>7</sup>

Most legacy TDM platforms are approaching 40 plus years in age and for most, if not all manufacturers, the platforms are discontinued; resources (expertise) and equipment spares are becoming scarce.<sup>8</sup>

Verizon has estimated the cost of operating copper facilities to 18 million homes and businesses that have fiber-to-the-premises is more than \$200 million per year in wasted operating expense.<sup>9</sup>

Outdated regulation also threatens to delay the transition to IP-enabled platforms and the new services they are capable of providing. According to Alcatel-Lucent,

In one real world example, Alcatel-Lucent performed an intensive three month long economic and technical analysis of one carrier's options for replacing its aging Class 5 infrastructure. Existing regulations required the carrier to host an IP-TDM gateway at all existing central offices with either any active interconnect or 911 PSAP trunk. In today's IP voice market, the most common approach is to centralize such gateways (e.g. 4-8 locations nationwide). Legacy regulatory requirements that have nothing to do with the efficiency of modern day IP networks essentially undermined the economic analysis, as the capital and operating expenses for large numbers of widely distributed, lower capacity gateways was much, much higher than a more scalable, centralized approach.<sup>10</sup>

In another example, a carrier investigating operations planning for a specific PSTN migration determined regulatory obligations associated with legacy voice features required unnecessarily identical features to be provided an IP-based replacement. As only one of many examples in this case, the IP-substitute included a nominal number of additional milliseconds of dial tone delay after switchhook closure compared to the legacy solution. While the percentage variation was insignificant with respect to customer quality of service, it was deemed unacceptable due to regulation tied to legacy technology. Ultimately, a lack of 100% equivalent implementation of existing tariffed voice services blocked the carrier's acceptance of the PSTN consolidation and retirement plan, notwithstanding a compelling business case and equivalent service quality.<sup>11</sup>

Third, in recognition of the radically different economics that exist in the telecommunications marketplace today, among other things, the FCC began a further phase-down of "antiquated, opaque, regulated charges" for the exchange of voice traffic in 2011<sup>12</sup> that will remove most of the hidden cross-subsidies that created inappropriate behavioral incentives for incumbents and new entrants alike in the past. Universal service objectives will now be undertaken more explicitly. The Connect America Fund will support the deployment of broadband service in high-cost areas without distorting competition.

I. WHAT ROLE SHOULD CONGRESS AND THE FCC PLAY IN THE OVERSIGHT OF INTERCONNECTION? (Question #1)

As a result of the dramatic changes that have occurred in the telecommunications marketplace, the special rules governing ILECs that were put into place in 1996 have fulfilled their purpose as a result of competition and are no longer necessary.

Beyond the general duty of telecommunications carriers to interconnect in Sec. 251(a) of the Communications Act, Congress and the FCC should streamline legacy regulation that was established long ago in response to a different set of needs and circumstances.

II. HOW SHOULD INTERMODAL COMPETITION FACTOR INTO INTERCONNECTION MANDATES? (Question #2)

The Communications Act expresses no preference for or against intra-modal versus intermodal competition. Congress and the FCC should undertake a consumer-focused analysis of market conditions. Services which large numbers of consumers view as effective substitutes some or most of the time should be treated as competitive alternatives for purposes of determining how much regulation is required to ensure consumer benefit. Policymakers should avoid mandates that could have the unintended effect of delaying the introduction of newer technologies that offer greater efficiency and are capable of providing new and improved services, such as all-IP networks.

III. IS A TECHNOLOGY-NEUTRAL SOLUTION TO INTERCONNECTION APPROPRIATE AND EFFECTIVE TO ENSURE THE DELIVERY AND EXCHANGE OF TRAFFIC? (Question #6)

Congress and the FCC should always strive for technology-neutral solutions; the need for variations, if any, should be well-established and not primarily for the benefit of reliance interests.

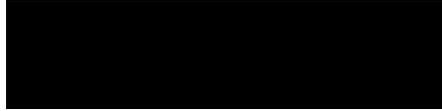
IV. IS VOLUNTARILY INTERCONNECTION WITHOUT REGULATORY INTERVENTION ADEQUATE TO ENSURE CONSUMER BENEFIT IN AN ALL-IP WORLD? (Question #7)

The indisputable success of voluntary interconnection agreements without regulatory intervention in the wireless and Internet sectors should serve as a wake-up call for policymakers and lead to a shift in the burden of proof from those who advocate less regulation to those who argue for its retention and even its expansion.

\* \* \*

Thank you very much for the opportunity to submit these views, which are my own and do not necessarily reflect the personal views of the officers or fellows of the Discovery Institute.

Sincerely,



Hance Haney  
Senior Fellow & Director  
Technology & Democracy Project  
Discovery Institute

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<sup>1</sup> “#CommActUpdate Efforts Continue With Interconnection White Paper” [Press release], *Energy & Commerce Committee, United States House of Representatives* (Jul. 15, 2014), available at <http://energycommerce.house.gov/press-release/commactupdate-efforts-continue-interconnection-white-paper>.

<sup>2</sup> Steve Coll, *The Deal of the Century: The Breakup of AT&T* (Atheneum, 1987), 38.

<sup>3</sup> *Id.*, 37.

<sup>4</sup> 47 U.S.C. §251(c)(1) and (2).

<sup>5</sup> 47 U.S.C. §251(c)(3).

<sup>6</sup> Anna-Maria Kovacs, “Telecommunications competition: The infrastructure investment race” (Oct. 8, 2013) available at <http://apps.fcc.gov/ecfs/document/view?id=7520959850>.

<sup>7</sup> In the Matter of AT&T Petition to Launch a Proceeding Concerning the TDM-to-IP Transition, *Comments of Alcatel-Lucent*, GN Docket No. 12-353 (Jan. 28, 2013) available at <http://apps.fcc.gov/ecfs/document/view?id=7022113605>, 5.

<sup>8</sup> *Id.*, 7.

<sup>9</sup> In the Matter of Technological Transition of the Nation’s Communications Infrastructure, *Comments of Verizon and Verizon Wireless*, GN Docket No. 12-353 (Mar. 5, 2013) available at <http://apps.fcc.gov/ecfs/document/view?id=7022127864>, 11.

<sup>10</sup> *Comments of Alcatel-Lucent*, *supra* note 7, 16.

<sup>11</sup> *Id.*, 17.

<sup>12</sup> “FCC Releases ‘Connect America Fund’ Order to Help Expand Broadband, Create Jobs, Benefit Consumers” (press release), Nov. 18, 2011, available at [https://apps.fcc.gov/edocs\\_public/attachmatch/DOC-311095A1.pdf](https://apps.fcc.gov/edocs_public/attachmatch/DOC-311095A1.pdf).

August 8, 2014

The Honorable Fred Upton  
Chairman  
House Committee on Energy and Commerce  
2125 Rayburn House Office Building  
Washington, D.C. 20515

The Honorable Greg Walden  
Chairman  
House Subcommittee on Communications and Technology  
2125 Rayburn House Office Building  
Washington, D.C. 20515

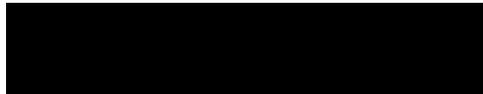
Dear Chairmen Upton and Walden:

Thank you for the opportunity to respond to your request for comments on **Internet interconnection** in the context of an Update of Communications Law.

I have attached a short paper (and accompanying slides) called “How the Net Works” that offers a basic history of interconnection. Also attached in our email to you are links to several commentary articles that examine the facts and arguments from recent, high-profile interconnection events.

Please don't hesitate to call on us if we can be of service.

Sincerely,

A solid black rectangular box redacting the signature of Bret T. Swanson.

Bret T. Swanson

# How the Net Works: A Brief History of Internet Interconnection

BRET SWANSON > February 21, 2014

The Internet is an historic technological, social, and commercial success. It is also a success of self-organization and self-governance. Building something so complex requires exquisite planning by individuals and teams creating the hardware and software to power such a sprawling system. It also requires a conceptual framework that provides just enough commonality to make the pieces work together, but not so much top-down instruction that the system cannot adapt, grow, evolve, and innovate.<sup>1</sup>

We celebrate the Internet's dynamism – most apparent in the ever expanding choices of content, services, and devices that attach to it. Less heralded, but no less important, however, are the networks that power the whole system and the increasingly complex and creative ways all our networks connect to one another.

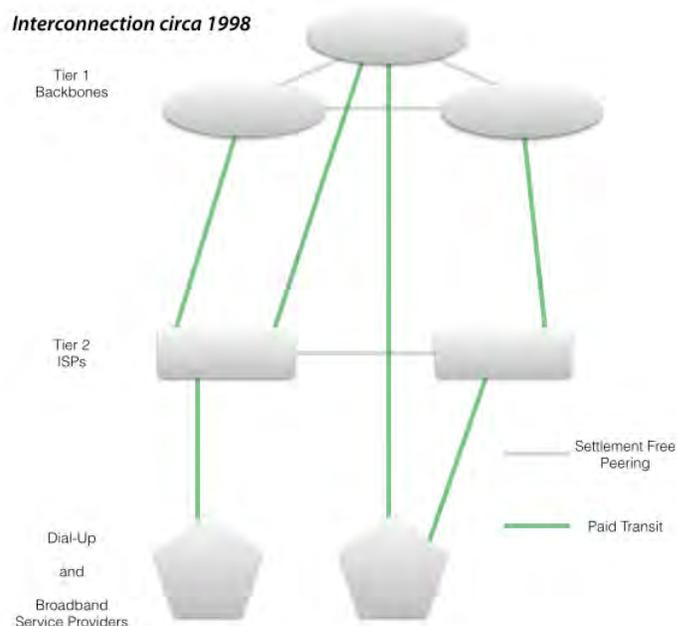
As the Internet grows in complexity and commercial importance, new network players, new network economics, and new interconnection practices can cause friction among the participants. Some argue we need new laws or regulations to govern the Internet from on high. But with all the industry's positive momentum, abandoning self-governance and commercial give-and-take would be a mistake. The market has proven it will adapt as circumstances change.

We have not reached the end of the line in network innovation. Cloud computing, mobile, real-time telepresence, and other network intensive services will require more bandwidth, more coverage, more connectivity, more up-time, and lower latency, all functions that will require more hyper-connected net-

work capacity. The existing organic process, where engineers and businesses make pragmatic technical and financial decisions, is, in this dynamic environment, far more likely than government mandates to drive growth and accommodate unpredictable innovations.

## The Early Internet

A brief history of the Internet helps make the point. In 1969, engineers working on a Department of Defense contract connected the



campus computer networks of UCLA, UC Santa Barbara, Stanford Research Institute, and the University of Utah. Arpanet, the seed of the Internet, was born.

Through the 1970s, more universities and government researchers joined Arpanet, and distinct teams built other experimental net-

works. Engineers created some of our well known languages and protocols, such as TCP/IP and Ethernet, but they also tried others that did not survive. In the 1980s, the National Science Foundation helped upgrade the backbone network from its original 50 kilobit-per-second telephone lines to faster 1.44-megabit T1 lines, and later to 45-megabit T3s. Private entities, such as UUNET and PSInet, however, also began building backbone networks. We started calling these data networks, collectively, “the Internet.”

Getting all these systems to work together was a highly collaborative process. The Internet’s early “stakeholders” circulated some one thousand Request for Comment (RFC) memos on protocols and interconnection schemes. In 1984, the domain naming system (.com, .edu, .gov) went into effect, and soon after practitioners from across the globe created two key groups – the Internet Society and the Internet Engineering Task Force – that would help develop the standards and customs that drove the next wave of growth. Between 1985 and 1987 the number of Internet hosts jumped from 2,000 to 30,000, then to 160,000 in 1989, and to one million by 1993.

By the early 1990s, the World Wide Web and Netscape browser shifted the Internet into an even higher gear. In 1990, NSF had lifted commercial restrictions on the NSFNET, and in 1995, NSF privatized it.

### Connecting the First Networks

During this period of expanding usage and new, private networks, a number of “exchange points,” or network meeting places, emerged. MAE-East, Commercial Internet eXchange (CIX), NSF’s Network Access Points (NAPs), and, later, MAE-West and Palo Alto Internet Exchange (PAIX) connected the various networks to one another. These were physical locations where the cables of the various networks connected to allow data traffic to flow from one to another.

This was an unregulated arena, so unlike the world of telecom at the time, with its government-set tariffs, geographic boundaries, and access charges, the Internet players were making up the technical and commercial rules as they went along.

At the exchange points, some of the larger networks with roughly equal traffic flows agreed to trade data traffic at no cost. They called it “settlement free peering,” and the choice of words was appropriate. “Peers” were networks similar in size and capability. Because most of the traffic was email, text, and Web pages, traffic tended to be roughly

#### Interconnection Terms

**Tier One ISP** — a large continental or global network that, through its own infrastructure and its peering relationships with other networks, can reach any point on the Internet. It does not pay others for transit.

**Tier Two ISP** — a network, often regional in nature, that connects broadband service providers, content providers and websites, and enterprises to larger Tier One networks. These entities pay Tier Two networks for transit to the Tier One networks, and Tier Two networks pay Tier One networks for transit to the rest of the Internet.

**Content Delivery Network (CDN)** — a network of computers and “caches” that stores data, webpages, and videos close to end users and optimizes routes across the Internet, both logically and geographically. Content providers and websites pay CDNs to speed their content to end users. Some large content providers like Google have their own CDNs.

**Transit** — a network access service in which, most often, a smaller entity or network pays a larger entity or network for access to the larger network. Consumers pay their broadband service provider for “transit” to the Internet. Broadband service providers, Tier Two ISPs, and CDNs pay Tier One ISPs for “transit” to the Internet.

**Settlement Free Peering** — an interconnection agreement in which two networks trade traffic with one another at no cost.

**Paid Peering** — an interconnection agreement in which networks trade traffic with one another but, because the traffic is “asymmetric” (one network is carrying far more data than the other, incurring higher costs), the party carrying less traffic pays the other a fee to make up the disparity.

symmetrical. Each network was likely to give and receive similar amounts of traffic to the other networks with whom it “peered.” Why engage in extra financial transactions with one another if the payments would just cancel out?

Smaller networks and the early Internet access providers like Compuserve and AOL purchased “transit” connections to the larger Internet backbones. These “Tier 2” Internet service providers thus paid to gain access directly to a “Tier 1” Internet backbone and, because the large backbones peered with one another, all points across the Internet. Transit providers could thus be thought of as “ISPs for ISPs.”

### The First Web Boom

The Internet exploded in the mid- to late-1990s, and its architecture continued to change. Between 1994 and 1996, Internet traffic grew 100-fold, or 10-fold two years in a row. And commercial Tier 1 backbones struggled to keep up. The exchange points were no longer up to the task of establishing enough connectivity, in the right places, in a timely manner. So the backbone networks started to connect to one another in a wider number of large markets using metro area circuits.

Peering politics was sometimes fierce. Networks fought with each other over who was Tier 1 versus Tier 2 and bickered over interconnection terms. Each network carrier wanted, as much as possible, the other networks to connect with it at its preferred location on its preferred terms. (In many ways, this is happening again today.) And yet the market successfully adjusted to the changing environment.

By 2000, a new model was emerging — the large, carrier-neutral, data exchange center. A company called Equinix proposed this new model. It would build large, modern, secure data centers and allow all comers to connect inside its facilities on their own terms. Because it supplied only the meeting space,

Equinix marketed itself as a neutral party, a sort-of open super hub for all types of network and content firms. It was a place where you knew all the other networks would have a presence and where, as peering expert Bill Norton described, “large-scale peering interconnections could be established within 24 hours rather than 24 months.”<sup>2</sup>

At about the same time, in the late-1990s, two other significant dynamics were changing the interconnection market — broadband access networks for consumers and content delivery networks.

### Broadband Access Providers

The cable TV firms grew up serving their customers video content, first via antennas on tops of hills and then via large satellite collectors at their “head-end” facilities in each town or market. The cable firms did not have connections to cross-country or global telecom networks. But the advent of the cable modem meant cable needed a path to the Internet. In the late-1990s, cable’s chief links to the Internet were through paid transit arrangements from Tier 2 ISPs such as @Home and Roadrunner.

During the technology crash of 2000, however, @Home failed, and the cable firms began buying transit directly from the Tier 1 backbone providers. The cable firms noticed something else. Much of their traffic was being sent to and from other cable providers. Instead of employing a Tier 2 ISP to reach the Tier 1 backbone, who would then connect to yet another Tier 2 ISP, and then down to the cable firm, why not just establish direct connections with other cable firms?

The broadband service providers — the cable firms and telecom DSL networks — thus began directly exchanging traffic with one another, often inside the new neutral exchange point data centers. Because they were carrying so much traffic within their own customer bases, the larger cable companies, such as Comcast, also began building larger nationwide backbones of their own.

## Content Delivery Networks

As the visual Web grew in the late-1990s, content firms, including big dot-coms, news sites, and ecommerce providers, needed to get closer to end users. If an Internet user in New York clicked on a webpage hosted on a server in San Francisco, the content of that webpage would have to traverse the country, often taking indirect routes through as many as 17 router and switching “hops.” (A hop is a physical node on the network — a router or a switch — that data packets touch on the way from origin to destination. More hops mean a less direct transmission, more electronic processing of packets, and ultimately slower and less reliable delivery of packets.) The physical distance and high hop-counts delayed the delivery of packets to the end user and eroded the experience, especially for photos, artwork, banner ads, and other multimedia content. Content providers, who purchased transit through Tier 2 and even Tier 1 ISPs, were dissatisfied.

Akamai, one of the first content delivery networks (CDNs), offered a solution. Replicate and store the most popular webpages and other content in multiple servers, strategically placed geographically and with more closely-coupled connections to broadband access networks. This would reduce both the light speed delay and the hop delay and might even reduce a content provider’s transit bill.

Content firms and websites paid CDNs to get their content closer to end users. CDNs, which consist of tens of thousands of geographically dispersed servers running specialized software that optimizes routes across the Internet, would often pay for multiple high-throughput connections to the broadband providers at strategic points around the country, and around the world.

Few of the early Internet pioneers could have imagined these creative network innovations happening within their conceptual framework, but there were even bigger changes on the way.

## Web Video and the Hyper Giants

Launched in 1998, Google, by 2003-04, was growing so fast that it was rapidly taking over entire data centers where it rented space. In 2006, Google acquired YouTube, and with broadband access networks now delivering multi-megabit speeds, Web video exploded. Google needed not just its own data centers but its own content delivery networks and global fiber network. It built them all.

Soon, Microsoft, Facebook, Amazon, Apple, and other content and software firms would do the same. The largest content firms (later dubbed “Hyper Giants” by network scientist Craig Labovitz) had suddenly become some of the world’s largest network firms. This was a silent revolution.

Netflix, the DVD-by-mail company, meanwhile, launched its Web streaming service, and seemingly overnight became one of the biggest bandwidth users on the planet.

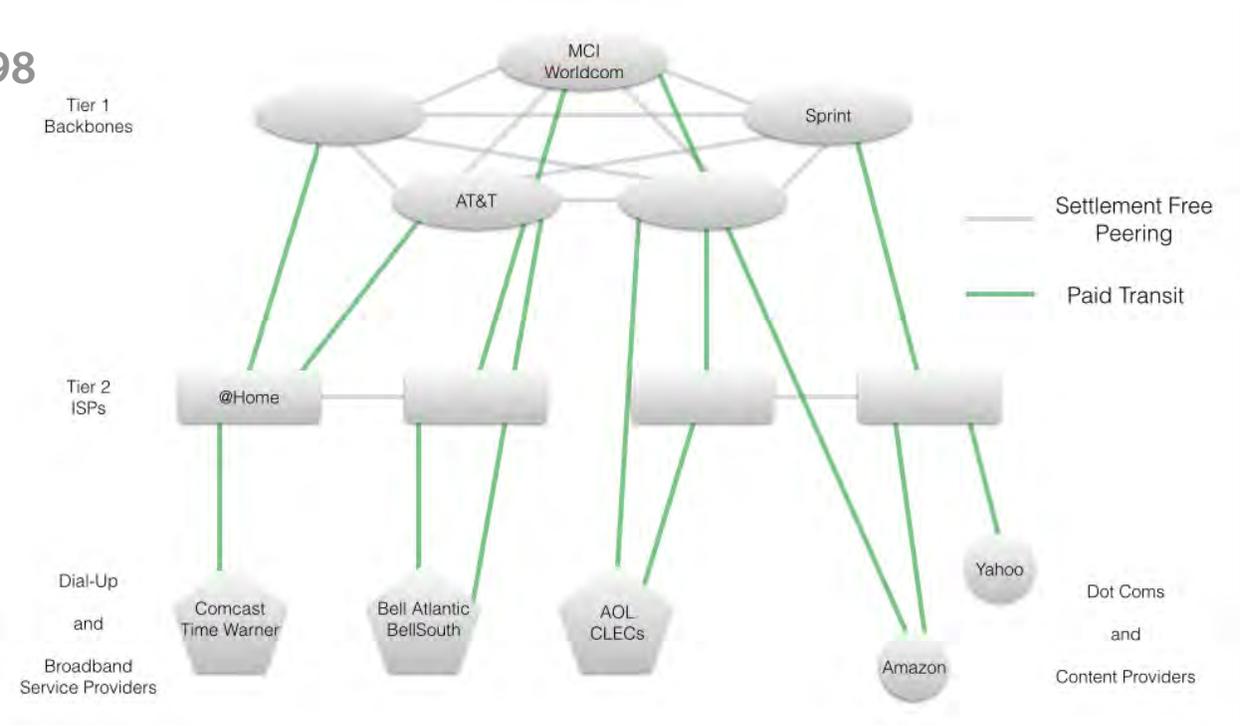
The rise of Web video did something else. It substantially altered the mix of downstream and upstream data traffic. Video is thousands of more times bandwidth-intensive than text or webpages, and for movies, sports, and video clips, it is nearly all downstream. That is, end users consume vastly more traffic than they put back into the network.

Transit payments had always been used by smaller networks or content providers seeking connectivity with more end points (that is, seeking to reach a larger audience). And settlement free peering often made sense between similarly situated networks — for example, between two Tier 1 ISPs. But in the past, the traffic and payment flows were simpler and more hierarchical (see network maps on page 5). In general, end users paid broadband service providers and content providers, who paid Tier 2 ISPs, who paid Tier 1 ISPs.

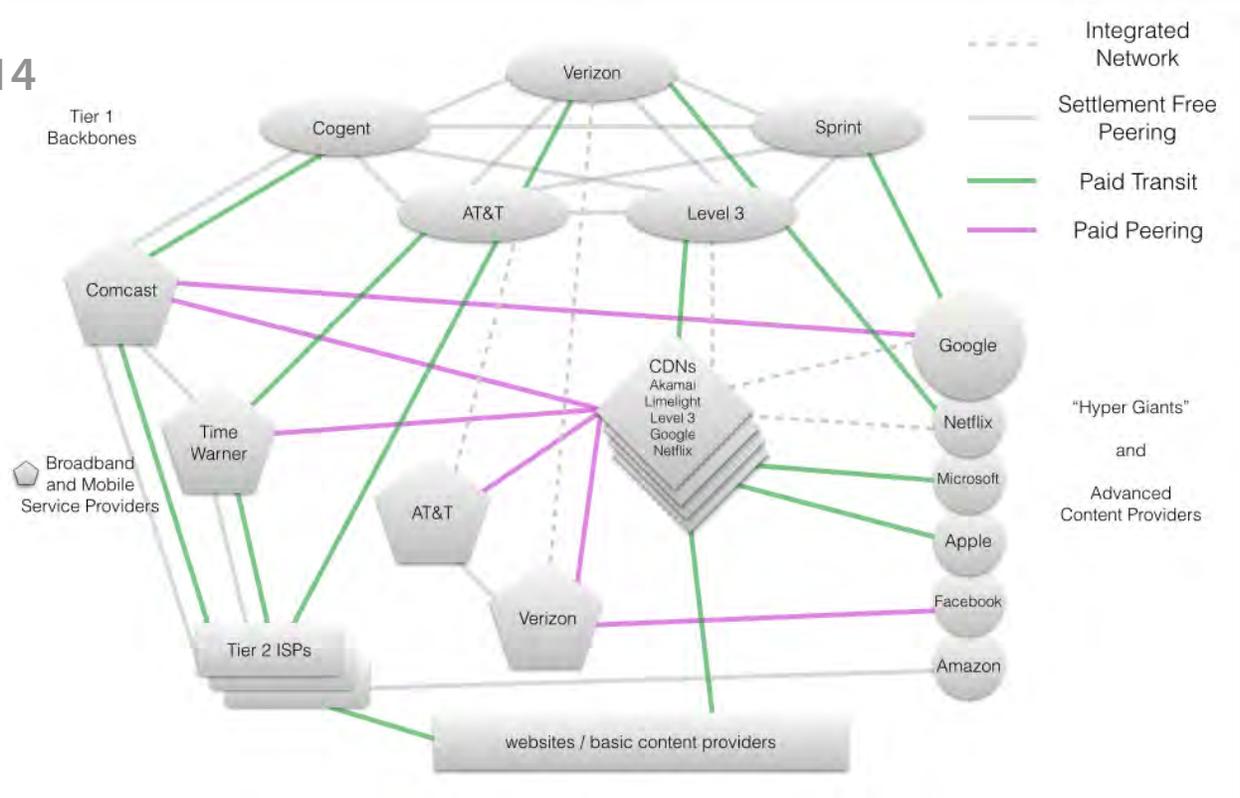
In the new world of YouTube, Netflix, and CDNs, however, an even larger share of the traffic is one-way, at least on many portions

**Interconnection, Then and Now** — These figures show simplified network maps, circa 1998 and 2014. Notice the big changes over a mere decade and a half — more players, new connection types, the rise of the “hyper giants,” and greater overall complexity. Also notice that the Internet is composed of a mix of paid transit, paid peering, and settlement free peering relationships, among others. (Lines connecting specific firms do not necessarily represent actual network or business relationships. Rather, they show typical connections and business transactions between firms of the type shown — i.e., broadband service provider, Tier 1 backbone, CDN, content firm, etc.)

c. 1998



c. 2014



of the network, at many times of the day. And the traffic does not necessarily simply flow “vertically” up to Tier 1 backbone networks and back down. More networks and content providers often connect to one another more directly — or “horizontally” — and in more places (again, see page 5). More networks and content providers thus use more varied and more sophisticated paid transit arrangements and even “paid peering” to account for these highly “asymmetric” traffic flows.

### **A Rare Public Battle**

In 2010, Comcast, Level 3, and Netflix engaged in a high profile battle over the ways Netflix’s traffic would reach customers on Comcast’s network. Level 3 and Comcast had both transit and peering relationships. And Netflix, through CDNs, had paid Comcast for access. But Netflix and Level 3 had an idea. If Netflix housed its content within Level 3, it could deliver its video to Comcast for free as if it were a peer. Level 3 would enter the CDN business and host the Netflix content for a lower price than other CDNs were charging Netflix to connect to Comcast. Level 3 would get a little extra revenue, and Netflix would cut costs by routing this traffic over Level 3’s settlement free peering links. Comcast would get the downside. Firms reorganize their network operations and business relationships often, and there is nothing wrong with seeking more efficient architectures.

Comcast, however, noticed a significant spike in traffic coming from Level 3 (due to Netflix) and pointed out that this violated its peering agreement with Level 3. Settlement-free peering, remember, had long been limited to situations where networks exchange roughly similar amounts of traffic. Comcast believed Level 3 and Netflix were trying to game the system by exploiting the Comcast-Level 3 peering relationship to dump costs onto the Comcast network. (A network or content firm that mostly sends traffic to others, but does not carry much traffic in return, can impose large financial and network quality costs and

upset the economics of the network value chain.) Comcast thus sought to adjust its agreement with Level 3 to reflect this traffic asymmetry. Level 3 and Netflix cried foul, using publicity and regulatory pressure to improve their negotiating leverage. In the end, however, the companies settled on a new agreement, the details of which were confidential — without regulatory intervention.

Considering the number of firms, the complexity of networks, and the pace of change, these episodes have been remarkably rare. The industry is highly competitive but, like most environments free from too much regulation, also highly cooperative.

### **Ever Changing Interconnection**

None of the interconnection arrangements has totally displaced the others. Settlement free peering, Tier 1 and Tier 2 transit, paid peering, and CDNs, among other arrangements, exist side by side. Network relationships and commercial arrangements change according to the quickly advancing technological and financial realities of one of the world’s fastest moving industries.

Broadband service providers now even house within their own networks Google Global Cache (GGC) servers, which contain its most highly trafficked content. Netflix, likewise, within the last 18 months, moved most of its video content from third party CDN providers to its own OpenConnect CDN infrastructure. Netflix is also attempting to forge relationships with broadband providers where, like GGC, it would house its content directly within the broadband networks, close to end users.

By 2010, Google’s network had grown so large that, according to network scientist Craig Labovitz, it accounted for 6-7% of all Internet traffic. But by 2013, that number paled: Google, says Labovitz, now accounts for up to 25% of the Internet. Netflix, meanwhile, accounts for up to a third of the data flowing over U.S. broadband access networks in evening hours.

Despite the rapid change, tumult, and occasional friction, most of the interconnection world “just works.” For example, according to a Packet Clearing House survey of the world’s 5,000 ISPs, 99.51% of peering relationships in 2011 occurred without contract, or merely on a “handshake” agreement.

The industry over many decades developed these customs because networks, by their very nature, are highly interdependent. A network that does not have good connectivity to other networks plunges in value. Connectivity is king. The incentives motivate each network player to seek the best service for its customers. ISPs and broadband service providers want their customers to be able to reach as much content as possible, as reliably as possible.

Because of the dramatic changes in content, traffic flows, and the number and type of new network players (the Hyper Giants, for example), the types and terms of interconnection agreements have continued to evolve. Paid transit, paid peering, and other network arrangements will proliferate as the Internet evolves.

### **The Future**

Networks will continue to grow, and interconnections will continue to grow in number and complexity.

Real-time multimedia streams for cloud-based gaming, desktops, and apps will replace many kinds of localized content. These data streams (such as ultra high definition 4K video) will need geographic proximity and, in some cases, interoperability of Quality of Service (or Quality of Experience) regimes that can prioritize content across multiple networks. The delivery of cloud-based apps, services, and content to mobile devices will especially benefit from closely coupled, low-latency links between data centers and mobile access points. (Because a mobile device relies so heavily on the cloud for its computer power and data storage needs — think Siri voice search, Google Docs, or cloud gaming

— and because wireless is trickier and more capacity-constrained than is wired, optimizing the links between mobile devices, wireless nodes, and cloud resources can make a big difference in the user’s experience.)

Software defined networks will also make new demands on and change the nature of interconnection. Moving network functionality like security, access control, QoS/QoE, remote peering, and network configuration to the cloud will yield large efficiencies and cost savings. Some firms are even considering the centralization and thus virtualization of individual wireless base station functions in remote cloud centers. But these cloud advances will also require big capacity, low latency, and high reliability, straining network performance.

Although asymmetric traffic flows dominated the last decade of Internet content, applications like high-resolution video chatting and conferencing may finally become widespread enough to reverse at least part of that trend, producing more symmetric content.

Whatever the case, all these technologies, products, traffic flows, and business relationships are difficult to predict. The numbers and types of networks will continue to grow, as will the interconnection relationships and overall complexity. Flexibility in network architecture and business relationships is thus crucial to accommodate these innovations.

### **Conclusion**

The Internet is an ever expanding network of networks, where the whole and its constituent parts are ever changing. Where Arpanet linked four entities, each composed of a few end points (primitive computer terminals), today’s Internet links thousands of large networks, millions of smaller networks, and billions of increasingly diverse end points (PCs, smartphones, web servers, cloud clusters, cars, and machines and sensors of all types).

To link billions of end points to one another, however, requires organization, cooperation,

and trillions of dollars in infrastructure investment. It requires universal standards, like the Internet Protocol (IP), so all the parts work together. But it also requires enough flexibility – in technology, architecture, and commercial relationships – to allow for innovation in networks, content, and services.

From the beginning, our networks have never stopped changing. Nor have the ways networks connect to one another, or the terms. Interconnection disputes are not new, but they have been and remain rare. The size of the Internet economy dictates there will be more disputes (as in any industry), but the industry has and will continue to resolve these disputes in a dynamic, rapidly changing environment, without regulatory involvement. **EE**

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<sup>1</sup> The author acknowledges and thanks Verizon for supporting the research in this report.

<sup>2</sup> Bill Norton's website [drpeering.net](http://drpeering.net) and his books, including *The Internet Peering Playbook, 2013 Edition*, are excellent resources for both the lay reader and the industry insider.



**Response to Questions in the Fourth White Paper**

**"Network Interconnection"**

**by**

**Randolph J. May, President, The Free State Foundation  
Seth L. Cooper, Senior Fellow, The Free State Foundation**

**and**

**Members of the Free State Foundation's Board of Academic Advisors:**

**Richard A. Epstein, New York University Law School  
Justin (Gus) Hurwitz, University of Nebraska College of Law  
Daniel Lyons, Boston College Law School  
Bruce M. Owen, Stanford University  
James B. Speta, Northwestern University School of Law  
Christopher S. Yoo, University of Pennsylvania Law School**

**before the**

**Committee on Energy and Commerce, U.S. House of Representatives**

**August 8, 2014**

# **Response to Questions in the Fourth White Paper**

## **"Network Interconnection"**

**by**

**Randolph J. May, The Free State Foundation**  
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**Christopher S. Yoo, University of Pennsylvania Law School \***

### **I. Introduction and Summary**

Once again, we commend the Committee for undertaking its sustained effort to review and update the increasingly anachronistic Communications Act. This update is not only timely but necessary, given the rapid rate of technological change, and the concomitant change in communications and information services markets, since Congress last updated the law with the Telecommunications Act of 1996.

We also commend the Committee for using the Fourth White Paper to focus specifically on interconnection. We agree with the Committee's recognition that the interconnection of communications networks "has been at the heart of communications policy" for a century, and further, that it should be an integral component of any Communications Act update.<sup>1</sup> As twentieth-century communications networks give way to the all-IP-based networks of the future, there is still a useful role for a government

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\* While the signatories to this Response are in general agreement with the views expressed in these comments, their participation as signatories should not necessarily be taken as agreement on every aspect of the submission. The views expressed should not be attributed to the institutions with which the signatories are identified.

<sup>1</sup> "Network Interconnection" ("Fourth White Paper"), House Commerce Committee, at 1.

regulator to play in overseeing the interconnection of the various privately-operated networks that comprise the nation's communications infrastructure.<sup>2</sup>

But going forward, this role should be noticeably different – presumptively less interventionist – in scope than it is under the current Act. That conclusion is consistent with the transition to more competitive communications and information services markets. Rather than overseeing enforcement of a general duty to interconnect, as the current Act requires, the law should presume that interconnection agreements between IP-based networks will be negotiated on a voluntary basis, as they have been throughout the Internet's history with minimal disruption. The Commission should intervene only upon a finding that denial of interconnection poses a substantial, non-transitory risk to consumer welfare, and that marketplace competition is inadequate to correct the problem. And in those rare instances when intervention is necessary, the Commission should solve the impasse by using some form of dispute resolution mechanism, such as mediation or some form of arbitration, rather than by resorting to current rate case-like adjudicatory procedures. This revised interconnection mandate is consistent with our view of the FCC's future role, not as regulator of monopolistic common carriers subject to public utility obligations, but rather as a sector-specific competition authority protecting consumer welfare in a competitive and dynamic marketplace.

## **II. Modern Interconnection Markets Are Competitive and Dynamic**

As the Fourth White Paper notes, the Telecommunications Act of 1996 sought to bring a “pro-competitive and deregulatory framework” to local telephone markets, in part

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<sup>2</sup> See Free State Foundation Response to Questions in the First White Paper, "Modernizing the Communications Act" at 13 (January 31, 2014); Free State Foundation Response to Questions in the Third White Paper, "Competition Policy and the Role of the Federal Communications Commission" at 7-8 (June 13, 2014).

by loosening the reins on existing interconnection obligations.<sup>3</sup> Section 251 placed a general duty on all telecommunications carriers to interconnect with one another,<sup>4</sup> and it imposed additional duties on legacy incumbent local exchange carriers (ILECs) to negotiate in good faith, to connect at any technically feasible point in its network, to provide a level of service equivalent to what it delivers to itself, and on reasonable, nondiscriminatory terms.<sup>5</sup> The law allowed networks to freely negotiate the terms of these interconnection agreements, but it subjected ILEC agreements to review by state regulators, and mandated compulsory arbitration by state regulators in the event of an impasse.<sup>6</sup> This interconnection duty and the concomitant arbitration and review procedures were part of the Act's broader movement from a heavily-regulated local telephone monopoly to a regime of "managed competition" within largely intrastate local telephone markets.

While the 1996 Act represented progress toward a deregulated communications marketplace, since that time market developments have obliterated the line between local and long-distance service that in 1996 justified state-level involvement in interconnection negotiations. Indeed, contrary to the dominant expectations of the day, the wireline telephone sector as a whole has receded dramatically, replaced by wireless networks (which are subject only to Section 251(a)'s general duty to interconnect) and by IP-based networks. Because the Commission has classified IP networks as "information services" rather than "telecommunications services," they are not subject to the Act's interconnection duties.

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<sup>3</sup> Fourth White Paper at 1.

<sup>4</sup> 47 U.S.C. § 251(a).

<sup>5</sup> *Id.* § 251(c).

<sup>6</sup> *Id.* § 252.

Interconnection has flourished despite—or perhaps more accurately, because of—this unregulated environment. Commentators often describe the Internet, accurately, as a “network of networks.” Interconnection agreements stitch this network together. The IP interconnection market is a “collection of 35 thousand autonomous systems bargaining with one another through arms-length transactions” to shuttle traffic among the Internet’s end-points.<sup>7</sup> As one might expect, these agreements inevitably contain wide variations in the terms under which parties interconnect and exchange traffic with one another. Interconnection agreements can run hundreds of pages, governing a wide range of conditions, and they are typically covered by non-disclosure agreements that reflect the competitively sensitive nature of those terms. All are freely negotiated on a voluntary basis, without a regulator-enforced duty to interconnect or government review of an agreement’s terms.

The interconnection market is diverse, in part because of the flexibility of voluntary negotiations to respond to changing market conditions. The two dominant forms of interconnection are peering (in which two networks agree to provide reciprocal access to each other’s end-user consumers) and transit service (in which one network agrees to provide access to all Internet destinations). Many peering agreements between networks of comparable size are on a settlement-free basis, though the market has seen a rise in “paid peering” when traffic flows disproportionately in one direction. Transit is usually sold on a volume basis, with the sending network paying the receiving network to deliver its traffic to its destination. To avoid being dependent on one interconnection agreement or network, many content providers and transit networks sign interconnection

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<sup>7</sup> Christopher S. Yoo, *THE DYNAMIC INTERNET: HOW TECHNOLOGY, USERS, AND BUSINESSES ARE TRANSFORMING THE NETWORK* at 55 (2012).

agreements with multiple networks to route traffic to end-users, a practice known as “multi-homing.”<sup>8</sup> The ability to forge these multiple pathways blunts the holdout power that any one carrier might have over the system, so that it is no longer appropriate to presume, as was done in 1996, that multiple parties had no choice in the pathway over which they transmitted their traffic. Competitive conditions, in a word, have been improved markedly by these advances in technology.

The interconnection market is also dynamic and evolving in response to changing patterns of Internet-based consumption. For example, the rise of Internet-based video services such as Netflix and Hulu has increased the volume and the vector of traffic flowing over IP networks, thus spawning alternatives to traditional peering and transit models. Content Delivery Networks such as Akamai maintain a distributed network of servers around the country, which store local copies of their clients’ content for delivery to consumers. Because the content traverses fewer interconnections, CDNs can be a high-quality, low-cost alternative to traditional transit for streaming video and other similarly-situated content providers. Some high-volume content providers have also begun to engage in self-provision, building their own server farms to store their content. This allows them to interconnect directly with end-user broadband networks rather than relying on transit providers for delivery. These innovations help provide lower-cost, higher-quality service for applications that need more than the “best efforts” delivery that marks the traditional public Internet. And as the “Internet of Things” of all manner of connected computing devices grows, one can imagine an entire class of network-based

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<sup>8</sup> *Id.* at 62-64.

services that could survive on less-than-best-efforts service.<sup>9</sup> As traffic flows change, interconnection agreements negotiated on a voluntary basis have the flexibility to adapt to suit.

The underlying technology of IP interconnection is also more complicated than in prior communications network architectures. The transition from circuit-switched TDM networks to packet-switched statistically-multiplexed networks – the transition that has enabled much of what is described above – greatly increases the number of factors that interconnection must address. Previously, interconnection meant physically connecting two networks and providing a relatively simple method for allocating a circuit between endpoints for the duration of a phone call.

Today, interconnection still involves a physical connection between networks. But the algorithmic logic governing how that connection is used must make real-time routing decisions on a per-packet level, sometimes factoring in information about current network conditions; it must respond in real-time to configuration changes across the network; it must incorporate real-time resource allocation logic; it must respond to congestion events; it must have logic for buffering and sorting packets as they arrive at switches and routers. Importantly, many of these factors conflict: Making a network more resilient to congestion, for instance, can increase latency and jitter when congestion does occur. And there is no “one-size-fits-all” configuration that works well for all uses or users. In other words, interconnection among IP networks is precisely the sort of

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<sup>9</sup> The “Internet of Things” generally refers to a wide variety of connected devices with embedded computing capabilities, such as smart thermostats, heart monitoring implants, biochip transponders on farm animals, automobiles with built-in sensors, and field operation devices that assist fire-fighters in search and rescue.

relationship that is best negotiated on a case-by-case basis by parties that understand their particular needs and how those needs best map onto the underlying technology.

Finally, IP interconnection markets are competitive. Content providers have multiple options to deliver their content to consumers—from transit providers with nearly global footprints to regional providers that rely on interconnection agreements to route traffic onward to consumers.<sup>10</sup> Some provide transit service only, while others provide complementary services as well. Although pricing schedules are often protected by nondisclosure agreements, there is a general consensus that competition has driven down Internet transit prices continuously and precipitously each year since the modern Internet's inception in the 1990s. Interconnection consultant William Norton calculates, based on informal surveys, that the average per-Mbps price for generic non-commit transit service has fallen from roughly \$1200 in 1998 to \$12 in 2008 and \$0.94 in 2014—an average rate of decline of over 30 percent each year.<sup>11</sup> TeleGeography similarly estimates that transit prices have fallen 26% annually from 2007 to 2012,<sup>12</sup> and Streaming Media Analyst Dan Rayburn has noticed similar trends in CDN prices.<sup>13</sup>

### **III. The FCC's Limited, but Important, Role in Interconnection**

The key to the tremendous growth and complexity of IP-based networks has been the supplanting of a public utility regime by a free-market oriented regulatory model. Given the importance of interconnection to the healthy functioning of any

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<sup>10</sup> See Dan Rayburn, *How Transit Works, What it Costs & Why It's So Important*, Feb. 24, 2014, available at <http://blog.streamingmedia.com/2014/02/transit-works-costs-important.html>.

<sup>11</sup> William B. Norton, *THE INTERNET PEERING PLAYBOOK: CONNECTING TO THE CORE OF THE INTERNET* at 34 (2013).

<sup>12</sup> See TeleGeography Press Release, *IP Transit Prices Steepen*, Aug. 2, 2012, available at <http://www.telegeography.com/products/commsupdate/articles/2012/08/02/ip-transit-price-declines-steepen/>.

<sup>13</sup> See Dan Rayburn, *The State of the CDN Market*, May 2014, available at <http://www.streamingmedia.com/dansblog/2014CDNSummit-Rayburn.pdf>.

communications system, we recognize that the Commission should continue to play a role in overseeing interconnection between network providers. But rather than the heavy-handed regulator of the 1934 Act or the competition “manager” of the 1996 Act, the future Commission’s interconnection authority should be circumscribed, and instances of actual intervention should be rare.

In our prior responses, we have noted that a future Commission should play a role with regard to interconnection. In light of a residual holdout problem, perhaps its role should be above and beyond the general role we envision for the Commission as enforcer of a sector-specific competition standard grounded in antitrust principles.<sup>14</sup> Our position is informed by many of the concerns that animated the Digital Age Communications Act Working Group’s proposal in 2005.<sup>15</sup> First, the Supreme Court’s *Trinko* decision leaves some uncertainty regarding whether one can order interconnection under an antitrust-based unfair competition standard.<sup>16</sup> Second, denial of interconnection can sometimes be a rational economic strategy whereby a single network can attempt to dominate a market in a way that harms consumers.<sup>17</sup> Finally, there are many non-economic social benefits to a unified communications network as an inclusive forum for news, education, free expression, access to emergency services, and facilitation of democratic self-government.

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<sup>14</sup> See, e.g., Free State Foundation Response to Questions in the First White Paper, "Modernizing the Communications Act" at 13 (January 31, 2014).

<sup>15</sup> See Randolph J. May and James B. Speta, "Digital Age Communications Act," Proposal of the Regulatory Framework Working Group, Progress & Freedom Foundation, June 2005 ("DACA Working Group"). As before, we acknowledge the debt owed to the DACA Working Group, within which many of these proposals originated.

<sup>16</sup> See *Verizon Communications, Inc. v. Law Offices of Curtis V. Trinko, LLP*, 540 U.S. 398, 415 (2004); Philip J. Weiser, *Goldwasser, The Telecom Act, and Reflections on Antitrust Remedies*, 55 ADMIN. L.J. 1(2003); James B. Speta, *Antitrust and Local Competition under the Telecommunications Act*, 71 ANTITRUST L.J. 99 (2003). But see *United States v. Terminal R.R. Ass’n*, 224 U.S. 383 (1912); *Otter Tail Power Co. v. United States*, 410 U.S. 366 (1972).

<sup>17</sup> See DACA Working Group at 26.

The Commission has a role to play in safeguarding these positive externalities of increased interconnection.

But while interconnection mandates can sometimes correct market failures in ways that enhance social welfare, this gain must be balanced against regulation's own potential inefficiencies. As Michael Katz and Carl Shapiro have noted, private institutions such as new players or standards-setting bodies may arise to achieve coordination and internalize the externality without government intervention.<sup>18</sup> Second, government intervention may unreasonably favor the status-quo, ossifying current practices at the cost of blocking or raising costs on innovative emerging technologies.<sup>19</sup> Third, regulators often lack the information needed to determine which course maximizes total surplus.<sup>20</sup>

Given these potential risks, we recommend that the Committee reject a general duty to interconnect with other IP-based networks. As an empirical matter, there appears no need to impose such a duty: content and application providers have a plethora of options available to deliver their content to consumers, and through multi-homing, they often leverage multiple options simultaneously to reduce the risk that any one network can exercise market power against them. There have been very few instances in which interconnection disputes have been brought to the Commission's attention, and those have largely been solved through private negotiations.<sup>21</sup> Moreover, given the wide range of potential interconnection options, from peering (free or paid) or transit to CDNs, self-

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<sup>18</sup> *Id.* at 26; see Michael L. Katz & Carl Shapiro, *System Competition and Network Effects*, 8 J. ECON. PERSP. 93, 112-13 (1994).

<sup>19</sup> Katz & Shapiro at 112-13.

<sup>20</sup> *Id.*

<sup>21</sup> See Randolph J. May, "Testimony of Randolph J. May, President, Free State Foundation," Hearing on "Evolution of Wired Communications Networks," Subcommittee on Communications and Technology (October 23, 2013).

provision, and more, the contours of such a duty would be difficult to define and enforce. Attempts to do so could inadvertently lock-in existing practices and reduce the market's ability to respond dynamically to changing trends in content and application markets.

Accordingly, we recommend that the Commission be given the authority to intervene to address only those specific interconnection practices that pose a substantial and non-transitory risk to consumer welfare.<sup>22</sup> The consumer welfare focus assures that the Commission's decision whether to intervene is based upon an explicit finding that the practice poses harm to competition generally, rather than to one specific competitor. The Commission's authority should further be premised upon an explicit finding that marketplace competition is insufficient to protect consumer welfare.<sup>23</sup>

In those (hopefully rare) instances warranting intervention, the Commission should mimic private dispute resolution mechanisms rather than take on, in a new context, its traditional role as a public utility regulator. Typically, it should condition its intervention on a requirement that the parties first submit their dispute to mediation. If mediation is unsuccessful, the Commission should devise some form of arbitration process, perhaps, for example, some form of "baseball-style arbitration," in which each side submits a proposed "last and best offer" and the arbitrator then chooses one.<sup>24</sup> This approach limits the Commission's discretion to interfere in ongoing interconnection disputes and places the burden primarily on the parties themselves to find a solution to the impasse. There may be other dispute resolution models that ought to be considered as

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<sup>22</sup> DACA Working Group at 24.

<sup>23</sup> *Id.* at 24-25.

<sup>24</sup> See Randolph J. May, "Testimony of Randolph J. May, President, Free State Foundation," Hearing on "Evolution of Wired Communications Networks," Subcommittee on Communications and Technology (October 23, 2013).

well. And, whatever mechanism is chosen, the process must be such that there will not be undue delay in delaying resolution of the dispute.

We also strongly recommend the Committee reject calls by some to require public disclosure of the terms of interconnection agreements. Mandating the detailed disclosure of specific, confidential business-to-business agreements negotiated between sophisticated parties in a highly competitive market is likely to do more harm than good to competition. One reason is that any distinctive structure of these agreements could well contain important trade secrets whose value is lost if made public. A second reason is that, as the industrial organization literature emphasizes, the sharing of competitively sensitive information among rivals can facilitate tacit collusion on price. For this reason, the Supreme Court, antitrust authorities, and the Commission itself have long stressed that disclosure of pricing and cost information can be harmful to competition, especially in markets like telecommunications that involve significant barriers to entry.<sup>25</sup>

Finally, state authorities should play a much more limited role with regard to interconnection than they do under the now obsolete 1996 Act regime. This is consistent with the evolution of telecommunications markets and the now almost-complete elimination of intrastate “local” markets as a competitively important classification. Today’s information networks are largely national in scope, and neither providers nor customers easily distinguish between interstate and intrastate communications. Attempts by state regulators to review or interfere with national interconnection agreements can have the unintended consequence of balkanizing the nation’s information infrastructure and of compromising the economies of scale generated by interstate operations. As noted

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<sup>25</sup> See Daniel A. Lyons, *Compelled Disclosure of Internet Interconnection Agreements Creates Anticompetitive Risks*, FREE STATE FOUNDATION PERSPECTIVES Vol. 9, No. 22 (2014).

in our response to the First White Paper, state regulators should retain a prominent voice with regard to consumer protection issues.<sup>26</sup> And any state should have standing to bring an interconnection dispute to the Commission's attention if the dispute adversely harms that state's constituents. But the Commission should have final decisionmaking authority regarding whether to intervene, given that it normally is in a better position to assess the costs and benefits of intervention from a national scope.

#### **IV. Conclusion**

As the Committee moves forward with its review and update process, we urge it to carefully consider and implement the views expressed in this Response, as well as the previous Free State Foundation Responses. We look forward to continuing to play a constructive role in this process leading to a much-needed update of the Communications Act.

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<sup>26</sup> See Free State Foundation Response to Questions in the First White Paper, "Modernizing the Communications Act" at 18 (January 31, 2014).

August 8, 2014

Honorable Fred Upton, Chair  
Honorable Greg Walden  
Committee on Energy and Commerce  
U.S. House of Representatives  
Washington, DC 20515

The Information Technology and Innovation Foundation (ITIF)<sup>1</sup> once again appreciates this opportunity to comment on the initial steps by the House Committee on Energy and Commerce to modernize the Communications Act. ITIF looks forward to future white papers and roundtables as the Committee moves forward with this important project.

The Communications Act of 1934 (the Act) is a complex patchwork of laws, and the time is ripe for a comprehensive re-write. Although a modest “update” that tweaks only the most obvious points of pressure in the aging Act would be of help to drive digital transformation, many of the worst inefficiencies in telecom regulation emerge after patchwork adjustments are made to a static framework without acknowledging the fundamental changes to underlying technological and economic constraints. The Committee should take a holistic approach and bring the Communications Act into the 21<sup>st</sup> Century, doing away with technological silos and clarifying the appropriate limits to regulatory oversight of a fast-paced industry.

Interconnection has long been a key policy in telecommunications. Historically, formal interconnection requirements were needed to allow consumers to benefit from positive network

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<sup>1</sup> The Information Technology and Innovation Foundation (ITIF) is a non-partisan research and educational institute – a think tank – whose mission is to formulate and promote public policies to advance technological innovation and productivity internationally, in Washington, and in the states. Recognizing the vital role of technology in ensuring prosperity, ITIF focuses on innovation, productivity, and digital economy issues.

effects while preventing large networks from tipping into a monopoly. As we opened up a tightly regulated phone monopoly to increased competition, interconnection was a key tool in facilitating new entrants. In the Internet space, where traffic is exchanged through the IP protocol, these formal requirements have not been imposed, and interconnection has nevertheless thrived.

Internet interconnection usually doesn't make for big news, but recent disputes have been making headlines. Indeed, the interconnection ecosystem has evolved remarkably well with only a few hiccups along a path of tremendous change. The rapid development of dense peering relationships, remarkable growth of Content Delivery Networks (CDNs), and dramatically falling transit prices have allowed for explosive growth of data delivery into last-mile networks. The flexibility of unregulated interconnection has certainly been a key factor in the success of data-intensive web applications, and we should not allow the well-publicized, but limited instances where interconnection negotiations have broken down to detract from the enormous success IP interconnection has had.

The few sore thumbs, such as the 2010 dispute between Level 3 and Comcast and recent disagreements between Netflix and various ISPs, are best thought of as growing pains in the continuing development of ever more bandwidth intensive use of the Internet. Both the Level 3 and Netflix disputes involved unprecedented levels of data being sent over links designed for an earlier era. The rise of streaming high-definition video has required profound changes in how traffic flows through the Internet – these changes would have been much more difficult to achieve under a rigid regulatory regime.

Take, for instance, the recent dispute Netflix had with a few ISPs. Netflix chooses a handful among of dozens of possible paths to deliver its traffic into last-mile networks. Soon after Netflix

turned on its “Super HD” video streaming,<sup>2</sup> many of the interconnection ports they had relied on under a settlement-free peering arrangement became congested, affecting some consumers’ streaming. Reports indicate that Netflix is in the process of negotiating multiple interconnection deals with ISPs to ensure this unprecedented amount of data can reliably be delivered onto access networks. It is likely that, given the tremendous volume of data Netflix users draw onto access networks, these sorts of paid interconnection arrangements are economically efficient.

There is little concern that access networks will be able to leverage their last-mile status to extract anti-competitive rents from interconnection arrangements because of simply how many paths there are into the network. Access networks are already well interconnected with the rest of the Internet – these simply are not like the terminating monopolies of old where you had to get equipment into a central office in order to interconnect. Instead, numerous possible arrangements allow for a great deal of flexibility for edge voice and data providers to find the most economically efficient solution. There are already numerous CDNs that have negotiated deals to deliver large amounts of data within these networks, and numerous transit providers compete fiercely to provide access to the Internet. Indeed, it has been well established that the highly-competitive transit market functionally provides a price ceiling to deliver data to a last-mile access network.<sup>3</sup>

This is not to say that interconnection disputes are non-existent or without problems. There is ample evidence that the packet-loss from congested interconnection ports affected users’ streaming. Many were frustrated by constant buffering and slow starts. The FCC is looking into the

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<sup>2</sup> Netflix, “Highest Quality HD Now Available to all Netflix Members,” (Sept. 26, 2013), <http://blog.netflix.com/2013/09/highest-quality-hd-now-available-to-all.html>.

<sup>3</sup> See David Clark *et al.*, “Interconnection in the Internet: the policy challenge,” 39<sup>th</sup> Research Conference on Communication, Information and Internet Policy, (Aug. 2011).

negotiated arrangements,<sup>4</sup> and reports indicate the Commission has recently asked for information about six more paid interconnection deals.<sup>5</sup> The Chairman has made clear that the Commission “is collecting information, not regulating.”<sup>6</sup>

This approach, as informal as it may seem, has a lot of merit. An unregulated interconnection market has proved to be incredibly dynamic and successful in adapting to new patterns in traffic. Indeed, the Commission has long recognized a general desire to avoid regulating IP interconnection.<sup>7</sup> There is also little reason to force any sort of strong transparency requirements in this space. These agreements are commercially negotiated, so automatically making them public would undermine efficient negotiations and potentially limit innovation in new types of arrangements. It is likely that this sort of informal, *ex post* analysis will serve us best as new norms in interconnection continue to be developed.

On the other hand, voice traffic that is currently exchanged in Time Division Multiplex is subject to numerous specific regulatory requirements. As a part of the ongoing IP transition, voice will increasingly be exchanged in IP format. This will undoubtedly be a welcomed development: an all-IP network will offer more resiliency, be less costly to operate, and allow for increased innovation and new services. With all-IP interconnection we can expect innovative new capabilities in communications – improved, higher quality audio and video calling are among the certainties we

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<sup>4</sup> See, FCC “Statement by FCC Chairman Tom Wheeler on Broadband Consumers and Internet Congestion,” News Release, <http://www.fcc.gov/document/chairman-statement-broadband-consumers-and-internet-congestion>.

<sup>5</sup> Jon Brodtkin, “FCC asked six more ISPs, content providers to reveal paid peering deals,” ArsTechnica (Aug. 1 2014), <http://arstechnica.com/business/2014/08/fcc-asked-six-more-isps-and-content-providers-to-reveal-paid-peering-deals/>.

<sup>6</sup> Statement by Wheeler, *supra* note 4.

<sup>7</sup> See, e.g., In the matter of Developing an Unified Inter-carrier Compensation Regime, CC Docket No. 01-92, *Report and Order and Further Notice of Proposed Rulemaking* FCC 11-161, Rel. Nov. 18, 2011 (stating, for example, “it is important that any IP-to-IP interconnection policy framework adopted by the Commission be narrowly tailored to avoid intervention in areas where the marketplace will operate efficiently.”).

can expect. Furthermore, the transition also offers a much needed opportunity to evaluate our interconnection regulatory regime.

As we make that transition, the success of the Internet’s unregulated IP interconnection regime should guide us in developing regulatory frameworks. There is little evidence that the heavy handed regime of section 251 is needed in an all-IP environment, and the Committee should give networks significantly more flexibility in the ways they interconnect. As long as IP voice traffic is marked with the appropriate QoS, it can be exchanged similarly to any other IP traffic. With this flexibility comes a wide array of possible interconnection arrangements – it is very difficult for a regulator, let alone a legislator, to say what type of interconnection will be appropriate.

The FCC has set an expectation that any IP-to-IP voice interconnection arrangements will be negotiated in good faith, and it is likely that good faith commercial negotiations will be the best way to continue to interconnect IP voice traffic. Of course dropping a voice calls has different policy implications from a buffering movie stream, and carriers should be remorse to allow interconnection disagreements disrupt call completion. But this doesn’t mean that an extensive interconnection regime is needed for voice traffic. Even any sort of “backstop” should be carefully tailored to ensure we don’t end up sliding into 50 different interconnection policies, one for each state. Indeed, one of the key benefits of IP interconnection is that it need not happen in nearly as many places as under the Local Access and Transport Area regime of old. The Committee should aim for a uniform, light-touch, flexible policy that allows for dispute resolution that will not grow into detailed rules.

In short, the outstanding success and innovation we have seen in the regulatory-free interconnection space of the Internet should guide us in moving forward with a Communications Act Update. We urge the committee to take a comprehensive approach to this project, changing the



fundamental framework of the Act instead of making minor changes to the current interconnection regime.

Sincerely,

Robert D. Atkinson  
President and Founder  
Douglas Brake  
Telecom Policy Analyst  
Information Technology and Innovation Foundation



## **Introduction**

ITTA, the Voice of Mid-Size Communications Companies, is a Washington, DC-based industry association dedicated to representing mid-size, incumbent local exchange carriers that provide a variety of communications services to consumers in predominantly rural areas across 45 states.

ITTA is pleased to respond to the Subcommittee on Communications and Technology's White Paper on Interconnection and welcomes the Subcommittee's interest in updating the outdated Communications Act.

In 1993 when ITTA was formed, our members offered POTS (plain old telephone service). Today, ITTA members are aggressively deploying networks capable of providing high-speed broadband services to millions of consumers, many of whom live in rural areas where the cost of deploying and operating networks is high and the return on investment is low.

In addition to offering voice and broadband services, ITTA members offer video services. Collectively, ITTA members pass in excess of 3.9 million homes with video services and compete head-to-head against traditional cable companies like Comcast, satellite providers, and online video providers like Netflix, Amazon, Hulu, Apple TV, and others.

In recent years, ITTA members have invested billions of dollars in upgrading their networks and plowing fiber to help ensure that consumers, including those who live in some of the most remote areas of our country, will have access to broadband. Simple and straightforward 'rules of the road' regarding how IP networks will be treated are needed to ensure that future investment continues. Getting interconnection policy right is critical to the future success of broadband investment and deployment. ITTA cautions policymakers that over-regulating in this space could have a devastating impact on broadband investment and deployment. Thank you again for the opportunity to comment.

Please feel free to contact Paul Raak, Vice President of Legislative Affairs, by email at [praak@itita.us](mailto:praak@itita.us) or by phone at 202.898.1514 with any questions or concerns.



**ITTA RESPONSE TO NETWORK INTERCONNECTION WHITE PAPER**

- 1) In light of the changes in technology and the voice traffic market, what role should Congress and the FCC play in the oversight of interconnection? Is there a role for states?**

In general, the role of Congress and the FCC on interconnection matters should be limited to oversight and consumer protection. No other segments of our economy are more marketplace-driven than the communications and technology industries and the market therefore can be relied on in most cases to produce reasonable interconnection rules-of-the-road. To protect consumers in the limited circumstances where there is evidence of marketplace failures, however, Congress should instruct the FCC to develop a light-touch regulatory process to mediate and resolve disputes. The states can play a valuable role by assisting the FCC in evaluating whether market failures do exist and regulatory assistance is needed to protect consumers.

- 2) Voice is rapidly becoming an application that transmits a variety of network data platforms. How should intermodal competition factor into interconnection mandates? Does voice still require a separate interconnection regime?**

It is too early to know whether voice and data should be treated separately because the marketplace is still evolving. The FCC is currently overseeing a number of IP transition trials that should lead to a better understanding of how voice and data will be exchanged in an all IP world. The results of the trials hopefully can be used to help guide public policy on this matter.

- 3) How does the evolution of emergency communications beyond the use of traditional voice service impact interconnection mandates?**

Just as our communications networks evolve so must the networks of public safety entities and first responders. Citizens have come to expect that in times of emergency their calls for help will be answered and this expectation must be respected as communications technologies and networks change. Congress must ensure that any Communications Act rewrite treats emergency communications as the highest priority.

- 4) Ensuring rural call completion has always been a challenge because of the traditionally high access charges for terminating calls to high-cost networks. Does IP interconnection alleviate or exacerbate existing rural call completion challenges?**

IP interconnection represents an opportunity to alleviate any remaining rural call completion challenges through development and application of industry standards and best practices. Work is already underway to develop such standards and best practices.

- 5) Should we analyze interconnection policy differently for best-efforts services and managed services where quality-of-service is a desired feature? If so, what should be the differences in policy between these regimes, and how should communications services be categorized?**

ITTA encourages Congress to let the marketplace function freely and avoid adopting rules that would impose different regulatory requirements on “managed” and “best efforts” services in the absence of firm evidence of market failures. Unnecessarily adding additional layers of regulation on different types of services will only lead to higher prices and fewer providers wanting to offer those services.

- 6) Much of the committee’s focus in the #CommActUpdate process has been on technology-neutral solutions. Is a technology-neutral solution to interconnection appropriate and effective to ensure the delivery and exchange of traffic?**

ITTA has long advocated for technology-neutral policies. With respect to interconnection, Congress should ensure that interconnection obligations apply equally to all non-end user entities regardless of the technology used to provide service.

- 7) Wireless and Internet providers have long voluntarily interconnected without regulatory intervention. Is this regime adequate to ensure consumer benefit in an all IP world?**

As stated in response to Question 1, ITTA believes that in an all IP world regulating interconnection is unnecessary unless a market failure exists. In the case of market failures, a process for resolving disputes should be administered by the FCC with input from the states.

**8) Is contract law sufficient to manage interconnection agreements between networks? Is there a less onerous regulatory backstop or regime that could achieve the goals of section 251?**

ITTA believes that when evidence of market failures exist, a light-touch regulatory process, equally applicable to all service providers, administered by the FCC with input from the states, may be an appropriate resolution mechanism. Contract law alone may not be sufficient in all instances to address situations where parties cannot reach agreement.



**AALBORG UNIVERSITET**  
KØBENHAVN

**Center for Communication,  
Media and Information Studies**  
A.C. Meyers Vaenge 15  
2450 Copenhagen SV  
Denmark

Datis Khajeheian

Phone: [REDACTED]

E-mail: [REDACTED]

August 5, 2014

August, 05, 2014

## **Communications Act Update, Interconnection White Paper**

Dear Chairmen Upton and Walden:

Thank you for the opportunity to participate in your request for comment on interconnection. I wish to convey some comments to help put your efforts into perspective. My expertise is the field of new media entrepreneurship. A robust interconnection market is important for users to enjoy Internet media.

As a person who comes from Iran and lives outside the United States, I observe that most Americans don't appreciate how well their interconnection regime works. For over 20 years of the existence of the commercial Internet and the zeta-bytes of data exchanged (and ever increasing), there has been scarcely a problem in this marketplace in the US. Parties resolved their issues through negotiation, and competition law provides a sufficient backstop if negotiation fails.

The regime in the US works because the interconnection marketplace is free and competitive with a diverse value chain: many providers of internet service, peering, transit, content delivery, and so on. Content and application providers not only have many options to deliver data, some even build their own solutions. Apple, Google, and Netflix are three companies with their own content delivery networks. This system works to provide not only the infrastructure but the business models to deliver content and applications.

Many countries in the world, including Iran, do not enjoy the same benefits as Americans. Indeed people in the Middle East frequently suffer for a lack of physical Internet backbones, not to mention market development for interconnection. The undersea internet cables in the Persian Gulf can be damaged by maritime traffic, and complete outages of the internet result. Furthermore a lack of development in the interconnection market in the region also creates a number of bottlenecks. On top of that, government censors routinely block data. It makes the net neutrality debate in the US with its unfounded scaremongering about ISPs look like a farce.

Netflix and Mozillahave suggested that the government impose price controls in the interconnection market. Netflix, a profitable company with 50 million customers worldwide, does not need governmental subsidies or protection. Such interventions would destabilize and distort the current market that works well.

Iranians are creative about finding ways to access American internet content and applications, however suboptimal these workarounds may be. But the point is that the American regime for interconnection continues to fuel massive amounts of content, data, services and applications. There is no problem in the American interconnection market that needs a regulatory fix. The market works out the issues faster, better, and more efficiently than the government.

Sincerely,

Datis Khajeheian



August 8, 2014

Hon. Fred Upton  
Chairman  
Energy and Commerce Committee  
US House of Representatives  
2125 Rayburn House Office Building  
Washington, DC 20515

Hon. Greg Walden  
Chairman  
Communications and Technology Subcommittee  
Energy and Commerce Committee  
US House of Representatives  
2125 Rayburn House Office Building  
Washington, DC 20515

*Re: Communications Act Update; Interconnection*

Dear Representatives Upton and Walden:

Thank you for the opportunity to comment on interconnection as part of your effort to update the Communications Act.

I submit my comments as US citizen, though I am informed from my research and experience as a Ph.D. Fellow in internet economics at the Center for Media, Communications, Information Technologies at Aalborg University in Denmark. I provide some general comments about the state of the IP interconnection market which is competitive and showing no signs of market failure and two academic reviews which should be helpful in the context of your inquiry. The first is a review of the 2011 dismantling of the Danish telecom regulator and redeployment of staff and functions across four other existing agencies. The second is a case study of the process to deregulate the wholesale wireless market in Denmark, a country that recognizes the internet protocol (IP) future is already here and is pragmatic about the role of telecom regulation. The views expressed here are my own.

### **General Comments**

As you concede in your whitepaper for this call for comment, the United States in the midst of a is a period of rapid technological change. At such times it is not ideal to promulgate new regulation. It can be premature and potentially damaging. Instead regulators and lawmakers should observe and collect information about how the market is working. They can also review whether there are instances of problems. Thus this update process should be commended as part of a prudent, rational approach to government.

That being said, now is a good time to remove obsolete regulations. You observe, "The historic, 'natural' monopoly that justified special rules to govern ILECs has faded in the years since 1996; there is inarguably more competition in the voice market today. Yet the rules remain in place as written nearly two decades ago..." As such, retiring old rules is in order.

Congress has been reluctant to regulate interconnection for good reason. The market for IP interconnection has been emerging and evolving. Moreover with continuing diversification of actors and business models, it is competitive. It is remarkable how well the regime has operated for over two decades with so little intervention.

However a market can quickly become uncompetitive when government creates distortions through price controls and other manipulations and distortions of transparency. Not surprisingly, when the FCC entertains the possibility of net neutrality and Title II utility regulation, it signals that it is "open for business" and creates perverse incentives. Firms line up at its door asking for handouts in the form of conditions to regulate rivals and

other rent-seeking practices. Two examples come from the FCC's Notice of Proposed Rulemaking 14-28 on net neutrality. Mozilla egregiously [requests](#) the creation of a "remote delivery service", essentially creating a regulatory category to satisfy its business goals, and Netflix [blatantly calls](#) for favorable treatment through price controls in transit.

Apart from Netflix's complaining, which is largely a public relations stunt, there are no systematic problems in the IP interconnection market in need of fixing. Conflicts, if and when they arise, have been resolved through negotiation by the parties. Furthermore parties can adjudicate with competition law if necessary.

As the last two decades have shown, the market for interconnection has worked without government oversight or intervention. Not only is this demonstrative of the competitive nature of the market, but it shows that actors have incentives to cooperate and find efficient outcomes.

It is also worth mentioning that the academic literature supports the notion of naturally competitive interconnection markets, a type of two-sided market. This is a robust literature of some 360,000 articles covering a variety of industries. Two-sided platforms, first promoted by Rochet & Tirole (2006) have an inherent incentive to price efficiently, meaning that market failures are unlikely to occur. It is not inherent that firms will attempt to act in way that deters consumer welfare, innovation, or efficiency. Platforms want to get both sides of the market "on board" so they tend to maximize—not foreclose—the participation of the parties.

The deregulatory 1996 Telecommunications Act is one of Congress's most important success stories. It helped support the internet we know today, which has touched, if not transformed, so many areas of life. The internet today drives over 5% of our GDP, accounts for America's third largest category of exports (digital goods and services), and employs at least one-tenth of Americans directly. To suggest that we should do something different or that without new regulation all of this will come to a halt is unfounded.

Regarding question 1 from the whitepaper, the role of Congress, the FCC and the states in the voice market, it should be observed that voice is not only a service that is declining relative to other services, but the portion of revenue earned from voice is also declining. It makes little sense to regulate a service that consumer show through their preferences that they no longer want.

Moreover consumers spend far more on housing, fuel, transportation, food, and clothing than they do on communication services. In fact consumers even spend more on discretionary vacations than they do on communications. Simply put, communications services provide Americans some the best values of any services available. The market is competitive and there is a need for less regulation, not more.

As to the role that congress, FCC, and States should take in voice and interconnection, the answer is as little as possible. More specifically, it would be disastrous to give states any more power to regulate voice and interconnection. The granting of greater regulatory authority to states creates strong incentives for regulatory capture, and many states, particularly those under financial pressure, would naturally explore the ability to earn revenue through rent-seeking or provide regulatory favors which they don't today.

The bedrock of America's preeminence of the digital economy is that is a digital single market. Any commercial service created on the internet in the USA can be sold to any user in the USA. Innovators have theoretically 311 million users in the US. When distortions arise, it comes from the state through individual laws and taxation.

As such, it is important for the federal government to assert national authority over the states. The 1993 Omnibus Budget Reconciliation Act,<sup>1</sup> in addition to introducing the legislation that allowed competitive bidding for spectrum, reinforced the role of the federal government to ensure a national telecommunications market. Mobile operators were able to take advantage of one set of systems and processes to serve the entire country, rather than having to roll out state by state. Had the states taken the lead, there likely would have been 50 different, potentially conflicting, sets of regulatory obligations. The United States would probably be in the situation the EU is in today, with a fragmented market, lack of scale, and no major Internet companies among the top 20 in the world. The EU—with 28 nations, 27 official languages, and 11 currencies—is hardly a single market physically, let alone digitally.

As for quality of service, market actors should be allowed to explore the business models that best meet the needs of customers. There is no need for legislation to require provisions for best efforts service. Clearly consumers can benefit not just from best efforts service, but also from better than best efforts service as well as less than best efforts service. There are a range of products and services across industries where consumers choose from different quality levels. Examples include priority shipping and mailing options, coach and business tickets for airlines, buying airline tickets online versus deluxe all-inclusive tours, fast food and slow food restaurants, do it yourself vs. customized home improvement services, consumer products sold with upgraded service packages, and a range of service levels in dozens of industries from personal care to finance.

Most of these offerings face little to no regulation relative to what is proposed for communications. Consumers clearly benefit from prioritization, so it is only logical that they pay for it when they want. In other cases, they may not need it, so there is no reason that they should pay full price. Consumers should have the freedom to choose the service level that matches their needs. Consider mobile communications for the internet of things. A dishwasher might not need priority to communicate with a home energy management system, but a heart monitor signal would likely need assured delivery to a health care provider.

Most notably, consumers can choose between free and premium models of different internet applications (software, music streaming, entertainment). It is illogical why the same flexibility should not be extended to IP communications and interconnection.

There is no significant evidence of market failure necessitating government intervention in the interconnection market.

### **The Rationalization of the Danish telecom regulator**

In October 2011 the new center-left government, upon coming into office in Denmark, dismantled the telecom regulatory authority, the Danish IT & Telecom Agency, and redeployed it into four existing agencies. To be sure, existing telecommunications laws are still in force (including EU rules), regulatory activities continue, and the employees of the former telecom regulator are still employed, albeit in different agencies. However the near overnight transition was a non-event in Danish society. This story is recounted in [The Future of Telecom Regulation – The Case of Denmark](#) by my Aalborg University colleagues Anders Henten and Morten Falch.

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<sup>1</sup> “Omnibus Budget Reconciliation Act of 1993, Title VI,” US Government Printing Office, accessed June 12, 2014, <http://www.gpo.gov/fdsys/pkg/BILLS-103hr2264enr/pdf/BILLS-103hr2264enr.pdf>.

I have compared in broad strokes the regulatory approaches of the US and European Union in the [EU Broadband Challenge](#) and in a forthcoming paper <sup>2</sup> *Innovation, Investment and Competition in Broadband and the Impact on America's Digital Economy*. While many of the 28 member states of the EU may be languishing in broadband deployment, Denmark is an exception. In 2012 next generation access (NGA) coverage of broadband speeds of 25 mbps or higher was available to 73% of Danes, but just 54% of people in the EU. Meanwhile the US had 82% NGA coverage.<sup>3</sup> This clearly shows how the market approaches to broadband taken in the US and Denmark have yielded higher network investment and NGA coverage.

The financial crisis in 2008 marked a shift for Denmark to move away from the telecom regulatory state to a more developmental state. These notions are described in Chalmers Johnson's book on the Japanese post-war miracle where he defines the goals of the developmental state as 'first, to identify and choose the industries to be developed (industrial structure policy); second to identify the best means of rapidly developing the chosen industries' (Johnson, 1982).

Denmark has been aggressive in its developmental strategy while other European countries have remained to varying degrees in increasingly obsolete regulatory paradigms. Instead of interventionist policies to regulate the market for telecommunications, including artificially-induced static competition, the Danish government has shifted to policies that expand broadband coverage and encourage private investment. In this way, telecommunication is not the end in itself, it is a means. The government understands telecommunication is an input for industrial development, not something to be micromanaged as the national regulatory project.

In practice this means that the country has a market-led, technology neutral approach to communications. This approach was vindicated by the Danish Productivity Commission,<sup>4</sup> a group of the nation's top economists and industrial experts who surveyed the country's various infrastructures and made the simple but scintillating conclusion: with a market-led, technology neutrality approach, there is no need for government targets for communications. Indeed firms and their customers know their communications needs better than bureaucrats.

The Danish government eschews communications subsidies for the most part, and has succeeded to foster an environment where the telecom industry invests highly in infrastructure (\$457/household), to a level approaching the US (\$562/household). The EU overall invests only \$244/household. In Denmark private companies invest in telecom infrastructure equivalent to the what the Danish government spends on roads, railways, and hospitals.

Another benefit of the shift away from the regulatory state is the emergence of thinking about how ICT enabled technologies are part of larger policy initiatives for the development of e-health, smart cities, e-learning, intelligent transportation, and so on. To be sure, many pro-regulatory advocates in the US would like to use telecom regulation as the centerpiece of their economic development strategy. But the interventionist focus on regulating telecom misses the forest for the trees. All the attention to regulating telecom leaves little room for the larger ICT market to emerge. When the telecommunications market can flourish, so can all the ICT goods and services on top of it. Contrary to what many pro-regulatory advocates claim, regulating the telecom sector is not helpful to the rest of the economy.

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<sup>2</sup> Michael Horney and Roslyn Layton, *Innovation, Investment and Competition in Broadband and the Impact on America's Digital Economy*, SSRN Scholarly Paper (Mercatus Center at George Mason University, March 29, 2014), <http://papers.ssrn.com/abstract=2417777>.

<sup>3</sup> <https://www.law.upenn.edu/live/files/3352-us-vs-european-broadband-deployment>

<sup>4</sup> Danish Productivity Commission, *Infrastructure Analysis Report 5* (Copenhagen, Denmark, January 2014), <http://produktivitetskommissionen.dk/media/160574/Rapport%20%20-%20Infrastruktur.pdf>.

In any event, my research and that of a number of others<sup>5</sup> provide the evidence that utility style regulation does not induce investment or innovation. The regulatory approach has not worked in Europe, and it will not likely work in US. Moreover Denmark has jettisoned the EU regulatory approach to telecom. It does better than the EU overall and many EU countries on key measures for the digital economy.

In compiling the study on the dismantling of the Danish telecom regulator, my colleagues conducted a number of interviews with key stakeholders to understand the rationale for action. The explanations included the following statements

- Telecommunications and IT are embedded in everything and therefore, there is no need for a specialized agency
- Telecommunications is better placed under a ministry taking care of general business issues
- Telecommunications is no longer a special sector and can be treated the same as other sectors.

In fact the embedding of professionals with telecom expertise into other agencies is considered synergistic. The other regulatory and bureaucratic personnel can benefit from the new insight.

Even without an official telecommunication regulator in place, regulatory functions still take place (spectrum auctions, information gathering, response to consumer inquires etc) and the national and EU communications laws are still in force. But the case of Denmark proves that these things can be done without a defined agency. It's not the agency or regulator that matters or needs to be preserved; it's *the rule of law*.

The story highlights an important difference between Denmark and the US. While telecommunications spending is almost entirely undertaken by the private sector in Denmark, the Danish government provides the greater part of health and education services. This is achieved through high value added taxes added to all consumption. Even telecommunications has a 25% tax.

However Denmark is keen to keep the cost of administration of public services to a minimum. Going forward the goal is to maintain the current service level without increasing budget or employees. The public sector will have to do more with less, and this will entail even more reliance on telecommunications and ICT enabled delivery. This economizing may also be a part of the decision to rationalize the telecom regulator and furthermore to avoid costly regulatory solutions to problems.

A key example is how Denmark has purposely avoided making a law on net neutrality. In response to activists' calls for restraints on telecom providers, Danish telecom operators organized a multi-stakeholder group called the [Net Neutrality Forum](#), inviting the regulator, content/application providers, consumers, and other groups to an ongoing dialogue which is facilitated by the telecom industry association. In fact all of the Nordic countries have avoided making net neutrality laws and instead rely on multi-stakeholder governance to manage the issue. This model has worked for some five years in the region, and telecom regulators in the region do not have net neutrality violations on record.

By limiting the instances where problems have to be solved with laws, Denmark reduces the regulatory burden and avoids litigation which can consume limited public resources and take years of adjudication to resolve.

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<sup>5</sup> See European scholars on this topic include Erik Bohlin, Chatchai Kongaut, Jan Krämer, Julienne Liang, Laure Jauniaux, François Jeanjean, Silvia Elaluf Calderwood, Fernando Herrera Gonzalez, Alain Maton, and Edmond Baranes. American scholars on this topic include Jeffrey Eisenach, Richard Bennett, and Christopher Yoo.

Furthermore without a telecom regulator to lobby, there is considerably less partisan political action on communications issues. This greatly reduces the risk of regulatory capture and the ability for any one party to game the system. Indeed the way that the many media and special interest groups have abused the FCC's net neutrality comment box like a garbage can with hundreds of thousands of profane, obscene, and impertinent comments would be frowned upon in Denmark.

### **Case Study: Deregulation of the wholesale wireless market in Denmark<sup>6</sup>**

Denmark was one of the first countries to regulate the wholesale wireless market as a means to stimulate the number of wireless service providers. The Danish IT & Telecom Agency (telecom regulator) regulated buying access to mobile networks by subscriptions (access), buying traffic minutes, and call origination, the network service that carries a call from the calling subscriber's network access point to the point of interconnection. In addition to regulation on its wholesale activities, national incumbent TDC was deemed to have significant market power (SMP) with some 50% of the wireless retail market and faced a set of special obligations. The second largest operator Telenor (formerly Sonofon) was also regulated on wholesale. However by 2006 the telecom regulator found that the market competitive and decided to deregulate the market. Specifically it concluded that

1. The presence of three wireless network operators and a fledging fourth operator creates a competitive market.
2. Entrants have access to multiple wholesale providers.
3. There are a range of substitute goods in the wholesale market.
4. Wholesale prices have decreased, and there is no evidence that customers have been denied access to networks.
5. The number of wholesale customers is increasing.
6. TDC was released of a number of ex ante sector specific obligations because it did not abuse its SMP of 50% share of the retail market.
7. Limited spectrum can be a barrier to the wholesale market, but this will be resolved in future as more licenses come on the market. That is to say that regulation on the wholesale market is not needed to compensate for the lack of optimal spectrum allocation.

The telecom regulator made this decision under the European Union Telecoms Directive<sup>7</sup> framework, specifically for the rules pertaining to Market 15 which cover access to mobile networks and traffic minutes, and in consultation with the Danish Competition Authority.

The telecom regulator's announcement to deregulate the wholesale market in 2006 was met with opposition by the fourth operator "3" (Hi3G owned by Hutchinson Whampoa) and brought to court. The Court ruled in favor of the telecom regulator. Thereafter the telecom regulator and competition authority updated their analysis and confirmed their earlier finding of a competitive market. The EU telecom authorities also concurred with the decision. The regulation of the wholesale market and a set of sector specific obligations of the incumbent TDC were vacated in 2009.

The deregulation means that the telecom authority cannot compel any network operator to engage in the wholesale market, nor does it regulate access or prices. Deputy Director of the National IT and Telecom Agency

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<sup>6</sup> This case study provides a synopsis of "Market Decision on TDC A/S for wholesale mobile access and call origination (Market 15)" by the Danish IT & Telecom Agency on March 30, 2009.

<sup>7</sup> <http://old.eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0021:EN:HTML>

Finn Petersen remarked, "Actually, we are obliged to remove the regulation when the competitive situation demands it. There is no need to regulate something that market forces can take care of, and our view is that it's not going to matter to mobile prices."<sup>8</sup> There have been no complaints to the regulator about the wholesale market since the deregulation.

Complaining of unfair competition is a trope frequently employed by the third or fourth operator to win in regulatory sympathy what it lacks in business acumen. In the Danish case the 4<sup>th</sup> (and youngest) operator which initially appealed the deregulation is today the stronger for the lack of it. In the short space of five years, "3" continued with its network build out and increased its capacity. It has the most supply of any operator in Denmark, so it offers the lowest prices to both its retail and wholesale customers. In fact "3" is in an increasing position to acquire the #2 operator Telenor.

If the telecom regulator wants to help the 4<sup>th</sup> operator, it should not be by forcing the bigger operators with larger networks to be more active on the wholesale market. In fact this is a recipe to demolish fledging players. Indeed this very unintended outcome came about in Denmark where the highly regulated incumbent TDC and Telenor used their mandated wholesale strategies to squeeze Orange, then the 4<sup>th</sup> player, out of the market. Subscribers could choose low-priced service from a reseller rather than buy from the fourth operator that was trying to build a network. Orange sold its business and exited the market in 2004.

Some believe that stimulating the wholesale market for service providers is a way to lower prices. This is a misunderstanding of how wholesale markets work. Prices are a function of supply and demand. As the Danish case illustrates, those operators that have excess capacity (supply) in their networks can offer a lower price than their competitors. Competition is created through technology development (new networks and innovation), not the number of providers.

Some countries have pursued aggressive wholesale market regulation to stimulate service-based competition. However it is not long before these service based competitors are acquired by network operators. Under this strategy, entrants have no incentive to invest in their own networks. They follow the economic incentives simply to lease infrastructure which is offered at an artificially low rate. Furthermore should a network operator offer an attractive package to acquire the service provider, there is further incentive to exit.

Denmark is considered by some to the birthplace of the MNVO market. The service provider Telmore launched in 2000 was purchased by TDC three years later. All of the leading service providers and MVNOs in Denmark have been purchased by the network operators. Now the operators run these companies brands as part of their discount strategies. In some cases, the service providers' brand names are removed and replaced by the network operator's name (e.g. TDC purchased service provider Onfone<sup>9</sup> and combined it with its cable offering YouSee.).

Even with the deregulation and a robust wholesale market with many service providers, the Danish national incumbent still has significant market power and some 50% of the retail market. If the regulator's objective is to reduce the market power of incumbent, then wholesale regulation does not appear to be an effective tool. The market is still competitive in spite of the SMP of the incumbent; service providers have choice for wholesale agreements; and consumers have choice for mobile services.

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<sup>8</sup> <http://m.business.dk/?article=2584148-IT--og-telestyrelse-dropper-regulering>

<sup>9</sup> <https://www.yousee.dk/mobil>

If incumbent TDC still has SMP, it is because of a superior management and operations, not because of any anti-competitive behavior. Indeed the company relentless about cost-cutting and is known as a highly demanding employer and shrewd negotiator with suppliers.

In the bigger picture, consumers lose by not getting access to next generation networks though facilities based competition if the regulator relies on a service-based competition strategy. In essence regulation becomes a self-defeating prophesy. The market is never competitive enough, and perpetual regulation becomes the fail-accomplish.

The Danish regulator had the courage to deregulate the market, and it strengthened the development of the fourth player. However competition means that by definition that some players win and other lose. Competition should not be about creating favorable conditions to favor entrants at the expense of established players that are running efficient businesses. Weaker players need to exit or be absorbed. The Danish market will likely consolidate to three players with the acquisition of Telenor, the operator with the lowest margin in Denmark. It could be purchased by Telia or 3 and not be opposed by competition authorities.

There is an ongoing discussion about whether a market requires a certain number of network operators to be competitive. Telecom consultancy Informa supports the three operator per market thesis<sup>10</sup> as it notes that many countries around the world are trending toward this development through consolidation. In fact the market could consolidate to two networks and still be competitive. It is not the number of providers that makes a market competitive, but the level of technology.

As has been shown by the deregulatory 1996 Telecommunications Act, the dismantling of the Danish telecom regulator, and the deregulation of wholesale market in Denmark, the path to growth and economic development is not to add new regulations. The Danish government and regulator had the courage to take decisive action to deregulate their telecom sector. I hope this can serve as an inspiration to the US.

I encourage the committee and Congress to retire the statues of the Communications Act in favor of a simple regime that applies equally to all networks, providers, business models, applications, and technologies. A standard framework is the best for industry, consumers, and innovation.

Thank you for the opportunity to comment.



Roslyn Layton  
Ph.D. Fellow, Internet Economics  
Center for Communication, Media and Information Technologies  
Aalborg University  
Frederikskaj 12, 3rd Floor  
Copenhagen, Denmark 2450

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<sup>10</sup> <http://blogs.informatandm.com/19202/press-release-informa-telecoms-medias-top-predictions-for-2014/>

Hon. Fred Upton  
Chairman  
Energy and Commerce Committee  
US House of Representatives  
2125 Rayburn House Office Building  
Washington, DC 20515

Hon. Greg Walden  
Chairman  
Communications and Technology Subcommittee  
Energy and Commerce Committee  
US House of Representatives  
2125 Rayburn House Office Building  
Washington, DC 20515

Internet interconnectivity and balancing the service demand in Europe

By Silvia Elaluf-Calderwood PhD

The current structure and use of the Internet is significantly different from its form as recently as ten years ago and this holds major implications for all of its stakeholders. The relationships among those who own the telecommunications networks, those who offer digital goods and services and those who look after the public interest are necessarily altered. Since its inception, the internet has experienced numerous major changes in structure and usage and we can expect that this current transformation will itself lead to further reconfiguring of technologies and uses in only a few years. In the meantime, it is necessary to understand what those changes are and how they affect growth and competition.

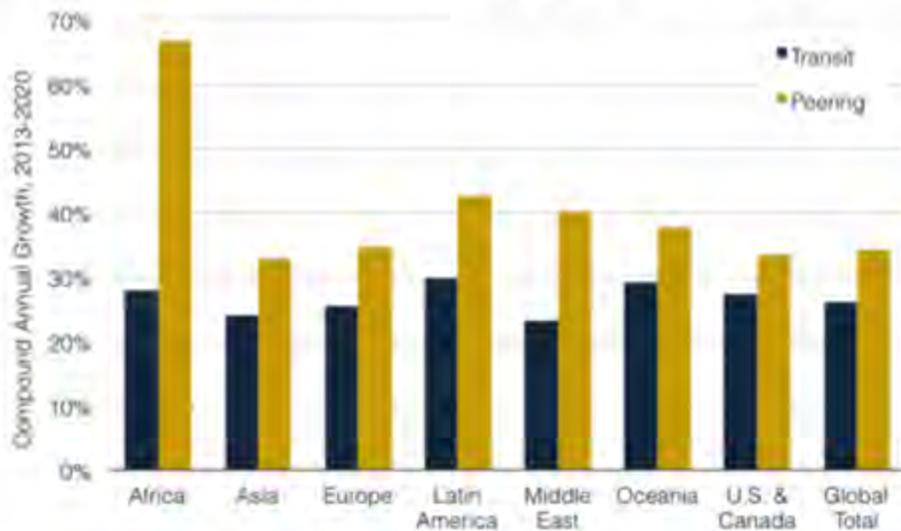
Trying to describe the new industry context of telecommunication network operators that holds implications for pricing bargaining power and control over some key elements of network management is quite challenging. The focus on interconnectivity is a distraction from the increase use of Internet exchanges by Internet companies such as Google, Netflix, Amazon, etc. as an alternative route to transfer traffic for the new patterns on demands.

In Europe, and based in a study I completed in 2013 for ETNO, my team was able to estimate that European internet exchanges (IXs) carry around one third of European digital traffic and increasingly constitute nodal institutions of the internet. When we focused our analysis on the traffic they carry, what they reveal about the dynamics of the internet, and how they structure relations among the three major categories of traffic overall: traffic that passes through exchanges, managed IP (private traffic and transit) and intra-network traffic. Furthermore, different institutions and economic principles govern each of these. And we were able to show prevailing trends and the impacts of changes in traffic that explain some critical aspects of change in network management. It is my understanding that a similar situation is happening in USA and other parts of the world such as Africa and Asia with new backbone Internet routing been developed and in place.

Of total estimated Internet traffic in Europe, about 30% is routed through the Internet exchanges while much of the rest of it remains obscure and incommensurate, with diversified data sources presenting an asymmetric relationship between data and analytical approaches. Given the high proportion of Internet traffic that passes through European Internet exchanges, it is not surprising that public interests would be expressed in the form of interventions to resolve disputes when market mechanisms cannot. Central to the smooth operation of this, as with other markets, is the availability of reliable information.

Estimated figures from TeleGeography (2014) confirm this trend. See figure 1.

## Transit vs. Peering Volume Growth by Region, 2013-2020



Source: TeleGeography

A new trend is arising: increasingly Internet services providers [ISPs] connect to an Internet exchange rather than buying transit from tier 1 providers. In Europe three exchanges dominate: DE-CIX, AMS-IX, and LINX. Tier 1 providers (often former incumbents) could be drawn into a race to the bottom for transit as the price they offer ISPs will depend on the sum of remote transit prices offered by competing backbone providers and the decreasing cost of remote peering in large European internet exchanges. In the short to medium term the strategic options for network operators appear limited. Four potential directions of movement can describe it: “status-quo plus”, lateral transformation, accentuated move to services, and integration.

To shed light on the relationship between traffic on the Internet and the business activities those are related to it. This is one way of addressing a familiar set of issues about pricing, access, “freedoms”, subsidies and policies. However, a shortcoming of this approach is the perspective taken that most participants (e.g. telecom incumbents) find uncomfortable because it exposes various forms of economic exploitation, free-riding, and cross-subsidizing that may be disturbing, but would be more damaging to ignore.

At industry level, including among regulators, incumbents, and other stakeholders, there is an incomplete understanding of strategic options and this, along with inadequate analysis, carries the risk of policy making that cannot be sufficiently evidence-based. Furthermore, the resulting information asymmetry provides too many arbitrage opportunities and too much secretive activity to allow us to regard the network economy as a semi-transparent marketplace.

A committed discussion on how these trends affect the overall governance of the Internet, and especially that of the Internet exchanges, affects its structure and use. The scale, level of competition, and revenue-generating powers differ greatly and this report shows how alternative strategies could

strike a balance among stakeholders. Therefore, the value of such analysis is to clarify what is obscure in the current debate on pricing and Internet structure within the European and worldwide context.

Hope this feedback if of interest.

Best regardsm

Dr. Silvia Elaluf-Calderwood  
Research Fellow  
Department of Management  
London School of Economics and Political Science (LSE)

mediathand ApS  
Frederikskaj 12  
DK-2450 Copenhagen SV  
Denmark  
www.mediathand.com



August 7, 2014

Hon. Fred Upton  
Chairman  
Energy and Commerce Committee  
US House of Representatives  
2125 Rayburn House Office Building  
Washington, DC 20515

Hon. Greg Walden  
Chairman  
Communications and Technology Subcommittee  
Energy and Commerce Committee  
US House of Representatives  
2125 Rayburn House Office Building  
Washington, DC 20515

Re: Communications Act Update

Dear Chairmen Upton and Walden:

Thank you for the opportunity to participate in your request for comment on the market for interconnection, the role that Congress and the FCC should play, and your interest to hear the perspectives of various stakeholders.

mediathand participates in the exciting and evolving space of video compression and content delivery. We offer solutions for high quality visual streaming that work for all major mobile platforms and operating systems and for both live and on demand streaming content. Compared to established encoding solutions, mediathand's data compression technology generally conserves 30-50% of the bandwidth needed to stream video live or on-demand delivering same AV quality. This means less data to stream and that content providers can lower their costs and improve user experience.

Launched in 2006, mediathand, currently based in Copenhagen, Denmark is the spin-off of an advanced technology partnership between Aalborg University, Motorola, Nokia, Danish Broadcasting Corporation, and Telenor. Our solutions have been deployed in Denmark by the company WatzMeNow.dk offering an over the top TV service with national and international TV channels and on mobile and flat screens via an HDMI (high definition multimedia interface) stick in we developed. Our solutions are available in the US as well.

There is no doubt that the majority and increasing part of internet traffic today is video. Users expect not only video on demand, but also live video, and they expect it on a range of devices. But yet, users who stream content may experience low visual streaming quality, buffering, stalling, and stops. In addition content providers may experience increased storage and delivery costs as their video inventories grow and as content becomes richer.

These situations are challenges and opportunities for networks, engineers, entrepreneurs, and innovators. Not only can the user experience with video be improved, but also content providers can compete on the strategies and technologies they use to reach their audiences.

The prevailing solutions for video streaming are largely defined by the operating systems of devices. Whether Android, Apple iOS, PC or Mac, each operating system has its own requirements and specifications. Thus content providers need to deploy a range of streaming solutions depending on the devices of the users they want to reach. This can make for a fragmented content delivery experience; the user would like to consume a piece of content but it may be optimized for one operating system and not another.

In addition to a having to choose form a variety of video delivery solutions of varying quality and specificity, another challenge is that streaming is a bandwidth-heavy activity. According to Sandvine,<sup>1</sup> just two video services, Netflix and YouTube, consume nearly 50% of downstream network capacity at any time networks in North America. Moreover real time entertainment, (YouTube, Netflix, MPEG, Amazon Video, Hulu etc) accounts for two-thirds of downstream fixed network traffic, and an impressive 40% on mobile networks. It's not uncommon for just 15% of a network's users, the heaviest streamers, to take up more than half of all network capacity. At for 17.61% , YouTube is the single largest source of all downstream mobile traffic in North America. Netflix still clocks in with an impressive 5%.

While the amount of video content is exploding, the majority of it is poorly encoded. This raises the question of whether scarce resources should be deployed to build new networks to increase capacity. Yet the quality of the video experience is largely driven by the format of the video's encoding and the method of its delivery, two factors which have little to do with the network type or its capacity.

Thus a more economical solution is to a better job to encode video content so that it is delivered more efficiently. This way existing networks can deliver more data. mediathand improves user experience by deploying intelligent engineering solutions that make more efficient use of data and bandwidth. While investing in next generation networks is important, ensuring that an existing network be continually optimized to accommodate more data is equally so.

Another reason to pursue network efficiency and video encoding is that it lowers energy consumption. The world's current and growing internet consumption also requires a significant input of energy to power mobile base stations, operate and cool server farms, and to deliver the growing amount of data in an old-fashioned way. Video encoding is an important part of the overall picture to make the internet more "green".

Some suggest that networks should be built indiscriminately just to accommodate growing traffic, with little regard for the engineering requirements for content delivery let alone the quality of content. Some even

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<sup>1</sup> <https://www.sandvine.com/downloads/general/global-internet-phenomena/2014/1h-2014-global-internet-phenomena-report.pdf>



justify this claim by saying it supports the growth of content. Yet essential engineering development and innovation may be complicated by initiatives such as net neutrality and broadband utility regulation. These policies favor brute force solutions of regulating bandwidth but create no incentives for video providers to improve the encoding of content, let alone the quality.

Live and on-demand encoding solutions provided by mediathand are a valuable tool for content providers to improve and enhance the user streaming experience, to lower costs, and to improve content delivery. In addition, deploying such a tool makes content providers cognizant of the quality of their content and may encourage them to refine it, whether through improved editing or curating.

There is no doubt that much of live streaming facilitates entertainment and sports. However the Committee is also interested in improving connectivity and content delivery for rural areas. Solution such as mediathand also offers a compelling opportunity to lessen the digital divide. mediathand is being tested to deliver a full entertainment package with live TV, catch-up TV and video on demand service in remote, harsh and rural environments with limited network capacity, limited bandwidth, and older generation networks. Indeed such solutions can provide dozens of live streaming channels on TVs and mobile devices and new interactive IP based services as mobile learning and education.

Thus my suggestion when considering the role that Congress and the FCC should play is to embrace a variety of solutions in the marketplace. Also it should encourage the role of engineering and technology provided by innovative companies and startup to solve problems. The relative lack of disputes in interconnection in the past two decades are a testament to a competitive marketplace that works well.

Should Congress attempt to regulate solutions through price controls, utility regulation and other interventions, it could reduce if not eliminate incentives for engineers and entrepreneurs to create technology solutions. Ultimately the experience of users is improved by innovation, not regulation.

Sincerely,

Gert Skov Peterson  
CEO & Executive Chairman  
mediathand

MICROSOFT'S RESPONSE TO THE ENERGY AND COMMERCE COMMITTEE  
WHITE PAPER CONCERNING NETWORK INTERCONNECTION

August 8, 2014

In any distribution system comprised of multiple physical networks, interconnection of those physical networks is necessary to ensure that all users of the system are able to interact with all other users of the system. For communications systems in particular, as long as there remain multiple communications networks, it will be necessary to interconnect all of those networks to ensure that communications signals can traverse each network and be accessible to each user of the system. This is true regardless of the communications protocols used in a communications system. Thus, interconnection is just as critical for the proper functioning of the Internet as it is for an all-voice communications system such as the Public Switched Telephone Network ("PSTN").

Just as a Cincinnati Bell Telephone Company landline voice services customer could not talk to a customer of Verizon Wireless or Birch Communications in Cincinnati or an AT&T landline customer in nearby Dayton or a Big Bend Telephone Company landline customer across the country without interconnection, a Comcast Xfinity broadband Internet customer cannot communicate and interact with MSN or Bing or Congress.gov without interconnection. A communications system intended to allow all users of the system to communicate with each other simply will not function unless all of the underlying networks that make up the system are interconnected either directly or indirectly and are able to exchange communications traffic across those networks.

The critical importance of interconnection among physical communications networks points to a continuing need for a strong national interconnection policy, including appropriate legislation and regulation of networks and network operators where market forces are insufficient to achieve interconnection policy goals. As the Committee notes, because of its importance to our national communications system, interconnection has long been at the heart of communications policy. It was first codified in the Communications Act in 1934 with the provision requiring "physical connections" between communications common carriers. It was reinforced in the Telecommunications Act of 1996 with the requirement that all telecommunications carriers interconnect directly or indirectly with all other telecommunications carriers. As long as network services have been an integral component of our nation's economy, national policy has had a strong focus on ensuring the interconnection of those networks.

Although our communications networks have changed dramatically in the last century, the importance of those networks has only grown, and thus there remains a need for strong national interconnection policies, particularly with respect to last mile networks and network operators that have control over access to their customers. There is little doubt as to the

critical role the Internet plays in our national and global economy and our daily lives. Beyond voice communications, nearly every way we interact with the world at large today, from accessing health care to watching movies to job hunting, occurs over broadband networks, all of which are based on the same IP protocol and architecture. Interconnection is the “glue” that allows the Internet to cohere as a “network of networks.” Without interconnection, including both paid transit and settlement-free peering, the customers of one IP network would not be able to interact with the customers of another, and the Internet as we know it would not exist. Crafting national policy to ensure there is interconnection among networks will be just as important as it was to ensure the interconnection of voice networks over the course of the last century.

Such policy should do more than simply transpose old regulations and laws using IP-based language and concepts. Interconnection policy must be grounded in the economics of 21<sup>st</sup> century Internet-based communications networks, which no longer feature the monopoly control of the communications system that prevailed across the nation in 1934 and in local access markets in 1996. Unlike some other communications regulatory issues, strong interconnection policy is equally, if not more, critical when there are multiple networks operators rather than a single operator. Yet, not every IP network has the same economic power to control the terms of interconnection by virtue of its position in the network of networks. These attributes must guide interconnection policy going forward.

In particular, interconnection policy must reflect that while there may often be multiple pathways for traffic to get to any particular network, there is only one way to reach a particular customer once he has contracted for service with a last mile network. National interconnection policy must reflect these marketplace realities and focus on protecting against potential failures to interconnect with any such last mile broadband networks that have unique control over access to its customers, while allowing market forces to ensure interconnection with all other networks. These principles are the tenets that must guide our national interconnection policy framework in the 21<sup>st</sup> century and should be implemented through appropriate legal and regulatory backstops.

At the same time, it is critical that interconnection policy focus specifically on the connections between and exchange of traffic among physical networks, and not the particular content or services distributed over those networks. The goals of a legal framework for interconnection should be to promote efficient connection between and among those networks, regardless of the particular network transmission medium, *i.e.*, wireline or wireless, copper or fiber; and to enable frictionless exchange of traffic across those networks, regardless of the particular content, application, or service being exchanged. It also should be clear, however, that last-mile broadband network operators should not be permitted to leverage their control over or role in interconnection to their networks to circumvent open Internet policies.

The decline of circuit switched voice networks and the PSTN does not imply that there is no longer any need for strong national interconnection policy. Neither would it be appropriate,

however, for Congress to simply transfer last century's interconnection regime to a 21<sup>st</sup> century broadband interconnection regime. Our national interconnection policy framework must evolve along with the IP transition, based on where the economic bottlenecks actually are in a multi-network system, rather than re-using historical proxies. Indeed, it will be critical to implement an interconnection policy that will promote the availability of robust broadband networks that will provide consumers all that IP-based technologies have to offer.

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Microsoft thanks the Committee for the opportunity to provide this response to the Committee's White Paper, and it looks forward to ongoing discussion concerning the modernization of the Communications Act. For questions or additional information, please contact Paula Boyd, Director, Government and Regulatory Affairs at [REDACTED] or John Sampson, Director Government Affairs at [REDACTED]